MINNESOTA

CROP NEWS

Vol. 4
No. 30

From the Crops System Team of the University of Minnesota Extension Service

Now is the time to order your 1999-2000 subscription to *Minnesota Crop News*. A convenient order form is located on page 167 of the December 18, 1998, *issue of Minnesota Crop News*.

High Spoilage Risk for Stored Grain this Year

The combination of low grain prices and an unusually warm fall have created a greater-than-normal spoilage risk for stored grain in the upper Midwest. We have a large amount of grain in storage, including some that was harvested in 1997. Much of this grain is too warm, some is too wet for safe storage, and some is stored in structures and piles where there is inadequate aeration and poor protection from precipitation and soil moisture. Because of the high spoilage risk created by these conditions, stored grain managers should check their bins more frequently than normal to catch insect and mold problems before they get out of control.

When grain is stored for more than a year and the grain temperature is high during part of that storage period, there is a high probability of infestation by insects. We have already heard a number of reports from grain managers who are finding insects in 1997 grain. If you find insects in stored grain during winter months, one of the best options is to aerate the grain during cold weather to slow insect activity and perhaps even kill the insects. We normally suggest that grain be cooled to 20 to 30F for winter storage, but if you have an insect problem, you might try cooling the grain to temperatures even lower than 20F and holding the grain at that temperature for a few weeks. Most insects become inactive at low temperatures and many die. Cool the grain as fast as you can because faster cooling gives insects less time to adjust to the temperature change and more of them will die. (Watch for frost buildup on screened roof vents in bins that have positive pressure aeration systems because restricted vent areas can lead to damaged bin roofs. Open roof hatches if frost starts to accumulate on vents.)

If you use this low-temperature strategy to control insects, it would be best to run the fans again later in the winter to bring the grain temperature up to 20 to 30F to reduce the temperature difference between

Highlights . . .

the grain and outdoor air when warm spring weather arrives. (Large temperature differences can lead to moisture migration and condensation.)

Another strategy for reducing existing insect problems is to run grain through a grain cleaner during grain transfer operations. Grain cleaning removes many of the broken grain kernels that attract insects and removes some of the insects as well. Fumigating stored grain is generally not an option during winter. The type of grain fumigant most commonly used on farms does not work well at low temperatures, and in fact the label indicates that the product should not be used at low temperatures. Try non-chemical strategies first, and if they don't work, wait until spring to fumigate the grain. Grain fumigants are potentially dangerous materials that require use of safety and gas monitoring equipment, so consider hiring a commercial applicator if fumigation is necessary.

Much of the 1998 crop was harvested at unusually warm temperatures and since it was unusually warm much of the fall, there were few opportunities to cool grain to the normal target temperature of 20 to 30F. If grain has not been aerated since harvest, do so as soon as possible. If grain was aerated, but the temperature was greater than 30F during the time that the fan was on, complete another aeration cycle during 20 to 30F weather. If the bin is not equipped for aeration, feed or sell the grain as soon as possible or move it to a bin that is equipped for aeration. Holding warm grain into cold weather is very likely to cause moisture migration which leads to molding, crusting, and possible insect infestation at the top center of the grain mass.

Some of the 1998 crop was also stored at moisture levels that are too high for safe storage. The warm fall led to rapid field drying, and to save money, some farmers put crops (especially corn) directly into storage without any artificial drying. In some cases, the corn didn't get quite dry enough and is now in storage at 15 to 17% moisture. If cooled to 20 to 30F, corn at this moisture can be held through the winter without spoilage, but it should be fed, sold, or dried to less than 15% moisture before spring.

Finally, part of the 1998 crop was stored in outdoor piles or in structures that were not originally designed for grain storage. Keep an especially close watch on grain in these situations, because in many cases the grain is exposed to precipitation or soil moisture, and aeration systems (if present), often do not provide uniform airflow. If you see signs of moisture migration, mold, or insects, aerate to try to control the problem and feed, sell, or move the grain as soon as possible.

Bill Wilcke
Minnesota Extension Engineer

Effect of Nitrogen, Inoculation and Iron Seed Treatment on Soybeans in Northwestern Minnesota —1998

Soybean production has increased over 280% in the northwestern crop-reporting district of Minnesota from 1994 through 1997, with over 500,000 acres planted in 1997. Iron chlorosis and poor nodulation have been problems over the past several years. Resistant and moderately resistant varieties can partially reduce iron chlorosis, whereas addition of nitrogen fertilizer has been used as insurance to overcome ineffective nodulation of soybeans. Soybeans utilize over 60 percent of their nitrogen requirement during the last forty days of development, therefore, applying in-season nitrogen may be beneficial.

An iron seed treatment experiment and an inoculation/nitrogen in-season nitrogen experiment were conducted during 1998 at sites near Ada (Glen Brandt Farm) and Red Lake Falls (Knute Knutson Farm). Funding for these research/demonstration experiments were provided through a grant from the Minnesota Soybean Growers Checkoff Research Funds.

Soil chemical properties prior to planting at each location were: Ada; 0-24" nitrate-N 128 #/ac., phosphate 22 PPM, potash 167 PPM, pH 8.1 and O.M. 2.4%, and Red Lake Falls; 0-24" nitrate-N 112 #/ac., phosphate 11 PPM, potash 306 PPM, pH 7.6 and O.M. 4.9%. The previous crop at both locations was wheat and soybean had never been grown before at either location. Plots were planted at a rate of 179,000 seeds per acre in 22-inch rows 50 feet long at each location. The Ada site was planted and preplant nitrogen rates applied on May 26, in-season nitrogen applied July 20 and harvested September 25. The Red Lake Falls location was planted and propellant nitrogen rates applied on April 30, in-season nitrogen applied July 13 and harvested September 15. The soybean culti-

var Agassiz was used in the inoculation/nitrogen experiments and Agassiz and Glacier, both moderately resistant to iron chlorosis, were the cultivars used in the iron seed treatment experiments. Ammonium nitrate was the nitrogen source used for both the preplant and in-season treatments at both locations. A commercial inoculate, Bradyrhizobium japonicum, was used as a seed treatment at both sites. Weed control at both locations consisted of 3 pt./ac. Prowl preplant incorporated followed by 4 ounces of Raptor herbicide post-emergence. The iron seed treatment experiment had 1lb. of 6% sequestered 138-iron chelate applied to the seed, which amounts to .06 lb./ac. of actual iron.

Treatments were replicated four times in a randomized complete block design for each experiment. Preplant nitrogen rates consisted of 55 and 60 lb./ac. and in-season nitrogen rates were 60 and 105 lb./ac. Total nitrogen derived from residual soil nitrogen plus added nitrogen were 110, 170 and 270 lb./ac. Paired treatments at the same nitrogen rates either received or did not receive inoculation. The iron seed treatment trial consisted of two varieties with or without iron seed treatment.

Yield and quality of soybeans from the nitrogen/inoculation trials are listed in **Table 1**. Nitrogen rates, timing or inoculation applications did not statistically effect yield or test weight at either location. The Red Lake Falls location showed a significant increase in protein percentage and a significant decrease in oil percentage as nitrogen rates increased. This effect was not statistically measurable at the Ada location.

Table 1. 1998 SOYBEAN NITROGEN/INOCULATION TRIALS—Red Lake Falls & Ada

Treatment	Yield (bu/ac)		Protein %		Oil %		Test weight	
	RLF	Ada	RLF	Ada	RLF	Ada	RLF	Ada
110 N - no I	61.0	53.5	35.53	35.45	18.50	18.70	53.0	53.0
110 N - I	61.2	53.5	35.65	35.15	18.52	18.92	52.8	52.8
170 N - no I	65.0	52.0	35.83	34.95	18.42	18.98	53.0	53.0
170 N - I	62.6	52.5	35.63	34.75	18.45	18.65	53.2	52.7
110 N + 60 N - no I	63.6	52.0	35.98	35.62	18.35	18.70	53.0	52.8
110 N + 60 N - I	55.7	53.2	36.18	36.00	18.38	18.55	53.3	52.9
165 N + 105 N - no I	60.4	52.0	36.35	35.20	18.23	19.02	53.2	51.9
165 N + 105 N - I	63.1	54.2	36.25	35.55	18.28	18.75	53.0	52.9
Significance	N.S.	N.S.	0.51	N.S.	0.27	N.S.	N.S.	N.S.

Table 2 lists the yield and quality of soybeans in the iron seed treatment trial. Statistically there were no significant differences with or without iron added as a seed treatment to the two varieties in this trial. Averaged over treatments, Agassiz yielded 10 bushels more than Glacier at Red Lake Falls and 7 bushels more at Ada.

Table 2. 1998 IRON SEED TREATMENT TRIALS—Red Lake Falls & Ada

Treatment	Yield (bu/ac)		Protein %		Oil %		Test weight	
	RLF	Ada	RLF	Ada	RLF	Ada	RLF	Ada
Glacier + Fe	45.6	43.0	37.18	36.00	16.78	17.88	54.3	54.0
Glacier	45.6	45.2	37.38	36.05	16.58	18.15	54.0	53.5
Agassiz + Fe	57.3	51.8	36.45	36.55	18.32	18.25	53.2	52.1
Agassiz	54.3	50.5	36.58	36.30	18.22	18.25	53.4	53.1
Significance	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

This research/demonstration project was a cooperative effort among Russ Severson, Ken Pazdernik, Dr. Bobby Holder, Dr. Carlyle Holen, Dr. John Wiersma, and James Cameron.

Written by Russ Severson
Polk Co. Extension Educator

Crop Picture Brighter Than Expected in Southern Minnesota

For corn and soybean growers in southern Minnesota, the economic picture is much brighter than we expected it would be back in August. Yes, grain markets are depressed, but a number of factors have improved the overall outlook.

First, yields are substantially higher than normal. Many producers are reporting their best crop ever. I supervised a state and national corn yield entry of 211 bushels per acre, more than 30 bushels better than any other dryland entry I have supervised from Meeker County. Loan Deficiency Payments (LDP) have helped offset record low grain markets in the form of 20 - 40 cents for each bushel of corn harvested, and 40 - 60 cents per bushel for each bushel of soybeans harvested. An additional Market Transition Payment of 18.7 cents per bushel for each bushel for corn was approved by congress in October as reported in the 11/13/98 issue of *Minnesota Crop News*. Not all producers were able to take advantage of these payments; but the payments have had a significant impact in rural communities.

Farmers are in excellent position for the coming growing season having completed harvest, wrapped up most fall tillage, and applied a much higher percentage than normal of anhydrous ammonia. All of this work was done under fairly dry soil conditions so compaction should be minimal. Subsoil moisture as of 11/17/98 is being reported at or above normal by the Midwest Climate Center in all areas of Minnesota except the Northwest. This combination should, on an average, allow farmers to get crops planted a few days earlier next spring and this should benefit crop yields.

Once again, seed dealers are reporting strong sales before January 1. This is a good sign that crop producers in southern Minnesota are coming through the 1998 year much better than was expected just a few months ago.

Dave Schwartz
Extension Educator—Soybeans

Potash and Alfalfa Production

The alfalfa crop has a greater requirement for potassium than any other nutrient. Past research has shown that the application of potash fertilizer will produce profitable increases in yields when soil tests for potassium are in the medium, low, and very low categories.

Recently, Dr. Keith Kelling at the University of Wisconsin completed a study designed to evaluate the effect of various management strategies for potash fertilizer on alfalfa production. The studies helped to identify the optimum rate of potash at various soil test levels of potassium. The study also compared two fertilizer sources of potassium and evaluated the effect of the timing of topdressed applications.

The results of this extensive study are summarized in the paragraphs that follow. The study was conducted for four years (1994 through 1997).

Alfalfa yields increased as soil test potassium levels increased up to approximately 120 ppm. There was no increase in yield if the soil test values were higher. When soil test values were in the very low range, a rate of 280 lb. potash per acre was needed for optimum yield. When soil tests were low, a rate of 210 lb. potash per acre was needed for optimum yield. This rate decreased to 70 lb. potash per acre when the soil test for potassium was in the medium range.

The results of this study are in general agreement with potash fertilizer recommendations from the University of Minnesota if the yield goal is in the range of 5 ton per acre.

Potassium sulfate and potassium chloride (0-0-60) were the two sources compared. The results were mixed. In the 1st and 2nd years, there was no difference in yields when the sources were compared. In the 3rd and 4th years, however, slightly higher yields were measured when the potassium sulfate was used. This may have been a response to the sulfur. However, alfalfa at this site has not responded to the application of sulfur in the past.

The time of potash application had no effect on alfalfa yield in the first year of the study. In the other three years, there was a slight reduction in yield when the potash was topdressed in early spring at "greenup." The highest yields were produced by the application after the first cutting. There was little added benefit if the potash application was split and applied after the 1st and 3rd cuttings.

In Minnesota, growers have considerable flexibility in the application of potash to alfalfa. Because of the need for sulfur early in the growing season, the sulfur should be combined with potash and topdressed before "greenup" when alfalfa is grown on sandy soils. When soils are not sandy, the needed potash can be topdressed either early in the spring at "greenup" or after the first cutting.

George Rehm
Extension Soil Scientist

Don't Use What You Don't Need

The current commodity prices are a serious concern for numerous Minnesota farmers. Forecasts by many market analysts suggest that there will be no major improvement in the near future. With this as a background, there is a very real need to take a close look at inputs that are purchased for crop production in 1999.

In most years, a substantial portion of the total amount of money spent for inputs is used to buy fertilizer. As we look to 1999, the efficient use of dollars spent for fertilizer is a major concern for crop producers in Minnesota.

It's very difficult to develop a cost effective fertilizer program without soil test information. The results of a soil test are important in two ways. They predict the amount of fertilizer needed for optimum yields. They also tell us when fertilizer is not needed.

The soil nitrate test is used to fine-line our nitrogen recommendations and it's use can prevent excessive applications of this nutrient. If carryover nitrate-nitrogen is high and is measured, crop producers can reduce purchases of nitrogen fertilizer and they won't be using what they don't need.

In addition, applications of phosphate and potash fertilizers can be discontinued if soil tests for P and/or K are in the high or very high range. For corn and small grain production, there is a very low probability that broadcast applications of phosphate fertilizer will increase yields if the P test is higher than 20 ppm (Bray procedure) or 16 ppm (Olsen procedure). Application of some phosphate in a starter is suggested if the soil test values for P are in the range of 20 to 25 (Bray procedure) or 16 to 20 ppm (Olsen procedure). The use of phosphate fertilizer is not suggested if the P test is higher than 25 ppm (Bray procedure) or 20 ppm (Olsen procedure).

For potash use for corn and small grain production, there is a very low probability that broadcast potash will be cost effective when the soil test for K is higher than 160 ppm. Potash in a starter is suggested if the soil test K is in the range of 160 to 170 ppm. No potash will be needed if the soil test for K is higher than 170 ppm unless corn is planted in a ridge-till or no-till system.

For soybean production, there is a low probability that there will be a response to the application of phosphate if the soil test level for P is higher than 10 ppm (Bray procedure) or 8 ppm (Olsen procedure). Potash fertilizer for soybean production will not be needed if the soil test for K is higher than 100 ppm.

The soil test guidelines for terminating the use of phosphate and potash for alfalfa production are the same as those used for corn and small grain production.

George Rehm
Extension Soil Scientist

Potash and Alfalfa Production

Samples submitted to the Plant Disease Clinic for analysis included:
corn—cultured for storage molds
wheat—cultured for storage molds
silage—cultured for storage molds
potato—soils processed for *Verticillium* sp
rose—*Paratylenchus* sp (pin) and *Pratylenchus* sp (lesion) nematode, *Botrytis* sp canker
geranium—*Xanthomonas campestris* pv *pelargonii* (bacterial wilt)
salvia—Impatiens necrotic spot virus (INSV), Tomato spotted wilt virus (TSWV), cyclamen, Limonium, Monarda, Penstemon, Bergenia and ferns all tested negative for INSV and TSWV.

Sandra Gould
Plant Disease Clinic

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Dave Schwartz
Extension Educator—Soybeans

Highlights . . .

Update on Soil and Climate Conditions

Farmers applying anhydrous ammonia, soil sampling, or injecting liquid manures are a somewhat common sight across the Minnesota landscape in October and November. But this December many of these activities were also observed, a highly unusual situation.

The absence of snow cover has provoked some concern for soil moisture conditions and possible winter injury to alfalfa and pastures. Soil moisture storage has been magnificently efficient this fall, with 60 to 80 percent of the precipitation being absorbed into the soil. The soil moisture models used by the Midwest Climate Center estimate that most of the state's soils are storing between 6 and 8 inches of available moisture in the top five feet of the profile (see table). Further, because of the absence of frost layers, the moisture has been rather evenly distributed throughout the root zone. This will be like money in the bank for the 1999 crop season.

More concern might be directed toward the effect of so many soil freeze-thaw cycles on alfalfa and pasture grasses. These species normally harden-off and become dormant for the winter, buried under ample snow cover. It is the late winter and early spring conditions which sometimes cause them to break winter dormancy and start to grow, only to be exposed to damaging late season severe cold spells. It is much more unusual to have these fluctuating climatic conditions prevail in early winter, as they are now. Many plants have broken dormancy. Any detrimental effects from this might be offset by a good snow cover. The question on everybody's mind is when will we get some snow cover?

Minnesota Soil Moisture Summary by Climate Division Estimated on 12/16/1998 Using the Soil Moisture Model of the Midwest Climate Center
Average water (inches) in 60.0 inch soil profile
% ppam

climate division	current year	last year	deviation*	current year
NW 1	8.2	4.5	4.0	95
NC 2	5.7	5.7	0.1	100
NE 3	8.7	8.3	0.2	100
WC 4	8.0	2.5	3.6	99
C 5	5.6	3.3	0.6	100
EC 6	6.6	4.1	0.7	100
SW 7	8.0	7.3	2.9	97
SC 8	7.9	8.5	0.8	96
SE 9	8.3	9.0	-0.1	96

** Deviations are from the records of 1951 - to present*
% ppam = percent of available moisture / pot. plant avail. moisture

It appears that the jet stream track is changing and the upper air pattern which has been locked-in for a seemingly long time is now breaking down. Medium range forecast guidance suggests that for the second half of December, we'll see a return to cold temperatures (even below normal values) and more frequent chances for snowfalls. However, should fields remain without ample snow cover, we may be looking at a situation that is conducive to widespread winter injury for alfalfa and pasture species.

Mark Seeley
Extension Climatologis

Roundup Ready Soybeans

Much excitement has been generated by the introduction of Roundup Ready soybeans, and for the most part weed control results have been excellent. Many unanswered questions, however, remain. The most important question: Do Roundup Ready soybeans compete economically with conventional varieties? The best answer is "it depends".

Variety testing work conducted by the University of Minnesota strongly suggests that 1998 Roundup Ready soybean varieties yield on average less than conventional soybean varieties. At this point in time I would figure a difference of 3 to 6 bushels less then conventional varieties. Whether this difference in yield can be recovered by other benefits provided by the Roundup Ready system remains to be answered, and will discussed below.

The impact of conventional soybean herbicides on Roundup Ready soybean yield has been questioned. Research conducted at the University of Minnesota Southern Experiment Station addressed many of the concerns expressed by producers. The university trials compared soybean yields of four Roundup Ready varieties under both a Roundup herbicide program (Roundup 32 oz/acre with AMS), and a conventional herbicide program (Command 1.5 pt/acre plus Pursuit 0.72 oz/acre soil applied). No significant differences in yield were detected between the two systems. The average yield under the Roundup system was 69 bushels per acre, the conventional system yielded 71 bushels per acre. If severe crop injury occurs due to unfavorable environmental conditions, improper herbicide timing, or other factors, it maybe possible to decrease soybean yield with conventional herbicides. The risk of crop injury is less of an issue with the Roundup system.

