Southwest MN IPM STUFF

All the pestilence that's fit to print

SW Minnesota IPM STUFF 2008-1

04/04//08

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Through the looking glass – Comments on production agriculture with emphasis on the current state of pest management in the northern Corn Belt cropping system

I was not planning to write a newsletter during the 2008 season. A concerted academic, ag industry and regulatory approach to pest management has apparently beaten most common pest problems into submission. Further, new evidence suggests that long held assumptions on pest/crop interactions may not be valid.

Please read the following points with caution. The points presented below may or may not reflect your personal view of reality. They are filled with inaccurate correlations, half-truths and other malarkey extrapolated and refined from real-world political, marketing and sales efforts. The following discussion is not meant to imply that politics, marketing and sales are inherently evil.

Entomologists, and to a lesser extent, workers in other pest-based disciplines, are doing some soul searching. Peer group discussions as well as public displays of angst, center on the death of Integrated Pest Management (IPM) in commodity crops. The academic community is trying to determine if in fact, the philosophy has died, or is merely in a state of diapause or hibernation. Another hypothesis, which does not have widespread support, suggests that instead of extinction, IPM has become so highly evolved that it no longer resembles its primitive ancestor. IPM has long been held as an obvious truth with the entomological community. Understandably, any perception of IPM's potential demise is deeply troubling.

The symptoms of poor health for IPM began to appear at approximately the same time glyphosate tolerant crops were introduced. The first signs of stress amongst agriculturalists were observed in those individuals specializing in the previously many faceted discipline of weed management. However, the timing of IPM's perceived demise relative to the introduction of transgenic crops may be only corollary and not causative in nature. Most entomologists are currently too traumatized to perform a detailed analysis.

Unemployment fears among IPM practicing agriculturalist are intensified by the knowledge that reduced corn acreage will soon drive food prices to record highs and all available employment niches within the plant pathology discipline have already been occupied by weed science refugees.

I have been taking classes at the University of Minnesota since January and have had limited communication with the outside world. Nevertheless, through conversations with individuals involved with production agriculture, reading popular farming literature, and listening to the radio, I began to realize that there are some problems with the logic previously used for crop pest management. It is now apparent and appears common knowledge that:

1) Soybean aphids will still be a problem in 2008. Suction traps caught few aphids last fall and examination of buckthorn tends to indicate that egg populations going into the winter are low. Aphid populations, however, are irrelevant when managing soybeans. The most likely reason for the very low expected 2008 soybean aphid populations is obvious. With $10-$13 soybeans, treatment should begin at a very low level. When economic injury level calculations are made using more than $15/ bushel soybean prices; it should be easy to see why the economic threshold would trigger blanket spraying at 1 soybean aphid/county. Since it is impossible to sample an insect at this low density, a calendar based, season long aphid treatment schedule should be adopted. Previously discounted sub-250 aphid/plant soybean aphid thresholds may have been prophetic when viewed in an historical basis.
2) Soybean rust will never be a problem in Minnesota. Although this disease may never see a Minnesota soybean growing season, it has, arguably, caused more economic impact than all other soybean diseases combined. On the debit side is the cost (time) spent in meetings being scared about the potential problem (movie theatre attendance and rental of horror videos have declined since this disease was reported in South America). Initially, I was concerned about dollars wasted through needless fungicide applications but have since been proven wrong (see points 3-5). On the credit side, attendance at APS meetings has increased. Although the number of spores contained in a basidium remained a mystery, many agronomists learned how to spell *Phakospora* and rapidly developed the ability to speak at length about plant pathogens. Perhaps the least recognized benefit of the soybean rust phobia was the rapid labeling of numerous fungicide compounds for soybean. This led directly to the discovery of the yield benefits of treating imaginary disease.
3) Transgenic crops and other forms of host plant resistance have solved our insect, weed, disease, and nematode problems long-term. This will allow producers to focus on management tasks that are really important and add to the bottom line. Formerly, great concern over the development of pest populations able to damage plant host resistant varieties caused some moderation in use of these traits. We now know that stacking similar genes/proteins within a plant eliminates the potential for pest resistance. In fact, it is so effective that refuge requirements could be dramatically lowered. Plant genome based insect and disease controls are obviously much less likely to create resistant pest problems. It is in the plant, after all, and there is no way for the insect or disease to escape death. If this theory fails in practice, industry has a lot of products on the shelf just waiting to be placed in the battle. For just this reason, resistance to a pest management

product is welcomed by the pesticide industry; provided resistance develops the year after a product goes off patent.

4) Although point 3 makes crop protection chemicals obsolete, seed applied and post emerge applications of herbicide and particularly insecticide and fungicide can produce a plant vigor effect known by one of several trademarked terms. This effect is most commonly observed in the absence of disease or insects. More frequent pesticide applications increase the probability of seeing this type of response. We now know that timely application of these products can actually eliminate the adverse effects of bad variety selection, field preparation including tillage and fertilizer management, and all manner of poor agronomic practices. Scouting would unacceptably delay the speed with which pesticide recommendations could be made. Therefore, a calendar based spray program will be the only viable alternative. An unfortunate side effect could be an accelerated economic collapse due to a major reduction in sun screen, hand lens, identification guides and soil probe sales (Yes, soil fertility management is undergoing a similar renaissance). We can hope that the Federal Reserve and Congress are ready to react quickly with changes in monetary policy and a targeted stimulus package if increased sales of spray tips cannot compensate for reduced sales of crop scouting paraphernalia.
5) We have entered a new era. We now know that high commodity prices can change not only economic thresholds, they can actually change biology. As a result, high value crops suffer detectable yield loss at much lower levels than the same variety when prices are low. A breakthrough in our understanding of economic thresholds occurred when it was discovered that reducing the rate of a fungicide until application costs were equal to a very low expected yield benefit still provided the vigor effect mentioned previously. It is now possible to match a fungicide rate to any level of expected yield loss. The underlying principle might also apply to insecticide and herbicide applications but these have not been adequately tested. The issue is not if a pesticide application will pay; but whether aquifers, already stressed by ethanol production, can supply the increased need for spray carrier. Research is currently underway to determine whether or not a yield benefit can be obtained simply by purchasing a product or does an inconvenient pesticide application actually have to occur. Parallel discovery indicates that it is impossible to purchase too much insurance. Research, conducted mainly within the seed industry working on transgenics, indicates that pest induced yield loss, as a percentage of yield, is positively correlated with the yield potential of a field. These last two studies, when viewed as a whole; show that it is imperative that pests should be treated at lower levels in high yielding crops. Intuitively, a calendar based pest management program, with redundant pest controls is the most efficient option.

Hopefully you can see that the above are not good strategies. They are only partly, if at all, grounded in reality, and a recipe for disaster. These strategies may lead to an earlier than desired retirement, perhaps on a wide scale, from production agriculture. They are presented to make a point. IPM principles are still valid. If you don't get the point we have the rest of the growing season to make it clearer.

The problem with agriculture

The attached document contains an analogy for all that is really wrong with agriculture and it's perception of reality. Perspectives of producers, industry, government and academia are equally represented (http://www.cis.gsu.edu/~dstraub/Courses/Grandma.htm). *This document was presented during a statistics course to illustrate the dangers of bias, observational studies and misinterpretation of data.* Please take some time to read this document carefully. I will discuss the findings of in the next IPM stuff issue. Dr. Adams groundbreaking 1990 treatise illustrates errors that occasionally occur in scientific publications. Those who interpret research findings for political reasons are especially prone to errors of this type. Examples are readily observed in both sides of climate change and bio-fuel debates. More germane to this discussion, some examples can be found in peer-reviewed pest management studies and examples are abundantly represented in marketing information. Finally, with a bit of introspection, the readers of this article should be able to find related problems in how they collect or interpret data. Over the course of the growing season, I'll try to explain the problems involved in collecting and understanding pest management data and the ever present threat of bias affecting both.

Knowledge is power. The pursuit of the truth has no end but knowledge combined with an understanding of the truth is freedom. Then again, being asked questions stresses and irritates some people and it's a lot easier to just do as you are told.

In the next issue: How yield loss really happens.

Corn on corn production

For those of you that haven't talked yourselves out of it yet, here is a check list put together a year ago. It seemed to have been more or less accurate. More importantly, it appears to do no harm.

U of M SWROC winter crops day February 7, 2007
B. Potter

- Primary tillage
  - No till corn on corn risky in our climate
  - The yield effects of between row residue less severe (zone tillage) and may be correlated to width of tilled zone
  - Assuming full width tillage, residue sizing will ideally be done before or width with primary tillage.
  - Partially incorporated un sized residue can/will cause seed bed and planting issues

- Seedbed preparation
  - Sized residue to allow planting
  - Firm seedbed encourages consistent seeding depth
    - Late emerging corn plants do not contribute to yield
    - Field cultivators tend to lift residue. High corn residue fields may require changes in spring tillage
  - Till and plant when field conditions are good
    - Everything within reason and moderation

- Residue management
  - Much more residue following corn
  - Surface residue in the row is detrimental (cooler and wetter)

  - Shallow buried residue in the row can impact germination or early development
  - Good row cleaners needed

- Nitrogen management
  - N rates for corn on corn need to be higher than corn following beans
    - Greater N immobilization on large amounts of corn residue
  - Be ready with rescue application or plan for side dress
  - Don't overdo Popup N
  - Spring application (all or part) desirable
    - Increasingly so under higher rainfall conditions
    -
- Hybrid selection
  - High yielding corn on corn hybrids are not always good corn on corn hybrids
  - Try to avoid planting the same hybrid(s) back to back
  - Defensive traits more important
    - Root and stalk scores
    - Early season growth
    - Drought tolerance
    - Leaf disease and stalk rots

- Pest management
  - Weeds
    - Watch for and manage species shifts
  - Insect control
    - Corn rootworm and European Corn borer tend to be worse in continuous corn fields
    - Both insects can interact with stalk rots
    - An economic response to control not guaranteed
    - Continuous transgenic corn (ECB, CRW) will push insects to deal with the trait
  - Disease
    - Watch for early season foliar diseases
    - No evidence that prophylactic fungicides improve yield consistently

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05/19//08

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Crop weather

This has been a tough spring in Southwest MN as it has been in much of the Corn Belt. If your own difficulties in getting fields planted aren't enough to convince you, the soil moisture at the U of M Southwest Research and Outreach Center; Lamberton, MN (SWROC) is considerably above average: http://swroc.cfans.umn.edu/Weather/Charts/Soil/2008/08_soil_water.htm.

