

Prime Time for Corn Borer Scouting

Moth captures in black light traps (see tables, page 105) have jumped dramatically since last week. Moths are commonly observed in roadside ditches (and other grassy areas) and decorate car and pickup grills throughout southern Minnesota. Captures have reached incredible levels at many trap locations. For comparative purposes, a typical first generation flight during an outbreak peaks at about 100 moths per night. Glance at captures from Faribault, Randolph, Blue Earth, Jeffers, Lamberton South to gain an impression of why I'm concerned about first generation infestations this summer. Moth catches farther north (Morris, Fergus Falls) have not increased dramatically yet.

Field infestations are highly variable, depending on location and corn height. We're still on the early side for larval infestations. Preliminary reports by crop consultants, agronomists, and applicators indicate fields knee-high and higher have from 20 to 80% of the plants infested. Larvae are primarily first stage with surviving numbers ranging from 0 to 8 per infested plant. This kind of variability is typical soon after hatch. Infestations will worsen over the weekend as egg laying and hatch continue.

I'm already receiving reports from farmers anxious to treat fields and some treatments taking place. **IT'S TOO EARLY TO TREAT THIS WEEK!!!** Next week looks like a prime time for insecticide decisions in southern Minnesota for two reasons:

- ✓ Egg laying and hatch are still underway. Additional larvae will be infesting plants over the next week or more. Delaying insecticide application allows more larvae to congregate in the whorl where insecticide application

can reach them, plus it extends any residual activity to later hatching larvae.

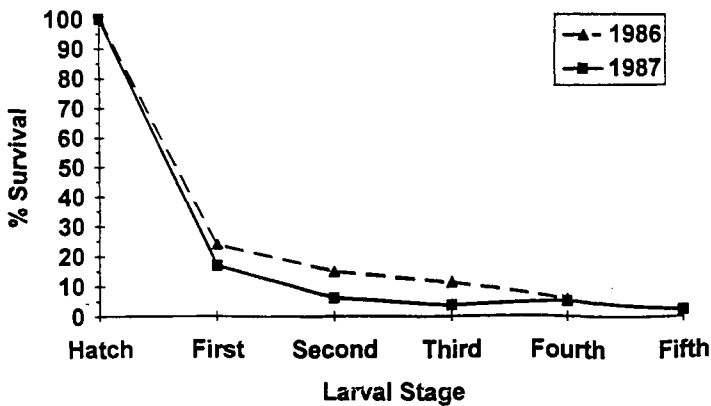
- ✓ Borer numbers drop quickly after hatch. The longer you wait, the more accurately you can estimate the number of borers likely to tunnel (see figure, page 102). High numbers of first-stage larvae from newly hatched egg masses can easily skew treatment decisions when few are likely to tunnel. (See graph on page 102, *Survival of First-Generation European Corn Borer.*)

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Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

Survival of First-Generation European Corn Borer



The trick is to not wait too long. The window for effective treatment ends as larvae tunnel. The time from egg hatch to third instar, when tunneling behavior begins, lasts about 220 degree days units, base 50°F. As you can see below, most larvae tunnel during the fourth stage.

Stage	Tunneling Borers
Third	10%
Fourth	58%
Fifth	96%

If you're wondering what stages of larvae you have, use the chart at right.

With temperatures near 90°F and lows near 70°F, about 30 degree day units accumulate each day, so the applica-

European Corn Borer

Ostrinia nubilalis (Hübner)

Larval Instar	Body Length Range (mm)	Prothoracic Shield Width (mm)
1	1-2	0.3
2	3-4	0.4
3	5-10	0.7
4	12-16	1.0
5	19-25	1.7

Prothoracic Shield

Note: This larva is shown larger than life size.
IOWA STATE UNIVERSITY

tion window might only last about 7 days. The optimal time for treating a mixed-age infestation is probably when the majority of larvae are second stage and the early hatching larvae are third or early fourth stage. Watch the situation closely. Hot weather can rapidly accelerate borer development while windy weather and heavy applicator demand can delay application. Converse with applicator and ag chem dealers ahead of time on product availability and application waiting lists. Let's not continue the long-standing tradition of tardy insecticide application for European corn borer.

Ken Ostlie
Extension Entomologist

Tissue Analysis as a Nutrient Management Tool for Potatoes

Tissue analysis is an accepted technique to monitor the nutritional status of the crop, diagnose nutrient disorders, and fine-tune a fertilizer program. It should be recognized that tissue analysis is not a substitute for a routine soil test taken before planting, but when used in conjunction with soil tests, tissue analysis can provide additional information related to crop nutrition and the efficiency of fertilizer use.

The principle behind tissue analysis is that maximum yields are associated with an optimum range of nutrients in the tissue sampled. If the level of a nutrient falls outside this range (particularly at the low end), then corrective measures should be taken. Optimum nutrient ranges are based on samples collected at a particular growth stage and tissue maturity. In general, nutrient concentrations change with age of the potato plant. For nitrogen, phosphorus, potassium, copper, zinc, and sulfur, highest concentrations occur during the vegetative growth stages during tuber initiation/set and then decline during tuber bulking.

Sample Collection and Handling: Nutrient sufficiency ranges for potatoes are based on collecting the most recently mature leaf, which corresponds to the fourth leaf from the top of the plant. Samples collected from younger or older leaves may lead to erroneous interpretations. Either the whole leaf (leaflets plus petioles) or the petiole alone can be sampled. Either tissue can be sampled; however, when interpreting sufficiency ranges, it is important to note that the concentrations of some elements (especially potassium) can be drastically different in petioles compared to whole leaves (Table 1). In addition, nitrate-nitrogen is determined in petioles, while total nitrogen is determined in whole leaves.

Generally, the petiole is more sensitive for determining the nitrogen status of the crop and can be used to predict whether additional nitrogen fertilizer is needed. For petiole analysis, the leaflets should be stripped off and discarded immediately after sampling. Approximately 40 to 50 peti-

oles or 20 to 30 whole leaves should be sampled from an area representative of the field. Areas with different cropping history, soil type, or fertilizer application should be sampled separately.

Samples should be dried as rapidly as possible at 150 F or sent immediately to a plant analysis laboratory. Samples should be sent to the laboratory in loose fitting, clean paper or cloth bags. Do not use plastic bags unless the samples have been previously dried or are transported to the laboratory within a few hours.

Interpretation: Sufficiency ranges for nutrients in petioles or leaflets plus petioles during the tuber bulking stage are presented in Table 1. These ranges are based on Russet Burbank and may vary for different cultivars. If corrective measures are not taken, nutrient deficiency and yield loss may occur when concentrations fall below the suggested sufficiency range. Values within the suggested range indicate that concentrations are adequate for vine and tuber growth at the time of sampling, but nutritional problems may still occur at a later stage of growth. Further sampling may be necessary to detect potential problems. Values above the suggested range indicate that application of these nutrients can be eliminated or reduced. High concentrations of

some nutrients may be due to a recent application of a pesticide that contains nutrients (eg. copper or zinc). In most cases these nutrients are on the leaf surface and not an indication of toxicity.

Table 1. Suggested nutrient concentration sufficiency ranges in recently mature leaves during the tuber bulking growth stage.

Element	Petiole	Whole leaf (leaflets plus petiole)
Nitrate-N, %	1.1 - 1.5	--
Nitrogen, %	--	3.5 - 4.5
Phosphorus, %	0.22 - 0.4	0.25 - 0.50
Potassium, %	3.5 - 6.0	8.0 - 10.0
Calcium, %	0.6 - 1.0	0.5 - 0.9
Magnesium, %	0.3 - 0.6	0.25 - 0.5
Sulfur, %	0.2 - 0.4	0.2 - 0.4
Zinc, ppm	20 - 40	20 - 40
Boron, ppm	20 - 40	20 - 40
Manganese, ppm	30 - 300	30 - 300
Iron, ppm	50 - 200	30 - 150
Copper, ppm	4 - 20	5 - 20

*Carl Rosen
Extension Soil Scientist-Horticultural Crops*

Plant Analysis at a Management Tool

Each year we answer several questions about plant analysis and the use of this management tool in an overall fertilizer program. In general, plant analysis can be used for two major purposes. Perhaps the most obvious use is in trouble-shooting situations. There are often situations when the cause of abnormal crop development is not obvious. Analysis of plant samples may provide some answers in these situations.

Three samples are needed if plant analysis is to be used in trouble-shooting. One sample should consist of plants taken from the stunted area. Normal plants should be used for the second sample. For the third sample, take plants that show only a slight amount of stunting or slight discoloration.

If the problem is caused by a shortage of some nutrient, careful study of the results of the analysis of all three samples will usually provide the answer to the problem.

Plant analysis can also be used as a management tool by growers who wish to monitor the effectiveness of their fertilizer program. If used for this purpose, plant analysis has only limited value unless a regular soil testing program is followed. Results of the analysis of the crop sampled can be compared to "standard" or "critical" values. If plant analysis is to be used in this way, specific plant parts or plants at a specific stage of growth must be sampled. These are summarized in the following table.

Crop	Stage of Growth	Plant Part To Sample	Number of Leaves or Plants Needed
Corn	Seedling Stage (less than 12 in. tall)	Whole Plant	10
	Tasseling to Silk Initiation*	Leaf Opposite and Below the Ear	10
Soybeans	Vegetative Stage (less than 12 in.)	Whole Plant	10
	Initial Flowering to Pod Set*	Most Recently Matured Trifoliate (exclude petiole)	50-75
Small Grains	Boot Stage	Whole Plant	20-30
Alfalfa	1/10 Bloom	Top 6 in. of Plant	10-20

* Preferred stage to sample

"Critical" values for the various crops have been established. They are summarized in Fact Sheet FS-3176 which is available from the local Extension office.

*George Rehm
Extension Soil Scientist*

What is a Balanced Fertilizer Program?

The word, "balance" means different things to different people. There are some who believe that a "balanced" fertilizer program is one where the amount of any nutrient removed by the crop is replaced in the fertilizer program for the following year. This approach to fertilizer application does not make use of a soil testing program. This concept of a balanced fertilizer program can also be very expensive.

There are also some who believe that there should be an ideal balance among calcium (Ca), potassium (K) and Magnesium (Mg) in soils. For example, it was once thought that crop yields would be maximized if 65% of the negatively charged sites in soils would be occupied by Ca and 10-15% of these sites occupied by Mg. More recent research, however, has shown that yields are not dependent on the relationship of these three nutrients to one another.

For example, Wisconsin researchers varied the Ca to Mg ratio in soils from about 2.25:1 to 8.5:1 and measured the effect on alfalfa yield (see table). It is obvious that the Ca:Mg ratio had no impact on alfalfa production.

The Ca:Mg ratio in Minnesota soils varies from 1:1 to 8:1. Yet, this should not be a cause for concern. The fact that the Ca:Mg ratio can vary over a wide range and not affect crop production should eliminate most of the controversy regarding calcitic and dolomitic limestone. Decisions on the source of lime to use should be used primarily on cost rather than what effect the material may have on the Ca:Mg ratio in the soil.

If we summarize all of the recent research with Ca, Mg, and K, we find that Ca:Mg, Mg:K, and CA:K ratios are not

Effect of various Ca:Mg ratios on alfalfa yield.

Theresa Silt Loam		Plainfield Loamy Sand	
Ca:Mg Ratio	Yield	Ca:Mg Ratio	Yield
	ton/acre		ton/acre
2.28	3.3	2.64	4.1
3.61	3.1	3.33	4.1
4.09	3.6	4.00	4.4
5.25	3.5	4.81	4.1
8.44	3.2	8.13	4.1
	NS		NS

important for crop production. There is no "ideal" balance among these three nutrients in soils. It is important, however, that these nutrients be present in soils in amounts that are adequate for crop needs in the same way that N and P are needed. If soil test K with Mg levels are low, these nutrients will be needed in a fertilizer program. The ratio of one to the other or the "balance" between the two is not important.

Simply put, a balanced fertilizer program is one which provides for adequate, but not excessive, supplies of all plant nutrients in the soil system. A large percentage of our soils in Minnesota are capable of supplying adequate amounts of many of the essential nutrients. When soil supplies of nutrients are low (as indicated by soil test), adequate amounts must be supplied in the fertilizer program. *Soil testing*, then, is the key to arriving at a balanced fertilizer program.

George Rehm
Extension Soil Scientist

CLINIC REPORTS—PLANT DISEASE CLINIC

SAMPLES SUBMITTED TO THE PLANT DISEASE CLINIC IN JUNE INCLUDED:

alfalfa—*Phoma* sp (spring black stem), *Leptosphaerulina* sp leaf spot
 corn—*Longidorus* sp (needle nematode), *Pratylenchus* sp (lesion nematode)
 wheat—*Bipolaris* sp root rot
 oats—barley yellow dwarf virus (BYDV)
 navy beans—*Rhizoctonia* sp root rot
 sandcherry—*Coccomyces* sp (shot hole) leaf spot
 turf—*Drechslera* sp, *Bipolaris* sp and *Colletotrichum* sp crown and root rot, *Rhizoctonia* sp root rot
 pumpkin—*Pythium* sp root rot
 Exacum—impatiens necrotic spot virus (INSV)
 lisianthus—*Botrytis* sp stem rot
 cyclamen—bacterial soft rot, *Botrytis* sp stem rot
 phlox—INSV
 spruce—*Rhizosphaera* sp needlecast
 oak—oak wilt
 ash—anthracnose
 strawberry—*Pythium* sp root rot

Sandra Gould
Plant Disease Clinic

Alfalfa

Potato Leafhopper—PLH migration to Minnesota has been very late this year, but small numbers are showing up in southern Minnesota. Identification still needs to be confirmed for the few possible leafhoppers that could be PLH, that we have found in central Minnesota (Rosemount and Anoka areas). The second growth crop is usually hit the hardest by PLH in Minnesota, and should be checked for PLH; adults are effectively monitored with a sweep net, and the presence of nymphs should also be noted. For complete details about thresholds

and how to monitor for PLH, please review our extension bulletin FO-3516-B, *Sampling Alfalfa Insects*, available through county extension offices (or call the MES Distribution Center, St. Paul campus at: 612-625-8173). Because of the late arrival this year, 3rd crop alfalfa should also be scouted, and new seedings should be checked carefully as well.

Bill Hutchison
Extension Entomologist

Vegetables

European corn borer—The ECB flight clearly hit some high levels for most of southern and west-central Minnesota this past week, with counts the last few days starting to decline. Degree-day updates and ECB light-trap updates are provided below. Our first-generation ECB flight model indicates that the range for peak flight activity should occur at 590 DDs (95% prediction interval of 540-650 DDs), which looks about right for most of the state. Also see the figure attached summarizing ECB moth catches for the season to date.

ECB egg-lay was averaging approx. 11% of plants infested with one or more egg masses per plant at Rosemount this past week. Please review articles by Ken Ostlie in the last two weeks of *Minnesota Crop News* for additional information affecting ECB egg-lay and larval survival given our recent weather conditions.

ECB Degree-day accumulations, southern Minnesota, as of June 24, 1996*

Alexandria	554	Caledonia	624
Faribault	592	Hutchinson	608
Mankato	642	Morris	604
Olivia	655	Rochester	576
Rosemount	656	St. Cloud	572
Waseca	622	Winona	615

*Provided by Dave Bartels.

ECB Light trap catch summary, for the week June 20-26, 1996*

Location	Avg. #/Night	Max. #/Night (Dates)
Fergus Falls	0.14	1 (6/20)
Crookston	0.0	--
Lamberton	50.4	124 (6/20)
S. Lamberton	103.8	240 (6/20)
Jeffers	91.5	177 (6/24)
Blue Earth 49A	53.8	182 (6/22)
Blue Earth 49B	35.5	62 (6/22)
LeSueur 51A	28.4	49 (6/19)
Sleepy Eye 52A	30.7	56 (6/20)
Sleepy Eye 52B	51.3	60 (6/20)
Waseca 53S	24	37 (6/19)
Waseca 54N	11.7	18 (6/21)
St. Peter	33.7	131 (6/19)
Randolph	122.5	293 (6/20)
Rosemount	55.8	137 (6/21)
Geneva/Hollandale71.1		137 (6/25)

*Provided by Dave Bartels and Becky Hines.

Bill Hutchison
Extension Entomologist

Daily Crop "ETs" Available for Irrigators via Local Hotlines

Irrigators in north-central Minnesota near Park Rapids, Perham and Staples area can obtain this summer daily crop water use "ET" information for corn, dry beans and potatoes via telephone hotline messages any time of the day.

Park Rapids @ (218)732-1963 @ Hubbard SWCD office
Perham @ (218)346-7923 @ East Otter Tail SWCD office
Staples @ (218)894-3476 @ Central Lakes Ag. Center

Daily crop "ET" information can assist an irrigator keep track of the soil moisture in a field, along with in-field inspections to help determine when to best start up irrigating. Daily "ETs" can also be very helpful in planning ahead if participating in the local electric load control program, to help assure that adequate soil moisture is available during the peak control periods.

Keeping track of crop daily "ET" use and regular in-field soil moisture checking can go a long way in helping to an irrigator optimize the crop's growth while minimizing the potential for leaching of crop inputs like nitrogen into the underlying groundwater.

Daily "ET" values best serve the user if recorded on a calendar log like an irrigation checkbook worksheet for quick reference when making your irrigation decisions. **Consider assigning the calling task to one of the younger members of your family.**

Each phone message basically presents a reasonable "ET" estimation of the daily crop water use for corn, dry bean, and potatoes for its current stage of growth based on the previous days' climatic conditions as measured by a lo-

cal weather station. Daily crop "ET" estimations are determined by taking the specific crop's research based stage of growth correction factor times the calculated daily potential crop "ET" value. For example, daily "ET" for corn in its sixth leaf stage is equal to about 50% of potential "ET" and at blister stage "ET" is equal to 110% of potential "ET".

Further information to setup an on-farm irrigation water management monitoring program is described in the Minnesota Extension Service bulletin *Irrigation Water Management Considerations for Sandy Soils in Minnesota* (FO-3875). Daily crop "ET" estimations based on high temperature is available in Extension Bulletin *Irrigation Scheduling-Checkbook Method* (FO-1322). Both are available at your local extension office.

Daily crop "ET" information can also be managed with computer software programs like WISDOM or PC-Irrigate. Information on WISDOM can be obtained from University of Wisconsin Extension (phone 608-262-8332) and PC-Irrigate from the University of Nebraska (phone 402-472-4259).

For more information on how to use daily crop "ET" information contact:

Jerry Wright, Extension Engineer at the West-Central Experiment Station in Morris, MN (320) 589 -1711, or call your local county extension office or the respective local county Extension Service or SWCD office nearest each ET hotline service.

Jerry Wright
Extension Engineer

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Entomology Notes

Yellowheaded spruce sawfly larvae are being found commonly throughout the Twin Cities. These yellowish-green larvae have dark green stripes and a red-orange head. They feed on the new growth of spruce. In some cases, they are already approaching full-grown size. It is best to treat them when they are 3/8 - 1/2 inch or less in size to minimize damage to trees. Check individual trees to see what stage they are in.

Mountain ash sawfly larvae were just detected in St. Paul at the beginning of the week. They are yellowish with black, have black spots and an orange or black head. They feed on the entire leaf blade, but leave the midrib. They feed in clumped groups on branches and commonly eat leaves on one branch at a time.

There have been a number of questions about **ants injuring garden plants**. Ants may be found commonly on plants, but they do not damage them. Any plant injury associated with ants is circumstantial.

We have been receiving questions concerning **cucumber beetles** on beans, cucumbers and similar plants. Leaf feeding can be severe, but the bacterial wilt that the beetles can transmit is more devastating. Treatments of carbaryl (Sevin) is the best bet. There are not any plant varieties known to be resistant to bacterial wilt.

Be on the watch for **squash vine borer adults**; they either are just emerging or will be out soon laying eggs on vine crops. Look out for **apple maggot adults**; they can start emerging from the ground beginning next week and will be looking for apples in which to lay eggs.

We still are getting lots of **carpenter ant** questions and lots of complaints about **cornfield ants** and **thief ants** in homes. These ants are just temporary nuisances and eventually go away on their own. We continue to receive calls and samples about persistent **carpet beetle** and **larder beetle** infestations. **Click beetles** are still entering homes and being a nuisance.

Jeffrey Hahn
Assistant Extension Entomologist

Hosta Leaves Burn in Sun

The past two or three weeks we've gotten a number of hosta leaves with large, transparent blotches in them. Some were growing in full sunlight, others in partial sun. They all looked perfectly good until we ran into that week of high temperatures. People were reluctant to believe the leaves were simply "sunburned."

Hostas have become so popular, we see so many of them at nurseries and garden centers, that people have forgotten they're best suited to shady conditions. Some varieties will tolerate sunlight better than others, but all grow best when shaded from intense sun.

Sunburned leaves will not recover. You can prune them out if there aren't too many of them. Look for a shadier location if your hostas sunburn regularly. You can transplant them just about any time if you're able to dig take them out with a large clump of soil attached to the roots and replant them immediately.

(The sunburning looks similar to the clearing you see on little transplants put out on a sunny, windy spring day without the benefit of hardening them off, first.)

Deborah Brown
Extension Horticulturist

Pea root rot—*Pythium* spp., *Fusarium* spp., *Aphanomyces euteiches*, *Rhizoctonia solani*

Heavy, wet soils can lead to many different pea root rot problems. Several fungi are responsible for causing root rots and may occur together. Above ground symptoms may include any of the following: stunting, wilting, yellowing of leaves, necrosis of lower leaves and damping off of seedlings. Peas may not exhibit any symptoms of this disease during cool, wet weather, however, as conditions become hot and dry plants can wither and die very quickly.

Symptoms of *Pythium* spp. often show up as a brown to black root decay, turning roots soft and mushy. *Fusarium* spp. often causes initial reddish-brown streaks to develop on the roots that gradually coalesce and give the root a dark reddish-brown appearance. Internally, the core of the root may have a reddish coloration. *Aphanomyces euteiches* produces a rot on the outer portions of the root causing the cortical tissue to slough off, leaving thin strands of inner tissue. *Rhizoctonia solani* is visibly similar to *Fusarium* forming reddish-brown to brown lesions on the roots. This disease is of minor importance and usually occurs earlier in the season, whereas *Fusarium* spp. occurs later in the season.

Control of root rot can be achieved by planting in well-drained soils, fertilizing during prolonged cool wet periods, removing pea residue from the garden area and rotating peas with other non-legume plants on a five year cycle. Cultivars resistant to *Fusarium* are available.

Kelly Russell
Plant Pathology Technician

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CROP

NEWS

From the
UNIVERSITY OF MINNESOTA
Crops System Team
of the
Minnesota Extension Service
26 1996

Insecticide Options and Performance Against European Corn Borer

There is potential for unprecedented insecticide use against corn borer this summer. Many questions have arisen about insecticide choice, application methods, and performance.

What insecticides are recommended for corn borer control?

Both liquid and granular insecticides work well against first generation corn borers. The corn whorl provides a natural funnel to where most larvae congregate. Properly timed insecticides frequently provide better than 80% control, but don't expect complete control with any insecticide. These insecticides are recommended for first-generation corn borer:

Type	Insecticide	Rate
Granules	Pounce 1.5G	6.7-13.4 lbs/acre
	Lorsban 15G	4.4-6.5 lbs/acre
	Dyfonate II 15G	5-6.5 lbs/acre
	Dipel SG	??
Liquids	Warrior 1E	2.6 - 3.8 fl oz/acre
	Pounce 3.2E	4-8 fl oz/acre
	Ambush 2E	6.4-12.8 fl oz/acre
	Penncap-M 2 FM	2-4 pt/acre

Note: Other liquids can be used (e.g. Lorsban 4E, Sevin XLR Plus, Furadan 4F, diazinon, various B.t. formulations, and Asana) but control is generally lower than with the insecticides listed above.

Do granules work better than liquids?

About 15 years ago the standard rule-of-thumb was to use granules against first generation corn borer. At that time, granular formulations of Furadan and Lorsban offered 15-30% better control than their liquid counterparts, or than other milder liquids such as carbaryl or malathion. Newer

pyrethroid insecticides (Ambush, Pounce, Warrior) and Penncap-M 2FM have compared favorably to granules in our more recent research and are recommended on an equal footing. A few differences do, however, occur.

Granules probably have a broader window of application and application is less affected by dry application conditions or wind. However, granules require specialized application equipment and each granular formulation must be calibrated independently. Aerial applicators often have to dedicate a plane to granular application because of clean-out issues, and this limits their willingness to use granules. Liquids offer ease-of-use and applicators can readily switch from insecticides to post-emergence herbicides or fungicides. Consequently liquids are likely to be used more than granules.

Highlights . . . June 21, 1996

- Insecticide Options And Performance Against European Corn Borer*
- Section 18 For Tilt to Control Rust on Dry Beans*
- Reminder—Ag Professional Field School*
- Postemergence Grass Herbicide Shortages*
- Foxtail (pigeongrass) Control in Small Grains*
- Plant Growth Regulator Herbicides on Rapidly Growing Corn*
- Waseca Weed Tour Date Changed*
- Vegetables*
 - Corn/European Corn Borer*
 - Aster Leafhopper Update/Alert*
- Up, Up, And Away - Corn Borers Take Flight*
- Dial U*
 - Trees in Trouble*
 - Shrubs and Hedges*
 - Turfgrass*
 - Don't Transplant Tulips Yet*
 - Entomology Notes*
 - Bacterial Blight of Lilac*

Insecticides Against Corn Borer/Continued

Application options available and how they compare?

Prevalent options include ground and aerial application. A few irrigators may be able to chemigate, providing their systems are certified. Limited research indicates ground and aerial application offer comparable control, but reductions in product rates may be possible with ground application.

Ground application has offered the opportunity to direct application into the whorl and reduce insecticide rates of both granules and liquids. For example, a 1991 experiment at Lamberton found that Pounce and Ambush banded over the row at 0.10 lb ai/acre provided control equivalent to broadcast applications (e.g. 87% broadcast versus 87% banded for Pounce, and 84% broadcast versus 80% banded for Ambush).

If using a banded application by ground, use an even fan nozzle with boom height adjusted to provide a band half the row width (e.g., 15" band in 30" rows). Similarly, granular rates can be reduced with directed whorl applications (see labels). With liquids applied by either air or ground, keep spray volume up, at least 3 gpa and preferably 5 gpa by air,

and at least 10 gpa but preferably 20 gpa by ground.

When is the best timing for an insecticide application?

The whorl provides a natural collecting point for young corn borer larvae until they reach the third or fourth stage. During the fourth stage, nearly all larvae tunnel into the stalk and cannot be reached by insecticides. This window last about 10-14 days for an individual borer.

The best control strategy is to let larvae accumulate in the whorl and treat just before borers began leaving the whorl to tunnel. Naturally, logistical problems, such as windy weather or the applicator's waiting list, may move the insecticide decision point earlier. To anticipate potential problems, call your insecticide supplier and applicator ahead of time to discuss available options and demand. The exception to this approach would be a B.t. insecticide, which performs best against very young larvae.

*Ken Ostlie
Extension Entomologist*

Section 18 for Tilt to Control Rust on Dry Beans Approved by EPA

The EPA has approved our application for a section 18 emergency exemption for the use of Tilt for the control of rust on dry beans in Minnesota. The application submitted by North Dakota was also approved so the control measure can be used by growers in both states.

Research on pinto beans at Staples, Minn., indicates that Tilt is an excellent rust control fungicide. Application of this fungicide stops spread of the disease, however early applications are best for maximum return. Results indicate that Tilt can cause smaller leaves on the sprayed plants that have a rugose appearance. This seemed to be confined to the leaves that emerged just after the spray. In no cases did this condition lead to yield loss or quality of harvested crop.

Ciba hopes to have a permanent label soon. This will add to our arsenal of tools to use against this potentially damaging disease. This spray should be used as part of a management system that includes plant resistance where possible, cultural control that includes burying of infected plant residue and the use of other protectant fungicides to discourage

the increase of rust races tolerant to the systemic fungicides.

CIBA Crop Protection Label Information Includes:

For the control of rust, apply 4 fl. oz. of Tilt/A. Begin application at the first appearance of disease and continue on a 14 day schedule.

IMPORTANT: On certain dry bean varieties, Tilt applications may cause smaller and/or greener leaves. Yields of dry beans displaying these characteristics have not been reduced due to Tilt treatment. Do not apply Tilt to succulent bean varieties or crop injury may occur.

NOTES: Do not apply more than 12 fl. oz. of Tilt/A per season. Do not graze or feed forage within seven days of application. Do not harvest hay or beans within 28 days of application.

*Richard A. Meronuck
Extension Plant Pathologist*

Reminder—Ag Professional Field School

The registration deadline for the upcoming Ag Professional Field School is this week. This program, at the Southern Experiment Station, Waseca, on July 9 and 10, will be a hands-on, in-field crop management program emphasizing corn and soybean production. Application for 14 CEU credits has been made in the crop production, soil and water management, pest management, and soil fertility categories.

This program alternates annually between southern and northern Minnesota. It was last at Waseca in 1992. A new feature this year is that advanced or repeat individuals will

be grouped separately for a more challenging program.

The plots look great and sign-up is strong. Plan on attending if crop production skills are needed for your professional development. Registration fee this year is \$225.

For further information on the program or to register, contact Tracey Benson at 612/624-3708 or 800/367-5363. For program content information, contact Mike Schmitt (612/625-7017) or Bev Durgan (612/625-7262).

*Mike Schmitt
Extension Soil Scientist*

Postemergence Grass Herbicide Shortages

Due to shortages of postemergence grass herbicides for the control of foxtails and wild oats in spring wheat, the Minnesota Department of Agriculture has issued a Section 18 - Crisis Exemption for "Silverado" herbicide for the control of green and yellow foxtail and wild oats in hard red spring wheat. Silverado will not be labeled for and should not be applied to durum wheat or barley.

Silverado, manufactured by AgrEvo, is currently labeled for use in Texas. Silverado contains *fenoxaprop*, the same active ingredient for grass control in Tiller and Cheyenne.

Silverado can be applied to wheat from the 3-leaf stage to the end of tillering. Do not apply after wheat jointing. Apply to grass weeds from the 2-leaf stage to the 2-tillering stage. Silverado MUST be tank mixed with 2,4-D ester and/or MCPA ester to prevent crop injury. Severe crop injury can occur if Silverado is applied without that mix. The accompanying table lists the rates of Silverado and 2,4-D and MCPA ester to use for foxtail and wild oat control.

Silverado will give similar foxtail and wild oat control as Tiller and Cheyenne. Silverado is only labeled for both ground and aerial applications.

AgrEvo will be shipping Silverado to the state immediately, and should have enough to treat approximately 300,000

to 500,000 acres (depending on the rate used). AgrEvo also hopes to have additional supplies of Tiller available in the near future.

Weed Species	Silverado Herbicide	MCPA Ester (4 lbs/gal)	2,4-D Ester (4 lbs/gal)
green foxtail	0.38 pt	0.75 pt	—
foxtail millet	(6 oz)	(12 oz)	
yellow foxtail	0.87 pt	0.50 pt	0.17 pt
proso millet	(11 oz)	(8 oz)	(3 oz)
wild oat	1 pt	0.75 pt	0.25 pt
	(16 oz)	(12 oz)	(4 oz)

This Section 18 Crisis Exemption became effective on June 14. Please read and follow all restrictions on the label.

It is my understanding that the North Dakota State Department of Agriculture has issued a 24C - Special Local Needs label for Silverado for use in North Dakota.

Beverly R. Durgan
Extension Agronomist - Weed Science

Foxtail (pigeongrass) Control in Small Grains

Making a decision on whether to control foxtail in small grains is not always easy. Research from North Dakota State University and in Canada has shown that infestations of foxtail often will not decrease wheat and barley yields. Heavy foxtail infestations can, however, cause harvest problems (especially when straight combining) and can cause dockage when the grain is delivered to the elevator.

In some situations the cost of a herbicide treatment for foxtail control is not justified. These would include:

1. With light foxtail infestations—fewer than 10 plants/ft².
2. When the foxtail emerges after the crop is in the 3- to 4-leaf stage. This is especially true for barley. Once the small grain is in the 3- to 4-leaf stage, it can usually out-compete foxtail, thereby making a herbicide treatment unnecessary. However, if the foxtail population is heavy (30 plants/ft² or more), control may be needed.
3. When the wheat variety does not compete well with foxtail. Research has shown that wheat variety "2375" is one such variety, therefore foxtail control in 2375 is more important than with other varieties.

Another factor that complicates this situation is moisture stress. Weeds will generally cause greater yield losses under drought conditions, therefore foxtail control would be more important in droughty fields.

Making the decision on whether to apply a herbicide for foxtail control is more complicated when the foxtail is emerging with or shortly after the small grain; as is the case in many fields this year. Some of the options to consider for foxtail control this year are:

1. If the foxtail infestation is heavy, and is emerging with the small grain, consider harrowing or rotary hoeing as soon as possible.
2. If a harrow or rotary hoe are not an option, consider a herbicide. If wild oats are also in the field, the herbicides of choice are Hoelon, Cheyenne and Tiller. Hoelon needs to be applied to small foxtail (1 to 3-leaf). If wild oats are not present, then Stampede EDF can also be considered.
3. If the foxtail infestation is light to moderate, it may be possible to wait and see if the crop will be able to out-compete foxtail. If foxtail is still a problem by the time the small grain is in the 5 to 6-leaf stage, then Tiller or Cheyenne can be used for control.

More on Postemergence Foxtail Control

Cheyenne (fenoxaprop + MCPA ester + thifensulfuron + tribenuron):

Cheyenne is labeled for postemergence control of foxtails, wild oats and most annual broadleaf weeds in hard red spring wheat. Cheyenne is NOT labeled for use in durum wheat, barley or oats.

Apply Cheyenne to spring wheat from the 3-leaf stage to the end of tillering (6-leaf stage). DO NOT apply after jointing. Apply when grass weeds are 4 inches tall or smaller.

Cheyenne has received supplemental labeling that allows tank mix applications with Buctril at 0.38 to 0.5 pt/A or Stinger at 2 fl oz/A. These tank mixes will provide additional control of many broadleaf weeds. DO NOT tank mix

Foxtail Control in Small Grains/Continued

Cheyenne with any other herbicide, additive, or fertilizer. See the label for mixing instructions.

Research at the University of Minnesota has shown that Cheyenne will give good to excellent control of wild oats, foxtails, kochia, common lambsquarters, pigweed and several other annual broadleaf weeds. Cheyenne can NOT be applied by air.

Hoelon (diclofop):

Hoelon will control both foxtail and wild oats in hard red spring wheat, durum and barley. DO NOT apply Hoelon to oats. Hoelon can be applied at 2 to 2.67 pts/A when foxtail is in the 1- to 4-leaf stage. Research has shown that Hoelon will give the best control if applied to foxtail before the 3-leaf stage, especially when using the 2 pts/A rate. When foxtail has reached the 4-leaf stage, the higher labeled rates should be used.

When using the 2 pts/A rate of Hoelon in spring wheat or durum, the addition of 1 qt/A of crop oil concentrate has been shown to increase foxtail control. DO NOT use crop oil concentrate on barley as severe crop injury may result.

Caution should be used before applying Hoelon to barley under cool conditions, as crop injury can result. The Hoelon label states not to apply Hoelon to barley if the daily minimum temperature reaches 40°F or less for three consecutive days before application. Hoelon should also be applied to barley before tillering to minimize injury.

It is important to carefully select the proper broadleaf herbicide to tank mix with Hoelon. Many broadleaf herbicides, when tank mixed with Hoelon, decrease the grass control of Hoelon. Hoelon can be tank mixed with Buctril (bromoxynil) or a low rate of MCPA ester (0.05 lbs/A) plus Buctril. DO NOT tank mix Hoelon with any other broadleaf herbicide.

Stampede EDF:

Apply Stampede to foxtail in the 1- to 3-leaf stage and at the 2- to 5-leaf stage of hard red spring wheat or the 2- to 4-leaf stage of durum, oats, and barley. It is important to apply Stampede to small foxtail for effective control.

Stampede EDF can be tank mixed with MCPA ester for broadleaf control. The use rate is 1.25 lb/A of Stampede EDF and 0.5 pt/A of MCPA ester. A 25 lb bag of Stampede EDF will treat 20 acres.

Many producers do not like to use Stampede because temporary yellowing of the crop usually occurs within three days of application. Research at the University of Minnesota has shown that this yellowing will not cause a yield loss. The crop will recover from this injury within 7 to 10 days.

It is important to follow the mixing instructions for Stampede EDF. This formulation may not mix with water as readily as other dry flowables.

Tiller (fenoxaprop + MCPA ester + 2,4-D ester):

Tiller is labeled for postemergence foxtail control in hard red spring wheat. The use rate for Tiller is:

- 1.0 pt/A for green foxtail control,
- 1.2 pts/A for yellow and green foxtail control,
- 1.7 pts/A for fields with mixed populations of foxtail and wild oats.

Apply Tiller after the spring wheat begins to tiller (3-4 leaf stage) but prior to jointing stage (6-leaf stage). Tiller will control larger foxtail (3-leaf to 2-tillers) and can be applied later than other postemergence herbicides used for foxtail control in hard red spring wheat.

In University of Minnesota research, Tiller has given good to excellent control of both yellow and green foxtail. DO NOT apply Tiller to durum wheat, barley, oats or rye. DO NOT apply more than one application of Tiller per season, or apply within 70 days of harvest.

Tiller can be tank mixed with some broadleaf herbicides for additional broadleaf weed control, however, it is important to carefully select the proper broadleaf herbicide. Many broadleaf herbicides, when tank mixed with Tiller, decrease the grass control of Tiller. The following is a summary of the tank mixing options for Tiller, however, it is important to also read and follow all restrictions on the label.

For control of green foxtail, Tiller at 1 pt/A can be tank mixed with Banvel, Buctril, MCPA ester, Stinger, and Tordon. Tiller at 1.2 pts/A, for green foxtail control, can be tank mixed with Harmony Extra and Express. However, in fields with mixed populations of green and yellow foxtail, Tiller applied at 1.2 – 1.7 pts/A, can be tank mixed with Stinger, MCPA ester, Tordon, and Banvel. DO NOT apply Banvel after the 5-leaf stage, and since Tiller should not be applied until the 3-leaf stage, the time when Banvel and Tiller can be tank mixed is very short.

There have been several cases of hard red spring wheat injury due to Tiller applications. The injury was associated with cool, wet weather conditions and late applications. In most cases, the spring wheat recovered from this injury, and there was no yield loss. To decrease the crop injury potential, DO NOT apply Tiller after jointing stage. Read the label for additional restrictions or precautions. DO NOT apply Tiller by air for wild oat control, as control may not be adequate.

Beverly R. Durgan
Extension Agronomist - Weed Science

Plant Growth Regulator Herbicides on Rapidly Growing Corn

After an extended period of cold and wet weather, it looks like crops will finally be exposed to warm temperatures and good soil moisture conditions. Please keep in mind that when

corn starts its rapid growth phase, the use of plant growth regulator herbicides can often result in wrapped, brittle, or lodged corn. Therefore, in most corn fields in Minnesota, it

would be wise to find appropriate alternatives to Banvel, Clarity, Marksman, 2,4-D, and Scorpion III. Fortunately, last week's weather made it possible for most of the growth regu-

lator herbicides to be applied.

Jeffrey L. Gunsolus
Extension Agronomist - Weed Science

Waseca Weed Tour Date Changed

The upcoming weed tour at Waseca, Minn., has been changed to July 24. It was previously reported as July 23rd, however, this date conflicted with other tours in the area. We apologize for this confusion. The July 24th weed tour will be held at the Southern Experiment Station in Waseca, from 8:30

a.m. until noon.

The Rochester weed tour is still set for July 17th and will begin at the Dodge Fairgrounds, Kasson, Minn., at 9:00 a.m. and will continue until 1:00 p.m. Be prompt as we will be touring by bus.

Vegetables

Corn/European Corn Borer

Warm weather last week throughout southern Minnesota helped get summer moving temporarily, with degree-day accumulations approaching 460-600 for most southern Minnesota sites (see table below). Dave Bartels and my fieldcrew found seven ECB egg masses per 100 plants on June 20 in V6 stage field corn, 12 to 15 inches in height.

Degree-day update for ECB as of June 17:*

Alexandria	468	Morris	496
Caledonia	501	Olivia	552
Cambridge	464	Rochester	466
Faribault	481	Rosemount	542
Hutchinson	505	St. Cloud	488
LaCrosse	630	St. Paul	572
Mankato	527	Waseca	507
Montevideo	522	Winona	499

*Data provided by Dave Bartels.

Despite some cool/rainy weather this past week, ECB trap catches continued to be significant. As in past weeks, more detailed summaries, including color line graphs of the total season catch to date, are available on Wednesday afternoons on the internet at the VegEdge site <<http://www.mes.umn.edu/~vegipm/>> and is also available via DTN, roughly Fridays through Tuesdays.

It appears that the south-central and south-eastern regions are showing the highest ECB pressure, however, we have not yet reached the peak (50%) of the flight. Based on our first-generation model, **the peak should occur at approximately 590 DDs, which should happen about June 25.** We should continue to see significant moth catches for another two weeks after the peak, rounding out a significant first-generation flight for most of southern Minnesota, and

ECB Moth catch (light traps) summary for week of June 12-19, 1996*

Location	Avg./night	Max./night (dates)
Crookston	0.0	—
Fergus Falls	1.3	3 (6/16)
Morris	*	*
Olivia	10.7	27 (6/13)
Lamberton	31.4	72 (6/17)
Jeffers	47.8	141 (6/19)
S. Lamberton	92.2	257 (6/19)
Blue Earth 49A	*	
LeSueur 51A	25.6	62 (6/13)
LeSueur 51B	26.7	54 (6/13)
Sleepy Eye 52A	23	30 (6/14)
Sleepy Eye 52B	23.8	42 (6/17)
Waseca 53S	4.7	12 (6/12)
Waseca 54N	15.4	23 (6/13)
St. Peter	25	61 (6/15)
Randolph	48.4	57 (6/16)
Rosemount	36.9	109
Faribault	60.3	202 (6/13)
Owatonna	68.1	162 (6/16)
Geneva	25.4	38 (6/15)
Simpson	15.3	55 (6/18)

* Data provided in cooperation with Dharma Sreenivasm, Minnesota Department of Agriculture, Minnesota Extension Service, and volunteers.

reflective of the overwintering population.

Interestingly, our ECB/barometer field at Rosemount (via Dave Bartels), was averaging pupation of 61.5% (range: 47-71%) as of June 13, 1996. There was still an average of 0.35

Vegetables/Continued

live larvae and 0.37 live pupae/stalk. The *two weeks following July 4th weekend* (i.e., get out and enjoy the weekend) will be a good time to start checking the earliest planted corn in your area for shot-holing and survival of live larvae. See Ken Ostlie's article in the June 14th Minn. Crop Newsletter about how to monitor for first-generation ECB. I will have more information in upcoming newsletters about first-generation ECB thresholds for sweet corn.

Some possible good news is that although the MDA recently reported from their annual fall survey that overall parasitism of ECB larvae in the state was low (10.8%; as in previous years, and in agreement with our observation at Rosemount this year at <1%), one of our graduate students (Craig Longtine) confirmed that approx. 80% of the larvae we collected this spring at Rosemount were infected with the microsporidium, *Nosema pyrausta*. This protozoan-like organism is useful because it not only kills larvae, but also hinders maximum egg-lay by infected females.

IF this trend holds up, it would represent our first sign of one of our resident biological control agents beginning to

have an impact on the high ECB population, and contributing to the next downward spiral of the ECB cycle. Clearly, however, many factors will continue to play a role in the coming weeks, affecting actual egg-lay and larval survival (see last week's article by Ken Ostlie).

Aster Leafhopper Update/Alert

ALH counts are slowly moving back up at Hollandale in southern Minnesota following recent storms. Counts are up drastically in the Anoka area as of June 19th, where nearly 100 ALH/100 sweeps were recorded (provided by Patrick O'Rourke, summer intern). These levels are very high, indicating that all susceptible crops, including carrots and lettuce should be checked closely (1 to 2 times/week) during the next 3 to 4 weeks, during active periods of plant growth. See May issues of this newsletter and/or the Commercial Vegetable Guide (BU-1880) for thresholds and details about ALH.

*Bill Hutchison
Extension Entomologist*

UP, UP, AND AWAY....CORN BORERS TAKE FLIGHT

The 1996 moth flight is underway with captures in black light traps increasing dramatically from last week.

Moths are becoming evident in grassy action sites, such as road ditches, pastures, CRP, waterways, and fence lines. Many attendees at summer field days at the Southern Experiment Station (Waseca) and the Southwest Experiment Station (Lamberton) reported seeing moths in evening windshield surveys (16 out of 23 cars I looked at in the parking lot bore moth carcasses). The situation will steadily deteriorate with peak emergence expected this week.

A quick check of taller corn fields on Tuesday and Wednesday revealed more egg laying than I expected. Fields near New Ulm, Lamberton, and Montevideo had from 3 to 8% of the plants with egg masses. One river bottom field with knee high corn also had about 1% of the plants with leaf injury. Based on flight status and the presence of egg masses, I would encourage scouting starting the week of June 24th and continuing at about 5-day intervals for the following two weeks. To economize on scouting effort:

- Target your taller corn fields (generally the earlier planted fields but its anybody's guess this year!)
- Walk a grassy field edge to see if moths are still using action sites (where they take refuge during the day)
- Move into the field 10-20 rows and estimate percent of infestation by counting the number of shotholed plants in 20 plants. Choose an area typical of the field to count. If fewer than 6 plants exhibit leaf injury, revisit the field in five days. If more than 6 plants exhibit leaf injury, it's worth investing your time on scouting the entire field.

Any field with corn about 14-16" tall (midcalf) or taller could be attracting egg laying. To determine whether egg laying is continuing in fields, look on the undersides of ex-

panded leaves for cream colored egg masses. They will often be found near the midrib.

Heavy rain in south central Minnesota raised questions about what weather could diminish corn borer problems this summer. In short, any weather good for corn growth will favor corn borer. Detrimental weather includes:

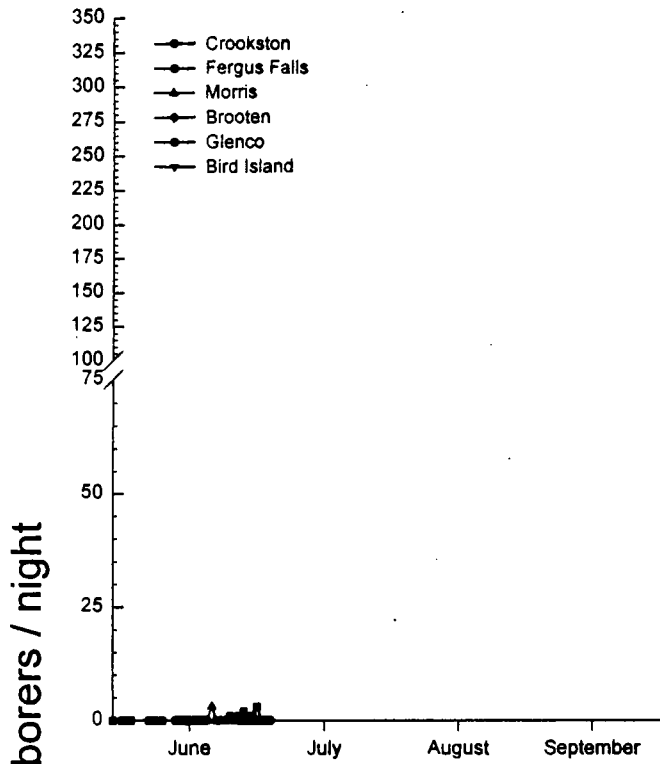
- Evenings cooler than 55°F, windy nights, and lack of dew-fall limit adult mating and egg laying activity.
- Heavy driving rains during the moth flight can reduce adult numbers and drown young larvae.
- Hot, dry, windy days that cause moisture stress on corn can also cause egg masses to desiccate or drop off the plant.

Typical weather will not have a big impact. Even rain-fall in excess of 3" earlier this week likely had little impact. Moths were still observed in action sites and egg masses could be found on plants (I walked through the mud to look). So far things look decent from a corn borer perspective.

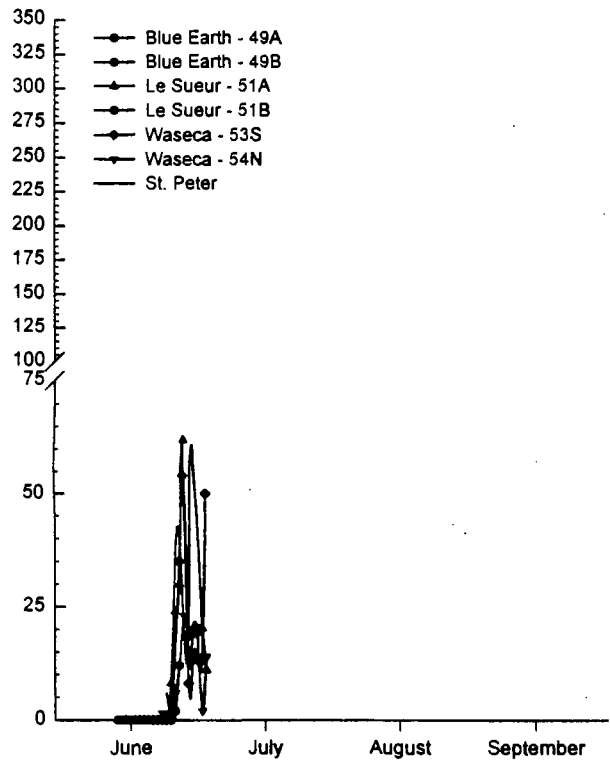
The late planting of corn and its slow emergence this spring raised many questions regarding larval survival on small corn. While corn may seem small, remember that we haven't seen peak moth flight yet. Moths take 2 to 3 days after emergence to mature, mate, and develop eggs for laying. Females lay about two egg masses per night (20-25 eggs/mass) for about 10 days. Eggs take 5 to 7 days to hatch. As you think about this timeline, ask yourself how tall corn will be in about two weeks when peak larval hatch will occur. You'll realize that corn height is not likely to figure prominently in this summer's infestation. Plenty of corn will be tall enough to support larvae.

*Ken Ostlie
Extension Entomologist*

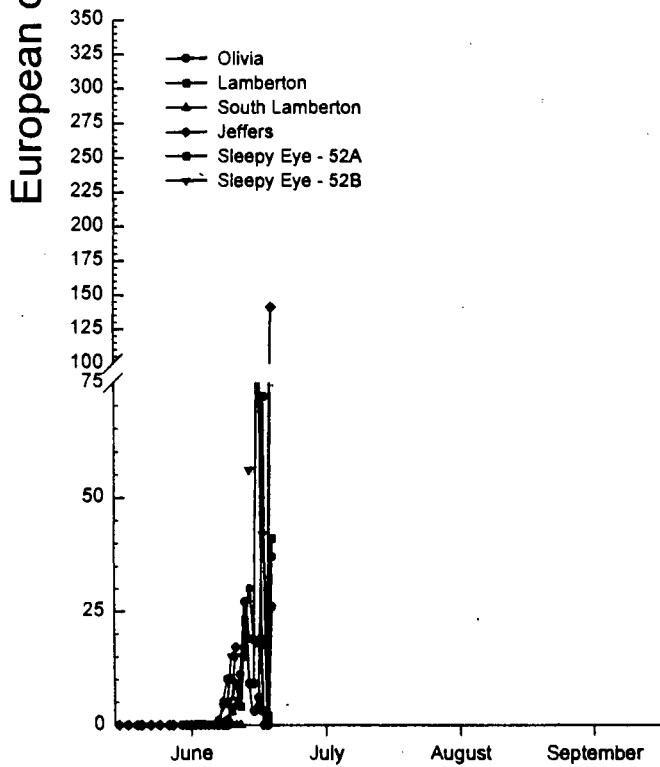
North - West



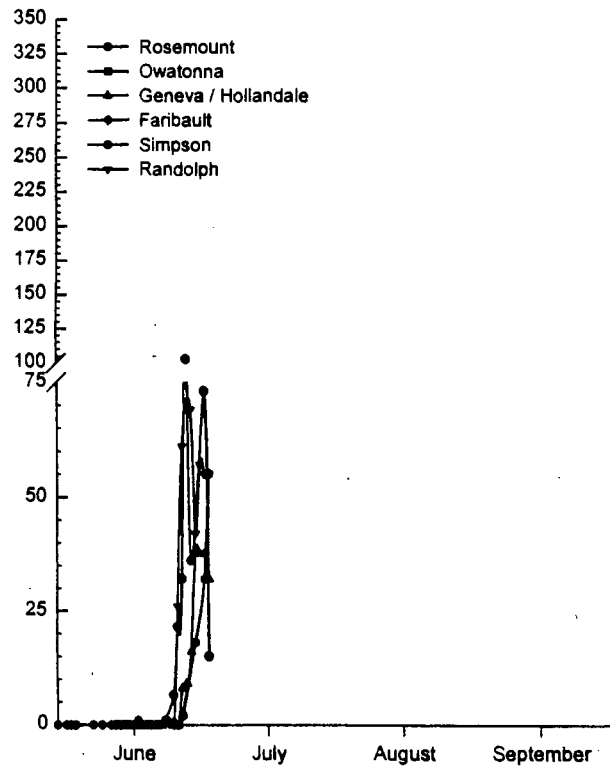
South - Central



South - West



South - East



Date

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Trees in Trouble

These have been our most common horticultural calls. Some have not leafed out at all, while others are leafing out sporadically or on the bottom or one side and not the other. We are speculating that abundant moisture last year may have interfered with the hardening off process, leaving even native trees more vulnerable to chilling injury during our bitterly cold winter. While roots were generally covered well with snow, stems and branches were exposed, and conductive tissue was damaged.

The question now is what can be done with these problem trees. Probably it's a wait-and-see situation. Where branches are brittle and no longer green beneath the bark, pruning or removal of the entire tree is in order. Where they're still flexible and green, sit tight and see what develops. You can always take them down later.

Water these trees if there is a week without heavy rainfall and temperatures are warm or hot. Fertilizer would probably just put more stress on them, and should not be attempted. They're not in trouble from lack of nutrients, but from winter injury.

Shrubs and Hedges

Many shrubs and hedges are only sprouting from the base. This indicates chilling injury to the upper parts of the branches. Prune them back, water and fertilize them to encourage new growth.

Plant Selection

We've had many calls on plant selection, including where to find specific and sometimes unusual species. We often verify choices suggested at nurseries, checking on disease resistance, growth habit, and particularly important, cold-hardiness. We also try to match up plants with soil types, so people don't try to plant trees that need well-drained soil on heavy, compact clay or vice-versa.

We make use of the Minnesota Landscape Arboretum's Anderson Library Sourcebook to find mail order nurseries that handle just about any plant that grows here.

Turfgrass

Turfgrass remains a terribly popular subject. Calls about fertilizing, weed control and seeding have dominated, but recently we've had a large number of calls on grass that has turned brown and dormant (we hope . . . as opposed to dead). Again, due to last year's abundant moisture, grass may not have developed good deep roots. So the minute it got hot, dry and windy, the grass turned brown. We are recommending regular deep watering to help lawns recover.

If the lawn was fertilized, our turf scientist says the large brown areas may be 'melting out' disease.

Remember, it's not a good idea to fertilize or use herbicide on any lawns that are moisture-stressed to begin with. There's every possibility it would cause them to grow worse. Our spell of hot weather is also a reminder that weed-killers should be discontinued with temps reaching the mid-80's.

Don't Transplant Tulips Yet

Wait until tulip foliage yellows or turns brown, then dig them up and replant them or store them in a dry, well-ventilated area for summer. If you dig them up, discard all small bulbs that are unlikely to bloom well. They are not worth the effort of planting, and will only disappoint you in the long run.

Wind and Storm Damage

We have received calls about storm damage from the tornadoes and strong winds that blew through the Twin Cities area on Memorial Day. Strangely enough, most calls were about perennials such as hostas, with shredded leaves. Some trees were hit also, and should be trimmed immediately to remove hazardous branches. With the exception of oak trees, no pruning paint or wound dressing should be necessary.

Deborah Brown
Extension Horticulturist

Colorado Potato Beetles

Control of Colorado Potato Beetles in home garden is challenging. Handpicking usually isn't practical. Carbaryl (Sevin) and rotenone can be effective but often are not, due to problem with resistance. *Bacillus thuringiensis* var. *tenebrionis* (M-One), is an environmentally compatible product, but to be effective it must be applied to the very young larvae. To maximize effectiveness, reapply it every 3 to 4 days.

Sawflies

Several species of sawflies may be found in the landscape. **European pine sawfly larvae** are green-gray with dark stripes and a dark head. They feed on the old needles of pine, especially mugho. They are mostly reported to be about 3/4 to 1 inch long which means they are finishing their feeding. Control is not justified.

Yellowheaded spruce sawfly larvae are just beginning to hatch. They are yellowish-green with dark green stripes and a red-orange head. They feed on the new growth of spruce. The best time to treat is when they are 3/8 - 1/2 inch or less in size. Monitor trees to detect them when they are young.

Mountain ash sawfly larvae have not been detected yet, but expect them by late June in central Minnesota. They are yellowish with black spots and an orange or black head. They

Dial U/Continued

feed on the entire leaf blade except for the mid-rib. They typically feed gregariously (in nonsocial groups) on branches.

Pine Spittlebugs

These insects are recognizable because of the frothy, white mass they create, which they hide in. They rarely occur in large enough numbers to damage trees.

Galls

We have been receiving a wide variety of different insect and mite induced galls on different trees and shrubs. There is no control once galls are seen. Galls rarely have any lasting impact on plant health.

Mosquitoes

The recent rains will add to our mosquito numbers. Personal protection, including long sleeve shirts, long pants and repellents, and avoiding them when they are most numerous (early morning or dusk, cloudy days, shaded areas) are the best methods to protect yourself.

Insects Invading Homes

We are still getting lots of ant questions, particularly concerning carpenter ants. We are receiving reports now of individual wingless carpenter ant queens in homes. This is not an indication of a nest, but is a nuisance that has wandered inside and has not yet established its own nest. We are also getting reports of increased activities of ants, like cornfield ants, in homes. Ants in these situations are just temporary nuisances and eventually go away on their own. We still are

getting calls about persistent carpet beetle infestations.

Jeffrey Hahn
Assistant Extension Entomologist

Bacterial Blight of Lilac

Bacterial blight caused by *Pseudomonas syringae* pv. *syringae* has been reported on lilacs, especially white lilacs. This fungal pathogen attacks many plants including forsythia and mock orange. The first foliar symptoms are usually irregular to circular dark brown to black spots, surrounded by yellowish (chlorotic) halos. The spots eventually coalesce, blighting occurs and the entire leaf dies. Petioles or succulent stems are also attacked whereby girdling lesions are formed. Shoots beyond these lesioned areas droop, wilt and wither. Woody twigs can also be attacked, giving them a black-streaked appearance.

To control, use prudent cultural practices. Maintain adequate spacing between plants, prune to provide good air circulation within the canopy and remove blighted twigs as soon as they appear. This entails cutting back at least three to four inches into healthy-looking tissue. Remember to use sterile pruning techniques, such as dipping sheers in a fresh, 10% bleach solution for 10 to 20 seconds between cuts, and pruning only during dry weather. Also, do not over fertilize young plants. If bacterial blight is an annual problem, consider making two to three applications of a copper fungicide such as Bordeaux mixture beginning when the new growth appears next spring.

Joe Walton
Plant Pathology Technician

MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA
COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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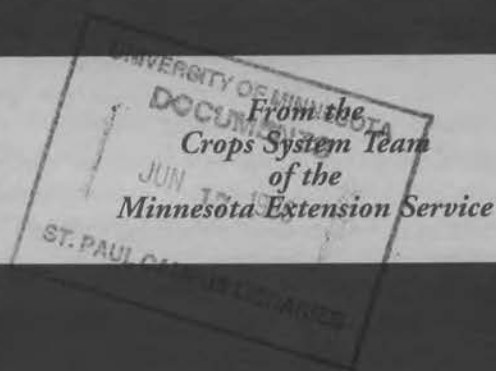
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CROP

NEWS



Scouting European Corn Borer in Field Corn

The signs don't bode well. High overwintering populations, low parasitism and disease incidence, and excellent winter survival mean only one thing for this year's first generation corn borer—the potential for heavy infestations. If you've never personally scouted for corn borer before, or sought professional help in scouting your fields, do it in 1996. With corn prices at record levels, it won't take much of an infestation to reward proactive efforts on your part and pay for an insecticide application. In this article I'll cover some of the basics on corn borer scouting and insecticide decisions.

Corn borer emergence is underway in southern Minnesota. Wednesday at Rosemount I commonly saw moths in last year's corn fields. Emergence will continue over the next two to four weeks (see update by Bill Hutchison on thermal unit accumulations and corn borer pupation). As the moths emerge from corn debris, they leave their "birth" field and move to grassy "action sites" to mature, drink dew or rain, and mate. Females mature about 48 hours before mating and then begin seeking out taller corn to lay eggs. Each female typically lays about two egg masses per night (15-30 eggs/mass) for the next 10 nights, if weather conditions permit. Warm, calm evenings with dew formation are extremely favorable for mating and egg laying. Eggs hatch in three to 7 days, depending on temperature. Corn with extended leaf height less than 16" contains higher levels of DIMBOA, a natural feeding deterrent that enhances larval mortality. DIMBOA concentrations generally decrease as the corn plant grows, so taller fields have less "juvenile resistance". Most corn borer mortality occurs within 48 hours of hatch from DIMBOA, weather, natural enemies, and failed dispersal attempts. This mortality ranges from 75-85%.

Scouting is critical to sound insecticide application decisions. Infestation severity varies widely from year to year and between fields. Once the moth flight begins, scout taller fields where moths initially focus their egg laying at three to 5 day intervals. Use these fields as barometers to corn borer severity and timing. Remember that any field over 17" extended leaf height can support larvae, and middle planting

dates can also suffer significant infestations. Normally there's about a two to 3 week window from egg hatch until tunneling begins. Use leaf injury as an initial tipoff on activity. Examine 20 plants at 5 locations per 40 acres for leaf feeding. Once 25% of the plants exhibit pinhole feeding on emerging leaves, start more intensive scouting efforts. At each location dissect the whorls of at least 2 plants (given the price of corn it is worth dissecting more plants, e.g. five plants, to get a more precise estimate of larval numbers). Use the following calculations to determine whether or not it's worth treating the field. Brief instructions on scouting and a quick

Highlights....June 14, 1996

*Scouting European Corn Borer in Field Corn
Is it Worth Treating Corn Borer?*

Cost: Benefit Calculations

*Black Cutworm Monitoring Ends With A
Favorable Prognosis*

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Dial U

Thunderstorms and Lightning Rocks Trees

Landscape Insects

Household Insects

**Commercial Vegetable Pest Management
Guide Available**

Scouting European Corn Borer/Continued

decision guide can be found in FS-5969, *Quick Guide to European Corn Borer Management: Scouting and Decision-Making for First Generation*.

A few key points about scouting:

- ✓ Talk to the grower ahead of time about what you'll be doing and confirm a willingness to treat the field.
- ✓ Check with local applicators about lag time between booking and application and with local dealers about insecticide availability.
- ✓ Use shotholing as an initial guide and don't invest much effort in whorl dissections until over 25% of the plants show leaf feeding on emerged leaves.

- ✓ To improve your decision, spend extra effort on dissecting whorls, if the field is close to threshold.
- ✓ Scouting later in the window improves estimates of larval survival per plant but older larvae leave the whorl in increasing numbers.
- ✓ Remember that the calculations provide only an estimate of returns on the insecticide investment. Talk to the growers about the economic return on insecticide investment they'd like to see and use it!

Next week we'll review insecticide performance data and insecticide options for corn borer.

Ken Ostlie
Extension Entomologist

Is It Worth Treating Corn Borer? Cost/Benefit Calculations

When thinking about insecticide applications for European corn borer, you have a valuable tool at hand....a way to determine how your input costs compare with expected returns. Here's an overview of the process and an example of the calculations.

- Step 1. Estimate borers per plant
Borers/plant = proportion of plants with leaf injury X borers per infested plant
- Step 2. Estimate value of the crop
Crop value (\$/acre) = expected yield (bu/acre) X expected price (\$/bushel)
- Step 3. Determine dollar value of loss per borer
Loss per borer = Crop value X 0.055
- Step 4. Calculate expected loss from infestation
Expected loss (\$/acre) = Loss per borer X Borers/plant
- Step 5. Estimate preventable loss
Preventable loss (\$/acre) = Expected loss X Insecticide effectiveness
- Step 6. Compare treatment cost (insecticide + application costs) to preventable loss. Insecticide application is recommended if preventable loss exceeds treatment cost by desired margin.

EXAMPLE

Assume you found 45% of the plants with leaf injury and 25 borers per infested plant. Expected yield is 120 bu/acre and contracted price is \$3.50/bushel. Treatment cost is \$13.50/

acre for Warrior 1E at 3.2 oz/acre (\$9/acre) applied by air (\$4.50/acre).

Step 1. Borers per plant = $0.45 \times 2.5 = 1.13$ borer per plant

Step 2. Crop Value = $120 \times 3.50 = \$420/\text{acre}$

Step 3. Loss per borer = $\$420 \times 0.055 = \$23.10/\text{acre}$ for each borer/plant

Step 4. Expected loss = $\$23.10 \times 1.13 = \$26.10/\text{acre}$

Step 5. Preventable loss = $\$26.10 \times 0.80 = \$20.88/\text{acre}$

Step 6. Preventable loss of \$20.88/acre exceeds treatment costs of \$13.50

Recommendation: Treat

Keep in mind that this calculations provides only an estimate of expected benefits. You are dealing with a biological system affected by many factors. For example, weather, hybrid & natural enemies determine how many tunnels will be produced by the larvae you counted while scouting. Similarly, yield is determined by soils, hybrid, weather and other stresses. Don't treat the outcome as a sacred number carved in stone but as an estimate. During the 1991 outbreak, I evaluated how well the decision process worked at a site near Lamberton. The model predicted yield protection worth \$14.25/acre and the actual gain was \$18.53/acre. As you can see, the model gave a realistic but conservative estimate of benefits.

Ken Ostlie
Extension Entomologist

Black Cutworm Monitoring Ends with a Favorable Prognosis

A hardy, dedicated group of 70 cooperators pitched in this spring to monitor black cutworm migration. While there were a few comments on whether or not spring actually occurred, the cool weather did keep a damper on black cutworm migrations. No significant migrations were detected in Minnesota! Consequently no significant black cutworm activity will be occurring. While most cooperators captured at least

one moth, a few 4-H members monitoring traps expressed disappointment over not catching more moths. Oh well! Maybe next year. Special thanks to all the cooperators in such a quiet year and to Dow Elanco for supporting the project through pheromone trap purchases.

Ken Ostlie
Extension Entomologist

Sunflower Beetle Adults

Due to the lateness of spring planting, sunflowers are just emerging and over-wintering sunflower beetles are also emerging and feeding on the first true leaves of the plant. One grower in Polk County has already treated a field for adult beetles in excess of two per plant which caused over 50% defoliation of his crop.

Last year Dave Noetzel included an article in the June 16, 1995, *MN Crop News* of a replicated research plot on reduced rates of Asana XL he and Howard Person established near Goodridge, MN. Similar conditions existed in

1995 with sunflower plant size being small because of late planting. Dave indicated last year that defoliation may be a better action threshold than number of beetles per plant. Defoliation should not be permitted to exceed 50% on seedling plants.

From the research results in 1995, Dave indicated it is quite clear that our lowest adult control label dosage of Asana XL (2.9 fl. oz.) is nearly as excessive as is the label dosage for larval control.

Following are the results from their trial:

Dosage in lb ai/acre	Fl. Oz. of Asana XL/acre	Acres/gal. of Asana XL	Avg. No. adults per 200 plants
Untreated	0	0	104.0
.001875	.36	352	9.5
.00375	.73	176	0.3
.0075	1.45	88	0.3
.015	2.90	44	0.7

Russ Severson
West Polk County Extension Educator

Nitrogen for Edible Beans on Sandy Soils

Edible beans are an important crop in many farm enterprises in Minnesota. Many growers have recognized the importance of nitrogen fertilizer for edible bean production for several years. This is especially true if the edible beans are grown on sandy soils.

Trials have been conducted at various locations throughout north central Minnesota to measure the effect of nitrogen fertilizers on this crop. The results from two locations are summarized in the following table. Navy beans were grown in Ottertail County and red Kidney beans were grown at the Staples Irrigation Center.

Effect of rate of nitrogen on the yield of edible beans.