Decreased herbicide carryover is also frequently brought up as a reason for using a Roundup Ready system. Roundup herbicide has no soil activity, therefore carryover to rotational crops is not a concern. Because it has no soil activity, however, it also has no residual weed control. Late germinating weeds may require additional control measures, such as cultivation, or sequential herbicide applications. Measuring the affects of herbicide carryover from conventional herbicides is difficult. When carryover occurs it is usually associated with uses inconsistent with the herbicide label or extreme environmental conditions (drought, cold wet weather, etc.). Using proper herbicide rates to match soil type and avoiding overlaps during application is frequently all that is needed to minimize carryover risks.

Determining the economic benefits of the Roundup Ready system is difficult to assess. Research trials comparing crop yield, and return over weed control costs of the Roundup system compared to conventional herbicide systems, has shown both systems to be equal. These trials were conducted using Roundup Ready soybeans with the only variables being herbicide treatment. There are pluses and minus for both systems. The system you choose needs to fit your management program, and address your weed control needs.

Research conducted by the University of Minnesota, as well as other north central universities, has shown that Roundup weed control is equal to conventional herbicides. Fields with low weed pressure frequently only require a single application. Fields with higher weed pressure, or unique weed problems, however, may require additional applications of herbicide, or weed control strategies. Perennial weed control

1998 Soybean Herbicide Evaluation—Waseca, MN

Herbicide	Timing	Rate (oz/a)	Giant Foxtail	Common Ragweed	Yield Bu/a	Cost $/a	Return $/a
Command/Pursuit	PPI/Post	24/0.72	99	81	57.7	$35	$253
Pursuit + FirstRate	Post	1.44 + 0.3	98	99	58.1	$29	$262
Roundup Ultra	Post	32	98	84	56.9	$23	$262
Roundup Ultra/Roundup Ultra	Post/Post	32 /24	99	99	59.2	$30	$266
Pursuit	Post	1.44	99	79	56.9	$20	$265
LSD (p=0.10)			8	9	3.9		

1998 Soybean Herbicide Evaluation—Lamberton, MN

Herbicide	Timing	Rate (oz/a)	Yellow foxtail	Common Lamb.	Yield Bu/a	Cost $/a	Return $/a
Command/Pursuit	PPI/Post	1.5/0.72	97	87	58.9	$35	$259
Pursuit + FirstRate	Post	1.44 + 0.3	97	88	57.6	$29	$259
Roundup Ultra	Post	2.0	100	100	57.3	$23	$264
Roundup Ultra/Roundup Ultra	Post/Post	2.0 / 1.5	100	99	58.4	$30	$262
Pursuit	Post	1.44	97	91	57.2	$20	$266
LSD (p=0.10)			3	4	3.9		

options with the Roundup Ready system do offer many advantages. One annual weed, which has presented challenges to the Roundup Ready system in 1998, is tall waterhemp. As more acres are planted, and Roundup use increases, we undoubtedly will encounter additional weed control challenges.

No matter which system you choose, make sure you are picking high yielding varieties. Select varieties, which have good agronomic traits (maturity, lodging, chlorosis, white mold, phytophthora, etc.).

	Conventional	Roundup Ready
Yield	+	=
Annual weed control	=	=
Perennial weed control	-	+
Carryover	D	+
Crop injury	D	+
Economics	?	?

D = Dependent upon crop stage and environment

Fritz Breitenbach, IPM Specialist
Tom Hoverstad, Scientist—Southern Experiment Station

An Interactive TV Educational Program

Have you ever wanted to know more about the importance and role of various nutrients in the metabolism of plants? Do you know how nutrients actually get from the soil into plant roots? If your answer to these questions is "yes", there is an opportunity to learn more about these and other topics.

An Interactive TV Course, planned for late January and early February, will focus on the "Principles of Plant Nutrition." This educational program will be offered at Rochester, Crookston, Lamberton, and Morris. The dates are January 22, January 29, February 5, and February 12. The program will start at 9:30 a.m. each morning and end at noon. After the course is completed, those who participate should have: 1) a reasonable understanding of how nutrients get into plants, 2) an appreciation of the importance of each essential nutrient in plant metabolism, and 3) an awareness of how the soil environment affects nutrient uptake.

Brochures describing this educational program have been mailed to many who advise farmers. If you do not get a brochure or if you would like more information, call George Rehm (612) 625-6210, Mike Schmitt (612) 625-7017, or Tracey Benson, (800) 367-5363.

George Rehm
Extension Soil Scientist

Dates and Locations Announced for 1999 Soybean Production Conferences

A series of 5 soybean production conferences, sponsored by the University of Minnesota Extension Service and financially supported by soybean checkoff dollars through the Minnesota Soybean Research and Promotion Council, will be held throughout Minnesota in January and February. These informative sessions will be of interest to anyone involved in the soybean industry, but will be particularly valuable to soybean producers and those who have direct contact with these growers.

Each session will provide the latest soybean production information available.

Speakers will be discussing results from their 1998 field studies, as well as those results from their colleagues. These new results along with trends that these specialists have been noting will be important in making management decisions for the 1999 growing season. With the continued increase in the cost of farm inputs coupled with low commodity prices, speakers will discuss increasing production while focusing on efficiency and profitability.

Our entire production system is changing at an incredible pace. We are facing new challenges due to changes in weather patterns, pathogens, and in local and world markets. We are also faced with changes in our most basic inputs. Advances in seed and herbicide technologies coupled with the ever changing corporate structure of seed and chemical companies makes production information an invaluable commodity to today's soybean farmer.

1999 Soybean Production Conferences/Continued

Dates and Locations for the Soybean Production Conferences are:

January 4, 1999—Ramada Inn, Worthington
January 5—Best Western, Mankato
January 6—Holiday Inn, Willmar
February 16—Best Western, Thief River Falls
February 17—Ottertail Power Company Building, Fergus Falls

Program:

Time	Room A	Room B
10:00 AM	Management Strategies to Minimize White Mold	Does Roundup Ready Pencil Out?
10:30 AM	Weed Management	Market Outlook and Opportunities
11:00 AM	Nutrient Management	Controlling Production Costs
11:30 AM	Selecting Varieties for Your Farm	The La Nina Weather Outlook
12:00 NOON	Lunch	Lunch
1:00 PM	Management Strategies to Minimize White Mold	Production Practices for Profitability
1:30 PM	Weed Management	Market Outlook and Opportunities
2:00 PM	Nutrient Management	Controlling Production Costs
2:30 PM	Living with Soybean Cyst Nematode	*The La Nina Weather Outlook

* Presented in Southern Locations Only

Speakers:

Jeff Gunsolus, Craig Haugaard, Dale Hicks, Carlyle Holen, Jim Kurle, Seth Naeve, Kent Olson, Bruce Potter, Mike Schmitt, Al Sims, Dave Schwartz. Bill Endersen, Leon Osborne, Elwyn Taylor, and Ed Usset

For more information, contact:

Seth Naeve—Extension Soybean Specialist (612)-625-4298 411 Borlaug Hall
Dale Hicks—Extension Agronomist - (612)-625-1796 - 411 Borlaug Hall
Dave Schwartz—Extension Soybean Specialist - (320)-587-0770

County Extension Offices and the Minnesota Soybean Grower Association Office have program brochures and registration forms.

Seth L. Naeve
Extension Soybean Specialist

1999 Ag Professional Update

The 8th Annual Ag Professional Update will run January 11-15, 1999, at eight locations across Minnesota. This program is designed for agricultural product dealers, crop consultants, Vo-Tech instructors, extension educators, and others involved in making crop management decisions for their clientele. This three and one half-hour program will update agricultural professionals on the latest research and crop production recommendations from the University of Minnesota Experiment Stations and Extension Service. The Ag Professional Update program has been approved for CCA. Continuing Education Units (CEU) will range from 2.5 to 3.5 CEU depending upon the location. The brochure for this educational program lists the CEU associated with each location.

Early registration is advised to ensure your place in the workshop and more importantly, to allow the program to start on time. On site registration only delays the beginning of the program. Due to the Bermuda-like winter we are having, it isn't likely we will have a major snowstorm until after this program has been completed. REGISTER EARLY. Preregistration and on-site registration will be $30. This fee includes coffee, refreshments and handout materials. To request a brochure that has the registration information and program agenda, contact Tracey Benson at (612) 624-3708 or 800-367-5363; Email: tbenson@ extension.umn.edu. To request information on the program topics or CEU, contact Kevin Cavanaugh at (612) 625-2778;
Email: kevinc@puccini.crl.umn.edu.

Workshop Locations

DATE	LOCATION	START TIME
January 11	Crookston, NW Exp. Station	12:30 PM
January 11	Mankato, Best Western Motel	12:30 PM
January 12	Rochester, Best Western-Apache	12:30 PM
January 12	Morris, W. Central Exp. Station	8:30 AM
January 13	Fairmont, Holiday Inn	12:30 PM
January 14	Little Falls, Courthouse, Meeting Rm 1	12:30 PM
January 14	Marshall, SW State U., BA Bldg Rm 102	8:30 AM
January 15	Willmar, Holiday Inn/Willmar Conference Center	8:30 AM

Kevin Cavanaugh
IPM & Ag Professional Program Coordinator

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in late Nov. and Dec. included:
corn—cultured for storage molds
silage—cultured for storage molds
wheat—cultured for storage molds
potato—soils tested for Verticillium sp, Pratylenchus sp nematode
soybean—Phytophthora sp (race 3 identified)
sugarbeet—soil for Aphanomyces root rot index, soils for Rhizomania testing
fern—Pythium sp root rot
N.G. impatiens—Impatiens necrotic spot virus (INSV)
geranium—Xanthomonas sp (bacterial wilt)
Campanula—INSV

Happy Holidays!

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Realities of Colorado Blue Spruce

Have you ever noticed aging Colorado blue spruce trees with no lower branches, bare branches (sometimes up to 75% of the tree), and/or browning foliage that is dead or dying? If you haven't, look around your neighborhood and you will probably find some.

Colorado blue spruce is probably the most preferred and over-planted tree in home and urban landscape. This tree is usually selected for its blue needles, shape, and dense foliage. Colorado blue spruce are planted as individual trees in the home landscape, as wind breaks in rural areas, and as living fences for privacy. The reality of planting Colorado blue spruce is that these trees are not native to Minnesota and suffer from environmental stress and fungal diseases. Most Colorado blue spruce begin to die back 20 to 30 years after planting, causing the tree to be severely disfigured and usually short-lived.

Two different fungal diseases cause thinning and dying of older Colorado blue spruce. The first disease is Rhizosphaera needle cast, and the second is Cytospora canker (often considered the more damaging). Both of these diseases typically affect the lower branches on the tree causing the needles to turn brown and fall from the tree. This leaves the tree with a hollow or bare appearance near the base. Both of these diseases spread upward through the tree causing the tree to have fewer and fewer living branches.

Rhizosphaera is a foliar needle disease that infects only needles. It begins by infecting new (current year) needles. Later these needles produce spores, which reinfect young needles the following year. Eventually infected needles die and fall from the tree.

Cytospora is a canker disease that infects the stems and branches. Cytospora canker enters stems and branches through wounds. These cankers girdle the branch causing the branch to die and the needles to fall. Management practices for Colorado blue spruce should begin at planting. Make sure the trees are healthy and disease-free, planted at the right depth, and on the proper site. Water trees during dry periods, mulch around the base of trees, and prune out dead or dying branches. If you have a disease problem, it may help to remove the lower whorl of branches to increase air circulation.

Rhizosphaera needle cast can also be controlled with fungicides such as chlorothalonil, applied in the spring. There are no chemical control measures for Cytospora canker. If you are going to treat a large tree it is suggested that you call a professional tree care company, in order to achieve optimum coverage.

The question remains "Why are so many Colorado blue spruce planted, when trees are destined to be infected by fungal diseases causing disfigurement and shorter life expectancy?"

Chad J. Behrendt
Extension Plant Pathologist

Ticks on Christmas Trees

We have received a lot of questions about bringing blacklegged ticks (formerly called deer ticks) into homes on conifers cut for Christmas trees. There apparently was a story that aired on WCCO, channel 4 (Minneapolis-St. Paul) just after Thanksgiving that warned people about this possibility. The story was probably inspired by the unseasonably warm weather we have been experiencing. Blacklegged ticks do have a temperature threshold of 4 degrees Centigrade (39 degrees Fahrenheit). Temperatures warmer than that will bring them out of hibernation.

When ticks are active, they will quest for a host to obtain a blood meal. Blacklegged ticks climb up on vegetation to height of about two to three feet to attach to a passing host (their favorite host is the white-tailed deer). This could include conifers but they do not preferentially climb trees; you are more likely to find blacklegged ticks on grass.

If people buy their Christmas tree from a lot where trees

have already been cut down and have been laying around for a while, there is little chance of ticks still being present on those trees. If someone goes out to cut down their own tree and are in an known area for blacklegged ticks, it is possible that ticks could be on the tree. You would find them within the first two to three feet off the ground and on ends of branches. However, there is as much chance if not more of encountering ticks walking into and out of the area, than of acquiring a tick from the tree itself.

As long as temperatures remain above 39 degrees F, blacklegged ticks can remain active. There is a risk of encountering blacklegged ticks not only for people out cutting down their own Christmas trees but also for people out hunting, hiking, and other outdoor activities that takes them into known blacklegged tick areas.

The chances of bringing blacklegged ticks into your home on Christmas tree is small (but not impossible) . We do not suggest that people do anything special to their Christmas trees. Use common sense. Once temperatures drop below 39 degrees F. blacklegged ticks will resume their hibernation on the ground in the leaf litter and other ground debris. Should ticks get inside, they are not likely to survive indoors very long because the environment is too dry and they will desiccate and die.

Jeffrey Hahn
Asst. Extension Entomologist

Multicolored Asian Lady Beetles

Toward the end of October and early November, we received numerous reports and a few samples of the multicolored Asian lady beetle. This species is similar in shape to other lady beetles, but is a little larger and shows great variation in its coloration (pale-orange to deep orange-red) and in the appearance (size and darkness) of the spots on its back. Another distinctive feature of this species is the M-shaped pattern on its prothorax.

The multicolored Asian lady beetle was imported from Asia as a biological control agent for pests of fruit and nut trees, Christmas trees, and other crops. They feed on soft-bodied insects, such as aphids, scales, and psyllids. Following introduction as a biocontrol agent, they have spread throughout much of the United States, being first found in Minnesota in 1994. Despite the beneficial nature of these beetles, they are sometimes pests because they aggregate in large numbers on the sides of houses when looking for a protected site to overwinter. This is the first year that they have been reported as pests in and around homes in Minnesota.

The best way to control beetles indoors is to physically remove them by hand or with a vacuum. To reduce problems next year, seal possible entry sites into the home by the end of summer. While we encourage people to tolerate these lady beetles because they control pests, there are cases in which they congregate and enter homes in very large numbers that may require the use of an insecticide. If needed, apply permethrin, dursban, or diazinon around the exterior of homes, following the label directions carefully.

Pavement Ants

Pavement ants have been an increasingly common call in November and December. Pavement ants are approximately 1/8th inch long and are reddish brown. When identifying them in the clinic, we look for 3 things: 1) two nodes between the abdomen and the thorax. These nodes will look like 'bumps' that connect the thorax to the abdomen, 2) a pair of small spines at the end of the thorax near the nodes, and 3) shallow grooves running from the back to the front of the head.

Pavement ants frequently occur under structures built on concrete slabs, and enter through cracks in the floor. If possible, find and seal any cracks in the concrete. If the ants still get in, the best long-term control technique is to use baits labeled for grease-feeding ants. Depending on conditions, baits take several weeks to several months to be effective, but will kill the entire colony. You can purchase baits commercially or make your own. Homemade baits can be effective but there have been reports of bait acceptance problems. For immediate but temporary relief of invading ants, apply a spray insecticide where you see the ants, but remember that this will have no effect on the colony. Don't combine spraying and baiting, because spraying interferes with the movement of the bait back to the colony, prolonging the problem. For more information on how to identify and control home-invading ants, see the fact sheet *What to do about Household Ants* (FO-1066), or visit the extension website at http://www.extension.umn.edu/Documents/D/G/DG1066.html.

Mystery 'Bug' Bites

This time of year brings calls of 'insect bites' that can't be attributed to any visible insect or other arthropod. Most biting arthropods that could occur in homes this time of year are readily visible without magnification, and consist of fleas, lice, ticks, bed bugs, and mites, with fleas being the most common. Complaints of itching and biting can be attributed to many sources other than bites by arthropods. Other possible sources of these sensations are reactions to physical agents (fibers and chemicals), dry air, static electricity, allergies, diseases and other medical disorders, and stress.

People may ask if bites from dust mites cause biting sensations. Dust mites don't bite, but they can cause irritation. Most problems are respiratory, including sneezing, itching, and watery eyes. These symptoms are not caused by bites, but instead by an allergic reaction to cast skins and fecal pellets. No insecticides for the control of dust mites are currently registered in the United States. Despite this, some homeowners and exterminators have applied insecticides anyway. This doesn't help the situation, since the reaction is the same whether the mite is dead or alive. Applications of an insecticide can exacerbate the symptoms (due to chemical sensitivities) and are a waste of money. If dust mites really are the problem, frequent and thorough cleaning is the best control.

If the problem can not be attributed to an arthropod after a thorough search, suggest other avenues to alleviate symptoms and other sources to contact for more information. Depending on the real cause of the problems, the use of HEPA filters, humidifiers, and skin lotions might help. Seeking the advise of an allergist or a dermatologist could also be beneficial. For further information on dust mites refer to Ohio State's webpage:
http://www.ag.ohio-state.edu/~ohioline/hyg-fact/2000/2157.html.

For more information on mystery bites, refer to webpages at the University of Florida:
http://hammock.ifas.ufl.edu/txt/fairs/50175
and Iowa State University:
http://www.ipm.iastate.edu/ipm/iiin/illusory.html.

John F. Kyhl
Entomology Technician

Unusually Warm Weather Poses Questions

Unless you're an ice fisherman or cross country skier, you've probably been enjoying our unseasonably warm weather. December has felt more like October, and we're still not sure there will be snow on the ground for Christmas. But what about our plants?

Bulbs have sprouted—some as much as six to eight inches—and buds have swelled on some trees and shrubs. Dandelions have bloomed in December (who cares?), but so have some creeping phlox.... and they won't bloom next spring.

Of greatest concern are the flowering trees and shrubs whose buds have swelled noticeably. Those buds are well-protected against cold when they're still tight, but once they swell, they're much more vulnerable to chilling injury when temps drop really low, as they inevitably will. This could mean a spring with only sporatic bloom on our lilacs, crabapples, and other normally colorful blooming plants.

The worst part? There's not a thing we can do about it....just wait and see what develops.

Good-bye to Readers

Staff at the University of Minnesota Extension Service Yard & Garden Line want to take this opportunity to say good-bye to readers of the *Minnesota Crop News*. Even though we will no longer be contributing to this newsletter on a regular basis, we hope to continue providing timely garden and landscape information through our own newsletter that we anticipate will be up and running this spring. More details will follow.

Keep in mind you can reach the Yard & Garden Line, toll-free, throughout the state by calling 1-888-624-4771, or in the metro area; 612-624-4771. As always, County Extension Educators and Master Gardeners can call Deb Brown, Jeff Hahn, and Chad Behrendt direct, for help with difficult questions.