Temperature observations, rainfall and other weather trivia are updated daily and summarized weekly at: http://swroc.cfans.umn.edu/Weather/weather.htm. Yup, we're colder and wetter than average but weather likes to change. As always, the biggest driver for crop yields will be the weather during the growing season.

A Sunday trip into eastern South Dakota showed intense field activity. Both corn and beans were being planted at a high rate of speed along MN 68 from New Ulm past Yellow Medicine County. Some early planted corn is now up and can be rowed. Some low spots look tough, but from the road but things look good in my windshield survey. Some areas are close to done with planting; some are just getting a good start.

The cold, mostly open, winter and cold spring may lead to relatively low levels of some of the insects that overwinter here. Less insect activity than usual seems apparent when walking around outside. The increased use of corn rootworm insecticides and seed applied insecticides included with Bt hybrids should minimize several early season corn insects- if there were any there to need minimizing. At this point, 2008 is shaping up as a low insect year but the situation could change quickly. That's probably OK because most have had enough stress just getting the crop in the ground.

Early season corn stand evaluations

Corn scouting should begin in earnest as soon as fields can be rowed. I am guessing that most of you have already looked at some early planted corn before emergence to determine the need for a rotary hoe.

Initial scouting efforts should focus on evaluating stand.

Determining the cause in areas with poor emergence might require some detective work because there are many potential causes of poor stand.

Was seed planted? My suggestion is to start with the obvious. Most of us can make a mistake once in a while and any mechanical device is predestined for failure.

How about planting depth? Shallow planted corn might emerge more quickly but may emerge less evenly than corn planted a bit deeper. Shallow planted corn (< 1 ½ inches) is exposed to greater temperature fluctuations and less consistent moisture. Shallow seeded corn is also at risk for poor root development and root feeding insect damage when it does emerge.

What is the seedbed condition? Poor seedbed preparation aggravates seed placement and emergence issues. Sidewall compaction and opening seed furrows leading to seed/seedling desiccation are common when fine textured soils are worked wet. Heavy rains and standing water can lead to crusting and emergence issues.

Did the seed germinate? Lack of moisture or cold conditions are the primary cause of poor germination; both conditions are more likely to occur with shallow planting. Once in a great while, poor vigor seed has a hard time with stressful conditions.

Has the seed rotted? While fungicide seed treatments do an adequate job of protecting corn seed and emerging seedlings from fungal pathogens (usually *Pythium* and *Fusarium*) but can occasionally be overwhelmed under prolonged very wet, cold conditions. Some early planted corn was under water for a considerable amount of time. Drowning, or lack of oxygen, can sometimes be a reasonable explanation for death and subsequent decay of corn seed and seedlings.

Is there evidence of insect feeding? Seedcorn maggot and wireworms are the two insects most often associated with corn emergence failures in SW Minnesota. Seedcorn beetles can also occasionally reduce stand. Slow emerging corn is at greater risk from these below ground pests. White grub damage usually shows up later. There is no effective rescue treatment, for these insects after corn is planted. Cruiser® and Poncho® neonicotinoid insecticide treated seed and labeled corn rootworm insecticides should provide some protection for these insects.

The **Seed corn maggot** is the larva of a fly. The adult resembles a small housefly. Damage from this insect is worse when corn emergence is delayed. Egg- laying adults are attracted to decaying organic matter. Fields at highest risk are those with heavy applications of solid manure and where a green manure (including heavy weed infestations) has been worked in. Seedcorn maggot larvae are small white maggots and have weak mouthparts able to attack corn seed after softened by water uptake. Some tunneling in below ground tissues may occur. The larvae attack the seed of both corn and

soybeans. Seedcorn maggots have very quick life cycles. Often only the dark oval pupae, empty pupal cases or feeding damage are found by the time stand loss is detected. Labeled planter box treatments, neo-nicotinoid insecticide seed treatments and corn rootworm insecticides provide control.

Several species of **wireworm** occur in Minnesota. The predominate species observed in 2001 SW MN corn was the corn wireworm, *Melanotus similis*. Wireworms are the larval stage of click beetles. They are "wormlike" with an elongate body, distinct heads, small but visible legs and a hard textured body. Most species are dark orange, although a cream colored species also causes problems in SW MN. Unless you've score a direct hit with the trowel, they are very active when disturbed. Wireworm can often be observed when digging in fields in early spring. Finding them does not mean stand loss is inevitable. Historically, wireworm problems have been associated with fields planted after sod but can injure fields in a corn-soybean rotation. Wireworm problems are most frequently encountered in high organic matter, low-lying areas and especially on alkali rims in this part of the world.

Several species can have multi-year life cycles depending on food supply and climate. The germ of the seed and the mesocotyl or growing point of larger corn may be attacked. Above ground symptoms are wilted plants or stunting. Stunted plants are often purple as with phosphorus deficiency or dark blue-green in color. Wireworms and their feeding injury occur below ground. Damage is often worse in cooler springs for two reasons. Corn development is slowed and corn plants are more vulnerable when small. Wireworms prefer cooler temperatures and will move down in the soil profile as surface temperatures warm. Larger wireworms may hang out for a last "bite" even in warm soils.

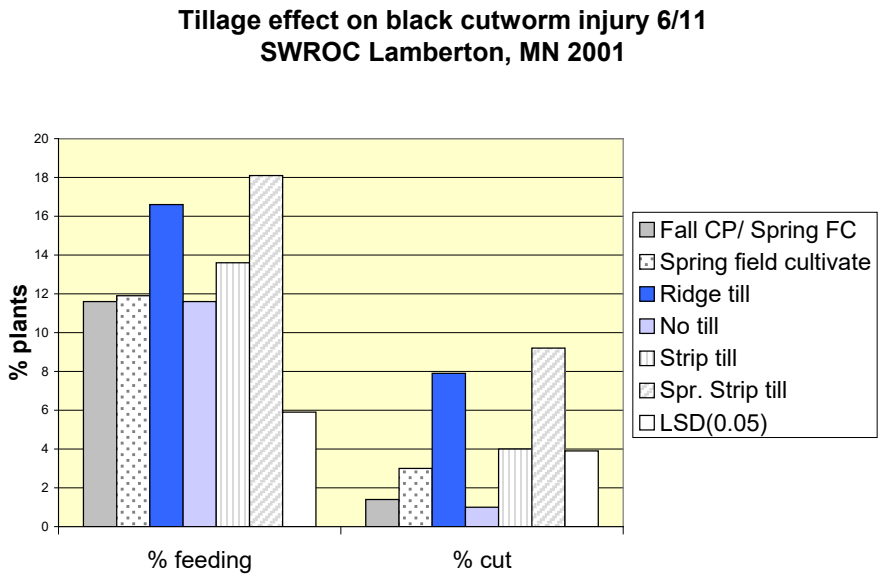
A labeled corn rootworm soil insecticide or neonicotinoid insecticide treated corn seed are recommended in replant situations. Wireworm larvae are attracted to geminating seed. It is not unusual to find wireworm larvae near corn seeds killed by other factors.

Cutworms

Will black cutworm be a problem in MN this spring? Hopefully not, but the reason for my concern (not spelled panic) is the delayed tillage, planting and emergence this spring. A coordinated pheromone trapping network, which would allow a bit of prediction for timing of scouting and to a lesser extent, geographic area at risk, is not available in Minnesota during 2008. Migrant black cutworm moths are attracted to soybean residue and early season weed growth, common ragweed and common lambsquarters, in particular. Ridge till, strip till and other reduced till fields with a history of weed problems are at increased risk. I would focus

initial scouting efforts for black cutworm on these types of fields that are planted to non - Herculex® hybrids (see linked article from Iowa State University).

One example of tillage effects on black cutworm can be seen in the figure above. They show a relationship between soybean residues, soil temperature and weed growth at the tile of black cutworm moth arrival. The degree of injury under various tillage systems are lack of injury with no-till may be most simply related to cold temperatures delaying weed growth. In some late planted fields we may be faced with a small corn large cutworm larvae situation.



Try to find a larva to make sure it is black cutworm causing the damage. Typically the larvae can be found under soil clods, residue or below ground at the boundary between wet and dry soil. The more common dingy cutworm cuts corn at or above the soil surface but does not cut corn below ground at or below the growing point. I suppose extremely shallow planting could be an exception but then you'd have other, more serious, problems!

Cutworm damage is often limited to small portions of a field. These infestations can be spot treated with adequate scouting. Making an accurate treatment or replant decision for cutworms with little emerged corn or uneven emergence is frustrating and darn near impossible.

Jon Tollefson and Marlin Rice, Iowa State University, have put together an excellent article on scouting for black cutworm. They also spent some time evaluating the economic threshold for black cutworm in light of recent high grain prices http://www.extension.iastate.edu/CropNews/2008/0516TollefsonRice.htm.