N Applied lb./acre	Location	
	Ottertail Co.	Irrigation Center
0	2438	2849
30	2513	3245
60	2815	3342
90	2870	3625
120	3133	4035
150	3073	3870

At both sites, yield increased as the rate of fertilizer N was increased to 120 lb. per acre. Additional nitrogen was not beneficial. These results agree with the results from similar trials conducted at other locations. It appears that the rate of 120 lb. nitrogen per acre is optimum when this crop is grown on sandy soils.

Split applications of nitrogen are very important where irrigation is used. In these experiments, one-half of the nitrogen was applied two weeks after emergence. The remainder was applied two weeks after the first application.

The edible bean grower has several choices for split applications. Research has not yet identified an optimum nitrogen timing schedule for this crop. Research, however, is in progress to identify the optimum schedule of nitrogen applications.

George Rehm
Extension Soil Scientist

Vegetables

Corn/European Corn Borer—The first-generation ECB flight is now officially underway, with many southern Minnesota light and/or pheromone traps catching the first moths over the past weekend and early this week. In some cases the first catch was Sunday night (e.g., Dave Bach, Pillsbury Green Giant, at the Le Sueur site). Most traps (e.g. at Rosemount) were catching 1-5 per night, and then the count went to

approx. 20/night on Monday night (as of June 11th). The most record to this week was at Faribault, where Jeff Haugen reported 200/trap on Wednesday night (recorded 6/13)! Looks to be an interesting summer.

The current weather is excellent for ECB emergence, mate finding, mating and egg-lay, with nice calm, warm evenings for adult activity. The only problem for ECB is that

Vegetables/Continued

most of the MN corn is only in the 2-5 leaf stage....not the preferred stage for egg-lay or larval survival. Conventional wisdom is that moths prefer to oviposit in fields (dent or sweet corn) that has at least 17" extended leaf height. However, ECBs do not always read the same text books we write, and will definitely lay eggs on corn that is shorter...when necessary; again however, larval survival may not be the best in these situations. Degree Days for most southern Minnesota locations are still between 325 to 400 as of June 10. I am still expecting the peak flight to occur about June 25th.

Once again, the earliest planted fields (dent, seed or sweet corn) will clearly be the most attractive, and ECB will fly some distance in search of the best possible oviposition sites (3-6 miles if necessary); thus these fields really become a sink (or magnet) for the first emerging moths within any local area. THESE fields should therefore be targeted for early scouting.

As in past years, also remember that we can have "bi-modal" peaks of moth, and therefore egg lay activity, because of sporadic periods of warm, then cool days/nights (which shut down moth activity and egg lay)...primarily during the first-generation flight with less predictable spring, early summer weather. This was definitely the pattern last year; we will have to wait and see what happens in 1996. Its useful to remember this when attempting to diagnose field-specific problems and come up with the appropriate timing strategies for control, where fields are above threshold.

Check this site and others on VegEdge (<http://www.mes.umn.edu/~vegipm/>), as well as the DTN and Farm DATA networks for ECB trap catch information (as well as corn earworm data)...usually posted by Wednesday afternoons on this WWW site, Fridays on DTN and Farm DATA...and Saturday/Monday via the MN Crop Newsletter. Thanks again to all light and pheromone trap volunteers who are participating in the trap networks this year, in cooperation with the Minn. Dept. of Agriculture.

P.S. for DTN/Farm Data Users: For DTN, follow the following menu system: from "Main Menu", go to

"Local Information", then "University of Minnesota" then "Minnesota Extension Service". For Farm Data users go to "NEWS" then "University of Minnesota". If you cannot find the Extension Service info. (including these updates for ECB), contact your DTN/Farm Data service rep. My understanding is that ALL users of both services in Minnesota, should have these menu items on their system. Be sure you have it, as this will be a great way to keep up with weekly updates.

European corn borer trap catch for week: June 5 - 12, 1996 (light trap date only):

Location	Avg # ECB/night	Max. # ECB/night (Dates)
Crookston	0.0	
Fergus Falls	0.2	1 (6/10)
Morris	0.428	3 (6/6)
Glencoe	*	
Bird Island	*	
Olivia	2.8	
Gaylord	*	
Stewart	*	
Lamberton	5.33	9 (6/11)
Jeffers	5.5	17 (6/11)
S. Lamberton	3.4	13 (6/11)
Blue Earth 49A	*	
Blue Earth 49B	*	
LeSueur 51A	8.8	54 (6/13)
LeSueur 51B	7.0	62 (6/13)
Sleepy Eye 52A	0	
Sleepy Eye 52B	*	
Waseca 53S	2.0	12 (6/12)
Waseca 54N	1.5	6 (6/11)
St. Peter	15.3	34 (6/11)
Randolph	3.85	26 (6/11)
Rosemount	*	
Faribault	-	200 (6/13)
Owatonna	5.70	9 (6/12)
Geneva	0.285	2 (6/9)
Simpson		*

* represents locations that have not provided data sheets as of 6/12/96

Bill Hutchison
Extension Entomologist

Small Grains Disease Update

Root Rot—There have been numerous problems with yellowing and dying stands of both wheat and barley. It appears that most of these problems can be attributed to root rots caused by either *Fusarium* spp. or *Pythium* spp. fungi. Especially the earlier planted fields are hardest hit. The initial cold and wet soils and the subsequent crusting problems have stressed the seedlings and made them more vulnerable to these root rot fungi. The hot and dry weather has made it appear more prominent as the affected root systems no longer can

support the moisture needs of the plant. The seedlings will turn yellow and eventually die. To determine whether your stands are still adequate, it is imperative to check the health of the root system regardless of above ground systems. If the plants have a healthy white root system and have developed healthy white crown roots, the plants will likely survive. If stands are above 15 plants/sq. ft. it is unlikely at this point in time that replanting will pay off.

Septoria and tanspot—Although septoria and tanspot have been found throughout the Valley, incidences are sporadic. The warm weather will slow the further spread and development at this point in time.

Rusts—The Cereal Rust Lab in St. Paul wrote in their June 11 issue of the *Cereal Rust Bulletin* that to date no leaf or stem rust had been found on barley throughout the US. In wheat, some light infections of stem rust had been identified in Kansas, while traces of leaf rust had been found throughout that state. Since the crop is approaching maturity in much of Kansas and the rust infections are light, there will be minimal losses. This decreases the chances of a rust epidemic to develop in the northern plains.

Heat Canker—The heat of recent days have caused, in some cases, severe heat canker. One or two pale yellow bands will be visible on the leaf sheets of wheat and barley seedlings. These bands are the result of the extreme high temperature at the soil surface, especially on black soils, which result in frying of the young tissue at the soil surface. Generally plants will grow out of the problem without any detrimental effects.

*Jochum Wiersma
Small Grains Specialist*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Thunderstorms and Lightning Rocks Trees

As if the miserably cold winter didn't do enough damage to our trees, hail, thunderstorms, lightning and strong winds rolled through parts of the state—including the Metro area—adding insult to injury. Dial U received many calls asking for help in saving newly damaged trees, but unfortunately, there's rarely much that can be done.

Winds knocked some trees over completely; some were only tilted part way. If they were still quite small, it might be possible to hoist them upright (the tilted ones, not those that are flat on the ground) and stake them in place. The trouble is that many roots underground snapped as the trees bent down; depending on how much root injury there was, they may or may not recover.

Lightning struck quite a few trees, also. We heard of one that had the bark come off in great spiral strips, and it steamed and sizzled! But it's not always that dramatic. You may just see a strip of bark gone, often with a burn mark. Unfortunately, those trees almost always die within a few years, too.

Hail shredded the leaves of some larger-leafed trees (and other plants such as hosta), but smaller-leafed trees didn't seem to be affected much. As long as leaves remain green, they're helping the tree—even if they're shredded. Of course, if they're limp and wilted, they'll drop eventually, and the tree will either leaf out again or wait until next year to make new leaves. Usually, this early in the season, they'll re-leaf.

Encourage new growth from trees that lose lots of leaves by watering the soil beneath the branches and beyond any time we go a week or so without good rainfall. You might even have a soil test to see if the tree could use fertilizing.

In Minnesota, if it's not one thing, it's another!

*Deborah Brown
Extension Horticulturist*

Landscape Insects

People are noticing **foulined plant bugs** in their gardens. These bugs primarily feed on perennials, although they may also feed on vegetables and annuals. They first appear as bright red nymphs and later develop into yellow-green bugs with four black stripes. Their feeding causes small, brown, circular sunken areas. Their feeding rarely kills plants. If control is necessary, spray acephate (Orthene), carbaryl (Sevin), diazinon, or malathion. **Cutworms** have been relatively common. They hide in soil during the day and come out at night, chewing stems within two inches of the ground which cuts plants off. Physically remove and destroy cutworms found in the soil. Use collars if transplanting plants. Aluminum foil can be used for plants already in the ground. If you wish to use an insecticide, carbaryl (Sevin) or diazinon are effective.

Dial U Landscape Insects/Continued

We have been receiving questions about **cankerworms**. In most cases they are large (about one inch long) and are finishing their feeding, making it too late to treat. If cankerworms are 1/2 inch or less, control helps minimize defoliation.

Household Insects

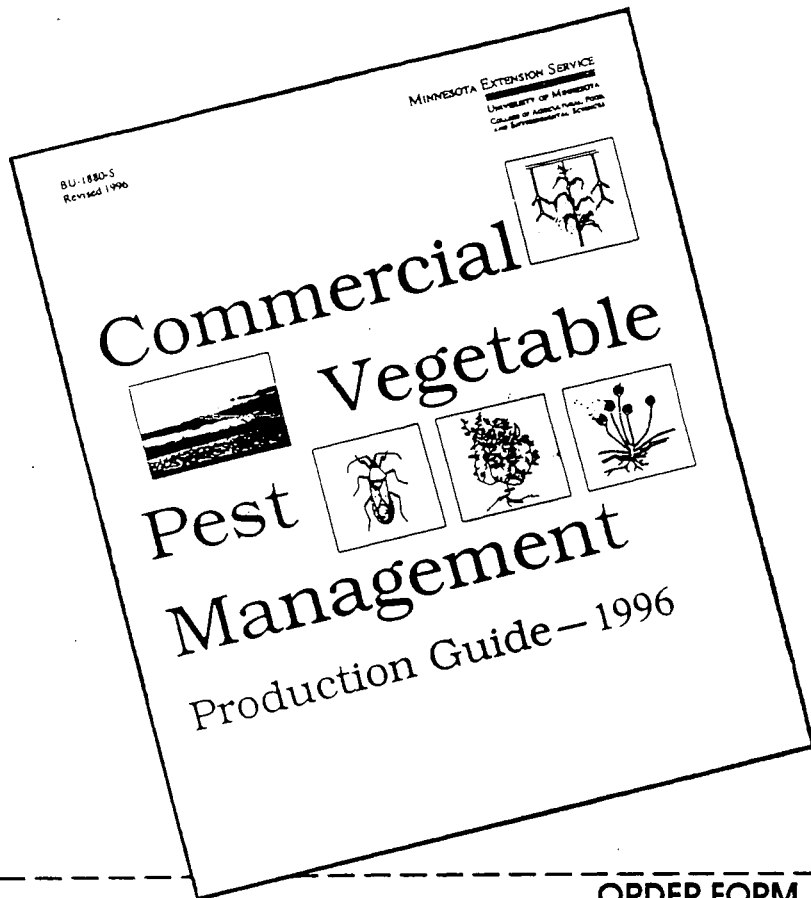
Click beetles have been common nuisance invaders in homes the last week or two. They are about 1/2 inch long, dark brown, and relatively slender insects. They apparently are attracted to lights and indoors are common on walls and ceilings. They are harmless to people and property. Physical removal is the

only necessary control. We have had a steady stream of **carpet beetle** questions this spring. The adult beetles actually feed on pollen but the larvae feed on material of animal origin such as wool, fur, hair, skin, feathers, dead insects, honey combs and hides. Although they may be found on carpets, they're not usually feeding on them as carpets are usually made from synthetic materials. Sanitation is very important in control. Vacuum to remove potential food sources. Also try to find the source of the infestation (sometimes easier said than done) and remove it. We continue to receive lots of ant calls especially **carpenter ants**.

Jeffrey Hahn
Assistant Extension Entomologist

ANNOUNCING

The 1996 Minnesota Extension Service
Commercial Vegetable Pest Management
 Production Guide — 1996



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Available March 1996

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Prepared by the Departments of Entomology, Plant Pathology, and Horticulture, The IPM Program, and Educational Development System, Minnesota Extension Service, University of Minnesota.

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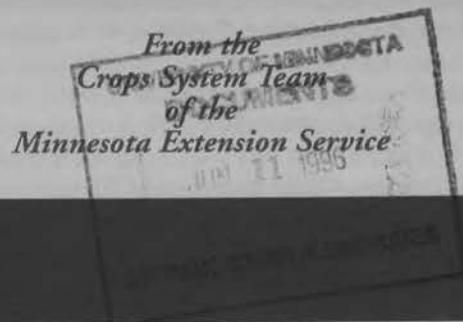
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CROP

NEWS



Herbicide Injury Problems Related to Cold Weather and Wind

Over the last week and one-half I have been receiving reports of corn injury associated with soil applied herbicides such as Dual, Lasso, Frontier, Harness, Surpass and Banvel. In almost all cases the major factor leading to crop injury has been the cold soil temperatures which have lead to slow emergence of the corn plant and the increased opportunity for herbicide uptake by the corn plant. Also, cold temperatures slow a corn plant's rate of herbicide degradation, thereby increasing the potential for crop injury.

In most cases large stand reductions have not been reported, the major exception has been where the acetanilide herbicides have been tank mixed with Banvel. Under these cold soil conditions this is a recipe for significant stand loss. Until the below normal cold temperatures subside, the potential for postemergence injury on cold stressed crops also exists. Most postemergence labels state this warning on their labels. Heed the labels warning. With late planted crops and the potential for an early fall, any set back in crop growth and development due to herbicide injury now may hurt you significantly at harvest time. The good news is that the weeds have not been growing at a very rapid rate either, so there is still time to get it all done.

Another problem has been the wind and the associated drift complaints. I know that time is limited in the spring and early summer but with the high unit activity of many of the herbicides in use today it is very important to avoid application during windy weather. For example, a little Roundup can go a long way if it drifts into a field of corn. Also, associated with drift is the potential for increased pesticide exposure and any corresponding health concerns. It has been a rough spring so far, but please, take it easy.

Jeffrey L. Gunsolus
Extension Agronomist—Weed Science

Highlights....June 7, 1996

- Herbicide Injury Problems Related to Cold Weather and Wind*
- Ag Professional Field School*
- Weed Tours, Branch Station Field Days*
- Interseeding Legumes in Sunflower*
- Should Supplemental N be Recommended for Corn?*
- Disease Monitoring In Dry Beans Has a Potential Payoff*
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 - Carrots/Aster Leafhopper Update*
- Dial U*
 - Black Flies*
 - Entomology Notes*
 - Trees Continue to Show Signs of Winter Injury*

AG Professional Field School

This summer, the Ag Professional Field School will be offered at the Southern Experiment Station in Waseca on July 9 and 10. This hands-on, in-field crop management program will emphasize corn and soybean production. Participants will enhance their troubleshooting and crop management skills with hands-on experience with actual cropping situations. Application for 14 CEU credits has been made in the crop production, soil and water management, pest management, and soil fertility categories. This School can also be taken for college credit.

Instructors will include UM faculty Gunsolus, Durgan, Randall, Stienstra, Ostlie, Hicks, Hardman, Lamb, Schmitt, Johnson, Porter, and MacDonald. Industry instructors include Gednalske, and Schoper. There will be an "advanced" grouping for participants who have attended this program in the past. Preregistration is mandatory as space will fill fast. Registration must be received by June 25. The fee this year is \$225. For information on the program and registration, contact Tracey Benson at (612) 624-3708 or 800-367-5363. For program content information, contact Mike Schmitt (612) 625-7017 or Bev Durgan (612) 625-7262.

Mike Schmitt
Extension Soil Scientist

Weed Tours, Branch Station Field Days

Minnesota Weed Tours—Please mark your calendars for the upcoming weed tours at Rochester and Waseca, MN on July 17 and 23, respectively. The July 17th weed tour will begin at the Dodge Fairgrounds at Kasson, MN at 9:00 a.m. and will continue until 1:00 p.m. Be prompt as we will be touring by bus. The July 23rd weed tour will be held at the Southern Experiment Station in Waseca, MN from 8:30 a.m. until noon. We have moved the weed tours into July with the hope of hitting a "calmer" period of time when more agriculture professionals are able to attend. We hope to see you at one or both of the tours.

Branch Station Field Days—If you have schedule conflicts with the July weed tours, perhaps you should consider attending a branch station field day. The field days offer you the opportunity to see the diversity of research being conducted at the branch stations, including corn and soybean herbicide evaluation studies. The field day dates are as follows: Waseca—June 18; Lamberton—June 19; Morris—July 11, morning.

Jeffrey L. Gunsolus
Extension Agronomist—Weed Science.

Interseeding Legumes in Sunflower

Sunflower is a low residue crop. Increasing residue may be achieved by interseeding legumes in the sunflower. Interseeding legumes has the additional benefit that legumes have the ability to fix di-nitrogen from the air. The legume can be broadcasted at the same time as field cultivation takes place. Research conducted at North Dakota State University showed that legumes can be interseeded in sunflower at the V4 sunflower growth stage (the plant has four true leaves), without reducing the sunflower yield.

Sweetclover (sown at the V4 sunflower growth stage), and hairy vetch (when sown at V4 and V10), and sunflower residues combined gave sufficient soil cover to protect the soil from erosion during the season and over the winter. The legume hairy vetch (*Vicia villosa* Roth) performed very satisfactorily. Hairy vetch is considered a winter annual in most states. However, grown in Minnesota, hairy vetch does not consistently survive the winter. Hairy vetch grows well on most soil types. The plant is fine stemmed and leafy. Hairy vetch seed is round and considered large for a legume crop (about 1/3 the size of a soybean). A firm seedbed is desired when seeding into tilled soil. The optimal seeding rate for interseeding hairy vetch in sunflower is 10 to 12 lbs/acre. A seeding depth of 3/4 inch to 1 inch is recommended. Seed can be obtained at about 70-90 cents/lb. Hairy vetch has good seedling vigor and seedlings are very competitive against weeds once established. It has a shallow root and is not considered drought tolerant.

Mean sunflower achene yield and legume dry weight averaged across two sunflower hybrids, and five environments in ND from 1992-1994.

Legume	PLT†	V4	V10
<u>Sunflower achene yield in lb/acre</u>			
Hairy vetch	1198c‡	1615a	1671a
Sweetclover	1373b	1608a	1677a
Alfalfa	1390b	1694a	1647a
Snail medic	1417b	1694a	1628a
Black lentil	1570a	1649a	1631a
Control	1634a	1675a	1638a
<u>Legume dry weight lb/acre</u>			
Hairy vetch	3657a	1422a	741a
Sweetclover	2050b	729b	338a
Alfalfa	1228c	568b	371a
Snail medic	1500bc	487b	422a
Black lentil	1236c	442b	272a

† Legume sown the same time as sunflower (PLT), and at the V4 and V10 growth stages of sunflower, respectively.

‡ Legume sowing date x legume values in a column

The interseeded hairy vetch can be worked into the soil in the fall or spring before sowing a small grain crop. Sweetclover should only be used if the intention is to establish the crop for the subsequent season.

Hans Kandel
Red Lake County Extension Educator

Should Supplemental N be Recommended for Corn?

Nitrogen management decisions are still being made, and many previous management decisions are being questioned. Nitrogen that was applied last fall, last winter, or early this past spring can be the cause of some anxiety. With the cool temperature and rainfall patterns we've seen this spring, the issue of supplemental N is appropriate. Supplemental N is not to be confused with sidedress N. If you planned on applying N in a sidedress manner as part of your original N management plan, that N is not considered supplemental. Supplemental N is the amount of N needed to be added to compensate for N that was already applied and possibly lost. Obviously, it gets confusing because all supplemental N will be sidedress applied!

We have devised a "scorecard" that has been successfully used for the past several years throughout Minnesota. Keep in mind that good judgement is still very important when using this simple decision aid. Also, each field needs to be evaluated individually.

Score Sheet: A decision aid to assist in determining whether sidedress, supplemental fertilizer N should be recommended for corn.

Instructions: For each field, evaluate the situation in terms of the three listed factors and assign the appropriate score.

Factor 1: When was the fertilizer N applied?

	<u>Fall w/o N.I.</u>	<u>Fall w/ N.I.</u>	<u>Early Spring</u>	<u>Late Spring</u>
Score:	4	3	3	2

Factor 2: What has been the predominate soil moisture status in the field?

	<u>Standing Water/Saturated</u>	<u>Wet</u>	<u>Normal</u>
Score:	4	3	1

Factor 3: What is the crop's current condition?

	<u>Chlorotic/ >16" Tall</u>	<u>Chlorotic/ <16" Tall</u>	<u>Green/ <16" Tall</u>	<u>Green/ >16" Tall</u>
Score:	5	3	2	1

Now: Total the score for the 3 factors and use the following guidelines.

<u>Less than 7</u>	<u>8-9</u>	<u>10 or more</u>
No supplemental N is recommended	Re-evaluate in one week	Add an additional 40-70 lb. N/acre

Our recommendations in Minnesota have a range of 40-70 lb. N/acre. Individual adjustments must account for local criteria regarding each field such as current yield goal, degree of soil saturation, etc..

*Mike Schmitt
Extension Soil Scientist*

Disease Monitoring in Dry Beans has a Potential Payoff

Experienced dry bean growers know that regular field monitoring and timely treatment can thwart yield losses due to diseases. Certified seed and seed treatments will aid in the damping off and root rot problems but they still can be yield limiting in specific cases. Damping off due to a buildup of soil disease organisms can many times be corrected by a second seeding in time for harvest before a frost. After the 5th or 6th trifoliolate scouting for leaf diseases is essential.

Rust and white mold are the 2 most important diseases to catch early. Rust pustules that appear before or during

bloom signal a potential yield loss in that field. Labeled applications of Maneb fungicides are still effective in slowing down this disease if caught early enough. EPA has still not acted on our application to use Tilt again this year. We will announce their decision as soon as we hear.

Monitoring water input from June 1 until 10 days into bloom will assist in a spray decision for white mold. Our latest research show that sprays will be economical only 20% of the time if 3-5 inches of rain/irrigation are applied during this period of time. If 5-7 inches of water are applied during

Disease Monitoring/Continued

this same period, the potential for return goes up to 65%. If over 7 inches of water are applied to the field during this period the potential for return increases to 85%. Benlate and Topsin M and Rovral are registered for use on white mold in dry edible beans. Benlate and Topsin M were used in the research study cited above. A spray program and irrigation scheduling according to water deficit will go a long way to beat white mold yield losses. Our research shows the irrigations should only be applied when soil water tension reach 55-60 centibars on the Verndale Sandy loam soils at Staples. During years with lower rainfall where irrigation accounts

for the majority of the water input, this irrigation schedule without spraying can be as beneficial as a spray program with soil tensions at 30 centibars (very wet).

The above research on white mold was supported by the Northharvest Bean Growers Association and AURI. The research was conducted at the Staples Ag Center in response to the needs of the growers in the irrigated sands. Project investigators include: Richard A. Meronuck, Jerry Wright, Linda Kinkel and Kasia Duellman. Support staff included Mel Wiens and Becky Sheets.

*Richard A. Meronuck
Extension Plant Pathologist*

Avoiding Uneven Emergence

Corn sometimes emerges unevenly because of environmental factors that corn growers can't control. Nevertheless, the following management practices can help you avoid uneven stands:

- ✓ Avoid excessive tillage trips which dry or compact the seedbed.
 - ✓ Remember that tilling when soils are too wet can produce cloddy soils, a major cause of uneven stands.
 - ✓ Dig up some seeds during planting to monitor seed placement. If contact between seed and soil is poor or seedling depth isn't uniform, adjust seed openers and/or press-wheel tension. Secondary tillage operations may need to be changed to improve soil conditions for more uniform planting.
- ✓ If you are using a tillage system that retains substantial crop residue on the soil at planting, adjust tillage and planting equipment so residue cover over the row area is uniform after planting.
 - ✓ Follow recommended herbicide application guidelines to avoid injuring corn.
 - ✓ After planting, closely monitor corn emergence and use a rotary hoe if a soil crust is keeping corn from emerging uniformly.

Source: *NCR Publication No. 344.*

*Harold Stanislawski
Otter Tail County Extension Educator*

Spray Equipment Tips

Cut Crop Injury by Cleaning Sprayer

Instructions for cleaning sprayers vary by herbicide, but details are on labels. In general, older sprayers used to apply 2,4-D type products should be rinsed with water and the rinse sprayed onto the crop.

CLEAN SPRAYER CONTAINING OIL BASED HERBICIDES (ester forms of 2,4-D and similar materials), by following these steps:

- 1) Rinse sprayer with kerosene, diesel fuel or a comparable light oil.
- 2) Fill tank one-fourth to one-half full of water-ammonia solution (1 qt or household ammonia to 25 gals of water) or a trisodium phosphate solution.
- 3) Circulate solution through system for a few minutes, then let a small amount go through nozzles.
- 4) Allow rest of solution to stand six hours and pump through nozzles.
- 5) Remove nozzles and strainers, then flush system twice with clean water.

TO CLEAN A SPRAYER CONTAINING WET-TABLE POWDERS, AMINE FORMS OF 2,4-D AND WATER-SOLUBLE LIQUIDS do the following:

- 1) Thoroughly rinse tank with a water-detergent solution (2 lbs. detergent in 30-40 gallons water).

- 2) Allow water-detergent to circulate through system for several minutes, then spray it on crop.
- 3) Remove nozzles and strainers, then flush system twice with clean water.

Worn Sprayer Nozzles Can Cost Money

A 50-foot sprayer with 20-inch nozzles spacing would have 31 nozzles. Those nozzles can cost anywhere from \$1.50 to \$4.00 each. Replacing them is going to cost from \$46.50 to \$124.00. Replacing nozzles costs money, but look at what those nozzles do during spray season. If that sprayer covers 1,000 acres of broadcast herbicide work in a season, each nozzle will have sprayed about 33 acres. With an average herbicide cost of \$10 an acre, each nozzle will have put out \$330 worth of pesticide.

A nozzle that is applying 10 percent too much chemical will add \$33 to that \$330 chemical cost. Take the \$33 times the number of nozzles that are over-applying and it adds up pretty fast.

*Harold Stanislawski
Otter Tail County Extension Educator*

Heat Canker, Small Grains, Broadleaf Crops

Air temperatures in the 80's with sunshine creates soil temperatures that can cause plant injury to both grass and broadleaf crops. In severe cases a constricted area completely girdles the base of the plant at the soil line. This can lead to a toppling over of the plant at that point. In less severe cases, there may be a little or no constriction, but as new leaves emerge they will have one more yellowish to whitish stripes across the leaf—these areas were at the soil line several days earlier when the soil was especially hot. These stripes represent heat injury while the leaf was still in the sheath. No serious damage is expected from this injury.

Broadleaf crops such as mustard, rapeseed and flax are often killed. Newly emerging plants are more susceptible. Before treating the fields for insects and herbicides, assess the stand loss and be sure sufficient plants remain for economic yields. Rapeseed, mustard and flax all compensate for reduced stand by more branching. Less than 50% stand will require extra care in weed control and other management to give good yields. Normal stands of flax should be about 70 plants per square foot. Rapeseed and mustard should have 20 plants per square foot at normal seeding rates.

*Harold Stanislawski
Otter Tail County Extension Educator*

Peak Herbicide Received Label in Small Grains

Peak herbicide has been approved for use in hard red spring wheat, durum, barley, oat, rye, proso millet, and sorghum.

Peak is a sulfonylurea herbicide and is a component in the corn herbicide package mix "Exceed". Peak controls many broadleaf weeds including: mustards, pigweed, cocklebur, common lambsquarters, kochia, smartweeds, wild buckwheat, and sunflower. Peak will also give suppression of common mallow and Canada thistle. Peak has soil activity and will provide a minimum of 4 weeks residual control of small seeded broadleaf weeds. Peak has good to excellent small grain safety.

Use rates in small grains is 0.25 to 0.5 oz product/A. Apply Peak after the 3-leaf stage of the small grain and until the 2nd node is visible.

Because of its soil residual, the use of Peak in Minnesota will be limited. The 1996 label allows small grains, corn and proso millet to be planted the year following a Peak application. Sugarbeet and sunflower cannot be planted until 24 months (three growing seasons) after a Peak application. All other crops can be planted the second growing season following a Peak application. Therefore, Peak herbicide could best be used in fields that are in continuous small grain or a small grain corn rotation.

Supplies of Peak will be very limited in 1996. The approximately cost is \$10.00/A.

*Beverly R. Durgan
Extension Agronomist—Weed Scientist*

Assure II Receives Label in Additional Crops

Assure II herbicide has been approved for use in dry and succulent peas, dry and snap beans, and sugarbeets. Use rates for Assure II in the above mentioned crops is very similar to use rates in soybeans. Check the supplement labels for use rates, tank mixes, and harvest restrictions.

Unfortunately, canola did not receive registration, however Dupont is hopeful that registration will be received sometime this year.

*Beverly R. Durgan
Extension Agronomist —Weed Scientist*

Early Season Fungicide Use on Wheat

According to Marcia McMullen, extension plant pathologist at NDSU and Roger Jones, extension plant pathologist at the University of Minnesota, the wet soils and heavy dews will favor early infection by tan spot or Septoria fungi, especially if wheat is in wheat stubble. Wheat in the 4-5 leaf stage may benefit from use of foliar fungicides, if disease is present.

The fungicide options available to Minnesota farmers include a 1 lb. rate of mancozeb (Dithane, Penncozeb, Manzate, or Clean Crop) at about \$2.75/acre or a 2 fl. oz./acre of Tilt at about \$4.25/acre. Mancozeb is a protectant type fungicide while Tilt has locally systemic activity. Note that for Tilt only 4 fl. oz./acre can be used in the same season. The early use of Tilt will restrict heading applications to 2 fl. oz./acre.

NDSU trials across sites, years, and cultivars indicate a variable response to early season fungicides. Average yield responses to mancozeb in 1992 and 1993 ranged from 5-7%. In 1994, responses were more variable, from 0% to a 14.5% yield increase in a north central site. Responses to a 2 oz. rate of Tilt in 1994 also were variable, but up to a 12% response at Wishek, ND. Interested producers may mix these fungicides with certain herbicides if allowed or not prohibited by the label. Producers must consult the herbicide/fungicide labels for restrictions on mixing, and for any need or restriction relating to adjuvants.

*Jochum J Wiersma
Small Grains Specialist*

Vegetables

Corn/European Corn Borer—I'm still not sure if global warming has hit Minnesota, but I will faithfully report ECB degree-day accumulations, such as they are, for this section of the planet. Accumulations are shown below for selected MN sites; if you have access to the internet, complete DD Maps (updated daily by 11:30 am) for ECB are available for MN and WI (<http://bob.soils.wisc.edu/wimnext/insectdev.html>) or at several stops along our "VegEdge" homepage, at <http://www.mes.umn.edu/~vegipm/> In addition, we now have plans to make this information, AND trap catch data, available on the DTN system, via the Minnesota Extension Service page. The first ECB information will be posted Friday, June 7, on the DTN (also for those who subscribe to the Farm Data Network in Minnesota only).

Degree-day Accumulations for Minn. (DD > base 50°F), as of June 3, 1996*

Alexandria	238
Morris	262
Rosemount	325
Faribault	261
Rochester	259
Waseca	283

*Provided by David Bartels, Graduate Research Assistant (GRA).

ECB Larval Survival and Pupation Rate—Dave Bartels and Becky Hines (GRA) conducted a follow-up survey of our sweet corn 'ECB-Barometer' field at Rosemount on June 4th, and found the following: avg. of 1.61 live larvae, 0.71 live pupae and 0.63 dead larvae per stalk. A total of 2.32 live individuals (larvae + pupae combined)/stalk is down from our May 2nd avg. of 3.13 live larvae/stalk, indicating some natural mortality; this level of mortality is reflected well by the 0.63 dead larvae/stalk estimate. Average percentage of ECB that had pupated was 27.5% (range: 15 - 37%). In contrast, ECB pupation was averaging 60% by June 4th in northern Illinois (via Brian Flood, Del Monte Foods).

ECB/Blacklight Trap Catches—*THANKS* again to all MINNESOTA cooperators who faxed their reports in this past week (remember to fax your updates on **Wednesday mornings** to Hutchison at: 612-625-5299). Nearly all counts

for all sites were ZERO this past week (as of 6/5/95). Given the fact that we are still at <300 DDs at most sites, and that our Rosemount ECB population is still at ≈ 28% pupation, I do not expect many moths flying at this time. However, with expected 10% catch at 460 DDs, AND some warmer forecasts for next week, we should see some ECB moth catches during the coming week at southern locations. Using current temperature data for 1996 (through June 4th) and 30-yr normal temperatures for projections, *our current DD FORECAST is projecting the early phase (10% catch) to occur about June 15th, and the peak catch (50% moth emergence) to occur about June 22nd.* These estimates are based on our first-generation ECB model for southern Minnesota (based on 5 years of data collected at Rosemount), shown below.

First Generation ECB Model—Southern Minnesota (5 yr data base)

% Moth Emergence	Avg. Degree-Days (DDs > 50°F) (with 95% Prediction Interval)
10	460 (... - 525)
25	520 (445 - 570)
50 (peak)	590 (540 - 650)
75	680 (615 - 810)
90	780 (670 - ...)

Carrots/Aster Leafhopper Update—ALH counts are still high in southern Minn. (Hollandale area), ranging from 15 to 60 ALH/100 sweeps; many growers, however, have now treated for ALH. Brian McCornack (summer undergraduate intern) collected ALH adults June 5th and transported these to the St. Paul campus (in collaboration with Dr. Ernie Banttari) to estimate the percent infectivity level. This information will be available later this month. As part of this AURI/MDA funded project, and in cooperation with Dr. Kim Mogan (UW River Falls), we are also developing/validating a quick PCR assay (essentially DNA fingerprint) to estimate the percentage of adults vectoring the aster yellows mycoplasma. In the meantime, the most recent estimate from Wisconsin is 2.5%, and should still be used for making treat no-treat decisions in Minnesota vegetables.

Bill Hutchison
Extension Entomologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Black Flies

Black flies, also known as gnats, have been noticeable since early May. The larvae live in large, fast rivers and when they emerge as adults can fly long distances from breeding areas to bite people and animals. These insects usually fly around peoples' heads and commonly bite along the hairline, arms, feet, ankles and other exposed skin. Their attacks are more severe during early mornings and evenings, cloudy days, and in still and sheltered areas. They are less of a problem on sunny days and windy days. Peoples' reactions to bites vary from slight or no reaction to much swelling and irritation.

There is no guaranteed method to keep black flies away, although people can minimize their bites. Avoid wearing after shave lotions, perfumes or other scented lotions. Wear long-sleeved shirts and pants that are light colored. Repellents generally don't work well, although some people claim products with DEET help them. Wearing a fine meshed veil helps protect the head. Black flies occur all summer but are most annoying in spring. This is because the two worst-biting species occur in May and June but only have one generation. Black flies live approximately six to eight weeks as adults.

Entomology Notes

Pine needle scale crawlers have been sighted at the beginning of the week. The best time to manage scale populations is when the crawlers are active. **Elm leaf beetle adults** have been spotted on elm trees. They consume the entire leaf. Elm leaf beetle larvae later on will skeletonize leaves. **Flea beetles** have been found chewing BB sized holes in radish, spinach, Swiss chard and other plants. If it is necessary to protect the plants, apply an insecticide (carbaryl, diazinon, malathion). **Spittle bugs** have been reported on perennials. They normally don't kill plants. If you remove the spittle mass, you will find a greenish insect. Remove or crush spittle bugs you find. Insecticides are not effective. **Oystershell scale crawlers** are expected to be present in early June (in central Minnesota). **European pine sawfly larvae**, 1/4 inch long, have been found on a mugo pine in the Twin Cities. Sawflies are best controlled when they are treated when they are 3/8-1/2 inch long or less.

Carpenter ants continue to be common calls and samples. We continue to see carpenter ants swarms. We have also received a sample of winged **pavement ants**. We also periodically have received questions about **carpet beetles**, sometimes in large numbers.

*Jeffrey Hahn
Assistant Extension Entomologist*

Trees Continue to Show Signs of Winter Injury

We're still getting lots of calls at Dial U about trees with winter injury. Now, in addition to trees that didn't leaf out, we're hearing about trees that began to leaf out but all of a sudden, the leaves are turning dark and crinkly, and dying.

Callers commonly look to current weather patterns for possible causes, but in reality, the problem is winter injury to the roots and/or conductive tissue that's responsible for transport of water and nutrients up through the plant and out to the leaves. They might have been able to handle the job at first, but as the leaves got larger, and weather got warmer and windier, the leaves lost more and more moisture and the roots and conductive tissue couldn't keep up with the demand.

Trees do not have to come down immediately. Where there's any hope they'll re-leaf and recover to some degree, just water them thoroughly any week we don't have good rainfall. Assess the tree late this summer, maybe even next spring. Then, if you can just prune out some dead branches, fine. But if most of the tree is dead or dying, you can replace it knowing you've done all you could.

In the Metro area we've gotten quite a few calls on maroon-leaved Norway maples, Sunburst (chartreuse colored) honeylocust, along with green ash and various maples. The injury doesn't seem restricted to certain trees, though. Location and exposure, age and degree of establishment, and whether the tree was suffering from any other problem that predisposed it to winter injury all need to be factored into the equation. Young trees in exposed sites seem to have suffered the most damage.

*Deborah Brown
Extension Horticulturist*

MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA

COLLEGE OF AGRICULTURAL, FOOD,
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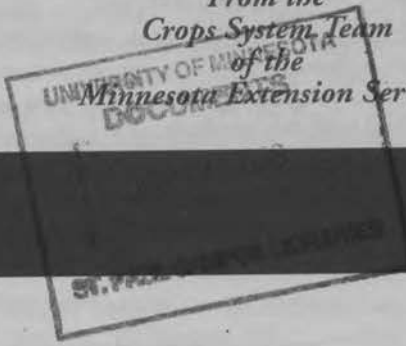
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CROP

NEWS

From the
Crops System Team

of the
UNIVERSITY OF MINNESOTA
Minnesota Extension Service



Light Green Areas in Small Grain Fields

There are recent reports that spring wheat, which was planted early, is showing a light green color in some fields in the eastern part of the Red River Valley. The cause of this problem is not obvious and a combination of several factors could produce a light green color.

This problem has also appeared in previous years. Soil and plant sample analysis at that time indicated that the problem could be caused by deficiencies of potassium and/or sulfur. Trials were conducted in 1995 in a field near Erskine to evaluate the effect of the broadcast application of various nutrients. The yields are summarized in the following table. In this field, there was a response to the use of potash. The soil test for potassium was in the medium range (120 ppm).

Effect of the application of various nutrients on wheat yield. East Polk County. 1995.

N	Nutrient Applied				Yield
	P ₂ O ₅	K ₂ O	S	Cu	
----- lb./acre -----					bu./acre
100	80	—	—	—	38
100	80	120	—	10	41
100	80	120	25	—	40
100	80	120	25	10	43
100	80	—	25	10	38

Fertilizer trials have been established in the area for 1996 in an attempt to determine the cause of the problem. There is no information yet from these trials. Hopefully, there will be an opportunity to collect more samples from these problem fields in 1996. At this time, there is no recommendation for application of potassium, sulfur, or phosphorus after the wheat has emerged.

*George Rehm
Extension Soil Scientist*

Highlights....May 31, 1996

- Light Green Areas in Small Grain Fields*
- Early Planted Corn*
- Samples Submitted to Plant Disease Clinic During May*
- Delayed Planting Of Small Grains and Alternative Crops*
- Vegetables*
 - Sweet Corn/European Corn Borer*
 - Aster Leafhopper Update*
- Stand Loss Problems Begin To Emerge*
- Dial U*
 - Trees Showing Effects of Harsh Winter*
 - Thief Ants*
 - Entomology Notes*

Early Planted Corn

As we drive across the state, it's obvious that most of the early planted corn has emerged. Most of the stands appear to be good. There are two problems that are very evident. Both are related to the below normal temperatures.

The majority of the corn has a light green color which can be attributed to the cool temperatures — especially the cool nights. On the drive home today (5/30) some fields

Early Planted Corn/Continued

were starting to show better color. A series of good warm days and nights should help this problem.

The weeds also grow well in cool, wet weather. Some fields are clean—others are begging for some weed control. The use of any one of a variety of effective post-emergence herbicides should help this problem.

For those who have not applied nitrogen, this is the time to get serious about sidedress applications. If there is uncertainty about rate, a spring test for nitrate nitrogen is available and can be an important management tool in fine-tun-

ing nitrogen recommendations. This test requires that soil be collected from a depth of 0-24 inches and analyzed for nitrate-nitrogen. Contact the local county extension office for additional details. With good prices, money is lost if less than adequate rates of nitrogen are applied. On the other hand, money is wasted if excess rates of nitrogen are used. The spring nitrate test will help to determine the accurate rate of nitrogen to use.

George Rehm
Extension Soil Scientist

Samples Submitted to the Plant Disease Clinic During May

Samples submitted to the Plant Disease Clinic during May included:

soybean—downy mildew, soil for soybean cyst nematode egg counts

wheat—scab/plant vigor testing

haylage, silage, corn—cultured for storage molds

sugarbeet—soil for cyst nematode egg counts

turf—*Bipolaris* sp leaf spot and crown rot

fuchsia—*Pythium* sp root rot

geranium—numerous samples were tested for *Xanthomonas campestris* pv *pelargonii* (bacterial wilt), one sample tested positive

N.G. impatiens—impatiens necrotic spot virus (INSV), *Pythium* sp root rot

tulip—*Penicillium* sp bulb rot

rose—downy mildew, herbicide damage to Horticulture

snapdragon—INSV

pachysandra—bacterial leaf spot

canna—bacterial leaf and bud rot

phlox—*Cercospora* sp leaf spot

begonia, gerbera, heliopsis, asclepiasis, ageratum, phlox, petunia & salvia—tested negative for INSV and TSWV

Sandra Gould
Plant Disease Clinic

Delayed Planting of Small Grains and Alternative Crops

As the month of May slipped past us, some of the small grains still have not been planted. We are quickly approaching the end of our planting window even for the extreme northern part of Minnesota. Wheat and barley yields from plantings after June 1 will be severely reduced and it may be more profitable to switch to other crops in northern Minnesota. This means that:

- a. If you decide not to switch away from wheat and barley, increase the seeding rate at least 20% after June 1.
- b. If you decide to switch away from wheat and barley, there are some alternative crops which may yield a better return per acre than either wheat and barley or prevented planting insurance. Among the crop options are:
 - 1) Flax
 - 2) Sunflower; choose early maturing varieties, especially north of Hwy. 2

- 3) Soybean; choose early maturing varieties, especially north of Hwy. 2
- 4) Dry edible beans; choose early maturing varieties, especially north of Hwy. 2
- 5) Buckwheat
- 6) Alfalfa and other forages as described by Dr. Martin in a previous issue of *Minnesota Crop News*.

Remember to check your cropping restrictions due to previously applied herbicides.

Jochum Wiersma
Small Grains Specialist
Ervin Oelke
Extension Agronomist-Crops

Vegetables

Sweet Corn/European Corn Borer — It appears we may actually have some spring weather this year, as we now have had more 70°F days than in April (only 2 total in April). However, for those of us who were able to spend a week in Arizona during April or May, personal heat unit accumulations may be significantly different. At any rate, for ECB in Minnesota, we are now getting over the 200 Degree-day mark (see table below). Again, we should not be seeing significant moth catches until 350-400 DDs (sine wave scale). Please refer to the May 10th issue of this newsletter to see our Minnesota ECB First-generation Model. Projected 10% cumulative catch, based on this model, occurs at approx. 460 DDs.

Degree-day Accumulations for Minn. (DD > base 50°F), as of May 28, 1996

Morris	192
Rosemount	258
Faribault	204
Rochester	205
Waseca	219

Beginning next week, and in cooperation with Dharma Sreenivasm, MDA, and our expert volunteers across the state, we will begin posting blacklight (and selected pheromone trap sites) trap catch information for ECB. Also remember that this information, along with DAILY HEAT UNIT (DD) updates for ECB (FOR MN AND WI) are available through our 'VegEdge' IPM site on the WWW of the Internet, at <http://www.mes.umn.edu/~vegipm/>

Aster Leafhopper Update — ALH counts are still high in southern Minnesota (Hollandale area), ranging from 15 to 40 ALH/100 Sweeps, and we are still assuming a 3% infectivity rate. All fields should be monitored closely, as counts vary considerably from field to field. In the Anoka area, ALH counts dropped to almost zero this week.

*Bill Hutchison
Extension Entomologist*

Stand Loss Problems Begin to Emerge

As corn finally begins to emerge, stand loss problems from insects also surface. Reports of cutworm, seedcorn maggot, and wireworm activity are beginning to trickle into our office. With this spring's cool, wet weather, stand loss from some insects, such as seedcorn maggot and seedcorn beetles, are likely to be above normal. Even though soybean planting and weed spraying distract us from scouting corn that's emerging, now's the time to check for stand loss problems. With this year's corn market, prompt detection and management is more important than ever.

Prompt detection and diagnosis hold the key to sound management decisions. Delayed detection limits management options and drastically diminishes the yield potential if replanting is required. When stand loss problems appear, it's time to play detective. Diagnosis involves narrowing the possibilities based on field history, damage symptoms, insect signs, and scouting for the actual insects themselves. What damage symptoms are present? Is there any pattern to the symptoms in the field? Is stand loss still occurring? Can you find the insect causing the symptoms? Knowing what insect is causing the problem reveals your immediate management options and the prognosis for continued damage.

Cool, wet weather this spring enhances the potential for stand loss problems from some insects, such as seedcorn maggot and seedcorn beetles. With **seedcorn maggot**, slow emergence increases the opportunity for them to find and attack the softened seed. Adult flies are attracted to partially buried, decaying organic matter. So fields at risk include heavily manured fields, especially solid manure with bedding, or spring plow-down of green manure. The life cycle is rapid, so in many cases decaying seeds or dying seedlings

with tunneling are the only symptoms. Orange to brownish, cylindrical pupal cases (<1/4") nearby in the soil may still be present. **Seedcorn beetles** are normally predaceous but cool wet weather makes finding their normal prey more difficult and they turn to seeds as a last measure. Damage usually subsides as soil temperatures warm and their normal prey become active. The only sign of attack may be chewed out seeds. Both of these insects can be regarded as temporary, opportunistic problems. Unfortunately no rescue options exist, so the only decision is whether or not to replant.

Wireworms become active as soil temperatures climb into the 60°F range. They attack not only the germinating seeds but also the newly emerged seedlings. Stand loss progresses until soil temperatures climb into the upper 70's and the upper soil layer begins to dry out. These hard-shelled, brown to tan to orangish insects (1/2" to 2") are usually still present when stand loss is noted. Because of a long life cycle, the problem may recur next year; so map trouble spots. If replanting is required, protect the replanted corn with a seed treatment (minimum) or a soil insecticide.

White Grubs feed on developing roots. Besides killing newly emerged plants, surviving plants may be stunted and have either a cyanotic (purplish) or xanthophyllic (yellow-orange) discoloration. The white "C" shaped larvae have a distinct orangish-brown head capsule and legs. Problems with *Phyllophaga impicita* in western Minnesota usually occur in lighter, sandier soils near treelines or farm windbreaks containing cottonwood, poplar or willow. Damage should be at

Stand Loss Problems/Continued

a low point in its 3-year cycle this spring. Other white grub species predominate in sod and CRP with the damage potential unknown.

Cutworm activity is increasing with only native cutworms that overwinter as eggs or larvae causing problems so far. Weather systems have generally not been conducive to black cutworm migration into Minnesota and little threat is expected from this species this year. With corn prices quite high, I suggest using a lower threshold for rescue sprays, 1-2% cutting and smaller cutworms present (<3/4"). Cutworms vary tremendously in cutting potential with species like black cutworm and glassy cutworm cutting very aggressive while others such as dingy cutworm are primarily leaf feeders. Do not treat fields on the basis of leaf feeding. Leaf feeding does not diminish yields and only serves as a "heads-up" for further monitoring. Watch cutting behavior closely....Where is the plant being cut? Cutting well below the soil surface has the greatest chance on causing stand loss.

In contrast, dingy cutworms cut at the soil surface with little impact on stand since the growing point is well below the soil surface on young corn. Remember that you're spraying to prevent future stand loss so find a few cutworms, look at their size, and make sure that some cutting potential remains. For example, treating 1.5 to 2" black cutworms satisfies a revenge urge but doesn't stop much additional stand loss.

Rescue sprays are quite effective against cutworms. Primary insecticide options include pyrethroids, such as Asana, Ambush, Pounce, and Warrior, and organophosphates, such as Lorsban. Insecticides can frequently be tankmixed with postemergence herbicides to reduce application costs and save a trip, but watch labels closely. For example, Lorsban may interact with sulfonyl urea herbicides to produce crop injury in either tank mixes or sequential applications.

I would appreciate hearing about stand loss problems with insects, especially severe infestations that require re-planting. Please call me and leave a message at (612) 624-7436.

*Ken Ostlie
Extension Entomologist*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Trees Showing Effects of Harsh Winter

As we get further into what the calendar assures us is spring, we're finding that some of the shade trees we thought were just leafing out slowly may have been more severely affected by last winter's harsh weather that what we had originally expected. This is particularly true of trees in exposed sites, along highways and on hillsides.

Some trees are leafing out on the lower branches, others are pretty much bare except for tufts of leaves on the tips of branches. Many just look sparse.

What can be done? At this point it's pretty much a waiting game. Trees may continue to leaf out as the season progresses. Then again, some may very well deteriorate once we finally get into warmer weather and more demand is placed on roots and conductive tissues by leaves that are losing moisture more rapidly.

Be sure to set sprinklers out to water the soil out at least as far as the branches spread, any time we go a week without good rainfall. Memorial Day week-end weather in the Metro area was cloudy and threatening, but we actually got only about ten or twelve drops of rain..... and as of writing this, it's been quite dry.

Fertilizing is probably just going to add further stress to those trees. Besides, if you do any lawn fertilizing, some of it will wash into the trees' feeder roots in the upper portion of the soil, anyway.

*Deborah Brown
Extension Horticulturist*

Thief Ants have been reported in homes. People sometimes describe them as those 'teeny tiny ants'. They are the smallest ants found in buildings in Minnesota, measuring 1/20 inch long. Thief ants often curl up when they die. They like greasy foods, including meats, cheese, and peanut butter. Thief ants usually nest outdoors in soil and rotting wood. Less commonly they may be found nesting indoors in small spaces, such as under countertops, cabinet voids, behind baseboards, and in wall voids.

Thief ants are usually just a temporary summer nuisance. When they are nesting outdoors, you can keep them out of your home by spraying an insecticide (chlorpyrifos, diazinon, permethrin) outside around the foundation. If the ants are nesting inside, your only real choice is to bait them. Use a store-bought bait attractive to grease-feeding ants or make your own. A homemade bait consists of 98 parts peanut butter (or something else they find attractive) to two parts boric acid (about 4 tablespoons to 1/4 teaspoon). Place the bait in a pill bottle lid or bottle cap and set it where the ants will find it (keep it away from small children and pets). Results may take weeks (or even months) to notice. See FO-1066, *What to do About Household Ants*.

Entomology Notes: First birch leafminer mines were sighted in the Twin Cities over Memorial weekend. They appear as somewhat discolored blotches on the leaves. Check individual trees as they may show up at different times. The most effective treatment is to spray the leaves (acephate or dimethoate) when the mines first appear. Ash plant bug nymphs should be out now; their damage is only cosmetic to ash leaves. Watch for European pine sawflies on the older needles of pine, especially mugo pine. Oystershell scale crawlers should be out in early June (central Minnesota).

Hold a white sheet of paper or a paper plate and tap the branches. Watch for tiny, yellowish crawlers. The crawler stage is the most effective timing for scale control (acephate, chlorpyrifos, insecticidal soap, horticultural oil, diazinon, carbaryl). The most effective timing for plum curculio on apple is at petal fall (about 3/4 of petals have fallen), repeated about 10 days later (use phosmet, diazinon, or malathion + methoxychlor).

*Jeffrey Hahn
Assistant Extension Entomologist*

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CROP**NEWS**

From the
UNIVERSITY OF MINNESOTA
Crops System Team
DOCUMENTS
of the
Minnesota Extension Service
MAY 29 1996

Nitrogen Management Concerns for Corn

Although the majority of the corn crop is in the ground, there is some concern about the nitrogen (N) fertilizer management program already, or soon to be, implemented. Here are some of my thoughts on N management at this time:

- ✓ The spring weather can be characterized primarily as cold, even though some could argue that wet should also be in that description. These conditions have not lead to major losses of fall, winter, or early spring applications of anhydrous ammonia (or urea).
- ✓ The majority of corn was planted after the optimum planting date for your region. Thus, there is a good chance that one's original yield goal may not be the same as actual yield.
- ✓ With the delay in "spring," the corn plant will be doing more vegetative growing during warmer weather. While mineralization of organic N always occurs as the temperatures warm, the difference this year is that this release will be while the corn is at an earlier developmental stage.

Highlights....May 24, 1996

Nitrogen Management Concerns for Corn
Denitrification in Northwest Minnesota
Stress During Planting Season
Vegetables

Aster Leafhopper and First Alert
Vegetable Insect Management Guide for
the Midwest

European Corn Borer Update
Hop Vine Borer Attack on Young Corn
Dial U

Common Landscape Concerns
Carpenter Ant Swarms
Birch Leafminers
Entomology Notes
Oak Anthracnose

Overall, N management strategies are not a huge concern at this time in my opinion. For those people who have planned on a sidedress N applications, keep in mind to sidedress early, as late planted corn often results in faster growing, taller plants. For those that applied N last fall or early this spring, I will be printing the Supplemental N Decision Guidelines in this newsletter in early June. Keep in mind that corn needs to be 6-12 inches tall for that decision aid.

Mike Schmitt
Extension Soil Scientist

Denitrification in Northwest Minnesota

The continued wet weather in northwest Minnesota has raised questions about potential losses of nitrogen from denitrification. Nitrogen is lost by this process when soil temperatures are high enough to allow for active microbial growth (usually higher than 55°F). So, there could be some loss from denitrification on the fine-textured soils of northwest Minnesota.

There is no accurate method that can be used to predict the amount of nitrogen lost. There are two suggestions for those who are concerned about nitrogen losses at this time. For fields where small grain has been planted, the best plan is to evaluate the wheat plants at the tiller stage. If these plants show a light green color and there is potential for good yield, some additional nitrogen at that stage might be justified.

For fields that have not been planted but where nitrogen has been applied, yield potential has probably been reduced substantially by the late planting. If this is the situation, there is probably adequate nitrogen remaining to support the lower yield potential. The most important concern is to get the wheat planted.

George Rehm
Extension Soil Scientist

Stress During Planting Season

This planting season has stressed nearly everyone. The seed bed preparation, planting conditions and extended cool/wet soils can also stress seedling plants. Corn planted 30 April was just emerging 20 May. Seed planted into the fall mold-board site was more uniform than the no-till plots. Soybeans had also started to emerge from the 13 May planting. It appears that both corn and soybean seed treatment plots were more uniform in emergence. The best time to check for benefits from seed treatments or to determine if seed should have been treated is early in the germination process. Corn seed rots slower than soybean seed and observations/decisions are best made early in the loss of stand evaluation process. Check

the seed, developing seedling and especially the roots system to determine if the young plant is going to be healthy and vigorous. Early damage is a soft rot, even watery, followed by a brown decay. The final appearance is a rotted brown, wet mass of nearly unrecognizable tissue. The major fungi in the early rot stage are *Pythium* and *Phytophthora*, followed numerous soil bacteria that finish the rotting job. Early stand evaluation will give you the most information about how well the seedlings are doing.

Ward C. Stienstra
Extension Plant Pathologist

Vegetables

Aster Leafhopper (ALH) and First Alert

ALH has arrived in Minnesota and Wisconsin, although populations appear to be higher in Wisconsin, with reports of 50/100 sweeps. In Minnesota, we have observed 9/100 sweeps in the Anoka area and up to 20/100 sweeps in Hollandale. Based on the distribution of ALH prior to our recent storms (i.e., ALH counts in MO and northeastern IA), it is not surprising that WI has received more ALH to date. Also, current mycoplasma estimates from ALH collected 3 weeks ago, in states south of WI/MN, is that approximately 3% of the adult leafhoppers are currently vectoring the virus-like mycoplasma that causes aster yellow symptoms in carrots, lettuce, celery, potato, aster flowers and a variety of crops. Lettuce, celery and carrots are often the most susceptible to aster yellows injury. In carrots, the disease causes discolored, red, yellow or bronzed leaves, but most importantly excessive adventitious root hair growth and a bitter taste, yielding unmarketable produce. Leaf lettuce will turn yellow; head lettuce may look fine until harvest, but the interior head will often turn yellow and or rot. The only effective method of control, to date, is weekly monitoring with a sweep net, and using the aster yellows index (AYI) along with knowledge of the varietal tolerance to aster yellows, to make sound insecticide treatment decisions.

The following table summarizes the AYI for the most preferred hosts in the state (note that potatoes and onions can also be affected by this disease, but are less preferred hosts, are more tolerant of aster yellows, and therefore only show symptoms in very severe ALH years [i.e., % infectivity > 10%]). The AYI (= % Infectivity X Avg. # ALH adults/100 sweeps) reflects when a given crop should be protected with insecticide treatment.

Aster Yellows Index (AYI)

Crop	Current MN AYI Estimates (with 3%) at:		
	AYI	10 ALH/100 Sweeps	20/100
Lettuce	25	30	60
Celery	35		
Sensitive Carrot Varieties	50		
Intermediate Carrot"	75		
Tolerant Carrot Varieties	100		

Therefore, at this time lettuce, celery and susceptible carrot varieties (that are at least 2-3" in height) should be treated within the next week.

Complete information about this approach is in the 1996 *Commercial Vegetable Pest Management Guide* (BU-1880-S; to order [\$6.00 + tax]; call 612-625-8173, or contact your local county extension office), with extensive carrot variety data from WI and MN. This information is also clearly explained and illustrated in the new *Vegetable Insect Management book for the Midwest* (see below for ordering). For those with access to the internet, a fact sheet on ALH is also available on our 'VegEdge' IPM site on the WWW (Internet) (<http://www.mes.umn.edu/~vegipm/>). Much of our work on ALH (for 1996-1997) is now supported by grants to the Minnesota Fruit and Vegetable Growers Assoc., from the Agricultural Utilization Research Institute's Pesticide Reduction Options program (AURI-PRO) and the Minnesota Department of Agriculture (MDA) Sustainable Agriculture program. Through this funding, additional monitoring will be done both in southern and central Minnesota. We will also be looking at refining a rapid assay to determine the percentage of adults that are vectoring the mycoplasma.

Vegetable Insect Management Guide for the Midwest

As mentioned in the last issue of MN Crop News, this book is now available locally, with the proceeds from books sold in Minnesota, going to support Vegetable IPM in Minnesota. *The correct price, however is \$40.00* (plus \$6.00 for shipping and handling), not \$45.00. To order, please send checks payable to "University of Minnesota", to: Bill Hutchison, Department of Entomology, 219 Hodson Hall, University of Minnesota, St. Paul, MN 55108.

European corn borer update

ECB larvae are still present in high numbers this past week at our Rosemount "indicator" field site, with no sign of parasitism or disease (@ 4-5/stalk). Still, no pupae were detected, which is not surprising given the heat units to date. The following table summarizes heat units (sine wave method) as of May 20, 1996 for selected MN sites.

Location	Degree-days (> 50°F)
Waseca	167
Rochester	163
Faribault	149
Rosemount	192
Morris	127

Given the slightly late spring, light traps, and/or pheromone traps in place within the next week should catch the beginning of the first generation ECB flight. As per our ECB model (see May 10th issue), we do not anticipate first ECB moth emergence until 300 to 400 DDs (10% at 460 DDs). Another great way to get DAILY ECB DD updates (and other key insect pests) for both MN and WI is via a MN/WI Climatology site on the WWW located at <http://bob.soils.wisc.edu/wimnext/insectdev.html> (this site can also be found as a link within the 'VegEdge' IPM page).

Also, on VegEdge, as of 5/24/96, via Bruce Potter and the MDA Pest Survey Program, we will have ECB fall survey maps for the past 5 years, for comparisons of outbreak (as in 1995) and non-outbreak years.

*Bill Hutchison
Extension Entomologist*

Hop Vine Borer Attack on Young Corn

Hop vine borer are stem-boring caterpillars that can cause severe stand loss in young corn. Severe infestations are scattered but persistent, with the majority of reports from southeast Minnesota, especially Fillmore, Goodhue, Houston, Olmsted, Wabasha and Winona counties. Infestations are closely associated with grasses that serve as egg laying sites. Typically infestations occur along fence margins, waterways or terraces with perennial grasses, such as smooth brome or quackgrass, but may occur with in-field grassy weed patches.

In-field infestations are almost always associated with poor grass control in the previous year's corn crop, especially woolly cupgrass, and quackgrass. Most in-field infestations are patchy and rarely encompass the entire field. Growers often blame grass competition for the resulting stand loss, not hop vine borer. The two elements of this stand-loss situation, grassy weeds and hop vine borer, work hand-in-hand. Hop vine borer reduces corn stand, which opens the canopy for a thriving grassy weed infestation. These grassy weeds provide an ideal site for future egg laying.

Adult female moths lay eggs in late summer (August, September) on grasses in both weedy patches within the field and/or along field margins. The eggs hatch in the spring and the young larvae initially feed in the stems of grasses. Older larvae need larger-stemmed grasses and that's where corn becomes attractive. Hop vine borer larvae are cream-colored caterpillars with a tannish to orange-brown head. Purplish spots run radially around the body on each segment. They attack both grasses and corn below ground. Feeding cuts in-

ternal piping between roots and developing leaves. Attacked plants wilt and die, while larvae move on to other corn plants. "Dead-heart" symptoms, where newly developing inner leaves wilt while outside expanded leaves remain green, are a common sign of hop vine borer attack. Timing of attack greatly influences stand loss. The majority of corn plants under 8 leaves die after attack with stand loss more rapid on younger corn. After 8 leaves, corn plants may only show slight wilting or no obvious symptoms, but yield less.

Crop rotation has been the most successful strategy for reducing hop vine borer numbers. Severe infestations typically occur in continuous corn for two reasons: a ready supply of large-stemmed host plants (corn) needed to complete development; and grassy weed problems that provide an egg laying site. Rotation helps break the hop vine borer life cycle by eliminating corn as a large-stemmed host and by improving grass control options.

A two-pronged attack provides the best chance of success in corn. Good, season-long grass control reduces availability of in-field egg laying sites. Insecticides provide a way to reduce hop vine borer numbers and, if properly timed, can reduce populations for several years. If insecticides are needed, the pyrethroids (Ambush, Asana, Pounce, and Warrior) should be used at the high cutworm rate. Previous University of Minnesota research has shown Asana worked best in previous trials. Research is currently underway to reexamine pyrethroid performance.

Hop Vine Borer/Continued

Don't assume that soil insecticides labelled for cutworms will control hop vine borer. There is no evidence that soil insecticides control hop vine borer infestations; most infestations occur in fields treated with soil insecticides. Research is currently underway to document what level of protection soil insecticide provide.

The timing of insecticide application varies with the field situation. In-field infestations need to be treated sooner, because weedy grass hosts are either just emerging (woolly cupgrass) or were knocked back by tillage or burn-down herbicides (quack grass). Chemical control for in-field infestations should be made between emergence, and seven day post-

emergence. Longer delays will result in stand loss. Unless accurate field maps were made the year before whole fields may need to be treated.

Field margin infestations should be managed different than in-field infestations. Field margin infestations usually occur later in the season. Larvae first attack perennial grasses at the field edge, and when the larvae out-grow these grassy stems, they migrate to a larger stemmed host (corn). Field margin infestations rarely exceed 6 rows into the field. Chemical treatments should be made when larvae first start to reduce stand in the first row of corn (usually 2-3 leaf corn).

*Ken Ostlie
Extension Entomologist
Fritz Breitenbach
IPM Specialist SE District*

DIAL U

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Common Landscape Concerns

Dial U has been swamped with calls (and samples) from people whose evergreens—especially shrubs—were badly damaged by our severe winter weather. We're still not seeing new growth on them, but many have died back so far that even with pruning and patience, they'll probably never look good again. We are suggesting that the worst of these plants should be replaced—often with the same type thing, if they haven't had many problems in past years.

The other subject we're hearing about repeatedly is lawn care; primarily weed control. People are worried about whether it's too late to put down a pre-emergent herbicide to prevent crabgrass and other annual weeds.

Well, many annual weeds have sprouted already, but crabgrass usually sprouts about the time that lilacs bloom. However, the seeds don't all sprout at exactly the same time. They continue to come up right through the middle of the summer, sometimes a bit later. Even though you might miss the early-sprouters (in some parts of the state) the treatment could be of some help.

(Remember that you must water the herbicide lightly into the soil in order to activate it.)

Dandelions are blooming their heads off so, of course, people are excited about getting rid of them, NOW. Fortunately, they're extremely sensitive to 2,4-D. The trick is find-

ing a day that's not windy and when no rain is expected for two days.

We're reminding people to check their lawns again next September or early October so they can spray again if they still have dandelions. When they get rid of them in autumn, they won't be around to bloom the following spring!

*Deborah Brown
Extension Horticulturist*

Carpenter Ant Swarms

Carpenter ant swarms have been reported this week. A swarm is a large number of winged, reproductive ants (queens and males) that leave the nest to mate. The queens then fly off to start new nests. Virtually all species of ants swarm, but the time of the year varies with the species. Carpenter ants produce winged reproductives during fall which swarm typically the following spring. Finding a swarm of carpenter ants indoors is a sure sign there is a nest in your home; as they fly out of the nest they become trapped indoors. Where you find the winged ants may also help you to determine more specifically where the nest is located. The most effective, permanent control of carpenter ants is locating the nest and treating it directly with an insecticide application. See FO-1015, *Carpenter Ants*.

Birch Leafminers

Adults have been seen at the beginning of the week. However, while the leaves on some birch are almost fully expanded, others have barely leafed out. We are generally anticipating first mines mid- to late next week (for the Twin Cities and central Minnesota). Birch should be monitored to determine when mines first appear and how severe the infestation is. It is important to check this as individual trees can vary. When deciding whether to treat or not, remember that birch can tolerate 30% - 60% leaf damage due to birch leafminer without seriously injuring the tree. You can control birch leafminers with a foliar application of acephate (Orthene) or dimethoate (Cygon) when mines first appear. See FS-6134, *Birch Leafminers*.

Entomology Notes

Cankerworms were sighted at the beginning of the week on linden. **Maple bladder galls** are just being seen on red maple. **Ash plant bugs** should be active now. **Pine needle scale crawlers** are expected to be active next week. **Elm leaf beetle adults** should also be active and laying eggs on elm by next week. (Sightings and predictions are for central Minnesota.)

Jeffrey Hahn
Assistant Extension Entomologist

Oak Anthracnose

Oak anthracnose is a foliar disease of oak trees causing a blight of leaves and shoots, characterized by browning, spotting, and shriveling of the leaves. Anthracnose is most prominent in the spring during wet, rainy weather.

Anthracnose is often confused with oak wilt since leaves have a brown, shriveled appearance. However several factors including host species, direction of disease spread, and environmental conditions can help to distinguish between these two diseases. Oak wilt is most common on red oaks and occurs mainly during the hot, dry summer. Wilting in oaks typically begins at the top of a tree and progresses downward.

Oak anthracnose is most commonly observed on white oaks during rainy weather in spring. Infection of leaves begins near the base and works upward. Anthracnose usually causes little damage to vigorous healthy trees, and control is usually not necessary on healthy, mature trees. Collect and remove fallen leaves. Prune dead branches (do not prune in April, May or June). Trees which have been defoliated for several years in a row or young, newly planted transplanted trees (especially ones infected the previous year) may benefit from chemical control. Fungicides protect leaves from infection. Chlorothalonil and Bordeaux mixtures are currently labelled for oak anthracnose control.

Chad Behrendt
Plant Pathology

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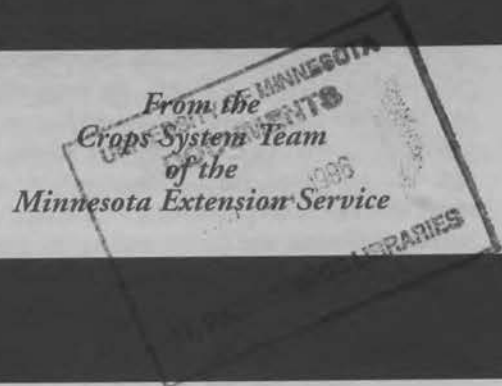
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CROP

NEWS



Returns on Purchased Inputs

Minnesota corn producers spend a considerable amount of money to purchase inputs that help to assure high yields. It's no secret that a major portion of the money used for purchased inputs that help to assure high yields. It's no secret that a major portion of the money used for purchased inputs is spent for nitrogen fertilizers and herbicides. During the spring planting season, some have questioned the return that might be expected from using these two inputs.