Deborah Brown
Extension Horticulturist

SUBSCRIPTION FORM

The Minnesota Crop News *Newsletter*

1999-2000 Season

It is time to renew your subscription to Minnesota Crop News. Renewal is simply a matter of providing the information that is requested below, write a check and return both to Debbie Baden Drange. We're making plans for a more complete and comprehensive newsletter in 1999. Don't delay and lose this in the Christmas mail. **RENEW YOUR SUBSCRIPTION TODAY.**

Please return this subscription form with a $25.00 check, payable to the University of Minnesota

MAILTO:

Debbie Baden Drange
Department of Plant Pathology
University of Minnesota
495 Borlaug Hall
1991 Upper Buford Circle
St. Paul, MN 55108

NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

For more information write to the address above or call 612-625-6290

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MINNESOTA

CROP NEWS

Vol. 4
No. 28

From the Crops System Team of the University of Minnesota Extension Service

Farmers to Receive Special Transition Payments

Farm operators that are enrolled in the seven year "Market Transition Program" will be receiving an additional 1998 "Market Transition Payment" very soon. This additional payment was made possible by special farm legislation approved by Congress and signed by President Clinton in October. The additional payment will be about 18.7 cents per bushel for corn. This is in addition to the Total 1998 "Market Transition Payment" of 37.66 cents per bushel that was paid earlier. In most cases, this payment was paid in two payments: an advance payment of 18 cents per bushel last December or January and a final payment of 19.66 cents per bushel in September.

Farm Operators also have the option of requesting their entire 1999 "Market Transition Payment" early. This option was made available by USDA to help alleviate some of the farm cash flow pressures that exist in some regions. Following are some details on the early 1999 "Market Transition Payments"

- ✓ Farm Operators must be enrolled in the seven year "Market Transition Program" to be eligible to receive 1999 transition payments.
- ✓ Producers must make a request for an early payment at their County Farm Service Agency (FSA) Office.
- ✓ Producers have about three options for the early payments :
  1. Receive the entire payment in December, 1998 (or earlier).
  2. Receive the entire payment in January, 1999
  3. Receive half of the payment in December and half in January
- ✓ Producers that do not request early payment of their 1999 "Market Transition Payment" will continue to receive half of the payment as an advance payment in December or January and the other half of the payment in September, 1999, or they will receive the entire 1999 payment in September, 1999.

Highlights . . .

Transition Payment (Continued)

- ✓ The payment rate for corn for 1999 has been set at 36.3 cents per bushel. This rate is the final payment rate and it will not be adjusted in September, 1999.
- ✓ Be sure to check 1998 income tax implications with your tax preparer before deciding which early payment option to request at the FSA Office. Remember you already have the additional 1998 transition payment (18.7 cents per bushel) that will be extra 1998 income. Many producers also had considerable 1998 income from "Loan Deficiency Payments". In some cases, there may be financial advantages by delaying the early 1999 transition payment until January, so it is counted as 1999 income.
- ✓ All "Rental Verification Statements" must be completed and on file at the County Farm Service Agency Office before any early payments will be made on any rented farm parcels. Following are some details on documenting rental verification:

  1. Proper rental verification requires that either a signed copy of 1999 rental contract or a signed written statement from the landlord indicating the farm operator for 1999 be presented at the County FSA Office.
  2. Any parcels in one year rental lease agreements that does not have a longer term "Rental Verification Statement" that includes 1999 will require rental lease verification for 1999, as will multiple year agreements that expired in 1998.
  3. Producers that have "Rental Verification Statements" on file at the County FSA Office that extend beyond one year, and include 1999, should not have to do any additional rental verification.
  4. If there are changes in the multi-year agreements, these changes need to be reported to the County FSA Office before the early transition payment checks will be issued.
  5. Remember, that if you have a farm parcel with one year land rental contracts combined with several other land parcels into one large "Farm Unit" at the FSA Office, you will receive no early transition payment until every rental verification for 1999 has been completed.

Remember that all "Market Transition Payments" are paid on 85 percent of the established FSA "Program Yield" and not on your harvested yields. The "Loan Deficiency Payments" this Fall have been paid on verified 1998 crop yields.

Following is the formula to calculate all "Market Transition Payments":

TRANSITION PAYMENT = Crop Base Acres X Program Yield X .85 X Payment Rate
EXAMPLE : * 500 Acre Corn Base
* 120 Bushel Per Acre Program Yield
* Extra 1998 Payment of $.187 Per Bushel (Paid in Nov.)
* Total 1999 Payment of $.363 Per Bushel (Paid in Dec. or Jan.)
Extra 1998 Payment = 500 A. X 120 Bu. X .85 X $.187/Bu. = $9,537.00
Total 1999 Payment = 500 A. X 120 Bu. X .85 X $.363/Bu. = $18,513.00
TOTAL ESTIMATED TRANSITION PAYMENT INCOME = $28,050.00

For more information on 1998 and 1999 "Market Transition Payments" or on Rental Verification requirements, producers should contact their County FSA Office.

Kent Thiesse
AMC Extension Fellow

Yield Monitors, Yield Maps, and Management Decisions

By now, we've all been exposed in one way or another to yield monitors and the yield maps produced from the yield monitor information. Some crop producers have readily adopted this new technology. Others are waiting to see how the information is used and how the technology can be used to improve farm profitability.

Many who use yield monitors collect the data, make the maps, then ask the question, "I have a yield map—now what?" The real value of this yield map is realized if the information from the map can be used to make management decisions to improve crop production. This requires an accurate interpretation of the map. The map shows that there are differences in yield across the field. The question is "What caused those differences?"

Mr. Larry Lotz, an Extension Educator in Fayette County, Ohio, has worked extensively with the challenge of interpreting yield maps. He's concluded that factors that cause yield variability can be grouped

into 2 categories—those that are controlled by producer management decisions, and those that are naturally occurring.

Mr. Lotz has concluded that yield patterns which follow straight lines across the field are caused by a related to producer management decision.

Straight line patterns which occur in the direction of planting can be caused by:

- differences in planting date
- change in hybrid/variety
- switch in herbicide used
- skips in herbicide application
- soil compaction

Straight line patterns which occur across the rows can be caused by:

- existing tile lines
- old traffic patterns
- manure applications to previous fields
- buried cables, etc.
- old fence rows

By contrast, yield patterns which are irregular are due to factors that are naturally occurring. The producer has little or no control over these factors. If there is an irregular pattern across the field, yield differences could be caused by:

- changes in soil type
- insect damage
- differences in disease pressure
- iron chlorosis (soybean production)
- nonuniform manure application

Differences in yields which appear as irregular areas or patches on a yield map could be caused by:

- changes in soil type
- drainage patterns (natural)
- weed infestations
- insect damage
- major changes in native soil fertility
- disease pressure
- insect damage

In evaluating yield maps, it's important to look for repeating or definite patterns rather than focus on small differences. Unless the cause is definitely known, too much attention to the small differences could lead to errors in management decisions.

Yield maps from a particular field, collected for more than one year, should be evaluated before there is a decision to make a change in some management practice. John Lamb has shown that yields "drift" over years even though the crop has been intensively managed. In other words, "high yielding" areas do not produce the highest yield each year. At the same time, the "low yielding" areas do not always produce the lowest yields each year. Therefore, yield data collected from one year is very important before making changes in management practices.

Yield monitors have been the first step for many into the age of precision farming. The commitment of time and resources required to effectively use this technology is a serious undertaking. There are several factors to consider when interpreting the maps. Keep an open mind and be willing to consider several factors that might be responsible for differences in yield. Many times, explanations for differences in yields are not obvious.

George Rehm
Extension Soil Scientist

18th Annual Crop Pest Management Short Course
November 23-24, 1998

The 18th Annual Crop Pest Management Short Course will be held on November 23-24 at the Earle Brown Continuing Education Center located on the St. Paul campus. This program is designed for agricultural professionals, such as private crop consultants, agronomists, agrochemical representatives, soil conservationists, and extension educators. This two-day program provides in-depth, high quality coverage of contemporary issues in crop pest management and crop production. The two-day short course will offer Roundup Ready topics (including yield drag) in the general session of the morning of November 23rd, followed by three concurrent sessions in the afternoon. On Tuesday, November 24, the entire program will offer concurrent sessions in areas of manure management, white mold in soybean, insect management and diseases, crop production, remote sensing, and risk management assessment in regards to low grain market prices. Each of the concurrent sessions will be repeated at least two times. The November 23rd part of the program will begin at 9:00 a.m. and conclude at 5:20 p.m. On Tuesday the program will run between the hours of 8:00 a.m. and 3:00 p.m. A total of 9.5 hours of CEU will be offered for attending this program for Certified Crop Advisers.

Short Course (Continued)

A brochure listing the speakers and times is available and has been mailed to ag professionals in the three state area. If you did not receive a copy of the brochure you can obtain one by calling Tracey Benson, Extension Special Programs, at 612-624-3708 or 800-367-5363. Information on the program content can be obtained by contacting Kevin Cavanaugh, IPM & Ag Professional Program Coordinator at 612-625-2778 or Ken Ostlie, IPM Coordinator, 612-624-9272.

Kevin Cavanaugh
Department of Agronomy and Plant Genetics

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in late Oct. and Nov. included:
corn—cultured for storage molds
silage—cultured for storage molds
wheat—cultured for storage molds
sugarbeet—soils for Aphanomyces root rot index
potato—tubers and soils for Verticillium sp, Pratylenchus sp (lesion) nematode
garlic—Fusarium sp bulb decay
onion—bacterial bulb decay
Monarda—Impatiens necrotic spot virus(INSV)
Physostegia—INSV
Sedum—INSV
Lychnis—INSV
Achillea—INSV
Lobelia—INSV
Papaver—INSV
Allium—INSV
Veronica—INSV
Malva—INSV
Aster—Tomato spotted wilt virus(TSWV)
geranium—Xanthomonas sp bacterial wilt

Sandra Gould
Plant Disease Clinic

Selecting Soybean Varieties for 1999

Variety selection is often the first and most crucial management decision made by soybean farmers. Many new, and potentially improved, varieties are available each year, so that producers can choose from those with higher yield potential, better agronomic characteristics, and/or improved seed quality characteristics. By reevaluating your soybean choices annually, you can utilize soybean varieties that best fit yearly changes in agricultural technologies, management practices, and potential pathogen problems. Specific varieties should be chosen for fields, or parts of fields with a history of special problems, such as iron chlorosis, soybean cyst nematode, white mold, or other disease problems. It is important to choose varieties based on their entire suite of agronomic characteristics and to not rely entirely on any one of these (including resistance to Roundup).

Each year the Minnesota Agricultural Experiment Station publishes the results of exhaustive variety trials using seed from public and private sources. These results will be available beginning in early December. They will be published in a special issue of Agri-News, on the Minnesota Soybean Homepage at http://www.mnsoybean.org/ as well as in county extension offices. The Minnesota Soybean Grower's Association also publishes results of their annual yield contest and those from county test plots. These will be available on the Minnesota Soybean Homepage and in booklet form. Contact the MSGA at 360 Pierce Ave, Suite 110, North Mankato, MN 65003 or Seth Naeve (612-625-4298) for more information.

Seth Naeve
Extension Soybean Specialist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Correction!

The article on prolonging the life of your pumpkins in the September 24, 1998, issue of the *MN Crop News* needs to be corrected. Item number three should include a clause on curing pumpkins before storing them in a cool dry place. Although this topic is outdated, please make a note in your files for future reference. The corrected article should read as follows:

A few tips to help prolong the life of your pumpkins.

- ✓ Harvest pumpkins as soon as they are fully matured, but prior to frost.
- ✓ Avoid wounding pumpkins during harvest (wounds allow the entrance of decay organisms).
- ✓ Before storing pumpkins in a cool, dry place (50 to 60 degrees F and approximately 70 percent humidity), cure them in a warm, sunny spot for about a week to help the skin toughen.
- ✓ Keep the surface of the pumpkin dry.
- ✓ Do not stack pumpkins on top of each other, if possible.
- ✓ Promote good air circulation.

Fungicide Safety

Fungicides, chemicals used to control plant diseases, are poisonous to microorganisms such as fungi, as well as humans and animals. Although some fungicides are not as poisonous, all fungicides should be treated as potentially harmful chemicals. Therefore, it is important to properly and safely handle fungicides.

Always read the fungicide label before opening or using the chemical. Wear protective clothing such as rubber gloves, an apron, and a face mask when handling fungicides. Not all fungicides require the same protective clothing, so read the label for clothing and handling requirements. Be careful not to inhale dust or smoke when mixing fungicides. After handling fungicides, wash with soap and water. If you spill a fungicide on your skin, wash the affected area immediately.

Fungicides should always be stored in their original containers with the labels intact. Never reuse fungicide containers. Store them in a dry, locked cabinet at temperatures above freezing. The label on the fungicides should indicate how long the material can be stored. In general most fungicides, when stored properly, will retain their effectiveness for two years. Thus, you should indicate the date of purchase on the label.

If a fungicide becomes outdated, freezes, or becomes wet (dry powders) it lose its effectiveness. Symptoms associated with ineffective liquid fungicides may include separation of the chemical or the inability of the chemical to properly mix in water, while powders may clump together and fail to suspend in water.

Disposal of old or unused fungicides should be conducted according to directions on the label. For more information on what materials need special disposal and where to properly dispose of your fungicides, call your county office.

Mark your calendar for dormant season fungicide application, now.

As we enter the dormant season, now is the time to mark your calendar for next year's dormant season spray. Fungicides used during the dormant season, mainly Bordeaux mixture or lime sulfur, are effective against a number of common diseases. Application of these chemicals should be made during late dormancy, usually late February through March, but before the buds begin to swell in the spring. Here are a few common diseases that can be controlled with the use of dormant season sprays: black spot on rose, black knot of cherry, cane diseases of raspberry, plum pockets, and others. For more information on specific diseases refer to the Yard and Garden Clinic Briefs or contact the Yard and Garden Clinic staff.

Chad J. Behrendt
Extension Plant Pathologist

Department of Plant Pathology
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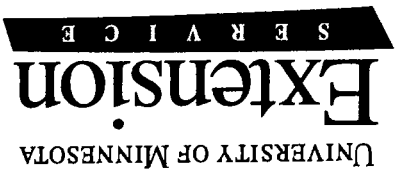

MINNESOTA

CROP NEWS

Vol. 4
No. 27

From the Crops System Team of the University of Minnesota Extension Service

Stored Grain Must be Aerated This Fall

A lot of grain in the upper Midwest was stored at abnormally high temperatures this year. Unless this grain is aerated with cool outdoor air, the temperature in the center of the grain bin or pile will remain high well into winter. A warm center in grain storage leads to two problems. First, insects and molds are more likely to infest the warm areas. And second, temperature differences in stored grain cause moisture to migrate from warm areas to cold areas, with resultant mold growth and crust development in the rewet areas.

Target grain temperatures for winter storage in the upper Midwest are in the 20 to 30F range. If current grain temperatures are 40 to 50F, wait for outdoor weather that is 20 to 30F, start the aeration fans, and run them as long as necessary to cool all grain in the bin or pile. The amount of time that fans need to be operated to complete cooling depends on the airflow per bushel. Typical grain aeration systems deliver about 0.1 cfm/bu (cubic foot of air per minute per bushel of grain); at that airflow, you can expect cooling to take about 150 hours. Some of the temporary grain storage facilities that are being used this year have aeration systems that deliver less than 0.1 cfm/bu, which means aeration cycles could take much longer than 150 hours. Many temporary storage facilities have non-uniform airflow, where some parts of the grain pile have a much lower airflow per bushel than other parts. In situations where air-

Highlights . . .

flow is not uniform, it is important to check grain temperatures at many different points and to run the fans until all parts of the pile are cooled.

If current grain temperatures are much higher than 50F, it is probably best to cool the grain in 15 to 20 degree stages. For example, if the grain is currently 65F, wait for 40 to 50F weather, and run the fans until the grain is cooled to that range. Then, stop the fans until outdoor temperatures drop another 15 to 20 degrees, and resume fan operation until all grain is cooled to 20 to 30F.

Either positive pressure (air pushed upward) or negative pressure (air drawn downward) can be used to aerate grain. However, positive pressure aeration systems do tend to provide more uniform air distribution in large grain piles that have long aeration ducts. One thing to watch for, though, with positive pressure systems is condensation under the roof when you aerate warm grain during cool weather. You can reduce condensation problems by opening doors and hatches to provide plenty of air movement over the top surface of the grain during aeration and by cooling grain in stages so that the difference between outdoor temperature and grain temperature is less than 20 degrees.

Once grain is cooled to 20 to 30F, you might not have to aerate it again during the winter. Check the grain every two to four weeks for signs of mold, insects, crusting, or heating and if you find problems, start the fans to try to cool and dry the problem area. If aeration doesn't seem to be working, remove the problem grain to prevent additional spoilage.

Bill Wilcke
Minnesota Extension Engineer

Check Stored Soybeans for Green Trash

A number of soybean producers in the upper Midwest encountered the somewhat unusual situation this fall of having mature, dry seeds on plants that were still green. Combining soybeans with green plants can result in large amounts of green, wet pods, pieces of stems, and other trash in the harvested crop. During handling, the seeds and green trash tend to segregate and the trash accumulates in pockets at various points in the storage bin. These pockets of high-moisture material are likely to mold and heat in storage and could lead to significant spoilage of the soybeans around them.

Check your soybean storage bins this fall to see if they contain pockets of green trash. If you find enough trash that you're likely to have problems, try to remove, or at least distribute as much of it as you can. If you aren't able to remove or distribute the trash, keep watching it for signs of mold and heating. Aerate the beans as often as necessary to prevent spoilage and to keep the temperature of the stored beans at 20 to 30F. If you are not able to control heating problems by using aeration, consider emptying the bin and running the beans through a grain cleaner before returning them to storage.

If you haven't harvested your soybeans, yet, consider the following steps to reduce problems with pockets of trash in the storage bin:

Set the combine to minimize the amount of non-seed material in the harvested crop.

Run the soybeans through a grain cleaner to remove excessive amounts of trash.

Use a grain distributor during bin filling to reduce segregation of seeds and trash.

Although soybean seeds are usually dry enough for safe storage at harvest, wet pods and stems frequently lead to storage problems. The value of soybeans per bushel is usually two to three times the value of other crops, so stored beans ought to be worth two to three times the management effort compared to other crops. Keep an eye on those stored beans this fall and winter!

Bill Wilcke
Extension Engineer

18th Annual Crop Pest Management Short Course November 23-24, 1998

The Crop Pest Management Short Course is scheduled for November 23-24, 1998 at the Earle Brown Continuing Education Center located on the University of Minnesota St. Paul campus. The two day short course will be comprised of a general session in the morning of the 23rd, and three concurrent sessions in the afternoon. On Tuesday, November 24, the entire program will have concurrent sessions covering a wide arrange of crop production and pest management topics in corn, soybean, dry bean and small grains. The program will run from 9:00 a.m. to 5:00 p.m. on Monday and 8:00 a.m. until 3:00 p.m. on Tuesday.

The brochure describing the program and the registration process will be available for distribution in about 10 days. Ag professionals who have attended this program or similar programs will receive one in the mail. Look for your copy in the mail. If you do not receive a CPM Short Course brochure in the mail by October 31 you can obtain one by calling Tracey Benson, Extension Special Programs, at (612) 624-3708 or 800-367-5363. Information on the program content can be obtained by calling Kevin Cavanaugh, IPM & Ag Professional Program Coordinator at (612) 625-2778 or Ken Ostlie, IPM Coordinator at (612) 624-9272.