Replant decisions

Need help deciding whether to keep a reduced stand or replant? **The corn grower's field guide for evaluating crop damage and replant options.** University of Minnesota Extension Service # MI-7290-S at http://www.soybeans.umn.edu/pdfs/CornGuide.pdf provides information to calculate yield from stand and planting date. Losses are based on percentages so they will hold true even for today's higher yields and prices. *The 30,000 stand is probably a bit conservative and many producers are now trying for final stands higher than this. The planting date information is probably fairly robust. Note that yield losses are proportionally greater for greatly delayed planting dates or severely reduced stands.*

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6/17/08

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Crop condition (please send a couple weeks of warm, dry weather)

It all depends on planting date and rainfall amounts. We were behind on planting progress and now degree days and crop development. Crops look better than might be expected (considering the spring weather) along the paths between Lamberton and Morris the past two weeks. There are early planted corn fields that avoided excessive rain looking pretty darn good with corn closing rows. Crops in other areas range from adequate to fields with deep sprayer ruts, delayed and stunted crop. Occasional drown outs testify to the amount spring precipitation. Spring wheat looks adequate to unbelievably good in the fields that I have driven by. Soybean growth has been painfully slow and has me a bit concerned. Chlorosis symptoms have started to appear on unusually small beans (unifoliate in some cases). Moisture influences soil chemistry and reduced root function from saturated soils and presumably some root disease are not helping.

I have been feeling a bit optimistic lately. It is an unfamiliar and uncomfortable feeling and I may need to take a trip south to restore my equilibrium. The jungle telegraph reports from south of Highway 14 indicate that conditions are worse there.

No, it's not anything like the abnormally fast start we had in 2007 but it could be much worse. The problems in parts of Southeast MN and neighboring corn-belt states are all over the media. Most producers in much of south central and western MN can consider themselves fortunate. Those of you have survived previous weather crisis of 1976, 1988 and 1993 and many other, more geographically limited, problems will find it easier to put this season in perspective. There should even be some knee high corn by the 4th with some good weather.

Colorful corn

Root problems become increasingly apparent as growing corn and soybean demands for soil nutrients increase. Brown corn is beyond hope. Yellow and purple stunted corn plants display nutrient deficiencies but these may be a secondary result of plants with poorly functioning root systems struggling in saturated soils. They need warm, dry weather. On the other hand, extreme heat would be hard on plants in saturated soils until they develop/regenerate root systems.

Supplemental nitrogen will not help while plant roots are drowning in an anaerobic soil soup. When it dries (oops, there's that optimism again), a row cultivation may help aerate crusted, sealed soils. Supplemental N guidelines, as well as other wet crop info are described in the latest Minnesota Crop E-news at http://www.extension.umn.edu/cropenews/2008/08MNCN13.html.

Missing plants

Germ has been lower than typical in some soybean seed lots. Based on seedling symptoms, I suspect but cannot confirm disease as part of the equation. Struggling emergence has been further hurt by seedling disease. There is a higher than normal amount of damped off corn and soybeans this year and not always in low areas. One Murray County corn field had more problems in the higher, lighter soils in the field, indicating that temperature may have been as or more important than soil moisture content. Damping off has been observed in corn (typically treated with seed applied fungicides) and soybean fields with and without seed applied fungicides. Although I haven't done the math yet, I don't expect much, if any difference between fungicide treated and untreated soybeans stands in a trial at the University of Minnesota, Southwest Research and Outreach Center (SWROC). Think type, intensity and duration of seedling disease when evaluating what went right or wrong. In most cases stands are ok.

Miscellaneous insects

So far 2008 has been refreshingly low-key with respect to insect problems.

Bean leaf beetle - Over-wintering adults are out there but in areas I have examined low in number. Early vegetative soybeans can lose a large percentage of leaf area (up to 50%) without yield loss.

Potato leafhopper - We have not yet found potato leafhopper in alfalfa but did see our first adult in soybean on 6/16/08. **Pea aphids** are common in alfalfa again this spring.

In spite of the depressing number of plants examined, I have not yet observed **soybean aphids** in soybeans this spring. I will visit prime soybean aphid territory later this week. Dave Ragsdale and crew have observed a few soybean aphids on buckthorn.

Stand reducing insects reports have been fairly minimal. I know of one Brown County field that was treated for **black cutworm**. I received a call about odd looking/behaving cutworms killing the growing point at the edge of a triple-stack planted corn field. The description of damage sounded similar to hop vine borer. When I saw the specimens, I was baffled. I am getting the Lepidoptera specimens to more some knowledgeable types and will post pictures and hopefully a solution.

Wheat

Winter wheat varieties ranged from boot stage to headed on 6/13. The cool, rainy weather has resulted in moderate to high incidence (percent plants infected) of the foliar diseases Tan spot, ***Septoria***, **Powdery mildew** and **wheat leaf rust**. Wheat leaf rust was the least prevalent and not observed on all varieties. **Tan spot** is typically rare in SWROC plots but this year's winter

wheat trial was planted close to a source of inoculum (last year's winter wheat trial). I expect that the powdery mildew will disappear with warm, sunny weather.

Spring wheat, on another part of the SWROC, was jointing and had much less disease. I did not observe any rust on spring wheat. I'd pay close attention to spring wheat diseases as heading approaches.

Small grain aphids, primarily bird-cherry oat aphid are present but have not reached threshold levels at the SWROC.

Web Resources

Pesticide Labels- To obtain current labels and MSDS for agricultural chemicals see the CDMS website
http://www.cdms.net.

Weather -
To keep up to date on all the crop weather details around the state during the growing season see:

Lamberton: http://swroc.cfans.umn.edu/Weather/weather.htm

Morris: http://wcroc.cfans.umn.edu/Weather.html

Crookston: http://www.nwroc.umn.edu/weather/weather.htm

Waseca: http://sroc.cfans.umn.edu/research/soils/climate/index.html

The MN climatology working group website provides an abundance of facts at: http://climate.umn.edu/climatology.htm. Http://climate.umn.edu/ddgen/ddgen.asp allows you to calculate degree-day accumulations across Minnesota. The temperatures are updated once a week on Monday.

Contrary to rumors, I am not too busy to visit with people about crop and pest conditions.

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6/20/08

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Errata

An unknown caterpillar

Keep your eyes open for this insect described below. I would appreciate hearing from you if you find any.

A consultant observed these insects attacking Yield Guard™, triple stack corn in Cottonwood County and correctly decided that these were not a typical cutworm.

Damage was confined to rows of corn along a narrow brome grass fencerow. The infestation did not warrant treatment. Affected plants had wilted tops (top left). Cream colored larvae with purplish stripes (bottom left) were found at the base of the plants and tunneled into the growing point and above (top right). These are not stalk borer. General appearance and damage resemble hop vine borer (*Hydraecia immanis*) but

based on coloration, I suspect these are something different. Lepidoptera larval taxonomy is painful, beyond my meager skills, and many species are not described as larvae. I am attempting to rear some specimens to adulthood for a better ID. I am also testing a couple larvae on Herculex® Xtra tissue.

European corn borer
We have started to capture European corn borer in light traps at Lamberton and Fulda but captures have been very low. Pheromone traps have started to capture corn earworm at Lamberton as well.

Soybean aphid
Soybean aphids have been observed at several locations in Southern part of the state including the Southwest Research and Outreach Center, Lamberton. In the latter case, the percent plants infested with aphids is very low 0.001% or less but colonized plants observed have 40 aphids or more. Some soybean aphid colonies had been found by ants and predators some had not. The calendar date of detection, soybean growth stage and initial infestation levels is typical for the SWROC.

We are a long way from economic levels in these and I presume all fields. It may be tempting to treat low and imaginary aphid (or bean leaf beetle) populations at the same time as an early glyphosate application is made. *This is not advisable and is a very high risk pest management strategy.*

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7/03/08

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I am sure many of you are frantically trying to finish some scouting or spraying and will be trying to relax on the 4th. This weekend, I'll try to finish a "How yield loss happens" article in anticipation of an upcoming spraying frenzy. It may be worth thinking about a couple issues as you evaluate fields next week.

Alfalfa

Potato leafhopper numbers are relatively low but increasing. Third cutting may be at the highest risk this year. Some new seeding fields have been treated.

Alfalfa weevil larvae are scarce in fields near Lamberton but NW, WC, C and extreme SW Minnesota have had some problem fields.

I would keep an eye on alfalfa plant bug and alfalfa caterpillar numbers when sweeping over the next few weeks.

Yellow beans

Yellow soybeans are common on alkali rims soils in western Minnesota. Before you blame all problems on poor IDC or glyphosate tolerance in the variety (yes, some folks did poorly on variety selection), I would investigate a couple of other potential causes.

Check root systems for root rots induced by saturated soils and more importantly soybean cyst nematode (SCN). SCN resistant varieties have been widely adopted by producers in this part of the world. However, you *can* have a nematode problem on soybeans sold as SCN resistant for two reasons: 1) Low SCN resistance in the variety and 2) The selection for SCN races (Hg types) that can feed and reproduce on the source of resistance planted in the field.

Based on the Hg types detected in limited 2007 SW MN soybean field samples, the later case should be of great concern to both producers and seed companies. I sense that it may be getting close to time to panic with respect to SCN management in SW Minnesota. ***Acknowledging a problem is always the first step.***

Soybean aphid scouting note:
We have had a period with good weather for soybean aphid populations for the past couple weeks.

Soybean aphid behavior is a bit unusual at the Southwest Research and Outreach (SWROC) center this spring.