As might be expected, there is no way to accurately predict an exact return from using nitrogen fertilizers and herbicides. There are obviously many factors that affect the economic response to the use of these two inputs. Some indication of the importance of nitrogen and herbicide use is provided by information collected from a study conducted in Dodge County (see the following table).

For this study where corn followed soybeans, Lasso was applied at various rates with and without the use of nitrogen

fertilizer. Lasso was applied as a preemergence treatment and the nitrogen was applied as 28-0-0 at sidedress time. The rate of 150 lb. N per acre was recommended to meet the yield goal of the farmer at this site. This is not the recommended rate for corn production in all of southeastern Minnesota. The field selected for the study had a history of a foxtail problem. Cultivation practices employed by the co-operating farmer were also used for the study area.

Influence of rate of Lasso and use of nitrogen fertilizer on corn yield. Dodge County.

N Applied lb./acre	Recommended Rate of Lasso (%)			
	0	33	67	100
0	11	44	85	107
150	77	125	157	166

Even though typical cultivation practices were followed by the farmer, weed pressure was severe and there was a substantial reduction in yield when no herbicide was used. This was especially true when nitrogen fertilizer was omitted from the management picture. Highest yields were achieved when the nitrogen was combined with Lasso at the recommended rate.

The corn yields continued to increase as the rate of Lasso applied increased up to the recommended rate. This increase was measured both with and without the use of nitrogen fertilizer. The return on the use of both inputs was obviously substantial with the added bushels of corn worth significantly more than the cost of the nitrogen fertilizer and Lasso combined.

The increases in yields listed in the preceding table are from the experimental site in Dodge County only. Returns from the use of these two purchased inputs should not be expected to be the same in other fields. Nevertheless, the results from this study show the importance of the combination of recommended rates of nitrogen fertilizer and herbicides for corn production in Minnesota.

*George Rehm
Extension Soil Scientist*

Highlights....May 17, 1996

- Returns On Purchased Inputs*
- Alternative Forage Crops for 1996*
- Phosphate Placement and Soybean Production*
- Drainage Workshop Planned for Certified Crop Advisors June 11 and 12*
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Alternative Forage Crops for 1996

Severe winter injury of alfalfa has been reported in Southwest Minnesota. In addition, the long winter has depleted hay supplies more than normal adding to an already tight supply of quality hay. Potential of winter injury, hay shortage, and high feed grain prices combine to force decisions about alternative crops for forage. A diversity of crops, timely harvest decisions and forage testing are your best strategies. This article deals with planting and harvest strategies for 1996.

Annual Crops for Silage

Annual crops for silage production in Minnesota are: small grain crops (barley, oats, wheat, rye, or triticale), sorghums (forage sorghums, grain sorghum or sorghum-sudangrass crosses), and corn (dent, sweet or popcorn). Research at Rosemount and Waseca during 1986 and 1987 provides an

evaluation of yield and quality of these cropping options. Yield and quality (protein, digestibility and NDF) of various types of corn or sorghum are summarized in Table 1. Use percent NDF as an indicator of intake potential; as NDF increases, intake decreases (an average value for corn silage is 48% NDF).

Popcorn and sweet corn

Both popcorn and sweet corn yield less than dent corn (Table 1). Digestible dry matter (IVDDM) of sweet corn is slightly lower than dent corn but higher than popcorn. Sweet corn is often too wet at maturity, greater than 62 percent moisture, for proper ensiling.

Be sure you know if label feeding restrictions apply to insecticides used on sweet corn.

Table 1. Yield and forage quality of several crops planted for forage in recent studies at Rosemount and Waseca.

Species	Yield		Quality	
	DM	CP	NDF	IVDDM
	T/A		----- % of dry weight -----	
Dent corn	8.2	6.8	43.6	68.2
Sorghum	8.8	5.8	49.4	61.0
Popcorn	5.3	7.2	51.2	64.5
Sweetcorn	4.9	8.0	49.3	68.1
Multiple cuts				
Typhon	3.2	15.4	27.0	75.0
Alfalfa	3.5	20.1	39.0	64.2
Red Clover	3.8	19.5	39.9	64.9
Sudangrass	5.7	12.7	58.6	61.0
Sorg-Sud	5.9	11.9	58.6	61.6
Sorg+Soybean	5.3	12.2	57.5	61.9
Proso millet	2.3	18.8	56.2	66.7
Foxtail millet	3.2	17.4	57.8	63.9
Pearl millet	5.8	19.2	58.4	65.4
Japanese millet	5.0	18.6	60.4	55.8
Sudangrass	6.2	19.2	59.6	62.9
Sorgh-sudangrass	5.8	19.5	58.9	65.0
Single cut				
Field pea	1.6	15.1	42.3	61.7
Cowpea	2.4	13.6	31.9	67.0
White lupine	1.4	12.9	47.8	63.0
Field pea + oats	2.1	9.5	58.8	52.9
Triticale + peas	1.5	14.5	52.2	59.6
Oat @ boot	1.6	20.5	NA	77.6
Oat @ milk	3.0	14.6	NA	66.4
Barley @ boot	1.7	23.4	NA	81.3
Barley @ milk	3.2	15.7	NA	68.5
Triticale @ boot	1.7	22.2	NA	79.6
Triticale @ milk	3.0	15.2	NA	66.4
Soybean	3.3	18.7	44.2	61.1
Milo + soybeans	4.1	12.1	56.4	55.8
Proso millet	3.0	13.0	62.1	62.4
Foxtail millet	3.5	12.3	65.5	58.1
Pearl millet	5.4	11.6	66.5	58.9
Japanese millet	3.5	13.9	64.5	60.9
Sudangrass	6.2	10.4	66.7	58.7
Sorgh-sudangrass	7.3	9.6	67.8	58.8

Sources: Kurle et al., 1991. *J. Prod. Agric.* 4:432-436; Cherney and Marten, 1982; Martin and Sheaffer, 1991. *MN Forage UPDATE*, Late Summer, XVI.

Forage sorghum

Forage sorghum yield higher than dent corn, but are extremely low in digestibility of dry matter and are often excessively wet at maturity for ensiling (Table 1). Forage sorghum are drought tolerant. However, they normally will not pollinate north of Minnesota Highway 10; short season maturities should be planted early.

Dent corn

Dent corn is the best annual crop for silage because of its yield, digestible energy content and its value (@ \$4.00 per bushel corn prices, 20 ton of corn silage is worth \$32 per ton). Select hybrids based on correct relative maturity for your region and performance of high digestible NDF or IVDDM.

Forage Crops for Hay and Silage

Alfalfa and alfalfa-grass mixtures are the dominant crops used for hay or hay-crop silage in Minnesota. Alfalfa or other perennial legumes are excellent sources of home-grown protein and calcium. High quality forage (percent IVDDM >60 and percent NDF <40) is only possible with alfalfa or other legumes, not grasses. Several annual crops considered as alternatives to seeding year alfalfa and red clover for hay are summarized in Table 1. Annual crop alternatives are more difficult to dry for hay than alfalfa or red clover.

Annual legumes

Field peas, cowpeas and soybeans are annual legumes that yield the same or less than seeding year alfalfa or red clover (Table 1). However, only soybeans contain enough crude protein to compete with alfalfa or red clover. Soybeans should be harvested at green-pod stage of maturity.

Warm season annual grasses

Sorghum-sudangrass crosses or sudangrass hybrids (Trudan 8 or Monarch) produced more dry matter than seeding-year alfalfa or red clover when cut several times (2-4 cuts/year) (Table 1). Neither Proso nor Foxtail millets had yields comparable to these sorghums, especially when harvested 4 times per year. Proso millet is not recommended because of lower quality and a potential of weed seed problems several years after a crop is allowed to produce seed. Japanese millet was intermediate in yield and quality between Foxtail and sudangrass. Pearl millet was equal to sudangrass in yield and higher in digestibility under 4 cuts per season. Pearl millet recovers from nodes on the stem; therefore, leave at least a 10-inch stubble height.

Typhon

Typhon, a forage from the brassica family (a cross between chinese cabbage and rape) tested extremely high in digestibility, but other animal performance evaluations of Typhon have resulted in inferior animal performance. Typhon, sorghum-sudangrass and sudangrass require N fertilizer; 150 pounds per acre of actual was used in these studies.

Small grains

Small grains provide from 1.6 to 3.3 tons per acre of dry matter when harvested from boot to milk stage of maturity (Table 1). Barley and triticale are not different but higher in yield than oats. Harvest at boot stage produces higher crude protein and IVDDM concentrations. Barley and triticale will have beards on the heads, which could cause sore mouth disease in cattle if they are harvested at advanced stages of maturity.

Small grains mixed with field peas

Planting a mixture of small grain and field peas will improve crude protein yield over the small grain alone. However, crude protein concentration may be higher for the barley harvested at boot stage. Small grain forage has been 37 days earlier than direct-seed alfalfa, June 7 vs. July 14. Small grains mixed with peas provide too much competition for successful alfalfa establishment unless harvested at boot stage of the small grain for first cut.

Sorghum and soybeans

Mixing soybeans with sorghum is proposed to improve crude protein of the sorghum. Seeding Corsoy 79 with SSX 643 increased yield when compared to Corsoy 79 alone but did not change protein concentration of SSX 643 (Table 1). Harvesting earlier, 24-inch height, second comparison of sudangrass listed below millets (sudangrass and sorg-sud listed above sorg-soybean was harvested at 40-inch plant height), increases protein 4 to 6 percentage points.

Emergency crops

All crops in these studies were planted early for maximum seasonal yield, except the millets listed with sudangrass and sorghum-sudangrass hybrids. The Millet study was planted early June to simulate an emergency crops situation. These crops can be successfully planted June through mid-July to provide supplementary forage. Crops planted herein received 75 lb/acre of actual N plus P and K required by soil test and an additional 50 lb/acre of N after first and second cuts. Pearl millet, hybrid sudangrass or sorghum-sudangrass crosses are the best emergency crop alternatives. July 1-15 are the latest recommended planting dates for northern to southern Minnesota.

*Neal P. Martin
Extension Agronomist-Forages*

Phosphate Placement and Soybean Production

Placement of phosphate and potash fertilizers is always a major consideration in developing fertilizer programs for crop production in Minnesota. Suggested rates are adjusted for band and broadcast applications for corn and small grain production. For soybeans, suggested rates of phosphate and/or potash are not adjusted for placement.

In contrast to corn and small grains, past research has shown that broadcast applications of phosphate have produced larger yield increases than banded placements. The data reported from Nebraska studies and summarized in the following table are typical of results reported from other studies.

Effect of rate and placement of phosphate fertilizer on soybean yield.

P ₂ O ₅ Applied lb./acre	Placement	
	Band	Broadcast
	---- bu./acre ---	
0	34.3	
23	35.5	38.7
46	34.9	41.2
92	35.9	41.8

Bray P Test = 3.0 ppm; Source: Nebraska

At the present time, there is no obvious explanation for the difference among crops in the response to phosphate placement. The response of soybeans to phosphate fertilizer is, of course, linked to soil test values for phosphorus. If the soil test for phosphorus as measured by the Bray procedure is less than 10 ppm, a yield increase from the use of phosphate fertilizer can be expected. If the Olsen procedure is used to analyze for phosphorus, a response can be expected if the soil test value is 7 ppm or less.

Use of phosphate for soybean production can be profitable if soil test values for phosphorus are low. If grown in conventional tillage systems, broadcast applications are preferred for this crop.

George Rehm
Extension Soil Scientist

Drainage Workshop Planned for Certified Crop Advisors June 11 and 12

The Minnesota Extension Service is planning a drainage workshop for individuals who would like to increase their knowledge base about drainage system design, economics, and environmental impacts associated with drainage. The two-day training will be held on June 11 and 12th at the Southern Experiment Station in Waseca. Topics to be covered include, regional drainage needs, usage and benefits for agricultural land, drainage system options and basic design considerations, an update on drainage discharge research, impact of drainage system discharge on surface water resources, drainage experiences and current research issues in Iowa, and a case study on the improvement and restoration options for Ditch #27 in Murray County. Also in-

cluded as part of the day is a field tour to look at current University of Minnesota research on drainage issues in the Minnesota River Basin.

The cost of the training is \$75.00 and pre-registration is required. Space is limited and will be filled on a first come basis. Persons interested in attending this workshop should contact Cindy Arnevik at the Faribault County Extension Office to obtain registration information. The telephone number is (507) 526-6240. The e-mail address is carnevik@mes.umn.edu

The deadline for registration is May 31.

Cindy Arnevik
Faribault County Extension Educator

Poast® Cleared for Use on Clover

Poast® (sethoxydim) has been cleared for use on clover. This label clearance applies to all *Trifolium* (clover) species. Poast Plus® does not have label clearance for use on clover at the present time. Poast® may be applied to seedling or established clover grown for hay, silage, green chop, direct grazing, or for seed. Poast® is cleared for application to clover at all stages of growth. The application timing would be determined by the species and stage of weed present and the Poast® harvest restrictions. Poast® should be applied in a minimum of 5 gallons of water per acre. If grass forage or crop canopy is dense, a minimum of 10 gallons per acre should be used. A nonphytotoxic oil concentrate or Dash HC should always be added to Poast®.

The strategies for sethoxydim use in clover would be similar to that for use in alfalfa. It is labeled for control of many annual grass weeds, for removal of interseeded oats, and for suppression of perennial grasses such as quackgrass. As in alfalfa, the nutrient detergent fiber content (NDF) of harvested forage will be significantly lower with the use of sethoxydim to remove grass or oat species. The harvest restrictions following application of Poast® in clover is 7 days before grazing, feeding or cutting (undried) forage which is the same as the harvest restrictions for alfalfa. However, there is a 20 day restriction following the use of Poast® before cutting clover for hay (dry forage) whereas the harvest restriction is 14 days on labeling for use on alfalfa.

My recommendations for the fit of sethoxydim use on clover would be to remove annual grasses during the establishment year, or for seeding clover with oat to protect seedling clover but removing the oat when 4-6 inches in height. The most economical use of sethoxydim for annual grass control would be to treat species such as barnyardgrass and green or giant foxtail before 4 inches in height where only 3/4 of a pint of Poast® per acre is required. Interseeded oat for oat mulching systems should be treated before oat exceeds 6

inches in height. Again, only 3/4 of a pint of Poast® per acre is required. Quackgrass should be controlled with fall applications of glyphosate before seeding clover. Quackgrass can be managed on a per cutting basis in clover stands with the application of Poast®, but would dictate that forage is valued and managed for NDF and acid detergent fiber (ADF) to justify the expenditure for Poast®.

Roger Becker
Extension Agronomist — Weed Science

Grazing and Haying Restrictions for Herbicides used in Pasture and Rangeland

Herbicide ¹	Lactating Dairy Animals		Beef and Non-Lactating Dairy Animals		
	Before Grazing	Before Hay Harvest	Before Grazing	Before Hay Harvest	Removal Before Slaughter
Ally/Escort	0	0	0	0	0
Banvel/Banvel SGF¹					
Up to 1 pt	7 days	37 days	0	0	30 days
Up to 2 pt	21 days	51 days	0	0	30 days
Up to 4 pt	40 days	70 days	0	0	30 days
Up to 16 pt	60 days	90 days	0	0	30 days
Crossbow	1 year	1 year	0 ²	1 year	3 days
Curtail¹	4 days	30 days	0	30 days	7 days ³
Gramoxone Extra⁴	1 month	1 month	1 month	1 month	0
Landmaster BW/Campaign⁵	7 days	30 days	3 days	30 days	3 days
Roundup Ultra/RT Glyphos (1)					
Spot					
Spray ⁶	14 days	14 days	14 days	14 days	0
Broadcast	8 weeks	8 weeks	8 weeks	8 weeks	0
Spike⁷	0	1 year	0	1 year	0
Stinger/Transline	0	0	0	0	0
Tordon⁸	14 days	14 days	0	14 days	3 days
2,4-D/MCPA¹	7-14 days	30 days	0-7 days	0-30 days	0
Weed-out 2,4-D	7 days	0	0	0	0

¹ Check individual product labels for restrictions and use rates. Many products containing the same active ingredients may be available.

² One year if more than 1.5 gallons/A is used.

³ Withdrawal not needed if 2 weeks or more time elapsed since application.

⁴ Restrictions based on degree of new seedling establishment before grazing. Suggested at least 6 inches of grass or legume growth.

⁵ No restrictions if 10% or less of the area is treated.

⁶ Do not treat more than one-tenth of any given acre at one time with spot or wiper applications. Remove livestock before application.

⁷ If no more than 20 lb/A used.

⁸ Remove livestock to untreated grass pasture for 7 days before transferring livestock to broadleaf or pasture areas. Removal before slaughter statement only applies to animals grazing treated forage for 2 weeks immediately.

Harold Stanislawski
Otter Tail County Extension Office

Vegetables

NEW Vegetable Insect Management Book! *Vegetable Insect Management with Emphasis on the Midwest* (Purdue University and Meister Publishing) is NOW AVAILABLE through the Department of Entomology, University of Minnesota. This book was written by numerous entomologists and extension specialists throughout the midwest, and clearly represents the most up to date source of information on all aspects of insect pest management for 14 vegetable crops grown in the midwest. The book provides information on all key pest life cycles, their biology and phenology in relation to crop phenology, practical sampling methods, suggested treatment thresholds, and a liberal dose of color photographs of insect pests, beneficial insects, insect damage, and traps and monitoring methods. As several of us in Minnesota participated in writing the book, Meister has given us permission to market the book in Minnesota to support our Vegetable IPM program. For a limited time, the soft-cover version of this book is available in Minnesota for \$45.00 plus \$6.00 shipping and handling. Proceeds from the sales of this book will help support our IPM programs in Minnesota. To order, send a check, payable to the "University of Minnesota"; att: Bill Hutchison, Department of Entomology, 219 Hodson Hall, University of Minnesota, St. Paul, MN 55108.

Prism Label Update for Onions (from Larry Binning, UW-Madison, Julie Lich, Valent USA) — Prism, a postemergence herbicide from Valent, is now labelled for annual grass control in onions. Prism 0.94 at 13 to 17 oz/ac can be applied up to 45 days prior to onion harvest. Do not apply greater than 17 oz/ac of Prism to onions in a single application. Prism must be applied with 1% v/v crop oil concentrate as an adjuvant. At the 17 oz/ac rate, Prism is labelled to control a long list of annual grass species up to 6 inches in height. A 1-hour rain-free period is required for activity.

European corn borer update — Not surprisingly, degree-day accumulations have been moving SLOWLY, and most ECBs are still in the larval stage. The following table summarizes heat unit accumulations for several MN locations, as of May 12, 1996.

Degree-days (>50°F) as of May 12, 1996.**

Alexandria	37	Caledonia	95
Cambridge	64	Faribault	68
Hutchinson	66	LaCrosse	133
Mankato	72	Montevideo	60
Morris	47	Olivia	70
Rochester	73	Rosemount	97
St. Cloud	63	Waseca	80
Winnebago	80	Winona	90

** (Data provided by David Bartels, M.S., Department of Entomology).

Two New Pyrethroids Labelled for Sweet Corn — As noted in the 1996 *Commercial Vegetable Pest Management Guide* (BU-1880; see April 19, 1996, issue for order form), two new pyrethroids are now labelled for sweet corn, particularly for European corn borer (ECB) and corn earworm (CEW). Both Warrior 1E (Zeneca) and Baythroid 2E (Bayer) are very effective on each of these pests, and provide additional tools for both fresh-market and processing sweet corn growers. Warrior is labeled for 2.56-3.84 fl. oz. product/ac, by air or ground application, with a 1-day pre-harvest interval. Baythroid is labeled for 2.8 fl. oz./ac. I will have more information on each of these products in upcoming articles.

Bill Hutchison
Extension Entomologist

Slugs

Cool, cloudy, and wet weather conditions have proven favorable for slug activity. In southeast Minnesota, we should have corn emerging before Saturday (May 18). If wet conditions continue, the potential for seedling corn damage from slugs is a real possibility. Typically, corn will out-grow any damage caused by slugs. If cool weather conditions prevail, however, economic damage is possible.

Damage usually occurs on the lower leaves, which appear skeletonized. Heavy slug populations in 1993 in Winona County caused severe brace root damage, and resulted in lodged corn. Look for slugs under large pieces of residue, or under clods of dirt. Slime trails may be visible during early

morning field inspections. Conditions which enhance soil moisture also favor slugs. Emerging soybeans can be heavily damaged by slugs, especially if the seed furrow does not close completely.

Several commercial metaldehyde baits are labeled and available for slug control in corn. The cost of these materials is very high. Most growers are unwilling to invest in control measures, hoping instead for warm dry windy conditions which favor drying and rapid crop growth.

Fritz Breitenbach
IPM Specialist, SE District

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Honeylocust Plant Bugs

Honeylocust plant bug nymphs were first sighted last week on honeylocusts. People often describe these insects as large aphids. However, aphids don't move much on plants while plant bugs can move quickly. Honeylocust plant bugs are first active as the new leaves come out. They feed on the underside of leaves, causing whitish or yellowish speckled discolorations; heavy feeding can brown leaves and even cause premature leaf drop. Their feeding also can cause new leaves to be dwarfed and cupped, similar to herbicide damage. Honeylocust plant bugs feed into July. There is one generation per year.

Despite the tree's appearance, honeylocust plant bug feeding does not seriously injure mature, vigorous-growing trees, even when feeding is widespread. However, very young or unhealthy honeylocusts are much more susceptible to plant bug feeding, and heavy infestations could injure trees. If it is necessary to manage honeylocust plant bug populations, spray when the insects are first found, about the time when honeylocust trees are first leafing out. Remember, in most cases these insects are doing no real harm to trees. Effective insecticides include acephate (Orthene), carbaryl (Sevin), diazinon, or malathion.

Entomology Notes

Slugs have been sighted but damage to plants has not been reported yet. **Nightcrawlers** have been active, causing a nuisance in lawns and driveways and sidewalks. A report of web-building caterpillars in a crabapple in the Twin Cities area are **Eastern tent caterpillars**. **Spruce spider mites**, a cool weather mite, have been active on spruce. Ants continue to be very common questions, especially **carpenter ants**. We are still receiving a lot of tick samples, including **blacklegged ticks** (formerly deer ticks).

Jeffrey Hahn

Assistant Extension Entomologist

Apple Diseases: A Timely Reminder

Two major diseases that affect apple trees during the spring are apple scab and cedar-apple rust. Both of these diseases can be controlled if proper control measures are promptly applied.

Control measures for apple scab require several applications of a fungicide such as captan. The fungicide should first be applied prior to opening of the blossoms, followed by 3-4 additional sprays throughout the spring to protect foliage. Additional treatments may follow during the summer, but this is usually not necessary for home grown fruits.

If cedar-apple rust is your concern, application of a fungicide with the active ingredient triforine should give adequate control. Apply the fungicide when apple leaves are about one-half an inch out of their buds (one-half inch green tip), or when you observe orange gelatinous tendrils emanating from brown galls on cedar branches. These structures produce spores that infect leaves and fruit of susceptible apple trees.

As always, read and follow all label directions carefully.

Joe Walton

Plant Pathology Technician

Planting Over a Septic System

We've gotten a number of calls this spring about planting near septic system drain fields. Vegetables and other edible plants should be grown a minimum of six feet away. If there's a slope, they should be at least twelve feet away from the downhill side of the drain field. Plant vegetables that produce fruit (tomatoes, peppers, beans, etc.) in the part of the garden that is closest to the drain field (six or twelve feet away) and root crops in parts of the garden that are furthest away.

Moss in Lawns

Many people complain of moss "taking over" their lawns, especially in shady locations. They are anxious to kill the moss, but moss is better adapted than grasses for shady places, and even if they are able to get rid of it, they'll probably have trouble establishing thick grass in its place.

Moss is also a sign of compacted, poorly-drained soils. Such soils may stay moist at the surface for a long time after heavy rainfall or irrigation. When moss is a problem in sunnier sites, annual use of a core aerifier to take plugs out of the soil will help with compaction. (Early autumn is the best time to aerify.) When the moss is in shade, aerifying may not be of much help in eliminating it.

Moss is also associated with nutrient-poor soils. Regular lawn fertilizing makes the area less attractive to moss and helps existing turfgrass to grow thicker and compete better -- again, if we're not talking about an area that is quite shady. Fertilize in late August or early September, then again in October. Fertilize this spring if you neglected to fertilize last fall.

You can get products at your local nursery or garden center that will kill the moss in lawns, but unless you improve underlying circumstances that make the area conducive to moss growth, it will come back.

Deborah Brown

Extension Horticulturist

Moles Are Active Now

Moles are insectivores not rodents; ninety percent of their diet consists of slugs, worms and insect larvae. While they don't often feed on plants, their burrowing activity may kill vegetation.

Poison pellets and sound emitters are often advertised for mole control, but neither have proven effective against moles. Trying to poison the insects in the lawn may actually lead to increased burrowing activity.

Trapping is the most cost-effective method to control moles in residential yards. Find which burrows are active by tamping down a short section of the ridge each day for 3 days. Then set traps on ridges which have been raised. Harpoon traps are the easiest to use. Move the trap to another location if it doesn't catch a mole within 2 days.

Jim Kitts

Extension Wildlife Specialist

MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA

COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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CROP

NEWS

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Soil Crusting

Soil crusting is more severe in soils that are low in organic matter (1-2%) than in soils with high organic matter (4%).

Small Grains: A rotary hoe or a spring tooth harrow should be used to break that crust in small grain fields that have not yet emerged. Harrowing fields that are emerging is usually not recommended unless there are seedlings leafing out under the crust. Harrows should be set shallow (1/2 inch) and angled back to reduce the potential of harrowing too deep. Tractor speed should be slow to minimize injury to the crop.

Broadleaf Crops: Breaking the crust in broadleaf crops is more risky. Harrowing can be safely accomplished if the field is harrowed approximately 2 days after planting and the crop is seeded at least 1 inch deep. Harrowing methods should be the same as in small grains. Harrowing shallow seeded crops, such as flax, before they germinate is not recommended unless the crop is seeded at least 1 inch deep. If the crop is emerging, harrowing should not be practiced because severe damage to the hypocotyl arch and cotyledons will occur causing a reduction in the stand. An empty double disk drill could be used across the rows as an emergency operation to break up the crust. Minimum pressure on the disks should be used, letting the packer wheels break up the crust.

Harold Stanislawski
Otter Tail County Extension Educator

Highlights....May 10, 1996

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Rhizosphaera Needlecast Symptoms Evident Now

Spring Frosts and Crop Survival

Spring seeded small grains are generally quite tolerant to freezing temperatures during much of their early development. Winter grains such as winter wheat or winter rye that are presently in the boot stage or are beginning to head are very susceptible to spring frosts. Frost injury is evident by whitened heads and bent awns when the heads emerge from the flag leaf. These symptoms do not develop until a few days after the freezing temperatures.

Flax becomes very tolerant to frosts shortly after seedling emergence. Soybeans or dry beans are easily killed by spring frost. Corn seedlings can be frozen up to the five leaf stage (eight inches tall) and still develop leaves from the growing point below the soil surface. Sunflower tolerate 25 degrees F temperatures when emerging but loses frost tolerance after 2 leafstage.

Harold Stanislawski
Otter Tail County Extension Educator

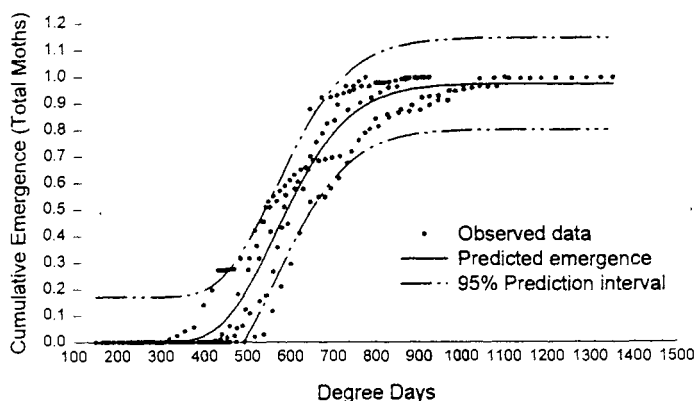
Vegetables —

European Corn Borer (ECB)—As indicated in previous articles by Ken Ostlie, the 1996 ECB overwintering larval population survived the winter in good shape and continues to look healthy. One of my students, Dave Bartels, has been monitoring one of our sweet corn fields at Rosemount (Dakota Co.), and recently confirmed high overwintering survival. On Sept. 19, 1995, one field averaged 4.8 ECB larvae/plant; on May 2, 1996, this field averaged 3.13 larvae/plant, with about 0.56 dead larvae per plant. As expected, based on the cool spring, none of the larvae have pupated. An average 65% survival rate is good considering the severe winter weather, but is explained by the good insulating snow cover, keeping actual soil temperatures high through most of the winter, and the inherent ability of ECB larvae to withstand temperatures to -20°C before they freeze.

Also, at this time it is too early to determine the percentage of parasitism (e.g., by *Macrocentrus grandii*), or those that might be infected with the microsporidia *Nosema* (these larvae were returned to the lab to check for parasitism). Our fall 1995 estimate at Rosemount is also in agreement with the MDA fall survey for southern Minnesota (a map of the 1995 fall survey can be found on our 'VegEdge' IPM page on the WWW at <http://www.mes.umn.edu/~vegipm/>). The bottom line to date, is that there continues to be a significant reservoir of ECB in southern Minnesota, and we should expect a significant first-generation flight.

The following graph illustrates our Minnesota ECB model for forecasting the first-generation flight, based on

**1st Generation ECB Emergence 1991 - 1995
Rosemount, MN, Blacklight Trap**



degree-days (sine wave method) and moth captures in black-light traps. This is a cumulative emergence model (scaled to 1.0 or 100% emergence) based now on 5 years of data collected at Rosemount. It can be used as a guide to know, at any given time this spring/summer, where we are at in the flight, at least for the eastern half of the state (in some western sections of the state, e.g., Olivia, we are seeing multiple flight periods, such as 3 peaks rather than 2 only, which is apparently attributed to a mixture of 2-generation/yr and 1-generation/yr ECB in the same location; this will require further study, and most likely new models).

Based on this model, we can forecast the estimated degree-days for peak emergence (50% of flight), or any other time period. The following table summarizes 5 key periods, along with 95% prediction intervals, to provide some indication of the variability associated with this model.

% Emergence	Avg. Degree-days (95% Prediction Interval)
10	460 (... - 525)
25	520 (445 - 570)
50 (peak)	590 (540 - 650)
75	680 (615 - 810)
90	780 (670 - ...)

Given the "spring" weather we have had to date, we are still at only about <100 degree-days. Although the weather "could" warm up at anytime, the projections now are for the first flight to begin in late May. More details with the forecasts will be provided in upcoming newsletters.

In addition to the newsletter updates, this year, we will be providing many types of ECB infestation updates via our 'VegEdge' Homepage on the World Wide Web (Internet) (see address above). These updates will include ECB model forecast maps (from Dennis Calvin, Penn. State Univ.), light trap and pheromone trap ECB moth catch maps (for MN, WI and IL), as well as late breaking text updates. All of this information is available 24 hours a day if you have a personal computer, modem (14 or 28 K baud rate) and internet software. I will have more information about this in future articles; if you need information about how to get connected to the internet, check out your local computer store.

Bill Hutchison
Extension Entomologist

Alfalfa Establishment — Who's the Bad Guy?

When it comes to alfalfa establishment, who are the bad guys? Weeds or companion crops? If weeds are 'bad', are all of them bad? Most alfalfa is seeded with a companion crop as a traditional practice that has served well. More intense management of alfalfa may include a shift to solo seeding. Surveys in Wisconsin and Minnesota in 1989 and 1990 show about 80% of alfalfa seedlings were planted with a companion crop, 16 to 19% were solo seeded with herbicide use, and the remainder solo seeded without herbicides. The same surveys showed that over 80% of alfalfa plantings were spring

seeded, and the remainder were summer seeded. Herbicide recommendations are listed in the University of Minnesota Bulletin, *Cultural and Chemical Weed Control in Field Crops*, 1996, BU-3157-F.

Companion crops protect alfalfa seedlings from environmental conditions such as soil erosion, reduce weed encroachment during alfalfa establishment, and provide grain and straw. Forage yield may be increased the establishment year by seeding a companion crop and harvesting it for silage. However, companion crops can compete with seedling al-

falfa and like weeds, may impact alfalfa production. Solo seeding can increase the production of forage that is high in quality the establishment year, although overall tonnage may be reduced. Solo seeding can also result in increased alfalfa vigor and population density during establishment. There is no one "correct" alfalfa establishment method, as the needs of the individual operation will determine which establishment technique would be most productive and profitable.

Companion crops may reduce, but will not eliminate, annual weeds during alfalfa establishment. Grass weeds such as foxtails will not be controlled the establishment year by clipping forage once foxtail reaches the tillering stage of growth due to regrowth from crown or basal buds. Annual broadleaf weeds are not as likely to persist if harvests are performed in a timely fashion. Minnesota and Wisconsin research indicates that nutrient composition and digestibility of many broadleaf weeds such as redroot pigweed, common lambsquarters, and common ragweed tend to be similar to alfalfa when harvested in a timely fashion. Giant and yellow foxtail, shepherdspurse and Pennsylvania smartweed lowered forage nutrient composition and digestibility. Most annual weeds tend to show a dramatic decrease in forage quality as they reach mature stages of growth when seedheads are produced.

Oat "inter-seeded" in alfalfa may later be removed with Poast or Pursuit to mimic solo seeding while minimizing soil loss potential. This makes it possible to establish alfalfa with an oat companion crop in areas where erosion potential is a concern, yet removes oat competition before long-term stand or vigor damage may occur. This technique also works well on sandy soil to prevent blowing sand damage common when alfalfa is solo seeded on these soils. Oat should be sprayed targeting 4 to 6 inches in height before considerable competition has occurred. Oat is recommended because other small grains are not as easily controlled with herbicide.

Table 1 shows oat control with Poast or Pursuit herbicide applied postemergence to 4-6 inch oat. The 0.5 pint rate is below labeled rates. Variability in control shows the lower performance and inconsistencies possible when using less than labeled rates. If soil moisture preservation is of concern, higher rates of herbicide in the labeled range should be used to provide quicker oat kill. Oat not killed by herbicide that remains stunted and green, and will continue to use soil moisture. Poast Plus currently has replaced Poast in the alfalfa market. Both formulations with recommended additives have performed similarly in Minnesota trials.

Table 1. Oat Control in Alfalfa Establishment, Minnesota 1989.

Rate	% Oat Control				
	Trt. (pt/A)	Rsmt	Waseca	Lmbtn	Mrrs
Poast 0.5	0.5	45	92	61	65
Poast 0.75	0.75	75	98	97	93
Pursuit 0.25	0.25	56	78	76	81

Poast applied with 28% and Dash (4 + 1 qt/A)
Pursuit with 28% and nonionic SU (1 Qt + 0.4 pt)

Pursuit was compared with Poast to manage oat companion crops during alfalfa establishment at Rosemount, MN (**Table 2**). Pursuit generally is more efficacious on smaller weeds. However, Pursuit (4 oz/A) was less active on 2 to 3 inch oat than when applied to 4 to 6 inch oat. Oat regrew and contributed more to forage yield when Pursuit was applied earlier. Poast or Pursuit both effectively removed oat at a 4 to 6 inch application. Broadleaf weeds can be very competitive when using Poast. If present at high populations, tank mixtures with 2,4-DB can be used. Pursuit controlled most broadleaf weeds present. Under-storied giant foxtail was generally controlled with all treatments.

Table 2. Control of Oat 5 to 7/4 to 6 WAT in Companion Crop Seeded Alfalfa, Rosemount, MN 1991-1993

Trt.	Rate (oz/A)	Oat		
		1991	1992	1993
		--- (% Control) ---		
Pursuit (2-3")	3	58	42	70
Pursuit (2-3")	4	77	56	88
Pursuit (2-3")	6	83	78	92
Pursuit (4-6")	4	97	67	92
Pursuit (4-6")	6	99	80	98
Poast Plus	12	96	87	98
Poast Plus	18	98	96	99
Poast Plus	24	99	96	100
LSD (0.05)		10	8	4

Summary

There are many options available to establish alfalfa. The decision to use a companion crop, to solo seed, or to use a herbicide in either system depends on each specific farming operation. Forage quality and yield goals should be part of any alfalfa establishment strategy. Companion crops and weeds both can compete with alfalfa seedlings, both can impact forage quality in negative ways for high producing dairy herds or for hay marketing, and both can protect alfalfa and soil during establishment. Companion crops can provide increased forage tonnage the establishment year, especially during drought periods. Management of the companion crop can optimize forage yield and quality. Your challenge is to determine how weeds and companion crops interact in your forage management program to optimize forage profitability.

Roger Becker
Extension Agronomist-Weed Science

Roundup Cleared for Preharvest Applications in Alfalfa

Have you ever had that question come at the end of May, "I want to cut my hay crop and then plant corn (or beans). How can I do it?" Farmers just can't let that cutting of forage go. When no-tilling or even with tillage, if quackgrass is present, the best management is to spray with glyphosate in the fall. The next best strategy is to spray when vegetation is 8 inches in height BEFORE cutting the forage in the spring. Now, Monsanto has received supplemental labeling for the use of glyphosate (Roundup Ultra) herbicide for use in alfalfa just prior to harvest. The label specifically recommends to use glyphosate in declining alfalfa stands or any stand of alfalfa where crop destruction is acceptable. Glyphosate used in this manner will control labeled annual and perennial weeds including quackgrass when applied prior to the harvest of alfalfa. The treated crop can be harvested and fed to livestock. A waiting period of 36 hours (1-1/2 days) is all that is required between application and harvest. This is a considerably shorter harvest interval than previously possible on glyphosate labeling.

The labeled rate is for use of up to one quart of Roundup Ultra formulation of glyphosate per acre. Applications can be made at any time of the year but the label states that only one application should be made per year to an existing stand of alfalfa. If quackgrass is a primary target, the label states that Roundup Ultra can be applied in the spring, late summer or fall when quackgrass is actively growing with the caveat that treatments must be followed by deep tillage for a complete control. This label does not allow the use of glyphosate where alfalfa is grown for seed.

My experiences in Minnesota and Iowa are that glyphosate application for control of quackgrass provides the most consistent and complete control when applications are made in the fall, hands down. For applications applied in the spring, glyphosate can provide similar control to that achieved with fall applications, but is often less consistent. With spring applications, it is particularly important to follow with some form of tillage to reduce quackgrass regrowth. Mid-summer applications can be very disappointing, particularly if quackgrass is in the seedhead development stage, at which point relatively little glyphosate translocates to the rhizomes to provide long-term control.

We conducted a study at Rosemount last year studying spring preharvest applications of glyphosate to an old alfalfa stand with bluegrass, quackgrass, and common dandelions. Treatments were the application of glyphosate at 1, 3, 7, and 14 days prior to harvest. Rates of glyphosate tested were equivalent to 1/2, 3/4, 1, and 2 quarts of Roundup Ultra per acre. The alfalfa stand had been in place for more than 5 years without any tillage and quackgrass comprised 30 to 70% of the forage.

Where the plots were plowed following herbicide application, all timing and application rates provided adequate control of quackgrass regrowth during that season. Where plots were no-till seeded, the 1-day prior to harvest application treatment, (shorter than labeled harvest interval), resulted in reduced control of vegetation in the following cropping system at all rates tested. The 1-quart per acre rate applied at 3 or more days prior to harvest seemed to be the best optimization of herbicide cost and performance. Rates of glyphosate equivalent to 1/2 or 3/4 quarts of Roundup Ultra did result in a reduced soybean yield due to significantly lower perennial forage control. Surprisingly (to me at least), control of quackgrass, common dandelions, Kentucky bluegrass, and remnants of the old alfalfa stand were controlled for the season with a spring application of 1 quart or more of glyphosate.

Remember, the Roundup Ultra label calls for deep tillage of stands where quackgrass is present to obtain control following application. Also, if vegetation is not controlled prior to planting, herbicides are available for postemergence application in soybean to suppress quackgrass, but no options exist that will provide adequate control of aggressive alfalfa regrowth in existing soybean stands. We planted soybean in this particular study because the late May seeding would preclude optimum growth of corn for grain yield, however, producers in dairy regions could consider planting corn and harvesting corn silage in this system. We will repeat this study this year growing corn and harvesting the corn for silage.

Roger Becker
Extension Agronomist - Weed Science

Weed Control in Crops Following Winter-Killed Alfalfa

A number of growers are faced with the situation of evaluating the viability of alfalfa stands and possibly replanting to another crop. One of the major problems encountered when replanting corn or soybeans following winter-killed alfalfa is that there often is still enough regrowth alfalfa to compete with the new crop. If you are following winter-killed alfalfa with soybeans, remember that there are no viable postemergence herbicide options that will control alfalfa in soybeans. There are, however, several options that you could consider before planting. You could plow the alfalfa field. This should greatly reduce the amount of alfalfa regrowth.

You could treat the remaining alfalfa when it is approximately 4-6 inches tall with 1 qt/A of Roundup and 1 pt./A of 2,4-D ester. This amount of a 2,4-D ester should still allow you to plant soybeans in seven days. Greater amounts of 2,4-D would require a 30-day waiting period. Viable postemergence alfalfa control options do exist in corn. Banvel or 2,4-D postemergence should control most of the regrowth alfalfa.

Jeffrey L. Gunsolus and Roger L. Becker
Extension Agronomists

Lorsban 4E-SG Approved for Control of Orange Wheat Blossom Midge

The Minnesota Department of Agriculture (MDA) has issued a 24(c) Special Local Need (SLN) registration for use of Lorsban 4E-SG, EPA Reg. No. 62719-245, for the control of Orange Wheat Blossom Midge in wheat. For control of OWBM, use one pint of Lorsban 4E-SG per acre. Treatment is recommended when 75% of the wheat heads have emerged from the boot and when midge adults are found in the crop (1 midge per 4-5 heads). Application timing is critical to ensure good control. If possible, apply in the late afternoon or early evening when temperatures exceed 50 F and wind speed is less than 7 mph. Applications may be made by ground or air. Although a minimum of 2 gallons per acre finished spray volume is recommended on SLN label, control of

OWBM improves when a minimum of 5 gal/acre by air or 15 gal/acre by ground is used. Ground application works best with nozzles tilted at a 45 angle. Do not make more than two applications per crop and do not apply within 28 days of harvest. Consult the SLN label, which must be in the possession of the user at the time of application, for other restrictions. Read the full Lorsban 4E-SG label before applying. Contact University of Minnesota Extension, the MDA at 612-296-4292, or a DowElanco representative for additional information.

*Jochum Wiersma
Small Grains Specialist*

Nutrients in Surface Runoff

Recently, a substantial amount of concern has been focused on plant nutrients and the quality of surface waters. The loss of phosphorus and ammonium-nitrogen to these waters receives special attention.

The loss of plant nutrients in surface runoff has been a concern of researchers involved with crop production for several years. Several studies have focused on developing management practices that might be used to reduce these losses. Tillage system has a major effect on soil loss and, therefore, has substantial impacts on losses of ammonium-nitrogen and phosphorus. Results from a study conducted in Kentucky illustrate the impact of tillage system on loss of ammonium-nitrogen and phosphorus from the landscape. The results of the research are summarized in the following table.

Effect of tillage system on soil, ammonium-nitrogen, and phosphorus from soil with a 9% slope.

Tillage System	Soil Loss	Nitrogen Loss	Phosphorus Loss
		-----lb./acre-----	
conventional	13,826	1.16	.62
chisel	2,944	.62	.36
no-till	268	.45	.27

The losses reported in this table were measured after three rainfall events and are not intended to represent losses during an entire growing season. Actual losses measured will also be affected by several factors. Therefore, the relative comparisons are important.

For the conventional system, the soil was plowed to a depth of 7 inches and disked twice. A straight shank chisel and light secondary tillage operation was used for the chisel-plow treatment.

The difference in soil loss as affected by tillage system were substantial. Since most of the ammonium nitrogen and phosphorus lost from a landscape is attached to soil particles, the higher losses of these nutrients in the conventional tillage system would be expected.

The results from this study show that residue left on the soil surface can reduce losses of plant nutrients from fields. The use of no-till practices on all acres, however, is not necessary. The chisel-plow system, that is popular in much of Minnesota, can also reduce nutrients lost in surface runoff.

*George Rehm
Extension Soil Scientist*

More Questions and Answers on the New Farm Program

Many counties have conducted informational meetings on the new Farm Program in the past couple of weeks. This has raised numerous questions about the new program, some of which will be addressed in this article. The answers listed are based on the latest Farm Program details available through the Farm Service Agency.

Q. Has USDA announced the 1996 market transition contract payment rates?

A. Yes. The announced rates for 1996 are "Estimated Payment Rates." The estimated rates will be used to determine the advance payment levels.

Q. What are the 1996 "Estimated Payment Rates?"

A. Commodity	Advance (50%)	Total
• Wheat	.31	.62
• Corn	.12	.24
• Grain Sorghum	.155	.31
• Barley	.115	.23
• Oats	.01	.02

Q. Is it possible for the 1996 payment rates to increase over "Estimated Payment Rates?"

A. Yes. The estimated rates are based on 100 percent program participation for a given crop. If the participation for any crop drops lower than 100 percent, the payment rate for that crop will be increased accordingly. Final participation

Farm Program/Continued

will not be known until after August 1, 1996. The payment adjustment will be made on the final 1996 payment, which is scheduled to be made by September 30. For example, if the nationwide program participation for corn is only 95 percent, it is estimated that the total 1996 payment will increase 2 to 3 cents. This would increase the September payment to \$.14 or \$.15 per bushel.

Q. What will the 1997 payment rates be?

A. These payment rate estimates have not been announced by USDA. Actual payment rates for 1997 will probably not be announced until after August 1, 1996, since they are dependent on the percentage of program participation for each crop.

Q. How will the repayment of my 1995 advance payment for corn take place?

A. USDA has not announced exact details on the mechanics of this repayment. However, the repayment for corn will most likely be deducted from the 1997 advance market transition payment on December 15, 1996 or January 15, 1997. The advance payment rate will be adjusted upward to reflect the repayment amount. For example, the total 1997 advance payment for corn may be \$.30 to \$.33 per bushel, but the "net" advance may only be \$.12 to \$.15 per bushel, for producers needing to repay 1995 deficiency payments.

Q. Why would the difference between the total 1997 advance payment and the "net" payment be less than the \$.20 per bushel 1995 repayment?

A. There was 7.5 percent set-aside acres in 1995, so program payment was on only 77.5% of corn-base acres. 1997 payments will be on 85 percent of base acres. Also, program participation percentage in 1995 was likely lower than 1997 participation.

Q. How will repayment of the 1995 wheat advance deficiency payment be handled?

A. Again, USDA has not announced exact details; however, it will most likely be handled very similar to the description given for corn. The only exception is that the repayment of the 1995 wheat deficiency payment will likely be deducted from the final 1996 transition payment, to be paid by September 10th. It is estimated that approximately \$.25 will be added to the final 1996 wheat payment to account for the deficiency repayment.

Q. Who is responsible for the deficiency repayment?

A. A producer that participated in the 1995 corn or wheat program and received an advance deficiency payment is responsible for the repayment. The repayment amount will most likely be deducted from future market transition payments according to the guidelines listed earlier.

Q. What if I repaid my 1995 advance payment last December for tax purposes?

A. Producers that have already repaid the entire 1995 advance payment will not have it deducted from market transition payments. For example, a producer that repaid the 1995

advance payment would receive the entire \$.30 to \$.33 per bushel estimated 1997 advance payment for corn rather than the \$.12 to \$.15 per bushel "net" payment.

Q. What if I did not participate in the 1995 program?

A. A producer that signs up for the market transition program for a crop in 1996, but did not participate in 1995, would not owe any deficiency repayment and would receive the entire payment, similar to the example listed earlier. For farms with multiple crop bases, repayment may be required on one crop, but not on others. For example, a farm with corn and wheat base would owe repayment on the corn base if they participated in the 1995 program, but would not owe repayment on the wheat base if wheat was not raised in 1995.

Q. If I quit farming after 1995 and cash rented my farm out for 1996, will I owe the 1995 repayment or will my 1996 renter owe the repayment?

A. The person that farmed the land in 1995 will owe the full repayment amount. If that person is no longer farming, they will need to make payment to the Farm Service Agency. The new renter will receive the entire market transition payment without any deductions for the 1995 deficiency repayment.

Q. If I was in 0/85 or 0/92 in 1995, do these deficiency payments need to be refunded?

A. No. Deficiency payments received under 0/85 and 0/92 are guaranteed and do not have to be repaid.

Q. If a husband and wife co-operate a farm, can each be eligible for a \$40,000 payment limit?

A. Yes. They each must meet the Farm Service Agency guidelines for being actively engaged in the farming operation. Contact local offices with specific questions.

Q. Is there a separate payment limit that relates to the repayment of the 1995 deficiency?

A. Yes. There will be a separate \$50,000 payment limit per person for the transition payment amount that will likely be added to final 1996 wheat transition payments and 1997 advance corn payments. The balance of the payments will be subject to the \$40,000 payment limit in the new Farm Program.

Q. How will my pro-rated annual payment be calculated for termination of a CRP contract?

A. The termination date will be 60 days after CRP termination is approved. So, if a CRP contract is terminated on May 1st, the termination date will be July 1st. The pro-rated payment will be from October 1, 1995 through June 30, 1996 or 83 percent of the total annual CRP payment.

Q. What is the final date to sign up for termination of a CRP contract and still be able to receive a market transition payment?

A. May 31, 1996. The additional 60 days would make the termination date July 31, 1996. All revisions for the new market transition program must be completed by August 1, 1996.

Q. Can I receive both a pro-rated 1996 CRP payment and a 1996 market transition payment on terminated CRP contracts?

A. Yes. This opportunity is only available for CRP contracts terminated by May 31, 1996. After that date, landowners will have a choice of a pro-rated payment or a market transition payment. Transition payments will be made on 85 percent of all crop-based acres that are returned following CRP contract termination.

Q. When does sign-up for the new Farm Program begin?

A. Sign-up for the Market Transition Program begins on May 20, 1996 and continues until July 12, 1996 at local Farm Service Agency offices. This is a one-time sign-up opportunity to receive market transition payments for seven years, 1996-2002. **Contact your county Farm Service Agency for sign-up details and to get answers to specific questions about your farm units.**

*Kent Thiesse
Crop Systems Extension Educator*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

“Dog Blight” and Associated Problems

Has your lawn “gone to the dogs”? We’re getting lots of calls about dead spots in the lawn, caused by—you guessed it—man’s best friend. This is particularly irritating when it’s not even your own dog. (You walk your dog and scoop up its droppings immediately, right?)

People mistakenly think that gypsum (calcium sulfate) will help those spots by “neutralizing” the acidity from the feces and/or urine that burned the grass. Actually, it’s not really the acidity that’s a problem; it’s the high concentration of “fertilizer” in a small area. What is needed is thorough soaking of the area to dissipate any fertilizer salts still concentrated where the dog did its business.

If grass doesn’t reappear after heavy soaking, re-seed the spots or dig small chunks of sod from a less conspicuous part of your yard to fill in dead spots that are located where you’d prefer the lawn to look its best. Then you can seed those places where you dug your own sod.

When collecting droppings, bag them and dispose of them in the trash. **DO NOT** put them into your compost pile. Dog and cat feces often carry parasitic organisms that pose a real threat to humans. They may not be killed in the compost pile, in which case you could pick them up later, while working in your garden.

*Deborah Brown
Extension Horticulturist*

Andrenid Bees

Some people have been finding andrenid bees in their garden or yard. These bees are generally small and black. They are solitary, i.e. they live by themselves (not social like bumble bees and honey bees). Although there is just one bee per nest, many of these bees typically nest close to each other. They nest in the ground, usually in sun exposed, dry areas. They are particularly conspicuous during spring.

Although andrenid bees can occur in large numbers, they are gentle and very rarely sting people. Andrenid bees are also important pollinators of native plants. If they are a nuisance,

first try to discourage them by sprinkling their nest entrances with water. This often encourages them to move to seek out drier sites. There are insecticides available to treat ground-nesting bees, but they should be used as a very last resort.

*Jeffrey Hahn
Assistant Extension Entomologist*

Rhizosphaera Needlecast Symptoms Evident Now

Many of the recent concerns with ornamental spruce in the urban landscape are the result of **Rhizosphaera needlecast**, a common fungal disease caused by *Rhizosphaera* sp. Colorado blue spruce are highly susceptible to this disease.

Infection usually begins in spring on the inner needles of lower branches. Later in the summer, infected needles show yellow mottling, followed by brown or purple-brown discoloration. Needles eventually drop the following summer, 12 to 15 months after initial infection. New growth on the ends of infected branches usually remains green and appears to be uninfected. However, observation of the green needles with a hand lens may show black fruiting bodies emerging from the stomatal rows.

Rhizosphaera needlecast progresses rather slowly from the base of the tree upwards infecting only the foliage. Environmental stress from drought or other environmental factors may predispose spruce to infection. Poor air circulation under lower limbs may also contribute to disease development, increasing the moisture content. Weed control, mowing under lower branches, and removal of lower branches to increase air flow can be beneficial. If chemical control is required, apply a fungicide with the active ingredient chlorothalonil (e.g. Daconil 2787, Ortho Multipurpose, and others) two times in the spring. Be sure to follow all label specifications. Depending on the severity of the disease, application may need to be repeated over two or three growing seasons.

*Kelly Russell
Plant Pathology Technician*

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COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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CROP**NEWS**

From the
Crops System Team
of the
Minnesota Extension Service
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DOCUMENTS

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Canada Thistle Control

Canada thistle is a primary noxious weed and the most prevalent broadleaf weed in Minnesota. It is found in all crop and non-crop areas and spreads by seeds, roots and rhizomes. Canada thistle seeds develop early. The seeds are ready to germinate eight to 10 days after the flowers open. Up to 680 seeds are produced per stem. Each seed is attached to a tiny parachute which can be carried long distances by air currents. The seeds can survive up to 21 years in undisturbed soil. Once the seed germinates and the plant develops, each plant sends out horizontal roots. From the root system a new plant can develop every eight to twelve inches. Each new plant develops a deep root system which stores food reserves and produces new shoots. From one Canada thistle seedling, a stand can spread out 60 feet in all directions.

In recent years Canada thistle has been more difficult to control for a variety of reasons. The wet cool soil conditions of the past several years have been ideal for Canada thistle root growth. In addition, the trend of less tillage in production fields has allowed the root systems to develop without

interruption. On top of that, many corn and soybean herbicide programs target weeds other than Canada thistle.

Canada thistle strategies involve either suppression to stop seed production or control methods to eliminate seed production, destroy the root system, and deplete the food supply. Suppression methods involve mowing, tillage or herbicide application prior to blossom development. Examples of herbicides which will offer suppression include: 2,4D and Banvel in corn and small grain; Basagran in corn and soybeans; Express, Ally or Harmony Extra in wheat and barley; and Ally in grass pastures.

A control program combines the in-season suppression and control methods with fall treatments to tillage or a control herbicide application. Examples of herbicides which provide Canada thistle control include: fall application of 2,4D plus Banvel or Roundup; Stinger in corn, small grain and pastures; or Curtail in wheat, barley or pastures. A two-year program will be necessary for Canada thistle control.

Producers should consult the herbicide label for drift precautions, rotational crop restrictions and grazing restrictions.

Bob Byrnes

Lyon County Extension Educator

Highlights....May 3, 1996

Canada Thistle Control
Correction
Waiting for Emergence
Samples Submitted to the Plant Disease
Clinic During April
Dial U
Ticks
Monitor for Insects
Field Ants
Lawn Problems in Shady Locations

Correction

In the April 26, 1996 issue, page 38, *Common Questions About The New Farm Program*, the response of \$20 should read \$.20. The answer should be corrected as follows:

Q. Will producers be required to repay 1995 deficiency payments that they received?

A. Yes. The \$.20 per bushel 1995 advance payment for corn.....

Waiting for Emergence

Producers who planted corn in late April or early May are waiting for germination and emergence. Some may even question their decision to plant into cool and perhaps dry soils. Most agronomists agree that late April and early May planting of corn is the correct management decision regardless of soil temperatures, providing that soils are fit to work. Yield potential declines for each day after May 1 are well documented. In addition, the potential for rain delays which stop field work increase in the second or third week of May. To quote Extension Agronomist Dale Hicks, seed in the

ground is better than seed in the bag. Soils will continue to warm until August. Because of the cool soil conditions, germination and emergence will take 15 to 20 days after planting. Emergence can be further delayed if seeds are in dry soils. However, as soils are wetted and soil temperature increases, emergence will occur. In some cases, weed seed near the soil surface may germinate before the crop. In these cases, rotary hoeing is recommended.

Bob Byrnes
Lyon County Extension Educator

Samples Submitted to the Plant Disease Clinic during April Included:

wheat—scab testing
soybean—*Phomopsis* sp, soybean cyst nematode
alfalfa—*Pythium* sp root rot, winter damage
tomato—*Rhizoctonia* sp stem rot
Austrian pine—*Dothistroma* sp needlecast
turf—*Microdochium* sp (pink snow mold)
geranium—numerous plants were tested for *Xanthomonas campestris* (bacterial wilt), *Pythium* sp root rot
impatiens—Impatiens necrotic spot virus (INSV)
gloxinia—INSV
petunia—INSV
spikes—Tomato spotted wilt (TSWV), INSV
alstroemeria—tested negative for Alstroemeria mosaic virus
browallia—TSWV
daylily—*Rhizoctonia* sp, bacterial soft rot
dahlia, dipladenia, & fuchsia—tested negative for TSWV & INSV

Sandra Gould
Plant Disease Clinic

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Ticks

We have just started receiving tick samples. They have mostly been adult female blacklegged ticks (formerly deer ticks) which are potential vectors of Lyme disease. Although Lyme disease is more frequently contracted during June and July, people can be exposed to it anytime blacklegged tick adults and nymphs are active (March - November). Infected ticks need to bite for at least 18 hours before they can transmit the disease organisms to their host. Ticks that are crawling on a person or ticks attached for a short period of time do not transmit Lyme disease.

American dog ticks (also known as wood ticks) are also active now. They are not important carriers of disease in Minnesota. It is important to distinguish between them to assess the relative risk of Lyme disease. If there is any question as to the identity of a tick, submit it to Dial-U for identification. Send samples in small crush-proof containers with tight lids (e.g. pill jars, film canisters). Do not tape samples or wrap specimens up in tissue paper. See FO-1013, *Minnesota Ticks and Their Control* and FS-3753, *Lyme Disease in Minnesota*.

Monitor for Insects

There are different methods for monitoring plants for insect pests, including calendar dates (you expect to see an insect at a certain time during an average year), plant phenology (the appearance of an insect corresponds with a certain plant event), traps, and visual sightings. Our atypically cool spring is going to make calendar dates inaccurate and plant phenology unreliable. Don't assume that insects ought to be on plants at a certain time because they were seen at the same time last year. Even if you factor in how late the spring is, that doesn't mean the insects will be late by the same amount of time. Sudden warm weather can accelerate their development and they could appear when you don't expect them.

Place less reliance on calendar dates and plant phenology and rely more on visual examinations and traps. Check plants at least weekly at first and more often as you anticipate the insect pests' arrival. The goal is to detect pests early so you can decide what management steps are necessary. The earlier you manage pests the more you minimize potential injury to plants.

Field Ants

Carpenter ants are probably the most common type of household ant in Minnesota. Many times we assume big black ants are carpenter ants. However, other ants are confused for carpenter ants. It is important ants are identified before control is attempted to be sure the correct management methods are used. This week we received several samples that were thought to be carpenter ants but were actually field ants. These two ants are similar in size and color; however, field ants do not nest in homes and do not damage structures. Field ants are considered nuisances only, and their control is different than that for carpenter ants. The bottom line is be sure you know which you are dealing with before attempting control as it can differ for different ants. See *What To Do About Household Ants*, FO-1066.

Jeffrey Hahn
Assistant Extension Entomologist

Lawn Problems in Shady Locations

Minnesotans love their trees, but sometimes I think they love their lawns even more! As shade trees grow and mature they cast ever larger shadows, and send out more and more feeder roots that compete with grass for moisture and nutrients. That's when the complaints begin.

It simply isn't possible to grow a thick, nice lawn where there's shade most of the day. Fine leaf fescues such as creeping red fescue or chewings fescue are about as shade-tolerant as you can find, and even they peter out as the summer wears on. (They need to be seeded with some common Kentucky bluegrass or they'll lay down flat and you won't be able to mow.)

The typical scenario has grass thinning and a combination of weeds (such as creeping charlie) and moss moving in and ultimately taking over. People focus on weed and moss control, but even though you can get rid of them with a certain amount of diligence, you won't be able to coax grass into growing well, and soon you'll be right back where you started.

Something will move in to fill those holes left bare by the removal of undesirable plants. Unless you can plant a shade-tolerant groundcover, you're probably better off putting up with the weeds and moss and enjoying the trees. At least you can walk on creeping charlie and moss. Ever walked on a hosta lily?

Deborah Brown
Extension Horticulturist

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Barley Production for Livestock Feed

Producers concerned about high feed costs or potential availability of traditional feed supplies in midsummer may want to consider barley as an emergency livestock feed crop. Barley is a good substitute for corn in livestock rations, with 85 percent relative feed value as compared to corn. Barley is also a short season crop, maturing about a week earlier than wheat, and harvestable up to two months before new crop corn is available. Barley has two markets: the malting industry and the livestock feed market. Barley grown in this area should be targeted for the feed market. Grain yields in the 90 bushel per acre range can be expected, although as with other small grains, environmental conditions can dramatically influence yields. The environmental conditions which could reduce grain yield include disease and inadequate kernel development. Hot weather during grain fill can reduce yield. Prolonged wet weather during grain fill can lead to the disease scab. Scab will not reduce yields of barley as much as wheat. However, scab induced vomitoxin can cause feeding concerns.

Production practices for Barley are similar to wheat and oats. Barley should not be planted on high fertility fields due to increased lodging risk. Since corn residue is a host for

Scab, fields previously planted to corn should not be planted to barley.

Fertilizer recommendations for barley are similar to wheat fertilizer recommendations. Barley yield goal of 90 bushels an acre on land previously planted to soybeans would require 75 pounds nitrogen and 25 pounds phosphate. It is unlikely that potassium would be required on most southwestern Minnesota soils.

Producers should select barley varieties with high yield potential, good lodging resistance and good disease resistance. The variety Stander is a recommended variety which offers high yielding ability and resistance to lodging. As is the case with wheat and oats, planting barley early is a significant factor in producing high yields of barley. Early planting will often enable the crop to mature before the occurrence of high temperatures and shortages of soil moisture, which hasten maturity and reduce yield.

A number of weed control options are available for barley production. Barley is more competitive than other small grains, but yields can be greatly reduced if weeds are not controlled. Most herbicides available for barley will control annual grasses and broadleaf weeds, but will not control established perennials. Perennial weeds such as Canada thistle or quackgrass should be controlled prior to (preferably the year before) seeding barley.

Insects usually are not a serious problem in barley. However, barley fields should be monitored for insects during the season and controlled if necessary. Aphids and army worms are the most common barley insect pests.

Harvest swathing is timed to when the kernels of a barley spike have reached their maximum dry weight (physiological maturity). Recent studies in Minnesota indicate that physiological maturity (PM) of barley is best determined visually by when the peduncle (the internodes just below the spike) has lost its green color. Generally, this is when the grain moisture is about 30%. Swathing the grain before its PM could result in yield loss.

Highlights....April 26, 1996

Barley Production for Livestock Feed
Common Questions About the New Farm Program
Seed Treatments
Potassium and Alfalfa Production
Scout Alfalfa Fields for Signs of Winterkill
Planting Date of Small Grains
Dial U
Carpenter Ants
Early Spring Gardening

Barley/Continued

Swathing should not begin until all kernels are free of green color and the grain moisture is 30%. Enough stubble (about 8 inches) should be left to keep the heads off the ground. A high swath will dry more quickly and will result in less head and kernel staining.

Optimum initial grain moisture for combining is 13.5%. The whole field should be inspected to make sure the barley in the swath is uniformly dry. Time and patience are necessary to set the combine to the proper adjustment.

The two most important adjustments are cylinder speed and concave clearance. Cylinder speeds used for wheat are too fast for barley. High cylinder speed should be just fast enough to thrash according to cylinder speed—close settings require slower cylinder speed. The sieves should be adjusted

for the least possible tailings return. Heavy tailings return can also be the cause for a high percent of skinned and broken kernels.

The moisture content of barley is relevant to the length of time the grain will be in storage. Short-term storage can be at 14% grain moisture. However, long-term storage (more than one year) should be at 13% grain moisture.

Barley straw is useful for livestock bedding, though not of the same quality as oat straw. The beards of barley which will be with the straw grain may cause sore mouths in cattle if the cattle eat the straw.

For livestock producers who will need a corn substitute for livestock feed this summer, barley may be the best choice. More information on barley production is available at the extension office.

Bob Byrnes

Lyon County Extension Educator

Common Questions About the New Farm Program

Details are now available on the "Agricultural Market Transition Act" (AMTA), which will govern farm programs from 1996 through 2002. Following are some common questions and answers regarding provisions of the new Farm Program:

Q. When are sign-up dates for the new Farm Program?

A. -May 20 through July 12 at County Farm Service Agency offices. **This is a one-time sign-up for a seven-year contract.** There will likely be no opportunities for sign-up after 1996.

Q. Was it necessary to participate in past farm programs to be eligible for AMTA in 1996?

A. - No. Program participation for one year from 1991-95 is not a requirement for AMTA program eligibility. (This was listed as a requirement in early versions of the Farm Bill). Any farm unit with crop acreage bases is eligible for AMTA and eligible to receive a "Market Transition Payment."

Q. Is it possible to receive payments on more than one crop base on a farm unit?

A. Yes. Payments will be calculated for any corn, wheat, oats, or barley base acres that exist on a farm unit and totaled for an annual "Market Transition Payment." FSA contract yields used to calculate payments for program crops are frozen at 1991-95 levels.

Q. What is the formula to calculate "Market Transition Payment?"

A. **Crop Base x FSA Yield x Payment Rate x \$.85** for each eligible crop base, then totaled together for a "Market Transition Payment."

Example:

Corn = 300 A. x 115 Bu. x \$.27 x .85 = \$7,917.75

Wheat = 60 A. x 40 Bu. x \$.66 x .85 = \$1,346.40

Oats = 50 A. x 70 Bu. x \$.05 x .85 = \$148.75

Total "Market Transition Payment" = \$9,412.90

Q. Will there be an advance payment?

A. Yes. Producers will receive 50 percent of their 1996 "Market Transition Payment" approximately 30 days after they sign their seven-year contract. The balance of the payment will be paid by September 30th. Starting in 1997, the advance payment can be received on either December 15th or January 15th, with the balance paid by September 30th.

Q. Are the "Market Transition Payments" guaranteed?

A. Yes. The payments do not fluctuate upward or downward with changes in commodity prices.

Q. What are the 1996 payment rates?

A. 1996 payments are not finalized as of this writing. However, it appears that the 1996 corn payment rate will be \$.27 per bushel and the wheat payment rate will be \$.66 per bushel. The wheat payment rate could be raised due to 1995 deficiency repayment funds.

Q. Will producers be required to repay 1995 deficiency payments that they received?

A. Yes. The \$20 per bushel 1995 advance payment for corn must be repaid after October 1, 1996, and the \$.35 per bushel 1995 advance wheat payment must be repaid after July 1, 1996. These repayments can be deducted from "Market Transition Payments" in the new farm program.

Q. Is it true that there is "total planting flexibility" under the new program?

A. Yes. A producer can plant any number of acres of any crop or any combination of crops that they choose. In other words, they could plant an entire farm unit to corn, regardless of previous crop bases. This planting flexibility also extends to alfalfa planting. The only restrictions are related to planting fruits and vegetables on contract acres.

Q. Is Catastrophic Crop Insurance Coverage required for program participation?

A. No. Producers that do not purchase Catastrophic Insurance for 1996 must show proof Multi-Peril Crop Insurance coverage or must sign a waiver making them ineligible for any potential disaster assistance. Catastrophic Insurance for 1996 may be purchased until May 22nd at Farm Service Agency offices.