Kevin Cavanaugh
Department of Agronomy & Plant Genetics

Plant Disease Clinic

Recent samples submitted to the Plant Disease Clinic included:

barley—tested for loose smut
corn—cultured for storage molds
wheat—cultured for storage molds
haylage—cultured for storage molds
soybean—*Cercospora* sp (gray leaf spot)
potato—*Pratylenchus* sp nematode, *Verticillium* sp
oak—oak wilt
spruce—Cytospora sp canker
geranium—*Xanthomonas* sp (bacterial wilt), rust
dicentra—tobacco rattle virus
chrysanthemum—impatiens necrotic spot virus
poinsettia—*Pythium* sp root rot, bacterial stem rot

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Final Fall Lawn Tips

* Apply a final fall fertilizer application right now, in mid-October. Even though top growth slows and ceases as temperatures drop, the soil stays warmer longer, so roots remain active. When you fertilize this late, nutrients will improve root and rhizome growth, rather than result in a flush of top growth, and grass will come back thicker and greener next spring.

* Don't quit mowing yet. Grass should go into winter neither too long (it will mat down) nor too short

(more prone to winter injury if we don't have reliable snow cover). It's still just fine to allow clippings to fall back to the ground where they'll break down rapidly, releasing a small amount of nitrogen back to the soil. If you do catch your clippings, put add them to your compost pile for use next year.

* Continue to rake leaves off the lawn. When left over winter, the matted grass beneath is more prone to snow mold. Use the leaves to mulch perennials or put them into the compost pile. Don't pile them up by the street where they can leach nutrients into storm sewers, and ultimately our lakes and streams.

* Alternately, new research has shown that it's also possible to run over a light cover of leaves with a mulching mower, and just let the chipped up leaves fall back into the lawn without hurting it. You need to be careful, though, not to overwhelm the grass with too thick a buildup of chipped leaves.

Deborah Brown
Extension Horticulturist

Garden Calendars; Great Gifts

If you're looking for a practical gift that's attractive and has a modest price tag, check out *Minnesota Gardening, 1999* (MI-6992), the latest in a series of garden calendars geared specifically to the needs and interests of Northerners. In addition to lovely, full color photos and monthly garden and landscape tips, this year's calendar features a page devoted to small fruit for home landscapes.

The calendar, a joint project of the University of Minnesota Extension Service and the Minnesota Agricultural Experiment Station also has maps showing plant hardiness zones and typical frost dates. You'll find descriptions of various organizations (county extension offices, Minnesota State Horticultural Society, Yard and Garden Line, Info U and others) where Minnesotans can get help with their garden, landscape, insect, plant disease, wildlife and water quality questions.

Minnesota Gardening, 1999, is available at garden centers, book, and gift stores state-wide. You can also pick them up at your local county extension office or order them directly from the University's Distribution Center. Call 612-624-4900 in the Metro area or toll-free, 1-800-876-8636. Once you see this great calendar, you'll want several—for gifts and for yourself!

Deborah Brown
Extension Horticulturist

Managing tree diseases in fall and winter

Trees are subject to a variety of diseases throughout the year. However, most of these diseases become inactive in late fall and survive the winter in dead or infected tissue such as dead limbs, fallen needles or leaves, and cankers on the main trunk. Maintaining healthy trees and preventing diseases year-round requires fall cleanup and winter pruning.

Sanitation or removal of dead, dying, or infected plant material through raking and pruning removes the source of inoculum and helps reduce the severity of disease the following year. However, these practices do not usually eradicate plant disease. Sanitation and pruning are especially helpful for reducing anthracnose in ash and oaks.

The optimum time for pruning most varieties of shade trees is during late dormancy (usually late February through early March), when fungi are inactive. Pruning of branches during the dormant season helps prevent disease, since many fungi require a wound or opening in order to infect the tree. In addition, bark beetles, like those that carry the oak wilt fungus, are attracted to the odor of freshly cut or wounded trees. Preventing wounding or pruning during months when these beetles are active eliminates their attraction to the oaks and thus infection by the fungus.

Fall Mushrooms

Fall is a time when many mushrooms begin to appear under trees in the home landscape. Some of these mushrooms are decomposers, while others are mycorrhizal fungi that form a symbiotic relationship with the tree's root system. This relationship is beneficial to the tree providing an increase in the uptake of micronutrients. Although many people consider mushrooms a nuisance, they are usually beneficial to trees

and the environment. Fungi are present in the soil or on the root system of trees all year long, but usually produce mushrooms in the fall when conditions are cool and wet.

Mushrooms come in a variety of colors and shapes, with some of them being extremely delicious and others extremely poisonous. It is important to accurately identify mushrooms before eating them.

Chad J. Behrendt
Extension Plant Pathologist

Cytospora Canker of Spruce

Are you seeing dead lower branches on your spruce tree? Your tree may have Cytospora canker, a disease caused by the fungus Leucostoma kunzei. Cytospora can occur on any species of spruce, but it most commonly affects Colorado blue spruce. This disease usually occurs on trees that are at least ten years old. However, Cytospora can affect younger seedling or nursery trees that are severely stressed.

Initial infection is through wounds on lower branches of trees. The fungus causes cankers (lesions) to form along a branch, eventually killing it. During the season the fungus produces spores which are spread by rain and wind to other branches higher in the tree. The initial symptoms of Cytospora in the spring are yellowing needles, which later turn brown and drop off. Cankers, with resin-soaked areas, may be visible on infected branches. Cytospora does not normally kill healthy trees, but may disfigure them.

There are no chemical controls available for Cytospora canker. Prune infected branches four to six inches beyond the cankered area. Keep trees healthy by choosing proper planting sites and water them during times of drought.

Crystal M. Floyd
Plant Pathology Technician

Entomology Notes

Hackberry psyllids are very small and gnat-like. Despite their appearance, they are relatives of aphids and leafhoppers. These psyllids are gall makers on hackberry leaves. During late summer and fall, adults emerge from the galls and seek sheltered places to hibernate. This often brings them to homes where they can easily penetrate through screens, around windows and doors and other small cracks and spaces. People occasionally will get a 'bite' that is nothing more than a prick. Because they are so small, it is very difficult to prevent them from entering homes. Once inside, they cause no damage and are short-lived. They are temporary problem and colder weather will end their activity.

Indianmeal moths are a very common call now. People usually notice small gray and brown moths flying around kitchens or other rooms. Sometimes they are first aware of a problem when they see small caterpillars in dry food products or on the walls or ceiling. Sanitation is the best control tactic. Throw away infested food and store susceptible food in insect-proof containers or in the refrigerator. Insecticides are not effective if there is an available food source.

Fruit flies are also common now. They are about 1/8 inch long and usually with red eyes. Fruit flies are associated with fermenting organic material which can include (but not limited to) old vegetables and fruits, food material stuck in garbage disposals, sinks, on the bottom or sides of trash containers. Removing the source of the infestation is the most effective control. Insecticides can not control fruit flies as long as there is a food source.

Western conifer seed bugs, a type of leaf-footed bug, have been common indoors lately. They are about 3/4 inch long, brown with white markings. They have large back legs with a leaflike enlargement on it (hence their name). They enter homes as they search for sites to overwinter. Physical removal is the only necessary control. Cold weather will eventually curtail their activity.

Birch catkin feeders We received a couple of reports of these insects still being active. In both cases, they were found under a birch on the ground. They do not harm birch or turf. They are only a nuisance. Control is not necessary; they will go away on their own as the weather becomes colder.

Black willow aphids Large numbers of these conspicuous aphids have been discovered on willows and other areas close by. No control is necessary this late in the season.

Jeffrey D. Hahn
Extension Entomologist

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MINNESOTA

CROP NEWS

Vol. 4
No. 26

From the Crops System Team of the University of Minnesota Extension Service

50°F

At this time of year, most crop producers are thinking about harvest, grain moisture, and grain markets. There always seems to be an urgent need to get things done. In working hard to finish harvest, some details are frequently forgotten. The importance of the soil temperature of 50°F is one of those details.

Most realize that the 50°F temperature is important for nitrogen management decisions in the fall of the year. This temperature is important because the rate of conversion of ammonium-nitrogen (NH_4-N) to nitrate-nitrogen (NO_3-N) drops substantially when soil temperature goes below 50°F.

The plan for application of any nitrogen fertilizer this fall should be to keep this nitrogen in the ammonium (NH_4) form. If there is no conversion of NH_4-N to NO_3-N in the fall, the potential for loss of NO_3-N in the spring of the following year is reduced substantially. There should be every attempt to minimize loss of NO_3-N for both economical and environmental reasons. Reductions in loss of NO_3-N due to leaching or denitrification can easily translate into more bushels per acre thereby improving the economics of corn production.

With low commodity prices, it's especially important to get maximum return for the money invested in fertilizer. When N loss is reduced, the applied N is used to produce more bushels. So, the delay in application of fertilizer N this fall should reduce the potential for loss of NO_3-N next spring.

Highlights . . .

For more information contact Extension Plant Pathology at 612-625-6290

50°F/Continued

There's a good argument for waiting until soil temperatures cool down if we think back to last year. In early October, temperatures were warm, soybean harvest was completed, and there was some time before the corn crop was ready for harvest. Many growers in central and southern Minnesota applied fertilizer nitrogen before soil temperatures dropped below 50°F. There was, in many situations, adequate time for nitrification to take place (conversion of NH_4-N to NO_3-N).

After planting this spring, there were heavy rains across much of southern Minnesota and soils were saturated. Conditions were appropriate for loss of NO_3-N due to the process of denitrification. During mid to late July, many corn and sugar beet fields showed a light green color indicating an inadequate supply of N during the growing season. Many of these fields that turned light green early had also been fertilized with N in early October.

After soybeans have been harvested, it's difficult to many crop producers to wait until the soil temperature drops below 50°F. Yet, this wait can minimize the potential for loss of N in 1999. Prevention of N loss usually means that more fertilizer N is available for increased yield. So, waiting in the fall of 1998 may translate to a higher potential for profit from a corn crop in 1999.

George Rehm
Extension Soil Scientist

Special Numbers

There's general agreement that soil testing is the first management step toward planning a cost-effective fertilizer program for crop production in 1999. As the results of the analysis reach dealer, consultant, and crop producer, there are some special number to remember as fertilizer plans are made for the 1999 corn and soybean crop. The importance of these numbers is described in the paragraphs that follow.

10 ppm P (Bray) : 8 ppm P (Olsen)

These soil test values relate to soybean production. University research has shown that there is a high probability that phosphate fertilization will increase soybean yields if soil test values for P are below these numbers. Appropriate rates of phosphate broadcast and incorporated before planting have increased soybean yields by 10% to 15% when soil test values for P are below these numbers.

20 ppm P (Bray) : 15 ppm P (Olsen)

Phosphate fertilizer placement decisions are affected by these numbers. If soil test P values are at this level or higher, there is a very low probability that the broadcast application of phosphate fertilizer will increase corn yields. Therefore, no broadcast phosphate is recommended when soil test P values are at this level and above. In this range of soil test values for P, the crop producer is urged to use a starter fertilizer or fertilizer placed with the seed.

25 ppm P (Bray) : 20 ppm P (Olsen)

These soil test values for P are considered to be very high. There is a very low probability that corn will respond to phosphate fertilization (broadcast or banded) when the soil test P values are at this level or higher. At this level, there is an ample supply of soil P to provide for optimum corn production. No phosphate fertilizer (broadcast or banded) is recommended when soil test P values are at this level.

120 ppm K

This soil test value also relates to corn production. There is a low probability that a broadcast application of potash fertilizer will increase corn yields when soil test values for K are above 120 ppm. At this level and above, the banded application of potash is suggested for corn production.

160 ppm K

This soil test value for K is considered to be very high. At this value and higher, there is a very low probability that corn will respond to the application of potash fertilizer (broadcast or banded). The use of potash fertilizer is not recommended when the soil test values for K are at this level or higher.

Crop producers have many numbers to remember. Those who remember these numbers will either save on money spent for fertilizer or improve yields when fertilizer is needed.

George Rehm
Extension Soil Scientist

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in September included:
Corn—*Kabatiella* sp (Eyespot)
Soybean—soybean cyst nematode, Brown stem rot, anthracnose, *Phytophthora* sp root rot
Tomato—*Septoria* sp leaf spot, *Phytophthora* sp (Late blight), *Colletotrichum* sp fruit rot
Oak—Oak wilt
Honeysuckle—*Phyllosticta* sp leaf spot, *Herpobasidium* sp (*Insolibasidium* sp) leaf blight
Rose—*Rhizoctonia* sp root rot
Kalanchoe—Tomato spotted wilt virus
Sedum—Impatiens necrotic spot virus(INSV)
Gloxinia—INSV

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Get Those Houseplants Back Indoors!

Many gardeners put their houseplants outdoors for the summer to soak up the warmth, humidity, and added light resulting from long days and short nights. Unfortunately, some are still outdoors, despite the cool nights we've had the past couple weeks. It's time to get them in!

Plants that grow best indoors almost all originated in the tropics or sub-tropics. They really can't take too much cold weather—particularly since they'll have to adjust to the warmth of being indoors again. But if they've been out for several months there are a few things you need to do before putting them back in their old places.

* **Try to eliminate pests.** Wash large-leaved plants with a soft rag, using lukewarm water and a few drops of mild dishwashing detergent. Be sure to clean the undersides as well as the tops of the leaves—mites usually congregate on the undersides, moving to the tops only when there's a population explosion. Swish small-leaved plants through a laundry tub containing—again—lukewarm water with just enough dishwashing detergent so it feels a little slippery.

* **Isolate plants, if possible.** Keep your "outdoor" houseplants away from houseplants that stayed in all summer, just in case they still harbor some insects or mites. After two or three weeks, if they're still "clean" it should be OK to put them back among the others.

* **Repot plants that grew a lot.** One of the results of spending the summer outdoors is that houseplants often put on a rather sizeable amount of new growth. Those extra leaves are always accompanied by additional root growth. If you're not sure whether your plant needs repotting, slip the plant out of its container to check the roots. If you see masses of roots circling the pot, upgrade to the next larger size. Otherwise, just put the plant back in the original pot; no harm done.

Deborah Brown
Extension Horticulturist

Dealing With Holes Left Where Trees Came Down

Two common questions are often asked about the holes that are left after large trees are taken down: **1)** What needs to be done so another tree can be planted in the same place? and **2)** What needs to be done so grass can be grown where the tree used to be?

After a large tree is cut down, a big grinding machine is used to "grub out" the stump. Roots should be grubbed out at least a foot deep if you plan to sod, but deeper and more extensively if you plan to plant a replacement tree nearby.

The grinder shreds the large roots immediately below the trunk and out a bit in all directions, leaving a mixture of soil and woodchips in the hole where the tree once grew. It's best to remove much of these woodchips because they will decompose over time, and the area will "sink" lower than surrounding soil.

Fortunately, these woodchips make an excellent mulch for landscape use around trees, shrubs and flowering perennials. They can also be composted and added to gardens. It would be terribly wasteful to just haul them away. The one exception could be black walnut. Some plants are sensitive to the juglone that is present in all parts of black walnut, so you must use shredded or chipped black walnut roots only around tolerant plants.

Because there will be more roots decomposing close to where a large tree once stood, it's best to replant six to eight feet away from the original hole, where soil is more stable. So whether you replant a tree or decide to plant grass, preparation will be similar because the tree will not sit on exactly the same site.

* Remove as much of the woodchip/soil mixture as possible.
* Replace it with soil from your garden, or soil that is as similar to the original soil as possible.
* Soak the area thoroughly to help settle the soil.
* Add another inch or two of soil to account for additional settling.
* Water again, rake starter lawn fertilizer into the soil and lay sod (this fall) or wait until spring to plant grass seed.

Deborah Brown
Extension Horticulturist

Yellowjackets

We have been dealing with yellowjackets for a long time this summer. Fortunately the end is finally in sight. Yellowjacket nests only survive for one year. When we receive a hard frost (something in the upper 20's or colder), the queen and most, if not all, the workers will die. Any subsequent frosts should finish any surviving workers. The only survivors are newly mated queens that were produced during late summer; they have already left nests to overwinter in protected, sheltered sites, such as under logs, loose bark, siding, roofing, and other cracks and spaces around homes. Next spring they emerge and start new colonies. Nests from this year are not reused next year. They will deteriorate and eventually disappear on their own. See FO-3732, *Wasp and Bee Control.*

Spiders

Spiders are a very common question right now. A lot of people have noticed argiope (also known as garden) spiders in their garden or yard. These spiders are large (body length up to one inch) and strikingly colored black and yellow. They produce large, flat wheel-like spider webs. Despite their appearance, they stick to their webs and are harmless to people (if carelessly handled, they could administer a mild bite). We have also received samples of spiders found indoors, such as grass, sac, and jumping spiders.

Spiders are very common during late summer and early fall, especially if you live near a river, lake or other body of water. You can reduce spider numbers by caulking and sealing obvious nooks and crannies that spiders may use to get indoors. Also keep tall grass and weeds cut short and remove firewood, bricks and piles of debris close to homes that may harbor spiders. Remove webs and crush any egg sacs that are seen. Insecticides are not very effective against spiders when sprayed just as a surface treatment. If an insecticide is used, it is more effective if applied under siding and into other cracks and spaces where spiders hide.

Indoors, remove boxes, bags and other areas of clutter. Regularly clean and kill and remove spiders and webs that are seen. Once we get consistently cold weather, spider numbers indoors should go down on their own. See FO-1033, *Common Spiders In and Around Homes.*

Whitelined Sphinx Moths

There has been a lot of sightings of hummingbird-like moths around petunias, nocotianas, and other flowers during evening. They can hover and dart quickly from flower to flower. Whitelined sphinx moths have a wingspread up to 3 1/2 inches. The forewings are brownish with a whitish band running from the base of the wing out to the tip. The hind wings are mostly pink. Their bodies are brownish with white stripes on the thorax and white and black markings on the abdomen. The adult moths first emerged sometime during midsummer and should be active until frost.

Entomology Notes

Foreign grain beetle calls are starting to tail off. They should not be active much past the end of September. We are still getting a few cluster fly questions but it is too late for any effective control to prevent them from getting indoors. Once they are in walls and attics, homeowners can't prevent cluster flies from emerging into the living quarters of their home; they can only kill them as they are seen. Indianmeal moth calls are starting to pick up. Even though we receive calls about these insects year around, fall and winter seem to be the time when we get the most questions. We are also fielding an increasing number of fruit fly questions. We receive most of our calls about them during fall.

Jeffrey Hahn
Asst. Extension Entomologist

Leaf Diseases of Walnut

Fall is upon us and leaves are changing color and dropping. The leaves of many walnut trees, however, have already turned yellow and fallen. This premature color change and leaf loss in walnuts is most likely caused by fungal leaf diseases such as anthracnose or bull's eye leaf spot.

Walnut anthracnose, caused by the fungus Gnomonia leptostyla, is commonly found wherever walnut trees grow. Symptoms typically appear on the leaves as dark angular spots that range in size from a pin-prick to 1/2 inch in diameter. Later small black bumps (acervuli) produced within these lesions, usually on the lower side of the leaf, release spores that are responsible for secondary spread of the disease to neighboring trees. Since walnut anthracnose does not harm trees unless they are severely defoliated, control of walnut anthracnose is not usually warranted. However, chemicals such as thiophanate-methyl or mancozeb should effectively control walnut anthracnose on ornamental trees. Trees grown for edible nut production should not be treated with these fungicides. In addition, proper maintenance and cultural practices help increase the vigor of the tree and minimize disease severity.