Typically, field edges and more vigorous soybeans are colonized first. However, we are seeing hot spots confined to eroded knolls with visibly stressed (poor tilth, low fertility and organic matter, SCN and yellowing). Nearly all nymphs have wing pads and I suspect the adult females will leave these stressed soybeans. Several have reported heavily colonized volunteer soybeans. I suspect, but cannot confirm, that this pattern has to do with a lack of emerged soybeans when aphids made the move from buckthorn. On the other hand, beans with iron deficiency symptoms have very few aphids.

Sure, with the high soybean and fuel prices insurance treatments seem cheap. They are, however, not without risk and do have the potential to hurt yield (chaos theory fans take note). Like many producers, the 2008 growing season has me a bit on edge but I'll do my best to let y'all know when it's time to panic.

Weed control
Things aren't really so simple. Glyphosate tolerant soybeans are not tolerant to glyphosate drift from corn if broadleaf herbicides have been tank mixed. By the way, the same holds true for tank mixes containing grass herbicides drifting from soybeans to corn. There are a few more examples out there. It is a good idea for producers to communicate to their advisors and applicators what actually got planted where. I'm just saying…

Upcoming events
I hope to see many of you at:

Crop Production Field Day, University of Minnesota Southwest Research and Outreach Center, Lamberton, July 8, 8:00 a.m. to 1:00 p.m. http://swroc.cfans.umn.edu/upcoming/2008/sfd.pdf

Summer Center Day, University of Minnesota West Central Research and Outreach Center, Morris
July 10, Tours start at 8:00 a.m.

Have a great 4th of July!

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Southwest MN IPM STUFF

All the pestilence that's fit to print

SW Minnesota IPM STUFF 2008-6

7/21/08

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Crop weather

Most of the drier areas received a welcome rain. This is important as we go into the critical seed set and pod- fill periods. Some areas with heavy rain and wind have root lodged corn. Poor root systems can be cause for several reasons: rootworm feeding, genetics, disease and poor seedbed conditions are equally likely. Rootworm Bt hybrids only protect against one of these. Corn has an easier time righting itself when lodging occurs before tasseling.

Corn rootworm

Both corn maturity and rootworm beetle scouting appear a bit delayed this year. I have not yet seen a beetle at the Southwest Research and Outreach Center (SWROC) this season. I suppose it is too much to hope for the extinction of the species.

Thrips on wheat

Some of the spring wheat at the SWROC was heavily infested with thrips. Symptoms superficially resembled root rot. These populations were definitely economic and resulted in dead foliage and blank heads. Typical thrips feeding injury (silvering) and frass were present. It was not uncommon to find 20 immature and adult thrips on leaves with green tissue left.

Soybean aphid problems... We have lift off.

It is nearly time to panic. If you haven't checked aphid populations, it may be worth your effort. It would also be worth the effort to closely count a few plants with different aphid densities to calibrate your eye. 250 aphids may be less (or more) than you think.

Aphid numbers continued to increase last week. Localized problem fields appear to be widely distributed through western Minnesota. Several consultants have reported threshold numbers in fields that typically have early aphid populations (e. g. fields near rivers, creeks, lakes and other areas with buck thorn concentration) in SC, SW and WC Minnesota. Ian MacRae also reported some fields at threshold in NW MN. Most have reported that larger fields, away from buckthorn, typically have low populations. Again, this is not unusual. At this time, economic levels of soybean aphid are not widespread. Fortunately, there are not any large geographic areas

in the upper Midwest with a high incidence of heavily infested fields to supply aphids downwind. Unfortunately, the wide geographic area with scattered fields near threshold may make this year problem less predictable than others.

While the fields I examined have a less clear edge effect than previous years, it is still there. Most aphids are concentrated on the upper foliage of these early reproductive stage soybeans. This will change as new leaf development ceases and pod fill begins (R4-5). Extreme heat, heavy rainfall, and wind/hail can lead to aphids using the lower portion of early reproductive soybean canopy to a greater extent.

I expect that aphid populations will increase more quickly in areas with less rainfall or in fields that hold less moisture. On a calendar basis, SW Minnesota soybeans are behind in development but aphid populations are tracking similar to ahead of 2006. Hopefully, the recent rains and some moderate temperatures can help generate some fungal controls in more heavily infested fields.

Insecticide options increase
You may be hearing about three new soybean aphid insecticides. All are restricted use pesticides. Pre –harvest intervals (PHI) and re-entry intervals (REI) do not necessarily correspond to the duration of insecticide activity.

The following is not intended as an endorsement of any product. READ THE LABEL!
http://www.cdms.net/LabelsMsds/LMDefault.aspx

Hero™
FMC Corporation
Contains two pyrethroids (zeta-cypermethrin same active ingredient as Mustang) and bifenthrin (same active ingredient as Capture).
The bean leaf beetle rate is
2.6 – 6.1 oz/A
The soybean aphid rate is
4.0 – 10.3 oz/A
This product is labeled for two spotted spider mite control at **10.3 oz/A**

PHI: 21 days
REI: 12 hours
Do not make applications less than 30 days apart
Do not graze or harvest treated soybean forage, straw, or use hay for livestock feed.

Leverage® 2.7
Bayer Crop Science
Contains a pyrethroid (cyfluthrin same Active ingredient as Tempo) and a Neonicitinoid (imadicloprid the active ingredient in Gaucho).

Soybean aphid and bean leaf beetle rate is **3.8 fluid oz./A**

PHI: 45 days
REI: 12 hours

Do not make applications less than 7 days.
Do not feed dry
forage for 45 days
Do not feed green
forage for 15 days

Resistance management guidelines (on the label) indicate that this product should not be applied to soybeans that have had a neonicitinoid seed treatment (e.g. Cruiser).

Warrior II with Zeon technology ™
Syngenta®
Is a new formulation of the pyrethroid insecticide Warrior (lambda-cyhalothrin). Warrior II is a 2.08 lb/gallon formulation compared to the older 1 lb/gallon formulation. There are some of both formulations out there so pay attention to rate by formulation.

The soybean aphid and bean leaf beetle rate for Warrior II is **0.96 – 1.6 fl oz.**/A

PHI: 30 days
REI: 24 hours

Do not feed or graze or feed treated foliage or hay.

Relax

Marketing pressure for insurance aphid treatments is at an all-time high. Claims of efficacy and residual control magic abound. One consultant cynically asked if the claims of elephant repellency could be true. If my first name was Harry, I'd be a bit less skeptical of claims that sound to good to be true.

High crop value does not mean that detectable crop injury occurs with fewer aphids. Exposing more aphids (and mites) to insecticide increases the selection pressure for resistance. We are applying quite enough pressure just treating fields at Economic threshold.

Remember, a season's soybean aphid populations are all clones (genetically identical) after the eggs hatch on buckthorn. Any successful genetic shift cannot be undone until sexual reproduction on buckthorn in the fall, if at all.

I would like to hear from you about any fields where poor insecticide performance can't easily be explained by operator error.

Just anticipating a problem regards,

Bruce Potter

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Southwest MN IPM STUFF

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SW Minnesota IPM STUFF 2008-7

08/04/2008

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Crop Weather

To keep up to date on all the crop weather details during the growing season see: http://swroc.cfans.umn.edu/Weather/weather.htm.

Welcome moisture, particularly to the north, came in several rain events late last week and Sunday. High winds accompanied some of these systems. While driving to research studies near Raymond and Renville we saw several areas with down corn, particularly sweet corn. In the limited area that I've been through since the storm, it appeared that the crop faired reasonably well. Dry soils probably helped minimize lodging there. I have not been through the worst-hit areas. Lodged corn will have yield potential but present harvesting challenges. Pollination will be impaired if it has not occurred and photosynthesis can be impaired with vertically challenged corn plants. Corn with snapped stalks above ear will produce an ear, those snapped below the ear are terminal. Remaining ears may compensate to a small degree, depending on the percentage of broken stalks and the location of the break. Corn, soybeans and wheat look good in areas avoiding wind damage and prolonged moisture shortage.

Corn rootworm

The air is heavy with the odor of corn pollen on calm, humid evenings. The next two weeks will be prime rootworm beetle scouting.

Beetle survival appears to have been fairly good in spite of the cold winter and wet spring. At Lamberton, we are seeing a number western corn rootworm, the more cold sensitive species, in addition to more common northern corn rootworms. We do have some lodging in corn following corn plots.

Northern corn rootworm adults began moving into soybeans last week. In research trials designed to look at the utilization of volunteer corn by rootworm beetles, we have seen no emergence from 2007 soybean ground. However, the picture changes in plots with volunteer corn in 2007 and planted to corn this year. For those of you in the real world this translates to fields with live volunteer corn until early July serve to complete a generation of rootworms,

perhaps on corn expressing low levels of RW Bt. Currently, there a more than a few soybean fields with significant volunteer corn pressure now. These fields have raised a crop of rootworms and are now serving as egg-laying sites. You will probably hear more about these trials and their ramifications for insect resistance management from Ken Ostlie during the winter.

Soybean aphid

How to make any aphid management decision look good

I rated an insecticide trial early Sunday afternoon. Very heavy aphid populations were treated with various insecticides on the 30th of July. Now, on this warm, humid afternoon, the silence was noticeable and typical of soybeans that have recently received an insecticide application. An occasional grasshopper nymph or cricket indicated the tenacity of the arthropod life form here. Fatigue and corn pollen irritated eyes made counting aphids more tedious than usual but. There was constant drone in the distance and I was thinking that an aerial applicator was busy making a living off to the southwest somewhere.

I was impressed with the unusual effectiveness of the compounds applied this year. Then, I realized that the sound was not an airplane but rather, the annual migration of bikers on Highway 14 headed to Sturgis.