Q. Who is eligible to receive "Market Transition Payments" in the new Farm Program?"

A. Any farm operator or landowner that assumes all or part of the risk of producing a crop is eligible to receive "Market Transition Payments." This includes all farm operators that own or rent land and landowners in share rent and custom farming arrangements. **Landowners that cash rent land are not eligible to receive contract payments.** These payments will go to the renter operating the farm.

Q. Is it possible to switch renters during the seven-year contract?

A. Yes. The farm unit is under the seven-year contract. The renter that receives the contract payment can be switched under procedures through the Farm Service Agency.

Q. Can a farm unit be separated from a larger combined unit after 1996?

A. Yes. Farm Service Agency offices will have procedures to reconstitute crop bases and yields for "Market Transition Payments" when a farm unit is separated from a combined unit.

Q. What is the payment limit?

A. Maximum of \$40,000 per person annual payment. A person may also be involved in two separate business entities and receive an additional \$20,000 annual payment maximum from each entity, for a total of \$80,000 payment limit under the "Three Entity Rule."

Q. Was the permanent Farm Law maintained in the new Farm Bill?

A. Yes. The 1949 and 1938 Farm Law was maintained in the new Farm Bill and would be invoked after 2002 if no new farm legislation is signed into law.

Q. Where can I get more information on the new Farm Program?

A. Farm Service Agency offices have details on provisions of the new Farm Program and many counties are scheduling information meetings. Kent Thiesse has prepared an information sheet titled: **THE NEW FARM PROGRAM.** Call the Blue Earth County Extension Office (507-389-8325) to receive a free copy.

*Kent Thiesse
Crop Systems Extension Educator*

Seed Treatments

Nearly all corn is fungicide treated while few soybeans are commercially treated. Fungicide-treated seed is an effective way of managing seedling diseases. Risk/benefit is the reason seed treatments are used. Corn growers know the risk is high and the benefit is real, but for MN soybean growers the benefit and risk is believed to be low.

Corn farmers have benefitted from seed treatment with Captan for many years. A recent study reported that almost 1.5 billion would be lost if Captan was not used on seed corn. Even in the corn market, additional products have a role and you can expect to see Apron added to Captan to expand the range of protection. This product is highly effective against Pythium, a major pathogen in no-till sites.

Seed treatments for soybean have been slow to develop. I've given several situations in soybean production in Minnesota that merit seed treatment: first in years with seed of marginal quality, especially when Phomopsis is present on or in seeds; 2nd if planting seed without adequate Phytophthora resistance for seedling decay; and 3rd when planting soils that are cold, wet, high residue and sites with a history of poor seedling emergence (replant history). Seed treatments are not a cure-all and in some years seed treatments do not return an economic benefit, but they are an insurance treatment that moderates the effect of unfavorable environments for seed germination and emergence. Seed treatments can pay for themselves many times.

Soybean seed treatments to consider are: Phytophthora and Pythium—consider Metalaxyl/Apron or Oxadixyl/An-

chor. For Fusarium and Rhizoctonia—consider PCNB, Thiram or Thiabendazole. Combination products will become the choice for future treatments as single treatments are limited in the range of control. The four fungi listed above are the major pathogens in Minnesota and can be found in most soils. No-till, wet and cool weather and early planting increase the risk of soybean seed problems and seed treatment may be the added factor you need to effectively establish soybeans.

Soybean in CRP land has raised the question about inoculant recommendations. Clearly land with no history of soybeans has benefitted from inoculants, while the information on inoculant survival without soybean is less well understood. Research has shown the effective and efficient strains do decline. After five years of corn, the population was significantly reduced from the levels in continuous soybeans or in a corn/soybean rotation.

Soybean inoculants are not recommended in fields with a history of well nodulated soybeans in the last 3 to 5 years, however sandy soils, cool wet soils, and sites with rotations other than every other year soybeans are places where added inoculants appear to have a benefit. Another new aspect is that some of the newer strains of *Bradyrhizobium japonicum* may be three times more efficient than indigenous strains in fixing nitrogen. It may be that the reports of soybeans needing nitrogen are in fact suffering from inefficient nodulation types.

*Ward C. Stienstra
Extension Plant Pathologist*

Potassium and Alfalfa Production

The importance of adequate potassium for optimum production of alfalfa has been recognized for some time. Potassium is usually needed in a fertilizer program where alfalfa is a major crop in the rotation in southeastern, central, and east-central Minnesota.

Where needed, the addition of potassium to a fertilizer program has many benefits on alfalfa growth. Some of the benefits identified in various research projects are: 1) improved concentration of chlorophyll leading to more leaf growth and carbohydrate production; 2) enhanced nodulation ensuring that the alfalfa crop can obtain adequate nitro-

gen from the atmosphere; 3) added resistance to some root diseases (especially *Phytophthora* root rot); and 4) improved winter hardiness which results in thicker stands and higher yields after a severe winter.

In Minnesota, potash recommendations for alfalfa are based on a combination of yield goal and the results of the analysis of a soil sample for potassium. These recommendations are summarized in the following table. Relatively large amounts of potash fertilizer are needed for optimum production if soil test values for K are in the low or very low range.

Potash recommendations for alfalfa production in Minnesota.

Yield Goal ton/acre	Potassium (K) Soil Test (ppm)*				
	0-40	41-80	81-120	121-160	161+
	----- K ₂ O to apply (lb./acre) -----				
3 or less	145	100	55	10	0
4	190	130	70	10	0
5	240	165	90	15	0
6	290	195	105	15	0
7	335	230	125	20	0
more than 7	380	265	145	20	0

*Use the following equation to calculate potash fertilizer recommendations for specific yield goals and specific soil test values for K.

$$K_2O_{Rec} = [55.7 - (.38) (K \text{ Soil Test, ppm})] (\text{Yield Goal})$$

Although potassium is not mobile in soils, this nutrient can be effectively utilized if topdressed to established stands of alfalfa. Researchers have measured the recovery of potassium by alfalfa when placed at various depths in the root zone. The results of this research are summarized in the following table.

Recovery of potassium placed at various depths in an established stand of alfalfa.

Depth of Placement	Recovery
in.	%
surface	41
0-6	29
6-12	19
12-18	16
18-24	10
24-30	15
30-36	11

A large percentage of potassium applied on the soil surface was recovered by the alfalfa crop. These results show that topdressed potassium is certainly an acceptable way to fertilize the alfalfa crop. When results of a soil test show a need, use of topdressed potassium, this spring, would be a good management practice for the alfalfa crop.

*George Rehm
Extension Soil Scientist*

Scout Alfalfa Fields for Signs of Winterkill

Alfalfa has broken dormancy during the last week. This is an excellent time to scout areas of alfalfa fields you suspect damage from ice sheets that occurred in southern Minnesota in January and again in March. Alfalfa experiments at Rosemount indicate that there will be little to no damage from the thin layers of ice interlaid within snow events during January. However, alfalfa plants in low depressions within fields that incurred deep sealed ice sheets which were in direct contact with alfalfa plants are dead or severely damaged. Several days temperatures in the 60's or higher will support initiation of alfalfa growth. Viewing fields this week

in southern Minnesota will give an indication of plant mortality from smothering ice sheets.

In localized winterkilled areas with less than 3 live plants per square foot, I recommend light secondary tillage as soon as soil conditions will allow tillage and seeding alfalfa with 2 lb/A of red clover and 1 bushel of oats as a quick emerging companion crop.

We will not be able to determine the full extent of damage from cold exposure for another 2-3 weeks.

*Neal P. Martin
Extension Agronomist*

Planting Date of Small Grains

Normally about 50% of spring wheat, barley and oats would be planted by this time. However, this year, only a limited amount of acreage has been planted in southern Minnesota. It is recommended that small grains should be planted as early as possible—as soon as a satisfactory seedbed can be prepared. Seeds of wheat, barley, and oats will germinate at temperatures as low as 35-45°F. Seedlings of spring wheat, oats and barley are resistant to low temperature, especially if they are gradually hardened before very cold temperatures. Spring wheat is more resistant to freezing temperatures than barley, which is more resistant than oats. Small grains seedlings injured by low temperatures often recover and produce good crops.

Yield reductions historically are reduced by delayed planting because of the probability of higher temperatures during

the 4.0 to 5.5 leaf stage which reduces kernel numbers and the probability of higher temperatures during grain fill, resulting in lighter kernels. In general a 1% per day reduction in yield can be expected for each day delay after the optimum date. In northern Minnesota this decline in yield usually occurs after the first week in May and in the southern part after mid-April; at a 50 bu/acre yield goal this is one half bushel per day and for a 100 bu yield goal this amounts to one bu per day delay. It may be desirable to increase the seeding rate by 10% when planting late since tillering could be reduced by late planting.

Ervin A. Oelke
Extension Agronomist
Jochum J. Wiersma
Extension Agronomist

DIAL U

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Carpenter Ants

As the weather becomes warmer, more people are finding carpenter ants in their homes. The key to carpenter ant control is locating their nest, then treating the nest with an insecticide application. Carpenter ants nest in both moisture-damaged and sound wood and in cavities such as knot holes in trees or wall voids in structures.

Detecting the nest can be challenging. There are signs you can look for to determine whether carpenter ants are nesting in your home. The presence of moisture-damaged wood may indicate a potential nesting site, especially if persistent numbers of carpenter ants are sighted nearby.

The presence of coarse sawdust suggests a nearby nest (carpenter ants don't eat wood but rather excavate it and then carry it out of the nest). Sighting a swarm of winged carpenter ants inside confirms an indoor nest and gives you the approximate location of it. Not finding these signs does not necessarily mean carpenter ants are not nesting indoors.

If the nest location is still unclear, try following ant trails to their nest at night (when they are most active). With a little patience, you should be able to trace the ants back to their nest. It may be easier to follow them if you set food out for them. During spring they are particularly attracted to protein, especially dead or live insects.

Find a cricket, moth, fly, or other insect and set it out where they can find it (you can even chop it up so it's easy for them to carry it) and follow the ants back to their nest.

Once a nest is discovered, apply an insecticidal dust (e.g. bendiocarb, chlorpyrifos, or boric acid) into the nest. If the nest is in a wall void, this will require someone to drill small holes into the wall.

This is often a job for a pest control operator, although a consumer can also successfully eradicate a carpenter ant nest. After the treatment continue to watch for ant activity. There may be more than one nest or treatment of the first nest may not have been completely successful.

Only treat if there is evidence of an ant nest.

If the nest is found outside or a satellite nest is present in the home, spray around the building's exterior, using chlorpyrifos, diazinon, or permethrin to keep ants out. Prune any branches that are in contact with the building so carpenter ants cannot go around the treatment (Caution: do not prune oak between April 15 and July 1; do not prune elm between April 15 and September 1 in southern Minnesota or between April 15 and July 15 in northern Minnesota). Also seal any holes or cracks that carpenter ants are using to get indoors. See factsheet FO-1015, Carpenter Ants.

Jeffrey Hahn
Assistant Extension Entomologist

Early Spring Gardening

Despite our cooler than normal spring, there are a few things you can plant in the garden once soil is dry enough to work. Just be sure to wait until the soil is crumbly or you'll end up with a bunch of clods or a hard, crusty surface that many seeds will find impossible to penetrate.

For color, plant small pansies and johnny jump-ups. They can take cool temperatures—even some frost—and will actually grow better in spring than they will in summer's heat, at least in the southern half of the state. Though many nurseries already have potted geraniums, hold off planting them unless they're meant for a container that you can whisk indoors if frost threatens.

You can also direct seed sweet peas, stocks, annual phlox, cosmos, snapdragons, hollyhocks and California poppies. Vegetables that can be seeded early include leaf lettuce, onions, peas, radishes and whole seed potatoes. Don't even think about putting tomatoes and other heat-loving plants outdoors this early. They must wait for warmer weather and warmer soil.

Deborah Brown
Extension Horticulturist

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CROP

NEWS

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Management Guide for CRP to Crop Production

CRP to crop production transition is a challenge facing many producers who have contracts terminating in 1996. Management of the transition will vary from field to field. This article will give general suggestions for successful CRP to crop production transition.

Start Early—The conversion from CRP requires advance planning. Scout the fields to identify weeds and vegetation which need to be controlled. Soil test to determine the nutrient requirement for the post CRP crop. Get a feel for the field roughness to determine if a light tillage operation is necessary to level the field to allow spraying and planting operations. Determine the location of water ways, buffer strips and other conservation practices.

Consider the Weeds—The CRP vegetation and invading weeds need to be controlled. A fall application of a burn-

down herbicide will control the typical grass/legume CRP planting. The same vegetation will be difficult to control in the early spring. Switch grass plantings may be difficult to control with herbicides, leaving tillage as the most viable switch grass control method. A spring application of a burn-down herbicide needs to be delayed until the vegetation is actively growing, which will delay planting, which in turn reduces corn yield potential.

Don't Burn—Some producers may be tempted to burn the CRP fields. Burning should not be considered a sound agronomic practice. Nutrients, especially nitrogen and sulfur, are lost in the burn. Organic matter which maintains soil tilth and soil structure is lost. The burned landscape is more vulnerable to both wind and water erosion. Burning should not be viewed as either weed or disease control. Research in post CRP wheat production in North Dakota, Montana and Washington showed reduced yields when burning was compared to production methods not involving burning.

Seed Treatment—Soybean seed needs to be treated with inoculum when planted on former CRP acres. Inoculation is necessary to stimulate the nitrogen fixing nodulation. Insecticide seed treatment is recommended for corn, soybean and wheat to protect against seed attacking insects such as wire worm.

Till or No-Till—No-till offers obvious advantages of preserving many of the environmental benefits of the CRP program. However, an effective no-till drill or planter is necessary to plant through the three to four tons per acre of CRP residue. Because that residue will slow soil warm-up, soybeans, which can be planted later in the spring than corn without suffering yield reductions, may be the best choice.

Tillage, most likely with the moldboard plow, will level the fields and incorporate the residue. Wet soil conditions

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Late Snow

Larder Beetles are Active Now

Commercial Vegetable Pest Management Guide Now Available

CRP to Crop Production/Continued

may complicate plowing. Tilled soils will lose moisture more rapidly if dry weather is encountered. Of course, tillage raises concerns about wind and water soil erosion.

Pocket Gophers—Many CRP fields are home to large populations of pocket gophers. As the CRP fields are transitioned to crop production, the pocket gopher population will decrease. The unanswered question is how long will it take for the gopher population to be reduced. Some fields will need a light disking to level the gopher mounds to allow herbicide application or no till planting. Continued mound making after planting may interfere with crop harvest, especially in soybean production.

Fertilization—Producers should not ignore crop fertility needs in post CRP crop production. Fertilization should be based on soil tests, including a nitrate nitrogen soil test in western Minnesota. If soil test information is not available, fertilization plans will be based on yield goal and soil organic matter. Fertilization recommendation publications for agronomic crops are available at the Extension Office.

CRP to Crop Production Timeline—Under ideal conditions, the CRP to crop production time line would include field mowing, leveling, burn down herbicide application and perhaps tillage the fall before crop production. In many cases with the early out option, producers do not have the

luxury of good agronomic planning and previous year's preparation operations. For those situation, spring operations are the only option. The most likely timeline will involve light disking as early as possible to level the gopher mounds. The spring burn-down herbicide should be applied after the CRP vegetation is actively growing, which will probably be late May. Because of the lateness of the burn-down application, the most feasible crop will be late planted soybeans seeded with a no-till drill.

What Crops?—If weed control and tillage was accomplished during the fall before spring planting, corn, soybeans and small grain are all viable planting options. If no fall preparations were accomplished, the necessary spring weed control will mean delayed planting. This delay will eliminate timely planting of small grain or corn. Soybeans will not suffer severe yield penalties from late planting and thus would be the most viable spring planted crop following CRP. Another option is winter wheat. For winter wheat, mowing and weed control could begin in early July with winter wheat planting in mid to late summer. The winter wheat planting timeline spreads the work load. The development occurs at a different timeline than spring wheat, so the scab disease which has harmed spring wheat should not be a problem with winter wheat. Other options include permanent pasture or hay production.

Bob Byrnes

Lyon County Extension Educator

Sources of Sulfur

The importance of sulfur (S) in a fertilizer program for crop production on sandy soils in Minnesota has been known for some time. When needed on the sandy soils, the use of this nutrient can double the yield of alfalfa, increase corn yields by about 20 bu. per acre, and improve small grain yields by about 10 bu. per acre.

In Minnesota, sulfur can be added to fertilizers in the sulfate (SO_4) form or as elemental sulfur. Sulfur is absorbed by plants in the SO_4 form. Elemental sulfur must be converted to SO_4 in soils before it can be used by plants. Bacteria are needed to convert elemental sulfur to SO_4 . Therefore, the rate at which elemental sulfur is converted to SO_4 depends on soil temperature and moisture conditions. This rate is slow when soil temperatures are cold, but increases rapidly as soil temperatures rise above 65° - 70°. With satisfactory soil conditions, elemental sulfur can be converted to SO_4 in about 30 days.

These two major sources of sulfur have been evaluated for several crops. Both sources usually have an equal effect on alfalfa yield and grain production. However, early growth of corn and small grains is frequently delayed if elemental sulfur is used because of the cool soil tempera-

tures in the early part of the growing season. Therefore, a product which supplies sulfur in the SO_4 -S form is suggested for application to corn and small grains. Both elemental S and SO_4 are appropriate for alfalfa production.

There are several sources of SO_4 -S. Three of the most common are ammonium sulfate (21-0-0-24S), and Sul-Po-Mag or K-Mag. Both of these products are 22% S, 22% K_2O , and 11% magnesium (Mg). The products which combine elemental S with clay are the best sources of elemental S.

Ammonium thiosulfate and potassium thiosulfate are two sources of sulfur that can be used with fluid fertilizers. Ammonium thiosulfate should not be applied in contact with the seed at planting.

In thinking about sulfur, it's important to remember that sulfur fertilizers are recommended only for sandy soils. Several studies have shown that the fine-textured soils that are well supplied with organic matter do not need sulfur in a fertilizer program.

George Rehm

Extension Soil Scientist

Strong Bray and Weak Bray Tests for Phosphorus

The laboratory results received from soil testing laboratories are frequently confusing to crop producers. Soil testing has always been the major "first step" in arriving at economical fertilizer recommendations. The results of the analysis of a soil sample are not intended to be complicated or confusing.

Results of a soil test for phosphorus are often confusing to some. Some soil testing laboratories report results for a "weak Bray" or a "strong Bray" test. Sometimes, these tests are referred to as P-1 and P-2, respectively.

The extracting solution used to measure the relative level of available phosphorus is a weak acid. The procedure using this acid is referred to as the "weak Bray" method. This analytical procedure is generally used if the soil pH is 7.3 or less. This is an excellent procedure for predicting phosphate fertilizer needs if the soil pH is acid or slightly higher than neutral (7.0).

A stronger acid can also be used to extract phosphorus from soils. The procedure, which uses this stronger acid, is referred to as the "strong Bray" or P-2 method. The amounts of phosphorus extracted by the strong acid, however, have

not been correlated to crop response in a variety of research trials. Therefore, this procedure has no value in developing phosphate fertilizer recommendations. Likewise, any ratios that are calculated from the P-1 and P-2 values do not provide any assistance in making phosphate fertilizer recommendations.

A completely different analytical procedure is usually used if the soil pH is 7.4 or higher. This procedure is referred to as the "Olsen test" and uses a reagent called sodium bicarbonate to extract phosphorus from the soil. This procedure usually is more effective at predicting phosphate fertilizer needs if the soils are calcareous.

In some areas of Minnesota, soil pH varies substantially across a field. For these fields, it would be a good practice to have soil samples analyzed by both the Bray P-1 and Olsen procedures. As our precision farming research continues, we will have more information about the effectiveness of these procedures for measuring relative levels of phosphorus in soils.

George Rehm
Extension Soil Scientist

CORRECTION

The World Wide Web site for APHIS, which was in the Karnal Bunt article, Vol. 2, No. 3 on April 5 was incorrect. The correct Web Address is: <http://www.aphis.usda.gov/oa/bunt/kbhome.html>.

Worker Protection Standard and Crop Advisors

Under the Worker Protection Standard (WPS) crop advisors (including consultants) and their scouting employees are considered handlers and must comply with various WPS handler requirements. On May 1, 1996, a WPS Crop Advisor exemption takes affect for 'for-hire services' certified crop advisors and their employee scouts. The exemption greatly reduces the WPS requirements for certified crop advisors and their employees when entering a pesticide treated areas during the Restricted Entry Interval (REI). The exemption applies to crop advisors certified by either the Certified Crop Advisor (CCA) or National Alliance of Independent Crop Consultants (NAICC) programs and their scouting employees. Until May 1, 1996, all crop advisors and their employees are exempt from all WPS requirements.

Starting May 1, 1996, there are four situations crop advisors may find themselves in:

- 1) **Crop advisor is not CCA or NAICC certified** - entry into pesticide treated areas during application or during the REI. Crop advisors must comply with ALL WPS handler requirements for themselves and their scouting employees except providing Information At A Central Location. See the WPS *How To Comply Manual*, pp. 4 and 5, "Duties for All Employers and Additional Duties for Handler Employers" and pp. 95-98 "Protections For Crop Advisors."
- 2) **Crop advisor may or may not be certified**—entry into treated area after the end of the REI. Crop advisor and their employees are exempt from all WPS requirements. See the WPS *How To Comply Manual*, p. 97 under the heading "Required Protections After The REI."
- 3) **Crop advisor is certified**—entry to treated area during pesticide application. Same requirements as #1.
- 4) **Crop advisor is certified: WPS Crop Advisor Exemption**—entry into treated area during the REI after the completion of pesticide application (starts May 1, 1996). A certified crop advisor and employees under the direct supervision of a certified crop advisor may enter pesticide treated area during the REI to perform crop advising tasks if:

Worker Protection/Continued

- a) Crop advisor is currently certified under the state approved CCA or NAICC program.
- b) Crop advisor and employees under the direct supervision of a certified crop advisor have met the WPS pesticide safety handler training requirement.
- c) Crop advisor must make specific determinations regarding the appropriate PPE (personal protective equipment), appropriate decontamination supplies, and how to safely conduct the crop advisors tasks for him/her self and employees. Crop advisor must convey this information to each person under their direct supervision in a language that the person understands.
- d) Before entering a treated area, the crop advisor must inform each person under direct supervision, through an established practice of communication, the pesticide product and active ingredient(s) applied, method and time of application, and the REI.
- e) The crop advisor must instruct each person whom they directly supervise regarding which tasks to undertake and how to contact the crop advisor.

Direct supervision does not require the crop advisor be physically present at all times, but the certified crop advisor must be the immediate supervisor of the employees and be directly accessible to the employees at all times. Mobile radios and telephones appear to meet this requirement.

Note:

While most crop advising activities normally take place after the REI, some may not such as: monitoring effectiveness of post emergence insecticide applications, checking for corn seeding rates when soil or seed insecticide treatments are used, a number of sugarbeet and potato scouting activities, and others.

Both the Minnesota Department of Agriculture and US EPA have recognized CCA and NAICC certification programs as meeting the requirements for the WPS Crop Advisor Exemption (situation #4 above).

The Minnesota Department of Agriculture has recognized that both currently certified and future certified crop advisors through CCA and NAICC programs as having met the WPS handler pesticide training requirement (#4 item b above). To fulfill this WPS requirement the national CCA exam is being revised to include test items addressing pesticide health and safety topics. Employees of certified crop advisors will still need to meet the WPS handler pesticide safety training requirement.

Crop advisors who are direct employees of a farm, nursery, greenhouse or forest operation (as opposed to 'for hire/independent' consulting services) have different WPS requirements. See pp. 95-98, "Protections For Crop Advisors," in the *WPS How To Comply Manual*.

For more information about WPS or WPS Crop Advisor Exemption contact Dean Herzfeld, Minnesota Extension Service 612-624-3477 or Steve Poncin, Minnesota Department of Agriculture 612-296-5136.

Thanks to Leo Langer, manager of CENTROL office in Cottonwood, MN and Craig Sallstrom of the Minnesota Crop Production Retailers Association for assistance in developing the information for this article.

*Dean Herzfeld, Coordinator
Health, Environmental, and Pesticide Safety Programs
Minnesota Extension Service
University of Minnesota*

Winter Survival of European Corn Borer

Winter seems to have finally ended but not questions over corn borer survival. While our memory of those frigid February temperatures in the -30°F to -40°F range are slowly fading (like the snow drifts in the farm groves), it's natural to wonder how they affected insect survival. The answer is surprising to many people....The frigid temperatures had little effect on corn borer survival! For example, Denise McWilliams, agronomist at the West Central Experiment Station, reported dissecting 10 corn stalks this week to find 18 live larvae and only 1 dead larvae. I'd welcome information from other locations on winter survival of corn borer.

Why did so little winter mortality occur from temperatures that made cars seem brittle? Two factors come into play. First, corn borers in diapause can easily survive exposure to temperatures less than 5°F by creating their own "antifreeze". Second, snow is an excellent insulator. For most of Minnesota, adequate snow cover meant soil temperatures did not even come close to testing corn borer survival skills. For example, on February 2, when air temperatures reached -30°F at Lamberton and -35°F at Waseca, soil temperature at the 2-inch depth dipped to only 23°F at Waseca and 28°F at Lamberton. The snow cover kept tem-

peratures quite cozy near the ground surface. In areas where snow cover was less, fields blew clear, and stalks still stood, the temperatures corn borers encountered were lower and may have challenged their survival skills.

The bottom line....Don't assume winter temperatures let us off the hook for corn borer problems this year! Start

planning for first generation corn borer infestations, especially on the earlier-planted fields. Be especially watchful if rainy weather splits corn planting.

Ken Ostlie
Extension Entomologist

Corn Rootworm Threat for 1996

Corn rootworm populations have rebounded from the impacts of rainy weather in 1991-3, according to the 1995 adult corn rootworm survey by the MDA (see table). Average populations in the southern third of Minnesota were well over 1 beetle per plant, the damage threshold if corn is planted in the field next year. Adult corn rootworms averaged 4.7 beetles per plant in the SE, 1.9 in SC, and 2.6 in SW Minnesota. Populations were generally higher where corn is more likely to follow corn. As we've seen in past years, northern corn rootworms predominate throughout most of the state (usually over 93%) with the greatest western corn rootworm populations (28%, nearly 8 per plant) in SE Minnesota. Note: this survey provides a rough idea of general population levels; however, individual fields vary so markedly that averages cannot accurately predict the threat to any given field. Scouting for adults this summer is strongly recommended to ensure that soil insecticides are actually needed in a field in 1997.

1995 CORN ROOTWORM ADULT SURVEY¹

District	Adult Beetles (#/acre)	Adult Beetles (#/10 plants)	Ratio NCR:WCR	% Plants Lodged
NW	9,528	3.9	74:26	0.0
WC	15,910	6.0	94:06	0.2
C	26,417	10.1	97:03	2.7
EC	13,710	5.7	94:06	0.5
SW	66,475	25.7	93:07	6.8
SC	57,985	18.7	96:04	0.1
SE	129,467	46.6	84:16	0.7

¹Data collected by Minnesota Department of Agriculture - Plant Survey Program from Aug. 3-25, 1995.

Black Cutworm Monitoring Underway

Nearly 80 cooperators have begun monitoring for black cutworms migrations. DowElanco and the Minnesota Extension Service - IPM Program provided the pheromone traps. A limited number remain, so if you have an interest in trapping black cutworms, call Lee Fields at (612) 624-6706.

As the late snow testifies, conditions have not yet been

conducive for migration into Minnesota so far but that could change quickly. As you bask in the strong, balmy southerly winds before the next cold front and associated rain hits, remember that those same winds could bring black cutworms to our doorstep.

Ken Ostlie
Extension Entomologist

Corn Rootworm Management Options When You Can't Rotate

Each year farmers who normally rotate occasionally find themselves growing corn after corn. This year, the new farm bill, higher corn prices, and potentially spring weather complications, could increase the likelihood of this dilemma. Whatever the cause, it leaves farmers with two worries:

Are corn rootworm problems likely? If you, or your client, farm in an area where crop rotation strongly predominates, the risk of significant corn rootworm damage is very

small. The risk is much especially greater in SE Minnesota where more continuous corn is grown and populations are higher. For example, corn rootworm populations in first-year corn averaged more than 1.5 beetles per plant in SE Minnesota compared to about 0.6 beetle per plant in SW and SC, and less than 0.3 beetle per plant in the rest of Minnesota. Where more crop rotation occurs, a substantial portion of the northern corn rootworm eggs may exhibit extended diapause and not pose a threat to next year's corn.

Corn Rootworm Management/Continued

What management options to soil insecticides exist?

Farmers, who historically rely on crop rotation, may lack soil insecticide boxes on their planter. As 22-inch rows become more common, some growers are opting for larger seed boxes and eliminating soil insecticide boxes. When granular insecticides can't be applied at planting, what options exist? (**Note:** Options listed chronologically, not in order of recommendation)

- ✓ Apply Lorsban 4E as a T-band, Dyfonate 4E or Furadan 4F as a band at planting
- ✓ Inject Dyfonate 4E or Furadan 4F with liquid fertilizer at planting

- ✓ Apply Furadan 4F as a postemergence spray, broadcast or banded. May be tank-mixed with herbicides if timing appropriate.
- ✓ Liquid insecticides (listed above) or granular insecticides (Counter, Dyfonate II, Holdem, Lorsban, Mocap, and Thimet) may be applied during cultivation.
- ✓ Lorsban 4E may be injected postemergence through a centerpivot irrigation system (properly equipped and licensed).

Probably the most widely used option at this point is Furadan 4F applied postemergence. More on Furadan 4F in the next newsletter.

Ken Ostlie
Extension Entomologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Late Snow

Late snow keeps the ground soft and moist so we can't get out to garden yet, but it really poses no threat to plants that are already poking out of the soil. If anything, it insulates them against the cold temperatures that sometime accompany the snow. As snow melts it provides a gradual, gentle watering, also.

By mid-April, mulch should be removed from tender roses and other perennial plants. Freezing temperatures usually don't cause much damage — unless they drop down to the teens or low 20's, in which case you'd want to quickly cover the plants again. To be on the safe side, you might leave the mulch close by for a couple more weeks, just in case.

This is Minnesota, remember!

Don't be in a hurry to uncover strawberries, though. Freezing temperatures can damage their flower buds, resulting in poorly developed fruit, or lack of fruit entirely. (The minute you remove mulch and expose plants to the sun's warmth, their growth begins to accelerate and they are more vulnerable to sudden drops in temperature.)

Deborah Brown
Extension Horticulturist

Larder beetles are active now.

Adult beetles are between 1/4 and 1/3 inch long, oval-shaped, and black with a cream-colored band across their back. They hibernate outdoors during winter and start looking for food in spring. They enter homes where they may feed on dead insects, animal hides and furs, feathers, cured meats, dry pet food and cheese.

Finding a few larder beetles early in spring is probably not a problem. Just remove the occasional larder beetle you find by hand. However, if you find persistent numbers of adults or see immature larvae (they are worm-like, hairy, dark brown, and appear to be banded), then you probably have an infestation in your home. Sanitation is the best control.

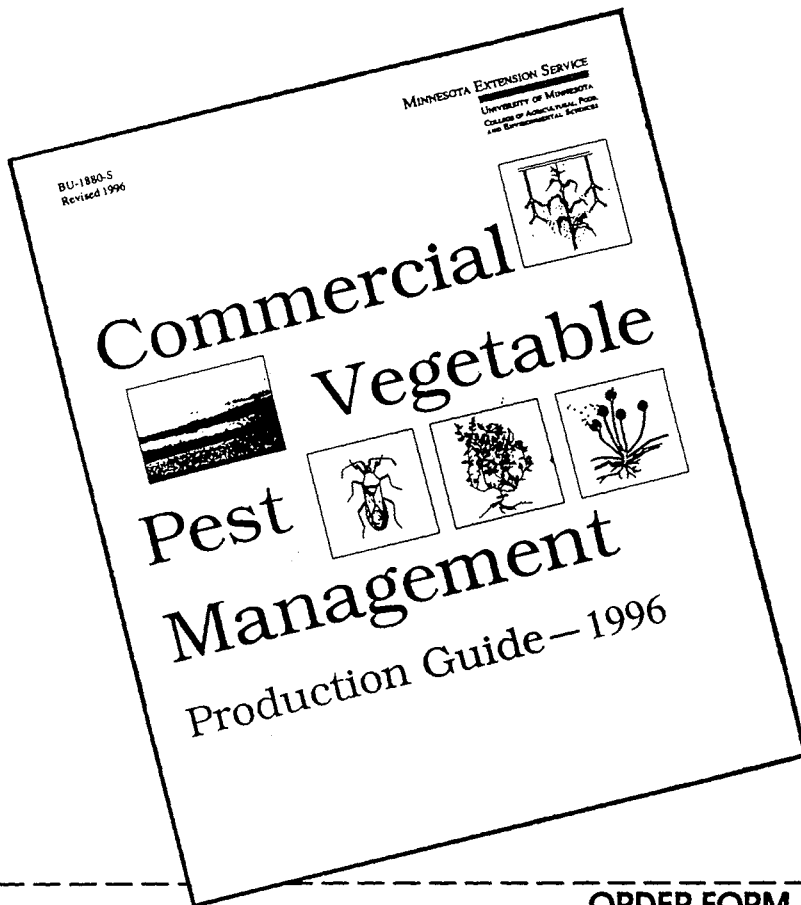
Throw away infested materials; be sure to check dry pet food, furs, hides or accumulations of hair. You can also freeze infested products at 0°F for 48 hours to save products but kill larder beetles. Store uninfested goods in metal or heavy plastic containers with tight lids to help prevent reinfestation. Not all infested sources are accessible, e.g. dead insects in a wall. There is no practical method for controlling larder beetles in this situation.

Insecticides are only a short-term solution. As long as a food source is present, insecticides do not control larder beetles. Once the food source is eliminated, larder beetles go away on their own.

Jeffrey Hahn
Assistant Extension Entomologist

ANNOUNCING

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Prepared by the Departments of Entomology, Plant Pathology, and Horticulture, The IPM Program, and Educational Development System, Minnesota Extension Service, University of Minnesota.

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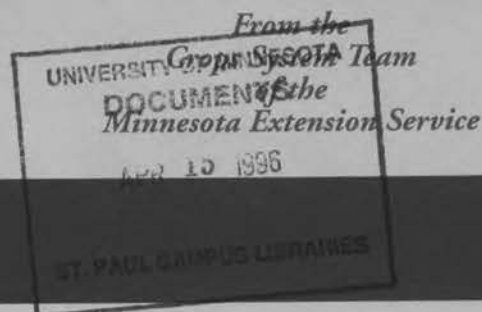
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CROP

NEWS



Late Nitrogen and Spring Wheat

A large number of acres in northwestern Minnesota scheduled to be planted to wheat in 1996 were not fertilized with nitrogen last fall. With normal spring weather, this would not be a problem. There would normally be time to apply nitrogen before planting. As we look ahead, it appears that we will not have an early spring and this raises questions about nitrogen fertilization.

The options open to wheat growers are highly dependent on soil moisture and weather in general. If wet soil conditions delay planting, urea can be broadcast to supply the needed rate of N, either after planting or after emergence. Some recent research projects conducted in north-

western Minnesota have shown that substantial amounts of nitrogen can be broadcast to emerged wheat up to tillering without harming yields. The nitrogen in these projects was supplied as urea (46-0-0) or an ammonium nitrate (33-0-0). Liquid fertilizers used to supply more than 40 lb. nitrogen per acre can cause some leaf burn which might lead to reduced yields.

Anhydrous ammonia (82-0-0) can also be applied this spring before planting if soil moisture conditions are suitable. It may be difficult to seal the soil after anhydrous application if soils are very wet. If a poor seal leads to the loss of anhydrous ammonia, a switch to either 46-0-0 or 33-0-0 is suggested.

The loss of nitrogen from 46-0-0 broadcast on the soil surface is a concern. Incorporation of this nitrogen source is a good management practice to prevent volatilization losses. Light tillage or 1/4 inch of rainfall will provide adequate incorporation.

A variety of nitrogen sources can be applied before planting if soils dry well before planting starts. If applied to prevent loss of nitrogen, all nitrogen sources have an equal effect on yield of small grains.

Nitrogen is mobile in soils. This mobility allows small grain producers to be flexible in making plans for nitrogen that was not applied last fall.

George Rehm
Extension Soil Scientist

Highlights...April 12, 1996

Late Nitrogen and Spring Wheat

Soil Insects and CRP Conversion to Crop Land

*New Insecticide Registrations for 1996:
Second Edition*

Dial U

Longhorned Beetles

Spring Lawn And Garden Activities

Soil Insects and CRP Conversion to Crop Land

Among the many issues farmers face when converting CRP to crop land, soil insects pose an unknown risk. Over 35 years have passed since the last big conversion of pasture and set aside to cropland in Minnesota. Since then, attitudes about insecticides have changed, environmental and health concerns emerged, better insecticide options have appeared, and input costs scrutinized anew. What insects pose a threat? What risks of significant stand loss do farmers face? What management options can farmers use?

What insects pose a threat after CRP? A variety of insects can attack corn, soybean, sunflower or small grains planted into former CRP land. These insects can be grouped by their method and timing of attack.

- ✓ Seed feeders - Wireworms, seedcorn beetles and seedcorn maggots attack germinating seeds and emerging seedlings.
- ✓ Root pruners - White grubs feed on the newly developing roots of seedlings.
- ✓ Seedling cutters and borers - Various cutworms, sod webworm, hop vine borer and stalk borer attack emerging seedlings and young plants by feeding on leaves, cutting plants, or tunneling.

What risks do farmers face after CRP? During the 10 years or so in CRP, insects have colonized these developing grasslands and built up populations. Unfortunately no one knows how prevalent these insects have become in CRP or how those numbers translate into risk of stand loss. Adding to the uncertainty is the lack of scouting tools that can pinpoint fields at risk. In short, no one knows what risk you face or the economic benefits/losses associated with specific management options.

Historically the biggest threats are likely from wireworms and white grubs. These insects have long life cycles (wireworms—2-5 years, white grubs—3 years), overwinter deeper in the soil, and are unlikely to be affected by tillage operations. Seedcorn beetle and seedcorn maggot damage may be enhanced if surface residue delays soil warmup and germination. Partially buried residue also is a prime drawing card for seedcorn maggot. Cutworm, sod webworm, stalk borer or hopvine borer could occur but little information is available on site-vegetation characteristics that enhance risk.

Crops will vary in susceptibility to attack by these soil insects. Corn faces the greatest risk. It hosts all of these insects and does not compensate well for stand loss. Small grains are less likely to suffer stand loss from some insects,

like seedcorn maggot, and can compensate for limited stand reduction by tillering. Soybean and sunflower face less risk from grass feeders like wireworms, white grubs and sod webworms, and offer tremendous compensation for stand loss.

What management options are available? Management options vary with the type of attack by soil insects.

- ✓ Seed feeders - No rescue options are available. Farmers have three primary options: Do nothing and take a risk, use a seed treatment, or apply a soil insecticide.
- ✓ Root pruners - No rescue option available. Seed treatments are not effective. Farmers can either “do nothing” or apply a soil insecticide.
- ✓ Seedling cutters and borers - Offer the best opportunity for a “treat-as-needed” approach. Scout for seedling injury during the first 2-3 weeks after emergence, and apply one of several labeled insecticides as needed. Alternatively a labeled soil insecticide can be applied as a preventative measure.

Seed treatments with lindane, or lindane and diazinon, offer good protection against seed feeding insects with product selection varying between crops:

Corn — Agrox DL Plus, Germate Plus, and Kernal Guard

Small grain — DB Green, Enhance Plus, Grain Guard Plus, and Sorghum Guard

Sunflower & Soybean — Sorghum Guard

For the money, \$0.50-\$1.50/acre, this option provides very cost-effective insurance against stand loss. Remember that the primary protection is for the seed, and that underground portions of the stem may not be protected adequately.

Soil insecticides vary in their spectrum of insects controlled and their labeled crops. The best product selection is available for corn (Aztec, Counter, Dyfonate, Force, Fortress, Lorsban, and Thimet) with limited choices for soybean (Lorsban, Thimet), sunflower (Lorsban), and small grain (Thimet). Products with the most versatile spectrums in corn include Aztec, Force, Fortress and Lorsban with Counter and Dyfonate offering only cutworm suppression, and Thimet offering no cutworm protection. Placement is an important issue with band or T-band placement more effective against cutworms and infurrow placement (if labeled) more effective against seed feeders and root pruners.

*Ken Ostlie
Extension Entomologist*

New Insecticide Registrations for 1996: Second Edition

At long last, two new pyrethroids were registered for field crops: Warrior 1E and Baythroid 2. I first began working with these insecticides as experimentals shortly after I arrived in Minnesota in 1984 and it's a distinct pleasure to see this new generation of pyrethroids reach the market. Both products have been emerged through EPA's tougher registration criteria and its the shifting sands of required tests that delayed their appearance. These products share some features:

- ✓ Use rates are extremely low, ca. 10-39% of earlier pyrethroids like Ambush or Pounce and ca. 95-98% of organophosphates such as Lorsban.
- ✓ The pest spectrum controlled is expanded.
- ✓ As with all pyrethroids, inherent toxicity to fish and aquatic organisms requires special precautions when applications are made near aquatic areas. A significant

precaution is a buffer around aquatic areas, 25 ft. for ground application, 150 ft. for aerial application. This precaution apparently does not apply to drainage ditches.

Warrior 1E (lambda cyhalothrin) from Zeneca is a broad-spectrum insecticide offering excellent control of a wide variety of insect pests of corn, soybean, wheat, sunflowers and sweet corn. Use rates from 0.015 - 0.03 lb AI/acre vary with pest and crop.

Baythroid 2 (cyfluthrin) from Bayer is also a broad-spectrum, primarily foliar insecticide providing excellent insect control in alfalfa, sweet corn, and sunflower. Use rates of 0.0125 - 0.044 lb AI/acre are listed for each crop.

Ken Ostlie
Extension Entomologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Longhorned beetles can be accidental guests in people's homes. This is a large group of beetles which vary in size—they are usually between 1/4 inch to 1 inch long. While many are brownish or grayish, some longhorned beetles can be brightly colored. These beetles get their name from their long antennae (horns) which are commonly the length of their body or longer. The immature larvae are known as round-headed borers. They live in dying or recently dead trees. These insects are brought into homes inside firewood or in lumber that has air-dried (not kiln-dried). The larvae finish their development and emerge from the wood as adult beetles.

Fortunately their appearance is more alarming than any actual deeds they may perpetrate. They are harmless to people and property. They do not infest wood in homes. They live for a short time before dying on their own. The simplest control is to remove longhorned beetles by hand. You can prevent adult emergence from firewood by not allowing firewood to sit indoors very long before burning it (then the beetles don't have a chance to emerge). In situations where lumber is used in a construction project in the home, there is no practical method to prevent longhorned beetles from boring out of the wood. You can replace the wood if that is practical or just let the problem run its course.

Jeffrey Hahn
Assistant Extension Entomologist

Spring Lawn And Garden Activities

Cold weather has put a temporary damper on home lawn and garden activities. All we need, though, are a couple of warm days and everyone will be chomping at the bit to get outdoors and make up for lost time. Before you rush out, here are a few words of caution:

- * Though it's important to rake your grass in spring, it's not a good idea to walk around on it before the soil firms up. Spring raking removes stones and debris that can prove dangerous when you run a mower over them, and also "lifts" grass blades to get air and oxygen to the base of the plants. It also removes annual weeds that have died over the winter months. (Use a bamboo or other lightweight, fan-shaped rake rather than a heavy, fixed-tine metal garden rake.)
- * You may notice a fair amount of browning or discoloration on evergreen shrubs such as yews or junipers, but unless branches are dry and brittle (dead, in other words), wait to prune until new growth begins. By late May or early June you'll have a better idea of where you can safely prune back to, and where new growth will mask the brown needles that will eventually fall off. By pruning too early, you may take off more than is really necessary for the shrub to look good. (If you have to prune heavily, be sure to fertilize the plants and water them regularly to encourage new growth.)

Deborah Brown
Extension Horticulturist

MINNESOTA EXTENSION SERVICE

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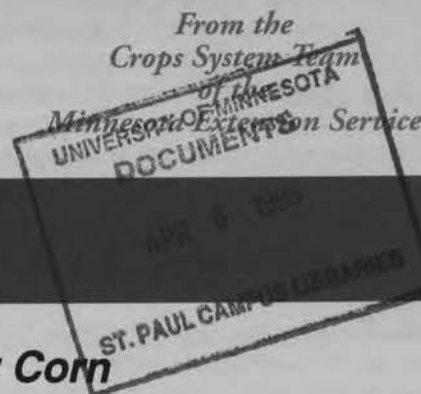
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CROP

NEWS



Starter Fertilizer for Corn

Use of a starter fertilizer has always been an important management tool for corn production in Minnesota. Past experience has shown that the advantages of a starter are more obvious when soils are cold and wet at planting. Looking ahead into the near future, it appears that there is a strong possibility that we will be faced with cold, wet soils during the coming planting season.

Yield increases produced by the use of a starter fertilizer also vary with soil test values for phosphorus and/or potassium. Some examples of responses to starter fertilizer measured during the 1995 growing season are summarized in the following table.

Measured yield increases from the use of starter fertilizer at two branch experiment stations in 1995.

Relative Soil Test Level for P*	Yield Increase	
	Waseca	Morris
	----- bu./acre -----	
very low and low	17	25
high and very high	less than 1	less than 1

* Soil test values for K were high or very high.

The yield increases reported were measured in 1995. Actual yield increases from using a starter fertilizer will vary with growing conditions and other corn production management practices. In general, there is a high probability that the use of a starter fertilizer will increase corn yields when soil test values for P and/or K are in the low or very low ranges. The probability of a yield increase diminishes as soil test values for these nutrients increase into the high and very high categories.

In addition to the potential for added bushels, there are other *economical* and *environmental* advantages for the use of a starter fertilizer. Rates of phosphate and potash fertilizers can be reduced to 1/2 of the broadcast recommendations if these nutrients are applied in a starter at planting. This can be an important *economical* advantage to the corn producer.

If placed in a band below the soil surface at planting,

phosphorus will not move and will not be subject to loss via soil erosion. Therefore, this practice has a potential positive impact on *environmental quality*.

There have always been questions about the use of starter fertilizer. Brief answers to some of the most common questions are listed below.

✓ **Dry vs Liquid:** Research has shown no benefit for either form if equal amounts of nutrients are applied.

✓ **Orthophosphate vs. Polyphosphate:** Both forms of phosphate have an equal effect on yield if the rate of applied phosphate is the same for each.

✓ **Availability:** Availability of phosphate is nearly equal in most fertilizers that are sold today. Chemistry of the soil (pH, percentage of free calcium carbonate, etc.) controls availability of phosphorus to crops.

✓ **Distance From The Seed:** There is no "ideal" distance between fertilizer and the seed. A distance one inch between fertilizer and seed is usually enough to avoid any potential seed damage. The "starter" effect diminishes somewhat if this distance exceeds 3 to 4 inches.

The potential benefits of starter fertilizers should not be forgotten as we move toward the 1996 planting season.

*George Rehm
Extension Soil Scientist*

Highlights...April 5, 1996

- Starter Fertilizer for Corn
- Corn Planting in Minnesota
- Karnal Bunt Identified in Seedlots of Arizona-Grown Durum Wheats
- Soil Nitrate Testing Can Be Done Now
- Insecticide Label Changes for 1996
- 1996 Black Cutworm Monitoring Network Dial U
- Overwintering Insects to "Wake Up" Soon
- Wait to Fertilize Lawns
- Give Houseplants Attention

Corn Planting in Minnesota

Corn planting time is just around the corner, which usually brings questions about when to begin planting. Early planted corn yields higher and matures earlier in the fall, which allows more time for field drying and harvesting. Grain usually has better quality and normal test weights. Since production costs are fixed, higher grain yields and better quality grain mean higher profits for early planted corn.

Calendar date, soil conditions, and number of corn and soybean acres are the major factors determining when to begin to plant corn.

The optimum corn planting period occurs between April 20 and May 1 for all corn planting areas of Minnesota. Optimum planting dates for soybean are between April 25 and May 5. On the average, only 6 days are field days during this 10 day corn planting period. Therefore one must plan to plant the corn acreage in six or fewer days to maximize corn yields from a planting date perspective.

Soil conditions must be such that an adequate seed bed can be prepared. If soil conditions allow, corn planting can begin prior to April 20. With these early planting dates, low soil temperature is usually a concern. More time is required

for germination and emergence, but soil temperature is not a reliable guide and should not be used to determine when to begin to plant corn. Plant emergence may be more variable and early stands appear to be more "ragged" compared with later planted corn that emerges more quickly and uniformly. As a result, early planted fields may not be as pleasing to look at, but on the average will yield higher and produce higher profits.

Injury from a late spring frost may also be a concern. Sometimes frost injury occurs to leaves, but rarely does a spring frost completely kill plants such that a significant stand reduction occurs. A major portion of leaves can be killed on young corn plants without affecting grain yield. The probability is extremely low that a late spring frost will have a significant effect on grain yield.

On the average, corn planting date has moved earlier each year for the past 20 years. However, the average planting date for Minnesota's 6.5 million corn acres is May 8. Corn growers can substantially increase profits from corn by planting earlier.

D. R. Hicks
Extension Agronomist

Karnal Bunt Identified in Seedlots of Arizona-Grown Durum Wheats: USDA Issues Quarantine

The Animal and Plant Health Inspection Service (APHIS) issued a federal quarantine on wheat (including durum) and triticale effective March 25, 1996, following the positive identification of the Karnal bunt fungus (*Tilletia indica*) on seedlots of 4 durum varieties. The quarantine involves the state of Arizona and six adjacent counties in Texas and New Mexico. This action is designed to restrict possible movement and artificial spread of the fungus into non-infected areas of the United States.

On March 5, 1996, APHIS was notified by the Arizona Department of Agriculture of the detection of a possible infestation of *T. indica* on a certified durum seedlot (variety Reva) produced in the Gila Bend region during 1995. Subsequent inspections of the Paloma Ranch site identified Karnal bunt contamination in stored seed of the original lot as well as in a second seedlot of the same variety. The total volume of these two lots represents about 1,000 tons. Survey activity following the initial detection confirmed positive identifications in lots of three other varieties (Durex, Ocotillo and Kronos). To date, seed of contaminated lots has been planted only in Arizona with the exception of 150 acres of Durex planted near El Paso, Texas, and 2,600 acres of various varieties planted in New Mexico. Emergency Action Notifications (EAN's) have been issued for 84 grower locations in Arizona as well as the Texas and New Mexico sites. These Emergency Action Notifications were authorized by Secretary of Agriculture Dan Glickman on March 20th and include the immediate quarantining of in-

fectured properties, equipment, seed, planted wheat and soil associated with the wheat. Authority to destroy the fields planted with contaminated seed is also contained within the "declaration of extraordinary emergency" invoked by Glickman on March 20th. Arrangements for compensation are currently being negotiated.

As of this writing, wheat fields in affected areas were just beginning to head. However, additional contamination at grain-cleaning facilities in the Imperial Valley of California threaten to expand the potential quarantine area. Efficient action on one shipment of Arizona durum seed sent to Montana resulted in its quarantine prior to the seed being planted or any seed coming into contact with equipment or facilities. Concern over importation of contaminated durum led to a Canadian quarantine of U.S. durum on March 27th.

At present, the Karnal bunt situation remains fluid. The USDA is attempting to manage the situation with a "flexible quarantine". Karnal bunt situation updates are available on the Internet's World Wide Web. The address is

<http://www.aphis.gov/oa/bunt/kbhome.html>

Background

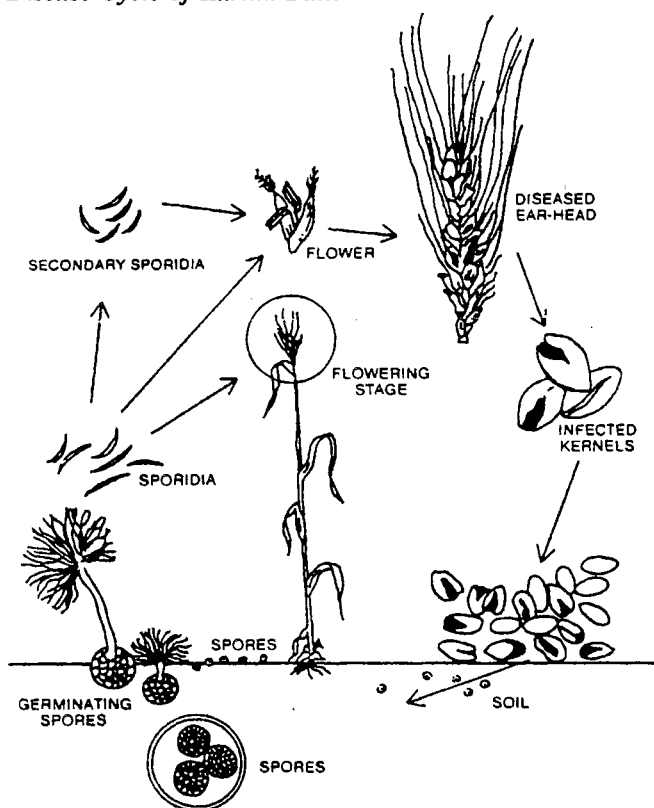
Karnal bunt is so named because it was discovered in 1931 on wheat grown at the Botanical Station near Karnal, India. For many years, it's distribution was limited to the northern plains regions of that country (accounting for the diseases

presence in modern-day Pakistan and Nepal). In 1977, Duran and Cromarty, *reference 2*, reported the disease to be in Mexico and indicated that it had been present in the state of Sonora since at least 1972, *ref. 1*, if not earlier. Other reports of the disease include Afghanistan, Iraq, Lebanon, Syria and Turkey although some of these reports do not distinguish between confirmation of the disease as opposed to confirmation of the fungus being detected on seedlots being shipped to or through a country.

Losses resulting from Karnal bunt are generally light. Even during years when epidemics were most severe in India, losses were only 0.3 to 0.5%, *ref. 4*. The disease does not present a risk to human health. Karnal bunt reduces flour quality. In northwestern Mexico, lots of grain with more than 3% infected kernels are rejected by the milling industry. Odor and palatability of whole meal and finished products are adversely affected by a trimethylamine produced by the fungus.

Compared to the fungi that cause common bunt (stinking smut), dwarf bunt, and loose smut of wheat, the Karnal bunt fungus is unique and very difficult to control. Karnal bunt affects wheat (including durum) and triticale (a hybrid of wheat and rye). Barley, oats and rye are not susceptible in the field nor can they be artificially infected by inoculation with the fungus, *ref. 3*. Durum wheats and triticale are less susceptible to field infection than bread wheats. Some bread wheat varieties have been found that have partial resistance.

Disease Cycle of Karnal Bunt



Infection and Disease Cycle

The disease cycle of Karnal bunt is illustrated in the figure at left. Dark resting spores (teliospores) can be introduced on planting seed or equipment. Once the disease becomes established in a field, the primary source of inoculum becomes the soil (where teliospores survive for up to 4 years). Teliospores on the soil surface germinate when wet and produce wind-blown spores (sporidia) that infect heads during bloom. Cool, humid or wet weather favors infection. Wet weather also favors the formation of secondary sporidia that can infect adjacent kernels or adjacent heads.

Developing wheat kernels are randomly infected and incompletely converted to the fungus, which is why the disease is sometimes called partial bunt. It is typical for only a few seeds per head to become infected and not all heads on a single plant are infected. Diseased heads are not conspicuous and infected kernels are usually only partially eroded at their embryo end (symptoms similar to black point). Some large sori (bunt lesions) may extend along the crease of maturing seed and occasionally envelop the entire kernel. Thoroughly bunted kernels will break open at harvest and serve to contaminate other seed. Kernels with smaller portions of their tissues infected may survive intact, but will produce a low-vigor seedling upon germination.

Control

Chemical seed treatments used to control other bunt and smut diseases of wheat are not effective for control of Karnal bunt because teliospores inside partially bunted kernels are protected from the fungicide. Also, the inoculum does not infect the developing seedling (as in bunt diseases) nor is it internal to the seed (as in smuts). Loose teliospores must make their way to the soil surface (or be deposited there during planting) for sporidia to develop and infect the flowers. Chemical applications to wheat during the heading stages has also been investigated, *ref. 3*. Many of these have reduced infection in certain trials but have proven ineffective in controlling the disease. Fumigation of seedlots drastically reduced germination of wheat seed and still did not eradicate teliospores of the Karnal bunt fungus.

The U.S. relies primarily on quarantines to prevent introductions and spread of Karnal bunt. Certification of seedlots is accomplished by the use of a wet-sieving method that washes samples in a 1:1 mixture of glycerol and water with bubbling air and concentrates teliospores with centrifugation, *ref. 5*. The pellet is then re-suspended in a mounting medium and examined microscopically. Recently, Peterson and others, *ref. 6*, have improved the sensitivity of this method by using selective screen sizes to preferentially trap spores. Teliospores of the Karnal bunt fungus have a particular size (23 - 42 microns; mean = 39) and shape that allow them to be differentiated from other bunts and smuts. The only other fungus with similar teliospores is the rice smut fungus (*Tilletia barclayana*). This fungus can be a problem when wheat is stored or shipped in containers that have also been used to store or ship rice. Kernel smut of.

Karnal Bunt/Continued

rice is a minor disease of that crop. *T. barclayana* can be differentiated from *T. indica* with a recently developed technique based on DNA, *ref. 7*. This method is being employed by USDA to identify questionable samples or "positive" samples from new geographic areas.

Summary and Implications to Minnesota

There is always uncertainty surrounding a new pest and its possible introduction. The potential effects on yield appear minimal, however the impact of Karnal bunt's introduction to the U.S. could significantly affect export markets. Quarantine actions by other countries will not respect state boundaries. If Japan or China, or South Africa for that matter, chooses to restrict imports of U.S. wheat because of Karnal bunt, they will do so for all U.S. wheat.

Efforts of the USDA to eradicate this pest should be supported. Destruction of fields planted with infected seed seems appropriate if reasonable compensation is forthcoming. Allowing these fields to head and managing the consequences of the harvest would seem a more costly option and pass excessive risk onto future years.

In Minnesota, the minimal acreage of durum makes the introduction of this pest from affected areas unlikely. Producers with seed from the quarantine area should not plant it. Wheat seed from the quarantine area also presents a potential risk sufficient to consider other alternatives. If wheat was purchased and a grower is considering other options feel free to call my office (612-625-6290) and we can discuss ways of safely getting rid of the purchased seed.

Seed of non-host crops (barley, oats, etc) represents a much less significant risk. If producers intend on purchasing such seed from inside the quarantined area they should consider obtaining phytosanitary certificates for this seed.

If they have already brought seed from this area into the state and they want to have the seed tested for Karnal bunt, call the above number.

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Roger K. Jones
Extension Plant Pathologist

Soil Nitrate Testing Can Be Done Now

In southern and eastern Minnesota, the University of Minnesota came out with a spring soil nitrate-N test a couple years ago. The objective of this test is to determine any residual (leftover) N in the soil from last year's N fertilizer and/or manure and credit our corn N fertilizer recommendations accordingly.

Our research used in developing this test indicated that fields that fall into the following three categories have the highest probability of having significant residual N in the soil for this year's corn crop.

First, is the previous crop corn? Well-fertilized corn on corn generally has potential for residual N.

Second, was manure applied to the field in the past couple years—even if the field was in soybeans—as manure provides residual N. (The soil nitrate test will not adequately estimate manure-N applied late last fall or throughout last winter.)

Third, has the predominate soil moisture situation been wet or dry? Although most Minnesota soils have been wet,

it would still be advisable to test fields that are continuous corn and/or have been manured.

Soil sampling for the soil nitrate test can occur now through the middle of May. The earlier you take the sample, the most N application options you will have. Remember, this test is a preplant test, taken to a depth of two feet. Complete details of this test can be found in Minnesota Extension Service bulletin FO-6514 entitled *A Soil Nitrogen Test Option for N Recommendations With Corn*.

Note that this test is not designed to evaluate field that had fall fertilizer N applied. Because much of our fall-applied fertilizer N would still be in the ammonium-N form, the soil nitrate-N test would be misleading. If you are concerned about the sufficiency of fall-applied N, we will provide a supplemental N scoresheet in early June to evaluate fall N management and soil and crop conditions.

Mike Schmitt
Extension Soil Scientist

Insecticide Label Changes for 1996

A record number of label changes took place in 1995 that may affect your decisions on what to use in 1996. After years of no new registrations, Aztec 2.1G, Fortress 2.5G & 5G, Warrior 1E, and Baythroid were all registered within the last year. A new sand formulation of Dipel was released that should have better performance against first generation corn borer. Counter 15G was discontinued. Lorsban 4E was labeled for at-plant use in a T-band.And this is just a partial list. In this issue I'll cover the new registrations of the two soil insecticides: Aztec 2.1G, Fortress 2.5G & 5G.

AZTEC 2.1G is a mixture of two insecticides, 2% tebuirimphos (an organophosphate) and 0.1% cyfluthrin (a pyrethroid). The product is labeled on field corn, sweet corn, seedcorn and popcorn for a broad spectrum of soil insects (corn rootworm, cutworm, wireworms, seedcorn maggot, seedcorn, beetles, and white grub). Performance is quite good and will be reviewed in next week's newsletter. Placement is flexible with no phytotoxicity when placed in furrow. Aztec does not interact with sulfonyl-urea herbicides such as Accent, Basis, Beacon, Broadstrike, Exceed, Scorpion III, Permit. As with Fortress and Force, use rates are quite low, 0.15 lb AI/acre in 30-inch rows, compared to older soil insecticides such as Counter, Dyfonate, Lorsban and Thimet at 1.33 lb AI/acre. Newer EPA environmental testing and criteria ensure a newly registered product like Aztec has a better environmental profile, e.g. low runoff and leaching potential. The only environmental restriction is in furrow placement within 20 yd. of aquatic sites.

FORTRESS (chlorothoxyfos) is a broad-spectrum, organophosphate soil insecticide labeled by DuPont on field corn, sweet corn, seed corn and popcorn. At-plant applications control corn rootworms, wireworms, cutworms, seedcorn maggots, and white grubs. Performance is quite good and will be reviewed in next weeks *MN Crop News*. Use rates are

quite low, 0.16 lb AI/acre in 30-inch row spacing, compared to older soil insecticides like Counter, Dyfonate, Lorsban or Thimet at 1.33 lb AI/acre. Placement is flexible since there is no phytotoxicity when applied in furrow. Incorporation of band or T-band applications is critical because the product is fairly volatile and performance problems may result with unincorporated. Fortress does not interact with sulfonyl-urea herbicides to produce crop injury. More restrictive EPA environmental testing ensure that newer products, like Fortress, have better environmental profiles. For example, rapid soil binding and low solubility mean minimal risk to water quality through leaching or runoff.

Fortress is available in two formulations for 1996; a 2.5G can be purchased in bags and a 5G that is available only in a SmartBox system. The SmartBox System represents the first significant advance in application technology in over 20 years and provides a closed handling system. Electronic metering provides very accurate delivery at lower rates than conventional granular applicators, especially when coupled with radar-based adjustments for ground speed. Trip switches insure no product leaks when the planter is picked up at end-rows or over grassed waterways. A cab-mounted control box offers on-the-go monitoring and shutoff while maintaining application records that can be downloaded to a computer. I've worked with the SmartBox system for two years during its development, and I am impressed with the application advance it offers. However, farmers may balk at the cost, ca. \$400-500 per row, product choice....only Fortress is currently available for the system, and limited availability. Eventually more insecticides will be available in returnable SmartBox containers.

1996 Black Cutworm Monitoring Network

Black cutworms will soon begin their northward migratory flights. These moths migrate northward using lower level jet winds ahead of approaching low pressure centers and trailing cold fronts. If you can recall strong balmy southerly winds in the day or two preceding spring showers or thunderstorms, you've got the picture. Will we see a black cutworm outbreak in Minnesota this year? Only time will tell. Because we're at the north and west edge of the typical migratory route, Minnesota farmers face a much lower threat than their southern Iowa, Missouri, Illinois, Indiana, and Ohio counterparts. The last significant outbreak in Minnesota occurred in 1985 and 1986.

While it's tempting to ignore the black cutworm threat, pheromone traps offer an excellent way to monitor migrations and provide early warning of black cutworm outbreaks. The Minnesota Extension Service IPM program, in conjunction with volunteers throughout Minnesota, will be maintaining a pheromone trapping network in 1996. I have a limited number of traps available to dedicated, interested coopera-

tors. Cooperators are asked to monitor the trap daily, report captures weekly, and alert the county extension educator and myself if significant flights occur. If you would like to be part of this trapping network, please call my secretary Lee at (612) 624-6706 or fax us a note at (612) 625-5299.

Black cutworm pheromone traps can be purchased from the following sources for approximately \$8 per trap. Be sure to order a wing trap with reusable plastic top and a black cutworm pheromone lure:

Great Lakes IPM	Gempler's
voice: (517) 268-5693 or 268-5911	voice: (800) 272-7672
(800) 235-0285	fax: (800) 551-1128
fax: (517) 268-5311	

Watch for more information on black cutworm flights and management.

Ken Ostlie
Extension Entomologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Wait to Fertilize Lawns

It's still early for fertilizing lawns, even in the southern part of the state. Wait until you've mowed the grass two or three times and it's growing actively to apply fertilizer. If you plan to use a pre-emergent herbicide and fertilizer combination to prevent crabgrass and other annual weed seeds, apply it the first or second week of May in the Twin Cities area. That's about two weeks before typical crabgrass germination. If you fertilized twice last fall and you allow grass clippings to fall back to the ground, you may not need to fertilize at all this spring.

Give Houseplants Attention

This is a good time to check houseplants to see if they need repotting. Knock them out of their pots to inspect the roots; if you don't see a mass of roots around the perimeter of the soil you can just put them back and no harm has been done. If you see more roots than soil, replant into a slightly larger container, adding fresh potting soil on the bottom and firming it along the sides.

Longer days result in increased growth rates, so be sure to resume fertilizing houseplants, even if they haven't grown enough to warrant repotting. It's always safest to mix houseplant fertilizer at 1/2 the label-suggested rate.

*Deborah Brown
Extension Horticulturist*

Overwintering Insects To "Wake Up" Soon

Overwintering insects in homes will soon be more of a problem as spring arrives in full force. Common examples include cluster flies, face flies, leaf-footed bugs, millipedes, boxelder bugs, sowbugs, elm leaf beetles, and hackberry psyllids. These insects (and related arthropods) have been hibernating in wall voids, attics, under siding and roofing and assorted cracks and crevices since last year. As warmer temperatures wake them up, they try to find their way outside. While some succeed, others become trapped indoors. It is common to find these insects around windows or walking or flying aimlessly around.

Removing insects you find indoors by hand or with a broom and dust pan is the only necessary control. There are no practical solutions for controlling insects still in the walls. These insects do not reproduce indoors and are not dangerous to people or damaging to property. They are temporary nuisances that will go away on their own by spring. It is not necessary to treat these insects when you find them outside on or near homes. They are leaving their overwintering sites and are not trying to enter buildings.

Other common entomology calls include carpenter ants, pavement ants and indianmeal moths.

*Jeffrey Hahn
Assistant Extension Entomologist*

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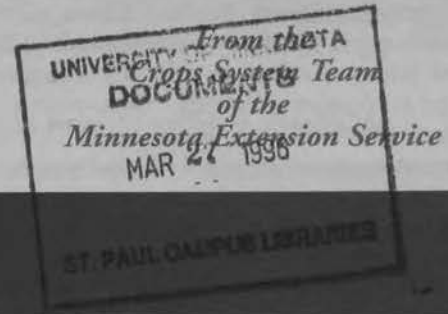
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CROP**NEWS**

It's Time to Start Spring Grain Drying

If you have natural-air grain dryers and weren't able to complete the drying process last fall, it's time to probe your bins and make some decisions about spring drying. Any corn that is wetter than about 22% moisture, and soybeans or small grains that are wetter than 20% moisture, are likely to mold before they dry. Bins that didn't get at least half dry last fall (drying front moved at least half way up through the bin) might not be good candidates for spring drying, either. Drying will take too long in these bins and you could end up with moldy grain at the top of the bin and badly overdried grain at the bottom. In both cases, it would be best to pull the wet grain out of bins and dry it in a faster type of dryer.

For bins in which the drying front has advanced at least half way through the grain depth and grain at the top of the bin is not too wet, the chances of completing drying this spring, without spoilage, are quite good. For corn bins containing any corn in the 19 to 22% moisture range, start the fans in

mid-March. If the wettest corn is 17 to 19% moisture, start the fans around April 1. For corn less than 17% moisture, you can wait until mid-April to resume drying. Reduce these moisture levels by about two percentage points, but use the same dates for managing natural-air drying bins that contain wet soybeans.

