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VISITORS DAY PROGRAM CHANGED TO AFTERNOON, JULY 16

The annual Visitors Day schedule at North Central will be considerably different this year. We are changing the time and the organization of the tours to accommodate a broader audience and are hoping to provide tours to a mixture of rural and urban visitors. Following is a schedule for the Visitors Day program.

THURSDAY, JULY 16, 1992

9:30 - 11:00
Wild Rice Tour at Aitkin for commercial growers

2:15 & 3:15
Wild Rice Walking Tour at Grand Rapids paddies - varietal and experimental wild rice, burreed control, 2-4,D residue and fungal brown spot research, soil fertility on flooded soils.

4:00 - 8:00
Tours to research areas:
Agronomy - wheat, oat and barley variety selection, intensive rotational grazing, alfalfa variety performance.
Forestry - Minnesota timber supply update; interrelationships

between tourism and natural resources; research techniques in forest genetics; seedling culture, propagation and grafting at aspen/larch greenhouse.

Horticulture - small fruits, All America flower selections, chrysanthemums, carrots, onions, cauliflower, sweet corn, broccoli, muskmelon, pumpkin, and various mulches including black and green (IRT-76) plastic film.

Animal Science - dairy, beef, swine and angora goats.

Intensive Rotational Grazing - dairy cow management comparison between grazing and stored feed; 4:00, 5:00 and 6:00 p.m.



Welcome to North Central



Haralson apple



Tree nursery and Tim O'Brien, forestry plot coordinator.

Tours during the afternoon and evening are free and open to the public. Visitors arriving by 3 p.m. will have an opportunity to tour two or three of the research areas. Specialists from the weed, disease and insect clinic; the Minnesota Department of Agriculture; the Itasca Community College will provide displays and be available to answer questions. The University of Minnesota College of Agriculture will have a representative available to answer parent and student questions about careers in agriculture. Visitors are encouraged to bring questions and problems for discussion. Milk and coffee will be provided to our visitors, however there will be no food service available this year.

Purple loosestrife, a menace to Minnesota's wetlands

Robert F. Nyvall, Professor and Plant Pathologist

Much has been written and said lately about Eurasian water milfoil, an exotic weed that threatens to choke out Minnesota lakes. To date, this weed is confined to lakes in southern Minnesota and around the Twin Cities. Another exotic weed is also threatening to become as big or a bigger pest than milfoil. This weed is purple loosestrife.

Purple loosestrife (*Lythrum salicaria*) is found throughout Minnesota from the

southern border to the Boundary Waters Canoe Country. Purple loosestrife is thought to have originated in Europe and Asia and was brought to this country in the early 1800s by homesick immigrants who wanted to take along familiar plants to beautify their homesteads. Since that time purple loosestrife has spread throughout most of the United States. This spread has been aided by

continued on last page



Wild rice research, Dr. Raymond Porter



Purple loosestrife infestation

This archival publication may not reflect current scientific knowledge or recommendations.
Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

UNIFORM APPLICATION OF ASH AT DESIRED RATES WITH A MANURE SPREADER

James J. Boedicker, Agricultural Engineer

Interest is "spreading" in northern Minnesota in the use of ash as an economical lime and fertilizer source for forage production, especially alfalfa. In the Grand Rapids area, the principal ash generator, Blandin Paper Company, delivers ash directly to farms and owners are responsible for applying it to their fields. Practically all application thus far has been with manure spreaders.

Like any other soil amendment, ash should be applied uniformly and at a "proper" rate to receive the maximum benefit. The purpose of this article is to present guidelines and methods for determining how to operate a manure spreader to apply ash uniformly and at desired rates without excessive trial and error. Uniformity and application rate are somewhat independent concerns and are discussed separately.

The first requirement for uniformity is that the spreader be capable of discharging material at a near constant rate. In this regard, our only experience has been with a PTO driven, box-type spreader with a worm gear apron drive. This spreader moved loads rearward at a constant rate without noticeable "slippage" and hence, appeared to meet this requirement. Spreaders with ratchet apron drives would likely perform similarly but exhibit a somewhat "step-wise" variation in discharge that might or might not be important. By contrast, side discharge spreaders would seem to have a less positive discharge system. We have done no testing with those types of spreaders to determine how uniformly they will discharge.