The insecticide efficacy did not seem quite as impressive anymore and I was a bit disheartened when I examined the untreated checks and surrounding soybeans. Without drift, we often see a depression of aphid numbers even in untreated checks following an insecticide application but this was unusual. (The math for calculating emigration and immigration rates and the effect on aphid populations is relatively simple. Aphids leaving untreated plots die in insecticide-treated ones and the insecticide-treated plots provide no new aphids for untreated plots.) With a mass exodus from the field for migration, the effect is quite startling, a proverbial aphid black hole.

As usual, the timing of the 2008 Harley-powered migration was tied to a mass movement of soybean aphid at Lamberton. While a large number of immigrating winged aphids made the effects of migration on aphid populations less obvious than some other years, it was still there.

This is the summer dispersal event for soybean aphid. Winged females may catch air currents and may travel to the next plant or over large distances on weather systems in search of new soybean fields. The timing has been remarkably consistent over the years that I have worked

with this insect and has probably helped maintain the sales of visors, goggles and window cleaning solutions.

Welcome to the insecticide treadmill (Way down yonder in the land of cotton…)
This migration, which peaked in heavily infested fields late, last week, is problematic for fields that had low aphid levels earlier or had an early insecticide application. Large numbers of aphids colonizing a field can produce rapid population increases. Steve Commerford reported that some of the earlier treated fields in the Minnesota River Valley are at or near economic threshold again (in less than 2-3 weeks). In the plots at Raymond and Renville and Raymond, most new growth had winged aphids and new colonies of small nymphs. I suspect that the latter had received an insecticide application in the past. I have no proof, but have unable to keep from asking the question: "Did the acreage of early, insurance insecticide applications help fuel the 2008 aphid problem?" It is easy to imagine winged aphids colonizing untreated new growth in fields where predators had been removed by insecticide. With the weather conditions we have had this summer, population increases would approach the maximum observed in labs and field cage studies. Sometimes, seemingly unimportant events can be biologically magnified to a problem.

The link with crop stage.
Soil scientists are well trained in chemistry but not trained in the behavior of biological organisms. They can be prone to take things too literally. At least one of the University of Minnesota's finest decided to examine this dispersal event in detail. Actually, the migration is most likely tied to soybean growth stage and photoperiod. It usually occurs at R 4.5 or when the terminal vegetative growth ends. Although soybeans were planted relatively late this spring, photoperiod cues triggered both the R4 (pod set) stage and aphid migration the same time as always. The R3 (beginning pod) stage lasted less than 1 week in some of the plantings I am working with. Research from Dave Ragsdale's lab indicates that R5 (pod fill) stage of soybean is a poor host relative to earlier stages and R6 stage. R5 is the stage where "white dwarves" are common on lower foliage.

Can they be stopped?
Soybeans with large numbers of aphids at Lamberton are mostly alatoid (pre-winged) nymphs now and I would expect these populations to remain steady or decline for the next week. Wing pads and orange head and thorax coloration are indicators that aphid nymphs may be headed for parts unknown. The easiest way to tell if winged aphids are coming or going is to look for small nymphs on the plant. You can often see a cluster of nymphs around the winged female. These alate (winged) producing populations are in fields and plots that have had some aphids from the beginning of the season and appear less common in more recently colonized fields.

There is predation and insect parasitism of soybean aphids where aphid populations have been present for several weeks. Perhaps more importantly, fungal disease is also a major player in the aphid declines in the experiments I am working in. Mark Bernard also reported seeing diseased

aphids to the east. With cool temperatures and moist foliage, these insect pathogens can provide very rapid control of aphid populations. Between disease and migration, some soybeans have seen declines in aphid numbers over the past week, as rapid as the increases had been.

Is it over?
Does any of this mean that fields at Economic threshold for soybean aphid should not be sprayed? No. The 2008 aphid season is not over. The drop in population is probably not occurring in all fields or obscured by new immigrants. Where disease is not obvious, some young nymphs and small "white dwarves have been left behind to start another aphid buildup before the fall migration to buckthorn. Sprayed or previously colonized plants are being heavily colonized by alate aphids and their offspring. Optimum aphid reproduction weather is forecast for the next week. *The emigration and disease observed at Lamberton does offer some hope that the last month of soybean aphid management will be less hectic and stressful than the first and it may minimize the number of fields that need to be re-treated.*

Soybean aphid movement between and within fields, weather, soybean stage, predation and parasitism will determine aphid populations in fields for the rest of this month. Weather (temperature) will determine when aphids leave soybean and head for buckthorn. As mentioned in an earlier issue, the 2008 aphid outbreak will be unpredictable.

A few final observations on aphids:
1) Keep track of fields that have low aphid populations while others around them reach threshold. I suspect that the aphids are pretty good indicators of soybean health.

2) In four to six weeks, there will be many experts on the 2008 aphid outbreak. I expect that you will hear from some of them during the fall and winter.

3) The 2008 outbreak should prove that there is not a simple formula for managing soybean aphids. We might have to actually resort to an IPM (multi-faceted and more than just scouting and spraying) approach to this insect. The alternative is likely to be a continuation down the path to poor mental health for practicing agriculturalists.

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Southwest MN IPM STUFF

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SW Minnesota IPM STUFF 2008-8

The antepenultimate issue

08/14/2008

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Crop Weather

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While days have been quite muggy lately, the nights are getting cooler. Through an open window, field and snowy tree crickets, cone-headed grasshoppers and katydids provide backup vocals for the Gov't Mule music that's playing on my computer as I type this newsletter.

The Minnesota River valley has been frequented by morning fog and heavy dews making soybean work unpleasant until late morning. It seems that my old eyes are having a difficult time distinguishing aphids and water droplets lately. Then again, optometrists need to eat too, I guess.

Hopefully, most have been getting critical rains. Parts of SW Minnesota will need some timely rains to keep what is now a good looking corn and bean crop going. Corn on corn is struggling somewhat this year. With the exception of replants and pea beans, most soybeans are R5 (beginning seed) now. The majority of corn in SW MN should reach black layer from September 15- Sept 25 (60 days after tassel).

Spring wheat yields in the variety trial at the SW Research and Outreach Center were low in spite of good looking crop growth at heading. The easiest explanation was a lack of moisture during fill period. I may have a better explanation after the inquisition.

The wacky world of weeds

If you know of fields with common waterhemp problems (and who doesn't) please let me know. Dr. Mike Owen, ISU is doing as study of waterhemp biotypes and is looking for seed from a wide geography.

Disease stuff

Corn

Common rust is present on flag leaves at very low levels. I am seeing quite a bit of eyespot in one hybrid in a corn on corn situation. At this time I have seen no gray leaf spot but due to a preoccupation with aphids, I haven't looked at corn fields in a wide area lately. Disease does not appear to be a major issue in most corn at this time.

Soybean

Bacterial blight is still the predominant disease at the SWROC. *Septoria* is also present in the lower canopy. Downy mildew is not present in any significant amount in the desert-like climate here but Steve Sodeman and Mark Bernard have reported the disease in South Central Minnesota. Mark and Corey Sinn have observed Sudden Death Syndrome (SDS) in Blue Earth and Martin counties. Although SDS had been reported from these counties, these were fields where the disease had not been observed before. With the cold, wet spring I expect that we will be seeing more SDS in 2008. The photos show foliar symptoms of this disease. Dean Malvick will be hosting an SDS clinic at the U of M Southern Research and Outreach Center, Waseca. See http://iap.umn.edu/components/advancedworkshops.html for details. As the crop reaches pod fill stages, lurking problems will start to show up, particularly if the crop is under stress. Poor root systems due to SCN, disease or other issues as well as stem diseases will be visible shortly. All in all, the crop looks pretty good at this point. With a little luck it will stay that way.

Spider mites

I am starting to see low levels of spider mites in moisture stressed corn on corn. Adjacent soybeans are, for practical purposes, mite free. I have seen nothing to panic over in either crop.

Soybean aphid

Yes, aphids suck!

This is starting to get real old and I am sure that many of you feel the same. From scattered but widespread problem fields in Minnesota this has escalated to an upper Midwest problem. For Minnesota, this is probably as bad of soybean aphid year as we've had.

I have had a number of conversations over the past week or so about aphid resurgence in fields sprayed before the very end of July. I assume that most of this is from winged females re-colonizing fields rather than poor initial control.

If you haven't done so, I would strongly advise that you revisit fields that were sprayed early. I do not know the percentage of problem fields but based on emails and phone calls, it appears that re-sprays are not that uncommon in many areas of Minnesota. ***An insecticide application does not mean that the remainder of the growing season will be problem free. If you enjoy surprises, just assume everything is going ok.***

If you are spraying a field for aphids the second time, it may be wise to change chemistry to avoid pushing the insecticide resistance issue. Based on the number of acres sprayed since 2000 and a lack of documented insecticide resistance in soybean aphid populations, it appears that these Asian imports arrived with a fairly small gene pool. Before we all get too smug, remember that transcription errors can occur any time DNA is replicated. Secondly, some of these 2008 soybean aphid clones may have a chance to be exposed to the same insecticide chemistry 3 or 4 times as they move between fields and geographic areas. If you're spraying aphids for a third time, you've probably got your insect management confused with your weed management, a whole other sore spot.

There were a large number of winged aphids and nymphs with wing pads in research plots at Morris last week but these populations (and many others) had not declined. I have looked at a very limited number of soybeans but it appears that production of winged aphids may be starting to slow. As typical, the Sturgis event is over and soybean aphid populations are once again increasing in untreated research plots at the SWROC.

IPM anyone?