Because the weather gets warmer and drier as spring progresses, it's important to start running fans fairly early in the year. If you wait too long, the grain will get too warm (grain temperatures greater than 50F invite mold and insect growth) and too dry. Since grain is marketed by weight, drying corn to less than market moisture is very costly.

For more information, get a copy of BU-6577, *Natural-Air Corn Drying in the Upper Midwest*, from the Minnesota Extension Service.

Bill Wilcke
Extension Agricultural Engineer

Highlights...March 22, 1996

It's Time to Start Spring Grain Drying

Try to Move Outdoor Grain Piles

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Recommendations For Corn

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Dial U

Try to Move Outdoor Grain Piles

Transportation problems have resulted in uncovered, outdoor grain piles lasting a lot longer than was originally intended. Grain that was rewet by snow melt on the tops and sides of these piles is likely to deteriorate quickly in warm spring weather. For example, the allowable storage time for corn rewet to 22% moisture is only 16 days when the grain temperature reaches 60F, and only about 9 days when the temperature is 70F.

With grain prices as high as they are, it might be worth moving the grain to inside storage to reduce further losses. During the moving process, you might consider running the grain through a cleaner to remove broken corn and fines. Also, consider running any wet grain through the grain dryer to reduce its moisture to safe storage levels. Once the grain has been moved, aerate it to bring the whole bin to a uniform temperature. Make sure aeration is completed soon, however, so that you avoid warming the grain to temperatures greater than about 50F.

Bill Wilcke
Extension Agricultural Engineer

Rising Nitrogen Prices and Nitrogen Recommendations for Corn

Rising prices for nitrogen fertilizers in recent months have caused crop consultants, fertilizer dealers, and farmers to stop and think about nitrogen recommendations for corn. With current prices, it's easy to calculate a cost of \$40-\$50 per acre for nitrogen applications. Now, some are asking if nitrogen recommendations should be cut back.

To answer this question, it's important to look at cost of nitrogen fertilizer and the associated return on the investment in this nutrient. Information gathered from a nitrogen rate study in Blue Earth County is used as an example.

<u>N Applied</u> lb./acre	<u>Yield</u> bu./acre	<u>N Cost</u> \$/acre	<u>Yield</u> <u>Increase</u> bu./acre	<u>Value of</u> <u>Increase</u> \$/acre	<u>Increased Value</u> <u>- Cost</u> \$/acre
0	107	-	-	-	-
30	133	9.00	26	71.50	62.50
60	144	9.00	11	30.25	21.25
90	156	9.00	12	33.00	24.00
120	164	9.00	8	22.00	13.00
150	169	9.00	5	13.75	4.75
180	161	9.00	0	0	

Corn Price = \$2.75/bu.; N Cost = \$.30/lb.

With corn following soybeans at this site, the optimum rate of nitrogen was 150 lb. per acre. Increasing the nitrogen application from 120 to 150 lb. per acre produced an additional 5 bu. corn per acre. This relatively small increase was profitable at today's prices. Farmers usually receive more return for money invested in nitrogen compared to all other nutrients.

Nitrogen fertilizer recommendations are based on the expected yield or yield goals of individual growers. For those concerned about fertilizer costs, a serious evaluation of individual yield goals may lead to lower recommenda-

tions. A highly optimistic yield goal that has never been achieved is not a good strategy when nitrogen fertilizer prices are high. If a yield goal is realistic and has been reached in the past, there is no economic justification for reducing nitrogen recommendations.

The excellent return on use of nitrogen fertilizers is no justification for excessive applications. A high percentage of farmers have adopted best management practices for nitrogen use. There is no reason to move away from these practices today.

George Rehm
Extension Soil Scientist

Catching Up

The wet weather last fall stopped tillage and nitrogen applications for many farmers in Minnesota. Therefore, some plans may have to be changed as we look forward to the spring of 1996. Yet, suggestions for tillage and nitrogen application to catch up will depend on the weather in early spring. It's not possible to make definite recommendations at this time. Some options, however, are listed below.

Tillage

Soybeans Following Corn: There are two major tillage options for planting soybeans into corn fields that were not tilled last fall. Many growers will choose to plant soybeans into existing corn stalks with no-till drills. The other major option is to disk twice and plant. The disk is an implement that compacts the soil. Therefore, disking should be delayed until soil has dried enough so that compaction is held to a minimum. Results of tillage trials conducted at Waseca, show that both of these planting systems have an equal effect on yield.

Corn Following Soybeans: If soybean fields were not tilled last fall, growers have two major options this spring. One choice would be to plant corn into the soybean stubble using a no-till planting system. The second choice would be to use a field cultivator on the soybean stubble and then plant corn. Many growers currently use this planting system and have been successful with it. Those who use the no-till planting

techniques should not ignore the importance of starter fertilizer in this planting system.

Use of a starter fertilizer is an important management practice for all tillage systems when soil tests for P and/or K are in the low and medium range. Results from several research trials conducted throughout the state have shown the importance of banded fertilizer near the seed when corn is planted in high residue situations and the soil tests for P and/or K are in the high range.

Nitrogen Application

Since nitrogen is mobile in soils, growers have several choices with regard to timing and source. As with tillage, decisions on nitrogen use will depend on spring weather.

If the weather is *warm and dry* in early April, the needed nitrogen can be applied before planting. Any nitrogen source can be used at this time. Considering the cost of the nitrogen fertilizer, it's important to manage the application so that nitrogen is not lost. This means getting an adequate seal to prevent loss of anhydrous ammonia. If urea is used as a nitrogen source, there should be some form of incorporation following application. This incorporation is especially important if soil pH is above 7.4.

For those who use the no-till and ridge-till planting systems, nitrogen fertilizer should not be applied so that it re-

mains in contact with crop residue. For this planting systems, the nitrogen fertilizer should be placed below the soil surface.

If *early spring weather is wet*, the emphasis should be placed on planting with plans to apply the nitrogen fertilizer as an early sidedress treatment. All sources of nitrogen can be used for this application. In recent years, many corn growers found that they could broadcast urea after corn emergence and incorporate with a cultivator. This would be an acceptable method for urea application in 1996.

The broadcast application of 28-0-0 will burn tissue of emerged corn. Nitrogen, applied in this way, can cause yield reduction. The probability for yield reduction increases when: 1) the nitrogen is applied late rather than early, 2) high rates (more than 40-50 lb. N/acre) are applied, and 3) the nitrogen is applied with a post-emergence herbicide.

The sidedress application of 82-0-0 has been a standard management practice for several years and is certainly appropriate for 1996.

George Rehm
Extension Soil Scientist

Precision Farming Video Available

The Minnesota Extension Service has been involved in a Precision Farming initiative for the past three years. A 15-minute video tape, which describes some of the concepts and activities, is one of the products of this initiative. This video is now available for distribution. Copies can be ordered by calling the MES Distribution Center. The telephone numbers are: 1-800-876-8636 or (612) 625-8173.

George Rehm
Extension Soil Scientist

Winter Weather and Winterkill Potential

The severity of the winter of 1995-96 is disguised by monthly statistics which do not deviate from normal too much. However, some specific weather events and episodes may account for damaged or winterkilled pasture and alfalfa as spring approaches. The extent and severity of any damage will probably not be evident until April, but we might anticipate some effects from the following weather features this winter:

Though snow cover was ample in much of northern Minnesota, much of the landscape was covered with ice following the unusually heavy rains, snow and sleet on January 17-18. Some places had as much as 1 to 2 inches of precipitation fall on top of snow-covered fields. The ice sheeting and ice crusted snow cover was both abnormally thick and persistent. It was especially observed from Olmsted County to Pine County and west to Sherburne County. The ice persisted for the most part until the fourth week of February. Smothering effects of the ice which inhibit gaseous exchange with the underlying soil are potentially lethal to alfalfa.

A second significant feature of winter has been the severe episodes of near record setting cold temperatures, particularly the period from January 30 to February 5, when the statewide mean temperature for the week was -20 degrees F. Fields blown free of snow or areas with little snow cover showed very low soil temperatures. Four inch soil temperatures fell below 15 degrees F for several days in the Morris, Princeton, Rosemount and Waseca areas among others. In fact, at Morris 4 inch soil temperatures were below 5 degrees F for several days and approached 0 degrees on two days. Soil temperatures colder than 15 degrees F, especially in saturated soils have been associated with winterkill of alfalfa.

Scouting these fields for winter injury during April will be important to making forage management decisions this spring.

Mark Seeley
Extension Climatologist
Neal Martin
Extension Agronomist

Night Plowing

We have been receiving many requests for information on the effects of night plowing on weed population. The following has been provided by Dr. Doug Buhler, the scientist who conducted this research in Minnesota and Iowa.

Tillage in the Dark and Emergence of Annual Weeds

Douglas D. Buhler, Research Agronomist, USDA-Agricultural Research Service, National Soil Tilth Lab, Ames

There have been several recent reports in the media that tillage during darkness reduces weed populations. Unfortunately, some of these reports have oversimplified the matter. It is true that there are strong indications that tillage in the absence of light reduces the emergence of some annual weed species. The light requirement for germination found in many small seeded species is believed to be an evolutionary strategy for survival. The majority of seedlings developing from small seeds found more than 0.5 inch deep in the soil would fail to survive due to insufficient energy reserves to reach the soil surface. Light sensitive seed buried deep in the soil remain dormant until soil disturbance, such as tillage, exposes them to light.

It is extremely important to point out that research in Iowa and Minnesota indicates a wide range of responses to tillage in darkness among important annual weed species. It should also be noted that total darkness is required for a response to occur. For example, tractor lights provide more than enough light to negate a response in susceptible species.

Research was conducted at Rosemount, MN in 1994 and 1995 to determine the effect of tillage in the dark on the emergence of 13 annual weed species common to our region. Some of the results of this research are summarized in the accompanying table. Tillage treatments included: two passes with a tandem disk in the light, one pass in the light fol-

Night Plowing/Continued

lowed by the second pass in the dark, two passes in the dark, and no tillage. Tillage operations in the light were conducted between 2:00 and 4:00 p.m. and dark operations were conducted between 11:00 p.m. and midnight. Weed emergence was evaluated 14, 30, and 50 days after tillage.

Emergence of the annual grass species (barnyardgrass, green foxtail, giant foxtail, and yellow foxtail) was not affected by the time of tillage. Emergence of large-seeded broadleaf species (common cocklebur, giant ragweed, and velvetleaf) was also similar following tillage in the light or dark. Emergence of small-seeded broadleaf species (common lambsquarters, common ragweed, eastern black nightshade, pigweed species, Pennsylvania smartweed, and wild mustard) was affected by the time of secondary tillage. The level of reduction in emergence when tillage was conducted in the dark rather than during the day varied by species and date of tillage. Emergence reduction with small-seeded broadleaf species ranged from 30 to 70%.

Based on the results of this experiment and research conducted at other sites in the U.S. and Europe, it appears tillage in the dark may have potential as a component of integrated weed management. It may also be possible to design equipment that excludes light from the soil while working

during daylight. However, it must be noted that several important weed species were insensitive to tillage in the dark (annual grasses and large-seeded broadleaf species).

Additional research is needed to determine the light sensitivity of various weed species, as well as the effects of tillage depth, tillage implements, and agronomic factors.

Emergence of annual weeds following tillage in the light (2-4 p.m.) and dark (11 p.m. midnight) at Rosemount, MN in 1994 and 1995.

Weed species	% reduction (dark versus light)
Barnyardgrass	0
Common cocklebur	0
Common lambsquarters	60
Common ragweed	48
Eastern black nightshade	55
Giant foxtail	0
Giant ragweed	0
Green foxtail	0
Pennsylvania smartweed	60
Pigweed species	40
Velvetleaf	0
Wild mustard	35
Yellow foxtail	0

Beverly R. Durgan
Weed Scientist

Minnesota Agriculture

Minnesota Agriculture. What is it to you? The 1995 Minnesota Agricultural Statistics show that in 1994 Minnesota ranked 7th in Cash receipts among the states. We are ranked 1st for Sugarbeets, 2nd for Sweet Corn and Green Peas, 3rd for Soybeans, Spring Wheat, Sunflowers and Hay, 4th for Corn and Barley, 5th for Oats and Rye, 7th for Dry Edible Beans and Potatoes and 10th for All Wheat.

This was produced from 85,000 farms on 29,700,000 Acres, our average farm size is 349 A. In the last ten years Minnesota has lost 12,000 farms and 700,000 acres. It is estimated that nearly one out of four jobs are dependent on agriculture. Minnesota ranked 9th in Agricultural Exports. Agriculture is big and important to the Minnesota economy.

On the national level food and fiber products represented 14.5% of the 6.3 trillion U.S. Gross Domestic Products in 1993. Employment in the U. S. food and fiber system repre-

sented 16% of all civilian jobs in 1993. One farm worker provides food and fiber for 128 people and in 1993 Americans spent 11% of their disposable income after taxes on food compared to 21% in 1950. U.S. agricultural exports (\$48.5 billion) are projected to exceed agricultural imports by \$20 billion in 1995.

Agriculture is big and is important, but few of the public really understand. Our Minnesota Commissioner of Agriculture, Gene Hugoson has as a goal to heighten awareness about agriculture in Minnesota's economy. For most of the readers of this newsletter it is our job, we are part of agriculture in Minnesota. As the '96 season begins, we believe this newsletter will be an important part of agriculture in Minnesota. Thanks for your subscription!

Ward C. Stienstra
Extension Plant Pathologist

Rhizosphaera Needlecast Common on Blue Spruce

Rhizosphaera Needlecast is caused by a secondary fungal pathogen which invades the needles of stressed trees. In Minnesota, Colorado blue spruce is highly susceptible. White spruce and its variant Black Hills are intermediate and Norway spruce is relatively resistant.

Needle infection on new growth occurs in spring and early summer. However, infected needles do not turn brown until the next year, after the new seasons growth has developed. This delay in symptom development helps to distinguish Rhizosphaera needlecast needle drying due to environmental conditions; a condition quite prevalent this time of year.

Needle discoloration and loss is most prevalent on the lower branches and inner needles. Healthy spruce tend to hold their needles for 5-7 years. When trees are stressed and needlecast is present they may only hold 1-2 years worth of

needles resulting in almost bare branches.

A positive diagnosis is based on the pattern of defoliation and the presence of black fruiting structures on infected needles. Early identification of the disease can prevent extensive damage to individual trees and prevent the spread to adjacent trees. The site should be analyzed to identify the stress factors contributing to the susceptibility of the tree. Alleviating those stress factors is recommended to slow the progress of the disease.

A protectant fungicide with the active ingredient chlorothalonil will protect new growth from infection if applied when new needles are 1/2 to 2 inches in length and repeated in 3-4 weeks. Trees under stress may need yearly applications to slow the progress of the disease.

Cynthia L. Ash
Assistant Extension Plant Pathologist

New Addition of Category "A Pesticide Applicator Training Manual

Now available from the Minnesota Extension Service is a new edition of the Category A - General Ground Pesticide Applicator Training manual. This manual is designed for use as a reference and for training commercial and noncommercial pesticide applicators and others. While this edition of the red manual looks the same on the outside, inside it has been completely rewritten, expanded and updated. The manual covers many topics including laws and regulations, protecting the applicator and the environment, safe handling of pesticides, and integrated pest management.

During February, 1996 the Minnesota Department of Agriculture has been offering two versions of the Category A initial exam - one based on the old edition of the Category A manual and one based on the new edition. Starting March 1, 1996 only the new version of the initial Category A initial exam will be offered. The new edition of the Category A manual will also be utilized in the 1996 Recertification Correspondence Courses to be offered later this year.

Purchase price of the manual is \$14.00 for in person pick-up and \$17.00 through mail order. To purchase the manual contact:

Tracy Svec
University of Minnesota
Education Development Systems
458 Coffey Hall
1420 Eckles Avenue
St. Paul, MN 55108
612-625-8215 or 1-800-367-5363

This manual was produced by the Minnesota Extension Service, University of Minnesota in cooperation with Agronomy and Plant Protection Division, Minnesota Department of Agriculture. The Minnesota Department of Agriculture provided the funds to print the manual, reducing the purchase price for Minnesota applicators.

Dean Herzfeld, Coordinator
Health, Environmental,
and Pesticide Safety Programs
Minnesota Extension Service

CLINIC REPORTS

Samples submitted to the Plant Disease Clinic in February and March included:

rose(miniature)—*Rhizoctonia* sp root rot, *Botrytis* sp stem rot
rose—*Paratylenchus* sp, *Pratylenchus* sp nematode
A. violet—*Impatiens* necrotic spot virus (INSV)
geranium—*Xanthomonas campestris* pv *pelargonii* (bacterial wilt), tested negative for TSWV and INSV
fern—*Pythium* sp root rot, *Phoma* sp stem rot
chrysanthemum—tested negative for disease, sent to Soil Testing Lab
alstroemeria—*Pythium* sp root rot, *Meloidogyne* sp (root knot nematode)
N.G. impatiens—INSV
caladium—INSV
E. lily—*Pythium* sp
primula—*isometric* virus, tested negative for TSWV & INSV
hosta—*Meloidogyne* sp nematode
viola—tested negative for root rot disease, sent to Soil Testing Lab
gerbera, oxalis & fuchsia—tested negative for TSWV & INSV
wheat—four samples for wheat scab-plant vigor test
navy bean—seed tested for pathogens

Sandra Gould
Plant Disease Clinic

CORRECTION IN EXTENSION FACULTY NAMES AND RESPONSIBILITIES, listed in the February issue of the Minnesota Crop News:

EXTENSION ENTOMOLOGY

NAME	RESPONSIBILITY
Bill Hutchison	Extension Entomologist: insect pests of commercial vegetables (except potatoes) and forage crops.
Vera Krischik	Extension Entomologist: insect pest management in residential environments; landscape and structural.

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Try to complete any pruning that needs to be done on apple trees and other fruit trees by the end of this month or early next month. It's best to prune lightly each year rather than wait for years, then take lots of wood off at one time. (Heavy pruning results in water sprout development.... weak, fast-growing, vertical branches that are more disease-prone.)

Don't be too anxious to remove mulching materials from bulbs, perennials and strawberries. The mulch protects them from warming prematurely and sending up early growth that will be vulnerable to inevitable drops in temperature. On average, it's best to wait until mid-April in the Twin Cities area. Even then, you may want to keep the mulch close at hand in case temperatures in the low twenties—or worse—are forecast.

Young trees that have been girdled by rodents, rabbits, hungry deer or other critters need to be removed or cut back to the girdled area. If they have a good root system, they'll probably send up several new shoots, one of which can be saved and "trained" into a new, upright trunk. Bridge grafting is not a practical idea unless the trunk diameter is about five inches and there is healthy bark above and below the girdled area.

*Deborah Brown
Extension Horticulturist*

Leaf-footed bugs have been reported all winter as nuisances in homes. These insects are about 3/4 inch long and brown. They have relatively long legs and antennae. The most distinctive feature of leaf-footed bugs is an enlarged leaf-like structure on the rear pair of legs near the 'foot'. Leaf-footed bugs have been confused with cockroaches, but unlike cockroaches they are slow moving and seen readily during the day. They have been also confused for masked hunters (a type of assassin bug). However, masked hunter adults are

black, lack any kind of enlarged structure on their legs and are not normally seen during winter.

Despite circumstances, leaf-footed bugs are not breeding indoors but have been hibernating in buildings since last fall. During summer, they feed on a variety of grassy plants. During late summer and fall, they entered homes, seeking refuge in wall voids, attics, under siding or roofing and other cracks and crevices that would remain cold during winter. As long as that site stayed cold, leaf-footed bugs remained in hibernation. As mild weather or increased building heat warms up the overwintering sites, leaf-footed bugs wake up thinking it's spring and move indoors where it is warm.

Fortunately, leaf-footed bugs are harmless to people and property and are relatively short-lived (they can live for about a week). They have scent glands and sometimes give off a bad smell. The only practical control is to physically remove leaf-footed bugs as you see them. The problem will go away on its own by spring.

New apple maggot publication—The apple maggot publication has been recently revised. The title has changed from *The Apple Maggot* to *Apple Maggot Management In Home Gardens*. The publication number remains the same (FS-1007). There are some new pictures, and the text has been completely revised. If you have clientele that deal with apple maggots, be sure to have this newly revised publication on hand.

*Jeffrey Hahn
Assistant Extension Entomologist*

MINNESOTA EXTENSION SERVICE

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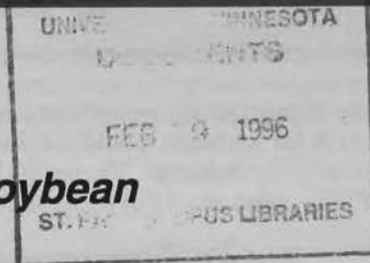
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CROP**NEWS**

*From the
Crops System Team
of the
Minnesota Extension Service*



Nitrogen Fertilizer for Soybean

Although a properly inoculated soybean crop is capable of using nitrogen from the atmosphere to meet its nitrogen needs, some have questioned if the use of fertilizer nitrogen would increase yields. Several years ago, results of a research project conducted at Iowa State University showed that a foliar application of fertilizer near or after flowering and pod set could produce substantial increases in yield. Several researchers conducted trials to confirm these results but were not able to report any consistent positive results from foliar fertilization.

Likewise, several research projects have been conducted to evaluate the impact of nitrogen fertilization on soybean production throughout the Corn Belt. Results have been inconsistent. Soybeans grown on soils in the Red River Valley have responded to use of nitrogen fertilizers if the amount of residual nitrate-nitrogen measured to a depth of 2 feet was less than 75 lb. per acre. At times, it is difficult to achieve good inoculation and subsequent nodule development when soybeans are grown on these soils.

In southern Minnesota, however, there is no problem in getting nodule development on soybeans and nitrogen fertilizer should not be needed. The results from a project conducted in Olmsted County in 1995 showed that nitrogen fertilization should not be used for soybean production in southern Minnesota.

In this study, two rates of N (50, 100 lb. per acre) supplied as urea were broadcast and incorporated before planting. A zero N control was also used. Inoculated and non-inoculated soybeans (Cenex/LOL 2494) were planted at each rate of fertilizer N. Plants were dug in late July. Plant weights were measured. Nodules were removed from

the root system and weighed. Yields were measured in October. The results are summarized in the table on page 2.

Neither N fertilization nor the inoculation of seed at planting had a significant effect on yield. Inoculation without N fertilization produced a small increase in plant weight. But, this difference in plant growth measured in July was not reflected in yield.

The amount of nodules found on each plant decreased as the rate of fertilizer N that was applied increased. These results are consistent with the results of several previous research projects which have focused on effects of N fertilization of soybeans. In southern Minnesota, we can expect to see a decrease in nodulation as the rate of fertilizer N increases.

Highlights...February 16, 1996

*Nitrogen Fertilizer for Soybean
Sulfur For Spring Wheat
Extension Faculty Names and
Responsibility
Role of Soybean Variety Reaction to Sclerotinia
Stem Rot in Disease Management
Plant Disease Clinic Report
Life After CRP
Dial U
Pavement Ants*

Nitrogen Fertilizer/Continued

The effect of rate of fertilizer N and seed inoculation on plant weight, nodule weight, and yield of soybeans.

N Applied lb./acre	Inoculated	Weight gm/plant	Plant Weight gm/plant	Nodule Yield bu./acre
0	yes	10.3	.54	43.8
0	no	9.5	.74	45.8
50	Yes	12.2	.43	44.8
50	no	11.9	.80	46.2
100	yes	14.0	.23	46.8
100	no	13.8	.28	45.9

The results of most studies which have focused on the use of fertilizer N for soybeans would not justify the application of fertilizer N for this crop. The results from Olmsted County in 1995 are added proof that fertilizer N is not needed

in southern Minnesota. This is especially true if you consider the price of nitrogen fertilizer today.

*Fritz Breitenbach and George Rehm
Extension Soil Specialists*

Sulfur for Spring Wheat

The importance of sulfur for production of both corn and alfalfa on sandy soils has been demonstrated in several studies throughout Minnesota. The value of this nutrient for spring wheat production has not been extensively researched.

Hard red spring wheat is grown on a substantial number of acres of sandy soils in northwestern Minnesota and sulfur requirements were not well defined. This study was conducted to evaluate the effect of sulfur sources combined with foliar fertilization on the yield and protein content of hard red spring wheat in 1995.

This study was conducted in a field of a cooperating farmer in East Polk County. The soil had a loamy sand texture with an organic matter content of 1.7%. Sulfate sulfur soil test values were 1.8, 3.6, 2.6, and 1.8 ppm for depths of 0 to 6, 6 to 12, 12 to 24, and 24 to 36 inches, respectively.

Two sources of sulfur (sulfate, elemental sulfur/clay mixture) were broadcast and incorporated before planting in late April. A no-sulfur control was also included. All

treatments received adequate amount of nitrogen, phosphate, and potash fertilizers. Foliar applications of two liquid materials (28-0-0, Ni-Sul) were made for all sulfur treatments at either tillering or just after flowering. The Ni-Sul product is a fluid material containing 20% nitrogen and 3% sulfur.

The effect of sulfur fertilization on grain yield and grain protein is summarized in **Table 1**. The use of sulfur broadcast and incorporated before planting produced substantial increases in production. The use of sulfate-sulfur produced the highest yields. Compared to the control, the use of this source increased wheat yields by approximately 10 bushels per acre. A response to sulfur fertilization would be expected. The soil was sandy and the organic matter content was 1.7%.

When averaged over all foliar fertilization treatments, soil applied sulfur fertilizer had no effect on protein content of the grain. The percentages are high. In general, protein content of wheat decreases as yields increase.

Table 1. The effect of soil applied sulfur on yield of hard red spring wheat and protein concentration in the grain.

Sulfur Source*	Yield	Grain Protein
	bu./acre	%
none	37.2	16.6
elemental sulfur/clay mix	44.0	16.4
sulfate-sulfur	47.2	16.3

* Sulfur rate was held constant at 25 lb. per acre.

Table 2. The effect of foliar fertilization at two growth stages on yield and protein content of hard red spring wheat.

Foliar Treatment	Stage of Growth	Yield	Grain Protein
		bu./acre	%
none	—	43.2	16.7
28-0-0	tiller	46.5	16.3
20-0-0-3	tiller	41.7	16.8
28-0-0	post flower	41.2	16.4
20-0-0-3	post flower	41.8	16.2

The effect of foliar fertilization on yield and protein concentration is summarized in Table 2. When averaged over the sulfur sources, foliar fertilization had no significant effect on yield. There were differences in treatment averages. These differences, however, were the result of natural variation of yields in the field. Protein concentration in the grain was not affected by foliar fertilization. The effects of foliar fertilization reported in this study are con-

sistent with results of foliar fertilization practices used in previous studies.

Sulfur fertilization can be important for small grain production. Response can be expected where small grains are grown on sandy soils with a low organic matter content.

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Extension Soil Scientist*

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Ken Ostlie	Extension Entomologist: field corn and soybean insects. Integrated pest management program and water quality.
Marla Spivak	Extension Apiculturist: management, diseases and pests of honey bees.
Bhadriraju Subramanyam	Extension Entomologist: pesticide impact assessment and (Subi) stored-grain pest management.

Role of Soybean Variety Reaction to Sclerotinia Stem Rot in Disease Management

Soybean varieties do differ in their reaction to Sclerotinia Stem Rot, ranging from moderate resistance to very susceptible in Maturity Groups 0 to II. Initial reports suggest less resistance is found in MG III and later maturing soybeans. To date questions remain about genetic/physiological resistance, is it real or is it another factor like plant architecture, maturity, lodging tendency, flower petal size, persistence or number? Infection escape, especially in early maturity types is reported to be related to the generally smaller size and early flowering. Yet high levels of infection are reported for even the MG 0's.

Clearly one can not predict with high accuracy how a specific soybean variety will perform. The average infection

level of 9 soybean varieties planted at two infested locations ranged from 0 to 88%. The test average was 2 at one site and 67% at the second location. Table 1. Cultivars that lodge or vine often express high levels of disease, but upright single stem varieties that are planted in narrow rows also can have high levels of disease. Years of very favorable environments can prevent differences associated with wider rows. Presently any field testing of a varieties reaction to Sclerotinia only really tells if that line is susceptible. We are blind, can't determine if the disease just avoided some soybeans. Multiple testing results begin to determine if susceptibility is low or high, but the identification of dependable production resistance or immunity still escapes us.

Sclerotinia/Continued

Yields of 6 soybean varieties planted at an infested Northfield, MN location did not vary greatly as to row width or level of Sclerotinia. White mold was detected only in 12 inch row beans in 2 varieties (Table 2). The infection appeared to develop late in the '95 season at least later than what was reported in '94. The soybean plots were not cultivated and chemical weed control was assisted by hand weeding. Parker had a serious grass weed problem that is believed to have lowered yields in the 30 inch row plot.

A larger collection of soybeans were planted in 12 inch

row plots expecting to demonstrate Sclerotinia Stem Rot damage/yield relations, however only 2 varieties developed the disease and as before the damage was slight. Table 3. Sclerotinia Stem Rot risk management for the present must be an integrated system as no one single control factor can be found. Select varieties with multiple reports of low infection levels and good yields. As your local experience dictates add additional management tactics like wider rows, lower plant populations, slightly later planting date and shorter season varieties, early in season cultivation, avoid excessive irrigation when flowering, avoid other susceptible hosts (peas, green and dry beans) and control weeds (Lambsquarter, red-rooted pigweed, velvetleaf and common ragweed).

Table 1. Sclerotinia Stem Rot Percent Disease

Variety	Staples, MN	Northfield, MN
	% Plants Infected at Maturity	
DSR-173	77	2
Dassel	83	0
Dawson	88	0
Evans	84	7
Great Lakes 1927	80	0
Hendricks	47	0
Kato	45	9
Lambert	75	0
Northrup King S1990	20	2
Average	67	2

Staples site was irrigated.

Table 2. Soybean Yields in a White Mold Environment 30" and 12" Rows

Variety	Company	Sclerotinia Present		30" Yield	12" Yield
		30"	12"		
S-19-90	Northrup King Co.	-	-	61.0	57.9
H-1218	Rob See Co.	-	-	57.4	58.1
G-1927	Great Lakes	-	-	57.4	53.6
S-12-49	Northrup King	-	-	51.0	53.4
Sturdy	Public	-	+	50.7	52.4
Parker	Public	-	+	43.0	51.6
		Test Average		53.4	54.5

Soybean Yields in a White Mold Environment

12" Rows

Variety	Company	SSR Observed	Yield
BT-2911	Ziller	-	63.4
H-1140	Rob See Co.	-	62.2
H-1218	Rob See Co.	-	58.1
S-19-90	Northrup King Co.	-	57.9
DSR-217	Dairyland	-	54.2
DSR-173	Dairyland	-	53.9
GL-1927	Great Lakes	-	53.6
S-12-49	Northrup King Co.	-	53.4
Sturdy	Public	+	52.4
L-1701	Cenex-LOL	-	52.3
Parker	Public	+	51.6
BSR-101	Public	-	51.2
Corsoy 79	Public	-	45.9
		Test Average	54.6

PLANT DISEASE CLINIC REPORT

Samples submitted to the Plant Disease Clinic in January included:

soybean—soils for soybean cyst nematode egg count
canola—seed tested for *Phoma* sp and *Sclerotinia* sp
potato—soil tests for *Verticillium* sp
sugarbeet—soil bioassays for *Aphanomyces* sp
fuchsia—tested for Tomato spotted wilt virus (TSWV) and Impatiens necrotic spot virus (INSV)-test results negative
geranium—*Xanthomonas campestris* pv *pelargonii*, (bacterial wilt), sooty mold, tested for TSWV & INSV-results negative
azalea—*Phytophthora* sp root rot
rose—*Verticillium* sp, *Rhizoctonia* sp root rot
freesia—*Fusarium* sp and *Penicillium* sp bulb rot
tulip—*Penicillium* sp bulb rot
daisy—*Pythium* sp root rot
lilac—*Pythium* sp root rot

Sandra Gould
Plant Disease Clinic

LIFE AFTER CRP

A conference for contract holders, farmers and ag professionals.

Background:

Nearly 2 million acres of Minnesota farm land have been idled under the Federal Conservation Reserve Program (CRP).

The present 10 year contracts are set to expire starting in 1996. In the six counties of Southwest Minnesota (Lincoln, Lyon, Pipestone, Murray, Rock, Nobles), 1,489 contracts covering 100,135 acres expire in 1996, 1997 and 1998.

The Challenge:

If CRP land is returned to production, many questions will arise, including: What agronomic and management practices should be employed? What are the economic consequences? Following the goals of the CRP, what strategies are appropriate to limit erosion and protect water quality? What farm system alternatives are feasible?

Contract holders will have decisions to be made concerning the future of their CRP acres. The decisions will generate agronomic, farm program, environmental and economic questions, as well as concerns regarding farming system alternatives, farm organizational structure, and community impact.

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DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Pavement Ants

Pavement ants have been a common call lately. These ants nest in soil, especially under objects, such as stones, sidewalks, concrete slabs and other pavement. When they are nesting under a home with concrete slab construction, pavement ants can cause problems. During summer, pavement ants normally forage for food outdoors and are not usually noticed by the people living there. However, when it is cold outside during winter, pavement ants can enter indoors to look for food if their nest is kept warm from the home's heat. These ants prefer to feed on greasy foods such as meat, margarine, crackers and peanut butter.

Occasionally people discover pavement ants with wings in their home. At certain times in the year, an ant nest produces new queens and males which fly out of the nest. The purpose of this is to mate. Pavement ants normally swarm during spring and summer, but their mating flights can also be found indoors in winter when they are nesting near an artificial heat source. They are tricked into believing that winter is over and leave their nest early.

It is not effective or practical to spray for pavement ants. While insecticide sprays do kill the foraging ants that are out, but this has little effect on the nest. The best control for pavement ants that are nesting in your home is to bait them.

You can purchase commercial baits for this purpose. You can also make your own home-made bait by mixing peanut butter, meat grease or a similar protein or fat based food (98 parts) to boric acid (2 parts). This would be about 4 tablespoons to 1/4 teaspoon. Place bait material on small jar lids, pieces of cardboard, in straws or something similar and set where pavement ants are found. Do not set baits where small children or pets can reach. See FO-1066, *What to do about household ants*.

Other common insect questions have been carpenter ants and Indianmeal moths.

Jeffrey Hahn
Assistant Extension Entomologist

Horticultural Tidbits

Gardeners are busy mulling over catalogs and ordering seeds to start indoors. Many are lavishing attention on the houseplants, beginning to fertilize them again as they respond to longer days by growing more actively. Others find this a good time to catch up on their garden reading (who has time in summer, when the garden itself beckons?) or they may attend some of the many short courses available around the state, including Master Gardener training in Mankato, Slayton and Little Falls.

Those of you who are looking for more home garden and landscape information might do well to check out a newsletter published by Iowa State University. Though it's written with Iowa in mind, much of its contents are excellent for Minnesotans, too, especially people who live in the southern third of the state.

Iowa's *Horticulture & Home Pest Newsletter* is published weekly from April to September and monthly the rest of the year. You can subscribe by sending a check for \$20 (payable to Iowa State University) to Extension Distribution Center, Printing and Publications Building, Iowa State University, Ames, IA 50011.

Deborah Brown
Extension Horticulturist

MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA

COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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CROP**NEWS**

*From the
Crops System Team
of the
Minnesota Extension Service*

CRP Field Day

A field day at the Lincoln County Conservation Reserve Program (CRP) demonstration plot will be held Thursday, September 5, 1996 from 9:30 a.m. until noon. The demonstration site and field day location is located 2 1/2 miles north of Lake Benton on state Highway 75 and 3/4 mile east on County Road 121.

The field day will overview the research and demonstration activities which have occurred in 1995 and 1996. The practices demonstrated simulate crop options, tillage and no till options, weed control and insect controls.

The CRP project stemmed from the magnitude of CRP in Southwest Minnesota. In the six counties of Southwest Minnesota, 1,489 contracts covering 100,135 acres expire in 1996, 1997 and 1998. In anticipation that some of that land will return to production, numerous questions arise, including: What agronomic and management practices should be employed? What are the economic consequences? Following the goals of CRP, what strategies are appropriate to limit soil erosion and protect water quality? What farm system alternatives are feasible? In response to this issue, the Minnesota Extension Service, in cooperation with the Lincoln Soil and Water Conservation District, received permission to utilize currently enrolled CRP land in Lincoln County for research and demonstration purposes. Demonstration research activity began on the research location near Lake Benton in 1995 and will continue through 1996.

Agronomic issues addressed in the research demonstration project focus on corn, soybeans, alfalfa, small grain growth and development as well as weed, insect and gopher control in first year post-CRP. Economic issues focus on cost of production versus economic return. Environmental issues addressed in the project include biomass management, tillage and no till residue management as well as mineralized inorganic nitrogen impacts on surface and groundwater quality.

Bob Byrnes

Lyon County Extension Educator

Highlights....August 9, 1996

CRP Field Day

Early Sampling for Nitrate-Nitrogen

Preharvest Weed Control in Small Grains

*Make Sure Stored Small Grains Are Dry
And Cool*

Corn Borer and Trap Catch Update

Note: *Corn Borer Information Available*

Aphids in Small Grain

Soybean

Dial U

Transplanting

European Corn Borer in Peppers

Fall Webworm

Early Sampling for Nitrate-Nitrogen

In Minnesota, those individuals who collect soil samples for growers face a special challenge each fall. Days are short and requests for sample collection are numerous. Therefore, there is an incentive to start sampling residual or carryover for nitrate-nitrogen as early as possible.

There's general agreement that amounts of nitrate-nitrogen found in the root zone are affected by soil temperature, soil moisture content, previous crop, and such factors as regrowth of weeds and volunteer grain following a small grain harvest.

Various amounts of nitrate-nitrogen are added to the soil system from the decomposition of organic matter when soil temperatures are higher than 50°F. Therefore, accuracy in measurement of nitrate-nitrogen increases when soil temperatures drop below 50°F. This is usually mid-October and later for most of western Minnesota.

Some have asked if there is an adjustment factor that can be used to account for nitrate-nitrogen produced between the time of sampling and the beginning of cooler soil temperatures. In order to get information to respond to this question, soil samples were collected throughout the late summer and fall at sites at the Lamberton and Morris Experiment Stations, where small grains were harvested in July, as well as selected farm fields in southwest Minnesota. Personnel from Centrol assisted with sample collection from farm fields. Samples were collected at depth intervals of 0 to 12 and 12 to 24 inches. These samples were analyzed for nitrate-nitrogen and carryover was calculated. Some of the results from this survey are summarized in the tables that follow.

At Morris, some small grain stubble was chiseled following harvest while a comparable area was not tilled. Soil samples were collected at approximately 2-week intervals and the results are summarized in **Table 1**.

Table 1. Effect of tillage system on nitrate-nitrogen measured to a depth of two feet in late summer and fall at Morris.

Tillage System	Year	Time of Sampling					
		Early Aug.	Late Aug.	Early Sept.	Late Sept.	Early Oct.	Late Oct.
----- lb. NO ₃ -N/acre -----							
no-till	1994	39	47	48	52	67	62
chisel	1994	43	60	52	54	56	63
no till	1995		16	29	38	44	44
chisel	1995		14	31	43	45	50

In general, there was a small increase in the amount of nitrate-nitrogen measured over time. The tillage system used at this site also had no major effect on measured nitrate-nitrogen. This increase was approximately 20 lb. nitrate-nitrogen per acre in 1994 and 30 lb. per acre in 1995.

These results, however, were different from those measured at the Lamberton site (see **Table 2**). At this site, some of the stubble was sprayed with Roundup to control volunteer small grain and weeds.

Table 2. The effect of tillage and herbicide on amount of nitrate-nitrogen measured to a depth of 2 feet at Lamberton.

Tillage System	Year	Herbicide Use	Time of Sampling					
			Early Aug.	Late Aug.	Early Sept.	Late Sept.	Early Oct.	Late Oct.
----- lb. NO ₃ -N/acre -----								
No-Till	1994	No	60	70	56	32	18	30
		Yes	59	63	64	60	5	67
Chisel	1994	No	30	42	44	26	12	19
		Yes	52	51	85	84	83	83
No-Till	1995	No	-	37	22	33	37	98
		Yes	-	40	35	57	65	104
Chisel	1995	No	-	45	42	61	76	120
		Yes	-	0	16	29	50	108

In 1994, measured nitrate-nitrogen was higher when regrowth was controlled. This was also true for the no-till system in 1995 indicating that this regrowth was utilizing nitrate-nitrogen mineralized from the organic matter. There was, however, no consistent difference between the two tillage systems.

The results of sampling conducted in farmer fields was also not consistent (see **Table 3**). There was no attempt to control regrowth on this fields which were planted to small grains in 1994. Results from some of the fields sampled are listed in the following table.

Table 3. Nitrate-nitrogen in fields of cooperating farmers in southwestern Minnesota.

Field I.D.	Sampling Time				
	Early Aug.	Late Aug.	Early Sept.	Late Sept.	Early Oct.
----- lb. NO ₃ -N/acre -----					
E 1	132	191	61	90	106
Peh	150	103	156	68	50
No E	109	102	87	122	83

The survey of these fields and others showed no consistent patterns in nitrate-nitrogen content.

An evaluation of the data collected from several locations in 1994 and 1995 leads to the conclusion that there is no consistent pattern for the amount of nitrate-nitrogen measured to a depth of 2 feet following small grain harvest. Therefore, we cannot provide an adjustment for nitrate-nitrogen if soil samples are collected from small grain stubble fields before the soil temperature reaches 50°F in the fall. Similar variability might be expected from fields planted to soybeans. Accuracy in measurement of nitrate-nitrogen will be increased if soil sampling for residual nitrates is delayed until soil temperatures approach 50°F.

George Rehm
Extension Soil Scientist

Preharvest Weed Control in Small Grains

In Issue 20 of *Minnesota Crop News* last year, Rich Zollinger and Beverly Durgan gave an excellent overview of preharvest weed control options in small grains. Again this year, late emerging broadleaves and grasses will be causing harvest problems in many fields. However, it is important to keep preharvest weed control in small grains in perspective. The following are some factors to consider before applying a herbicide as a harvest aid:

1. The expectations for preharvest weed control usually exceed reality—it is not possible to kill/dry down a 3-foot weed in the same manner as a 3-inch weed. Lower portions of the weed may not be affected.
2. It requires time to dry down treated weeds—usually 7-10 days. It may require more time if wet and/or cool weather conditions occur after treatment. All herbicides labeled for preharvest application are systemic and slow acting which requires a longer dry down period as compared to contact, fast acting herbicides.
3. The intent of a preharvest treatment should be to facilitate harvest and reduce harvest loss. Preharvest treatments do not decrease yield losses due to weed competition or prevent weed seed production.
4. Herbicide drift from preharvest treatments can cause major problems this time of year. Consider sensitive crops (sugarbeets, potatoes, etc.) and other plants (trees, gardens, etc.) in the general vicinity of the field receiving treatment.

The following is a list of herbicides labeled for

preharvest treatments in small grains and precautions treatments in small grains and precautions on their use.

- A. There are no herbicides labeled as a harvest aid for use on oats.
- B. 2,4-D is labeled as a harvest aid in spring wheat, durum, barley, and rye. Labels vary in crop use. Follow the label.
- C. Banvel is labeled only in North Dakota as a preharvest application in wheat and durum applied alone or in a tankmix combination with 2,4-D.
- D. Ally is labeled as a preharvest aid in wheat, durum and barley alone or with 2,4-D or on wheat and durum with 2,4-D and/or Banvel.

Intended for use in a winter/spring wheat or wheat following rotation. **Must** follow crop rotation restrictions.

- E. Roundup Ultra, Roundup Ultra RT, or Landmaster BW is labeled as a harvest aid in spring wheat and durum **ONLY** —not barley or oats.
- R. Paraquat is **NOT** labeled as a harvest aid in small grains. **DO NOT** use it. Not only it is illegal, it is not effective.

The section 2 (ee) label for Roundup RT, which was granted last summer to allow Roundup RT to be used on seed production fields, has not been extended for Roundup Ultra and Roundup Ultra RT. Concerns about seed germination and vigor, if applied too early prompted Monsanto to this decision.

Jochum Wiersma
Small Grains Specialist

Make Sure Small Grains are Dry and Cool

Grain spoilage always reduces your bottom line, but with this year's good grain prices, letting grain quality deteriorate in storage is even more costly than usual. Preventing grain spoilage is primarily a matter of keeping grain dry enough and cool enough to limit mold and insect activity.

Recommended moisture content for small grain storage is 14% for up to nine months storage and 13% for more than nine months. If grain is wetter than 14%, either run it through a heated-air dryer or put it into a natural-air drying bin. Since most heated-air dryers were designed for corn, monitor the dryer carefully and adjust the controls as needed to keep kernel temperature below 140F to prevent starch damage for milling grain and below 110F to prevent germ damage for seed or malting grain.

To reliably dry small grains with natural-air, it's best to use a bin that has a full perforated floor and an airflow per bushel that is matched to the grain's initial moisture content. Suggested airflow values are 0.5 cfm/bu (cubic feet of air per minute per bushel of grain) for 14 to 16% moisture grain, 0.75 cfm/bu for 16 to 17% moisture, and 1.0 cfm/bu for 17 to 18% moisture. Be aware that because small grains have greater airflow resistance than

shelled corn (especially wheat), natural-air bins that were designed for shelled corn will provide much less airflow per bushel when filled with small grains.

The Minnesota Extension Service has a FANS computer program available to help you determine airflow for different fan, bin, and grain combinations. To access the program, contact a county extension office, or download the program from the Internet (<http://www.bae.umn.edu/extens/harvest.html>). For more information on drying, get a copy of Minnesota Extension Service fact sheet FS-5949, *Wheat and Barley Drying*.

After grain is dry enough for storage, run aeration fans to cool the grain to less than 60F as soon as possible. In late summer and early fall, you might have to run fans just at night to accomplish much cooling. (Fans should be run continuously during drying, but intermittent fan operation is okay for grain that is dry enough for storage.) After all grain in the bin has cooled to less than 60F, wait until mid-fall to cool grain to about 40F, and finally, in late fall, cool it to about 25F for winter storage. See the Minnesota Extension Service fact sheet FS-5947, *Wheat and Barley Storage* for more details.

Bill Wilcke
Extension Engineer

Corn Borer & Trap Catch Update

The second generation ECB moth flight (normal bivoltine strain) is well underway for southern Minnesota (see Table, opposite, and Figures on page 143 for year-to-date summary). Most significant increases in trap catch began last Friday night, as expected, and increased to over 100 moths/night in several south-central traps. Egg-lay, as of August 5th, was still <1% at Rosemount (complements of my IPM crew) and 4-10% at LeSueur (complements of George Klacan) in fresh-silking sweet corn. Again, more frequent (2-3 times/week) updates on the ECB flight and egg-lay are provided on our 'Veg-Edge' WWW site at: <http://www.mes.umn.edu/~vegipm/> The information can be accessed under "Pest Infestation Updates" as well as "ECB Trap Catch Updates/Infestation Maps."

Insecticide sprays for ECB should continue at 5-7 day intervals on row-tassel to fresh silking sweet corn for the next 3 weeks. In addition to the pyrethroids (Pounce, Warrior and Baythroid), Penncap-M can be used for ECB until corn earworm arrive; once CEW arrive, only use pyrethroid materials to control both pest species. Also note, each of these 4 materials are all restricted use pesticides, and require appropriate applicator certification. Do not use Asana XL for ECB control. Do not use Lannate alone for either ECB or CEW. Lannate only provides ovicidal activity (egg kill). Under heavy ECB or CEW pressure, Lannate can be tank-mixed with the pyrethroids or Penncap-M to provide some additional ovicidal activity. However, because its residual activity on the silk or leaf surface breaks down within 48 hr, it provides very little control of hatching larvae.

Fortunately, we have not yet picked up significant CEW counts in pheromone traps. CEW usually arrive in significant numbers about August 22-25th, plus/minus 5 days. Their arrival (from southern corn production states, such as Texas to Kansas) is not related to our local degree-day accumulations, but more likely to the senescence of field corn in the southern states, and their subsequent northerly migration.

For more details on ECB and CEW thresholds and control options, refer to the *Commercial Vegetable Pest Management Production Guide—1996* (BU-1880-S:

ECB Moth Flight Summary, Minn., August 1-7, 1996*

Location	Avg. # ECB/Night	Max. # ECB/Night (Date)
Crookston	10	19 (8/6)
Fergus Falls	2	3 (8/4)
Morris	18	32 (8/1)
Bird Island	---	---
Olivia	18.6	31 (8/5)
Lamberton	24.6	48 (8/5)
S. Lamberton	---	---
Jeffers	16.8	38 (8/5)
Blue Earth 49a	---	---
Blue Earth 49b	---	---
LeSueur 51a	26.3	99 (8/4)
LeSueur 51b	56.8	68 (8/4)
Sleepy Eye 52a	102.3	180 (8/6)
Sleepy Eye 52b	88.4	112 (8/7)
Waseca 53S	1.3	3 (8/2)
Waseca 54N	15.2	24 (8/3)
St. Peter	25.2	50 (8/3)
Randolph	63.2	161 (8/6)
Rosemount	33.7	104 (8/5)
Faribault	12.8	18 (8/3)
Owatonna	10.3	20 (8/3)
Geneva/Hollandale	7.4	18 (8/5)
Simpson	8.0	12 (8/7)

*Thanks again to all volunteer cooperators, processors and MDA staff.

available through county extension offices or by calling 612-625-8173). Also review the July 3, 1996 issue of this newsletter for a review and summary of numerous midwest trials evaluating the efficacy of Pounce, Warrior and Baythroid for ECB control in sweet corn.

For the best updated reference on sweet corn insect pest management (including color photographs, easy-to-read charts, etc.), order the new *Vegetable Insect Management Guide*, with Emphasis on the Midwest. You can order this by sending a check (\$45.00) made payable to the "University of Minnesota" to my attention at: Dept. of Entomology, 219 Hodson Hall, Univ. of Minnesota, St. Paul, MN 55108. This book also covers all other vegetable crops produced in the midwest.

Bill Hutchison
Extension Entomologist

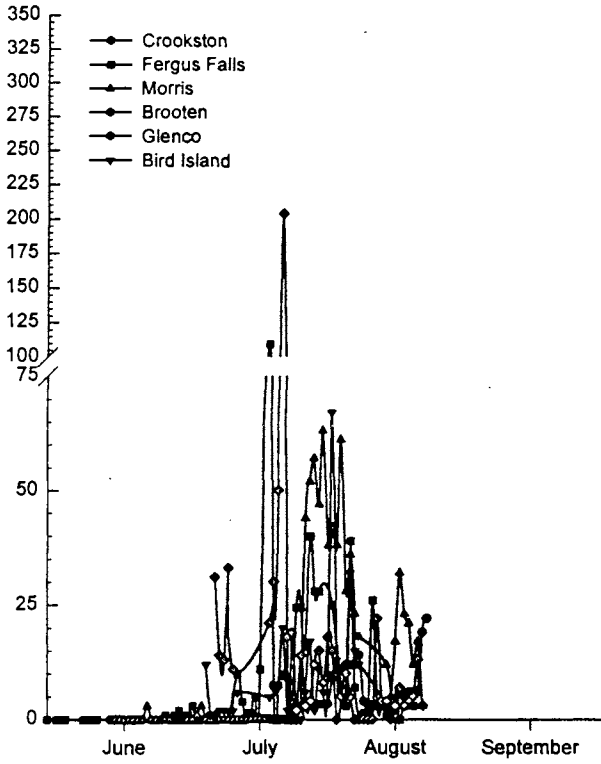
Note

Revision of fact sheet: FO-5971, *Managing Second Generation European Corn Borer (Trouble times two: Second generation corn borer infesting fields)*, will be available in the Department of Entomology and your county extension offices on a limited basis.

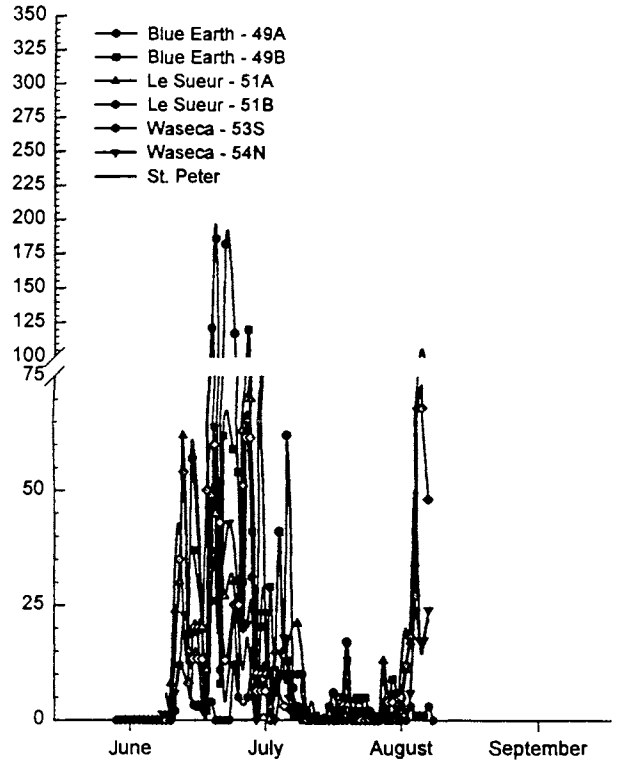
This week is the prime week for scouting for second-generation corn borer in field corn

Ken Ostlie
Extension Entomologies

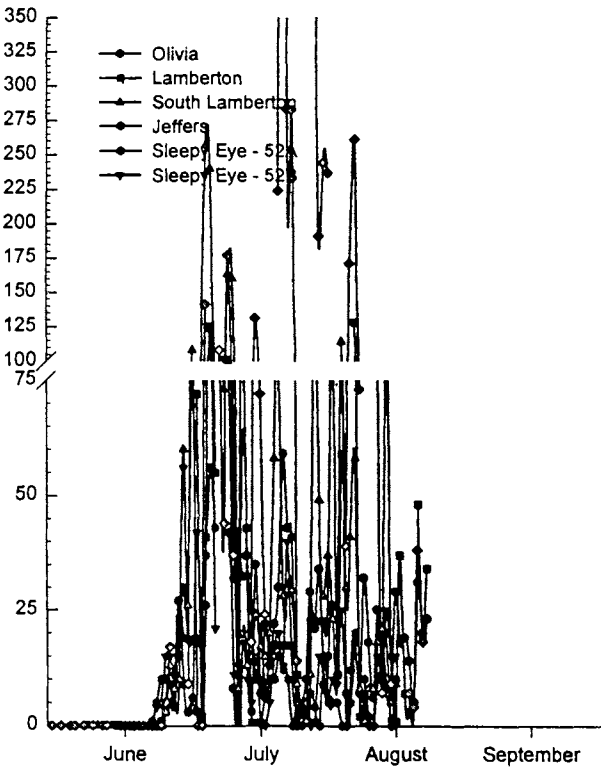
North - West



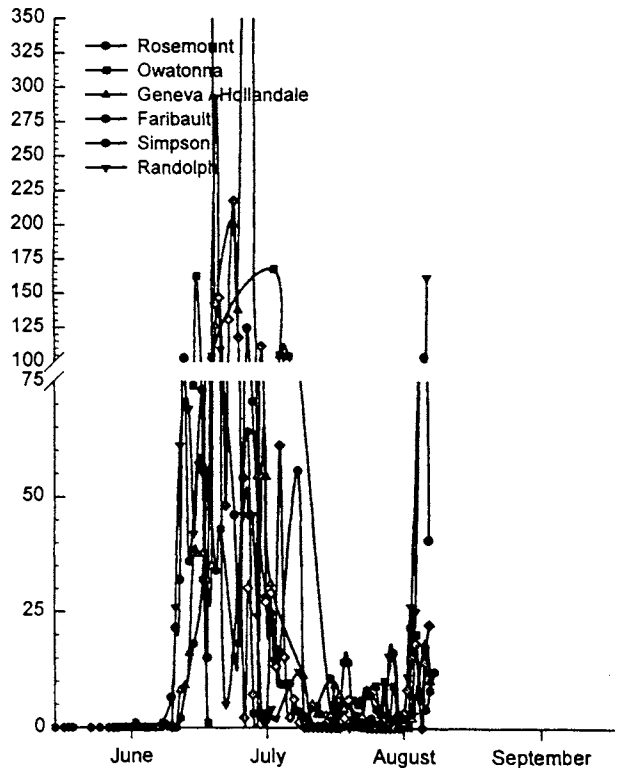
South - Central



South - West



South - East



European corn borers / night

Date

Aphids in Small Grain

We looked at several small grain fields in the Greenbush area on Tuesday with Randy Jensen of McFarlane Seed & Feed. Most fields we visited were headed and probably averaged mid-dough stage. We found aphids (bird cherry-oat, English grain and corn leaf aphids) commonly in the heads in all fields. In barley small colonies on the leaves were also easily found. The per cent of stems infested ranged from below 50% to nearly 100%.

If these aphid infestation levels had been present at

flag leaf they would have been economic. However, at mid dough there is unlikely to be any benefit to the grower from any present control.

Aphid control decisions must be based on monitoring during tillering, and treatments made to *flag leaf grain* for maximum yield benefit. It is highly unlikely that aphid infestations at flag leaf justified treating in 1996.

David M. Noetzel

Extension Entomologist, Emeritus

Soybean

The symptoms of SCN produced this year appear to be more nutrient deficient like than disease. The lack of nutrients, i.e. potassium and nitrogen, may be due to lack of potassium or due to the fact of limited root systems. I tend to believe the latter. Root systems on soybean I've examined are limited/damaged and the new roots are very near the surface. In dry weather these surface roots are not able to supply the potassium. If you see typical potassium deficiency, a irregular yellow mottling on the leaf margins in the early growth stages followed by the yellow areas running together forming a yellow border on the leaf, suspect SCN. The soybean requires large amounts of potassium, especially in the rapid vegetative growth period. The symptom of iron deficiency is also a yellowing of the interveinal areas of the leaf. At first the veins are green, but later even the veins can become yellow. When severe the leaves turn tan or ivory/white. Plant growth is reduced and it can cause leaves to develop brown spots or even death. High temperatures can increase the severity of iron deficiency.

Lack of nitrogen also can cause yellow beans. Soybean plant roots I've seen have few or small nodules and can be expected to be short of N. The yellow bean, short and tall bean(wavy pattern), and rows that don't close are all potential SCN sites.

These look-alikes should be examined carefully to determine the cause of the problem. The role of SCN in this symptom progression can be more important than what first appears. One can spent several years trying soybean varieties that have higher chlorosis scores to solve the problem when in fact the cause was SCN. In the years that other soybean varieties are grown the SCN egg counts increase. If one decided to add additional potassium, this response would be ineffective in solving the real problem.

This year on soybean roots I've looked at, the SCN "White Female" stage is about 1/2 to 1/4 the size I'd expect. This makes the identification much more difficult, but not impossible. Therefore, if you are looking

for the cause of the yellow beans and can't find the SCN reproductive stage, look again and you may find the smaller cysts. I don't know why females are so small this year, it could be the hot temperature, poor root growth or just an early stage of reproduction when I was looking at roots.

A survey of MN soybean fields in 1995 reported that 69% of the soil samples tested had positive results for SCN. This random stratified survey result is higher than what I've believed to be the case, but we do have several counties with all townships recorded as positive. The message is clear, in MN SCN is a real problem. The latest county to be reported as having SCN is Lyon. The sample was first seen by Bob Byrnes as he studied roots for potential herbicide injury/root disease problems. If one can't find the reproductive stage on roots, check again after two weeks and if nothing is still visible take a soil sample to be processed for cysts and egg counts. In Lyon county the egg counts ranged from low to very high.

Sclerotinia Stem Rot appears to be less common this year. At a Northfield test plot the pathogen reproductive structure has not be found. Reports from other state locations indicate no symptoms are being reported. Soil samples from the test site do have the sclerotia present and the recovered sclerotia are alive. At the Staples test site, sclerotia have produced a crop of apothecia, first seen 18 July. Disease symptoms should be developing at this time. The soil moisture conditions for sclerotia germination were not favorable in most locations as the soybean began to flower. We need wet soils for 10 to 14 days and temperature below 60F for apothecia formation. This did not develop this year and we may escape severe damage. This pathogen will wait for another year, it is well suited for survival.

Ward C. Stienstra

Extension Plant Pathologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Transplanting

Dial U has had calls all year on when to transplant various garden and landscape plants. Late summer/early autumn turns out to be a decent time for quite a few—but not all—plants.

Many perennials can be transplanted either early in spring, when they first come up, or early in autumn, when there's still enough time for their roots to begin to establish in the new location before extreme cold freezes the soil.

Late summer/early autumn is a great time to move (and divide, if necessary) iris, daylilies, peonies, hosta lilies, ferns and even rhubarb. In fact, you can move just about any perennial, provided you dig it up in a clump with soil attached to the roots. Just be sure to mulch newly transplanted perennials to give their roots added protection from cold and fluctuating soil temperatures next winter and early spring. Mulch will also keep the ground from freezing a little longer this fall, allowing the roots to continue growing.

Small woody plants, whether trees or shrubs, can be planted safely in fall. But when it comes to transplanting them from one location in your yard to another, it's better to wait for early spring. They'll overwinter better right where they are now.

*Deborah L. Brown
Extension Horticulturist*

European Corn Borer in Peppers

European corn borer is a familiar pest to many in sweet corn, but what many do not know is that the borer is a key pest of peppers. The second generation of European corn borer is expected to be large this summer and when this happens many of the female moths lay egg masses on pepper plants with developing fruit. The white egg masses are laid on the undersides of leaves and gradually darken with age. After hatching, the young borers enter the pepper fruit near the cap and feed on the placenta and seeds. Once inside the fruit the caterpillars are protected from predators and insecticides. The older caterpillars will damage and spread rotting bacteria to more than one pepper fruit.

You can manage this pest by scouting for egg masses from late July through mid-August. Any egg masses should be destroyed along with any bored pepper fruit. The caterpillar leaves a small hole and waste pellets by the cap of the fruit. Insecticides registered for home garden use are not very effective against the European corn borer. Any gardens that are close to sweet and field corn are particularly vulnerable. Keep an eye out to minimize your losses.

Entomology Note

The first reports of **fall webworm** are in here at the clinic. These caterpillars feed on a great variety of trees and shrubs, and can be identified by their distinctive nest of cottony fibers at the outer margins of the plant. The caterpillars are fringed with white tufts of hair and black dots down their backs. Many can occur in one nest where they are well protected. The easiest method is to physically remove the nest and caterpillars with a broom. Chemical treatment is rarely necessary.

*Joseph Pedretti
Entomology Technician*

MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA
COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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Effects of Plant Growth Regulator Herbicides on Corn and Soybean

After an extended period of cold and wet weather followed by warm temperatures and high humidity, corn has been through several environmental stress periods that have increased corn's susceptibility to plant growth regulator herbicides. Most of the injury symptoms have presented themselves as buggy-whipped (onion-leafed) corn, at or around the 12th node. The best answer as to why there is such a delay in the expression of the injury symptoms from the time of herbicide application until now can be best explained as follows. Plant growth regulator herbicides are systemic and accumulate in the growing point where leaf initiation is occurring. Also, corn plants that are under stress are less likely to detoxify the herbicide in the plant. Therefore, stressed corn that is treated with a growth regulator herbicide at an early growth stage is initiating more advanced leaf stages at the time of application and this would explain the delay in expression of the injury symptoms.

A lot of the injured corn plants have been treated with tank mixtures of growth regulator herbicides and either Basis or Accent. One of my concerns is that the addition of adjuvants to improve Accent or Basis weed control activity may also be increasing the likelihood of plant growth regulator injury. Before the days of Accent or Basis an applicator would not have added an adjuvant to a plant growth regulator treatment. Also, data from the Waseca 1995 weed management trials would also support the idea that the use of the plant growth regulator herbicide in the total postemergence approach has a greater likelihood of crop injury than plant growth regulator herbicides applied without a tank mix partner.

The hot and dry temperatures of July have also brought reports of cupped and strapped soybean leaves. The cause of this plant response is not often clear cut. In some cases it appears to be due to volatilization of plant growth regulator herbicides. In other cases it appears to be a general response to other stresses such as heat or other postemergence herbicides. Despite the cause, unless the growing point is severely injured, cupping or strapping of leaves rarely is a good predictor of reduced soybean yield.

Jeffrey L. Gunsolus
Extension Agronomist / Weed Science.

Highlights....August 2, 1996

Effects of Plant Growth Regulator Herbicides on Corn and Soybean
Is Yield Mapping Season Coming?
Corn Borer & Trap Catch Update
Extension News and Views
Plant Disease Clinic
Samples Submitted to the Plant Disease Clinic in July
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Pollination Problems in the Veggie Garden
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Is Yield Mapping Season Coming?

The summer is progressing quickly and thoughts are turning to harvest. Interest in using yield monitors is increasing. A grain yield monitor coupled with a location device (GPS) can be used to provide a yield map of a production field. Before going whole hog on yield monitoring, a basic question needs to be asked. What will the producer use this information for? Or (What good are yield maps to the farming operation?).

First, there maybe merit in knowing what grain yields in a field were. To make this information more useful, other information should be combined with the yield map. The yield map represents the results of a whole growing season's effects on a crop. Without information such as soil tests, pest infestations (such as corn borer and weeds), treatment of pests, distribution problems of inputs, tillage differences, weather damage, etc., a yield map is of little use for future management decisions.

The yield may also identify problems caused by more permanent soil properties which cause reduction in yield. These include salt affected soils, poor drainage, and iron chlorosis areas. Possible management strategies such as salt tolerant crops, tile or surface drainage, or chlorosis tolerant soybean varieties maybe applied on a site specific basis. Future yield maps then can be used to evaluate the usefulness of those management changes.

Finally, a yield map could be used for input allocation based on yield goal. Most of our fertilizer recommendations are based partially on yield goals. In sandy soils the nitrogen recommendation is totally based on yield goal. Logic would indicate that we could vary the rate of fertilizer applied by using yield maps from the previous seasons. To use a yield map for setting yield goals we need to know if grain yields are stable from year to year. Stability of yields occurs if the pattern of variability in yields across the field are the same year to year or the areas with the best or worst grain yields are in the same part of the field every year. Stability is important because normally the fertilizer recommendations are greater for higher yield goals than lower yield goals at a given soil test category. If the yield goal for a particular part of a field is changing each year then it would be very difficult to know what yield goal to use for managing inputs over a long time. In setting yield goals on a field basis, the common rule of thumb is to use at least five years worth of information and throw out the abnormally high and low years. This should also be used with using yield map information for setting yield goals.

To answer some questions about yield stability across a landscape, a research study was conducted from 1991 to 1995 on irrigated continuous corn. The research area

was on a sandy soil near Princeton, Minnesota. The objectives included determining how much variability occurs across a relatively uniform field, how stable are the grain yield across the landscape, and can we use yield information from previous years to establish yield goals for the next year's fertilization program. The herbicide, irrigation, and fertilizer inputs were applied uniformly across the 4.4 acre experimental area and corn yields were hand harvested from 50 ft. by 60 ft. grid cells in each year. A summary of the corn yields are reported in **Table 1**. The difference between the minimum and maximum grain yields ranged from 44 bushel per acre in 1992 to 72 bushel per acre in 1991. This is a considerable amount of variability for such a small area. Also noted is the large differences in yield from year to year. These differences can be attributed to the large differences in growing season weather conditions. The yields were not stable from year to year. Only 3% of the area had similar relative yields over the five years. This means that 97% of the area with the same relative yields were not in the same in the five years of the study.

Finally, if you used the first four years of yield information (1991 to 1994) you could only account for 46% of the yield variability in 1995. This means in this case the use of previous yields from yield maps would not be very useful for establishing yield goals.

Table 1. Average, minimum, maximum, and difference between maximum and minimum corn grain yields from 1991 to 1995.

Year	Average	Minimum	Maximum	Difference
	Corn grain yield (bushel/acre)			
1991	136	91	163	72
1992	113	90	134	44
1993	67	44	89	45
1994	122	100	151	51
1995	110	78	135	57

Should a grower buy a yield monitor? The bottom line is how much is the information worth to the operator. At this time the information's worth should be equal to or greater than the equipment and data management costs. The farmer should have a problem which is can be corrected with management and have the time and interest to interpret the data to make the most out of this investment.

*John Lamb
Extension Soil Scientist*

Corn Borer & Trap Catch Update

The second generation ECB moth flight has just begun in south central and southeastern Minnesota, with light trap catches starting to show a slight increase this past week (see **Table** at right). Trap catches for west central Minnesota, however, are down slightly over the previous week. Cool weather (below normal highs and lows) slowed down the emergence somewhat, but this should rapidly change with forecasts showing a warming trend (high 80s) this weekend. Despite the cool weather, our 30 year forecasts maps for ECB are still on track for the 2nd generation flight. Again, color maps for Minn., Wisconsin and Illinois are now available at our 'VegEdge' WWW (Internet Site), at...