Bull's eye leaf spot, caused by the fungus Cristulariella pyramidalis, is not as common as walnut anthracnose. Symptoms of bull's eye leaf spot typically appear as dark, round spots that are target-like in appearance. These spots can be easily distinguished from walnut anthracnose by looking for the target-shaped lesions. Control measures for bull's eye leaf spot include proper maintenance and care. Chemical control measures are not warranted for this disease.

Prolong the Life of Your Pumpkins!

Here are a few tips to help prolong the spook of your Jack-O-Lantern.

1) Harvest pumpkins as soon as they are fully matured, but prior to frost.

2) Avoid wounding pumpkins during harvest (wounds allow the entrance of decay organisms).

3) Store pumpkins in a cool, dry place (50 to 60 F and approximately 70% humidity).

4) Keep the surface of the pumpkin dry.

5) Do not stack pumpkins on top of each other, if possible.

6) Promote good air circulation.

Chad J. Behrendt
Extension Plant Pathologist

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MINNESOTA

CROP NEWS

Vol. 4
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From the Crops System Team of the University of Minnesota Extension Service

Don't Let High-Moisture Corn Get Too Dry

It looks like there's a good chance that corn harvest will come early this year and that grain moisture in the field will drop rapidly. Livestock producers who are intending to store corn in silos as fermented high-moisture corn will need to keep a close watch on their crop and make sure they harvest before corn gets too dry.

In high-moisture corn storage, naturally occurring bacteria cause fermentation by consuming oxygen and a small amount of corn dry matter. The bacteria produce acids and carbon dioxide that inhibit growth of the storage fungi (molds) that cause undesirable quality loss and spoilage. The optimum corn kernel moisture for fermentation is 25 to 30% (wet basis). At moisture levels greater than 30%, production of undesirable acids and excessive leaching of nutrient-rich liquids from the silo is likely. At moisture levels lower than 25%, corn is often too dry for proper fermentation and spoilage is likely. Attempts to rewet overdry corn to bring about fermentation are not usually very successful. Since corn moisture content in the field drops rapidly in early fall, it is best to start harvesting high moisture corn near 30% moisture and then fill silos as quickly as possible.

Bill Wilcke
Extension Engineer

Highlights . . .

Thinking About Fertilizer Costs For 1999

Everyone associated with Minnesota agriculture understands the problems caused by the current low commodity prices. If projections from some who look into the future are correct, it may be some time before prices rise to a profitable level. Given the low prices, the crop producer can either plan to grow more without spending more money or keep the same yield goal with a focus on spending less for production inputs. Since weather has a major impact on yield and we have no control over the weather, it's best to focus attention and energies on the most efficient use of production inputs.

Usually, the amount of money spent for fertilizer is a substantial part of the cost of all inputs needed for crop production. Fertilizer management practices can affect the total amount of money spent for fertilizer. As the fall harvest for the 1998 crop approaches rapidly, it's not too early to look ahead at possible fertilizer costs for the 1999 growing season.

Fertilizer costs, of course, are affected by the intended crop, expected yield, soil test values, the previous crop in the rotation, and the price of the various fertilizers needed. It's also impossible to predict fertilizer costs that would be applicable to a large number of crop producers. However, there is some value in providing costs that might be used for comparison purposes. Four examples are summarized in the tables that follow.

Intended Crop	Yield Goal	Past Crop	Soil Test Values (ppm)			
			P (Bray)	P (Olsen)	K	Zn
corn	160 bu./acre	soybeans	8	-	140	.6
corn (irrigated)	160 bu./acre	edible beans	23	-	85	1.1
wheat	65 bu./acre	soybeans	-	5	175	.5
alfalfa	5 ton/acre	alfalfa	12	-	85	.7

Fertilizer recommendations and estimated cost for the four situations described in the previous table.

Intended Crop	Yield Goal	Placement	Fertilizer Recommended					
			N	P_2O_5	K_2O	Zn	S	Cost
			lb./acre					$/acre
corn	160 bu./acre	broadcast	110	70	25	5	0	43.70
		band	110	35	12	1	0	26.66
corn	160 bu./acre	broadcast	160	0	70	0	25	51.00
		band	160	12	40	0	12	42.20
wheat	65 bu./acre	broadcast	90	45	0	0	0	25.95
		band	90	25	0	0	0	18.75
alfalfa	5 ton/acre	broadcast	0	30	90	0	0	21.00

Some explanation is needed for the recommendations and costs shown in the above table. The recommendations are those currently used by the University of Minnesota. The nitrogen recommendations are made by using previous crop, yield goal, and soil organic matter content. It was assumed that the soil nitrate test was not used.

The situation where corn follows soybeans can be representative of some fields in southern Minnesota. Anhydrous ammonia was used as the N source for this situation. For the second example (corn following edible beans), the corn is assumed to be grown on an irrigated sandy soil. For simplicity, urea is used as the N source.

With the broadcast placement, a charge of $3.00 per acre was added to the cost of the fertilizer. This same broadcast charge was used for all crops.

Fertilizer costs were obtained from a major dealer in southern Minnesota calculated costs per pound of nutrient are as follows:

N (as 82-0-0)	$ .15/lb. N
N (as 46-0-0)	$ .19/lb. N
P_2O_5 (as 10-50-0)	$ .21/lb. P_2O_5
K_2O (as 0-0-62)	$ .13/lb. K_2O
Zn as Zn SO_4	$1.25/lb. Zn
S as SO_4-S source	$ .34/lb. S

Again, it is emphasized that the costs shown are not intended to be perceived as recommended costs. These are examples only that may fit some production situations. Actual costs will vary with soil test results and fertilizer prices. The prices, of course, will vary across the state.

However, it soon will be time to sit down and calculate projected costs. Time spent in calculating should help the grower make fertilizer management decisions for next year. The program that was used in 1998 may not be the most economical for crops grown in 1999.

George Rehm
Extension Soil Scientist

Sweet Clover—Good or Bad?

As we may consider more ways to make farms sustainable, sweet clover is being used more and more as a cover crop and soil improvement. With more sweet clover being grown, farmers are asking, "Am I safely using sweet clover for hay or silage?" Many are afraid to use sweet clover as a forage because of sweet clover "poisoning".

Sweet clover "poisoning" goes back to at least the 1920s when it was noted in the North Central U.S. and Southern Canada. At that time, it was discovered that the "poisoning", or bleeding disease, was caused by livestock eating improperly cured clover hay. Research found that the problem came about when coumarin (a natural nontoxic compound in the plant) was converted to dicoremarol by growth of molds on the hay. Livestock losses occur annually throughout areas of the U.S. and Canada as a result of feeding spoiled sweet clover hay or silage—pasture is not affected.

According to information from North Dakota State University Veterinary Toxicology Department, sweet clover can safely be used as a livestock's feed, if managed properly. Proper management includes putting it up without mold growth. For hay, this means it will minimize mold growth. The basic silage production practice that will minimize mold growth are:

*rapid filling of the storage facility
*harvesting at 65% moisture
*chopping finely
*adequate composition
*covering exposed surfaces
*elimination of air as quickly as possible
*rapid feedant.

Other management techniques that lower the potential for the disease include feeding it with twice as much other roughage, or by alternating it with other roughage in periods of ten days or two weeks. The old saying that "if it looks good and smells good, it probably is good" applies to the sweet clover as well. However, if a person wants to be absolutely sure, the hay or silage can be tested at the NDSU Veterinary Diagnostic Laboratory. The testing should be done about two weeks before it will be fed.

Curt Nygaard
Roseau County Extension Educator

Minnesota Canola Disease Survey

Art Lamey at North Dakota State University has completed his canola disease survey. The data reported in the following table were collected by making random stops in each field (crop in the swath) examining 5 stems 1 stop and 10 pods every second stop for a total of 40 stems and 40 pods. It appears that the early crop in Roseau County escaped a serious sclerotinia outbreak in 1998. Sclerotinia incidence in 1997 was 24%.

Canola Disease Survey 1998
North Dakota State University
Art Lamey

County	No. of Fields	% Incidence Blackleg	% Incidence Sclerotinia	% Severity Black Spot
Kittson	9	0	15.8	0.3
Marshall	10	2.8	13.3	1.1
Roseau	12	2.8	5.3	0.2

Art Lamey
Extension Plant Pathologist
North Dakota State University
Richard A. Meronuck
Extension Plant Pathologist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Are your apples spotted, blotchy, or deformed?

Have you noticed scabby, blotchy, or deformed apples during harvest time? There are a number of diseases that can affect the appearance and quality of apples such as apple scab, sooty blotch, and flyspeck. Although apple scab may cause a reduction in fruit quality, sooty blotch, and flyspeck affect only the appearance of the fruit. All three of these diseases are caused by fungi and can be controlled through cultural and chemical measures early in the season. Once infection has occurred and fruit appears deformed, scabby, or blotchy it is usually too late for control measures. Thus, control of these diseases this year is no longer possible. However, cultural control measures and sanitation practices will help reduce the severity of disease next year.

Apple scab, a common fungal disease, begins infecting healthy tissue in the spring. This disease is able to infect many different parts of the plant including leaves, petioles, blossoms, and fruit. Infected fruit has brown, corky spots that may crack or mature unevenly. Disease severity is worst when fruit is infected early in the season and moisture is readily available. Late season infections tend to cause blemishes but do not usually affect fruit quality, while early season infections cause blemishes as well as deformities in the fruit. This disease survives the winter on infected leaves and branches, and begins to infect healthy foliage during wet periods in the spring. If wet periods continue throughout the summer secondary infections continue.

Sooty blotch and flyspeck usually appear in late summer, and are favored by moderate temperatures, high humidity, and rainfall. Fruit infected by sooty blotch usually has black smudges or spots, while fruit

infected by flyspeck has groups of black dots. Although two different fungi cause these two diseases, they tend to occur together. These diseases survive the winter on woody plants and are spread by splashing water. Once infection occurs it usually takes a period of time before the blotches and specks become visible. Damage caused by these two diseases is superficial, and does not affect the fruit itself.

In order to produce healthy looking apples next year and to help prevent the severity of these diseases, cultural control measures and sanitation practices should be conducted this fall. Cultural control measures may include planting resistant varieties, removal and destruction of infected leaves and fruit, and improving air circulation by properly pruning trees. Fungicide application also effectively controls these diseases. A complete spray program should be followed next year. For more information see the University of Minnesota Extension publication *Home Fruit Spray Guide*, FO-0675. Since apple scab is highly dependent on moisture conditions, cultural control measures may be adequate for controlling this disease during dry seasons. These cultural and chemical control measures should also effectively control sooty blotch and flyspeck.

Postharvest Diseases

Stored produce such as apples and potatoes are subject to a variety of different rots and decay. Symptoms associated with these rots and decay may include soft spots, dry mummified produce, soft wet tissue, and white or colored fungal growth.

These diseases may be caused by a number of different fungi and bacteria. Infection may occur in the field and develop later, or may occur after harvesting. Infection usually occurs through wounds, cuts, or bruises. Infection can spread from infected tissue to healthy tissue when rotten or decayed tissue comes in contact with healthy tissue. However, the spread of disease organisms generally requires warm temperatures and high moisture.

Control of post-harvest diseases should begin in the field during harvest. It is important to avoid physical injury such as wounding, bruising, and cutting. Pick produce during cool, dry weather. Specific recommendations for potatoes include; digging potatoes during dry weather after the vines have died, avoiding bruising the potatoes during harvest, and allowing them to dry for 2 to 3 hours in a shaded place before storing in a cool dark location. Apples should be carefully harvested, making sure to leave the stem on the fruit. Apples store best just above freezing with a high relative humidity.

Chad J. Behrendt
Extension Plant Pathologist

Entomology Notes

Wasps are still our number one question. We are also getting a fair number of bumble bee calls. Now that we are into September, we can start to think about the first hard frost which is typically in September. Both wasps and bumble bees are annual insects; their nests survive just one year. Once freezing temperatures arrive, these insects will die. People wondering what to do about nests may elect to just leave them and wait for Mother Nature to take care of them.

Foreign grain beetles are also still quite common. They are small (1/12 inch long) and reddish brown. Most infestations occur in homes constructed in the last few years, The green, wet wood is attractive to them as well as allowing mold and fungus to grow inside walls. This has been reported on sheet rock. When walls are closed, the beetles are trapped inside. With a foodsource, they can reproduce. Despite this, there is an apparent seasonality to foreign grain beetles; they are most common during August and September. These beetles are harmless. The only practical control is physical removal until they go away on there own.

We have received a few woolly aphid questions, including woolly aphids on ash. An interesting woolly aphid on a conifer is balsam fir adelgid on balsam fir. In addition to the conspicuous white woolly material they produce, the ends of twigs become swollen as a result of their feeding. We also have received reports of apparent woolly aphids on the trunks of hawthorn and aspen. It is not clear what woolly aphids would be doing on the trunk of these trees. They do not appear to be causing any harm. A hard spray of water from a hose should dislodge them.

Other household insects that are significant now include: cluster flies, millipedes, fruit flies, Indianmeal moths, and carpenter ants.

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Insect Observations

I have received a few reports of 2-spotted spider mites in soybeans. Although the populations are still relatively low, the drier, warmer conditions up here in the Red River Valley may favor the buildup of some populations. Mite populations, like many insect populations, are usually kept in check by fungal diseases; but these require high humidity and relatively cool temperatures. Remember, even if it rains, the mite populations won't decrease. I think it's probably too late in the year to be concerned about wide spread mite outbreaks, but later infestations can reduce yields so it's worthwhile to watch for potential problems. The same is true for dry beans (beans are the typical plant used to raise colonies of 2-spotted spider mites in labs). Dimethoate 4E, Lorsban 4E, and Warrior all are registered. Treatment thresholds are if mites are found throughout the field. If mites are only present at the field margins, border treatments may provide sufficient control.

There have also been reports of Lygus (Tarnished plant bug) in sugar beets in the past week. You can recognize these bronze/brown plant bugs by the white "V" just behind the head. They will preferentially feed on new plant material and in large populations can kill plants. Again, it's only of concern in certain areas, but worth watching for. Both Warrior and Lorsban will be effective if treatment is warranted.

Note: This late in the year it's important to consider the Post Harvest Interval for any chemical applied.

Ian MacRae
Extension Entomologist

Highlights . . .

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Harvesting Pears and Apples

Even though you know when your pears or apples usually ripen, this has been a strange year; they may be a couple weeks ahead of schedule. If you leave them on the tree too long you'll compromise not only their flavor and texture, but their storage life. Since pears and early apples don't store long, anyway, it's important to test them for readiness earlier than you usually would.

Pears ripen "from the inside out" and will be gritty— maybe even brown—if you wait until the outside of the fruit looks and feels ripe. Instead, pick them as soon as the background green of the skin lightens and becomes a more yellow-green. Wrap each fruit in tissue or newspaper, and spread them on a table or counter top in your basement. Check them regularly, and bring them upstairs to be eaten or refrigerated as soon as the flesh feels softer and ripe.

Testing apple ripeness is a different story; skin color is of little consequence. Ripe apples should pull off the tree easily. They should contain very dark brown seeds, and lack any "starchy" flavor. (Some mildly-flavored apples are never sour, but they will be starchy until the sugars are fully developed.)

While pears must be picked before they ripen, apples should be picked just at the point of ripening. Taste the apples. If they taste "right", they're ready, regardless of what the calendar tells you. Once you've picked them, store your apples as close to freezing as possible, without actually letting them freeze. The warmer you store them, the sooner they'll deteriorate.

Deborah Brown
Extension Horticulturist

Tree Diseases

Tar spot of maple

Tar spots on maple leaves may be unsightly, but usually cause no significant damage to the tree. Tar spot, caused by the fungus Rhytisma sp., is commonly observed on red and silver maple, but may also occur on other species. This fungus appears on the upper surface of the leaf as a thick, black, shiny spot. Thus the name tar spot. Spores released from these spots begin infecting healthy leaves following spring rains. Spots initially appear yellow-green in color, but become black as the summer progresses. Tar spot is mainly a cosmetic problem, and thus control measures are not usually needed. However, removal and destruction of infected leaves is an effective control method since fallen leaves contain all of the viable spores for infection.

Aspen twig blight

For those of you who are nature lovers and have recently taken a walk through the forest, you may have wondered why the twigs on young aspen trees were blackened, brittle, and curled. These trees were most likely infected by the fungus Venturia sp., which is a common disease of aspen in wooded or forested areas. In the spring aspen twig blight infects the leaves and shoots of the current year's growth causing death of the new growth. After repeated attacks, this fungus can cause growth loss, stunting, and even death in young seedlings. Spores released from infected trees or debris on the ground initially infect trees. Aspen twig blight tends to be most severe on densely planted trees or short seedlings and suckers. Although Aspen twig blight can be damaging to young trees, chemical control is not usually recommended.

Cedar-Hawthorn rust

Cedar-hawthorn rust is a fungal disease that can be observed right now (late summer and early fall) on the leaves of infected hawthorn trees, while in the spring this disease can be observed on cedars. Spores produced on infected hawthorn appear orange-yel-

low or rust colored with fingerlike projections protruding out from the bottom of the leaf. Infected leaves also have orange-yellow spots (lesions) on the upper surface of the leaf. Spores released from these lesions are blown by the wind to susceptible cedars where they begin new infections. Although cedars may become infected this fall, infections will not be visible until next spring when they will appear as small greenish-brown swellings. The following spring these brown swellings will produce spores that are able to infect hawthorn. Control measures are not usually recommended, but may include removal of one of the hosts or removal of galls from the cedar tree.

Chad J. Behrendt
Extension Plant Pathologist

Cluster flies

People have been complaining about cluster flies coming into their homes. These flies are slightly larger than house flies and are dark gray. A distinguishing character is a patch of wavy yellow hairs on the side of the thorax behind the head. Cluster flies are not noticed during summer as they are parasites of earthworms. But as the summer starts to wind down, they instinctively start searching for protected sites to overwinter.

This often leads them to homes. They congregate on the home's exterior, especially on the upper portion of buildings and in areas that received a lot of sun (most often the south side but also the west and east). Cluster flies usually find their way into attics and wall voids to overwinter. However, they may also accidently enter into the interior of homes. Indoors, they are attracted to light and are usually found around windows.

Cluster flies are harmless to people and property. They are short-lived inside and do not breed and reproduce indoors despite the fact that people may find them off and on from late summer through spring. Still, they can be real nuisances, especially when there are a lot of them.

The best control tactic is exclusion. First start by sealing as many cracks and spaces as possible. While it is not possible to make a home so tight as to not allow any insects inside, you can significantly reduce the number of cluster flies by caulking. Pay special attention to windows, overhangs, and areas where wires enter buildings.

You may need to supplement sealing with an insecticide treatment. The active ingredients permethrin and cypermethrin are effective against cluster flies; usually just one application is necessary. These insecticides can be applied by a pest control operator. It is possible that home dwellers can find products with these active ingredients in them, although they may be hard to locate. Permethrin can be found in Total Pest Control (a Bonide product) and cypermethrin in Vikor Excel Pest Control Concentrate (an AgrEvo product). Check for these insecticides in farm stores, hardware stores, variety retail stores, home building supply stores, and other stores that sell insecticides.

Once inside, there is little you can do about cluster flies except to physically remove them, e.g. with a vacuum. Insecticides are generally not suggested; they do not prevent more cluster flies from returning. However, you can temporarily treat large numbers of flies indoors with an aerosol can of insecticide labeled for flying insects (containing an active ingredient such as pyrethrins, resmethrin, or tetramethrin).