As an educator in IPM, I feel a sense of failure and am disappointed by some of the insect management practices that occurred this year. There was nothing here that violated what we know about the insect or stood biological principles on their head. There may be no bad students and I am perfectly willing accept blame for inadequate teaching skills. However, it appears that some agriculturalists have been hanging out with and been influenced by a bad crowd. Many fields needing re-treatment did need an earlier insecticide application to maintain yield, I understand your frustration. In other cases, some of the insect management behavior that I am hearing

about indicates that we might need to call in the "Agricultural Super Nanny". On the other hand, I am part German and would sure hate to have deprived anyone of a valuable learning experience.

The 2008 soybean aphid problem illustrates several of the core principles of IPM regarding insect control with insecticides:
1) Economic thresholds based on economic injury levels minimize economic crop loss and prevent unnecessary insecticide applications. The soybean aphid economic thresholds developed by land grant institutions have a lot of biological data behind them. They are not perfect but they are better than those developed through fear and greed.
2) Insecticide applications (foliar, soil and seed applied) reduce natural controls by predators and parasites.
3) Once an insecticide application is made, fields are more susceptible to reinvasion by the pest since biological controls are removed, marketing notwithstanding.
4) Poorly timed or unnecessary insecticide applications can cause economic loss through yield loss or the need for additional applications.

When will it be over?
Winged soybean aphids are still present but aphid flights are down. Fields treated after August 1 or a bit before should be relatively safe for the remainder of the season. This is better phrased as fields with very low populations at this time should be safe for the remaining month of the 2008 soybean growing season.

There is no magic calendar date when soybeans are out of aphid danger. The most likely end to the problem will be an aphid population crash from disease or when they begin to move to buckthorn. Insecticide pre-harvest intervals will become important as the season progresses. Most soybeans are in the early R5 stage and still susceptible to aphid injury. While data is limited, it is probable that soybeans in late R5 and beyond stages can tolerate higher aphid populations without yield loss. On the other hand, while it does not often happen, very large aphid populations can cause yield losses to R6 soybeans into September.

Disease – Fungal diseases can cause rapid aphid population crashes if epidemics occur. This is what stopped the SW Minnesota outbreak on August 23, 2003. Most species of entomopathogenic (insect disease) fungi require cool temperatures. As you might expect, they also require wet conditions.

From my limited observations, it would appear that high aphid populations are required for widespread epidemics. The heavy dews, fog and cool nights may help this form of biological control. I wouldn't count on it unless I saw an epidemic happening. Diseased aphids can carry the pathogen to new locations. These entomopathogenic fungi may be most effective while aphids are on buckthorn.

Movement to buckthorn- This is when the sexual stage for the soybean aphid occurs. While I've observed aphids on buckthorn in August, typically this does not occur until September with males moving to buckthorn after females. Figures 1 and 2 show MN suction trap captures for 2006 and 2007, respectively. The peak at the end of the season is assumed to be aphids moving to buckthorn. Of note is the difference in magnitude between the 2006 and 2007 summer and fall migrations. Thanks to the North Central Soybean Research and Promotion Council for funding this network of traps across the Midwest and Dr. Dave Voegtlin for coordinating and identifying the aphids in the trap network. The bad bit of news is that aphid population declines in western Minnesota, unless driven by disease, often are driven by soybean senescence. They are usually present while leaves are falling.

Crop stage – Figure three shows soybean growth and yield components fixed at various growth stages. I believe I pilfered the original image from Dr. Grau in Wisconsin. Only seeds/pod and seed size are affected as soybeans approach maturity. What the figure does not show as clearly is that soybeans have less ways to compensate for stress as they mature. Hopefully, the reader can see why high levels of aphids are more damaging to early reproductive soybeans than later reproductive stages. There is evidence to suggest that later vegetative stage soybeans can tolerate more aphid pressure in terms of aphid-days but this has not been well worked out. This knowledge should allow you to become increasingly conservative with treatment recommendations as pod fill continues. Secondly, the calendar and crop development will limit accumulation of aphid days.

I would not let very large aphid populations (thousands/plant) persist as late as early R6. Treating soybean aphids at 250 /plant during R5, while less certain of return than earlier applications, should minimize back end yield loss from very large late season soybean aphid populations. Use common sense judgment on calendar and crop maturity. There is no point treating plants where leaves and pods are turning. Watch the pre-harvest interval for insecticides.

Superimposed on soybean development is actual aphid data from Lamberton in 2005. The aphid populations were from untreated checks and show a migration event in very late July. The reason for the aphid decline was lower canopy loss. Other plots were treated at 250 aphids/plant and remained low for the rest of the season. These untreated plots did not. Significant yield loss (5 or 6 bushels if I remember correctly) occurred in trials where fall populations reached 5-6,000 aphids /plant late R5 and early R6.

It's the downhill part of the trip. ***Over the next week or so, your efforts should be increasingly focused on late planted and/or fuller season soybeans.*** I'm pretty sure that I need a vacation.

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Figure 1.

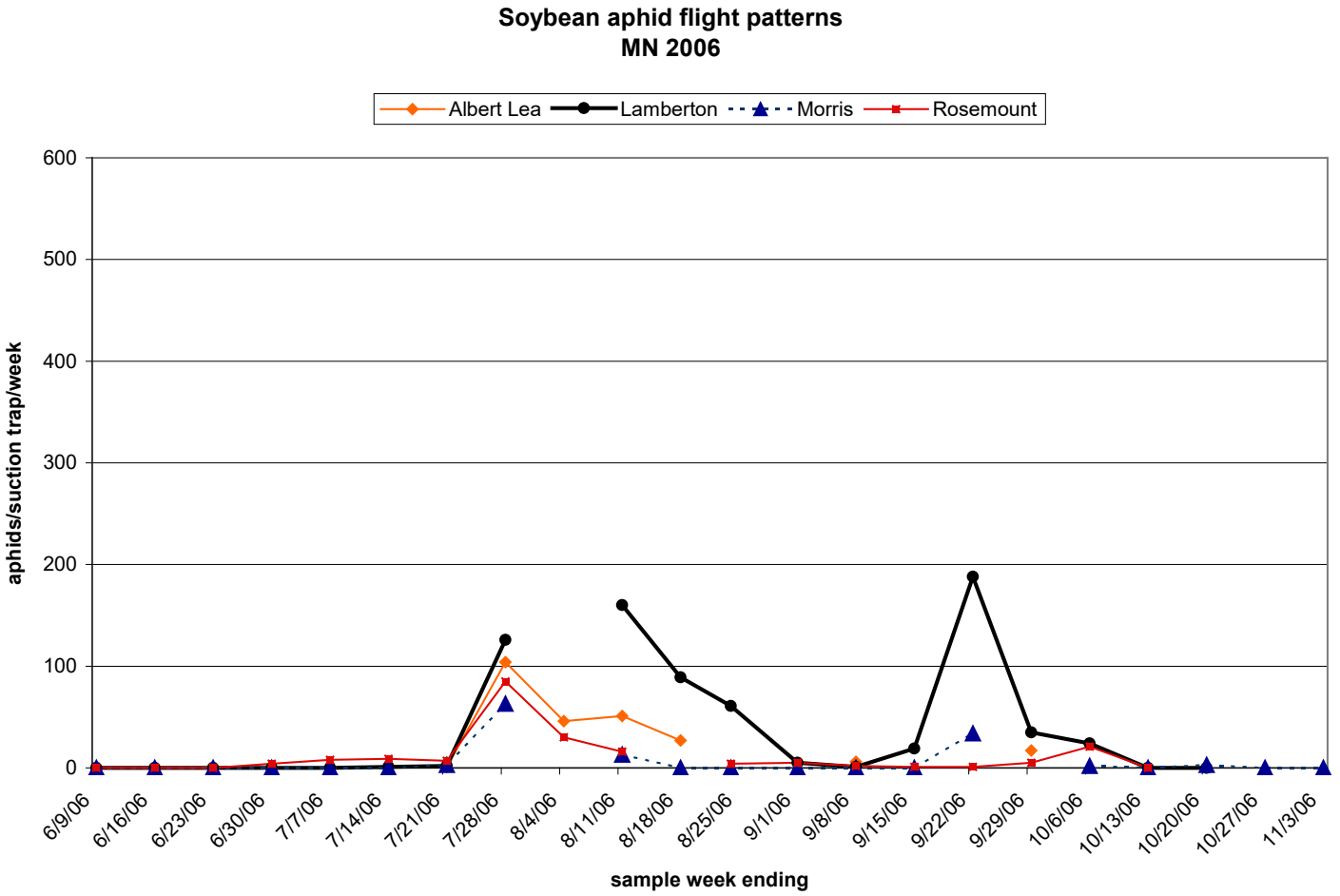
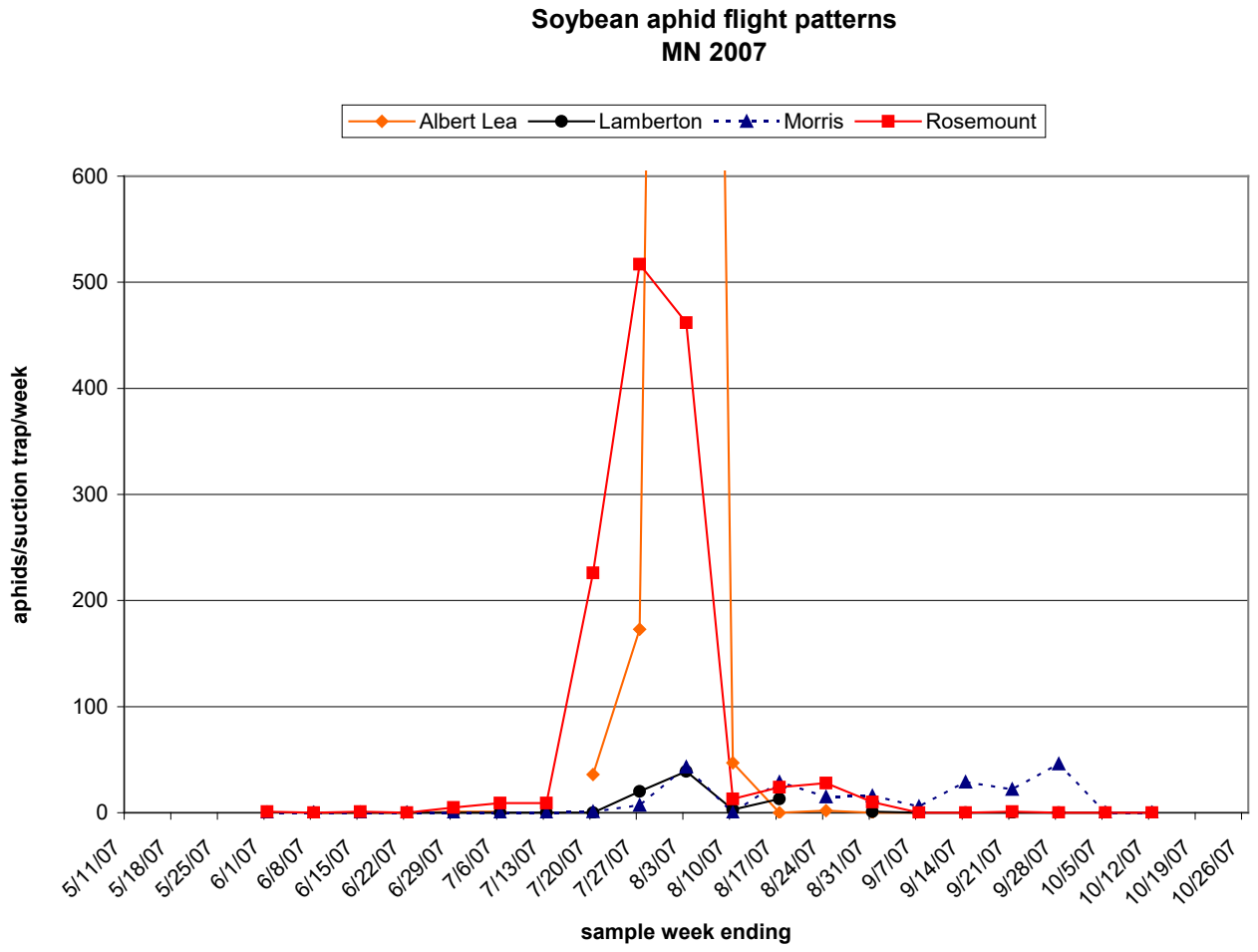