Uniformity also depends on shape of spread patterns and how patterns overlap on adjacent passes. With a row of catch pans we found that, at standard PTO speed, our box spreader produced an 18-foot wide, bell-shaped spread pattern practically symmetrical about the spreader centerline. For these tests, the spreader was equipped with a slurry

or fines pan mounted below the beater to prevent ash, sloughing off the rear of the advancing load, from falling directly to the ground without contacting the beater. Analysis of that spread pattern showed it necessary to limit effective spread width (distance between centerlines of adjacent passes) to a maximum of 11 feet to achieve reasonable uniformity. With a symmetrical pattern, uniformity will be the same for either the perimeter or the back and forth application method. With non-symmetrical patterns as side discharge spreaders might produce, the perimeter (around and around) method is preferred. When in doubt about shape of the spread pattern, a good rule of thumb is to keep effective spread width to a practical minimum while overlapping as much as possible.

Application rate with any spreader depends on the spreader discharge rate, travel speed and effective spread width. These factors are related by the following formula:

$$AR = \frac{0.24 \times DR}{TS \times ESW} \quad (1)$$

where:

AR = application rate (tons/acre)

0.24 = a units conversion factor

DR = discharge rate (lb/min)

TS = travel speed (mph)

ESW = effective spread width (ft)

This formula can be rearranged for use in solving for either required TS or ESW as follows:

$$TS = \frac{0.24 \times DR}{AR \times ESW} \quad (2)$$

and

$$ESW = \frac{0.24 \times DR}{TS \times AR} \quad (3)$$

To use these formulas, it is first necessary to determine the spreader DR. For a box spreader, multiply together apron speed (ft/min at standard PTO speed), width and average height of the load (both in feet) and density of the

ash. For apron speed, consult the operator's manual or measure the distance (feet) the apron moves in one minute at standard PTO speed. Some spreaders provide a choice of two or more apron speeds. Preferred apron speed will depend upon desired AR, preferred TS and available tractor power. As for density, tests with freshly delivered ash showed 45 lb(dry)/cu ft to be a reasonable estimate. Dry density of wet ash, piled for a year, was only about 30 lb/cu ft after being disturbed in loading. We have no experience in predicting DR of side discharge spreaders.

The following example shows how the formulas work for a box spreader. Assume the desired AR is 12 tons/acre. For an apron speed of 4.5 ft/min, load width of 5 ft, average load height of 2 ft and ash density of 45 lb/cu ft, DR would be 2025 lb/min (4.5x5x2x45 = 2025). Next, use Formula 2 to calculate required TS. Here assume a "trial" ESW of 10 feet. With these figures.

$$TS = \frac{0.24 \times 2025}{12 \times 10} = 4.05 \text{ mph}$$

For a gear type tractor, consult the tachometer dial, gear/speed sticker or operator's manual to find out which gear produces about 4.05 mph at the engine rpm corresponding to standard PTO speed. If none comes close, select preferably the next higher gear and use its mph figure in Formula 3 to calculate a new (smaller) ESW. With an infinitely variable transmission, set engine speed (throttle) to provide standard PTO speed and then while observing the speedometer (if one exists) adjust TS to the desired mph.

I encourage anyone spreading ash to try this method. It gets easier and IT DOES WORK! Remember, ash is abrasive and somewhat corrosive so work upwind, protect yourself and engines from dust, grease often, and clean equipment when finished.

HORTICULTURAL RESEARCH--NEW IN 1992

David K. Wildung, Horticulturist

One of the most exciting parts of my job as horticulturist is to see the plans of our research develop in the form of new plantings or good winter survival of perennial plantings in the spring. As I write this, the horticulture department at

North Central Experiment Station is in the middle of a busy season of planting and evaluating winter survival. It seems appropriate to share a few of our plans with you in the expectation that you will visit our plots during the coming grow-

ing season.

First looking at the perennial crops, it appears that they overwintered well. There does appear to be winter injury to some tender cultivars, but there are also very good differences. These differences

are exactly what we want to see to enable us to select more hardy cultivars for northern Minnesota. This spring we had some unusually cold days in late May (26 degrees F on May 24). At that time the apples and blueberries were at or near full bloom while early strawberries were still in the bud stage. At this writing it is too early to tell how they will survive, however; it appears that the apples and blueberries will be fine. In fact, the blueberries look outstanding as they are beginning to drop their petals. The 26 degree F ground temperature they appear to have survived is the coldest I am aware of. That is very significant and shows that blueberry flowers near full bloom can survive several degrees of frost. On the other hand, the early strawberry cultivars that were at bud stage appear to have lost most of their primary (king) fruit. There should still be a nice strawberry crop unless additional frosts occur in early June when the plants will be in full bloom. Raspberry winter survival as expected was variable with good survival of hardy cultivars (Nordic, Festival, Boyne, Killarney) and poor survival of tender unadapted cultivars. A few surprises were the cultivars Brandywine and Haida. It will remain to be seen how well they fruit during the season. Woody ornamental winter survival appears to be excellent this season. Bloom has been outstanding with several selections already this spring. For example, some of our *Forsythia* bloomed to the tip (over 6 feet high). This amount of bloom is the best I can remember in over 20 years. Very little winter damage has been seen on the woody plants. So much for the perennial plants. What will be new in annual plantings in 1992?