People sometimes wonder whether they can reduce cluster fly numbers by spraying lawns. This is not effective and very impractical as cluster flies can travel over a mile to find an overwintering site. Cluster flies also seem to be attracted to the same site year after year.

Entomology Notes

Questions about foreign grain beetles have been common this week. These small (1/12 inch long) beetles are attracted to moisture and are commonly found around sinks and tubs. Because of their small size, it is not possible to exclude them from homes. Fortunately, these insects are not really pests but just nuisances. They should go away on their own by the end of September.

Wasps continue to be very abundant. They are still a problem around outdoor activities serving food. They will be less of a problem on cool, cloudy days. Wasps will persist until our first hard frost. At that time the old queen and all the remaining workers die; the nest is not reused next year. Only the newly produced queens survive. They seek shelter under bark, stones, and in around buildings where they remain until next spring.

We are still receiving reports of various tree and shrub insects, including lace bugs, yellow-necked caterpillars, aphids, and imported willow leaf beetles. It is late enough in the season that management of these insect is not necessary for the plant's health.

Jeffrey Hahn
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Using Flat Buildings For Dry Grain Storage

In years when grain yields are high and prices are low, it is worth considering use of existing flat buildings (machine storage buildings, warehouses, or even livestock buildings, for example) for temporary grain storage. Here are some things to consider when deciding whether a given building would be a good choice for grain storage.

Sanitation. Can you get the building clean enough for grain storage? If the building previously contained manure, ag chemicals, or petroleum products, can you completely remove these materials and their odors so that grain will not be physically contaminated or pick up odors that would result in down grading? Also, take a look at the way the building is constructed and try to determine whether you can keep birds and rodents away from the grain.

Wall strength. Dry grain exerts high pressure on walls, and unless the building was specifically designed to withstand the pressure of grain or some other granular product, it will need to be reinforced. If the building was designed and erected by an ag building company, you might ask the company if a "grain package" is available. Or you could consider hiring an engineering consultant to design building modifications for you. Another option would be to set free-standing bulk heads inside the building to keep grain away from the walls. Extension doesn't currently have plans for do-it-yourself bulk heads, but some local contractors or building materials suppliers might be able to build them for you. Some farmers avoid the wall-pressure problem by buying metal grain bin rings (without floors or roofs), and setting the rings inside the building. Finally, you could accept reduced storage capacity and just place grain in the center of the building in sloping piles that do not touch the walls.

Capacity. When you are trying to decide whether it is worth using an existing building for grain storage, make sure you estimate how many bushels can be stored. It is disappointing to find how few bushels can actually be stored in some flat buildings, especially when buildings have low ceilings or when grain is not piled against the sidewalls. To estimate capacity, calculate the volume of the planned grain pile in cubic feet and then multiply by 0.8 bushels per cubic foot, or divide by 1.25 cubic feet per bushel to get volume bushels. Contact the University of Minnesota Extension Service if you would like assistance in estimating building capacity.

Water-tightness. First, check the roof for leaks and estimate how difficult and expensive it would be to repair it. Next, look at the grade around the building to make sure that water doesn't get onto the building floor. Finally, look at the floor itself. A vapor barrier (6-mil plastic, for example) is needed between the soil and the grain to prevent moisture from moving into the bottom layer of grain. For buildings with earthen floors, consider piling the grain on plastic, or

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installing a new concrete floor with a vapor barrier under it. Keep in mind that new concrete floors should be allowed to cure for several weeks before grain is placed on them. If the building has an older concrete floor that does not have a vapor barrier under it, and the grain will be stored more than a few months, it would be best to put down plastic over the floor as the building is filled.

Filling and unloading the building. Grain handling is not as convenient in flat storage as it is in round metal bins and it can be a challenge to move grain in and out of the building. There is some specialized equipment designed for this purpose that you could buy or rent. But if that's not practical, you might be able to use portable grain augers to fill flat storage by making openings in the roof, or by moving the auger around inside the building. Unloading can be accomplished by using a portable auger or a front end loader. Pneumatic grain conveyors could also be used for filling and emptying flat storage.

Grain moisture. Because it is difficult to achieve uniform air movement in flat storage, it is difficult to dry grain adequately in these buildings. It is probably best to make sure grain is dry enough for storage before placing it in the building. Corn that will be fed through the winter months can be held at up to 18% moisture, but corn to be stored into the following spring should be no more than 15% moisture. Use 14% moisture for corn storage into summer, and 13% for storage of a year or more. Small grains should be 13 to 14% moisture, and soybeans should be about 13% moisture.

Grain aeration. Even if grain is dry when it is moved into flat storage, it should still be aerated so that you can control grain temperature to reduce mold and insect activity and to prevent moisture migration. Perforated ducts placed on the floor can work well for flat buildings. If the pile is fairly level, duct spacing should be about equal to the pile depth. If you have a long triangular-shaped pile, you might get by with one duct, centered under the peak, running the length of the pile. Unusual pile shapes make aeration design tricky; consult with an experienced aeration system designer in these cases. Perforated ducts (metal or plastic) that are made for grain aeration work best. Ordinary plastic drainage tile doesn't work very well because it doesn't have enough perforated area for good air movement. Try to keep duct lengths to less than 100 ft to reduce problems with non-uniform air distribution.

Positive pressure designs (air blowing into ducts and out of the top of the pile) tend to work best for flat storage, but be aware of potential condensation problems under the roof. You can minimize condensation problems by providing plenty of air exhaust area and plenty of air movement over the pile while the fans are running, and by running the fans often enough to minimize the temperature difference between the grain pile and outdoor air.

Round metal grain bins are hard to beat for convenient grain handling and aeration, but flat storage can also work if you provide good management and can meet grain handling, aeration, and pest control challenges. Contact the University of Minnesota Extension Service for more information.

Bill Wilcke
Extension Engineer

Converting Tower Silos For Dry Grain Storage

We have lots of unused tower silos on Minnesota farms and it looks like we might have a lot of grain to store this fall. Can tower silos that were once used for haylage, silage, or high-moisture grain be converted for storage of dry grain? Yes, many farmers have successfully stored dry grain in tower silos, and you can, too, but you'll have to meet the following challenges in making the conversion.

Make sure the walls will withstand the pressure of dry grain. Dry grain exerts more pressure on walls than does silage. Many newer silos were designed to handle the pressure of dry grain, but some older ones were not. Also, the steel rods on the outside of concrete stave silos have probably corroded and weakened over time. Carefully examine the condition of the silo walls and reinforcing rods, and if necessary, contact the manufacturer to find out if the silo is currently strong enough, or can be made strong enough to hold dry grain.

Make sure the silo is water-tight. First, check the roof and repair or replace it to prevent water leaks. Then, examine the sidewalls for evidence of leaks. It might be possible to re-plaster concrete or concrete stave silos that have cracks and leaks. Some farmers have attempted to hang plastic liners inside of silo walls to protect dry grain from moisture; this can work, but it is difficult to keep the plastic in place—especially during unloading. Finally, make sure you have a good floor that is well above the ground surface outside of the silo. If the silo has an earthen floor that is below grade, consider adding fill, putting in a plastic vapor barrier, and pouring a new concrete floor several weeks before harvest.

Develop a plan for filling the silo. Believe it or not, getting grain into silos can be one of the biggest obstacles to their use for dry grain storage. Silage blowers cause a lot of impact damage to grain kernels, so dry grain should not be run through a silage blower unless the grain will be fed relatively soon

after harvest. Silage blowers can be modified for use with dry grain by running an auger into the pipe just above the blower, but because silage blowers really throw rather than blow silage, they don't generate much air pressure and the handling capacity (bushels per hour) of modified blowers is very low. Most transport augers will not reach the tops of silos, but you might be able to at least partially fill silos that have side doors by running an auger into the highest door that the auger will reach. One of the best options for filling silos with dry grain is to use a pneumatic grain conveyor. These types of conveyors are slow and require a lot of power, but they should get dry grain up to the top of a silo with relatively little kernel damage. Pneumatic conveyors can sometimes be rented from equipment dealers, elevators, or other farmers.

Make sure grain is dry enough for storage. Because high fan power is required to blow large quantities of air through deep beds of grain, it is expensive to dry grain in silos. It is probably best to make sure grain is dry enough for the intended storage period before it is moved into the silo. Corn that will be fed through the winter months can be held at up to 18% moisture, but corn to be stored into the following spring should be no more than 15% moisture. Use 14% moisture for corn storage into summer, and 13% for storage of a year or more. Small grains should be 13 to 14% moisture, and soybeans should be about 13% moisture.

Install some type of aeration equipment. Even if grain is dry when moved into the silo, it should still be aerated so that you can control grain temperature to reduce mold and insect activity and to prevent moisture migration. You could install full perforated floors for silo aeration, but you can probably get by just using perforated metal over the unloading trench, or simple perforated ducts. You can also get by with relatively small fans if you design for a low airflow per bushel (0.1 cubic foot of air per minute per bushel of grain (cfm/bu) might be a good target). Either positive pressure (air blowing into bottom of silo) or negative pressure (air pulled out bottom of silo) aeration can be used; either system will work if managed properly. In addition to installing fans and ducts at the bottom of the silo, you'll need to provide some open area at the top to let air in or out of the silo when the fan is running. Provide about one square foot of open area for each 1000 cfm of airflow.

Unload from the center! It is especially important to unload silos from the center so that you don't end up with grain piled higher on one side, which causes uneven wall pressures that can lead to structural damage. Either install a conventional grain unloading sump in the center of the silo floor, or simply run an unloading auger from one of the lower doors into the center of the silo. Some farmers have had success with inserting an open-ended aeration tube into the center of the silo and then unbolting the fan and sticking an unloading auger in through the aeration tube when it's time to unload the silo.

In some cases, silos are not in a convenient location for dry grain storage, or it turns out that it would be cheaper to build a new metal grain bin rather than convert an old, dilapidated silo. But it is worth considering using silos for dry grain, because in other cases, silo conversion is relatively simple and provides safe, economical storage.

Bill Wilcke
Extension Engineer

When Can Irrigating Corn And Soybeans Stop?

As irrigated corn and soybeans near maturity, the soil water deficit may be allowed to increase to greater limits without causing stress to the crop.

For corn, after kernels have begun to dent, research has shown that allowing the soil water deficit to increase to 60-70 percent by maturity should not reduce yields in most years.

Generally a corn crop will need 2 to 2.5 inches of additional ET after first dent to come to full maturity. For soils holding at least 3.5 inches of available water at first dent there should be no additional irrigation needed if temperatures remain at or below normal. A heavier soil may tolerate an even earlier cutoff time but lighter soils may need one or two more irrigations.

Managing a larger soil water deficit near maturity may reduce the irrigation water needs by 1 to 3 inches per acre, which saves pumping costs and conserves the irrigation water supply.

Table 1. Estimated normal crop ET requirements for corn and soybeans between various stages of growth and maturity in central Minnesota.

Stage of Crop Growth	Days to Maturity	Inches of ET to Maturity
CORN		
blister	45 - 50	7.0 - 7.5
milk	38 - 42	4.8 - 5.3
dough	30 - 35	3.2 - 3.6
first dent	23 - 27	2.1 - 2.4
full dent	19 - 21	1.6 - 1.8
1/2 milk line	12 - 14	0.9 - 1.2
1/4 milk line	6 - 8	0.4 - 0.6
SOYBEANS		
full flower	48 - 54	6.8 - 7.6
full pod	35 - 39	4.0 - 4.8
begin seed fill	27 - 31	2.7 - 3.3
full seed fill	16 - 18	1.1 - 1.4
begin maturity	9 - 11	0.4 - 0.7

Irrigating Corn and Soybeans/Continued

Table 1 on page 129 lists estimated crop ET requirements between different growth stages and maturity for corn and soybeans under normal weather conditions in central Minnesota. These ET estimates maybe used to estimate at what growth stage the final irrigation maybe considered under normal weather conditions.

More information on irrigation water management is discussed in University of Minnesota Extension Service bulletin *Irrigation Scheduling by the Checkbook Method*, FO-1322, available at county extension offices or contact Jerry Wright, Extension Engineer, at (320) 589-1711.

Jerry Wright
Extension Engineer

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Mid-August Reminders

* **Fertilize the lawn** once towards the end of this month or early next, and then a second time in mid-October. Use a standard, high nitrogen formulation.
* **Divide and transplant flowering perennials** any time now, so they receive several weeks of good growing conditions before cold weather sets in.
* **Renovate and reseed thin lawns** any time this month or early next. Mid-September is the cut-off date for seeding in the southern part of the state. You can sod later, however.
* **Fight thatch buildup** by power raking or core aerating, as soon as temperatures are no longer in the mid to high 80's. This is also a good precursor to overseeding the lawn.
* **Stop fertilizing roses** and other perennial plants. New growth that develops late in the season is more vulnerable to winter injury. You want plants to start slowing down by now.
* **Order spring flowering bulbs** from catalogs so they'll arrive in plenty of time to do a good job of rooting after they're planted. Choices will be more limited if you wait too long.

Deborah Brown
Extension Horticulturist

Verticillium Wilt

Verticillium wilt is a fungal disease that infects hundreds of different plants ranging from trees to vegetables. Verticillium is most frequently found in maple trees and potatoes; however, the Yard and Garden Clinic recently found Verticillium in smoke bush.

Verticillium causes wilt-like symptoms in plants by disrupting the vascular (xylem) tissue. These symptoms may appear at any time during the growing season, but are most prevalent during the summer months when environmental conditions are hot and dry. Symptoms may develop slowly or rapidly. Typically the lower or outer leaves turn yellow and wilt first. In many cases only a few branches or one main branch (section) of the plant will wilt.

Verticillium survives in the soil on dead plant debris or as microsclerotia (specialized fungal structures for long-term survival) and begins infecting the root system of susceptible plants when the fungus comes in contact with actively growing young roots. The fungus then moves through the root and up into the plant causing a discoloration of the vascular tissue. Verticillium can be spread from infected plants to healthy plants through soil, tubers, seed, water, and vegetatively propagated plants.

Control of Verticillium wilt is very difficult since the fungus is able to survive in the soil for many years. Therefore, management strategies should focus on improving plant vigor through proper watering and fertilizing. Other management strategies may include rotating crops in the garden and planting disease-free or resistant plants. If plants become infected and die, susceptible species should not be planted in the same location.

A Problem with Trees Losing Their Bark?

Recently the Yard and Garden Clinic has received several calls on trees with dead and/or sloughing bark. Problem trees, usually maples, have been described as being healthy but having large to small patches of bark that fall from the tree. Typically the wood beneath the falling bark is described as looking healthy.

The most frequently asked question is "What disease is causing the bark to fall off?". Three factors caused by harsh winter environments may cause bark to slough off. These factors include winter injury, sunscald, and frost cracks. These factors cause death of the inner bark, as well as wounds that allow secondary fungi to enter the inner wood and begin degrading dead tissue. Canker fungi can also enter through these wounds and begin infecting living tissue. Although these fungal diseases can infect living trees and cause bark to fall from infected areas, they are not able to enter healthy unwounded trees. Therefore, it is usually harsh environmental factors that cause death of the bark and wounds for infection by other organisms.

Regardless of the problem, winter injury, sunscald, frost crack, wood rotting fungi, or canker fungi, trees with sloughing bark should not be treated with fungicides or painted with wound dressings. Management strategies should include proper watering, fertilizing, and mulching. These practices will help to improve the vigor of the tree and its own defense mechanisms.

Chad J. Behrendt
Extension Plant Pathologist

Yellowjackets and Trees

Several callers have described yellowjackets mysteriously flying around various types of trees. When trees are examined more closely, people usually discover aphids exuding copious amounts of honeydew. Yellowjackets' dietary priorities change during late summer from collecting protein for yellowjacket larvae to meals comprised primarily of carbohydrates to maintain their own energy levels. So it is not surprising to find them around sweets, including honeydew. If the tree is in an area of the yard where people do not normally spend much time, just ignore the insects until freezing temperatures kill them.

If the tree is situated in an area where people spend a lot of time and there is a concern for stings, you may need to try to reduce the numbers of aphids and honeydew to reduce the attraction of the yellow jackets to the tree. Try spraying the branches and leaves with a hard spray of water to dislodge the aphids and wash off the honeydew. Insecticides are a possibility but should be reserved in cases of extreme yellowjacket problems. Insecticidal soap is a good less toxic insecticide. Acephate (Orthene) and malathion are also effective against aphids.

Black and Yellow Argiope Spiders

People have been noticing one of the largest web-building spiders of Minnesota in their gardens and areas with tall grass or weeds. Black and yellow argiope (pronounced ar-JI-o-pee) spiders are a type of orb spider. Their body is about one inch long; including the legs they are several inches in length. They are quite colorful, having black and yellow markings. They construct a large, round, flat web often with some zigzag bands near the center where they spend their life. This is a native species and is quite common, especially during late summer and fall. Argiope spiders do not enter homes and pose little or no threat to people. Control is not necessary when these spiders are seen.

Picnic Beetles and Yellowjackets in the Garden

As strawberries, raspberries, tomatoes, corn, and other fruits and vegetables ripen in gardens, they attract picnic beetles and yellowjackets. These pests have been especially common this year. Picnic beetles are commonly found around fermenting and rotting smells and yellowjackets are scavengers during late summer and are particularly attracted to sweets. Once these insects are drawn into a garden, they are difficult to discourage. The best bet is sanitation. Pick fruits and vegetables as they ripen. Don't allow produce to lay on the ground where it will rot and attract insects. Insecticides do not prevent these insects from coming into the garden very well. Plus once an insecticide is sprayed, there is a waiting period before fruits and vegetables can be safely picked.

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MINNESOTA

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CROP NEWS

From the Crops System Team of the University of Minnesota Extension Service

Temporary Grain Storage Ideas

It appears that many farmers in the upper Midwest will have a need for extra grain storage space this fall. Farmers have been reluctant to sell grain at the current low prices, so part of last year's crop is still in storage and much of this year's crop will be stored as well. Silos, machinery storage buildings, livestock buildings, and outside piles can all be adapted for dry grain storage, but any potential surplus storage facility should be evaluated based on the following factors.

✓ **Ability to keep grain dry.** Grain needs to be protected from precipitation, surface water, and from soil moisture, which means you need a good roof or cover, good drainage away from the storage site, and a vapor barrier or some kind of base that prevents soil moisture from rewetting the bottom layers of grain. Concrete floors that do not have a vapor barrier under them will, over time, allow soil moisture to move up into grain. So if you intend to store grain for more than a few months on concrete that was poured without a vapor barrier, it would be best to put down a vapor barrier between the grain and the concrete.

✓ **Ability to withstand the pressure exerted by dry grain.** Most building sidewalls and some older silos will not withstand grain pressure without reinforcement. Alternatives to reinforcing building walls include setting portable bulkheads inside the walls, or assembling metal bin rings inside buildings.

✓ **Ease of aerating the grain.** In any situation where dry grain will be stored more than a month or so, it is important to install some kind of system for moving air through the grain to control its temperature. Aeration systems in tower silos can be quite simple—a fan and perforated metal duct at the bottom of the silo and an air vent at the top are usually adequate. It can be tricky to design an aeration system for a flat storage building that contains an odd-shaped pile, but some air movement through the pile is essential. Since

Highlights . . .

it is usually difficult to achieve uniform air movement or to move large volumes of air per bushel through facilities that have been adapted for temporary grain storage, it is generally best not to dry grain or to hold wet grain in temporary storage facilities.