<http://www.mes.umn.edu/~vegipm/ecbmap/ecblist.htm>
(You can also link to the Wisconsin ECB Degree-day forecast maps for ECB for both MN and WI, at this same site, which have been tracking the flights well this year).

ECB egg-lay has (as expected so far) been minimal this past week, with only 1-2 fresh egg masses found in 200-300 plants (tasselling/silking sweet corn). These same counts were found at both LeSueur and Rosemount, Minn from 7/30 to 8/1. However, many sweet corn fields should be at the 4% egg-lay spray threshold within the next 4-5 days. Again, any sweet corn in the row-tassel, open tassel or early silk stages will be most attractive for oviposition.

For more details on ECB thresholds and control options, refer to the *Commercial Vegetable Pest Management Production Guide - 1996* (BU-1880-S: available through county extension offices or by calling 612-625-8173). Also review the July 3, 1996 issue of this newsletter for a review and summary of numerous midwest trials evaluating the efficacy of Pounce, Warrior and Baythroid for ECB control in sweet corn.

For the best updated reference on sweet corn insect pest management (including color photographs, easy-to-read charts, etc.), order the new *Vegetable Insect Man-*

ECB Moth Flight Summary, Minn., July 25-31, 1996*

Location	Avg. # ECB/Night	Max. # ECB/Night (Date)
Crookston	3	3.3 (7/25)
Fergus Falls	7.4	26 (7/26)
Morris	---	---
Bird Island	5.3	16 (7/28)
Olivia	14.9	29 (7/31)
Lamberton	---	---
S. Lamberton	10.9	21 (7/28)
Jeffers	50.5	97 (7/27)
Blue Earth 49a	1.0	3 (7/31)
Blue Earth 49b	3.6	9 (7/29)
LeSueur 51a	4.2	13 (7/27)
LeSueur 51b	1.7	4 (7/28)
Sleepy Eye 52a	6.0	20 (7/29)
Sleepy Eye 52b	11.4	25 (7/29)
Waseca 53S	0.86	3 (7/29)
Waseca 54N	1.7	6 (7/29)
St. Peter	2.3	10 (7/27)
Randolph	5.8	15 (7/28)
Rosemount	3.25	16 (7/29)
Faribault	0	0
Owattona	4.9	10 (7/27)
Geneva/Hollandale	---	---
Simpson	1.1	4 (7/25)

*Thanks again to all volunteer cooperators, processors and MDA staff.

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Bill Hutchison
Extension Entomologist

Extension News and Views

Several weeks ago in church one of the readings was about a wheat grower in Biblical times whose enemy spread weed seed in his newly planted wheat. The pastor identified the weed as "bearded darnelle", which is indistinguishable to wheat in the early growth stages. Bearded Darnelle is a winter annual, which fortunately does not grow in this region. However, we are challenged by plants and weeds which are similar in appearance, and differ only in their biotype or genetic makeup. Herbicides utilized in crop production which control some weeds while not controlling other similarly appearing weeds is becoming more common. Varying biotypes within the same weed

species allows the survival and reproduction of herbicide resistant weed biotypes. Examples of the herbicide resistant biotypes include Roundup resistant Quackgrass, Pursuit resistant Cocklebur and Waterhemp resistant to commonly used ALS-inhibiting herbicides.

Like the Bearded Darnelle challenge faced by the Biblical wheat producer, visual identification of herbicide resistant biotypes are difficult if not impossible and are identified many times only when the plants are not controlled by herbicides. Currently in Lyon County, we are evaluating one potential case of Roundup resistant Quackgrass and numerous cases of ALS-resistant Waterhemp.

Extension News & Views/Continued

Waterhemp is a plant which looks very similar to Pigweed, and like the Biblical weed example, is very difficult to identify at early growth stages. Pursuit, the popular post emergence broadleaf herbicide for use in soybeans, does not control Waterhemp, but does control smooth and redroot Pigweed. Some producers have felt this herbicide has not performed adequately because weeds assumed to be Pigweed were not adequately controlled, only to discover through proper identification that the weed is Waterhemp.

Here are some tips to distinguish between Waterhemp and smooth and redroot Pigweed. Tall Waterhemp: 1) has no hair; 2) shiny leaves; 3) leaf shape is long and narrow. Smooth Pigweed: 1) has no hair; 2) shiny leaves; 3) ovate leaves. Redroot Pigweed: 1) hairy; 2) dull color; 3) rough surface and ovate leaves (wider base than top). Correct weed identification is of paramount importance when evaluating your weed control program and herbicide performance. Because of increased postemergent weed control programs and less cultivation, selection pressure for resistant weed biotypes have become increas-

ingly common. Providing weed control history when bringing in weeds for identification is essential. If there is significant evidence of resistance, save the seeds from these plants or bring in live rhizomes to your local Extension Offices where they can be forwarded to the University of Minnesota Agronomy and Weed Science Department for further tests and evaluation.

How can Waterhemp be better managed in the future? Steps must be taken to extend the length of control provided by the weed management program. This usually will involve using multiple tactics, such as a combination of preemergence and postemergence herbicides and the use of row cultivation. No-till fields in which consecutive Waterhemp control failures have occurred may benefit from tillage to dilute the seedbank within the soil profile. Waterhemp will continue to cause problems in the future, but the implementation of integrated management systems should eliminate most of the control failures that have occurred the past few years.

Bob Byrnes
Extension Educator

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in July included:

alfalfa—*Phytophthora* sp and *Rhizoctonia* sp root rot, *Phoma* sp (spring black stem), *Leptosphaerulina* sp leaf spot, *Pseudopeziza* sp leaf spot
corn—*Colletotrichum* sp (anthracnose), herbicide damage referred to Agronomy, *Longidorus* sp (needle nematode)
sweet corn—*Pythium* sp root rot
wheat—*Fusarium* sp (scab)
soybean—soybean cyst nematode-identified in sample from Lyon County for the first time. White female cyst nematodes now observed on roots of submitted samples. *Phytophthora* sp root rot, leaf bronzing (abiotic), herbicide damage sent to Agronomy
turf—*Colletotrichum* sp (anthracnose), *Pythium* sp root rot, *Rhizoctonia* sp root rot
oak—Oak wilt
ash—Verticillium wilt
elm—tested negative for DED
Linden—tested negative for Verticillium wilt
apple—scab
pepper—*Pythium* sp
garli—*Fusarium* sp basal plate rot, *Pythium* sp root rot
pumpkin—watermelon mosaic or zucchini yellow mosaic virus
tomato—ethylene damage referred to Horticulture
strawberry—*Xanthomonas* sp (angular leaf spot), *Ramularia* sp leaf spot
peony—*Colletotrichum* sp (anthracnose)
gladiolus—thrips damage referred to Entomology
phlox—ethylene damage referred to Horticulture
poinsettia—referred to Soil Testing and Entomology
kalanchoe—tested negative for TSWV and INSV
orchid—*Colletotrichum* sp (anthracnose)
hollyhock—*Phytophthora* sp root and stem rot
begonia—INSV

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Pollination Problems In the Veggie Garden

Each year we get callers who wonder why their melon, squash or cucumber crops failed. For several years running, cool temperatures might have played a role, certainly in limiting maturation. Obviously, that hasn't been a problem this year. Yet, we've heard from people whose zucchinis started to grow, then just shrivelled up and dropped off; people who've had misshapen cukes and people who've never gotten a single pumpkin or watermelon started. These are all signs of pollination problems. (The cukes could also be suffering from large fluctuations in moisture going to the developing fruit.)

These related plants in the cucurbit family all produce both male and female flowers. It's easy to tell them apart because the female has an enlargement shaped like the fruit that will eventually develop, right behind the flower. Only the females will result in fruit, but pollen from the male flowers must make its way to the receptive parts of the female flowers first; and the flowers only stay open for one day.

Pollination problems can arise in a number of circumstances. Early in the season, or sometimes when cucurbit plants are under stress, they produce only male flowers. Excessive use of insecticides can limit the number of bees and other pollinating insects that visit the flowers. Wet, cloudy weather will also limit insect activity. Overcrowding can contribute to problems of shady conditions, as does planting vine crops in inadequate sunlight.

If all else fails, try a little hand pollinating, using a child's soft paintbrush or a cotton swab to transfer pollen. It's too late to get pumpkins, winter squash or melons that will mature before frost, but you can certainly have some success with cukes, zukes, patty pans or other summer squash that are best picked small, anyway.

*Deborah Brown
Extension Horticulturist*

Red Pine Shoot Moths

We have received several samples and calls about old (20 - 40 years old) red pine in suburban sites with dead current year shoots. After examining samples, we discovered shoot moths had infested most of the dead growth. With the help of Mike Connor, Jim Hanson, and Steve Katovich of the U.S. Forest Service, we have identified the problem as red pine shoot moths, *Dioryctria resinosella*.

Although these shoot moths prefer to attack limbs in the upper portion of trees, we have had reports of many lower limbs also being infested. There is also a characteristic pitch mass on infested shoots. Red pine shoot moths do not kill pine, although the growth of affected trees is slowed and trees become flat-topped or otherwise misshapen. Red pine shoot moths are normally most common in open grown stands and borders around pine plantations, although the complaints we have received have been in landscape trees.

High populations should not occur for more than 2 - 3 years. There are 17 different parasitoids known to attack red pine shoot moths. Insecticidal control is difficult and not suggested considering the natural enemies that are present.

*Jeffrey D. Hahn
Asst. Extension Entomologist*

MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA
COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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CROP

From the
Crops System Team
of the
Minnesota Extension Service

NEWS

Heavy Rains in Northwest May Bring on Disease in Several Crops

Heavy rains on July 17th and 20th affected many areas of the Red River Valley. Prior to this time dry conditions had limited disease development in most crops but this could change rapidly. Field monitoring should be intensified over the next several days especially in wheat, potatoes and sugarbeets. Sclerotinia (white mold) in dry beans and sunflowers may also develop as a result of the available moisture.

Communication remains the key to saving money. Identifications of potato late blight or Cercospora leaf spot should be reported to local fieldmen, county extension agents or by calling my office (612-625-6290). Optimizing fungicide programs depends upon local knowledge of diseases (in the area, in the township or in a particular field).

Spray programs have begun in potato fields throughout the area although most beet fields are unprotected at this juncture. White mold symptoms should begin to develop a week to 10 days after the rain events.

Scab in wheat and barley: The heavy rains also established conditions favorable for the development of Fusarium head blight (scab) in cereals grains. Scab symptoms were reported (7/22) from a grower in Faribault County on a field of wheat (variety = Kulm) that had been planted into chisel plowed corn stubble. In the Red River Valley, the earliest planted (May 15) grain might escape infection this year but crops planted near the end of May or the beginning of June are just entering the flowering stage (when they are most susceptible). Fungicide treatments with Benlate or a tank mix of Benlate with one of the mancozeb will be beneficial if the wheat is just entering the flowering stage and rain events continue. Benlate treatments have not been shown to reduce scab in the moderately resistant 2375, and this material is not registered on barley.

Control of leafspots in fields planted to susceptible varieties (Grandin, 2375, Sharp, Butte 86) will also be profitable if high yield potential exists and market prices remain as they are. Prior to heading, Tilt fungicide will effectively

suppress leafspot development. Mancozeb formulations are registered for application after heading has begun.

Heat damage: High winds and high temperatures on June 28 caused an injury to the tips of wheat and barley heads that were exposed to these conditions just as the heads were emerging (symptoms appear as white awns and sterile, bleached spikelets on the upper 5 to 10% of the head. Symptoms are observed in the earliest planting dates (heads were not emerged in later PD's) of both wheat and barley. The rapid shift from cool to very hot/dry conditions caused this injury. The young tissues of the head are very delicate until epidermal tissue becomes fully developed.

Xanthomonas streak and Bacterial leaf blight: Xanthomonas streak was observed on both wheat and barley and Bacterial leaf blight was seen on wheat in several fields throughout the Valley. Symptoms occur in circular

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Soybean

Corn Borers: Round 27

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Corn Borer*

Aphids in Small Grain

Effects of Plant Growth Regulator Herbicides on Rapidly Growing Corn

Exceed Carryover to Soybean

Dial U

Plant Identification

Winged Ants and Pear Slub Larvae

Hard Rains.../Continued

patches (2 - 5 ft in diameter) of plants with watersoaked streaks running along the direction of the leaf veins. With wet weather, these diseases may spread. Streak can also affect the head (as black chaff) however, yield loss should be minimal. Varieties differ in their susceptibility to each of these diseases but ratings of currently grown varieties are not available.

Cercospora leaf spot: Consecutive rain events have created conditions favorable for infection by the *Cercospora* leaf spot fungus. Spray alerts have been issued in many areas based on the *Cercospora* Prediction Model. Rains have insured the presence of adequate soil moisture and yields will not likely be limited by this factor. To protect the crop, *Cercospora* must be controlled. Typically, leafspot spray programs are initiated based on the results of field monitoring. When disease is identified in the field, a protective spray is applied. Subsequent sprays are made based on weather-driven advisories. In the absence of adequate field monitoring, a sound strategy is to begin a protective program with a full rate application of TPTH (5 oz/ac) and follow the spray advisory after the 14 day effective interval

of the treatment has lapsed. This program is particularly critical for fields that have reached full canopy. These fields are difficult to monitor, retain leaf wetness, and are close enough to maturity not to be limited by the restrictions on application numbers associated with this fungicide.

Cercospora is not an explosive disease (compared to say late blight of potatoes or stem rust of wheat). On moderately resistant varieties it will slowly progress during favorable rainfall events. Intensive field monitoring can be used as a substitute for a Preventive Spray (based solely on the Advisory). Sprays in monitored fields can begin at the first sign of the disease in that particular field. This strategy is higher risk and more labor intensive. A more complete description of the integrated use of field monitoring and the *Cercospora* Advisory is given in *A Management Model for Cercospora Leaf Spot of Sugarbeets* (FO-5643) available from the Minnesota Extension Service). Careful reading of this bulletin will reveal that the Severity % required to enter a "caution" zone for spray purposes would have to exceed 0.025% as of July 21.

Roger K. Jones
Extension Plant Pathologist

Soybean

The season has been favorable for Downy Mildew, a consistent foliar disease in Minnesota. The symptoms are pale green to light yellow spots that become bright yellow spots. Look on the under side of the leaf for fungal growth, in moist periods the spot will have a tuft of mycelium and spores. Leaves can die from this disease but it seldom reduces yield. Pod infection is more damaging, as seed when infected is smaller and less viable. Seed infected is one method this fungus uses to infect next years crop. Plants grown from infected seed are small, stunted and have mottled gray-green leaves. Seed treatment will help, but disease-free seed is better. Infected residue should be buried. Rotate out of soybeans for one year. Some soybeans are resistant and the resistance is usually expressed after the leaf is 8 day old. Higher temperatures before infection tend to develop resistance earlier.

Root problems for soybeans are very common this year. I've seen several fields with very poor roots and it is not easy to determine the cause. In several sites the *Phytophthora* fungus is present. The loss of stand and now a loss of some 12 inch plants to wilting, I believe, was due to *Phytophthora* Root Rot. Typical stem lesions are not easily found, but a few plants did exhibit the stem lesion. More will only have a stunted, pale green color. Plants with a history of field tolerance seldom exhibit typical PRR damage and the mild symptoms/hidden damage does reduce yield. The effect of herbicide damage to roots, lack of tillage and poor growing conditions all interact to damage roots.

Several samples have been seen with *Rhizoctonia* Stem Lesions. This can be found on plants with damaged roots from PRR. *Rhizoctonia* does better on plants that are slow to grow and develop. Again poor growing conditions tend to favor *Rhizoctonia*. Look for the reddish brown cortical decay just below the soil surface.

The season is also favorable for Soybean Cyst Nematode damage recognition. Plants that are stunted, slow to grow, and appear to have nutrient problems can be damaged by SCN. Roots are poor and nodules, if present, are few and small. On carefully dug roots the white to tan female body/cyst can be seen. The damage from SCN is greater in dry seasons. Watch for it this year. Maybe you can find it sooner, early detection is desired to prevent additional spread. When scouting fields carry a trowel-dig don't pull plants and have a hand lens to examine roots. This soil borne problem will not go away and it will continue to expand. Several new resistant lines have performed well in trials. Rotation out of soybeans is the first step in control/management programs. Sanitation is of value to prevent spread.

Ward C. Stienstra
Extension Plant Pathologist

Corn Borers: Round 27

Moths again? So soon? Is the second generation underway? Common questions over the last two weeks. A second corn borer flight is well underway throughout west central and northwest Minnesota. As discussed two weeks ago, this flight probably represents one-generation biotype that emerges significantly later than the first flight of the typical multi-generation biotype. Recent cool weather has diminished moth activity, spread out the flight, and slowed corn borer development. The week of July 29 should be the prime time to scout corn borers from this later flight.

In areas where these biotypes overlap, a real mess can result. For example, at Morris on July 11, an early-planted field I scouted had 2nd through 5th stage larvae from the first flight and new egg masses from the second flight were found on 5% of the plants. Similarly, near Princeton on July 16, I found egg masses and first through fifth stage larvae. This week consultants in WC Minnesota report fields up to 60% infested with first and second stage larvae. Moths are still active and egg masses can be found. Another cycle of insecticide treatments is underway. In the past, extended moth activity has produced gradually increasing larval numbers and, in worst cases, produced substantial damage while not reaching treatable levels (especially at \$2/bushel corn). With current corn prices, however, infestations may reach treatable levels even though older larvae may have already tunneled and young larvae may just be hatching.

Rapid corn development and, in particular, tassel emergence raises questions about corn borer behavior and insecticide control. As corn approaches tasseling, more larvae will abandon the whorl for lower leaf axils and leaf sheaths. Larvae of all stages may feed in the tassel, protected by tightly wrapped leaves. First stage larvae may even feed within individual male "flowers". Leaf injury, as an indication of infestation, loses effectiveness and can only be replaced a thorough examination of leaf axils and the tassel plus its surrounding leaves (if any). Some larvae will tunnel in the tassel but this feeding will not affect pollination since abundant pollen is produced in a field. The major yield im-

pacts come from tunneling of lower internodes and, potentially, the ear. As the ear shoot develops, larvae may also colonize the ear tip.

Regarding insecticide performance, liquids are generally preferred over granules. The growth of the corn canopy means more leaf surface will intercept the insecticide, and control generally declines about 65%. The advent of the tassel may actually improve control since larvae are no longer protected by upper leaves and will move to lower internodes. Two recent studies in NW Minnesota illustrate the control that can be achieved. Last summer, an infestation predominated by second instars was aerially sprayed at the NW Experiment Station at Crookston. The liquid sprays were applied to a dry canopy that was just beginning to tassel.

Insecticide	Rate	Tunnels Per plant	% Control
Untreated	--	5.06	--
Pounce 3.2E	4 oz.	1.64	67.6
Pounce 3.2E	6 oz.	1.56	69.2
PennCap-M 2 FM	3 pt	1.63	67.8
Warrior 1E	2.6 oz.	1.51	70.2
Warrior 1E	3.2 oz.	0.97	80.8
Warrior 1E	3.8 oz.	1.29	74.5

In 1994 Carlyl Holen and I treated an infestation near Red Lake Falls in newly tasseled corn. The infestation was fairly old, primarily third stage larvae with nearly 3% of the larvae tunneled in the lower stalk. Although I thought it too late to achieve any better than 50% control, PennCap-M 2FM provided about 76% control with over half of the larvae in protected sites (ear tips, midribs, behind leaf sheaths, and in tunnels). Clearly, larvae move about and come into contact with insecticide treated surfaces more frequently than we think.

Next week I'll cover scouting second generation.

Ken Ostlie
Extension Entomologist

Vegetables... Corn, Corn Borer & More Corn Borer

Sweet Corn/Corn Borer—Corn Borers on the MOVE—Part II—The 2nd generation ECB flight is on schedule to begin any day now for southcentral and southeastern Minn. (see Degree-day forecast table below). An early infestation of 4% egg-lay (4% of plants with 1 or more fresh egg masses) was observed July 22nd in a sweet corn variety trial near Owatonna. At most of our southeastern, southern and southcentral sites, moth catches this past week were still low, ranging from 0 - 5/night, reflecting the expected continued "break" between the two generation flights in these regions of the state, where we still have primarily "normal" bivoltine (2 generations/yr) ECB populations. Again, the

treatment threshold for ECB on all sweet corn hybrids at late-tassel to first-silk is 4% egg-lay (4% of the plants infested with 1 or more egg masses).

However, for west-central Minnesota (e.g., Olivia, Lamberton, Glencoe, Cosmos, etc..) we continue to see (4th year in a row) the presence of a univoltine (1 gen./yr) ECB strain (e.g., with over 85 moths/night on July 19th at Olivia, Dan Palmer, DeKalb) "on top of" the normal bivoltine population in these regions (see Trap Catch Table below). This phenomenon results in essentially 3 consecutive generations of ECB, a nearly continuous moth flight. For susceptible crops such as sweet corn, peppers and snap beans, this will

Vegetables/Continued

require continuous monitoring of the moth flight, egg masses in sweet corn and peppers, and much more frequent insecticide treatment compared with southcentral and southeastern Minnesota.

The univoltine flight is now active, producing new eggs; early instar hatch is underway. Gary Halvorson, FMC Corp., reported a 30% egg mass infestation in dent corn 20 miles SW of Lamberton (7/24) (already 90% infested with late-instar larvae from the 1st gen. flight of the bivoltine population). Dwight Felton, crop consultant-Willmar, reported early instars hatching (7/24) in fields from Glenwood to Fergus Falls.

ECB Moth Flight Summary, Minn., July 18-24, 1996*

Location	Avg. # ECB/Night	Max. # ECB/Night (Date)
Crookston	10.9	14 (7/23)
Fergus Falls	16.3	39 (7/21)
Morris	31.2	61 (7/19)
Bird Island	14.0	32 (7/21)
Olivia	22.3	86 (7/19)
Lamberton	1.2	128 (7/22)
S. Lamberton	42.0	114 (7/19)
Jeffers	36.0	261 (7/22)
Blue Earth 49a	5.0	17 (7/19)
Blue Earth 49b	4.3	13 (7/19)
LeSueur 52a	2.2	3 (7/18)
LeSueur 52b	0.7	2 (7/18)
Waseca 53S	2.9	8 (7/19)
Waseca 54N	0.8	2 (7/21)
St. Peter	0	----
Randolph	0.9	2 (7/21)
Rosemount	5	6 (7/18)
Faribault	2	6 (7/19)
Owattona	----	-----
Geneva/Hollandale	3.8	8 (7/23)

*Thanks again to all volunteer cooperators, processors and MDA staff.

The predicted onset (5% moth emergence and 5% egg-lay) of the 2nd generation flight for southern Minnesota, provided by the Penn State ECB model (developed by Dennis Calvin, coupled with GIS Mapping by Joe Russo) is summarized below. Based on 30yr avg. max.-min. temperature files, the ECB forecast map for Minnesota can be *roughly* summarized in the following Table. However, the most accurate and clear way to view these model predictions is to view the color map on our Vegetable IPM WWW page on the Internet (<http://www.mes.umn.edu/~vegipm/>), or obtain a color hardcopy from someone who does have access to the WWW page (and a color printer).

Timing of 2 nd Gen. ECB Flight (So. MN)	Start: 5% egg-lay
Blue Earth to N & NW following S. of MN River	July 23 - July 26
E of Blue Earth to Austin, N, NW to N. of MN River	July 27 - July 30
SE Minn. to 75 mi. N of Twin Cities, & W of Cities	July 31 - Aug 3

For processors and consultants with corn/snap beans in WI and IL, I have just received new ECB maps for these states; we should have these posted by Friday (7/26) on the VegEdge page. Although these forecasts are based on 30yr avg. temperatures, they are proving to be accurate enough this year (at least for MN), as we are fairly close to the 30yr average to date. For most sites we are within 100 degree-days of normal as of July 22nd (approx. 1100 to 1250 Degree-days accumulated since Jan. 1st).

As mentioned previously, all producers should watch corn and susceptible vegetable crops VERY closely this year. With the first flight hitting the all-time record, with over 1,000 moths/night at some sites (much higher than some years' 2nd gen. flight), and continued excellent weather for ECB survival and development, we are clearly in for a major 2nd gen. flight that should exceed last year's record high.

Note to DTN Subscribers: As with the 1st gen. flight this year, Joe Kurtz (Minn. Extension Service) and I will be placing 2nd gen. information, and trap catch summaries on DTN. During the past few weeks, some subscribers have not been able to access this information (under "Local Information", University of Minnesota, Minnesota Extension Service, etc.). Not all subscribers have the same menu options. For those who cannot currently access this information, you should call DTN for an update to your menu, as this should be included in all "base" packages. For DTN assistance, you should call 1-800-485-4000, when prompted enter extension 8633 and ask for Mary. For those who have been able to access the information this year via DTN, Farm Data Network, or the VegEdge WWW page, we hope these delivery methods have been cost-effective and improved your efficiency. Feel free to contact me at any time with additional suggestions.

Cole Crops/Cabbage Looper

Cabbage Looper populations continue to slowly build with pheromone trap catches (Apple Valley and Rosemount) averaging about 1-2 moths/trap/night (this is significant for looper), and egg-lay averaging about 2.5-5% of plants infested. Imported cabbageworm, diamondback moth larvae and cabbage looper (combined) reached 30% of the plants infested this week in untreated check plots this past week (30% is our threshold for pre-heading cabbage; 10% once cabbage starts heading).

*Bill Hutchison
Extension Entomologist*

Aphids in Small Grain

With the wide spread wheat midge outbreak, the question of aphid control in small grains became confused with the more critical midge issue. Most small grains are now headed, but were/are free enough from aphids that aphid control has not been warranted.

However, before the dust settles, let's briefly review what our several years of aphid control trials have clearly demonstrated. First, there is absolutely no yield response to any effective aphicide unless the aphid infestation exceeds around 15% of the stems infested. It's not too difficult to count infested stems and all fields should be monitored so that non-infested fields are not treated. With \$2.50-3.00 wheat, the action level of 83% infested stems is still quite acceptable.

Secondly, it is early aphid control (applied between tillering and flag leaf) that pays most greatly for the grower. The maximum yield benefit can be achieved when the aphicide is applied no later than flag leaf. Application of an aphicide at 70% heading, for example, will lose at least one-third of the benefit that it would have provided at flag leaf. If one waits until early milk, then two-thirds of the benefit is lost. Our data supports these observations.

Growers should note that this timing precludes any possibility of combining aphid and wheat midge control. These are completely separate decisions.

Thirdly, we seem to be preoccupied with PennCap-M as the aphicide. All of the chemicals listed in the following table are equally efficacious for aphid control in wheat.

Insecticide & formulation		Rate/acre formulation	AI	Cost/acre
PennCap-M	2F	2 pt	0.5)	6.05
dimethoate	4E	1/2 pt	(0.25)	1.90
ethyl-methyl parathion	6-3E	1/4 pt	(0.375)	1.60
Disyston	8E	1/4 pt	(0.25)	2.30
Lorsban	4E-SG	1 pt	(0.5)	6.23

When we measure aphid control either directly (aphid reduction), or indirectly (through final wheat yields), all of the above aphicides perform equally well.

The question of whether a compound is persistent is simply meaningless when insecticides are applied on the same day and wheat yields are identical at season's end.

Wheat prices are higher than in years past and should encourage a higher management level on the grower's part. However, insecticides (aphicides) are for the purpose of reducing a pest population *already present* that we know has the potential to reduce yield. The grower obtains neither insurance nor additional profit when an aphicide is applied to wheat without aphids. Anyway, if the grower chooses to do that, why not make another \$5.00 per acre by using an equally effective, less costly insecticide.

Dave Noetzel
Extension Entomologist

Effects of Plant Growth Regulator Herbicides on Rapidly Growing Corn

After an extended period of cold and wet weather it looks like crops will finally be exposed to warm temperatures and good soil moisture conditions. Please keep in mind that when corn starts its rapid growth phase, the use of plant growth regulator herbicides can often result in wrapped, brittle, or lodged corn. Therefore, in most corn fields in Minnesota, it

would be wise to find appropriate alternatives to Banvel, Clarity, Marksman, 2,4-D, and Scorpion III. Fortunately, last week's weather made it possible for most of the growth regulator herbicides to be applied at that time.

Jeffrey L. Gunsolus
Extension Agronomist - Weed Science

Exceed Carryover to Soybean

In the last two weeks there have been numerous reports from all over southern Minnesota of Exceed carryover from 1995 corn to this year's soybean crop. Based on my discussions with Ciba and surrounding states there have also been reports of Exceed carryover in Iowa, northeastern Nebraska and southeastern South Dakota.

Soybean injury symptoms are what you would expect from an ALS herbicide, short beans. The beans may appear iron chlorotic, with interveinal chlorosis (yellowing) in the upper leaves but associated with this is slight to extreme shortening of the internodes, making a very compressed look-

ing bean. It is not likely that the extremely shortened beans will grow out of this condition.

It is too early to say definitively what is going on at these carryover sites but one overriding factor does seem apparent, soil pH. Fields at or above pH 7.0 are the most frequently cited fields where Exceed carryover is being detected. As the soil pH increases above the low 7 pH readings to pH 8, the severity of the Exceed injury increases. To illustrate, east of Rochester where soil pH generally is in the low 6's I saw carryover injury near a gravel road where I am sure the pH is higher. The soil pH in those exact spots

Exceed Carryover/Continued

is just now being determined. There also were sites within the field, near the gravel road, where Exceed was not applied last year and the beans look fine.

There are many other factors that still need to be addressed regarding Exceed carryover. Microbial degradation is believed to be the primary mode of Exceed degradation. Therefore, time of Exceed application in 1995, length of the growing season, time of and conditions at soybean planting, and tillage practices need to be assessed as well. Based on current field observations, tillage impact on Exceed carryover is as you would expect, the least injury (but still a problem) occurs on plowed fields and the worst injury occurs on chisel-plowed and no-till fields. Soil type and drainage may also be playing a role in enhancing Exceed carryover.

Management implications for next year are yet to be determined because it is first necessary to determine what the key factors are that have helped create some of the severe injury symptoms. People with problem fields should assess them thoroughly now and set up appropriate yield evaluations for the fall harvest. CIBA has been walking a lot of fields and hopes to have some answers by early fall as to what impact this situation will have on fall and spring management practices and the future of Exceed use in Minnesota.

*Jeffrey L. Gunsolus
Extension Agronomist - Weed Science.*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Plant Identifications

This is the time of year that Dial U staffers are busy identifying plant samples. Here are a few we've seen recently:

Red-berried elder or "scarlet elderberry" has clusters of attractive small red berries now. People want to know what they can make with them. Unfortunately, the scarlet elder is not considered edible, though it is a source of food for wildlife. American elderberry, also known as "common elderberry" is the one that's used for jelly, syrup and wine. It has clusters of tiny purple-black berries, but they aren't ripe until August or September.

This year, as in years past, we've gotten hydrangeas that don't bloom properly. They have clusters of little nubbin-like flowers, minus the "petals" (bracts, actually) that make them showy. Though we're not positive what causes this, they never flower normally. It's probably best to buy hydrangeas in bloom, so you know their flower type is true to form.

We're starting to see dodder coming in, attached to impatiens and other annuals. We've seen it in the past on raspberries, as well. Dodder is a parasitic plant that looks like pale, ghostly spaghetti strands covering the host/victim plant. It's an annual, growing from seeds, but once it attaches to a host plant it severs any connection with the soil and lives strictly off the plant.

All you can do is pull up the whole mess, then follow up with a pre-emergent herbicide in the area the following spring, to prevent any seeds the dodder may have produced from sprouting and continuing the cycle.

We've also seen several samples of common buckthorn, a small tree or large shrub that's popping up and becoming a nuisance in the wild. Its small berries (green now, but blue-black in autumn) are eaten by birds; seed is scattered far and wide in their droppings. The leaves look a little like apple leaves. People always want to make something edible with the ripe fruit, but they are never to be eaten in any form. They'll make you miserably sick.

If you want to submit a sample to Dial U for identification, send it flat between paper towels, along with a note telling where and how the plant grows, its size, etc. Be sure to enclose a check made out to the university for \$2.99, and a phone number or address where we may reach you. Dial U's address is 155 Alderman Hall, University of Minnesota, 1970 Folwell Ave., St. Paul, MN 55108.

*Deborah L Brown
Extension Horticulturist*

Winged Ants and Pear Slug Larvae

There have been numerous sightings of large numbers of **winged ants**. Winged ants are the new queens and males produced by a mature colony. They swarm out of the nest to mate; then the queens fly off to start their own nests. Different species swarm at different times of the year. Last week we identified winged pavement ants, cornfield ants, and field ants. While pavement ants are at the end of their normal swarming time (May through July), we can continue to expect cornfield ants and field ant swarmers (July through

September). All three of the above species nest in soil and are capable of nesting under objects, including concrete slab construction of homes.

When you see a swarm, it means the nest is nearby. Swarms are harmless and usually last for only a few days. When you find one outdoors, you can just ignore it. Although they do not injure people or damage property, they are a nuisance when found indoors. When you find these particular species swarming in your home, the nest is probably in the soil under the house. A crack in the concrete allows the swarm to come into the interior of your home. You can use an aerosol, ready-to-use can of insecticide that is labelled for flying insects to kill large numbers of winged ants, or you can simply vacuum them. It is not practical to eliminate the nest when it is in the soil under your home. An exception would be if you find a consistent number of worker ants that you can bait. (See FO-1066, *What To Do About Household Ants.*)

Pear slug larvae are slug-like, dark-colored insects that typically feed on the leaves of fruit trees, including cherry, plum, pear, and chokecherry, as well as other deciduous trees and shrubs, such as mountain ash and cotoneaster. Despite their appearance, these insects are sawflies which turn into wasp-like adults. As the larvae feed, they chew the upper leaf layer, leaving the veins, causing window paning damage. Eventually these damaged areas turn brown. Pear slugs have two generations a year. The first, from early June through July, is just finishing. A second generation appears in August.

One step in sawfly management is to check the size of the larvae. Pear slug larvae are about 1/2 inch long when fully grown. When they are that size, they are finishing or finished with their feeding and it is best to leave them alone (it doesn't help the plant to treat the insects at that stage). If the larvae are 1/4 inch in size or less, it is worth while for the plant to treat the insects. Also consider the condition of the plant. Healthy, well established deciduous trees and shrubs do not suffer any long-term injury from sawfly feeding, although their appearance can be affected.

If someone wants to treat the second generation this year, they should examine their plants regularly, starting in August and treat as soon as young pear slugs are detected. There are many insecticidal options to kill them including acephate (Orthene), carbaryl (Sevin), diazinon, malathion, and insecticidal soap. (See FO-6703, *Sawflies of Trees and Shrubs.*)

Newly revised publication *Are They Wasps or Bees?*, FO-3732, has been retitled ***Wasp and Bee Control*** and has been completely revised, including some new photos and figures. This publication discusses identification, biology, stings, control of nests, and wasp activities during fall. Wasp season is just around the corner. Be sure to have enough copies on hands (please discard all old 1989 copies).

Jeffrey D. Hahn
Asst. Extension Entomologist

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CROP**NEWS**

From the
Crops System Team
of the
Minnesota Extension Service

**Vegetables****Cabbage/Cole Crops**

So far, this has been a mild year for insect pest problems on cole crops, with only limited numbers of imported cabbageworm and diamondback moth present. However, this is the week that CABBAGE LOOPER populations begin to increase and growers should watch their crops closely. Over the past 3 years, looper moths and egg-lay increased dramatically between July 20-25th in southern Minnesota. As with many of our other economic pests, the cabbage looper migrates into our state each year. We monitor looper pheromone traps to track the annual migration and will provide updates via this newsletter if and when significant populations develop. Of these 3 major pests, cabbage looper is the most difficult to control. The *Bacillus thuringiensis* (Bt) products work well for ICW and DBM, but other products such as the pyrethroids are usually necessary to manage looper infestations. Refer to the *1996 Commercial Vegetable Pest Management Production Guide* (BU-1880) for details on labelled insecticides and thresholds. Becky Hines, M.S. graduate student, is presently conducting research to develop and validate treatment (action) thresholds for this pest complex on cabbage. This work is funded by the Agricultural Utilization Research Institute (AURI) and the Minnesota Department of Agriculture Biological Control Program.

Carrots/Aster Leafhopper

ALH populations remain high from Anoka to southern Minnesota (ranging from 10 to 100/100 sweeps. Dr. Ernie Banttari has also provided an updated estimate of the percentage of adults vectoring the aster

yellow mycoplasma, ranging from 4.6 to 6.6%. This estimate is based on ALH adults collected in southern Minnesota, and is 2X higher than our early-season estimate. If a field is averaging 50 ALH/100 sweeps and we assume an avg. infectivity rate of 5.6%, the aster yellows index (AYI) = $50 \times 5.6 = 280$, indicating all susceptible crops (lettuce, carrots) should be treated. See the *Vegetable Guide* regarding the AYI for treatment details.

Highlights....July 19, 1996**Vegetables***Cabbage/Cole Crops**Carrots/Aster Leafhopper**Onions/Onion Maggot**Sweet Corn/European Corn Borer***Alfalfa***Potato Leafhopper**Staples Dry Edible Bean Field Day**Phosphorus Management—Water Quality—**The Minnesota River***Dial U***Horticulture Notes**Entomology Notes**Earwigs**Deer in Your Garden?*

Vetables/Continued

Onions/Onion Maggot

This has also been a light year for onion maggot in southern Minnesota, with no control failures reported, and maximum infestations of 3% in one field. With some of the heat however, growers should check their fields for onion thrips. The treatment threshold is 7 thrips/plant; see the Veg. Guide for details on labelled insecticides.

Sweet Corn/European Corn Borer

For most southern Minnesota sites, the 1st generation flight is finally over; most larvae (in those rare fields that have not been treated) are now 4th instars with 5th (last) instars common and a few pupae. Treatments that I have observed to date, have provided effective control. Now is the time to re-check your budgets and get ready for the 2nd generation flight, beginning as early as July 25th in southern Minnesota. My colleague, Dennis Calvin, Penn State University, is collaborating this year, by providing state maps showing an ECB model forecast for the timing of the 2nd generation flight (start = 5%, peak = 50%, etc.). We now have 5 of these color maps posted on our VegEdge

site on the WWW internet. The URL address directly to these maps is:

<http://www.mes.umn.edu/~vegipm/ecbmap/forecast.htm>

In the near future we hope to have an updated map for Minnesota, based on recent ECB larval instar data and current 1996 temperatures for the state, as well as maps for Wisconsin and Illinois.

Please Note: sweet corn processors/growers in west central Minn. (e.g., Olivia, Cosmos, Glencoe, etc.) should be very aware to the possibility (again) this year of continued ECB moth flights throughout July, and therefore the need to continue to scout fields for ECB activity. See Ken Ostlie's article (MN Crop News, July 3rd issue) and graph of ECB trap catches for Olivia (provided by Dan Palmer, DeKalb), where it is quite apparent we likely have a univoltine (1-gen. per year) ECB strain that emerges in July....on top of the usual bivoltine (2 generations/yr) ECB strain.

*Bill Hutchison
Extension Entomologist*

Alfalfa

Potato Leafhopper

PLH populations are finally becoming more consistent over southern Minnesota, and are present on much of the 3rd crop alfalfa. Fields with more than 2 adult PLH/sweep and/or the presence of PLH nymphs should be treated with a registered insecticide. New seedings of alfalfa should also be checked carefully for PLH activity. All materials labelled for PLH control on alfalfa are effective at the low to mid-rate range; however malathion and Sevin (carbaryl) do not provide as

long of residual control (especially for nymphs) as other insecticides. Treatments should be limited to fields that are still 6" to 12" in height. Only one application should be necessary (at this time of year) for either an established stand or a new stand of seedling alfalfa.

*Bill Hutchison
Extension Entomologist*

Staples Dry Edible Bean - August 15, 10:00-2:00 p.m.

The Staples Dry Edible Bean Field Day will be held Thursday August 15 at the Central Lakes Ag. Center (Staples Irrigation Center), County Road 2 & Airport Road, Staples, MN from 10:00 - 2:00 p.m. The field day will concentrate on the present projects at the Ag. Center. Research, extension and industry personnel will give presentations at field stops and be available for questions concerning dry bean production. The day is a cooperative effort of the University of Minnesota Agricultural Experiment Station, Minnesota Extension Service and the Dry Edible Bean Industry. For more information contact the Central Lakes Ag. Center at 218-894-1053.

*Richard A. Meronuck
Extension Plant Pathologist*

PHOSPHORUS MANAGEMENT—WATER QUALITY— THE MINNESOTA RIVER

For several months, the quality of water in the Minnesota River and surface waters in general has been a major concern for some. The majority of the discussion is focused on phosphorus and the impact of the use of phosphate in agriculture on the quality of these waters.

The effect of phosphorus on water quality has been researched for some time. Likewise, various research projects have identified management practices that can be used in crop production which will substantially reduce the movement of this essential plant nutrient from the landscape to surface waters. A brief summary of the important practices follows.

1) Erosion Control

The majority of the phosphorus that leaves the landscape is attached to soil particles. Various measurements have shown that 75% to 90% of the total phosphorus lost is attached to soil particles. Therefore, management practices that reduce soil erosion will reduce the loss of phosphorus from the landscape. Planting systems (ridge-till, no-till) which leave crop residues on the soil surface have a major impact on preventing movement of phosphorus.

2) Banded Application of Phosphate Fertilizer

When phosphorus fertilizers are broadcast and incorporated before planting, the phosphorus is mixed with the surface soil. If erosion occurs, there is a higher probability that this nutrient will leave the landscape. With a banded application, however, phosphorus is placed in a small zone below the soil surface. The probability of loss from this placement is low.

Various researchers have compared the effect of phosphorus placement on loss. As might be expected,

losses were reduced substantially when the banded placement was used.

Today, there are several options for banding fertilizers. These options can usually be incorporated into the tillage system chosen by individual farmers. The banding of phosphate fertilizers has economical as well as environmental benefits.

3) Matching Phosphate Use to Soil Test

The application of phosphate fertilizers to soils that already have a high or very high soil test for P is not a good management practice. This practice does not result in added yield and is, therefore, not economical. This practice simply adds to the amount of phosphorus that is subject to loss from erosion and can lead to a reduction in the quality of surface waters. Soil testing is a management practice that can be easily adapted to reduce phosphorus losses.

4) Attention to Manure Management

Substantial amounts of phosphorus can be added to the soil system through manure application. Management practices that are appropriate for fertilizer application also apply to manure use. Loss of phosphorus can be reduced if this material is banded below the soil surface. As with use of fertilizer phosphorus, application of manure should be adjusted for the soil test values.

These management practices are not new. They have been used by many Minnesota farmers for several years. The research base used in the development of these management practices is extensive and solid. The challenge in the near future is to apply these practices, as appropriate, to farming enterprises.

*George Rehm
Extension Soil Scientist*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Horticulture Notes

Some parts of the state—including the metro area—have been pretty dry lately and many plants are starting to look a little worse for the wear.

Kentucky bluegrass lawns are going dormant wherever they're not regularly watered. Most will come back fine, provided they've not been pampered with lots of water and fertilizer up to this point. It's a good idea to "syringe" or water lightly every so often, just to keep the roots from totally dehydrating. Don't water heavily enough to bring grass out of dormancy, however, unless you intend to keep up the watering so it will stay green. Repeatedly bringing the grass back from dormancy uses energy reserves in the roots; eventually the plants just run out of reserves.

Check containers and hanging baskets twice daily; they can dry very rapidly in hot, windy weather. Flowering annuals and perennials should have developed enough roots to keep them going several days, even in heat, but it's a good idea to put some mulch over the soil to help keep it cool and conserve moisture. The same holds true for vegetable gardens.

An uneven supply of water (very dry to suddenly very moist, then very dry again) results in knobby potatoes, bitter and/or misshapen cucumbers, and blossom end rot on tomatoes (and sometimes on peppers and vine crops, too).

Try to water early in the day when temps are lowest and it's less windy. More moisture will reach the soil rather than evaporate into the atmosphere. You can even set your sprinklers to go off before sunrise, knowing that plants—grass, included—will dry rapidly once the sun is out.

*Deborah Brown
Extension Horticulturist*

Entomology Notes

We have had several calls from home gardeners about large numbers of **grasshoppers**. They feed on all types of plants and can be severe defoliators when numerous. They are also known to chew siding and window screens. Management of grasshoppers is difficult. Even if you eliminate them in your yard and garden, grasshoppers are mobile and will reenter your property from adjacent areas. If you attempt to treat them, try carbaryl (Sevin), acephate (Orthene), malathion, or diazinon.

We have received several reports from central Minnesota of high numbers of **gregarious oak leafminers**, *Cameraria cincinnatiella* (Gracillariidae). This insect is a type of blotch leafmining moth. They infest different oaks, particularly white and bur oak. They typically form several mines per leaf with more than one individual per mine. On a bur oak sample we received, we counted 12 mines and over 40 individuals on one leaf. Injured areas eventually turn brown. Feeding can be severe and leaves can drop prematurely. Despite the tree's appearance, its health is not substantially harmed. These insects overwinter as pupae in leaves on the ground so raking can help to reduce the number of leafminers. Insecticide sprays normally are not needed. If it is necessary to protect a conspicuous oak in the landscape, apply a treatment of acephate (Orthene) or dimethoate (Cygon) when the larvae are first active in the leaves. Several generations are reported to occur each year.

Earwigs

Earwigs are noticeable now. You can recognize these 3/4 inch long insects by their beetle-like appearance, short wings and reddish-brown color. They also have forceps-like cerci at the tip of their abdomens which

can give you a mild pinch if handled carelessly. Earwigs are generally uncommon in Minnesota, but they can be abundant in isolated sites. Every year we seem to get more calls about them. Earwigs have the potential to damage garden plants, although we have not received calls about that over the last few years. People are usually concerned about them when they are found indoors. To help prevent earwigs from entering homes, caulk and repair spaces and cracks. Also clean up debris around the house which may provide harborage, such as firewood, stones, and lumber. Physically remove earwigs found inside. There is no practical control to prevent earwigs from entering your yard.

Jeffrey Hahn
Assistant Extension Entomologist

Deer in Your Garden?

Taste and odor repellents can help keep deer from eating plants in your garden when fencing is not practical or desirable. When choosing among the brands available at your local garden center, consider the following: Can the repellent be applied safely to garden vegetables you intend to eat? Is the repellent harmful if accidentally ingested by a child? Will the repellent cause damage to the plant? How often does the repellent need to be applied?

Home remedies can be effective as well. Some people place or hang bars of soap around the garden; other folks spread human hair on the ground or hang it mesh bags. You may need to try a number of repellents before determining which works best for you.

Alice Doolittle
Wildlife Technician

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CROP

NEWS

UNIVERSITY OF MINNESOTA
From the
Crops System Team
of the
Minnesota Extension Service

Zinc Deficiency Symptoms in 1996

Compared to recent years, zinc deficiency symptoms are appearing in more corn fields in 1996. When plants are zinc deficient, they fail to develop normally and certain characteristic deficiency symptoms will usually appear. With corn, symptoms usually appear in the first two or three weeks of the growing season. Depending on the severity of the problem, these symptoms may or may not last throughout the growing season.

A deficiency of zinc in corn is characterized by the development of broad bands of striped tissue on each side of the midrib. These stripes begin on the part of the leaf closest to the stalks and appear first in the top of the plant. A zinc deficient corn plant also appears to be stunted.

Corn and edible beans are the only agronomic crops grown in Minnesota that have responded to zinc fertilization. Suggestions for use of zinc in a fertilizer program are summarized in the following table. Since zinc fertilization is not required for all crops in a rotation the application of this nutrient in a starter fertilizer is suggested for both corn and edible bean production.

Zinc recommendations for corn and edible bean production in Minnesota.

Soil Test* For Zinc	Method of Application	
	Starter	or Broadcast
ppm	----- Zinc to apply (lb./acre) -----	
0.0 - 0.25	2	10
0.26 - 0.50	2	10
0.51 - 0.75	1	5
0.76 - 1.00	0	0
1.10+	0	0

*Zinc extracted by the DTPA procedure.

The DTPA soil test for zinc is an excellent measure of the zinc status of soils. An analysis for zinc should be requested for soil samples whenever plant symptoms indicate that the supply of zinc from the soil might not be adequate.

Attempts to correct zinc deficiencies of corn which appear during the growing season have not been successful. There are several sources of this nutrient that can be applied before planting. Some sources, such as zinc sulfate can be easily blended with other dry fertilizer materials. For those who use liquid fertilizers, there are also inexpensive materials that can be mixed with the common fluid materials.

The exact role of zinc for plant growth is not known. It is involved in several of the plant's metabolic processes. It is needed in small amounts for optimum growth. If deficient in soils, there can be a substantial reduction in yield. Use the soil test for zinc if the zinc status of fields is in doubt.

*George Rehm
Extension Soil Scientist*

Highlights.....July 12, 1996

Zinc Deficiency Symptoms in 1996

Corn Borer

Vegetables

Corn/European Corn Borer

Vegetable IPM Field Day

Corn Leaf Disease Alert!

Dial U

Septoria Leaf Spot

Change Your Approach to Lawn Care

Corn Borer

The moth flight has essentially ended in southern Minnesota but moth activity is picking up in west central and northwest Minnesota. Cooler weather is slightly prolonging the treatment window but most locations will be past the treatment point in southern Minnesota by this weekend. Age of the infestation in a field and often borer abundance reflects its relative planting date. Older corn generally has older borers and more of them. While it may be too late to treat older fields it's still possible that younger corn has infestations that could still be controlled. This pattern is illustrated by a date of planting study at Lamberton and Waseca taken on July 2 and 9, respectively.

Relative Planting Date	Lamberton Mean stage	#/plant	Waseca Mean stage	#/plant
Early	2.0	1.90	2.6	1.53
Middle	1.8	1.55	2.4	1.05
Late	1.5	0.44	2.1	0.21

Product availability has become a real issue, especially with Pounce and other granules, and even with the liquid pyrethroids, such as Warrior, Pounce and Ambush. The search for alternatives is on as the treatment window closes. When looking for alternatives, keep the following relative performance trends in mind:

- > Lorsban and Dyfonate II granules offer slightly less control (ca. 10% less) than Pounce granules. For a lower cost, liquids such as Warrior, Pounce, Ambush and Penncap-M offer comparable or slightly better performance.
- > Liquids such as Furadan, Lorsban, Sevin XLR,

diazinon, and Asana offer significantly less control (ca. 25-40% less) than Pounce granules.

While granules are slightly preferred to liquids, reregistration and special reviews have diminished granular options. Corn borer has been dropped from the labels of several granules in recent years: Diazinon, Furadan, Thimet/Phorate, and Counter. Desperation for granular products has led to illegal applications. Already I've heard of foliar applications of Force and Counter, which are strictly off label (but must be incorporated into the soil, which is doubtful given current corn development). Various adjuvants (e.g. silicon spreader stickers) have been advocated with no performance data to verify that they actually enhance performance. For example, a trial near Crookston last year indicated that silicon did not improve corn borer control by liquids (e.g., Pounce) at all.

Corn borer in west central and northwest Minnesota can pose some unique challenges. Last week I covered the overlapping flights of two strains in west central Minnesota. Crop development also plays an interesting role. Corn in these areas is generally closer to tasseling when corn borer infestations occur. Later timing of attack has two ramifications. First, the use of leaf injury ("shotholing") as an index of infestations breaks down. Few leaves unfurl after infestation and larvae move into lower leaf axils. If fields are near tasseling or have tasseled, I recommend counting larvae on the whole plant. Second, performance of insecticides is slightly reduced. Expect about 70% control compared to 80% or above for whorl stage corn.

*Ken Ostlie
Extension Entomologist*

Vegetables

Corn/European Corn Borer

Infestations are rather predictable in most of southern Minnesota, with the magnitude of infestation highly correlated with corn height (therefore attractiveness for egg-lay) during this recent ECB flight. For example, Eric Burkness (Graduate Student and DowElanco summer intern), on July 10th just south of Rosemount, found 10% ECB larval infestations in knee-high corn, 40% in waist-high corn and 90% in 5 ft corn. Although moth catches have finally subsided in most southeastern and southcentral locations of Minn. (e.g., 10-25 moths/night), the southwest continues to show high levels of activity. For example, near Jeffers, our MDA trap averaged 377/night (max. of 1,092 on July 6th). One exception for southcentral MN was the Owatonna area where the trap was still averaging 95 moths/night. As mentioned earlier, this information is available every Wednesday afternoon on the IPM VegEdge page on the World Wide Web (Internet) at <http://www.mes.umn.edu/~vegipm/>

The cool weather this week allowed everyone to buy some time. There is still time to treat sweet corn. Any early tassel (green tassel just visible within the whorl) corn showing live ECB larvae should be checked closely and treated (see last week's newsletter for details on thresholds and efficacy of labelled materials).

*Bill Hutchison
Extension Entomologist*

Vegetable IPM Field Day

A new field day and annual Minnesota Fruit and Vegetable Grower Picnic will be held this Sunday afternoon from 2-5 pm at Bob and Bonnie Dehn's farm in Anoka Co. (near Andover). All growers and consultants interested in all aspects of vegetable production are invited. The emphasis of this field day will be on demonstration plots of carrot and sweet corn research, with aster leafhopper and European corn borer, respectively. The carrot/aster leafhopper project consists of several objectives,

including: development of an easy-to-use sampling plan for ALH; development of a more rapid assay to determine the percentage of ALH that are vectoring the aster yellows virus-like mycoplasma; a comparison of conventional and organic-transitional production systems; and the impact of aster yellows infection on yield and quality. Bill Hutchison, cooperators and students working on the project will present an overview and provide demonstrations on how to sample leafhoppers. Mr. Richard Gagne with the Minn. Dept. of Agric. Biocontrol program will present an overview and results of his work with releasing *Trichogramma* parasitic wasps for control of Euro-

pean corn borer in sweet corn. He will also demonstrate the use of a new sprayer for applying *T. brassicae* wasps in sweet corn field.

Although these projects will be emphasized, growers are encouraged to come with any questions related to IPM in vegetables. The field day is co-sponsored by the MFVGA, the Minnesota Extension Service, the Pesticide Reduction Options (PRO) program of the Agricultural Utilization Research Institute (AURI) and the Minn. Dept. of Agric. Sustainable Agric. Program.

*Bill Hutchison
Extension Entomologist*

Corn Leaf Disease Alert!

The fungus that causes Anthracnose has been identified on corn in Minnesota. This disease is favored by warm, humid cloudy days. The fungus survives best in corn residue left on the soil surface. Corn on corn is where to look for this disease. Symptoms of Anthracnose leaf blight are variable depending on the host resistance, leaf age and the environment. A small round to oval water-soaked spot appears first, the lesion or spot may be on any part of the leaf. The semitransparent spot enlarges upto 1/2 inch and becomes tan in the center with red, reddish-brown or yellow orange borders. The individual spots can enlarge blighting the whole leaf. The leaf symptom is most common on young leaves early in the season

and on the upper leaves in the late season. These infected leaves can wither and die rapidly. The fungus *Colletotrichum graminicola* produces a dark brown structure-acervuli in the host tissue that looks like a small speck scattered in the infected tissue. This spore producing structure can have long dark brown setae (hair like) projections. This can be seen with a hand lens. Resistant plants have smaller lesions or just a yellow spot.

*Ward C. Stienstra
Extension Plant Pathologist*

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About the time those first few tomatoes are beginning to form, a fungal disease called septoria leaf spot begins to infect the lower leaves of tomato plants. If conditions are right, the disease will spread up the plant and kill all the leaves and stems. Prevent losses now by avoiding overhead irrigation. If this is the only way you can water, water early in the day so the plants dry quickly. Remove any infected leaves and apply a registered fungicide such as chlorothalonil.

*Chad Behrendt
Plant Pathologist*

While the arrival of true summer weather is good news for vegetable gardeners and sweet corn-lovers, it does signal a change in approach to lawn care.

To begin with, abandon herbicide use on lawn weeds until late summer or early next autumn when temperatures are consistently cooler again. (You can still spot

treat individual weeds such as thistle or poison ivy, but be sure it's not windy and temperatures are no higher than the low to mid-80's.)

Set your lawnmower higher than it was in spring and autumn. Taller grass blades help shade the crowns of the plants, keeping them cooler and more moist. Continue to mow whenever the grass is one third taller than what you'll cut it back to. There's no need to catch and remove your clippings.

Plan to supplement rainfall with thorough watering to keep grass green and competitive all summer. You can tell the lawn needs to be watered when walking on it leaves "footprints" that don't spring right back. Water early in the morning when temperatures are coolest and there's typically less wind. Watering in the heat of the day is fine for the grass, but lots of water is lost through evaporation before it ever reaches the soil.

*Deborah Brown
Extension Horticulturist*

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CROP

NEWS

From the
Crops System Team
of the
Minnesota Extension Service

Corn Borer Decision Point in Southern Minnesota

Scout Now and Make Your Treatment Decision by July 10!!!

Hot weather over the last week is rapidly driving corn borer development. The moth flight peaked last week. With the appearance of third stage larvae and a forecast for continued hot weather, the window for insecticide application will close within a week for most areas of southern Minnesota.

What's the status of corn borer infestations? Here's a sampler of corn borer infestations reported across southern Minnesota by crop consultants and agronomists:

Area	Source	Plants with Leaf Injury	Borers per Infested Plant
Chatfield	Ken Ostlie	45% (20-70%)	1.8 (0-8)
Rosemount	Ken Ostlie	65% (20-95%)	3.3 (0-8)

Nearly all contacts within the last few days report larvae predominantly first and second stage with some thirds present. Moths are still active in most areas so additional egg laying will occur. This mixture raises a critical questions about timing insecticide applications, especially in areas that experienced an extended moth flight last summer or where application delays may occur.

What's the best timing for an insecticide application? Imagine the corn borer infestation in the whorl as coffee pouring into a cup. We're interested in a full cup but don't want to spill. The best time to stop the server who's pouring the cup is just before it begins to overflow. Similarly, the best time to apply insecticide is just before larvae leave the whorl to tunnel into the stalk. Midrib tunneling and classic "shotholing"—a row of holes across the leaf—indicate tunneling behavior of third stage larvae is beginning and movement into stalk tunnels will occur shortly. These third stage larvae, however, can be killed with insecticide with prompt application.

When is it too late to treat? If tunneling by some older larvae is observed, don't automatically assume it's too late to treat. While insecticide won't kill larvae that are tunneling in the stalk, the critical question remains, "Is it worth controlling the larvae still left in the whorl?" As with the coffee cup analogy above, it still may be worth buying the cup of coffee, even though coffee has spilled on the table cloth. Remember: The insecticide decision process uses counts of live larvae in the whorl. As long as enough live larvae remain in the whorl to justify treatment, it's worth proceeding..... even if some larvae have tunneled. For example a 1994 application against a corn borer population with 42% third and 12% fourth stage larvae (4% of larvae were already tunneling) still provided a 67% reduction in tunnel number.

Be wary when making late applications, especially if there's a significant application delay, such as poor weather or long waiting lists. Eventually too few larvae remain in the whorl. If more than a 3-day delay is anticipated, re-check the field just before application to ensure sufficient borers remain to justify treatment. Remember, the time to treat is now.

Highlights....July 3, 1996

Corn Borer Decision Point in Southern Minnesota

Insect Activity in the Red River Valley Alfalfa

Potato Leafhoppers Finally Arrive Vegetables

Tissue Nitrate Analysis for Vegetable Crops

Good Time to Update Grain Systems

Puma Receives Section 18 Label in Minnesota

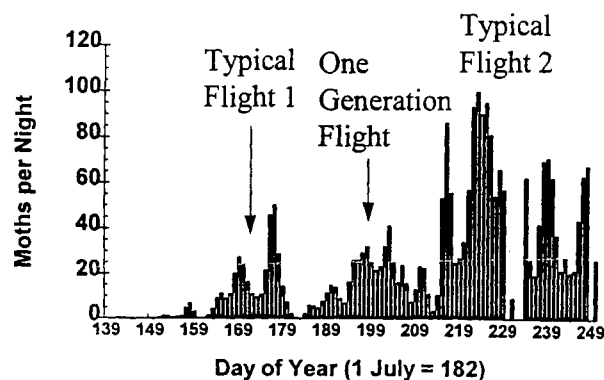
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Entomology Notes

Corn Borers in Southern MN/Continued

What about an extended moth flight? As illustrated in the following figure, extended moth flights have been observed as far south as Olivia (data supplied by Dan Palmer, DeKalb). A prolonged moth flight probably indicates a mixture of two different moth "strains" or biotypes. The original corn borers colonizing Minnesota had one generation per year, while a subsequent invasion brought a mul-

1995 Corn Borer Moth Flight Olivia, MN



iple generation form that typically had two generations. The multiple generation form predominates throughout much of Minnesota whereas in WC and NW Minnesota the two biotypes may coexist. These two biotypes emerge at different times (ca. 2 weeks apart) and prolonged larval hatch can really complicate insecticide application decisions. According to Dan Palmer's estimates, the one-generation biotype should begin emerging at about 915 degree days (base 50°F).

Uncertainty reigns whenever we're facing something new. With limited information, I can only offer these general guidelines.

1. With flights peaking about 300 degree days apart, there's enough spread in larval development from these biotypes that no single insecticide application can offer effective control. (No product has "residual" of that magnitude).
2. Scout each moth flight separately and make independent insecticide application decisions. Remember: Insecticide decisions are based on whether or not effective control of the larvae currently in the field is economical.
3. No comparative information on the egg laying preferences of these biotypes exists. For example, I don't know if earlier-planted fields will also bare the brunt of infestations from the one-generation borers. I'd appreciate reader impressions and we'll keep you posted on moth flights.

Ken Ostlie

Extension Entomologist

Insect Activity in the Red River Valley

Orange Wheat Blossom Midge—Wheat midge emergence is underway in NW Minnesota and has coincided with heading on the earliest seeded wheat. This insect has the potential to be very damaging to wheat in years when seeding has been delayed. Monitoring for wheat midge should begin as soon as wheat heads begin to emerge from the boot and continue until 50% of the plants in the field have flowered (a head has flowered as soon as you see any evidence of anthers). Monitoring must be conducted in the evening, ideally just as the sun is setting. Action levels for control are when you observe 1 adult midge per 7 to 8 wheat heads. Lorsban 4E-SG is labeled for wheat midge control in Minnesota and North Dakota and is the preferred insecticide.

Questions have been raised about the efficacy of Lorsban for aphid control in small grains, and whether or not a tank mix of Lorsban and other insecticides is needed if you are trying to control wheat midge and aphids in the same field. Data from aphid control trials (Table 1) conducted in 1992 and 1993 show that Lorsban is an superior aphicide and tank mixes of are not needed.

Grasshoppers—In the past two weeks there have been reports of grasshopper damage to the edges of sugarbeet and canola fields. As tiny grasshopper nymphs move from emergence sites such as roadsides, pastures or CRP they can quickly defoliate small plants and cause stand loss. Action levels (Table 2) for grasshopper control are the same across the United States and should be used to evaluate the potential for crop damage.

Table 1. Efficacy of PennCap and Lorsban 4E-SG for aphid control in wheat.

Crookston, MN 1992			
	Rate (lb IA/acre)	Aphids (#/head)	Yield (bu/acre)
PennCap	0.25	4.1	37.3
Lorsban 4E-SG	0.5	2.8	37.8
LSD (p=0.05)		6.2	5.1
Mahnomens, MN 1993			
	Rate (lb IA/acre)	Aphids (#/head)	Yield (bu/acre)
PennCap	0.5	17	49.0
Lorsban 4E-SG	0.5	25	47.0
LSD (p=0.05)		33	8.2

Table 2. Grasshopper nymph and adult ratings based on numbers/square yard.

Rating	Nymphs per square yard		Adults per square yard	
	Margin	Field	Margin	Field
Light	25-35	15-25	10-20	3-7
Threatening	50-75	30-45	21-40	8-14
Severe	100-150	60-90	41-80	15-28
Very Severe	200+	120	80	29

If you haven't tried to count grasshoppers before, you might ask how do you estimate grasshopper numbers in a square yard as they all hop in different directions? It is actually easier than you might think if you break the square

yard into square foot counts. For example as you walk through infested areas on a regular basis (lets say every 10th step) count the number of grasshoppers that jump or move in the one square foot area where you place your foot. After nine observations you total the numbers for your square foot estimate. Just remember that everything that jumps in fields isn't a grasshopper! Grasshopper control is generally necessary when counts reach the threatening level. However, these action levels are only guidelines and they should be modified depending on crop condition and crop value.

Insecticide trials conducted by Dave Noetzel in 1989 (Table 3) show there are several highly effective insecticides available for grasshopper control.

Table 3. Grasshopper Control Stevens County 1989

Insecticide	Dosage in lbs ai/acre	Average % control at day		
		2	7	22
Lorban 4E	0.5	100	100	97.4
Asana XL .66E	0.02	99.5	99.5	90.7
Furadan 4F	0.25	99.5	100	97.7
Sevin XLR 4F	1.0	93	97.1	93.5
Malathion 5E	1.0	87.6	94.7	91.8

Cereal Aphids—Low numbers of cereal aphids are present in wheat and barley fields in NW Minnesota. Hot temperatures and abundant predators, particularly ladybird beetles, suggest aphids will probably remain at non-economic levels this season.

Carlyle Holen
IPM Specialist NW
Jochum J. Wiersma
Small Grains Specialist

Alfalfa

Potato Leafhoppers Finally Arrive—PLH adults finally arrived in Dakota Co., with high infestations recorded in alfalfa and potatoes. PLH counts averaged 9/100 sweeps in alfalfa just south of Faribault, July 2, 1996. Review last week's *MN Crop News* for details on PLH thresholds. For established stands, the thresholds range from 0.5 to 2.0 PLH/sweep, for crop heights ranging from 5 to 12". Given their late arrival this year, most of the 2nd crop in southern Minnesota should escape significant damage. However, re-

growth of the 3rd crop should be checked closely; more of our 3rd crop acreage may need treatment this year. All labelled insecticides for PLH are effective. However, malathion and Sevin (carbaryl) provide little residual activity, which is important for controlling young nymphs as they hatch from eggs laid in alfalfa stems.

Bill Hutchison
Extension Entomologist

Vegetables

Sweet Corn, Snap Beans and Peppers—ALERT—(TREAT ECB NOW, THEN Enjoy July 4th Holiday)

European corn borer (ECB) egg and larval infestations are now showing up in much of southern Minnesota with infestations ranging from 10-50% of the plants infested (field and sweet corn) with varying numbers of live larvae per plant. Although field corn growers may still have some time before making a treatment decision, sweet corn and snap beans should be treated now, depending on the variety and crop growth stage. Because of the holiday this week, we will not be able to provide all of the light trap catch info for the state. ECB moth catches declined in many areas this past week. However, the Owatonna (Clairmont) trap picked up 1,250 and 821 moths, on June 26 and 27th, respectively, indicating this flight isn't ready to quit. The ECB flight this year was already considered to be one of our historic highs, with numerous sites averaging over 200/night and Faribault reaching 400/night last week. Insecticide treatment will therefore be needed in many fields this week, and where flights continue to be strong, a second ECB treatment may be needed (sweet corn, snap beans, peppers). *NOTE: although corn is usually the most favored site for egg-lay, flowering snap beans and peppers in any given area will be attractive for egg-lay, particularly where tall corn (> 17" high) is limiting.* As indicated in the table at right,

most Minnesota locations range from 697 to 869 DDs, which indicates we should be close to 90% completion of the first generation flight (based on our 5-yr model, this occurs at approx. 780 DDs). Note this is most likely true only for southeastern, central and south-central Minnesota. Western Minnesota may continue to see an ECB flight throughout July and August, due to unusual ECB dynamics the past 3 years.

European Corn Borer Degree-Day Summary, Minnesota, as of July 1, 1996*

Alexandria - 734	Morris - 781
Caledonia - 795	Olivia - 842
Cambridge - 697	Rochester - 751
Faribault - 774	Rosemount - 845
Hutchinson - 789	St. Cloud - 747
La Crosse - 953	St. Paul - 869
Mankato - 831	Waseca - 817
Montevideo - 817	Winona - 789

*Provided by Dave Bartels.