Andes cauliflower

The flower plantings promise to be good with many new cultivars and All America Selections (from 1988-1992 and including the 1993 winners) on trial. We will be evaluating several different colors and types of flowers including red petunias (on which we normally have

poor performance), lisianthus, seeded geraniums compared to cutting type geraniums, nicotianas (which should be used more in our gardens), ornamental kale as well as many others. I am currently exploring with a couple of seed companies the possibility of fall planting pansies for early spring bloom. This idea has some exciting possibilities. The 1992 season will find the largest chrysanthemum planting ever that will include ten U of M breeding selections and eight seed lines. Altogether our flower trials will be one of the larger plantings we have had in recent years.

Another flower study we are excited about in 1992 is a celosia-mulch study for dry flower production. Celosia is a warm season crop that needs lots of heat units to produce good flower spikes. It is marginal for dried flower production in northern Minnesota without using some maturity aids. We will be comparing black and green (IRT-76) plastic film, raised and no beds, and plastic floating or no row covers to determine what combinations will speed maturity and give us maximum production of dried flowers. The dried flower industry is increasing in Minnesota and hopefully this study will help answer some questions on maximizing celosia production.

Vegetable plantings for the coming season will focus on cultivar evaluation and cultural management studies. Major cultivar trials will be conducted on cauliflower, broccoli, supersweet and regular sweet corn, carrots and onions. Smaller cultivar trials will be conducted on peppers, green beans, celery (for sources of aster yellows resistance), muskmelon, pumpkin and spinach (for color development, bolting resistance and aster yellows tolerance). In all of these trials each vegetable type will be evaluated for yield, shape, color, disease resistance, appearance, season of maturity and desirable characteristics for the crop under northern Minnesota conditions. Several seed companies contribute new cultivars and advanced breeding lines for evaluation. These trials serve as the basis for vegetable cultivar suggestions for commercial producers and home gardeners in Minnesota.

Several vegetable cultural studies are also planned for 1992. Two of these studies involve broccoli. One will be a pinching study to determine if lateral head formation can be increased by pinching out the growing point at planting or up to four weeks after planting. By sacrificing the primary head it is expected that more laterals will be formed, potentially leading to greater secondary head formation and more total yield. The other broccoli study will be

done in cooperation with Dr. Cindy Tong, Post Harvest Specialist from St. Paul. We will be evaluating calcium sprays for increasing cut broccoli shelf life. Another study with muskmelon will compare clear, black and green (IRT-76) plastic film with no plastic to increase muskmelon production. The new green film is supposed to suppress weeds (which clear poly does not) while providing maximum heat transmission. The cultivar Superstar will be used in this study.

In recent years there has been increasing interest in processed vegetable production in northern Minnesota. Carrots are one of the crops being evaluated, especially for dehydration. Dehydrated carrots are used in dry soup mixes, frozen dinners and similar type products. In order to dry or dehydrate carrots, heat is used to drive moisture out of the carrot. Most carrot roots are 85 to 90 percent moisture so much heat is needed in the process. Therefore, carrots with a lower moisture content will cost less to dehydrate. During the process other root characteristics such as color also change (high orange color is desirable). Since there are so few dehydration plants in the United States, very little information is available on the development of carrot color and percent moisture of the root tissue as the roots mature. Cultivars also vary in color and dry matter content. We will be comparing these changes in ten cultivars beginning about 10 weeks after emergence and into October. The cultivars were chosen because they have shown high dry matter content and good natural color. 1992 will allow us to identify how color and dry matter develop in the carrot roots and future research will then deal with how the crop can be managed to improve color or dry matter content. Other similar studies may follow with other vegetable crops like spinach.

While several of these studies are yet to be planted in the field and the variable northern Minnesota climate could alter our plans, this discussion provides you with a preview of the 1992 season. I hope it will encourage you to visit our horticultural area during the growing season or to attend one of our field days on July 16 or August 26.