✓ **Ease of moving grain in and out.** For each potential storage site, consider how much labor, what kind of equipment, and how much grain damage might be involved in filling and emptying the structure. Tower silos are relatively easy to empty (make sure, though, that grain is withdrawn from the center of the silo to prevent uneven pressures and damage to the walls), but silos can be quite a challenge to fill. Depending on what equipment is available to you, flat storage buildings can be hard to both fill and empty. Pneumatic grain conveyors are slow and require a lot of power, but they offer a lot of flexibility in loading and unloading a variety of temporary storage structures. Sometimes equipment dealers and elevators are willing to rent pneumatic conveyors.

✓ *Economics.* Make sure that whatever facility you select does not lead to spoiled grain or have excessive cost per bushel (consider costs for remodeling, aeration, labor, and equipment rental). The amount of grain that you can get into a structure is an important part of the cost equation. Flat storage buildings often have a disappointingly low storage capacity. Because dry grain forms relatively flat piles (angle of repose, or angle between the surface of the pile and a level surface, is often 25 degrees or less), buildings that have low ceilings don't hold very much grain—especially if you can't pile grain against the sidewalls.

As an alternative to storing dry grain, dairy and beef farmers might consider harvesting more of this year's corn crop as silage, high-moisture corn, or ear corn. Silage and ground ear corn can be stored in tower silos, bags, bunkers, or if necessary, in covered piles. High-moisture shelled corn can also be stored in tower silos and bags, but bunkers and piles are not the best choice for high-moisture shelled corn. Ear corn can be stored in renovated cribs, or if necessary, it can be piled on the ground in late fall and fed during winter. Farmers who normally produce cash-grain crops could consider selling part of their crop as silage or high-moisture corn to neighboring livestock feeders.

Finally, cylindrical metal bins are hard to beat for convenience and preservation of grain quality, so before putting too much effort or money into adapting facilities for temporary grain storage, it would be worth checking with neighbors to see if they have any bin space available for rent. This includes neighbors who live on older farmsteads that are no longer associated with working farms. If you do rent space at another location, it would be a good idea to develop a written agreement that spells out who is responsible for checking the grain, electricity costs, and any repairs that might be necessary.

Bill Wilcke
Extension Engineer

Cation Exchange Capacity in Soils

The soil testing laboratory measures the **cation exchange capacity** (CEC) of soils. Can you explain CEC? What does it tell me about soils? How do I use this information in making fertilizer recommendations? These are frequent questions from crop consultants, fertilizer dealers, and farmers.

Those who work with the chemistry of soils define CEC as the measure of soils to hold certain plant nutrients. To understand this definition, it's important to have a basic understanding of some fundamental principles of chemistry. To begin, plant nutrients are found in the soil as ions with an associated very small electrical charge. The ions with a positive charge are called **cations**. The cations important to plants are calcium (Ca^{++}), magnesium (Mg^{++}), potassium (K^{+}), ammonium (NH_4^{+}), zinc (Zn^{++}), copper (Cu^{++}), manganese (Mn^{++}), and iron (Fe^{++}). The ions with a negative charge are called anions. The important anions for plant growth are nitrate (NO_3^{-}), sulfate ($SO_4^{=}$), phosphate ($H_2PO_4^{-}$ or $HPO_4^{=}$), chloride (Cl^{-}), and borate ($H_2BO_3^{-}$).

Negative electrical charges are associated with the clay sized particles and humus in soils. There is a rather complicated chemistry explanation for the origin of these negative charges. To keep the explanation of CEC from getting too complicated, we should accept the fact that these negative charges exist.

The cations with their positive charges are attracted to and held by the soil particles with the negative electrical charge. Cations held in this way on the surface

of soil particles are defined as being "exchangeable". Cations can exchange for one another on the clay size and organic particles. The magnitude of this exchange depends on many factors that will not be discussed here.

The anions with their associated negative electrical charges are not attracted to and held by soil particles. They are free to move through the soil with the soil water.

It's important to understand that the CEC is a soil property that changes very little over time. The CEC is simply a measure of the number of electrical charges associated with the clay size particles and soil organic matter. In most soils, a very small percentage of the negative electrical charge is associated with the soil organic matter. The amount of clay sized particles is closely linked to soil texture. The texture of soils does not change with time. So, there should be no major change in CEC over time.

In Minnesota a measure of CEC provides an indication of soil texture (see following table). Knowledge of soil texture is very useful in determining the water holding capacities of soils. In the laboratory, the CEC is measured as milliequivalents per 100 grams of soil.

Soil texture and associated CEC

Soil Texture	CEC
	Milliequivalents/100 gms. Soil
loamy sand	5-10
sandy loam	11-15
loam	16-18
silt loam	19-22
silty clay loam	23-28
clay loam	29-35

Except for providing some indication of soil texture, the CEC measurement provides little useful information that can be used for management of agronomic crops.

There are some that attempt to use a measure of CEC in an effort to adjust the balance of calcium, magnesium and potassium in soils. This balance concept for those who believe in it, is used to make fertilizer recommendations.

Field research conducted during the past 20 years has clearly shown that the use of this "balance" concept leads to expensive fertilizer programs, which produce no added bushels. This "balance" concept is outdated as we think about making fertilizer recommendations in Minnesota today. Therefore, a measure of CEC does not improve or refine fertilizer recommendations for crop production.

George Rehm
Extension Soil Scientist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Prime Time for Grass Seeding

Just a reminder that mid-August (in northern Minnesota) through mid-September (southern Minnesota) is the absolute best time to plant grass seed. Whether you've got thin areas in your lawn that need overseeding, or you want to start a brand new lawn from scratch, this is the time to do it. When you seed now, there's plenty of time for the new grass to develop decent roots that will help it survive the winter.

Grass seed that's planted in autumn has several advantages over the same seed planted in spring. Days are growing shorter, so there are longer, cooler nights, and more dew forms each morning to keep seedlings moist. Even more important, weed seeds are generally "programmed" to sprout in spring and summer. By late August, it's unlikely you'll get many new weeds that will compete with young grass plants.

To sprout and grow well, grass seed must fall into receptive, soft soil. You can't just toss it about on hard ground and expect good results. In existing lawns, use a power rake or core aerator right before seeding, to create slits or holes in the sod. Spread a starter fertilizer, then seed and water the area frequently but lightly.

In areas where you're planting grass seed for the first time, be sure you've gotten rid of any nasty perennial weeds first, either hand-pulling or spot treating with Round Up. (Broad-leaf weed-killers would damage newly emerging grasses.) Once grass seed is sown, you can't use weed-killers until next year, when the grass is indistinguishable from older, established grass.

Deborah Brown
Extension Horticulturist

Foreign Grain Beetles

We have been receiving calls concerning foreign grain beetles. These insects are quite small (about 1/12 inch long) and reddish brown. They readily fly and sometimes are confused for fruit flies. However, fruit flies often have red eyes and visible wings when at rest while foreign grain beetles lack red eyes and fold their back wings underneath their elytra (shell).

These beetles commonly enter homes during August and September. Because they are so small, it is not difficult for them to enter homes through screens, around windows, under siding, and other cracks and spaces. Foreign grain beetles are associated with moisture and are commonly found around sinks, basins, and tubs. They are especially attracted to newly constructed buildings as the wood is still wet. These beetles prefer to feed on moldy grains, although they are rarely, if ever, a pest in dried food products in homes. Foreign grain beetles are just a temporary nuisance.

Physically remove foreign grain beetles with a vacuum. You may be able to reduce their numbers by keeping homes dry with a dehumidifier or fan. Insecticide applications on the exterior of homes are usually difficult. Spraying foreign grain beetles found indoors is not practical. Remember that they are a temporary problem and should go away on their own by the end of September.

Landscape Insects

Trees or shrubs with webbing on the ends of branches are dealing with fall webworms. The feed on the leaves of a wide variety of trees and shrubs (they are known to feed on at least 88 plant species). The caterpillars are generally yellowish, hairy. Despite the unsightliness of the webbing, it is late enough in the season that fall webworms normally do not have much lasting effect on healthy, well-established trees and shrubs. Your best bet is to ignore them or prune out infested branches. The webbing helps protect these insects from insecticides.

We have received other reports of late season defoliators, including yellow-necked caterpillars, orangestriped oakworms, and mountain ash sawflies. In most cases they were nearly full grown. It is not necessary to treat these insects this late in the season, especially when they are mature insects.

We received a few calls and samples of 'bugs' on birch which have turned out to be birch catkin feeders (a type of seed bug). They often been quite numerous, although they cause no real harm to birch. They have well-developed scent glands and give off a disagreeable odor. They are a short-lived problem and should go away on their own. Insecticide applications are not suggested.

Jeffrey Hahn
Asst. Extension Entomologist

Powdery Mildew

Powdery mildew is beginning to appear in the home landscape on lilac and other ornamental plants. Powdery mildew is a fungal disease that commonly infects rose, phlox, begonia, zinnia, and alpine currant. This disease, unlike most, does not usually kill the plant it is living on, but does derive nutrients and water from the plant causing a reduction in growth and reproduction.

Powdery mildew typically appears on the surface of infected leaves as spots or patches of white to gray powdery, mildew-like growth. Powdery mildew typically appears on the upper surface of the leaf, but can also appear on the lower surface, as well as other parts of the plant. Occasionally leaves may become puckered and necrotic (dead). After becoming established

the fungus produces spores, which are dispersed to other leaf tissue causing secondary infections. Later, the fungus produces black pinhead structures, called cleistothecia. These structures are able to survive the winter and cause new infections in the spring.

Although powdery mildew is quite common, it requires certain environmental conditions before infection can occur. Both temperature and relative humidity are important factors with cool temperatures and high humidity resulting in maximum disease severity. These conditions tend to occur when plants are grown in close proximity, damp shaded locations, or in areas with poor air circulation. Powdery mildew also tends to be most severe when cool nighttime temperatures follow warm daytime temperatures.

Since high humidity and cool temperatures closely regulate powdery mildew, control or management strategies should begin with improved cultural practices. These practices may include increasing light penetration, increasing airflow, or thinning crowded plants. Chemical control measures are not usually required in the home landscape, but sulfur can effectively control powdery mildew.

WHITE MOLD IN FLOWERS

Recently the Yard and Garden Clinic has received several different annual flowers infected by white mold. White mold, caused by the fungus Sclerotinia sp., is a common disease that occurs on hundreds of plants including vegetables, flowers, and ornamentals. White mold gets its name from the cottony white growth that appears on infected tissue. This disease is able to infect the stem, leaves, or flowers of plants. Lesions occurring on the stems of infected plants usually appear brown to gray in color.

Disease symptoms usually begin to appear after a dense canopy has formed, which causes a reduction in air movement and light penetration. White mold is also favored by cool, moist conditions. This disease can be identified by observing white fungal growth on infected plant tissue or hard black masses of fungal material, known as sclerotia, which form on either the surface or inside of infected tissue. Sclerotia can persist in the soil for many years and spores from sclerotia can infect hundreds of different plants. Therefore, it is difficult to eradicate the disease from an area or garden once present.

Control of this disease focuses on cultural practices aimed at reducing moisture. Practices such as thinning dense plantings, properly spacing plants during planting, avoiding excessive and late season irrigation, and removing weeds will help reduce moisture. If disease is observed, remove and destroy all infected plants. Removal of plants not only reduces the number of sclerotia remaining in the soil but also the spread of white mold from plant to plant. Do not plant species susceptible to white mold in the same location next year. Chemical control is available, but the efficacy is questionable. Fungicides like thiophanate-methyl can be tried.

Chad J. Behrendt
Extension Plant Pathologist

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MINNESOTA

CROP NEWS

Vol. 4
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From the Crops System Team of the University of Minnesota Extension Service

Corn Crop Development

The warm temperatures in the first three months of the crop season have pushed crop development ahead of normal. Growing degree units have accumulated fourteen percent more rapidly than historic normal levels. Growing degree units are calculated by averaging the daily high and low temperatures and subtracting 50. Temperatures above 86 degrees are counted as 86 and temperatures below 50 degrees are counted as 50 since crop development is not advanced by high or low temperatures.

Assuming normal growing degree unit accumulation, it takes 55 to 60 days from pollination to physiological maturity. Most corn in southern Minnesota pollinated in mid to late July, which would put physiological maturity in mid to late September.

Beginning at corn tasseling, pollen shed and pollination, the plant focuses it's energy on kernel development. Most corn is at or beyond the blister stage. At this stage, the cob, husks and shank are fully developed. Starch accumulation has just begun in the endosperm and the kernels have begun to increase rapidly in dry weight accumulation. This rapid rate of dry weight accumulation will continue until dent stage. The blister stage is followed by the dough stage at 24 days after silking and full dent stage at 48t days after silking. Stress at any of these stages, such as leaf loss from hail or nutrient deficiencies, will result in unfilled kernels, usually at the tip of the ear or "Chaffy" ears. Death of the corn plant prior to physiological maturity or black layer will result in reduced test weight and reduced yield. Premature death may be due to the freezing temperatures as well as disease or insect damage. Yield loss from premature death is dependent on maturity of the crop. Research shows a yield loss of 2 percent when corn is 5 days from maturity; 4 percent when corn is 10 days from maturity; and twenty-one percent when corn is 20 days before physiological maturity. The "dent" stage in corn is about ten days prior to maturity, while the "dough" stage is twenty-five days prior to maturity.

Highlights . . .

Corn Crop Development/Continued

Beginning at the blister stage, one can make a preliminary yield estimate with the assumption that kernels will fill and progress normally to physiological maturity. To make a yield estimate, measure one one thousandth of an acre. In thirty inch rows this will be seventeen feet five inches or in thirty-six inch rows this will be fourteen feet six inches. The location should be representative of the field. From that measured area, count the number of plants. Pull the fifth, ninth and twelfth ears. From those ears, determine the average number of rows of kernels and the average number of kernels in each row. Then multiply the number of plants with an ear by the number of rows per ear by the number of kernels per row. Divide this product by 103.936 and multiply the result by 1.16. The result will be the estimated yield in bushels per acre. This method will over-estimate low test weight high moisture corn, and will under estimate high test weight corn.

Bob Byrnes
Lyon County Extension Educator

Grasshoppers

Now that small grains are maturing and being harvested, a lot of grasshoppers are moving from grain fields into other cropping systems. I figured it was time to remind folks on the list to scout corn and bean fields for grasshoppers. Grasshopper numbers will be increasing in field crops that neighbor grain fields. Remember, most of the damage will be on the margins of the fields and most of the grasshoppers are already adults (so the thresholds will be more than 21 adult grasshoppers per sq. yd. at the field margin or more than 8 adults per sq. yd. with the fields). You may also want to check for pod or ear damage as both soybean and corn will tolerate some defoliation before yield is impacted.

If anyone wants the grasshopper brochure we prepared this year, e-mail me:

imacrae@mail.crk.umn.edu

and I'll attach the PDF file for you to print out.

Ian MacRae
Extension Entomologist

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic during the last two weeks of July included:

barley—samples tested for loose smut

corn—*Longidorus* sp. (needle) nematode

soybean—*Septoria* sp. leafspot, downy mildew, *Diaporthe* sp. (pod and stem blight), anthracnose; *Fusarium* sp., *Rhizoctonia* sp. and *Phytophthora* sp. root rot

wheat—samples for storage molds, scab

kidney bean—bacterial leafspot

turf—anthracnose; *Bipolaris* sp., *Septoria* sp. and *Leptosphaerulina* sp. leafspot, *Rhizoctonia* sp. root rot, *Curvularia* sp.

oak—oak wilt

lilac—*Phytophthora* sp. root rot

spirea—*Cylindrosporium* sp. leafspot

dogwood—*Cylindrosporium* sp. leafspot
Miscanthus—*Rhizoctonia* sp. root and stem rot
maculata vine—*Myrothecium* sp. leafspot
Epimedium—tobacco rattle virus
poinsettia—bacterial soft rot
hosta—*Meloidogyne* sp. (root knot) nematode
sedum—*Rhizoctonia* sp. stem rot
chrysanthemum—*Phytophthora* sp. root rot
geranium—*Pythium* sp. root rot
aster—*Septoria* sp. leafspot
barberry—bacterial leafspot
sumac—bacterial tip blight

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Rain Provides Welcome Relief in Much of State

Much of the state received decent rainfall last Sunday and Monday. From a lawn and landscape perspective, it was just in the nick of time. Grass was starting to turn to straw in the Twin Cities, and gardens were beginning to look a little frayed around the edges.

Though plants usually "snap back" after a good rainfall, it's really best not to let them become moisture-stressed. With the exception of prairie grasses and wildflowers, most plants will benefit from supplementary watering when weather is hot and dry. The question is how to know when you need to water, and how much water to apply.

Lawns are easy; you water them when walking across the grass leaves footprints that don't spring back up. Leave the sprinklers on long enough to soak the soil a good four to six inches deep.

Gardens are a little tougher, as some plants will begin to droop while others still look pretty good. It's best to water thoroughly at the first sign of any droopiness. Soak the soil at least six inches down or more, and make sure you have several inches of mulch

between rows or plants to reduce surface evaporation and keep the soil cooler.

In general, early morning watering is best for lawns and gardens, because temperatures are cooler and there's less wind. Soaker hoses or oozing hoses work particularly well in gardens where they can direct moisture right to the plants' roots rather than lose it to evaporation, but overhead sprinkling is fine, as long as there's time for the plants to dry off by nightfall.

Deborah Brown
Extension Horticulturist

Bumble Bees

Bumble bees have been a common call lately. They are large and robust, hairy, and black and yellow (or orange). They typically nest in the ground, e.g. in old rodent burrows. Callers have commonly found them in the lawn, under steps or the foundation of homes. Sometimes bumble bees take up residence in above ground cavities, such as wall voids. In one unusual case, bumble bees were found nesting in a discarded mattress.

When dealing with a bumble bee nest in the ground, first try exterminating it with soapy water. Any type of laundry or dish soap should do the trick. There isn't a specific concentration to mix it as long as it's soapy. If that doesn't work, there are several insecticides that can effectively control a bumble bee nest. A dusts is more effective (carbaryl [Sevin] or chlorpyrifos [Dursban]) than a liquid (carbaryl [Sevin], diazinon, or acephate [Orthene]). If the nest is hidden in the wall void or other cavity in a building, someone needs to drill holes and apply a dust. This is usually best done by an experienced pest control company.

Like wasps, bumble bees have an annual nest, meaning the nest survives for just one season. Newly mated queens leave the nest sometime during late summer or fall to find a sheltered site to spend the winter. Otherwise the old queen and all the workers die when hard freezes arrive (usually October). Once you are sure all bees are dead, seal nest entrances so those cavities can not be used by insects next season to build nests. See FO-3732, *Wasp and Bee Control.*

Jeff Hahn
Assistant Extension Entomologist

Are Your Tomato Plants Spotted?

Septoria leaf spot, a very common problem on tomatoes, is probably present in your garden right now. This disease begins to appear on tomatoes about the time fruit sets and continues to infect plants once established. Septoria leaf spot initially infects the lower leaves of the tomato plant but continues to progress up the plant infecting the leaves, stem, and petiole. These lesions can be identified by looking for round, yellow spots early in the season and gray to brown spots with dark margins later in the season. Infected leaves may have a few or many spots, with heavily infected leaves turning yellow and falling from the plant. Early defoliation can cause the formation of irregular fruit or sunscald.

If you have septoria leaf spot present in your garden it may be too late to apply fungicides, since most are preventative and not curative. However, fungicides may be applied to plants with minor infections to protect the remaining healthy foliage. More importantly, plants should be watered at ground level in the morning to prevent water splash and to allow time for the plants to dry. If there are only a few infected leaves, you may pick or remove the infected leaves to help reduce the amount of fungal material available for secondary infection.