Snap Beans: Despite very high natural mortality of ECB larvae in snap beans, all fields that are flowering or in the pin-bean stage (i.e., when pods are about 1" in length) should be treated. We have easily exceeded our current threshold (see the *1996 Commercial Vegetable Production Guide*,

Vegetables/Continued

BU-1880) of "15 moths/night for the first-generation flight." Of the currently labelled materials, use either Orthene 75S (0.75 to 1.00 lb AI/ac) or Penncap M (0.5 - 1.0 lb AI/ac). This is a year where 3 or more applications will likely be needed for both early and late planted beans. Although Orthene has a 14-day pre-harvest interval (PHI), many processors should still be able to get 2 sprays of Orthene applied before the PHI restriction, or one Orthene spray and 2 applications of Penncap M. Although Asana XL is still labelled for snap beans, the current labelled maximum rate (0.05 lb AI/ac) does not provide effective (economical) control of ECB (in snap beans or sweet corn). Note: Snap beans should also be checked this week for Potato Leafhopper (PLH); all labelled materials are effective on PLH, including those labelled for ECB.

Peppers: As with snap beans, consumers, and consequently growers, cannot tolerate even light infestations of ECB larvae or damage in fresh-market peppers. Also, once ECB larvae tunnel into the pepper (usually from the top near the stem), any insecticidal control is virtually worthless. Therefore, growers in nearly all areas of the southern Minnesota should be treating their plantings now, especially if the plants are flowering or in early fruit set stages. Of the labelled materials, Orthene, permethrin (Pounce or Ambush) and cyfluthrin (Baythroid 2EC) are recommended. Applications this year will likely be needed every 5-7 days during fruit set. Note: of these recommended materials, Orthene is the only option that is not a restricted use material. Also note the PHIs for each material, maximum labelled rates, etc. Peppers should also be monitored for potato leafhopper this week; all ECB materials will also be effective on PLH.

Sweet Corn: In contrast to snap beans and peppers, we have more flexibility regarding timing and effectiveness of insecticide applications on sweet corn. The following guidelines are based on recent research by one of my graduate students, Dave Bartels. Dave has found significant differences in ECB tolerance among commercially available hybrids, and by growth stage. Most of our work has been with Green Giant 'Code 5' (an early-season processing hybrid, but also representative of many fresh-market hybrids), and 'Jubilee' which continues to be one of the more popular full-season processing hybrids.

For fresh-market hybrids (and 'Code 5'), treatments should be initiated when only 4-5% of the plants are infested with one egg-mass/plant (or approx. 25 first-instars/plant) for all plant growth stages, to maintain the at-harvest ECB larval and/or contaminant level (including discolored kernels) to \leq 5% of ears damaged.

For 'Jubilee', which confers a higher level of resistance to ECB, we have found that growth-stage-specific thresholds can be used (see Table below). The best way to think of these thresholds is the upper limit, or maximum cumulative ECB infestation level that can be tolerated for a given growth stage. Treatments should be applied to ensure that infestations do not exceed these levels.

Growth Stage	ECB Treatment Thresholds (% Plants Infested with One Egg Mass or 25 1st-instars/Plant)
Early to Mid Whorl	25%
Late Whorl	20
Green (early) Tassel	5
Open Tassel	12
Silking	5

Additional notes on insecticide selection: Where comparable materials are available (e.g., Orthene vs. Penncap-M on snap beans), other variables to consider are pricing, PHI and re-entry times, etc. For sweet corn, we have 4 effective pyrethroids to choose from for ECB and corn earworm, including: Ambush (Zeneca) or Pounce (FMC) (permethrin), Baythroid (Miles) (cyfluthrin) and Warrior (Zeneca) (lambda-cyhalothrin). Each of these materials have performed well in most of our late-season ECB/sweet corn trials (however, I also have only one year of data for Baythroid), usually providing 95% or better control. Although we know the timing of the first spray is critical for overall efficacy, our late-season trials are usually treated 2-3 times (from silk to harvest). Unfortunately, I have data for only a few "whorl-stage" (1st generation ECB) trials in sweet corn. However, these trials have confirmed that one application of an effective pyrethroid is not usually adequate for sweet corn ear protection. Therefore, all fields that are sprayed for ECB should be checked in 5-7 days to document the level of control of the existing ECB infestation (e.g., mostly 1st and 2nd instars by now), and/or to assess the impact of the application on any new egg-lay that may still occur this week.

In response to growers and processors interested in the merits of Pounce vs. Warrior vs. Baythroid, for ECB control in *sweet corn*, I conducted a survey of Insecticide and Acaricide Tests (1992-1993) and Arthropod Management Tests (1994 - 1996), summarizing data over 5 years throughout the midwestern states (MN, WI, OH, and IN). An 'acceptable' trial for this analysis was based on standard ground-application methods, and the need to have at least 10-12 large larvae/25 ears in the untreated check plots. Results of this summary (Table below) for up to 12 trials, representing a wide range of infestation levels yield some interesting results. The primary result is that there are very

Regional Analysis of ECB Insecticide Performance, 1991 - 1995, Midwest USA*

Material	Rate Range	Avg. % ECB Control	Range(%)	# of Trials
Warrior 1E	0.02 lb AI/ac 0.025 " "	92.9% 96.7%	(77-100) (93-100)	12 8
Pounce 3.2E	0.15 lb AI/ac 0.20 " "	94.4% 95.4%	(82-100) (91-100)	9 6
Baythroid	0.03 -0.05 lb AI/ac	95.4	(86-100)	4

*Source: Insecticide & Acaricide Tests, Arthropod Management Tests (1992-1995), Entomol. Soc. of America.

few numerical differences in average % control between Warrior at 0.02 and Pounce at 0.15 lb AI/ac; the same is true when comparing avg. control for Warrior at 0.025 and Pounce at 0.20 lb AI/ac. Also, the range in control is less variable when using the high rate vs. the lower rate for each product.

Given these results, I would not anticipate finding statistical differences between the products. Although only 4 trials have been located to date, for Baythroid, I provide

these results for your information. Additional analyses of these data will continue. Because each material has similar restrictions for spraying near waterways (because of similar aquatic toxicity concerns, as with all pyrethroids), identical PHIs of 1 day (Pounce and Warrior), and similar re-entry levels of 12 hours (Pounce) and 24 hours (Warrior), the primary difference to consider is cost.

Bill Hutchison
Extension Entomologist

Tissue Nitrate Analysis for Vegetable Crops

Tissue nitrate analysis has proven to be a valuable tool to guide in-season applications of nitrogen. The tissue usually sampled for analysis is the petiole (stem portion of the leaf), although for some crops the leaf midrib is collected. Petiole analysis is especially recommended for scheduling nitrogen applications for overhead and drip irrigation and has been used extensively for potato production. Traditional petiole analysis is based on collecting petioles at defined stages of growth, sending the petioles to a plant analysis laboratory as soon as possible and then receiving results of the nitrate analysis within 48 hours. For most crops, the plant part to sample is the most recently mature leaf. All

leaf blade portions should be removed immediately and the petiole saved for analysis. For some crops such as cabbage, broccoli, cauliflower, and lettuce, the leaf midrib should be saved for analysis. Time of day can affect tissue nitrate concentrations. To reduce variability, it is recommended that tissue be sampled before noon.

Advances have also been made in quantitative determination of nitrate in petiole sap. Portable nitrate electrodes such as the Cardy meter and color test strips have been shown to be useful for determining nitrogen needs. The advantage of the sap test is that results can be obtained more quickly than with conventional dry weight analysis. The same tis-

Table 1. Sufficiency nitrate-N concentration ranges for petioles/midribs of selected vegetable crops on a dry weight and sap basis. Petioles/midribs should be collected from the most recently matured leaf.

Crop	Tissue sampled	Growth stage	Nitrate-N	
			dry weight %	sap ppm
Broccoli	Midrib	Buttoning	0.9 - 1.2	800 - 1100
Cabbage	Midrib	Heading	0.7 - 0.9	NA
Carrots	Petiole	Midgrowth 1/4" diameter shoulder	0.75 - 1.0	550 - 750
Cauliflower	Midrib	Buttoning	0.7 - 0.9	NA
Celery	Petiole	Midgrowth	0.7 - 0.9	500 - 700
Cucumbers	Petiole	First blossom	0.75 - 0.9	800 - 1000
		Early fruit set	0.5 - 0.75	600 - 800
		First harvest	0.4 - 0.5	400 - 600
Eggplant	Petiole	Initial fruit	NA	1200 - 1600
		First harvest	NA	1000 - 1200
Lettuce	Midrib	Early heading	0.7 - 1.2	400 - 600
		Preharvest	0.6 - 1.0	300 - 500
Muskmelon	Petiole	First blossom	1.2 - 1.4	1000 - 1200
		Initial fruit	0.8 - 1.0	800 - 1000
		First mature fruit	0.3 - 0.5	700 - 800
Peppers	Petiole	First flower	1.0 - 1.2	1400 - 1600
		Early fruit set	0.5 - 0.7	1200 - 1400
		Fruit 3/4 size	0.3 - 0.5	800 - 1000
Potatoes	Petiole	Vegetative	1.7 - 2.2	1300 - 1600
		Tuber bulking	1.1 - 1.5	800 - 1200
		Maturation	0.6 - 0.9	400 - 700
Tomatoes	Petiole	Early bloom	1.4 - 1.6	1000 - 1200
		Fruit 1" diameter	1.2 - 1.4	400 - 600
		Full ripe fruit	0.6 - 0.8	300 - 400
Watermelon	Petiole	Early fruit set	0.75 - 0.9	1000 - 1200
		Fruit 1/2 size	NA	800 - 1000
		First harvest	NA	600 - 800

NA = Not available.

Tissue Nitrate Analysis/Continued

sue is collected for sap analysis as for conventional petiole analysis. The difference is that instead of drying the tissue in a laboratory, the petioles are crushed to express the sap and then the sap is immediately analyzed for nitrate. Ideally, petioles should be processed immediately; however, if this is not possible, whole petioles can be stored in a plastic bag on ice in a cooler or in a refrigerator for up to 8 hours or at room temperature for up to two hours. Be sure that all leaf blade portions have been removed before storing.

Sap can be expressed with a garlic press or hydraulic sap press. Petioles can also be placed in a plastic bag and then crushed with a rolling pin to express the sap. Follow sap analysis instructions of the manufacturer. For the Cardy meter, sap generally does not need to be diluted. For other

portable electrodes or the color test strips, the sap needs to be diluted to obtain an accurate reading.

Most interpretations are on a nitrate-N basis. Nitrate concentrations usually decline as the crop matures and the season progresses. Therefore, interpretation is based on stage of growth. Nitrate-N concentrations on a dry weight or sap basis for selected crops are presented in Table 1. If nitrate-N concentrations fall below the sufficiency range, then fertigation with urea-ammonium nitrate is recommended. An application of up to 40 lb N/A can be made with overhead irrigation systems. Smaller (5 to 10 lb N/A) more frequent applications can be made with drip irrigation.

Carl Rosen

Extension Soil Scientist-Horticultural Crops

Good Time to Update Grain Systems

Grain producers who find themselves in a good financial position due to high commodity prices, farm bill changes, or other reasons, might want to invest some of their money in their grain drying, storage, and handling facilities. Other producers might want to make improvements, even if they have to borrow money, if their grain systems have been causing problems, or if late planting is likely to result in unusually wet grain this fall.

Many grain systems in the Upper Midwest are outdated and are suffering from:

- Inadequate grain handling capacity for unloading, transferring between bins or between bins and dryers, or loading trucks. Possible solutions include grain receiving pits, higher capacity conveyors, strategically placed holding bins, automatic controls, or better system layout.
- Inadequate drying capacity (not enough bushels dried per day). Ways to boost capacity include bigger dryers, additional dryers, changes in drying method, changes in cooling method, or installation of large wet holding bins (large enough to hold 1 to 2 days harvest).
- High labor requirements. Addition of automatic controls, high capacity conveyors, or holding bins, or changing drying methods can reduce labor requirements.
- High energy use per bushel for drying. New gas-fired dryers are much more energy efficient than older models, so replacing the dryer is one solution. Other possible solutions include changing the way the current dryer is operated, switching fuel sources, reclaiming exhaust heat, changing cooling methods, or changing drying methods.
- Poor grain quality (broken kernels, low test weight).

Damage caused by dryers can be reduced by reducing drying temperature, buying a newer dryer (newer ones are designed to give better grain quality), changing cooling methods, or changing drying method. Damage caused by conveyors can be reduced by repairing worn conveyors, reducing speed of augers, switching to more gentle conveyors, or changing system layout to reduce drop height and number of times grain is handled.

- Lack of high quality storage. Add new storage bins or upgrade existing bins with good aeration systems, grain distributors, and temperature monitors.
- Safety hazards. Replace missing shields, bury overhead powerlines that are near grain bins, and install safety cages and landings with bin ladders, or replace ladders with stairs.

The first step in making improvements is to analyze the current grain system to identify bottlenecks and problems. Then, try to identify likely future needs. At this point, it is helpful to visit some other grain systems and study grain system planning references to see what equipment is available and to get ideas for potential changes. The *Grain Drying, Handling, and Storage Handbook, MWPS-13* is an excellent planning reference and I encourage anyone who is considering grain system changes to get a copy. Copies are available from Terry Capaul in the Biosystems and Agricultural Engineering Department, (612) 625-7024.

Anyone who intends to make grain system changes this season needs to act quickly—contractors and equipment suppliers are unusually busy this year.

Bill Wilcke

Extension Engineer

Puma Receives Section 18 Label in Minnesota

Due to the continued shortage of postemergence grass herbicides for use in hard red spring wheat and durum, the Minnesota Department of Agriculture has issued a Section 18 label for Puma.

Puma contains fenoxaprop, which is the same active ingredient for grass control that is in Tiller, Cheyenne, and

Silverado. However, Puma contains a safener that provides excellent safety to wheat. Puma is not labeled for use in barley. Puma does not contain 2,4-D, MCPA, Harmony Extra or any other broadleaf herbicide.

Puma is formulated as a 1 lb/gallon active ingredient. Puma is labeled for both ground and aerial applications.

Puma can be applied from the 2-leaf to the 6-leaf stage of wheat. DO NOT apply after jointing due to the risk of crop injury. Puma will give good to excellent control of green and yellow foxtail, barnyardgrass, and wild oats that are in the 2-leaf to 2-tiller stage.

Apply Puma at 0.33 pt/A for green foxtail control, 0.44 pt/A for yellow foxtail control, and 0.66 pt/A for barnyardgrass and wild oat control.

Foxtail under drought stress that exhibit rolled leaves (onion leaves) should not be sprayed with Puma as reduced control will result.

Puma can be tank mixed with Furadan or Sevin insecticides. Do Not tank mix with malathion as wild oat control will be reduced.

Mancozeb, Tilt, Mertect, and Benlate fungicides can be tank mixed with Puma.

Puma at 0.33 pt/A can be tank mixed with Buctril at 1 pt/A, Buctril Gel at 4 packs/20 A, MCPA ester at 0.75 pt.A, Express at 1/6 oz/A, Harmony Extra at 0.30 oz/A, Banvel at 2 fl oz/A or Banvel SGF at 4 oz/A. MCPA ester at 0.5 to

0.75 pt/A may be included with the above tank mixes except Buctril and Buctril Gel.

Puma at 0.4pt/A can be tank mixed with MCPA ester, Tordon, Banvel and Banvel SGF at the same rates as listed above. MCPA at 0.5 - 0.75 pt/A can be included with the above tank mixes.

Puma at 0.66 pt/A can be tank mixed with Buctril, Buctril Gel and Tordon at the rates listed above.

DO NOT add herbicides at rates higher than allowed by the label as reduced grass will result. DO NOT add other herbicides or adjuvants as crop injury or reduced weed control will result.

As mentioned in previous newsletters by myself and Rich Zollinger at NDSU—There is a shortage of postemergence grass herbicides in Minnesota and North Dakota. If you intend to return any postemergence grass herbicides to your dealer—**PLEASE do so IMMEDIATELY**. This will allow others to use these products in a timely manner.

Beverly R. Durgan
Extension Agronomist - Weed Scientist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Entomology Notes

Yellowheaded spruce sawfly larvae and mountain ash sawfly larvae are still active in the landscape. The first step in determining pest management options is to check how large the larvae are. If they are about 3/4 to one inch long (fully grown), it is not worth treating as they finished or finishing their feeding. It is best to treat them when they are 3/8 to 1/2 inch or less in size to minimize damage to trees.

We have been receiving a lot of samples of **post birch leafminer damage**. The leafminer larvae have already left, leaving foliage brown. You can identify leafminer damage: it is scattered throughout the tree and damage can cover the entire leaf or just part of it. You sometimes can see black frass inside the leaves (some describe it as black eggs or spores). You can also pull apart the two leaf surfaces or at least tell that something was feeding inside. It is too late for management; the best time to treat is in spring just after the leaves have come out and when early mines are present.

Rose chafers are active on a wide variety of flowers and shrubs. They especially love roses and peonies. They are found in areas of sandy soil (where their eggs are laid). A cheesecloth barrier higher than the plants will exclude rose chafers. You can also control them by handpicking or using an insecticide (e.g. acephate (Orthene), carbaryl (Sevin), or malathion). **False Japanese beetles** are also out now. They feed on a variety of flowers and plants. They are similar in appearance to Japanese beetles but lack the

white patches along the side and tip of the abdomen. Control by handpicking or an insecticide (same as rose chafer). Continue to watch for **squash vine borer adults** and **apple maggot adults**.

We continue to receive a lot of calls about ants in homes, particularly **carpenter ants**, **cornfield ants**, and **thief ants**.

New Publications

There are several new entomology publications available through the distribution center discussing two very popular landscape insect topics. The first is a new fact sheet entitled *Sawflies of Tree and Shrubs*, FO-6703. It describes 14 species of sawflies on evergreen and deciduous trees and shrubs and for each discusses their appearance, hosts, damage, and life history. This is followed with a section on management. Illustrated with color pictures.

The publication *Plant Galls*, FS-1009 has been revised, including a new title, *Insect and Mite Galls*. This publication is two pages (one sheet) and contains updated text, including management. There are no pictures. A companion publication to this is called *Insect and Mite Galls in the Landscape*, FO-6704. The text is the same, but the publication is expanded to four pages to include 15 color photos of galls.

Jeffrey Hahn
Assistant Extension Entomologist

MINNESOTA EXTENSION SERVICE

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JAN 9 1997

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Second Annual West Central Minnesota Agricultural Technology Expo

The second annual West Central Minnesota Agricultural Technology Expo will be held in the Training and Community Center in Montevideo on Friday, January 31, from 9 a.m. - 4 p.m. This year's program will feature three presentations, 40 commercial exhibits, and a free noon lunch sponsored by the exhibitors.

Gene Hugoson, Commissioner of Agriculture, will speak on "1997 Ag Policy Decisions," Don Wyse and Dave Somers, Department of Agronomy and Plant Genetics, University of Minnesota, will address "New Tech-

nology in the Marketplace," and LeRoy Louwagie, market analyst, will discuss the "Market Outlook."

This new look in educational programming has strong support with the collaborative planning committee. Roger Larson, Chippewa County Extension Educator, may be contacted for further information (phone: 320/269-6521; e-mail: <rlarson@mes.umn.edu>).

Roger Larson
Extension Educator

Phosphorus In The Agricultural Environment

During recent months, a substantial amount of attention has focused on the effect of phosphorus and phosphorus management on the quality of water in lakes and streams. Many questions have been raised, and there seems to be growing concern about runoff from agricultural land and its effects on algal growth and eutrophication. The need for a better understanding of phosphorus in the agricultural environment is apparent.

A series of Interactive TV sessions has been planned to provide a better understanding of the importance of phosphorus for crop production in combination with management practices that can be used to reduce losses of this nutrient from the landscape.

The dates and topics for the sessions are:

- February 7 The Nature of Phosphorus in Soils
- February 14 Phosphorus Transport to and Availability in Surface Waters
- February 21 Understanding Phosphorus Fertilizers

- February 28 Agronomic and Environmental Management of Phosphorus

Highlights . . . January 10, 1997

Second Annual West Central Minnesota
Agricultural Technology Expo
Phosphorus in the Agricultural Environment

New Publications

1997 Ridge-Till Conference

Clinic Reports

Dial U

A Gardener's Take on Snow
Household Ants

Phosphorus / continued

Three sites will be linked for delivery of these Interactive TV programs. These are:

- Rarig Center, Minneapolis Campus, University of Minnesota
- Southwest State University, Marshall, Room ST266
- South Central Technical College at Mankato

The programs are designed for farmers and agricultural professionals who need to know more about the role of phosphorus in the agricultural environment. Those who are interested in participating can get a brochure and more information by calling 1-800-367-5363, or George Rehm at (612) 625-6210, or Judy Martens at (612) 625-5797.

*George Rehm
Extension Soil Scientist*

New Publications

The Minnesota Extension Service has three new publications focused on the management of copper, zinc, and potassium for crop production in Minnesota. Information in these folders may be especially useful for those who are preparing to take the exams for the CCA program in February. Titles and publication numbers are:

FS-6790-A Copper For Crop Production

FO-0720-B Zinc For Crop Production

FO-6794-C Potassium For Crop Production

These publications are available from local Minnesota County Extension Offices or the MES Distribution Center.

*George Rehm
Extension Soil Scientist*

1997 Ridge-Till Conference

The 1997 Midwest Ridge-Till Conference will be held at the Civic Center in Mankato on January 30. The conference program is designed for those who are currently using the ridge-till system as well as those who are thinking about switching to this production system.

Conference registration begins at 8 a.m., with the program starting at 9:30 a.m. This year, the featured speaker this year will be Larry Neppl, Iowa Farms Associates, Fort Dodge.

The remainder of the program features ridge-till

farmers who are testing some new ideas. Some of these are: reduced rates of herbicides, planting corn on ridges in 20-inch rows, and planting twin rows of corn on a ridge. This conference is a good opportunity for farmers to share ideas and learn from each other.

The conference also features commercial exhibits of equipment and products specifically suited for the ridge-till planting systems.

*George Rehm
Extension Soil Scientist*

Clinic Reports

Samples submitted to the Plant Disease Clinic in December included:

Soybean—soil for soybean cyst nematode(SCN) egg count, SCN was identified in two more counties in 1996 (Lyon and Meeker)

Corn—cultured for storage molds

Wheat—scab/plant vigor testing

Geranium—*Pythium* sp & *Rhizoctonia* sp root rot

Primula—Impatiens necrotic spot virus (INSV)

Cineraria—INSV

Sprengeri—INSV

Poinsettia—powdery mildew

Iris—*Fusarium* sp bulb rot

A variety of host plants such as Streptocarpus, spikes, lilac and rose were submitted for analysis; however, test results were negative for disease.

Thanks to everyone who used the Clinic services in 1996. Happy New Year!

*Sandra Gould
Plant Disease Clinic*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

A Gardener's Take on Snow

Everyone agrees; all this snow has meant back-breaking work for shovelers, and practically round-the-clock work for folks who drive the big plows and road graders. But this snow is a blessing to gardeners.

A heavy layer of snow insulates the soil so it doesn't freeze down as deeply as it otherwise would. (Unfortunately, it also insulates ice on lakes and rivers, making them less safe for vehicles.)

Flowering perennials and marginally hardy plants will come through a winter that has lots of snow cover in much better shape than they would a warmer winter with less snow.

However, snow does reflect sunlight, and young, thin-barked trees can suffer from sunscald if they're not protected from sunlight -- both direct and reflected. It's not too late, though, to wrap the exposed trunks of young maples, honeylocusts and other vulnerable trees. You'll just have to wade through snowdrifts to do it.

Snow can also weigh down evergreen boughs and cause arborvitae and some other upright multi-stemmed conifers to splay apart. (You can tie them gently back together with pantyhose or other soft rags.) In most cases, it's not advisable to remove snow from the branches. Once it melts and sap runs in spring, they'll return pretty much to their original positions on their own.

Given a choice, I'd take snow over all the flooding on the West Coast, any time!!!

*Deborah Brown
Extension Horticulturist*

Household Ants

Despite the cold weather, ants can be a common problem in Minnesota homes during winter. When you see

ants active this time of year, it means they either are nesting inside the home or under the building, especially under concrete slab construction. In either case, there must be sufficient warmth near the nest to allow the ants to be active.

Several types of ants may be seen, including pavement ants, yellow ants, Pharaoh ants, and carpenter ants. It is very important to identify the particular ant that is present as different ants are controlled differently.

Pavement ants nest in the soil under concrete slab construction. It is difficult to treat the nest directly. Also spraying the ants that are seen has little effect on the nest. Instead, it is more practical to bait the worker ants that are found.

Yellow ants also nest in the soil. Unfortunately, workers are rarely seen in homes, leaving no practical control. They cause no damage and are just a temporary problem, so it is best to ignore them.

Pharaoh ants nest in a wide variety of cracks and crevices inside homes. General sprays are not effective against the nest. Baiting is the most effective treatment.

Carpenter ants nest in wood and in cavities, such as wall voids.

Direct treatment of the nest is the most effective control. However, this is best done in the spring or summer when the nest is fully active.

This is a simplified account of how to control these ants. In practice, it is usually more challenging. In some cases, it may be desirable to hire a professional pest control operator to eliminate an ant problem. See also, *What To Do About Household Ants*, FO-1066.

*Jeffrey Hahn
Assistant Extension Entomologist*

Renewal Reminder

**Remember to see the November issue
of *Crop News* for your subscription renewal notice.**

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CROP

NEWS

DOCUMENTS
From the
Crops System Team
of the
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So I Have a Yield Map. Now What Do I Do?

Many farmers are entering this winter with a new source of information to make management decisions for next year. After investing in a yield monitor, they have tons of yield data. But To make the investment pay, the data must be used.

The first step is to get the data ready to incorporate into a yield map. This may be accomplished by yourself, at your own computer, or by hiring a consultant to do it for you. Whoever does it will have to examine the data for outliers before a quality yield map can be made. Two sources of bad data are:

- Data where a momentary loss of the Global Positioning Satellite differential signal occurred.
- Data collected when mechanical problems occurred which affected the grain flow in the combine such as plugging, breakdowns, getting stuck, or the beginning and end of a swath.

The loss of the GPS differential signal will result in a wrong value for the position of where the data point was taken. Sometimes this can be adjusted but only after a close look at the data. Grain flow data problems occur because the combine is filling to threshing capacity, or when the combine has stopped moving and the threshing area is emptying. The data from these points should be discarded.

The quality yield map can be made once you have the bad data removed. Then the yield map itself should be evaluated cautiously. Are there any patterns? Patterns with straight lines tend to be manmade. To interpret these patterns a producer should refer to last years management records. More importantly, you

should look at management information on the field from the past 30 to 40 years. Old farmsteads, feedlots, manure and fertilizer applications, chemical spills, and fence lines leave a long lasting effect. Other more recent practices should then be considered such as variety, previous crops, tillage, or poor agrochemical application. Irregular smooth patterns may be reflecting different soil conditions such as soil series, eroded areas, landscape position, or pest infestations such as perennial weeds and insects.

What strategy should be used to implement management practices based on a yield map? First, change the obvious. This could include better equipment

Highlights....December 13, 1996

So I Have A Yield Map. Now What Do I Do?
Soils And Soil Fertility Course Offered In January
Tough Year for Natural-Air Grain Drying Assess Drying System Performance
Clinic Reports -
Samples Submitted to the Plant Disease Clinic in November
Dial U
Crop and Plant News For Mid-December
Final Calendar Reminder
Leaf-Footed Bugs

Yield Map / continued

maintenance to correct poor application distribution of inputs such seed, fertilizer, and pesticides.

Another commonly overlooked factor is the drainage system. Can it be improved? Drainage in Minnesota is crucial, whether it be by tile or on the surface. Mother nature controls a significant amount of the crop growth potential compared to what we can control and drainage is probably the closest we can come to controlling moisture.

Some uses for quality yield maps require information from more than one year. Among these is the use of these maps to establish yield goals for variable rate fertilizer application. The worst case scenario is that some fields may have several years of yield maps which do not have any common features. In that case it is impossible to assign varying yield goals.

Ideally, a grower could combine yield maps from

several years and create a yield potential map for the field. To combine these maps, each year's yields will need to be indexed to the best yield of each year. Information from abnormal years should be discarded. The most recent example of an abnormal year would be 1993.

A use of a yield maps which should be discouraged is as an indicator of crop removal of nutrients for use in fertilizer recommendations. Basing fertilizer recommendations entirely on crop removal is a *very expensive* fertilizer management program which is *not recommended*.

Yield maps can potentially be a positive influence on crop management decisions. The quality of the data used in the yield map can significantly contribute to the quality of the yield maps for management decisions. Because of this, caution should be used when using yield mapping information.

John Lamb
Soil Scientist

Soils And Soil Fertility Course Offered in January

In January, a 4-week (one day per week) "*Introduction to Soil Nutrients and Soil Properties Affecting Soil Fertility*" course will be offered. It will be taught at four locations in Minnesota using interactive television. Sites are Crookston, Marshall, Rochester, and Minneapolis. The dates for the presentations will be January 10, 17, 24, and 31, from 9 to 11:30 am. Instructors will include soil scientists Mike Schmitt, John Lamb, Albert Sims, George Rehm, Lowell Busman, and John Schmidt.

This course should provide an awareness of how nutrients behave in the soil and how soil properties — chemical, physical, and biological — affect the behavior, movement, and management of nutrients. The intended audiences for this educational program are top crop producers, agribusiness personnel, and environmentally-minded citizens desiring basic information. It can also be used as a refresher course on soils and soil fertility. This course has applied for CCA credits (2 hrs in soil and water and 8 in soil fertility).

A brief course agenda:

Week 1. Soil nutrients and water quality N, P, and K behavior and cycling in soils

Week 2. Soil physical properties and fertility interactions Soil chemical properties and fertility interactions

Week 3. Soil biological properties and fertility interactions Soil water and fertility interactions

Week 4. Soil Fertility/Plant Nutrition Hot Issues — Organic/Inorganic Fertilizers, Soil Quality, Soil Additives

For more information, for a course brochure and/or registration information, contact Tracey Benson at 612/624-3708 or 800/367-5363. For course content information contact Mike Schmitt at 612/625-7017. Space is limited and on-site registration will *not* be possible.

Mike Schmitt
Extension Soil Scientist

Tough Year For Natural-Air Grain Drying

In normal years in the upper Midwest, corn producers who have natural-air dryers (no heat) can expect to accomplish a significant amount of corn drying

during the month of November. This year, however, November was colder and wetter than normal, and consequently, drying progress was limited. In many

Tough Year / continued

cases, the drying front probably did not move all the way through the bin before winter weather arrived.

It would be a good idea for managers of natural-air grain dryers to probe their bins to find the drying front. Corn below the drying front should be at a moisture content that is in equilibrium with the drying air that last moved through the bin. If the fan was operated very much during November, corn below the drying front will probably be in the 15-17 percent moisture range. Corn above the drying front will still be at harvest moisture.

The best way to find the drying front is to pull grain samples from various depths and actually measure the moisture. An alternative is to simply push a long slender rod down into the corn. If there is very much difference in moisture between the corn below the front and that above the front, the rod will suddenly start to move more easily when it reaches the drier corn. (Watch for overhead power lines when handling long metal rods at the top of grain bins!)

If the drying front has progressed at least half way through the bin and corn at the top of the bin is not wetter than 22 percent moisture, you should be able to hold corn without spoilage during winter and finish drying in spring. Just aerate as needed to keep the corn cold through the winter (20° to 30° F) and then resume drying some time after mid-March. The wetter the corn is, the earlier you need to start spring drying.

If the drying front has not moved at least half way through the bin, or there is corn in the bin that is wetter than 22 percent moisture, holding corn for spring natural-air drying is pretty risky. It would be better to feed or sell this corn during the winter, or pull it out of the bin and dry it in a faster type of dryer.

For more information, get a copy of *Natural-Air Corn Drying in the Upper Midwest, BU-6577*, from the Minnesota Extension Service. (The Distribution Center phone number is 612-625-8173.)

Bill Wilcke
Extension Engineer

Assess Drying System Performance

This is a good time of the year to evaluate your grain drying system's performance during the past season and start thinking about possible changes for next year. In many cases, farmers have added acres, increased yields, and traded combines two or three times since they bought their last grain dryer. If so, it's no surprise that the old dryer no longer seems to have enough capacity! In other cases, farmers have joined corn co-ops or signed contracts for specialty grains and their old drying system just doesn't give the grain quality needed to meet contract specifications.

If drying capacity is insufficient, potential solutions include:

- Replacing the old dryer with a new, high-capacity model.
- Adding a second dryer in parallel (beside) the old dryer.
- Changing cooling methods to get grain out of the dryer sooner, at a higher moisture content. (Unload grain hot and cool it in a cooling bin or in storage.)
- Adding a large, aerated wet holding bin ahead of the dryer and adding more automatic controls so the dryer can run more hours per day.

If grain quality is inadequate, potential solutions include:

- Replacing the old dryer with a new dryer that gives better grain quality. (Most new dryers are designed to produce better grain quality.)
- Switching to a gentler drying method.
- Changing cooling methods. (Slower cooling gives better quality.)

An excellent reference to use when you are planning changes to your grain system is *Grain Drying, Handling, and Storage Handbook, MWPS-13*. You can order the handbook by contacting Terry Capaul in the university's Biosystems and Agricultural Engineering Department at 612-625-7024.

After you've studied some planning references and assessed your needs, contact the extension service and visit elevators and other farmers to get some ideas. Finally, contact some equipment dealers and start shopping around for the best deals on equipment and service. You're likely to get a lot better prices and have a lot more options now than you will have if you wait until next fall.

Bill Wilcke
Extension Engineer

Clinic Reports — Samples Submitted to The Plant Disease Clinic in November Included:

Soybean — soils for soybean cyst nematode egg counts

Wheat — scab/plant vigor testing

Primrose — *Cylindrocladium* sp root rot

Cyclamen — Impatiens necrotic spot virus, *Botrytis* sp stem rot, *Pythium* sp root rot

Tulip — *Fusarium* sp bulb rot, *Pythium* sp root rot

Geranium — tested negative for *Xanthomonas* sp, bacterial wilt

Rose — cultural, no disease

Sandra Gould
Plant Disease Clinic

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Crop And Plant News For Mid-December

As seems to have become the usual the past few years, winter has again come early to Minnesota. We've had plenty snow — some of it wet and heavy. Much of the state has also had freezing rain and sleet. In many areas, snow has fallen over hard-packed frozen slush and ice, making sidewalks and driveways treacherous. This impacts our landscape plants both directly and indirectly.

Heavy snow weighs down evergreen branches. This can, along with ice, cause breakage. However, if you try to remove snow from evergreens, you must do so cautiously, scooping it off gently, rather than beating on the branches. Wood is less flexible in cold temperatures, and is more likely to break.

Ice makes the situation even worse. When plants are ice-covered it's best to let nature take its course, rather than trying to "help" the situation. Anything you do is likely to increase the chances of damage.

One exception would be propping up an ice-laden branch that is drooping low and appears to be in danger of breaking off. If icy branches threaten power lines, however, call your utility company. Under no circumstances should you attempt to deal with the situation yourself.

Finally, consider the effect that de-icing products you use on walks and driveways will have on nearby grass, trees and shrubs. Because they are "salts", they'll brown or burn plants when used repeatedly in the same area. Most landscape plants are sensitive to salt spray and to salts picked up in the soil.

If possible, stick with sand or kitty litter, rather than de-icers. But if you must use de-icing products, try urea (nitrogen fertilizer) instead of traditional de-icers. Though it, too, can burn plants when high concentrations build up in the soil, it will actually fertilize the plants without harming them if used sparingly.

Final Calendar Reminder

Our new calendar, *Minnesota Gardening 1997*, makes a great last minute gift for all your gardening friends and relatives. You can order the calendar in the Twin Cities Metro area by calling 624-4900. Outside the Twin Cities, call 1-800-876-8636. (credit card sales, only) You can also find the calendar at Extension offices, nurseries, book and gift shops throughout the state.

Deborah Brown
Extension Horticulturist

Leaf-footed Bugs

These insects can be commonly found indoors during winter. These bugs are about $\frac{3}{4}$ inch long and brown with white markings. They have long back legs which makes them look some what like a grasshopper. They get their name from the leaf-like structures found on their back legs (one on each back leg). Leaf-footed bugs move slowly and occasionally fly.

Last fall, leaf-footed bugs searched for protected sites to spend the winter, including in and around buildings. They get under siding, roofing, into wall voids, attics and other cracks and crevices where they

hibernate. As long as the weather remains cold, they remain dormant. However, mild winter weather can waken leaf-footed bugs that are hibernating in voids, fooling them into thinking spring has arrived. They emerge from their overwintering site and walk around inside homes. However, they have no food and die shortly.

Despite the circumstantial evidence, leaf-footed bugs do not lay eggs indoors. All the bugs seen during the winter are those that entered the home in the fall. Leaf-footed bugs are harmless; they do not bite

people or pets, eat our food or damage our property. Leaf-footed bugs are just a nuisance.

Kill leaf-footed bugs as you see them by hand or other physical means. Insecticides are not necessary because leaf-footed bugs are short-lived and inoffensive. We have been receiving more leaf-footed bugs questions over the past several years, although it is not clear why their numbers have apparently increased.

Jeffrey Hahn
Assistant Extension Entomologist

Renewal Reminder

**Remember to see the November
issue of *Crop News* for your
subscription renewal notice.**

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CROP**NEWS**

*From the
Crops System Team
of the
Minnesota Extension Service*

NOV 18 1996

Crop Production Review**ST. PAUL CAMPUS
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As the 1996 crop production season concludes, it is a good time to review the agronomic factors that may have impacted yields. In general, most producers were satisfied with 1996 crop yields. However, there may have been fields where corn and soybeans did not yield up to expectations, or producers may have been disappointed in corn test weights. Field by field harvest data can be useful in determining reasons for production falling below expectations.

Soybean yield reductions can be due to a variety of factors including disease, Soybean Cyst Nematode, inadequate weed control, late planting or herbicide injury. Soybean Cyst Nematode is likely if soybean yields have been declining and all other agronomic factors such as weed control and planting date are not limiting yield. For these suspicious fields, soil test to determine if cyst nematodes are present. If detected, management can be adjusted so nematode populations do not increase. In 1996, Lyon County had it's first confirmed infestation of Soybean Cyst Nematode. Since that initial detection, at least three more fields in the county have been confirmed to have Soybean Cyst Nematode.

Sclerotinia White Mold was widespread in soybean fields in 1996, just as it was in many of those same fields in 1994 and 1992. Management may need to change on those white mold infected fields when those fields are planted to soybeans in 1998. Reduced soybean planted populations, wide rows, avoiding nitrogen or manure application prior to soybean planting and careful variety

selection are all factors to consider to reduce the risk of Sclerotinia White Mold.

Seedling disease problems were common in the cool wet conditions of May and early June. Contributing to these seedling disease problems were challenging weather conditions and poor seed bed preparation. Lack of control of seeding depth and seed to soil contact may suggest the need to upgrade planting or seeding equipment. If cool and wet weather is anticipated following planting, a fungicide seed treatment should be considered.

Highlights....November 15, 1996

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Ag Professional Updates
Tillage, Fertilization, and Phosphorus Losses
Transition Payments and Rental Contracts
Plant Disease Clinic Report
Subscription Form For 97-98 MN Crop News
Season
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Unknown Bites or Irritations
Entomology Notes*

See p. 189 to order your 1997-1998 Subscription to MN Crop News.

Crop Production Review/continued

In general, corn producers were satisfied with corn yields, but disappointed with corn test weights. Early frost and lack of optimum accumulation of growing degree units are likely the biggest factors in low test weights. However, other factors, such as corn borer or nitrogen deficiency, may also be a factor in reduced grain test weight. Corn borer tunneling in the stalk and ear

shank may have caused the plant and ear to die prematurely and may have contributed to low test weight. Nitrogen deficiencies to denitrification following heavy summer rains or fall applied losses from early October fall nitrogen applications may have resulted in nutrient deficiencies which contributed to reduced grain fill.

Bob Byrnes
Lyon County Extension Educator

AG Professional Updates

The Ag Professional Updates have been scheduled for 1997. The dates and locations are listed below.

<u>Date</u>	<u>Location</u>
January 13	Morris , West-Central Experiment Station 12:30 - 4:30 p.m.
January 13	Rochester , Best Western Apache 12:30 - 4:30 p.m.
January 14	Crookston , Northwest Experiment Station 8:30 - 12:30 a.m.
January 14	Mankato , Best Western Motel 12:30 - 4:30 p.m.
January 15	Willmar , Holiday Inn Conference Center 12:30 - 4:30 p.m.
January 15	Fairmont , Holiday Inn 12:30 - 4:30 p.m.
January 16	Marshall , Room 208, IL Building, Southwest State 8:30 - 12:30 a.m.
January 16	Little Falls , Morrison County Courthouse 12:30 - 4:30 p.m.

These meetings are designed to provide up-to-date research results to professionals who work with crop producers. A variety of topics are discussed at each location. Look for more detailed information describing the specific topics to be covered. Take time now to mark the calendar for the date and location of your choice.

George Rehm
Extension Soil Scientist

Tillage, Fertilization, and Phosphorous Losses

Phosphorus in runoff from agricultural land has been identified as a major cause of algal blooms in surface waters. Therefore, considerable attention has been focused on identifying management practices that can be used in crop production to reduce or minimize phosphorus losses from the landscape. A substantial number of research projects are being conducted throughout the United States in an effort to develop these needed practices.

Research has identified two very important practices which can be used to minimize phosphorus losses. Most

of the phosphorus which reaches surface waters is attached to sediment. Therefore, use of tillage systems (ridge-till, no-till), which reduce erosion, is a major consideration. Application of fertilizer below the soil surface can also produce substantial reductions in phosphorus losses.

The impact of tillage and placement of phosphate fertilizer on phosphorus loss is demonstrated by recent research from Kansas. Researchers measured phosphorus losses when broadcast and banded phosphate was applied in three tillage systems (chisel-disk, ridge-till,

no-till). The soil at the experimental site was somewhat poorly drained with a slope of 1 to 2%. The results are summarized in the following tables.

Table 1. The effect of tillage system on soil loss and total P loss in 1996.

Tillage System	Soil Loss ton/acre	Total P Loss grams/acre
chisel-disk	1.48	684
ridge-till	.69	436
no-till	.59	357

Table 2. The effect of tillage system and phosphate fertilizer placement on loss of soluble phosphorus in 1995.

Tillage System	Phosphate Placement ----- grams/acre -----	Soluble P Loss
Chisel-disk	-	6.8
	broadcast	11.0
	subsurface band	5.1
ridge-till	-	15.8
	broadcast	67.4
	subsurface band	16.3
no-till	-	14.0
	broadcast	210.7
	subsurface band	19.2

The effect of tillage system on soil loss and total P loss in 1996 was substantial (**Table 1**). As might be expected, losses were reduced when residue remained on the soil surface (ridge-till, no-till). The importance of the ridge-till system in reducing soil erosion has been recognized in Minnesota for some time. This information supports the use of the ridge-till planting system for fields where soil erosion is a major concern.

Total phosphorus loss was measured in grams per acre. When considering this loss, it's important to focus on relative differences rather than the actual numbers.

The impact of fertilizer placement on loss of soluble phosphorus is shown in **Table 2**. Again, consider relative differences rather than the actual numbers. Very little of phosphate broadcast on the soil surface is incorporated in the ridge-till and no-till planting systems. Therefore, losses of soluble P with this placement can be expected to be high in these two planting systems. Some soluble phosphorus comes from residue remaining on the soil surface in ridge-till and no-till planting systems. Soluble phosphorus, however, is a small part of the amount of total phosphorus lost from the landscape.

The results from this study and others show that phosphorus loss can be reduced by reducing tillage and placing phosphorus fertilizers below the soil surface.

George Rehm
Extension Soil Scientist

Transition Payment and Rental Contracts

The Agriculture Market Transition Act will govern farm programs from 1996-through 2002. Advance payments will be made on either December 15th or January 15th each year, depending on the choice of the farm operator. Final transition payments will be made by September 30th each year. It is important that changes in farm operators be reported to Farm Service Agency offices by December 1st to maintain eligibility for advance payments. Following are some situations that could occur:

1. The same farm operator will be operating a farm unit in 1997 that operated that farm unit in 1996...

* There is no concern, provided that the landlord and farm operator signed a Rental Verification Statement at the local Farm Service Agency that extended beyond one year (1996) and is in effect for 1997. Many

counties encouraged the signing of seven year Rental Verification statements to cover all years of the new Farm Program, 1996-2002. In this situation the 1997 advance payments will be made to the farm operator on December 15th or January 15th, depending on the date requested.

* If the landlord and farm operator signed only a one year Rental Verification Statement for 1996, they must sign another form and submit it to the local Farm Service Agency Office by December 1st to be eligible for the advance payments. If the rental verification is submitted after december 1st, no advance payment will be made on that farm unit. The entire transition payment will be made on that farm unit. the entire transition payment will be made in the final payment, which will be paid by September 30, 1997.

Transition Payment/Continued

2. A different farm operator will be operating a farm unit in 1997 than operated that farm unit in 1996...

- * If there is a one year Rental Verification Statement in effect for 1996, the landlord and new farm operator must submit a new verification form to local Farm Service Agency Offices by December 1st in order for that farm operator to receive an advance payment. Otherwise, the entire 1997 transition payment will be made by September 30th.
- * If there is a seven year or multi-year rental verification agreement in effect at the local Farm Service Agency, the landlord and new farm operator must notify the local office of the change by December 1st. This will make the new farm operator eligible to receive the advance payments for 1997.
- * If there is a seven year or multi-year rental verification in effect, and the Farm Service Agency is not notified of a change of farm operators for 1997, the advance payment will be sent to the 1996 farm operator. The new farm operator will not receive their 1997 transition payment until September 30th, and may not receive the entire payment until the 1996 farm operator refunds the 1997 advance payment on that farm unit.

3. The landlord is unsure who will farm a farm unit in 1997, or has not finalized the 1997 rental contract by December 1st...

- * The landlord should notify the local Farm Service Agency that the rental contract is not finalized and that no advance payment should be made on that farm unit. In that situation, the entire 1997 transition payment will be made by September 30th.
- * If there is currently a one year Rental Verification Agreement for 1996, this should not be a concern. However, with multi-year agreements, the 1997 advance payment will go to the 1996 farm operator if the landlord does not notify the Farm Service Agency Office by December 1st of a potential change of farm operators. Again, this may require the previous operator to refund the advance payment before the new farm operator can receive the entire 1997 transition payment.

4. A farm operator has several farm units combined into one farm unit for payment purposes at the Farm Service Agency...

- * There is no concern if all Rental Verification Statements are multi-year or have been filed at the Farm Service Agency Office by December 1st. Advance payments for 1997 will be made by December 15th or January 15th.
- * However, if there are one year rental agreements in effect that are not finalized by December 1st, no advance payment will be made on the entire farm unit. This would also likely be true in a multi-year agreement when a landlord has notified the Farm Service Agency to hold the advance payment due to a potential change.
- * In this situation, farm operators should contact their local Farm Service Agency to separate the farm unit without signed agreement from the combined unit. This will allow for timely advance payments on the remainder of the combined farm unit. Otherwise, the entire 1997 transition payment will be delayed until September 30th.

BOTTOM LINE

- * If there are no changes planned for 1997 rental agreements and proper documentation has been made with local Farm Service Agency Offices, don't worry because everything should be set for timely transition payments for 1997.
- * If there are potential changes in farm operators for 1997 on farm units, try to reach agreement by December 1st and notify the local Farm Service Agency Office, to allow for 1997 advance payments.
- * If an agreement for 1997 rental contracts can not be reached by December 1, notify the Farm Service Agency Office and plan to receive the entire 1997 transition payment in September, 1997.
- * If there are specific questions on changes in rental agreements or farm units and required documentation, contact your local Farm Service Agency Office.

*Kent Thiesse
Gary Hachfeld
Educators
Minnesota Extension Service*

Clinic Reports

Samples submitted to the Plant Disease Clinic in October included:

- soybean—*Colletotrichum* sp. (anthracnose), *Phomopsis* sp. (pod and stem blight), downy mildew, soybean cyst nematode.
- potato—scab, *Fusarium* sp. dry rot
- corn—cultured for storage molds
- squash—*Ascochyta* sp. & *Fusarium* sp. fruit rots
- A. gerardii* (big bluestem)—*Phyllosticta* sp. leaf spot
- apple—scab
- poinsettia—*Pythium* sp. root rot
- Cyclamen—*Fusarium* sp. corm rot
- Chrysanthemum—*Pythium* sp. root rot
- Phlox—powdery mildew
- Potentilla—downy mildew
- pansy—*Pythium* sp. root rot
- spruce—*Rhizosphaera* sp. needlecast

Sandra Gould
Plant Disease Clinic

Dial U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

It's Not Too Late to Mulch Landscape Plants

Once your soil freezes, it's time to spread a layer of mulch over bulb beds and atop flowering perennials. Mulch is used this time of year to protect plant roots from extreme cold, but also to prevent fluctuating temperatures and early warm ups that would begin to bring plants out of dormancy at a time when they'd still be vulnerable to further cold weather.

Young trees and shrubs should have been mulched earlier with woodchips or shredded bark to keep the soil around them from freezing as early as it would otherwise. But if they haven't been mulched yet, it will still be beneficial over the long run.

(Early mulching around woody plants allows you to continue to water them later in the season, as long as the soil hasn't frozen, which is particularly important in the case of evergreens.)

What are good mulching materials? Leaves, either whole or shredded, partially decomposed compost, salt or marsh hay (you'd have to buy it), ground cornstalks (sold as Dickey's Natural Mulch), pine needles, chopped

straw or hay that's relatively seedless, and evergreen boughs are all useful and effective for covering and insulating plants.

Woodchips and shredded bark are better for covering the soil between plants, where it can be left undisturbed, year-round.

Minnesota Gardening Calendar Reminder

Again, let us remind you that the Minnesota Gardening calendar for 1997 makes a great hostess gift at Thanksgiving, and a welcome holiday gift for anyone who enjoys plants and gardening. It's reasonably priced, beautifully illustrated with original photography, and chock full of good information for northern gardeners, including a full page about raised bed gardening.

Purchase copies of **Minnesota Gardening** from your local gift or book store, or order them from your county extension office. You can also call the University's Distribution Center toll-free at 1-800-876-8636, or 624-4900 in the Metro area, with credit card orders.

Deborah Brown
Extension Horticulturist

Dial U/continued

Minute Pirate Bugs

During mid to late October, people were complaining that small 'flies' or 'bugs' were biting them. These biting insects turned out to be minute pirate bugs. These common insects fly, are about 1/16th inch long and are black with white markings. Minute pirate bugs usually don't bite people but are predators, feeding on small, soft-bodied insects and insect eggs.

The warm weather in October was responsible for minute pirate bugs remaining active longer than normal. With their normal food source gone, these insects landed on people in an effort to find something to eat. People's reaction to these bites varied. Some people hardly reacted at all, while others were sensitive and developed moderate-sized red bumps. Fortunately, this problem only lasted as long as the weather stayed warm, then went away on its own.

Unknown Bites or Irritations

We have been receiving calls this fall from people that are finding 'bites' on their bodies that they believe are caused by insects or mites. Although many say they feel something on their skin but don't see anything, they still believe it is a 'bug bite'. This is a very difficult problem to diagnose, especially if there are no obvious insects causing the problem.

What is the best way to deal with a situation like this? First we explore the insect or mite possibilities. We examine any insects they believe are causing the problem and describe what they would probably find if it were one of the common biting insects, such as fleas, bed bugs or lice. If this does not yield any results, we can suggest that they hire a pest control company to do an on-site inspection. At the same time, we tell people

they should not use any pesticides unless they can confirm there is an insect or mite responsible for the problem. Insects are just one of many possible causes of unknown irritations. If insects are ruled out, the person should consider other possibilities (to be diagnosed by the appropriate medical specialist).

Non-insect causes of unknown 'bites' or 'irritations' can include allergies (to detergents, soaps, shampoos, cleansers, medications, clothing, food), low humidity, changes in temperature, static electricity, tobacco smoke, fibers (from paper, insulation, fabric) stress, diabetes, and many others. We never try to diagnose the problem if we do not feel it is insect- or mite-related, although we do suggest that there are other possible explanations. A great deal of tact and consideration is necessary to deal with people who experiencing such problems.

Entomology Notes

Many people have had questions about **fruit flies**. The best control is to discover the source of the infestation and remove it. Likely infestation sources include old fruits or vegetables, a clogged garbage disposal and old food stuck to a trash can. Spraying adult fruit flies does not control the infestation. **Blacklegged ticks** (formerly known as deer ticks) have been encountered through most of October and November. Blacklegged ticks can be active when temperatures are at 39°F or warmer. **Stored product insects** such as Indianmeal moths, flour beetles and sawtoothed grain beetles have been common in homes. Sanitation and exclusion are the best controls.

*Jeffrey Hahn
Assistant Extension Entomologist*



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CROP**NEWS**

*From the
Crops System Team
of the
Minnesota Extension Service*

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Fall Applied Dual

The question of fall application of herbicides is upon us again. Questions pertain to the fit of fall-applied herbicides in Minnesota. Fall herbicide applications allow applicators to spread their work load into the fall season, if the fall season permits. This is important considering the short window of opportunity to apply herbicides with spring time constraints for custom applicators and farmers to cover the large number of acres with the equipment and labor available.

The other promotional aspect being discussed regarding Dual applications in the fall as a benefit to the environment. Consider that the most dramatic surface runoff events occur in the spring associated with severe, localized thunderstorms when fields have relatively little plant or residue cover to protect soil, and occur in close temporal proximity to herbicide application. This results in the common detection of acetanilides such as Lasso and Dual, and triazines such as atrazine and Bladex in surface waters with peak detections occurring down stream in St. Louis and New Orleans during June or July. Generally speaking, incorporation of herbicides can reduce surface runoff of herbicides compared to preemergence herbicide application.

Theoretically, applications of a herbicide such as Dual in the fall would allow "natural" incorporation of the herbicide with rainfall events that typically are more frequent and less severe than with spring or summer thunderstorms, thus less prone to cause surface loss. Similarly, mechanical incorporation of herbicide in the spring, common in southwestern and south central Minnesota, would reduce the concentration of herbicide in runoff

compared with spring preemergence applications. The EPA has often considered mandatory preplant incorporation of soil applied herbicides to reduce surface runoff. This has been controversial since actual benefits are dependent upon rainfall patterns and localized climatic events. Conceivably, with fall applications the cumulative annual loss of Dual to surface water could remain unchanged, with peak detections in June or July reduced but balanced with an increase in low level detections in late fall and early spring.

Dual should be applied after October 15th and when soil temperatures are below 50°F to reduce microbial degradation, analogous to the concept of applying anhydrous ammonia after the microbes that convert anhydrous to nitrate go "dormant". Also, Dual should be applied only to medium or clay textured soils with or

Highlights....October 18, 1996

*Fall-Applied Dual
Crop Response To Lime In South-Central and
Southwestern Minnesota
Herbicide Storage
Dial U
Protect Tender Roses Any Time After Oct. 15th
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Millipedes*

Fall Applied Dual/Continued

ganic matter of 2.5% or more. Dual should not be applied after soil is frozen, much like the label restrictions for Velpar use on alfalfa, to reduce surface runoff. Dual should not be applied to sloping, saturated fields even if the soil temperature and calendar requirements can be met due to high potential for runoff.

Herbicide properties do influence how successful a fall-applied herbicide program might be. Treflan (trifluralin) has had fall-applied labeling for some time and is commonly used as such on other crops. Treflan is relatively persistent and immobile once mixed with soil. It will not be subject to leaching below the optimal zone for weed control and will likely not dissipate enough to reduce efficacy the following spring. Of the acetanilides, Dual is relatively persistent and has moderate solubility and adsorption such that it will move into the soil surface profile with activating rainfall. The other extreme would be an acetanilide such as Ramrod (propachlor) which would not be a good candidate for fall applications (and is not labeled for fall applications). Ramrod simply dissipates too fast and would be too mobile to remain near the surface at concentrations to provide weed control the following spring.

A logical place to consider fall Dual applications would be to soybean stubble that will be no-till planted to corn the following spring. Fall applications of Dual would ensure activation of the herbicide by the time fox-tail seedlings germinate in the spring, similar to early

preplant applications. Beyond that, the challenge is to match fall and spring tillage needs or optional P and K fertilizer placement if impregnated on fertilizer with optimum placement of the herbicide. Research conducted at Waseca and Lamberton has shown good and less than adequate performance for fall applications of Dual. Herbicide performance can be less than adequate with traditional spring applications as well, however. Situations less than ideal for fall-applied Dual would be extremely high grass pressures and specific species that are more difficult to control such as proso millet or woolly cupgrass.

In the final analysis, fall-applied Dual does have potential in Minnesota. The jury is still out as to whether there is any environmental advantage to fall applications of Dual. Dual is not the most economical soil-applied herbicide to use if you are going to plant soybeans the following spring. As with any weed management option, never put all of your management eggs in one basket. Always diversify the herbicide choices and methods of application within your farming operation to hedge against widespread failures due to localized environmental conditions. Likely, any one of the herbicides or methods of application will result in poor performance in a given season. Diversifying your management programs will give you the flexibility to get back to those troublesome acres in a timely manner to rotary hoe, cultivate, or apply another herbicide.

*Roger Becker and Jeff Gunsolus
Extension Agronomists - Weed Science*

Crop Response to Lime in South-Central and Southwestern Minnesota

Crop consultants and fertilizer dealers who have been using grid sampling expected to find variability in soil test values for P and K and the results have been consistent with expectations. Substantial variability in soil pH values within a field was not expected. This is especially true for the soils formed on glacial till in south-central and southwestern Minnesota. This discovery of low pH values has raised questions about lime use where lime has not been applied in the past.

Detailed evaluations of lime use on these kinds of soils are limited. One study was conducted at the Southern Experiment Station at Waseca to measure the effect of lime applied to these soils on crop yields. The initial soil pH values are listed at right.

<u>Soil Depth (inches)</u>	<u>pH</u>
0-6	5.6
6-12	5.7
12-18	5.9
18-24	6.3
24-30	6.3
30-36	6.8
36-42	7.1
42-48	7.5

The pH values above 18 inches were very acid probably as a consequence of repeated applications of nitrogen fertilizers. The pH did increase with depth in the root zone.

Corn, soybeans, and alfalfa were grown following the application of various rates of ag lime. The measured yields, as affected by rate of ag lime applied, are summarized in the following table.

Ag-Lime Applied --- ton/acre ---	Crop		
	Corn ---- bu./acre ----	Soybeans ---- ton dry matter/acre ----	Alfalfa ---- ton dry matter/acre ----
0	169	52	4.4
2.5	166	51	4.6
5.0	167	49	4.6
7.5	171	53	4.4
10.0	164	53	4.5

These results show that liming of the soil at this site, which was formed on glacial till, had no positive effect on crop yield. An exact explanation for the lack of a response to lime is not known at this time. The soil pH did increase with depth and this may have been an important factor for this soil.

It's important to emphasize that liming is an important management practice for crops grown on sandy soils and silt loam soils in Southeastern and East-Central Minnesota. The information presented here relates to crop production on soils formed from calcareous glacial till.

George Rehm
Extension Soil Scientist

Herbicide Storage

Proper storage of herbicides is essential to avoid contamination, preserve the quality of the product and to minimize the risks to the environment. The first step in pesticide storage begins by reading the label to determine what special handling or storage requirements are needed. All agricultural chemicals should be handled and stored with care.

Pesticides should be stored in a separate facility designated only for pesticide storage. Having the pesticides isolated will help to prevent accidental exposure from happening to humans and animals. It is important that the pesticide storage unit be securely locked. Materials that should not be stored in the pesticide storage unit include animal feed, seed, fertilizer and protective pesticide clothing. Keeping these materials out of the pesticide storage unit will avoid contamination from spillage or chemical vapors. Dry chemical products should be stored on shelves above liquid products to avoid contamination by leaks of liquid products. All bagged materials should be thoroughly sealed to prevent caking and chemical breakdown from moisture. Metal containers should be placed on wooden pallets to prevent corrosion from moisture. If herbicides are to be stored over the winter it is a good idea to inspect all bags for tears or containers for possible leaks.

The pesticide storage facility should have a concrete floor to make clean up spills easier. Having clean up supplies available for chemical spills such as detergent, hand cleaner, water, absorbent materials (sawdust, cat litter), shovel, broom and a fire extinguisher on hand is essential. A good pesticide storage facility should be well lit, well ventilated and well insulated. High temperatures can cause liquids to expand. If the storage unit is poorly insulated, fluctuating temperatures can

cause liquid formulations to expand, or worse catch on fire. Low temperatures can cause some liquid formulations to separate making it difficult or impossible to mix them. Freezing of herbicides may cause physical separation of emulsifiable concentrate formulations. Consult table for minimum storage temperature.

Minimum Storage Temperatures of Herbicides **

Product Name	Minimum Temperature/Storage Comments
Accent	No freezing problem
Ally	No freezing problem
Amber	No freezing problem
Arena/Stall	32°F
Assert	40°F
Assure II	No freezing problem
Atrazine	No freezing problem
Avenge	40°F
Balan EC	40°F
Banvel	No freezing problem
Basagran/Ascend	32°F
Beacon	No freezing problem
Betamix	No freezing problem
Betamix Progress	No freezing problem
Betanex	No freezing problem
Bicep	No freezing problem
Bicep II	No freezing problem
Bicep Lite	No freezing problem
Blazer	32°F
Broadstrike-Dual	No freezing problem
Broadstrike-Treflan	40°F
Broadstrike Plus (corn pre, ppi)	No freezing problem
Bronate	3°F
Buctril +Atrazine	32°F
Buctril	3°F
Buctril Gel	32°F
Bullet	0°F
Butyrac	No freezing problem

Minimum Storage Temperatures of Herbicides/continued

Product Name	Minimum Temperature/Storage Comments
Cheyenne	10°F
Clarity	No freezing problem
Classic	No freezing problem
Cobra	No freezing problem
Command 4 EC	40°F
Commence EC	40°F
Concert	No freezing problem
Confidence	32°F
Curtail	40°F
2,4-D amine	40°F
2,4-D ester	No freezing problem
Dakota	10°F
Dual 8E, 25% G, Dual II	Store in well ventilated place
Eptam	No freezing problem
Eradicane Extra	No freezing problem
Exceed	Store in cool dry place
Express	No freezing problem
Extrazine	No freezing problem
Far-Go G	No freezing problem
Far-Go 4E	32°F
Freedom	32°F
Frontier	55°F
Fusilade DX 2000	No freezing problem
Fusion	No freezing problem
Galaxy	40°F
Gramoxone Extra	32°F
Harmony Extra	No freezing problem
Harness	No freezing problem
Herbicide 273	32°F
Hoelon	20°F
Hyvar XL	No freezing problem
Kerb	40°F
Laddok	15°F
Lariat	40°F
Lasso Microtech	-4°F
Lasso EC, II	32°F
Lexone	No freezing problem
Lorox DF	32°F
Marksman	No freezing problem
MCPA amine	40°F
MCPA ester	No freezing problem
Option II	10°F
Partner	No freezing problem
Passport	40°F
Permit	No freezing problem

Product Name	Minimum Temperature/Storage Comments
Pinnacle	No freezing problem
Poast	32°F
Poast Plus	32°F
Preview	No freezing problem
Princep 80% WP, 90% DF	No freezing problem
Prism 2EC	No freezing problem
Prowl	40°F
Pursuit	32°F
Pursuit DG	No freezing problem
Pursuit Plus	40°F
Pyramin SC	No freezing problem
Norton SC	No freezing problem
Ramrod 20	No freezing problem
Ramrod & Atrazine	No freezing problem
Ranger	50°F
Reflex	32°F
Resource	No freezing problem
Ro-Neet 6E	32°F
Rodeo	10°F
Roundup	10°F
Roundup D-Pak	59°F
Salute	No freezing problem
Select 2EC	No freezing problem
Sencor 4F	No freezing problem
Sonalan	40°F
Spike	No freezing problem
Stampede 80 DF	32°F
Stinger	32°F
Surpass	No freezing problem
Storm	32°F
Sutan +	No freezing problem
Sutazine +	No freezing problem
Tiller	10°F
Tordon 22K	No freezing problem
Treflan EC, 5	40°F
Treflan TR-10, M.T.F.	No freezing problem
Turbo	No freezing problem
Velpar	32°F

*** Not all herbicides and their minimum storage temperatures have been listed. Refer to the specific label for storage requirements.*

*Kevin Cavanaugh, Junior Scientist
Department of Agronomy and Plant Genetics*

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Protect Tender Roses Any Time After Oct. 15th

Many people have switched to growing hardy shrub roses, but an overwhelming number of gardeners still cherish their tender hybrid tea roses. Though tender roses won't be damaged until temperatures dip below 20 degrees, it's safest to protect them during the later half of October. On October 19th, volunteers will bury roses at the Arboretum, using the Minnesota Tip Method.

The Tip Method involves tying canes together and tipping them into a trench dug to one side of each plant. You need to loosen the roots first, then lower each plant into its trench. Cover with soil, then lots of leaves or straw.

Tipping roses allows you to lift a large plant the next spring, compared to other methods of protection. But mounding is usually easier, and can also yield excellent results.

Prune the canes down to about 18 inches, then mound roughly 10 inches of soil over the crown of each plant. Leaves or straw go over the soil, then chicken wire, branches or something else to keep that mulch layer in place.

Don't cover the mounds with plastic sheeting. Whatever you use must "breathe." The inability to breathe is one of the reasons rose cones are unreliable. Often, when you lift those white polystyrene cones in spring, the plants inside are dead and full of mold.

Minnesota Gardening Calendar

If you enjoy the gardening and landscape information we supply in this newsletter, you'll find much more in our newest calendar, "Minnesota Gardening, 1997." Pick one up at your local county extension office or look for it at your favorite book or gift store. It has a beautiful photo of the rose gardens at Duluth's harbor on the cover.

The calendar, a joint project of the Minnesota Extension Service and Agricultural Experiment Station, is a great guide to gardening and landscape care in northern climates, and makes an ideal gift at holiday time.

This year's calendar features a page about raised bed gardening, along with a weather map and one showing planting zones.

*Deborah Brown
Extension Horticulturist*

Millipedes

Millipedes have been common in homes throughout October. Millipedes are dark-colored, worm-like, and typically are one to two inches long. They have hundreds of legs (four per body segment), although they are short and sometimes are not noticed. Despite the many legs, they move slowly. Millipedes prefer damp, cool conditions and typically are found under rocks, mulch, leaves, and other objects where they feed on decaying vegetable matter. During fall, millipedes search for sheltered places to hibernate in and commonly enter buildings.

Millipedes are harmless to people and property and don't reproduce indoors. They're just a nuisance by their presence. If it necessary to control them, you can minimize the number of millipedes coming into your home by removing potential hiding places around the foundation, such as leaves, stones, mulch, and wood. Seal possible entry sites by caulking cracks in the foundation at or near ground level and replacing worn weather stripping around doors.

Persistent number of millipedes can be controlled during late summer and fall with an insecticide treatment. Spray either chlorpyrifos (Dursban) or diazinon in a band that covers the foundation and the adjacent ground. However, a spray this late in the fall is of questionable value.

Once indoors, millipedes don't live long, curling up when they're dead. It's not necessary to spray millipedes indoors with an insecticide as it's usually too dry for them to survive. If damp conditions exist, use a fan or dehumidifier to dry the area out. As temperatures continue to cool, fewer millipedes should be seen until it is cold enough that they are no longer active (See *Sowbugs, Millipedes, and Centipedes in the Home*, FS-1023).

*Jeffrey Hahn
Assistant Extension Entomologist*

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NEWS

From the
Crops System Team
of the
Minnesota Extension Service

Conservation Reserve Program—Transition

During the past two years, the Minnesota Extension Service has been investigating alternatives for transitioning Conservation Reserve Program (CRP) land to crop production. In anticipation of some CRP land returning to production upon the contract expiration, the Lincoln CRP Research and Demonstration Project duplicated potential scenarios farmers may encounter when transitioning CRP to crop production. Agronomic practices, environmental factors and economics were studied in the course of the project.

What has been learned in the project? Final yields and results have not yet been determined. However, preliminary results provide the basis for some agronomic, environmental and economic recommendations in transitioning CRP to crop production. Those recommendations are highlighted in this column.

Weed control is important. Elimination of the CRP vegetation is essential so as to not compete with the planted crop. Timing of the vegetation control is critical. Ideally, a burndown herbicide will be applied the season before production. If burndown herbicide application is delayed until spring, it is necessary to wait until perennial grasses are actively growing, which can delay spring planting. Fall burndown herbicide application allows effective control without complicating later tillage or planting operations. Fall burndown herbicide can be applied in late September or early October. The herbicide must be applied before the perennial grass experiences a killing frost and while at least 50 percent of the leaf surface has not turned brown. Perennial grass killing frost temperature is 23 degrees Fahrenheit for several hours. Earlier light frost actually improve burndown

herbicide effectiveness as it triggers active nutrient and herbicide translocation to the root system. At the Lincoln County CRP Project, 2 quarts of Roundup per acre were applied in late September 1994, providing excellent control. The Lincoln CRP Project also demonstrated that tillage and post emerge herbicide applications can control vegetation successfully. However, proper timing and multiple sequenced post emerge applications may be necessary.