Sustainable Agriculture Tour
 Wednesday, September 2
 Al Jackson Farm
 Annual Crops for Nitrogen
 Intensive Grazing
 Time for Questions
 Call North Central for Details

NEWS FROM NORTH CENTRAL

David L. Rabas

Spring came slowly to North Central. At times it seemed that winter would not let go. Late May frosts yellowed some corn and damaged some early gardens in the area. June brought warmer weather, but neither late May or early June provided enough rain for a good hay crop. Planting proceeded well in spite of the dry weather and grain crops were off to a good early start.

I am writing this article in early June and I am presuming about hay harvesting time it will begin to rain. If it does not rain soon the effects of the drought could create serious pasture and hay shortages in the area.

North Central employees honored Gordon Bickford in May with a noon lunch. Gordy retired after 36 years of employment here at the Station. We wish Aggie and Gordy the best of luck in their retirement.

Please notice that we have changed the format for our Visitors Day on July 16. By planning our programs for late afternoon and early evening we hope to provide the opportunity for more people to attend. Our Visitors Day is one of two formal tours we hold here at North Central. A second tour to the horticultural research area is held on the last Wednesday in August each year. Visitors are always welcome to come to the station, but being here for scheduled tours with specialists to answer questions is always a good way to learn more about our station's research programs.

Please accept this special invitation to be with us on Thursday, July 16. We welcome this opportunity to share with you ideas and information which help us build more profitable and sustainable agriculture and forest industries in Minnesota.

COMING EVENTS

July 16 — Visitors Day
August 26 — Horticulture Night

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Purple loosestrife *continued from page one*

the development of different horticultural varieties of purple loosestrife. Many readers of this article may have a beautiful spiked purple flower growing in their garden! Ironically, this flower may have been bought in a greenhouse.

Although purple loosestrife is a beautiful flower, it poses a menace by crowding out useful native vegetation along waterways, marshes, and wetlands; creating a monoculture of vegetation that is useless to wildlife. It is conceivable that in the future if loosestrife is allowed to go unchecked, it could become the dominant vegetation in many of our lakes and wetlands. One has only to visit the backwaters of the Mississippi River between Winona and Red Wing to see evidence of what can happen.

To date, the only known approved control of loosestrife is the application of the chemical herbicide glyphosate (Rodeo) by trained personnel of the DNR. This has several obvious drawbacks such as the expense of application, regrowth of vegetation and the social issue of applying pesticides to our lakes and waterways. Insects have been identified that also have potential as biocontrol agents. These insects were to be released this year.

In other attempts to control loosestrife, a research program to develop mycoherbicides is currently underway at North Central. Basically what this involves is the utilization of fungi that are already found in nature as a biocontrol agent of loosestrife. Similar efforts are underway in other parts of the country



Superintendent Dave Rabas congratulated Gordy Bickford on his retirement.

and world to develop insects as a biocontrol agent. My research will concentrate on the search for fungi that cause leafspots, crown rots or root rot of loosestrife. There is reason to be optimistic that this approach will succeed. After one year I have identified three fungi that are consistently isolated from leafspots on loosestrife. This fungi will be manipulated in various ways and re-applied to loosestrife plants in an attempt to screen for a successful mycoherbicide. Hopefully, by this time next year, I can say there are one or more fungi that are promising as biocontrol agents. These could then be utilized (in some instances, together with insects) as a biocontrol agent of purple loosestrife.

This type of research involves a lot of traveling, looking and patience! Several purple loosestrife sites are visited and examined carefully for signs of disease or other abnormalities. Plant samples are then taken back to the laboratory and procedures conducted to isolate the microorganisms causing the disease. If successful, the microorganisms are then subcultured and a pure culture of the microorganism attained and identified. Lastly the different cultures are screened for potential mycoherbical properties. All of this takes time and money! I would like to thank the LCMR and the DNR for their support for this research.

I would like to solicit help from readers of the Quarterly. I need to identify other purple loosestrife sites in northern Minnesota, preferably within an hour or two of Grand Rapids. I will be taking plant samples from these sites to isolate fungi that may be potential mycoherbicide candidates. If you know of a purple loosestrife site please write to me at the University of Minnesota, North Central Experiment Station, 1861 Highway 169 East, Grand Rapids, MN 55744. Please be sure to enclose a map to the site. A very rough drawing will do. If it is private property I must also have permission to enter the land. Thank you in advance to everyone who is helpful in identifying these sites.

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