Soybean aphid flight patterns
MN 2006
Albert Lea
Lamberton
Morris
Rosemount
aphids/suction trap/week
600
500
400
300
200
100
0
6/9/06
6/16/06
6/23/06
6/30/06
7/7/06
7/14/06
7/21/06
7/28/06
8/4/06
8/11/06
8/18/06
8/25/06
9/1/06
9/8/06
9/15/06
9/22/06
9/29/06
10/6/06
10/13/06
10/20/06
10/27/06
11/3/06
sample week ending

Figure 2.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600
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6/1/07
6/8/07
6/15/07
6/22/07
6/29/07
7/6/07
7/13/07
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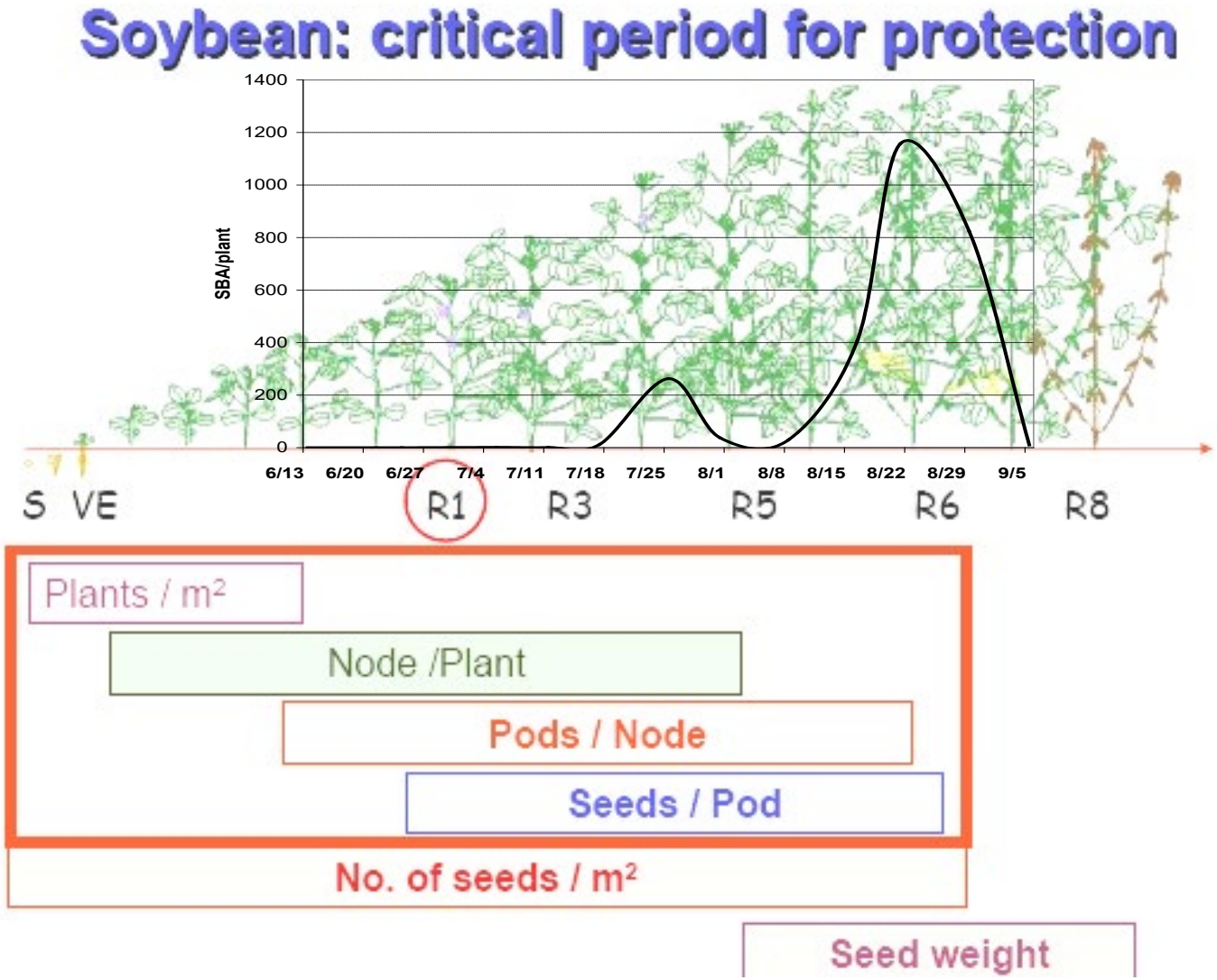
10/5/07
10/12/07
10/19/07
10/26/07
sample week ending

Figure 3.


Soybean: critical period for protection
SBA/plant
1400
1200
1000
800
600
400
200
0
6/13
6/20
6/27
7/4
7/11
7/18
7/25
8/1
8/8
8/15
8/22
8/29
9/5
S
VE
R1
R3
R5
R6
R8
Plants / m²
Node /Plant
Pods / Node
Seeds / Pod
No. of seeds / m²
Seed weight

Southwest MN IPM STUFF

All the pestilence that's fit to print

SW Minnesota IPM STUFF

Aphid errata
08/22/2008

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Crop Weather

To keep up to date on all the crop weather details during the growing season see: http://swroc.cfans.umn.edu/Weather/weather.htm.
Much of MN is now in need of rain. Moisture stress may accelerate soybean development. Hopefully, those that need it will get some rain yet today. There are areas that have suffered significant loss from lack of moisture already.

I have started to see small pockets of spider mite damage on the edges of some fields. I'd avoid trying to make things worse in corn and soybeans with unnecessary insecticide applications.

In spite of dry conditions late season disease is present. Infections of Sudden death syndrome, Brown stem rot, white mold, *Phytophthora* and others occurred when moisture was more adequate. Leaf disease can spread with prolonged periods of dew.

We are seeing some R6 Stage soybeans now.

Aphids

This is good year for aphids in SW Minnesota.
In addition to the seemingly never-ending soybean aphid plague, other plant species are seeing their own version of aphid pestilence. Questions about corn aphids are arriving with some regularity lately and will be discussed later. I am looking out my window at two basswood trees that are completely black with sooty mold. I've heard about heavy aphid infestations on giant ragweed as well. If you get a chance to see a giant willow aphid outbreak you won't forget them.

Aphids have evolved in close association with their hosts and most species are named for their host. Each plant species has its own compliment of aphid species that feed upon them. In other words, aphids that feed on corn cannot move to unrelated plants, like soybean, and feed or

reproduce successfully. Often, both primary and secondary (summer) hosts are needed to complete a life cycle. For example, buckthorn is the primary host and soybean the secondary host for soybean aphid. Aphid life cycles can be very complicated but it seems to work for them.

I only wish that the aphids that feed on weeds were more prolific. Weed science needs the help.