No-till can work well. Provided the weed control is adequate, planting provides good seed to soil contact and the seed furrow is free of residue, no-till can be successful. Tillage can be advantageous in leveling

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CRP Transition/Continued

rough fields and speeding spring soil warm-up. However, the Lincoln Project has shown that both tilled and no-till can produce similar yields. No-till has the obvious advantage of reducing soil erosion potential and maintaining some of the conservation benefits of the CRP Program.

Most crops can be successful. The Lincoln Project has shown that corn, soybeans, wheat and alfalfa can be grown without suffering post CRP yield reduction. However, for this to occur, all agronomic practice must be in

place, including weed control, timely planting and a residue free planting zone. Fertilizer management is important. The cool early season in 1996 demonstrated the importance of starter fertilizer when planting in CRP soils which are typically slow to warm due to accumulated biomass. Soil nutrient levels likely have not changed during the CRP enrollment. Nitrogen, phosphorous and potassium fertilizations should be based on soil test and yield goals.

Bob Byrnes

Lyon County Extension Educator

New Insect Pest of Alfalfa

The alfalfa blotch leafminer was first discovered and limited to 3 northern MN counties in 1994. The leafminer most likely entered the state via hay purchased from southwestern Ontario in 1993-1994. Infestations in 1994 ranged from 50-75% of the plants with obvious damage. Infestations were lower this year (as of 9/24 sampling) in both Cook and Lake counties. However, on 9/24 I found significant infestations in Pine Co., as well as Burnett and Sawyer counties of NW Wisconsin. (A leafminer infestation was previously documented in Washburn county in early September.) Each of the latter infestations were in 40 acres-plus sized fields. Although it is unknown at this time how much damage potential exists, how soon we can introduce some beneficial parasitic wasps, etc., all county extension educators, consultants, agronomists, and seed company representatives should be aware of the insect. To better assess its distribution, I would appreciate it if as many people as possible, particularly in central regions of both MN and WI, could check a few fields in your respective areas for leafminer damage or still-active larvae.

I will soon be sending a 2 page fact sheet (developed in Canada) to all county offices to facilitate ID of the damage. Those interested can also contact Lee Fields (secretary in Entomology), to have a fact sheet mailed

out or faxed. Essentially, the leafminer has approximately 3 generations per year; overwinters in the pupal stage. Adult flies make numerous small punctures in the leaves, when laying eggs. The larvae feed between the upper and lower leaf surfaces, initially reflecting typical serpentine mining, but eventually removing all leaf tissue (except for epidermal layers) on each leaf...thus given the "blotch" leafminer name. Late-instar larvae are yellow in color and can be seen feeding within the leaf tissue. For those who suspect the insect is present, call me for further information (612-624-1767). You may also send me a sample for ID during the next 2 weeks. In fields where you suspect you have the leafminer, mail (1st class, priority or FED Express, on Mondays or Tuesdays) at least 5 stems showing the damage. Place moist paper toweling around the base of the stems, and place the sample in a paper bag; do not use plastic bags. Mail your sample to my attention at:

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1980 Folwell Ave.
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Bill Hutchison

Extension Entomologist

Lime Use for Established Alfalfa

The benefits of lime for optimum alfalfa on acid soils have been widely recognized and accepted for some time. Yet, some growers seed alfalfa without checking soil pH and find that the pH is acid (frequently below 6.0). Thoughts usually turn to possibilities of a rescue treatment for these situations and questions are raised about the effectiveness of topdressed lime for established alfalfa.

Trials were conducted in Goodhue County in 1990 and 1991 in an effort to get an answer to this problem. Alfalfa in the field selected for study had been seeded in the spring of 1989, producing an excellent stand. The soil pH, however, was 5.7 and lime had not been applied prior to seeding.

Treatments listed in the table on page 173 were applied in the fall of 1989, and alfalfa yields were measured in 1990 and 1991. When knifed into the soil, the knives were placed 12 inches apart.

Effect of lime applied to an established stand on the yield of alfalfa.

Lime Source	Placement	Applied lb./acre	1990 -ton dry matter/acre-	1991	Ave.
None	-	-	4.24	3.41	3.83
Pel Lime	knife	724	4.44	3.49	3.97
Ag Lime	broadcast	2,916	4.30	3.47	3.89
Fluid Lime	broadcast	2,000	4.72	3.53	4.13
Fluid Lime	knife	2,082	3.91	3.82	3.87

There is some variability in yield among treatments. This, however, is natural variability in the field. Yields were not affected by the topdress application of lime. Differences in yield were not the result of lime applied (compare yield of all treatments to yield of the control).

When the benefits of lime applied to acid soils are considered, yield increases from topdress applications should not be expected. Lime is used to establish a good pH environment for the bacteria which cause nodulation allowing alfalfa to utilize the nitrogen in the atmosphere. These nodules do not develop on roots at the soil surface. The majority of the nodules are found at a depth of 4-6 inches.

Surface-applied lime without incorporation will not change the pH at this depth. Incorporation of topdressed lime must be used to realize full benefit from lime use.

Therefore, growers who plan to seed alfalfa in 1997 should use the following procedures.

1. Take a soil sample to measure soil pH and determine the amount of lime needed.
2. Broadcast the needed lime and incorporate. This can be done in either spring or fall.
3. Plant alfalfa after lime is incorporated.

*George Rehm
Extension Soil Scientist*

Potassium Deficiency Symptoms in Southeast Minnesota

In 1996, there have been numerous reports of potassium (K) deficiency symptoms in both corn and soybean fields in southeastern Minnesota. The obvious question is: "Why is potassium deficiency more obvious in 1996 compared to other years?" The answer is related to the 1996 weather as well as production practices used in the area.

Potassium uptake by agronomic crops is relatively high and plants absorb substantial potassium to produce optimum yields. Potassium is also relatively immobile in soils. Therefore, normal root growth is needed so that adequate amounts of K can be absorbed by actively growing plants.

The ability of plants to absorb needed potassium was hindered by two factors in 1996. To begin with, soil compaction has been a major problem in recent years. Planting seasons have been wetter than normal. Soils have also been wet at harvest. Compaction of these wet soils has probably restricted root growth thereby limiting the ability of plants to absorb potassium.

Soils were also drier than normal in southeastern Minnesota in 1996. Potassium fixation is enhanced when

soils are dry. This fixation reduces the amount of potassium available for plant growth. The combination of compaction and dry soils can explain many of the observed deficiency symptoms.

Management practices used by some crop producers cannot be ignored as a possible cause. Some growers who reported deficiency symptoms used 10-34-0 as a starter or pop-up fertilizer as a substitute for 7-21-7. The deficiency symptoms were more severe in fields where potassium had not been applied in a starter fertilizer.

Soil tests for potassium were either low or very low in fields where potassium deficiency symptoms were obvious. These observations indicate that many producers could improve crop production by paying close attention to soil test values for potassium.

In summary, the increased number of reports of potassium deficiency can be attributed to any one or a combination of the three factors discussed above.

*George Rehm
Extension Soil Scientist*

Minnesota Soybeans Need More Harvest and Post-harvest Care

A recent study by the Iowa State University Grain Quality Laboratory indicates that for the years 1987 to 1990, Minnesota soybeans had higher moisture content, more foreign material, more splits, and more DKT (total damaged kernels, which is largely mold damage) than soybeans from other states in our region. (See C.R. Hurburgh, Jr., 1996, "US soybean quality related to costs and benefits of soybean cleaning," *Applied Engineering in Agriculture* 12(3):379-382, ASAE, St. Joseph, MI.)

Given our short growing seasons and narrow windows of harvest opportunity, Minnesotans frequently encounter more difficult conditions for harvesting soybeans than do our southern neighbors. This doesn't mean that we can't produce as high quality beans as our neighbors, it just means that we need to work a bit harder to do so. With the expected high prices for soybeans this year, it would be worth investing a little more time, effort, and fuel (electricity and perhaps gas) this year to make sure you have high quality beans available for sale.

The first step in producing high quality soybeans starts with combine operation. Check the condition of harvested beans frequently and change combine settings as needed to minimize the number of split beans and amount of foreign material in the grain tank. It might be

best to leave replanted spots or other parts of fields that have unusually wet or immature beans for later harvest, rather than mixing them in with beans that are clean, dry, and fully mature.

If soybeans are 13% moisture or less, they can go directly into storage. All storage bins should have some kind of aeration system - especially for a high-value crop like soybeans. Use the aeration system to cool beans down to 20 to 30 F for winter storage. Storage at this temperature reduces the likelihood of mold growth and reduces the chances of natural convection currents which can cause moisture migration and spoilage at the top of the bin.

If soybeans are wetter than 13% moisture, they need to be artificially dried for safe storage. Natural-air drying (no heat) should work well if you have a bin that has a full perforated floor and fan power of about 0.75 hp per 1000 bu of beans (for bins less than 18 ft high). Heated-air drying can also be used for soybeans, but keep the temperature down (less than 140 F) to avoid splitting seeds. Turn the temperature down even further (less than 110 F) if you plan to keep the beans for seed.

Best wishes for a profitable soybean harvest!

Bill Wilcke
Extension Engineer

Samples Submitted to the Plant Disease Clinic in September

corn—Eyespot and anthracnose leaf spot
soybeans—downy mildew, soybean cyst nematode, *Septoria* sp leaf spot
turnip—*Rhizoctonia* sp root rot
Erigeron—*Phytophthora* sp root rot
Empress of China—*Pythium* sp root rot
Daphne—*Phytophthora* sp root rot
Helleborus—*Phytophthora* sp root rot
geranium—rust
Chrysanthemum—*Rhizoctonia* sp root rot
dwarf lilac—*Phytophthora* sp root rot
oak—Oak wilt
ash—Verticillium wilt
scotch pine—*Diplodia* sp tip blight
turf—Fairy ring, *Colletotrichum* sp (anthracnose) leaf spot

Sandra Gould
Plant Disease Clinic

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Water Evergreens Until Ground Freezes

The Twin Cities area has a moisture deficit of seven inches, as of late September. Not all parts of the state are quite that dry, but many are drier than usual. This has serious implications for landscape plants, especially evergreens.

It's critical that evergreens go into dormancy without suffering moisture stress since their needles will continue to lose moisture throughout the winter, due to sun and wind. And it's particularly important for young trees and shrubs that haven't had years to establish extensive root systems.

Unless plants receive frequent, fairly regular rainfall, it's best to supplement with a thorough soaking every seven to fourteen days (depending on temperatures) right until the ground freezes. It's also a good idea to mulch evergreens with three or four inches of woodchips or shredded bark to keep soil from freezing as early as it might otherwise.

If you've been watering young deciduous trees and shrubs all summer long, you should probably hold off any additional watering this late in the season. Eventually we'll probably get some fall rains, and if you just keep watering at this point, it could interfere with those plants going into dormancy in a timely fashion.

(Deciduous materials—because they drop their leaves—aren't at as great a risk of losing moisture in winter.)

Wait for Frost Damage to Cut Perennials Down

A common question this time of year has to do with cutting down foliage from peonies and other perennials. The leaves may look a little ragged, or, in some cases such as with bleeding hearts, they may be quite yellow.

The rule of thumb is to leave foliage alone that's mostly green. Cut it down after frost damages it; until then it's still putting energy into the roots for next year. Yellowed leaves are a different story, though. Once they're no longer green, they're not functional. They can be cut back at any time.

Keep in mind, though, that if leaves aren't badly damaged by insects or disease, you may wish to leave them in place over the winter to help hold snow and protect the plants' roots.

*Deborah Brown
Extension Horticulturist*

Entomology notes We received numerous calls and samples from southern Minnesota about 'tiny orange bugs' on the trunk of ash trees. These tiny bugs are actu-

ally **spider mites** congregating on the bark, preparing to hibernate for winter. No treatment is necessary at this time year. We did suggest that people could wash them off with a hard stream of water from a garden hose if they wanted to take some action.

Callers recently wanted to know what was making loud, pulsed sounds in the tree tops at night. That is a good description of a **katydid**. The males sit in tree tops calling a mate. This sound sometimes was annoying to people trying to sleep. However, there is no practical control for katydids. It is a temporary situation that people need to tolerate until the insects go away on their own.

Damage by **white grubs** to turf has been apparent during September. You can distinguish white grub injury from other lawn problems by trying to lift the grass up. White grub feeding allows you to easily lift the turf up whereas the lawn holds firm for other problems. White grubs have a three year life cycle. All the white grub problems reported have been in their third (and last) year of development. Because they are finished feeding, it is too late for control (also control would be too late this season as white grubs are moving deeper into the soil for the winter).

One of the most common household insects reported recently is **fruit flies**. These flies are attracted to old fruits and vegetables and moist food particles. The best control is to find the food source and remove it, although this is often challenging. Check for old fruits and vegetables, food stuck on the bottom or sides of trash containers, clogged garbage disposals, soft-drink residue from cans or bottles kept for recycling, food swept into floor drains and so on. The problem usually involves a site that has been left undisturbed for some time. Spraying the adults with an insecticide does not control fruit flies as long as there is a food source for them to lay their eggs into.

New publication

Insecticide Suggestions to Manage Landscape Tree and Shrub Insects, FO-0704 has just been revised. It lists common landscape tree and shrub insect pests, their tree and shrub hosts, effective pesticides, timing for pesticides, and other pertinent comments in a very easy to read format. The pesticides are listed as commercial use only or as general use. If you deal with tree and shrub problems, be sure you have this new publication in your files.

*Jeffrey Hahn
Assistant Extension Entomologist*

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CROP**NEWS**

*From the
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SEP 19 1996

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Drainage School Planned For Certified Crop Advisors

Date: September 19 and 20

Place: Ada, Minnesota

The Minnesota Extension Service Crop Systems Team is planning a drainage school for individuals (certified crop advisors, extension educators, etc) who would like to increase their knowledge base about surface drainage design, economics and environmental impacts associated with drainage; and awareness of available technical resources in the Red River Basin. The day and half training will be held on September 19 and 20 at the VFW Club in Ada, Minnesota.

The cost of the school is \$50 and pre-registration is required. Soil and water management CEUs have been applied for from the MN Certified Crop Advisor Board.

This educational program is being coordinated by Ken Pazdernik (218-784-7183) at Norman County Extension Office in Ada, Minn., and Jerry Wright at the West Central Experiment Station (320-589-1711) to obtain registration information. Contact Ken Pazdernik *immediately* if you'd like to register.

Topics to be covered included surface drainage system options and design factors, drainage system

construction and maintenance considerations, Minnesota drainage laws, Swampbuster criteria, water quality assessment in the Red River Basin, land values and available land/water programs from state agencies. Also included as a part of the first day is a field tour to observe different drainage systems in Norman county.

*Jerry Wright
Extension Engineer*

Highlights....September 13, 1996

*Drainage School Planned For Certified Crop Advisors
Growing Degree Day (GDD) Update
Sclerotinia Surveyed As Number One Canola Problem
Corn Borer, Corn Earworm, and Trap Catch Update
Dial U
Foreign Grain Beetles
Entomology Notes
Last Chance For Seeding Grass*

Growing Degree Day Update

Several crop producers have expressed some concern over the lack of Growing Degree Days this year. Your concern should, however, be minimal. Departures from normal values have not been particularly extreme.

Growing Degree Days (GDD) are a generalized temperature-based index used to gage the development and maturation of field corn throughout the Midwest. Using daily mean temperature, the modified GDD method uses a lower base of 50 degrees F and an upper base of 86 degrees F. GDD are accumulated from planting until crop maturation (black layer). The GDD index is not precise for all Relative Maturity (RM) groups or for all hybrids.

Much of the state's corn crop has now entered the dent stage. Typically 105 day RM hybrids take about 2050 GDD to reach this stage, while 115 RM hybrids require over 2200 GDD to reach the same stage. GDD departures from the long term average have not been extreme this year, as shown in the accompanying table. In fact, the warmer than normal temperatures during late August and early September helped push crop development along. Some northwestern locations actually show above normal GDD values since May 1, while the remainder of the state is generally somewhat less than normal.

Growing Degree Days (Base 50/86 F) for the period from May 1 to September 8, 1996 at selected Minnesota climate stations. Percentage of normal is based on 1961-1990 average values for the same time period.

Location	Cummulative GDD	% of Normal
Crookston	2036	103
Moorhead	2150	102
Warroad	1804	106
Itasca	1806	104
Alexandria	2037	96
Browns Valley	2262	104
Canby	2252	95
Morris	2117	102
Hutchinson	2136	95
Staples	1998	106
St. Cloud	2003	101
Willmar	2116	96
Lamberton	2156	95
Pipestone	2076	97
Redwood Falls	2264	94
Worthington	2043	95
Faribault	2051	94
Waseca	2121	98
Caledonia	2028	98
Rosemount	2200	97
Winona	2242	97

Mark Seeley
Extension Agricultural Climatologist

Sclerotinia Surveyed As Number One Canola Problem

Sclerotinia was the most serious disease in a survey of 85 Canola fields in North Dakota, Minnesota and South Dakota. The incidence (number of infected stems) was 14 percent for all three states and 16 percent for eastern North Dakota and Minnesota. Losses for eastern North Dakota and Minnesota are estimated at 11 percent, but individual fields with 35-47 percent incidence may have experienced 24-33 percent losses.

No satisfactory management strategy is available

for Sclerotinia except to not plant susceptible crops in short rotation; and many growers know that crop rotations are not an adequate answer to this disease. We are making progress toward the registration of Benlate fungicide under the IR-4 (minor use) program. It should be available for growers within several years, along with information on deciding when it will be economic to use a fungicide. Future new variety releases may also help reduce losses.

Blackleg was a minor problem in most fields, al-

though there was high incidence in a field of Polish Canola (all these varieties are susceptible) and in one other field. Use of Argentina varieties with a moderate level of resistance has helped to control blackleg in recent years.

Art Lamey
North Dakota State University
Extension Plant Pathologist

Richard A. Meronuck
Extension Plant Pathologist

Corn Borer, Corn Earworm & Trap Catch Update

European corn borer (ECB) and corn earworm (CEW) moth flights continued to decline during the past week, with most of the ECB trap catches declining significantly since September 5. Egg-lay and larval development will now be significantly delayed as high temperatures drop into the 60s and low 70s (degrees F). Although the ECB flight this year for southern Minnesota was about as long as usual (five weeks+), it was not as high in some areas as we were expecting given the mammoth size of the first generation flight.

I may have indicated in a previous article that spraying for ECB or CEW could be stopped within seven days of anticipated sweet corn harvest. This estimate, particularly with cooler temperatures, should now be raised to at least 10-14 days. Any new larvae hatching during this time period will not reach large enough size (i.e., > 1/2 inch in length) by harvest to cause contaminate problems. A good rule of thumb is that, for most of the larval-stage pest insects, larvae mature at about 1mm per day, assuming average heat units of 20/day. Therefore, it should take most larvae about 14 days to reach this 14 mm length, meaning they should either not make it into the ear tip, or easily spin out early in the processing plant.

This rule of thumb also assumes the following: early sprays during early-tassel to early-silk have provided the most timely control, so that late-instar larvae are not present within the ears; most silks are start-

ing to turn brown at this time, and therefore no longer attractive for ECB (or CEW) egg-lay; and most insecticide applications at this time will be too late and not effective on late-instar larvae (e.g., > 1/2 inch).

ECB Moth Flight Summary for Minnesota, September 4-11, 1996*

Location	Average Number of ECB/Night	Maximum Number of ECB/Night (with Date)
Olivia	9.6	20 (9/6)
Lamberton	11.9	44 (9/5)
S. Lamberton	---	---
Blue Earth 49a	67.1	214 (9/5)
Blue Earth 49b	30.4	88 (9/5)
Arlington	24.6	75 (9/5)
Waseca 53S (SES)	9.3	25 (9/5)
Waseca 54N	54.7	123 (9/4)
Waseca (Dean FVC)	55.1	93 (9/5)
St. Peter	49.0	75 (9/4)
Randolph	44.7	108 (9/5)
Rosemount	28.0	49 (9/5)

*Thanks again to all volunteer cooperators, processors and MDA staff.

Bill Hutchison
Extension Entomologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Foreign Grain Beetles

Foreign grain beetles have been common since the first of September. They are very small (about 1/12 inch long), reddish-brown and commonly fly. People may describe them as looking like fruit flies. Foreign grain beetles are attracted to moisture and are commonly found around sinks, basins, tubs, or other sources of moisture. New homes especially are attractive to these beetles because of their wet wood.

Due to their small size, foreign grain beetles can easily enter homes. There is no practical control to prevent foreign grain beetles from entering homes. Once inside, these insects are just nuisances, and physical removal is the only necessary control. When the weather becomes drier (less than 60% humidity) foreign grain beetle numbers go down, and eventually they should go away on their own.

Entomology Notes

We continue to receive calls and samples on a variety of **late-season defoliators** on trees and shrubs including fall webworms, pearslug sawflies, cecropia caterpillars, orange-striped oakworms, and sawflies on pine. No control is necessary this late in the year.

We also continue to receive questions about **yel-**

low jackets, especially those that nest in the ground, or in wall voids and other concealed cavities within buildings. If their presence can be tolerated, wait for freezing temperatures to kill them in their nest (See *Wasp and Bee Control*, FO-3732).

During late August and early September, we identified several samples of small, green beetles that look like cucumber beetles only without any stripes or spots. In fact, they are a close relative of cucumber beetles, known as **northern corn rootworms**. They have been reported feeding on a wide variety of garden plants. Carbaryl (Sevin), diazinon and malathion should be able to effectively control these insects, although it would not be worth treating any that are still active now.

A number of apple samples have been examined recently, many with **plum curculio** damage. These apples have a crescent-shaped scar due to egg-laying. Many of these apples are also deformed and misshapened due to plum curculio feeding. The best time for treatment is in the spring at petal drop, with a follow up spray about 7-10 days later.

*Jeffrey Hahn
Assistant Extension Entomologist*

Last Chance for Seeding Grass

For all practical purposes, this weekend is your last good opportunity to start grass seed this autumn. Regardless of whether you want to overseed a thin lawn, repair dead areas, or simply start some new lawn from scratch, grass planted now should have ample opportunity to develop a root system that will enable it to survive the winter. It **IS** possible to attempt a dor-

mant seeding later in the season, but your chances of success are not as great.

The beauty about planting grass in early autumn is that most weed seeds are "programmed" to sprout earlier in the growing season. They won't pop up to compete with new grass the way they would in spring. Soil is still warm, so grass seeds will germi-

nate rapidly in autumn. Typically there's more rainfall, too, to help with the job of keeping newly planted grass moist.

Soil preparation is important if you want the new seed to grow well and come back thicker and stronger next spring. Seed must make contact with soft open soil, which means you need to power rake or core aerate existing lawn before overseeding, and work up new areas or dead patches thoroughly before you plant.

Spread starter fertilizer or mild organic fertilizer such as Milorganite when you seed, then water newly seeded areas lightly but regularly, perhaps as often as twice daily if weather remains hot and dry. As seeds sprout and grass grows taller, gradually begin to water more deeply but less often.

Finally, mow the grass once it's about three inches; it's not a good idea to let it just get too tall and floppy.

If you want to try dormant seeding, prepare the area to be seeded just as you would for early fall seeding, but wait until weather is much cooler and soil is about to freeze or lasting snow is expected. Plant your seeds when there's no chance of germination -- probably mid-to late October or later, depending on how far north you live.

Keep newly seeded areas off limits to foot traffic, even though there's plenty of snow cover. If all goes well, the seed will sprout with snowmelt, spring rains, and warmer sunnier days.

Deborah Brown
Extension Horticulturist

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CRP Acres Back Into Production: Fertilizer Management

A considerable number of acres which are currently enrolled in the CRP program are scheduled to go back into crop production next year. This is an excellent time to start thinking about fertilizer management options that might be used to reach optimum yields. Some suggested practices might be somewhat different from those that have been used by many farmers in the past.

In southern Minnesota, these acres will probably be planted to either corn or soybeans. Therefore, fertilizer management suggestions are provided for both crops.

Nitrogen Use: Many have chosen to use the moldboard plow or the chisel plow on these acres this summer. Others will use these tillage implements this fall. With both systems, a considerable amount of residue has been incorporated and this will affect nitrogen recommendations for corn.

In order to arrive at cost-effective nitrogen recommendations for these acres, plan as if corn was the previous crop. If acres were plowed before mid-October, use a soil nitrate test to measure the amount of nitrate-nitrogen ($\text{NO}_3\text{-N}$) produced from the breakdown of the organic matter during the summer and early fall. Adjust the nitrogen recommendations for the amount of $\text{NO}_3\text{-N}$ measured. Use the standard recommendations for corn following corn if the moldboard plow or chisel plow is used after mid-October.

Be sure to use a soil nitrate test to determine nitrogen recommendations if corn is to be planted in 1998 following corn in 1997.

To reduce the potential of soil erosion, the soil surface should be left as rough as possible through the winter months. This means that nitrogen applications for these acres should be deferred until next year.

Nitrogen fertilizer, of course, will not be needed for those who choose to grow soybeans in the first

Highlights....August 30, 1996

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Corn Borer, Corn Earworm Alert, and Trap Catch Update
Carrots/Aster Leafhopper
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Some Roses Didn't Bloom Either
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CRP Acres/Continued

year of production. Inoculation of the seed just prior to planting is recommended. This practice will help to assure that the soybean crop will get the needed nitrogen from the air.

Phosphate and Potash Use: These nutrients are not mobile in soils. Therefore, special consideration should be given to placement. If the moldboard plow or chisel plow has been used for primary tillage, these essential nutrients can be either broadcast and incorporated before planting or applied as a starter for corn. If possible, delay broadcasting until spring. This will reduce fixation or tie-up (especially phosphorus on high pH soils). Unless the residue is thoroughly incorporated, these soils may be cooler than most. Therefore, the use of a starter fertilizer for corn is strongly suggested.

A starter or banded fertilizer supplying phosphate and/or potash is essential if a no-till planting system is to be used for corn production. The presence of large amounts of residue on the soil surface puts corn at a disadvantage early in the growing season. The banded phosphate and/or potash can help the crop overcome this disadvantage.

For soybeans, highest yields have been achieved if phosphate and/or potash are broadcast and incorporated before planting. Banded use of these nutrients will, of course, be needed if soybeans are planted with no-till techniques.

The rate of phosphate and potash should be based on the results of a soil test. Expect these values to fall into the low range. Soil samples should be collected this fall. This sampling can be completed either before or after primary tillage.

Sulfur and Micronutrient Use: Sulfur is needed in a fertilizer program only if soils are sandy and corn is the intended crop. Use 12-15 lb. sulfur per acre in a starter fertilizer if soils are sandy. The soil test for sulfur is not a reliable indicator of the need for this nutrient if soils are not sandy.

Zinc is the only micronutrient which may be needed in a fertilizer program for corn grown on these acres. The soil test is the best predictor of need. Zinc is most effective if used in a starter fertilizer and low rates are needed.

Sulfur and zinc are not needed in fertilizer programs for soybean production.

*George Rehm
Extension Soil Scientist*

Pre-Harvest Checklist for Corn Drying and Storage Systems

Here are some things you can do to get your drying and storage system ready for harvest and make it more effective, reliable, and safe.

- * Pull or cut weeds and grass within a couple of feet of bin foundations. This will reduce problems with insects and rodents and make it easier to clean up any spilled grain.
- * Clean up spilled grain outside of bins and old grain inside bins, conveyors, or unloading sumps.
- * Try to remove accumulated fines from the inside of aeration ducts and from under perforated floors. A powerful shop vacuum cleaner or a pneumatic grain conveyor might make this task easier.
- * Remove bird's nests from grain spreaders and stirrers and from bin hatches and eaves.
- * Inspect wiring and controls for corrosion, broken insulation, or rodent damage and repair as needed.
- * Inspect belts, chains, and mechanical drives and replace any broken or worn parts.
- * Replace missing guards on drives or over auger intakes.
- * Lubricate any parts that need it and check lubricant levels in gear boxes.
- * Fill propane tanks.
- * Clean fan blades that have an accumulation of dust or insect or rodent parts on them. Disconnect the power first!
- * Start fans and burners to make sure they and their associated controls still work. Open bin roof hatches or vents before starting fans to avoid damaging bin roofs.
- * Put a new battery in your portable moisture meter and check its moisture readings against those from a meter known to be accurate.
- * Consider buying some a few critical spare parts to have on hand.

Have a safe and trouble-free harvest!

*Bill Wilcke
Extension Engineer*

Samples Submitted to the Plant Disease Clinic in August Included:

soybean—*Phytophthora* and *Rhizoctonia* sp root rot,
soybean cyst nematode
sugarbeet—MT soils for cyst nematode egg counts
turf—*Colletotrichum* sp (anthracnose), *Pythium* sp
and *Rhizoctonia* sp root rot, fairy ring
Amelanchie—*Entomosporium* sp leaf spot
oak—Oak wilt
elm—Dutch elm disease
red pine—*Diplodia* sp twig blight
maple & ash—tested for *Verticillium* wilt-negative
results
mayday—black knot
Prunus—*Cylindrosporium* sp leaf spot

lilac—*Phytophthora* sp
dahlia—Dahlia mosaic virus
daylily—*Fusarium* sp crown and stem rot
rose—*Diplocarpon* sp (black spot)
tomato—*Phytophthora* sp (late blight)
potato—*Alternaria* sp (early blight)
Penstemon—*Rhizoctonia* sp root rot
Paxistima—*Phytophthora* sp
Coreopsis—*Phytophthora* sp
Pittosporum—*Phytophthora* sp

Sandra Gould
Plant Disease Clinic

Corn Borer, Corn Earworm Alert & Trap Catch Update

European corn borer moth flight declined during the past week (*See Summary Table*); we should be past peak flight activity by now. However, recent cool weather, along with some significant nighttime rainfall, has reduced emergence and/or flight activity. In green tassel and silking sweet corn, where light traps averaged 150-300 moths/night, it is common to find 1-2 egg masses per plant (within minutes of scouting; e.g., Rosemount Expt. Stn.). Again, ECB egg masses (usually 15-30 eggs/egg mass) will most often be found on the undersides of leaves usually near the midrib, usually 1 ft above or below the primary ear. However, egg masses can also be found near or on the tassels, or on small "ear leaves", especially those at the tip of the ear on hybrids with an abundance of excessive husk tissue. I have noticed many of these additional sites for egg-lay come in to play under heavy ECB pressure during the 2nd generation (late-season) flights.

More frequent updates for both egg lay and trap catch information, including trap catch information for Illinois locations are available via our internet site (note that this site is best viewed using a 28.8K modem and either Netscape 2.0 or 3.0, or Microsoft's Explorer; also the address below must be typed in exactly as shown, e.g., use only LOWER CASE letters).

'Veg-Edge' World Wide Web site at: <http://www.mes.umn.edu/~vegipm/>

Corn Earworm Alert: Of equal importance to sweet corn growers (as well as those growing snap beans, peppers) is the recent MAJOR INCREASE in corn earworm moth flights throughout southern Minnesota (based on pheromone trap data; *See Also Summary Table*). Right on schedule (i.e., Aug. 25th, plus/minus 4 days), CEW trap catches increased from nearly zero to an avg. of approx. 20/night in some areas. The flight is not related to our local degree-day accumulations, but more likely, the senescence of field corn in Texas and other southern states. In previous years, USDA-ARS researchers (Texas A&M University) tracked this same late-August flight into to southern Canada.

Our general guidelines are to treat for CEW when pheromone trap catches average 10 or more moths/night for at least 3 nights, or 4% of the plants are infested with eggs. CEW lay their eggs directly on sweet corn silks, thus effective insecticide residue needs to be on the corn silk before eggs hatch (3-6 days, depending on temperature). All of the pyrethroids are effective on CEW; those still using PennCap-M for ECB control, should switch to the pyrethroids (Pounce, Warrior or Baythroid for ECB; the same pyrethroids or Asana XL for CEW) for the remainder of the season. *Note:* I have field and laboratory data to show why the max. labelled rate of 0.05 lb AI/ac of Asana XL does not provide adequate control of ECB in Minnesota; notify me if you need a copy of these reports.

Corn Borer, Corn Earworm Alert/Continued

Use the mid- to high rate range of each pyrethroid to provide maximum residual activity, and attempt to stay on a 4-5 day schedule (approx. 50-60 degree days). With cooler weather right now (highs in low 80s), a 5-day schedule with the pyrethroids should be adequate for both ECB and CEW. For both insect pests, insecticide sprays should be discontinued once

most of the corn has reached the brown-silk stage, or the crop is within 7 days of harvest.

See also the *1996 Commercial Vegetable Pest Management Guide* (\$6.00) or the *1995 Vegetable Insect Management book* (\$45.00) (see previous MCN issues to order) for more details on CEW management in sweet corn and other vegetable crops.

ECB and CEW Moth Flight Summary, Minn., August 21-28, 1996**

<u>Location</u>	<u>Avg. # ECB/Night</u>	<u>Max. # ECB/Night (Date)</u>	<u>Avg #CEW/Night.Max</u>
Crookston	---	---	---
Fergus Falls	6.6	11 (8/24)	---
Morris	10.0	34 (8/22)	---
Bird Island	---	---	---
Olivia	48.0	109 (8/22)	---
Lamberton	55.3	94 (8/26)	---
S. Lamberton	---	---	---
Jeffers	98.5	187 (8/25)	---
Brooten	---	---	---
Blue Earth 49a	153.7	371 (8/26)	269.1 475 (8/27)
Blue Earth 49b	122.3	302 (8/22)	---
LeSueur 51a	45.6	170 (8/22)	---
LeSueur 51b	53.3	144 (8/22)	18.5 30 (8/26)
Sleepy Eye 52a	62.1	125 (8/22)	21.4 45 (8/28)
Sleepy Eye 52b	76.0	200 (8/22)	30.0 64 (8/27)
Arlington	47.1	75 (8/22)	---
Waseca 53S (SES)	16.9	21 (8/24)	---
Waseca 54N	45.7	98 (8/21)	---
Waseca (Dean FVC)	107.2	164 (8/21)	---
St. Peter	48.3	113 (8/25)	---
Randolph	70.6	91 (8/21)	---
Rosemount	47.1	198 (8/21)	17.4 27 (8/25)
Faribault	---	---	---
Owatonna	101.6	426 (8/26)	2.4 11 (8/25)
Geneva/Hollandale	72.4	226 (8/22)	18.3 93 (8/22)
Simpson	14.3	20 (8/23)	---

** Note: ECB counts based on light traps; CEW counts based on pheromone traps (light trap is not an efficient/reliable trap for CEW). Thanks again to all volunteers, processing company representatives and MDA staff.

Bill Hutchison
Extension Entomologist

Carrots/Aster Leafhopper

In addition to on-going fresh-market carrot harvests in the Anoka area, carrot harvest has also begun in southern Minnesota and the ALH season is winding down. ALH counts have declined the past 2 weeks at Hollandale, Rosemount and in the Anoka area. Our general rule of thumb is that growers can stop spray-

ing for ALH within 3 weeks of harvest. This is because of the delay between initiation of ALH feeding and time for an infected plant to show significant damage to the roots (such as bitter taste or excessive root hairs).

Bill Hutchison
Extension Entomologist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Potato Questions

Potatoes are a popular home garden vegetable; they're a snap to grow as long as you have a good, sunny location and reasonably good soil that drains well. This year we've had lots of question about how they're growing, though.

Many people who grow potatoes regularly noticed that their plants weren't flowering, probably because they got off to a slow start with our late, cool spring. They assumed the lack of blossoms meant there would be no potatoes.

In reality, potato tubers develop in response to days growing shorter, irrespective of flowering. The flowers are only useful to potato breeders who make crosses, then save and plant out seeds from the little fruits that develop. The small tomato-like fruits are not edible; whether they appear or not is of no consequence.

Some Roses Didn't Bloom Either

Failure of roses to bloom is far more serious. In fact, if a hybrid tea rose doesn't bloom at all, chances are good that the grafted, desirable part of the rose bush died in last winter's cold. The rootstock sends up canes, but they only bloom on second year wood, and their flowers—should you protect them well enough to bloom next year—are not particularly showy.

Bottom line: If a rose didn't bloom at all this year, dig it out and replace it next spring. Consider planting a hardy shrub rose in its place.

*Deborah L. Brown
Extension Horticulturist*

Mole and Gopher Control

Moles and pocket gophers leave signs of increased activity in the fall, so this is a good time of year to control them. Ridges of pushed-up soil in your lawn, sometimes accompanied by piles of dirt, are indicative of moles, while gophers tend to leave large, fan-shaped piles of dirt and no surface tunnels. Mole traps and gopher traps can be purchased at many garden centers and hardware stores. Step down across mole tunnels and check periodically to see if those spots have been raised up again. If so, you've located an active runway and a good place to set your trap. To set pocket gopher traps you'll need to dig down to the tunnel system and set the trap into a runway. Place a board or flat rock over the opening you

made at the surface, or the gopher may try to seal off the tunnel and cover the trap with dirt in the process.

*Alice Doolittle
Wildlife Technician*

Aphids in Trees and Shrubs

Some recent calls have described "sap dripping out of trees and shrubs". The "sap" is a sticky substance known as honeydew. It is composed of sugars that some plant-feeding insects, including aphids, cannot digest and is excreted. Although honeydew is not harmful to trees and shrubs, it can be annoying. Honeydew can be difficult to remove from objects, especially when left for a long while. The feeding of aphids has no long-lasting effect on healthy, well-established woody plants. You can reduce aphid numbers with a hard spray of water. A spray of insecticidal soap also helps to manage aphids and is soft on natural enemies. Acephate (Orthene) and malathion also helps to manage aphids but can also kill aphid predators and parasitoids. The nuisance of honeydew needs to be weighed against the cost of treatment, especially when aphids occurs in large trees.

Entomology Notes

Spiders on the outside of buildings are common this time of year. Clean up wood piles and other debris, cut tall grass near buildings, kill egg sacs, knock down webs, and kill spiders that are found. An insecticide spray of chlorpyrifos (Dursban) or diazinon, especially under siding and in other cracks and crevices also helps to manage spiders. Beetle-like or bug-like insects that appear to be stuck to tree trunks and are seen moving out of their "skin" (i.e. they are molting) are **annual cicadas**. Also known as dog day cicadas, they spend most of their lives underground feeding on the roots of trees. They emerge in August to molt and turn into adults. They are a curiosity, but are not a pest to trees in Minnesota. Cicadas are also responsible for the high pitched whining sound that is heard during the day. **Grasshoppers** are still very abundant now. They are difficult to control because they are so mobile. It is impractical to treat garden plants to protect them from grasshoppers. **Stalk borers** have been found infesting the stems of flowers and vegetables. Once they are discovered, it is too late for control.

*Jeffrey D. Hahn
Assistant Extension Entomologist*

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COLLEGE OF AGRICULTURAL, FOOD,
AND ENVIRONMENTAL SCIENCES

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CROP**NEWS**

*From the
Crops System Team
of the
Minnesota Extension Service*

AUG 23 1996

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Assessing Crop Development and Fall Maturation

Much concern is being expressed about prospects for full maturation of row crops in Minnesota prior to the occurrence of a killing frost this fall. Crops lag behind historical average development by 7 to 10 days in most places.

Growing Degree Days (GDD) since May 1st range from 85 to 95 percent of normal and account for some of this slow crop progress, and in addition, most row crops were planted late this year. Positive temperature departures between now and mid September could greatly enhance crop maturation rates, but it is too late in the season to catch up entirely based on GDD. Whereas average daily GDD in late August is typically 17 to 19 per day, by mid September the average is only 10 to 12. Though average crop maturation occurs around mid September in Minnesota, row crops will benefit greatly from an extra 1 or 2 weeks before killing frost this year. National Weather Service outlooks have favored a cooler than normal fall for southern Minnesota, but this is likely to favor depressed temperatures due to cloudiness rather than increased chances for an early killing frost.

Perhaps the most significant climate anomaly affecting this year's crops were the persistent and extreme negative soil temperature departures during the planting sea-

son. Throughout the crop planting season until mid June, soil temperatures were well below historical normals and planted seed just sat in the soil and perhaps germinated very slowly. The table below is derived from our weekly Crop-Weather Reports showing weekly average

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Plant Conifers in Autumn
Excluding Wildlife Visitors This Fall
Nuisance Insects

Assessing Crop Development/Continued

soil temperature and departure from normal at various university experiment stations.

Mean soil temperatures at the 4 inch depth reported

by University of Minnesota AES Branch Stations in spring 1996. Shown as weekly average temperature and departure from historical average (degrees F).

Location	Week ending dates											
	5/12	Dep	5/19	Dep	5/26	Dep	6/2	Dep	6/9	Dep	6/16	Dep
Lamberton	48	-11	58	-4	57	-8	60	-7	62	-8	72	+1
Morris	45	-12	55	-6	53	-10	58	-8	60	-8	70	0
Waseca	48	-11	58	-5	57	-8	60	-7	60	-10	74	+3
Rosemount	51	-10	58	-6	59	-7	62	-6	61	-11	71	0

Mark Seeley
Extension Climatologist

Corn Borer, Corn Earworm & Trap Catch Update

European corn borer moth flight continues to be significant in some areas; we probably have not yet reached peak activity for the 2nd flight (see Table at right). Egg-lay reached 60-80% of plants infested (with one or more egg masses/plant) in silking sweet corn near LeSueur.

More frequent updates for both egg lay and trap catch information, including trap catch information for Illinois locations are available via our internet site (note that this site is best viewed using a 28.8K modem and either Netscape 2.0 or 3.0, or Microsoft's Explorer; also the address below must be typed in exactly as shown, e.g., do not use UPPER case letters).

'Veg-Edge' World Wide Web site at:

<http://www.mes.umn.edu/~vegipm/>

Corn earworm (CEW) trap catches remain low, but usually begin to increase this coming week. We will provide trap catch data on CEW as they migrate into Minn.

Bill Hutchison
Extension Entomologist

ECB Moth Flight Summary, Minn., August 14-21, 1996*

Location	Avg. # ECB/Night	Max. # ECB/Night (Date)
Crookston	1.3	8 (8/14)
Fergus Falls	3.3	5 (8/16)
Morris	7.1	17 (8/18)
Bird Island	29.9	90 (8/20)
Olivia	26.4	81 (8/20)
Lamberton	285.4	531 (8/18)
S. Lamberton	165.8	276 (8/19)
Jeffers	233.8	473 (8/20)
Brooten	1.3	4 (8/19)
Blue Earth 49a	189.5	404 (8/19)
Blue Earth 49b	402.8	1767 (8/20)
LeSueur 51a	113.3	176 (8/18)
LeSueur 51b	73.9	109 (8/18)
Sleepy Eye 52a	53.6	100 (8/19)
Sleepy Eye 52b	88.4	111 (8/15)
Arlington	117.3	208 (8/14)
Waseca 53S (SES)	24.0	38 (8/20)
Waseca 54N	86.5	116 (8/18)
Waseca (Dean FVC)	128.4	354 (8/14)
St. Peter	99.6	214 (8/19)
Randolph	186.6	139 (8/20)
Rosemount	---	---
Faribault	75.3	150 (8/19)
Owatonna	255.3	865 (8/19)
Geneva/Hollandale	84.3	117 (8/20)
Simpson	44.8	82 (8/20)

*Thanks again to all volunteer cooperators, processors and MDA staff.

Future Crop Technologies

We are entering an era where corn and soybean production will differ greatly from the production practices of the past. Biotechnology developed at universities are becoming commercially available. The result is crops which will be planted for particular agronomic practices and with particular characteristics matched to end use needs. Some of these types of practices have been around for a long time. A soybean with good chlorosis tolerance is planted on high pH soils or a corn hybrid with high vegetative development is planted for silage production. However, biotechnology and genetic engineering has increased both the potential and the complexities of crop production.

Genetic resistance to European corn borer feeding is currently available and in the next several years genetic resistance to cutworm and root worm will be available. It is anticipated that there will be continued introductions of protection strains to present development of insect resistance. Biotechnology also has made available both corn and soybeans which are genetically protected from herbicides. IR and IT or PT corn hybrids are resistant to herbicides Pursuit and Scepter. STS soybeans are tolerant to the herbicide Reliance which is a high ratio of Classic plus Pinnacle. In the near future Roundup Ready Soybeans and perhaps corn, SR Corn and Liberty Link Corn and Soybeans will be available. SR Corn is tolerant to the grass herbicide Poast and Liberty Link Corn and beans are tolerant to the new herbicide Liberty which is a non-selective herbicide similar to Roundup (but with a different mode of action). With

these technologies, it will become critical that the farm agronomic planning combine the seed selection with anticipated pest protection required with the planned herbicide application. Gone will be the days when weed or insect control decisions can be made without consideration to hybrid or variety planting selection. Accurate records will be important to avoid a mix-up of an improper pesticide application which could result in crop destruction.

At the other end of the production cycle, the end use of the corn or soybeans will be important. The increase in value added processing increases the emphasis on grain characteristics which are valued in processing. The CEO of a major seed company has predicted that within the next five years that virtually all hybrids and varieties may be "designed" for a specific end use, such as a high starch corn hybrid grown for ethanol production or a high protein, low fat soybean for human consumption. Corn grown for livestock feed will feature different nutritional characteristics that match the particular needs of pork, beef, dairy and poultry producers. Segregation of grains with different characteristics and end uses will be a challenge for farmers and commercial grain handlers.

The commercial introduction of biotechnology to crop production will bring many opportunities as well as challenges.

*Bob Byrnes
Extension Educator-Lyon County*

IPM Specialist Position Available

Kevin Cavanaugh's departure last fall created a void in IPM expertise in WC and SW Minnesota. After some delay, I am pleased to announce approval of an IPM specialist position for SW Minnesota. A brief description follows. For a more complete description or further information contact Dale Hicks, Search Committee Chair (see address below) or Ken Ostlie, IPM Coordinator at (612) 624-7436.

The University of Minnesota - College of Agriculture, Forestry and Environmental Science seeks qualified applicants for integrated pest management (IPM) specialist in southwest Minnesota. The IPM specialist will lead development and implementation of an IPM educational and applied research program on field crops in southwest Minnesota. This 12-month, non-tenured, professional position requires an MS or Ph.D. in a pest management (weed science, entomology, plant pathol-

ogy), or related field (agronomy, soils, horticulture). Strong leadership, communication, organizational and interpersonal skills are also required. Desired qualifications include experience in extension educational and applied research methods. Applicants with interdisciplinary education and/or expertise in pest management and cropping systems preferred. Interested applicants should submit letter of application, current CV, transcripts and three letters of reference (recommendation) to: Dale Hicks, Search Committee Chair, Department of Agronomy & Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108. Phone: (612) 625-8700 Fax: (612) 625-1268 email: dhicks@mes.umn.edu. Deadline for submission of materials is Oct. 1, 1996. The University of Minnesota is an equal opportunity educator and employer.

*Ken Ostlie
Extension Entomologist*

DIAL U

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Plant Conifers in Autumn

September and early October are ideal times to plant conifers in your landscape. Many people need to replace shrubs—and in some cases, trees—that were killed or severely damaged by last winter's combination of cold, wind, sun and ice storms. Others may simply wish to add evergreens to give their yards more winter interest.

The sooner you plant evergreens in autumn, the more opportunity they have for their roots to begin to become established. Mulch the root area with several inches of shredded bark, wood chips, shredded cornstalks or other organic material. It will prevent the soil from freezing as early as it would if not protected.

Organic mulches are far superior to the old "rock and plastic" combination that many people rely on. If you want a weed barrier, lay landscape fabric, available at nurseries and garden centers, below the mulch. Unlike sheets of plastic, these special fabrics allow air and water to penetrate to the soil below.

Water evergreens to supplement rainfall when weather is dry, but don't make the mistake of watering every few days. As temperatures drop, water thoroughly, but only once every week and a half to two weeks. You can rot the roots with overwatering, especially on heavy clay soil.

*Deborah L. Brown
Extension Horticulturist*

Excluding Wildlife Visitors This Fall

Snakes often overwinter under patios and driveways and in the foundation of houses. You may see them more frequently in the fall as they return to those spots. They generally do not do any damage. If you just don't like having them around, though, your best option is to exclude them from the cavities they are seeking out. Use caulking, driveway sealant or expandable foam to seal

off cracks and crevices greater than 1/4 inch. For a more permanent solution you may need to have someone come in to repair separated expansion joints or fill in under slumped steps or driveways.

This is a good time of year to think about bat-proofing your house as well. Seal off any possible entrance points; bats can squeeze through crevices as small as 3/8 inch by 7/8 inch. Cover vents and chimneys with hardware cloth. To avoid trapping bats in your house, leave one entry point open. Tack or tape a piece of bird netting or inner tube above the opening so that bats can crawl out but won't be able to find their way in again. After a few days or a week you can seal this opening off as well.

*Alice Doolittle
Wildlife Technician*

Nuisance Insects

There are two insects in particular that have been reported entering homes, sometimes in large numbers. The first are **ground beetles**. This is an extremely common group of beetles and it is not uncommon for them to enter buildings in August and September. These beetles are generally dark, although some may be metallic-looking. Most ground beetles are between 1/6 inch to 3/4 inch long. Ground beetles are predators of a wide variety of insects and are usually considered to be beneficial. You can find ground beetles on the ground under rocks, leaves, bricks and other debris. Ground beetles usually do not fly, but are quick runners.

Another insect that has been reported entering homes are damsel bugs (Nabidae). These insects are slender, about 3/8 inch long and grey. They have needle-like mouthparts, as do all true bugs. They typically are predators of aphids, caterpillars and other insects. Damsel

bugs are not known to be a problem indoors, but for some reason they are actively flying about now and accidentally invading buildings.

Both insects are very unlikely to bite people (they would have to be mishandled and almost encouraged to bite). They do not damage property and do not reproduce indoors. Once inside they are short-lived and die on their own. They are just a nuisance by their presence. Once these insects are inside, physical removal (e.g. with a vacuum or a broom and dust pan) is the only necessary control.

To prevent ground beetles from entering homes, check around the outside of the building and caulk, weather strip or otherwise seal any obvious cracks or

space that may allow insects to come inside. Also remove any objects that ground beetles may use to hide under. If large numbers of insects are occurring, you can supplement this with an insecticide treatment around the base of the building's foundation. Use a product containing diazinon or chlorpyrifos (Dursban).

Because damsel bugs can fly and enter through screens and other small spaces, they are difficult to control. An insecticide treatment around the building's exterior may help some but is not likely to keep all of them out. Both insects pose only a temporary problem and will go away on their own.

Jeffrey D. Hahn
Extension Entomologist

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CROP

NEWS

From the
Crops System Team
of the
Minnesota Extension Service

AUG 19 1996

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Trouble Times Two: Second Generation Corn Borer Infesting Fields

After a brief reprieve, corn borers are at it again. Light trap captures indicate rapidly increasing moth activity, and complaints from motorists conducting evening windshield surveys are starting. Egg masses have been observed at low levels this week but that will change markedly as the newly emerging moths mature and begin laying eggs. Jim Gill, scouting seed fields near Hastings, reported up to 20% of the plants with egg masses Wednesday. Although moth numbers are likely to peak soon, this moth flight promises to be quite extended. Egg laying should peak next week, Aug. 17-24, providing the prime time for scouting.

What damage can second generation cause? Second generation borers tunnel in the stalk and ear shank plus feed on developing kernels in the ear. While most farmers focus on harvest losses from dropped ears and broken stalks, the primary loss comes from physiological disruption by tunnels in the stalk. The result is reduced kernel fill and lower test weights. Ear tip feeding can also damage kernels, enhancing storage problems and potentially lead to dockage. Finally, in conjunction with stalk rots, plants may die prematurely from corn borer damage.

Can treating second generation make a difference? Yes. Marlin Rice, extension entomologist at Iowa State has been scouting and spraying second generation infestations for several years. In on-farm trials from 1991-1994, when scouting indicated insecticide use was warranted, he found yield benefits averaging about 12 bushels per acre with benefits in individual fields ranging from 9 to 33 bushels per acre. Similarly, a 1991 study at Lamberton found a 12-bushel return along with significantly higher test weight and less kernel damage. Even

at \$2/acre corn, the treatment of this field returned about \$30 per acre when grading penalties for lower test weight and kernel damage were included.

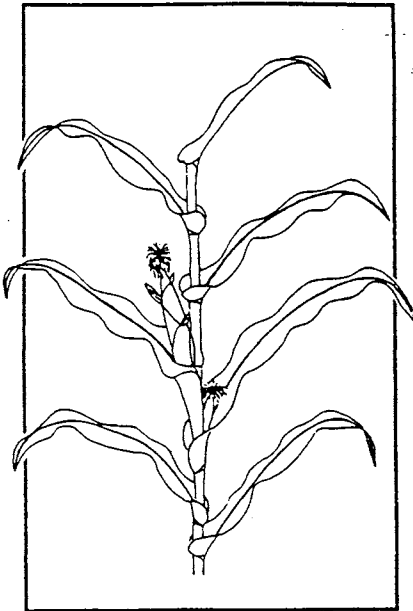
What do we scout during second generation? The focus on second generation scouting is on egg masses. The reason is simple: young larvae are tough to find in ear silks and leaf axils filled with pollen. Egg masses are white to cream colored clusters of eggs overlapping like fish scales. They vary considerably in size, from a few eggs to over 70 eggs, but average about 23 eggs per mass. A typical egg mass is about half the size of a pencil eraser.

Highlights....August 16, 1996

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Trouble Times Two/Continued

Where do we find egg masses? While egg masses are



laid all over the plant, the preferred location is on the waxy underside of the leaves near the midrib. About 90% of the egg masses are typically found in a zone from 3 leaves above to three leaves below the ear (see drawing).

Scouting zone for egg masses and larvae.

How do we scout a field? At each of five locations in a field, scout for egg masses on the underside of the middle seven leaves of 10 plants. Multiply the total egg mass count by 1.1 to correct for egg masses laid elsewhere on the plant. A second visit about 5-7 days later may be needed to ensure good timing.

When's the best time to scout? The best time to scout a field, when female moths have laid between 25% and 50% of their eggs. This timing allows insecticide to be applied just after peak egg hatch when best control is obtained. This year it appears that peak egg laying will occur the week of Aug. 18. While all fields will attract some egg laying, fields that are silking or pollinating now will attract the majority of egg laying. Focus particularly on later pollinating fields. If egg counts are low, check leaf axils for larvae, in case egg laying is largely

finished in your field. Return in 4 to 5 days and re-scout the field for egg masses. Add the two egg mass counts together and rework the calculations to see if the cumulative egg laying has reached treatable levels.

Is it worth treating a field? Use the decision process outlined below to determine if a field is worth treating. If this is your second visit to the field, add this visit's count to the previous count before proceeding with the calculation.

The physiological impact of a second generation tunnel is less than first generation, 2 to 4% compared to 5 to 6%. However, second generation makes up for it in sheer numbers. This decision process does not include potential harvest losses or next year's impact of volunteer corn. Why? Ear drop is highly variable and depends on infestation severity and harvest weather. In recent outbreaks, shank infestation levels over 50% in WC Minnesota, where conditions are more favorable for ear drop, produced 0.4% ear drop in 1991 to over 5% in 1987. Because ear drop is so unpredictable, it's not reflected in the calculation.

What insecticides can be used against second generation? Liquids are generally considered the preferable formulations for second generation. Primary options such as Ambush 2E, PennCap-M 2FM, Pounce 3.2E, and Warrior 1E may be in short supply. Widespread application of products against first generation has reduced supplies. Other labeled products with higher costs or slightly lower performance can be used, e.g., Furadan 4F, Lorsban 4E or Sevin XLR. Expect slightly lower residual benefits from these products.

With all insecticides watch applications restrictions and preharvest intervals closely. For example, Pounce and Ambush cannot be applied after brown silk stage while PennCap-M cannot be applied to a blooming crop, such as pollinating corn. These restrictions will also limit product selection depending on crop development.

Ken Ostlie

Extension Entomologist

Prime Corn Rootworm Scouting This Week

Adult corn rootworm emergence has been underway for about 2 weeks and should be peaking. After two weeks a female has matured sufficiently to begin laying eggs. Numbers in fields should stabilize over the next couple weeks. Scouting now should provide a good indication of the threat to corn if planted in the same field next year. The best scouting approach is a whole-plant count of adult beetles. The basic scouting process involves trapping beetles in the ear tip with one hand, while ex-

amining the rest of the plant for beetles with the other hand. Finally, release the ear tip and open it to count beetles cascading out of the ear tip. If counts on 50 plants (2 plants/location, 25 locations) average more than 1.0 beetle per plant than soil insecticide use or crop rotation is advised next year.

Ken Ostlie

Extension Entomologist

Cost Benefit Calculation for Second-Generation Corn Borer Treatment

1. Estimate borers per plant = _____ egg masses per plant X 4 borers per egg mass
2. Estimate resulting yield loss (%) = _____ borers/plant X 0.04% loss per borer*
3. Translate to bushel loss (bu/acre) = _____ % yield loss X expected yield (_____ bushels/acre)
4. Calculate economic loss (\$/acre) = _____ bushels/acre X expected price (_____ \$/bushel)
5. Estimate preventable loss = _____ \$/acre X 0.67% control
6. Determine if insecticide application profitable = _____ preventable loss - _____ control costs

For example, assume we found 30% of the plants had egg masses on a field with 120 bushel yield potential and a contract price of \$3/acre.

1. Infestation level = 0.30 X 4 = 1.2 borers/plant
2. Projected yield loss = 1.2 borers/plant X 0.04 = 0.048 or 4.8%
3. Estimated bushel loss = 0.048 X 130 bushels/acre = 6.24 bushels/acre
4. Economic loss = 6.24 bushels/acre X \$3/bushel = \$18.72/acre
5. Estimated preventable loss = \$18.72 X 0.80 = \$15.00/acre
6. Profit/Loss = \$15.00 preventable loss - \$16.00 control costs = -\$1.00/acre

Decision: Scout again in 5 days

Suppose after scouting in 5 days, we found another 0.15 egg mass/plant for a cumulative total of 0.45 egg mass per plant. Then the preventable loss would change to \$22.50/acre for a profit of \$6.50/acre.

Ken Ostlie
Extension Entomologist

Corn Borer, Corn Earworm & Trap Catch Update

The second generation ECB moth flight (normal bivoltine strain) really took off this past week, with many traps averaging 100+ moths/night in south central Minnesota (see Summary Table) below. The record for the week was one of the Blue Earth traps which peaked at 2,279/night on Aug. 14th. The interesting wrinkle is that we will probably not reach the peak of this 2nd generation flight until Aug. 23rd-26th.

Egg-lay, as of August 13th, had picked up to 20-40% (% of plants infested with one or more egg masses) in fresh-silking sweet corn. More frequent updates for both egg lay and trap catch information, including graphs of each trap site are available on our internet site:

'Veg-Edge' WWW site at: <http://www.mes.umn.edu/~vegipm/>

ECB forecast maps (including 50% peak flight) are now available for a 5-state region, including: MN, WI, IA, IL and IN. These maps can be found by selecting the option entitled, "ECB Infestation & Forecast Maps", from the VegEdge homepage.

Corn earworm (CEW) trap catches remain low, and range from 0-4/night, which is below treatment threshold levels for sweet corn. The max. catch of 4/night was at Sleepy Eye. CEW usually arrive in significant numbers about August 22-25th, ± 5 days. Their arrival (from southern corn production states, such as Texas to Kansas) is not related to our local degree-day accumulations, but more likely to the senescence of field corn in the southern states, and their subsequent northerly migration.

Bill Hutchison
Extension Entomologist

ECB Moth Flight Summary, Minn., August 8-14, 1996*

Location	Avg. # ECB/Night	Max. # ECB/Night (Date)
Crookston	6.9	22 (8/7)
Fergus Falls	11.8	23 (8/11)
Morris	5.3	10 (8/13)
Bird Island	---	---
Olivia	42.1	112 (8/14)
Lamberton	163.7	380 (8/13)
S. Lamberton	---	---
Jeffers	43.7	83 (8/12)
Brooten	1.9	6 (8/13)
Blue Earth 49a	99.7	219 (8/13)
Blue Earth 49b	441.3	2279 (8/14)
LeSueur 51a	51.8	172 (8/13)
LeSueur 51b	36.9	121 (8/13)
Sleepy Eye 52a	159.2	350 (8/13)
Sleepy Eye 52b	166.2	400 (8/14)
Waseca 53S (SES)	12.0	40 (8/14)
Waseca 54N	38.1	103 (8/11)
Waseca (Dean FVC)	91.0	177 (8/12)
St. Peter	78.7	221 (8/11)
Randolph	192.6	486 (8/13)
Rosemount	100.3	183 (8/13)
Faribault	23.4	56 (8/13)
Owatonna	---	---
Geneva/Hollandale	29.4	47 (8/11)
Simpson	20.0	73 (8/14)

*Thanks again to all volunteer cooperators, processors and MDA staff.

Drainage School Planned for Certified Crop Advisors September 19 and 20 at Ada, MN

The Minnesota Extension Service-Crop Systems Team is planning a drainage school for individuals (certified crop advisors, extension educators, etc.) who would like to increase their knowledge base about surface drainage design, economic and environmental impacts associated with drainage, and awareness of available technical resources in the Red River Basin. The one and one-half days training will be held on September 19th and 20th at the VFW Club in Ada, Minnesota. Topics to be covered include: surface drainage system options and design factors, drainage system construction and maintenance considerations, MN drainage laws, Swampbuster criteria, water quality assessment in the RR Basin, land values and available land/water programs from state agencies.

Also included, as a part of the first day, is a field tour to observe different drainage systems in Norman County.

The cost of the school is \$50 and pre-registration is required. Persons interested in attending this training should contact Ken Pazdernik (218-784-7183) at Norman County Extension Office in Ada, MN, or Jerry Wright, Extension Engineer, at the West-Central Experiment Station (320-589-1711) to obtain registration information. Deadline for registration is September 10th. Soil and water management CEUs have been applied for from the MN Certified Crop Advisor Board.

*Jerry Wright
Extension Engineer*

How Many Cores Should go into a Soil Sample?

With small grain and sweet corn harvest under way there has been interest in starting soil sampling. It is a perfect time to consider taking soil samples for immobile nutrients such as P and K. It is not a good time to take soil samples for N, as it's status in the soil will change before next year's crop is planted. For information about nitrate-N status during late summer and fall, look at George Rehm's article in the last newsletter.

A common concern is how many soil cores do you need to composite into a soil sample to do a good job of characterizing the soil nutrient concentrations. The answer will depend on what nutrient you are sampling for, past fertilizer management history of the area to be sampled, accuracy level desired of the soil test value, and the precision of the sample.

Accuracy refers to the correctness or nearness of a soil test value to the field average. Precision is a measure of the reproduceability of the sample. In other words, a soil sampler wants to take a sample which is the closest to the correct value for a nutrient (accuracy) and be able to get the same result if a second sample would be taken (precision). For any level of precision, the accuracy of a soil sample is directly related to the number of soil cores taken, the more soil cores in a sample the more accurate the sample. The accuracy level needed will depend on the soil test. In most cases a + or - 15 % or better accuracy will be sufficient. Precision, again, is the ability of reproduce the same results with a different soil sample. At an 80 % precision level, it means that if 10 soil samples are taken then 8 of them will be within the desired accuracy of the true soil test value of the field. An 80 % precision level is considered to be adequate.

Data from North Dakota State University (**Table 1.**) indicates that at the same precision and accuracy levels, you need the most cores for a phosphorus soil test, fol-

lowed by nitrate-N, and then potassium. This information assumes that soil abnormalities caused by dead furrows, head lands, potholes, soil texture, slope, or soil color have been discarded. At a common precision level of 80 % and an accuracy level of + or - 15 %, 21 cores for phosphorus are needed.

Table 1. Number of cores required to provide a soil sample at three precision levels and three accuracy levels for N, P, and K.

Preci- sion level %	Accuracy level (% of mean)								
	+ or - 5 %			+ or - 15 %			+ or - 25 %		
	N	P	K	N	P	K	N	P	K
	Number of cores								
90	227	298	59	25	34	7	10	12	3
80	137	181	36	18	21	5	6	8	2
70	90	117	24	10	14	3	4	5	2

Another consideration for determining the optimal number of cores per sample is prior fertilization history. If a grower has banded P or K (immobile nutrients in the soil) and the location of the band is unknown, then the number of cores required increases dramatically. Results from Nebraska research suggest that in a soil with a history of broadcast phosphorus applications, 20 cores would be required for phosphorus soil test. That same soil with a history of banded applications required 290 cores taken at random to achieve the same levels of accuracy and precision. Are there methods to reduce the number of cores needed in a banded fertilizer situation? A study conducted in Colorado suggests that if a sampler knows the direction of application of the band and the spacing between the bands, then the number of cores required could be reduced by collecting paired cores.

The first core would be taken randomly from the area to be sampled. A second, paired core, would be taken half the distance of the band spacing away from the first core in a direction perpendicular to the band application. An example: If a sample was to be taken from a field where the fertilizer band application was done in a North-South direction and the band spacing was 30 inches, then the first core would come from anywhere in the sampling area. The second core would be taken 15 inches either east or west of the first core. This method has been re-

ported to reduce the needed number of cores to between 30 and 60 per soil sample.

Bottom line: If you are sampling area with a history of broadcast fertilizer applications, in Minnesota, 20 cores are needed to produce a good quality representative soil sample. However, if the fertilizer history includes band application in recent years then more cores will be required and the method obtaining the cores will have to be more systematic.

John Lamb

Extension Soil Scientist

DIAL U

Dial U is a user-fee telephone diagnostic clinic for calls and samples related to gardening, landscapes, plant diseases, insects and wildlife associated with the home environment. Calls from the public are taken at 1-900-988-0500 weekdays. A flat \$2.99 charge is billed automatically to the phone from which the call is placed.

Overseeding Lawns

Late summer through early autumn is the optimal time to plant grass seed in Minnesota. If you live in the northern part of the state, the sooner you plant, the better. It's important for grass seedlings to develop a root system that will take them through winter, so even in the southern part of the state, you want to get those seeds in the ground by mid-September.

Seed must fall on receptive soil, which means you must scruff up the soil surface of existing lawns in order to overseed them. If you have only a small area to cover, you may do this by hand, using a heavy garden rake. If you have a larger area, or the soil is quite compacted, rent a core aerator and run it over the lawn several times before seeding. Allow the cores of soil to remain on the surface: they'll break down over the next few weeks.

Apply starter fertilizer or a mild, organic lawn fertilizer at planting time, and keep the newly seeded area moist by watering frequently. Mow the area whenever the older, original grass needs it. It won't hurt the seedlings—just be sure your mower blades are sharp so they don't pull young grass plants out of the soil.

Keep in mind, you can't use weed-killers in the area where you plan to seed shortly, nor can you use them after seeding.

Deborah L. Brown
Extension Horticulturist

Vole-proofing for Winter

Voles (small, mouse-like rodents) are active through the winter on the surface of the ground underneath the snow. In the spring after the snow melts, you may find a network of pathways in the grass along with piles of grass clippings. This damage usually does not continue through the spring and summer, since voles often disperse to areas with more protective cover. To discourage voles from returning to your lawn to overwinter, keep grass cut short and remove excess thatch. Select plants for your yard that do not provide a lot of protective cover at ground

level. When selecting bedding material for strawberries and other perennials, consider using straw instead of tame hay: it is less attractive as a food source for voles. If voles have been gnawing at the base of your shrubs and young trees during the winter, protect them now with a cylinder of hardware cloth (1/4 inch mesh, buried a few inches into the ground) or tree wrap.

Alice Doolittle
Wildlife Technician

Ground-nesting Yellowjackets

Yellowjackets have become more obvious during late summer as nests are larger and workers are more numerous. Although people are familiar with yellowjacket nests in trees, they actually construct their nests more commonly in the ground in old mice burrows or similar cavities.

There are several options if you discover a ground-nesting yellowjacket nest. If the nest is in an area that people infrequently visit, leave it alone; freezing temperatures will kill the inhabitants of the nest by the end of the fall.

If the nest is near human traffic and there's a risk of stings, you can first try pouring a soapy water solution into the entrance (it's not critical what concentration to mix it). Many types of laundry and dish soaps will work. If that isn't effective, try an insecticide. Dusts, such as carbaryl (Sevin) or chlorpyrifos (Dursban) work best. You can also try a liquid concentrate mixed with water, including carbaryl (Sevin), acephate (Orthene) or diazinon.

Once you are sure all the yellowjackets are dead, cover the nest entrance with soil. Although old nests are not reused, it does prevent a new queen from constructing a new nest in the same burrow next year. See *Wasp and Bee Control*, FO-3732.

Jeffrey D. Hahn
Asst. Extension Entomologist

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