Corn aphids

Did the entomological to do list just get bigger? A good heavy rain would help a lot of issues and this may be one of them. Aphids on corn are causing concern in parts of SW Minnesota. Populations are quite large in some fields. It looks like the good guys (predators and parasites) are finding them. In addition to corn leaf aphids there are large numbers bird-cherry oat aphids, the later primarily on and around the ear. Today, I sent specimens of an aphid, unknown to me, for identification. This large green aphid with black cornicles was forming dense colonies (the aphids are tightly clustered more or less like roof shingles on the ears). Shawn Vis has also seen colonies of this aphid on both ears and leaves and supplied the photo.

Perhaps more interesting than the number of aphids; multiple aphid species can be seen infesting the same leaf or ear. I've seen more than one species on small grain but they are usually occupying different parts of the plant.

Corn aphid control guidelines are based on pre-pollination corn. We are well past this stage now. I have not had time to do a thorough search of the literature but I am not aware of any studies or data showing yield loss from corn aphids this late in the season. There is a lot of photosynthetic area on a corn plant so honeydew and sooty mold would have to be very heavy to impact yield. Without virus transmission, I would expect that populations much heavier than those shown in the photo would be needed to cause physiological damage.

Often problems are confined to field edges. These aphids are distributed through the canopy so coverage would be a concern with any insecticide application. *Based on a lack of yield loss data, I'd be inclined to ignore these aphids as corn approaches dent.* Obvious crop stress symptoms related to aphid populations would cause me to change my mind.

There appear to be distinct differences in aphid populations by hybrid. Note hybrids with exceptionally heavy or light aphid populations as you look at test plots that have heavy aphid infestations. I'd appreciate hearing about these hybrids. If combined with 2008 yield data, these observations may give us a hint whether these heavy late season populations might make any difference.

Soybean aphid

Populations appear to be dropping in some of the areas with greater moisture stress. They continue to increase in other areas, including Lamberton. Untreated populations at Lamberton have declined only because aphid stress has caused premature lower leaf drop, leaving less plant tissue to colonize while other plots continue to increase. This ought to make data analysis interesting.

Don't worry about what others are finding. Each soybean field is unique with respect to soybean aphid populations. this is particularly true late in the season as soybean maturity and other plant quality factors drive aphid populations. Local weather is a bigger factor now as between-field movement has slowed.

Finally! This should be about over with. Scouting over the past couple weeks during the R5 stage should have found any potential late season problem fields. As soybeans enter the R6 stage (seed filling the cavity in one of the four top nodes), I would be very reluctant to apply insecticides. The exception would be marginal moisture and 1000s of aphids/plant. Pre-harvest intervals are going to start becoming important. The next big movement of soybean aphids should be to buckthorn.

Can any biological allies help with soybean aphid?

I was really hoping for some moisture and an aphid disease outbreak. It could still happen. I have heard several observations that aphids seem to be heavier where fungicides were applied.

Dave Ragsdale, U of M Entomology, has entered curmudgeon training. He offered the following to my comments on aphid control by entomopathogenic fungi in the last IPM Stuff issue: "But for those of you who bought the marketing line of "plant health effects" and have added a fungicide when you were applying Roundup or insecticides, may have set back this group of natural enemies so they no longer are as prevalent and aphid population decline may be much slower than in past years. Only time will tell."

In addition to a fungicide's potential direct effect on the aphid killing fungi, they can have an indirect effect on aphid populations by delaying leaf senescence and allowing heavy colonization later in the season. There is usually more than one way to mess things up.

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SW Minnesota IPM STUFF 2008-9

10/02/08

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Low soybean yields in 2008 - Just in case the simplest answer is not the best

Reports of disappointingly low soybean yields from Southwest MN continue. We were behind average in moisture, particularly in mid-late August. At the Southwest Research and Outreach Center Yields have been running 35 to 45 bushels so far. Areas with less moisture are yielding lower. In most cases, plant height was very good with average to slightly lower than average node numbers. Pod numbers are average at best, often contain one or more aborted seeds, and small seed size is typical. This is not a statewide problem. I have heard some good yields from areas with a more favorable climate. Perhaps more confusing, is the reports of individual, scattered high yielding fields in SW Minnesota.

What went wrong?

This was not an ideal soybean growing season. In most cases, these were late planted soybeans with a cool spring further delaying development including late onset of flowering. Plant architecture was typical of later planted soybeans with few nodes and reduced branches. Moisture (and other) stress in July and early August is reflected in reduced pod numbers. Stress in mid - late August is reflected in aborted seeds and small seed size.

Weather is always directly tied to yield and our growing season should be the first factor examined when determining what went right or wrong. Severity of yield loss depends on the timing of temperature and moisture stress with respect to soybean development stage. Weather can also influence soybean yields by creating an environment favoring insect outbreaks and disease epidemics.

Poor timing of aphid control may be a cause for some low yields in some fields. Yield loss in aphid untreated plots at Lamberton will run in the 50% range compared to aphid free. Late season infestations look like they will impact yield but I do not have these plots combined yet. It appears that some fields really should have been treated for aphids more than once.

Aphids are not the sole reason for disappointing yields and are not a factor in many fields. Brown stem rot is rampant at the Southwest Research and Outreach Center, Lamberton. Susceptible varieties are running 60 % plants infected and up. In spite of the cool growing season, I observed charcoal rot at the West Central Research and Outreach Center, Morris. I have not seen this disease this far north before. This disease is not a major yield limiting factor. White mold is also present in SW Minnesota this year, but I have not been in any fields with high levels of disease.

Soybean cyst nematode symptoms, although present, were less obvious this year. This may be due to a cooler season and late planting limiting the number of SCN generations. The lack of severe SCN symptoms makes me question drought stress as the only driver for low yield. If SCN were the cause for widespread low yields, it would mean widespread resistance failures. I am not ready to go there yet.

Some of you observed a strange orange tinge in many, if not most, fields as soybeans leaves started turning this fall. I suspect that this indicates sugars trapped in leaves. This may be due to environmental stress factors but there may be another culprit involved. Pod and stem blight symptoms were observed earlier than usual this season. Late season symptoms of this are higher than I ever seen. The distinctive fruiting structures arranged in rows on the stems are visible on 100% of the plants in some trials, including a foliar fungicide trial. The control and all treatments have pod and stem blight. It appears that there may be slight treatment differences in pod and stem blight severity but they are probably related to delayed senescence rather than disease control. I am curious to see if the combine picks up any yield differences.

Is pod and stem blight the reason for our low yields?
Although circumstantially suspect, a higher than normal incidence of pod and stem blight may not mean that this is the cause of low yields. The genus *Diaporthae* (the sexual stage of pod and stem blight and stem canker) and the *Phomopsis* (the asexual stage of several genera including pod and stem blight) can be isolated from most late season soybean plants in any year with or without visual symptoms. *Diaporthae* is also the genus associated with top die back, a rather mysterious disease that occurs late in the season. I have only seen top die back where SCN are easily found on the roots but it has been documented from other areas without SCN pressure.

It may be that the increased pod and stem blight symptoms at Lamberton, and I assume other areas as well, may indicate that soybean stress allowed this fungus, already present to proliferate. This type of relationship is known to occur with corn stalk rot.

There are a few varieties out there that have some resistance to pod and stem bight. They should yield well relative to other varieties if pod and stem blight is a yield limiting factor.

How can we tell what is the real cause for these disappointing yields?
If this is a disease related, varieties with resistance to pod and stem blight or brown stem rot should yield considerably better. Pockets of high and low yield will exist within soil types if a biotic cause for low yield is the driver. Uniform yields by soil type and water holding capacity indicate a strictly environmental cause. Much higher soybean yields in fields with more than one year between soybean crops would indicate that disease and/or SCN are responsible.

As yields continue to come in, we should be able to sort this out. I doubt we will find a single cause but rather a combination of factors causing the problem.

Low soybeans yields do not mean corn yields will be equally low... different root systems, different grain fill dynamics and etc.

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Insurance insecticide treatments for soybean aphids - Why we are concerned about this management strategy.

Everyone dreads another pesticide trip across the field. You may be planning or have been encouraged to apply an insecticide with an upcoming glyphosate application, without regard for aphid populations in the field. While this strategy may occasionally work out, there are several potential problems that can arise from this strategy.

1) **Cost**
   There is **no** data to suggest that very low aphid populations hurt yield. Early applications are more likely to be re-colonized and require re-treatment. Claims of insecticide residual activity lasting a month, or longer, have little factual basis, particularly when applications are made to rapidly growing soybeans.

2) **Resistance**
   The more often soybean aphids are exposed to insecticide the more quickly insecticide resistant populations will develop. More than one product could lose effectiveness at once, depending on the mode of resistance. An unpleasant wrinkle to soybean management would be aphids that won't die.

3) **Increasing populations of soybean aphid, or other arthropod pests (e.g. spider mites) by removal of beneficial species**
   Removal of beneficials (predators and parasites) can have unexpected consequences. Yes, this really does happen! Imagine how quickly newly arrived aphids reproduce when you've already removed the beneficials for them. When we do this with cages that exclude predators, aphid populations go from 10 to more than 1000 in a little more than a week.

4) **Compromises leading to poor insect and/or weed control**
   Ideal nozzle, water volume and pressure selection for insecticide and glyphosate applications are not the same. Herbicide and insecticide timings should be based on when to apply to the target pest (weed or aphid) to be most successful.

You are responsible for managing **your** crop for a profit. There is nothing illegal about applying an insecticide labeled for soybean when aphid populations are below threshold. However, insecticide applications do have consequences in the environment. We wish only to point out that there are potential short and long term risks when insecticide applications are made without regard to pest populations.

Respectfully,

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Bruce Potter, IPM Specialist SW MN, University of Minnesota
David Ragsdale, Entomologist, University of Minnesota