Finally, you should take the necessary precautions to help prevent severe infections from occurring next year. These include removing all debris after the growing season and destroying it, rotating your crops next year, and practicing good cultural practices early next season (watering at ground level in the morning, mulching under plants with straw to prevent water splash, avoiding working in the garden when plants are wet, and removing weeds).

Wilting Trees

Do you have maples, oaks, or elms that are wilting? If you do, they may be suffering from drought stress or wilt diseases such as Verticillium wilt of maple, oak wilt, or Dutch elm disease. All of these diseases cause wilt like symptoms by disrupting the vascular (xylem) tissue of the tree. Although these diseases may occur throughout the growing season, they typically occur in mid to late summer (July and August). It is during these months that long, sunny days and high temperatures cause trees to transpire heavily (lose water through their leaves). In addition, it is during these months that rainfall is usually limited, resulting in insufficient water. Thus, trees infected by wilt diseases die rapidly during July and August since they are lacking water and are not able to transport sufficient water to the canopy of the tree. If you suspect your tree is wilting from a disease, you should identify the problem as soon as possible so that proper management strategies can be implemented.

Chad J. Behrendt
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MINNESOTA

CROP NEWS

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From the Crops System Team of the University of Minnesota Extension Service

Watch for Insects in Stored Grain

Some Minnesota farmers have been finding insects in grain that has been stored since the 1997 harvest. Probably the most important factor for stored grain insect activity is grain temperature, with 60 to 90°F being ideal for insect reproduction and growth. Considering the relatively warm weather that we've had over the last year, it is not too surprising to hear reports of stored grain insects.

To check for stored grain insects, inspect the outside of the bin, the grain surface, and samples taken from below the grain surface for live insects and insect-damaged grain. While you're checking for insects, it would also be a good idea to check grain moisture, temperature, and cleanliness. If you find insects, it's likely that the grain is too warm, too wet, and/or contains too many fines (small pieces of kernels and foreign material).

The first step for controlling an insect problem is to cool the grain as soon as possible by operating the fan at times when the outdoor air temperature is less than 60°F. The amount of time required to cool a bin of grain depends on the airflow per bushel delivered by the fan. With a large drying fan, you might be able to cool an entire bin in one night, but smaller aeration fans might require 150 to 200 hours of operation to cool the entire bin. Check grain temperatures to monitor the cooling progress. If you plan to store the grain until this winter, cool the grain as far as you can this summer and early fall, and then cool it again to about 20°F in late fall. At 20°F, most of the insects will die. If the storage bin does not have aeration equipment,

Highlights . . .

it will be very difficult to control insects, and it would be best to move the grain to another bin or get rid of it as soon as possible.

If you plan to store corn or small grains for a full year or more, the moisture content should be 13% or less. Soybeans should be no wetter than 11% moisture for a year or more of storage. Dry any grain that is wetter than these values as soon as possible. If you have to move grain to dry it or to get it into a bin equipped for aeration, consider running it through a grain cleaner to remove fines and some of the insects during grain transfer.

As a last resort, you might consider fumigating stored grain to kill insects. The most common fumigants used on farms and in commercial storage are solid pellets or tablets that are probed into bins or dropped into conveyors during grain transfer. The solid material reacts with moisture in the grain and air to produce toxic gases that kill insects. Bins must be tightly sealed for several days to allow time for the gases to move throughout the bin. After fumigation, the bin is opened and gases dissipate into the atmosphere, and there is no residual insect control. If insects are present because the grain is too warm or too wet or contains too many fines, the insect population will rebound after the gas dissipates. Fumigants are very dangerous materials and you are required to have safety and gas monitoring equipment on hand during and after fumigation. If you decide to fumigate grain, consider hiring a licensed commercial applicator who has the proper equipment and experience with grain fumigants.

If you have questions about grain aeration, feel free to e-mail me (wwilcke@extension.umn.edu) or call (612-625-8205). If you have questions about insect identification, insecticides, or fumigants, you can contact Subramanyam Bhadriraju (Subi) by e-mail (sbhadriraju@extension.umn.edu) or by phone (612-624-9292).

Bill Wilcke
Extension Engineer

Insect Tidbits

European Corn Borer

Moth captures in NW Minnesota continue to sputter along but at lower levels. The second generation flight is just beginning in southern Minnesota. Univoltine infestations in WC and NW Minnesota are spotty. Treatable infestations appear more commonly north of Moorhead and in WC areas with higher black light trap or pheromone trap captures. The window is closing rapidly on timely univoltine applications of insecticide.

Corn Rootworm

Adult emergence has peaked with mating and egg laying underway. Now is a prime time to scout corn rootworms if you will be planting corn next year on this year's corn ground. Extended diapause of northern corn rootworms continues to be a problem in SW Minnesota. Strong winds during storms last week exposed fields with heavily damaged corn roots. If you suspect corn rootworm contributed to lodging, now is a good time to verify corn rootworm feeding on roots and to determine which corn rootworm might be involved. Only the northern corn rootworm, the green beetle, causes extended diapause problems. If western corn rootworm is involved, egg laying in soybean could be involved. Please advise me of any first-year corn fields that appear to have a western corn rootworm infestation.

Bean Leaf Beetle

Adult emergence of bean leaf beetles is underway. Jim Ruhland, Centrol—Cottonwood, reports high numbers in soybean fields. While defoliation might not become significant, pod clipping and feeding on pods can cause yield loss and reduced seed quality. Watch these infestations closely.

White Grubs in Soybean

White grubs infestation following CRP have caused significant stand loss in some SE Minnesota fields. Fritz Breitenbach, IPM specialist—Rochester, reports two fields where grubs were still feeding last week. In one case, about 55 out of 80 acres had stand loss severe enough to warrant replant, if it were earlier in the season. Regrettably there are no rescue options.

Ken Ostlie
Extension Entomologist

Extension Yard and Garden Line

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Consider Green Manures for Vegetable Garden

As portions of the vegetable garden peter out and are no longer productive, consider seeding a "green manure" crop to grow there the rest of the season. Green manures help keep the garden weed free, prevent erosion from heavy rains and wind, and add organic matter to the soil when you turn them in next spring. If you grow a legume such as clover or vetch as a green manure, you'll also have the benefit of added nitrogen.

The most commonly planted green manure crops in Minnesota include annual ryegrass, buckwheat, clovers, hairy vetch, peas/beans or soybeans, winter wheat or winter rye. They need to be sown thickly so the plants form a dense groundcover that will keep out weeds. You'll also need to mow the plants if they begin to flower and set seeds. Without mowing, those seeds will sprout next year, becoming "weeds" in your garden.

For more details, check the Dial U Brief, *Green Manure Cover Crops for Minnesota*, by Jill MacKenzie. Your county extension office can make you a copy.

Deborah Brown
Extension Horticulturist

Household Insect Notes:

Wasps continue to be our number one insect question. Due to our early spring, wasps are producing large populations. Expect them to be very conspicuous in and around homes from now into October. We continue to receive *earwig* calls, although the numbers are less compared to a month ago. They are temporary nuisances in home and should go away on their own by fall. *Carpenter ants*, as usual, are frequent calls. Although an experienced pest control operator is usually the best bet, homeowners can help by looking for symptoms that will help reveal the location of the nest. These can include the presence of moisture-damaged wood, large numbers of workers (20 or more), presence of swarmers in the spring, and detecting a sound resembling the rustling of leaves. Carpenter ants can also be followed at night back to their nest. *Cornfield, pavement, thief ants* have also been commonly found indoors. They nest outdoors and can become temporary nuisances in homes but should disappear by the end of summer. *Larder beetles* remain a commonly noticed insect. They feed on dead insects and animals and are most likely feeding in walls or other voids where insects, like cluster flies, or animals have become trapped and died. They are not easily controlled; reduction of their food source limits larder beetles.

Landscape Insect Notes:

There have been a number of late season defoliators being reported, including *fall webworm*, *redhumped caterpillar*, and *mountain ash sawfly*. Fall webworm is conspicuous because of their gregarious feeding and the webbing they produce on the end of the branches they are feeding on. Although the webs are unattractive, they normally cause little actually damage to trees and shrubs. Insecticides are not effective as the insects are protected inside the webbing. Infested limbs can be pruned or just ignored. Other defoliators can also be generally ignored this late into the season. More people are discovering *iris borer* damage. There is no control this late in the season. *Thrips* have been reported on lily and gladiolus foliage, in some cases severely injuring plants. When thrips damage is heavy, treat with acephate (Orthene). Iris foliage should be removed after the first hard frost to eliminate any eggs that have been laid. *Insect and mite galls* continue to be commonly reported, including various galls on oak and maple and *ash flower gall*. Galls are nearly always just an aesthetic problem, causing no real injury to trees and shrubs. There is no control once galls are seen. *Picnic beetles* have been reported in gardens. Sanitation is the best control. Pick fruits and vegetables as they ripen and avoid allowing them to become overripe or rotten to minimize attracting the picnic beetles into gardens.

Jeff Hahn
Assistant Extension Entomologist

Problems With Your Home Lawn?

Recently the Yard and Garden Clinic has received many calls on thinning or dying turf. Symptoms associated with these lawns have included irregular patches of dying grass, rings of dead grass, dead spots or patches in the turf, and overall thinning. Although it is difficult to accurately diagnose turf diseases, many of the problems occurring on turf can be controlled or managed through improved cultural practices. These practices include proper fertilizing, watering, and mowing, as well as soil aeration and thatch management. Since fungicides are not always effective at controlling plant disease, management strategies should begin with improved cultural practices. However, fungicide application is optimized if applied early in the season or at the first sign of disease.

Some of the more recent turf diseases observed at the Yard and Garden Clinic have included leaf-spotting diseases, patch diseases, and rust fungi.

Leaf Spot and Melting Out are two similar diseases that cause spotting (lesions) on the leaves of grass plants. These diseases can also infect the crown of the plant, causing the crown and leaves to become chlorotic, wilt, and die. Lesions typically appear purple-red to brown in color with tan centers. As the grass begins to wilt and die, thin, irregular patches begin to develop in the turf, hence the name "melting out". Control of leaf-spotting diseases should begin with improved cultural practices. Fungicides such as thiophanate-methyl can be applied in coordination with improved cultural practices, but should be applied as soon as disease is noticed.

Patch Diseases typically result in circular areas or rings of dead grass with live (green) grass in the center. These diseases (summer patch, yellow patch, and necrotic ring spot) were previously known as Fusarium Blight. Patch diseases attack the root system and the crown of grass plants, causing the roots and crown to be rotted and dark in color. Leaves of infected plants usually appear tan to brown in color. Circular patches of dead grass may persist for several years, while new symptoms continue to develop. Infected plants usually die during hot, dry periods since they have no root system for support. Management of patch diseases should begin with improved cultural practices, and fungicides should be applied only in conjunction with these practices.

Rust Fungi, recently identified in home lawns, may cycle between two different plants (grass and non-

grass), but usually continue to infect the same plant (grass) over and over. Urediniospores (repeating spores) produced on dying grass reinfect healthy grass plants during the current year, as well as the following year. These spores survive the winter on infected grass plants in mild climates, and are transported by the wind to colder climates where urediniospores cannot survive.

Infected grass first develops a light yellow fleck (lesion), which later turns reddish brown (rust) in color. Rust fungi are most severe in turf that is growing under stressful conditions. These stresses may include drought, nutrient deficiency, low mowing height, shade, or infections by other pathogens. Heavily infected lawns may appear thin or weak, and red-brown in color. Heavily infected lawns also produce large numbers of spores that can discolor shoes when walking through the infected grass.

Management of rust fungi should begin with improved cultural practices that alleviate stressful conditions. Other management practices may include watering the lawn in the morning, avoiding mowing the lawn too short, increasing light penetration (if possible), using resistant cultivars when reseeding, and applying fungicides. In the case of rust fungi, fungicides have been shown to be effective, but are not usually needed.

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CROP NEWS

From the
Crops System Team
of the
Minnesota Extension Service

Lodging and Corn Root Worm Concerns

Strong thunderstorms in mid July brought welcome rain and relief from heat stress. However, the storms also were accompanied by strong winds which flattened or lodged some cornfields. In most cases, the corn will right itself sufficiently to successfully pollinate and produce a yield, although harvesting severely lodged fields will be challenging.

A common question following strong thunderstorms is why some cornfields lodge while other are unaffected by the strong winds. The common answer is differences in storm intensity or row direction. The more important factor is the root health of the corn plant. The required factors for lodging of corn are high winds and rain. Contributing factors are corn hybrid lodging susceptibility, soil compaction, herbicide injury to roots, hot dry soils during brace root development, and corn rootworm feeding.

As the corn plant grows and the stalk begins to elongate, the first (lowest) five or six leaves are lost due to stem enlargement and by the development of the nodal roots. Brace roots develop from the seventh leaf node from the base of the plant. The nodal and brace roots provide the plant with moisture and nutrients as well as stability. Injury to the nodal or brace roots or poor development of the root system not only reduces yield potential, but also makes the plant more susceptible to lodging in strong thunderstorms. Several factors can cause this injury.

Soil compaction can inhibit root development. Late application of broadleaf herbicides can injure nodal and brace roots. Hot dry soils during brace root development can result in the brace roots stubbing off and discontinuing growth. This condition is likely, especially in the areas of southwest Minnesota which were under drought conditions in early July.

Corn rootworm damage is a likely contributing factor in many storm damaged lodged fields. To determine this in the field, producers can dig the plant to check for root injury. Once the dirt is shaken off, wash the root with water and check for evidence of rootworm activity. Rootworm feeding can be as mild as feeding scars present on the roots to as major as the entire nodes of roots destroyed. More extensive feeding will result in increased lodging potential.

Historically, the corn-soybean crop rotation has effectively controlled corn rootworm. However, corn rootworms with extended diapause can adapt to this rotation. Extended diapause refers to the ability of corn rootworm eggs to survive for two or more years before hatching. In extended diapause the corn rootworm beetle can lay eggs in fields planted to corn and the eggs will hatch in two years when corn is again growing in the field. That corn is then vulnerable to corn rootworm damage.

It is important for farmers to know if they are dealing with corn rootworm problems. The thunderstorm

Highlights . . .

activity of mid July provided a good indication of which fields should be checked for rootworm injury. Now is also a good time to check fields for corn rootworm beetle activity. Corn rootworm beetles may be found feeding on ear silks and tassels. Deterring corn borer beetle activity can be important in future insecticide use decisions. An instruction sheet and management decision aid for corn rootworm beetle scouting is available at the Extension Office.

Bob Byrnes
Lyon County Extension Educator

Pollination of Lodged Corn

High velocity winds caused severe stalk lodging in several cornfields in western and southern Minnesota last week. Corn was pollinating at the time and the question is whether the lodging condition will affect pollination. The amount of pollen is not likely to be a limiting factor; those plants remaining erect after the wind will shed pollen, which should be sufficient to result in complete pollination for good kernel set. Some hybrids may have a portion of the plants that are not male fertile. These plants do not shed pollen, but this should not have an adverse effect on pollination. Plants that are leaning over will also shed pollen, but the pollen may not land on silks to the same degree that it would have if it began it's fall downward fall from a position about three feet above the "silk plane" in the field, which it usually does.

Some silks of leaning plants may not catch pollen because they are physically hidden below other silks when the ear is leaning rather than upright, as it should be on normally standing corn plants. This should not reduce kernel number substantially, but is likely to occur on some ears. The missing kernels will be on the lower side of the ear, the side facing the ground.

The major effect of the lodged corn will be a reduction in grain yield and associated harvest problems. Higher than normal harvest losses can also be expected. Grain yield will be affected because of poor sunlight interception. When plants are leaning, leaves are "stacked" on top of each other. The "top layer" of leaves gets good sunlight, but the leaves under are shaded and are less efficient in photosynthesis. With normally standing plants, a higher proportion of the leaves intercepts sunlight or the solar energy penetrates to a lower level in the corn canopy and is captured by more leaves.

While some upright straightening of plants will occur, they will gooseneck and will not completely stand erect. Slower harvest speeds will help to reduce the harvest difficulty and likely help to lower or minimize harvest losses.

D.R. Hicks
Agronomy and Plant Genetics

Potassium—Calcium—Alfalfa Hay

During the past two years, individuals who work with dairy rations have observed low levels of calcium (Ca) in alfalfa hay. These low levels appear to be associated with high levels of potassium (K) in the soil and alfalfa tissue. The low Ca concentrations are associated with herd health. This raises questions about possible management practices that might be used to increase the Ca concentration or decrease the percentage of K in the alfalfa tissue.

The relationship between Ca and K in plant tissue has been documented by past research. Uptake of high amounts of K can reduce the uptake of Ca. As the supply of K in soils increases, uptake of K will increase. Many plants will absorb more K than needed for optimum growth and yield. This uptake above required amounts is known as "luxury consumption."

From a crop production standpoint, there is little that can be done to reduce K uptake by plants. Obviously, it's important to avoid adding potassium to the soil system when soil test values for potassium are high.

The most logical approach to increasing the amount of Ca supplied to the dairy animal is to add this nutrient to the ration. Adding various sources of Ca to the alfalfa crop in the field will have only a minor impact and will be much more expensive.

	K Source		
Alfalfa Cutting	none	potassium chloride	potassium sulfate
	% K in alfalfa tissue		
1st	2.35	2.61	2.73
2nd	2.14	2.47	2.29

The source of potassium used in a fertilizer program does not affect the K concentration in the alfalfa tissue (see table above).

This information was collected from the Irrigation Center in Staples in 1994. Compared to the control (no K applied), both sources of K increased the K concentration in alfalfa tissue. The K concentration was not affected by the source of potassium. Potassium chloride is the most economical source of potassium for alfalfa production in Minnesota.

George Rehm
Extension Soil Scientist

European Corn Borer Status

The univoltine flight continues to subside into a negligible trickle, with no dramatic increase in moth captures to signal the beginning of the second generation flight. With such poor production of first generation borers, there may not be any significant increase in moth captures. Spotty infestations of univoltine borers are flirting with treatable levels in a few areas. For most applications, it seems to be an attempt to hit corn borer when they're down. The prospects of significant second generation activity are slim.

Location	9-15 July	16-22 July
NW		
Crookston (NWES)	NA	6
Moorhead	8	?
WC		
Morris (WCES)	6	?
Fergus Falls	9	5
Montevideo N	14	14
Fairmont, ND	16	16
Twin Brooks, SD	16	16
Olivia	16	21
Gaylord	NA	NA
Arlington	2	1
Buffalo Lake	23	6
Bird Island	5	2
Fairfax	6	2
Willmar	72	72
Lake Lillian	5	4
Clear Lake	6	NA
Rice	64	NA
Big Lake	1	2
Rosemount	2.5 / 5	10.5 / 13
SW		
Lamberton (SWES)	13	11
Lamberton (French)	3	5
Jeffers	7	7
Elkton, SD	25	25
SC		
Waseca (SES)	9	4
Waseca (Seneca)	NA	10
Henderson	0.4	6
LeSueur	2	5
St. Peter	NA	NA
New Ulm	NA	NA
Hanska	26	4
Sleepy Eye	17	5
Blue Earth #1 / #2	3 / 2	4 / 4
Faribault	NA	7
St. James	NA	NA
SE		
Blooming Prairie	NA	6
Stanton	NA	NA
Dodge Center	NA	0
Stewartville	0	0
Plainview	NA	NA

Ken Ostlie
Extension Entomologist

Alfalfa Establishment

In recent years there has been an increase in interest in alfalfa production. This is due in part to the desire to add diversity to the typical corn and soybean crop rotation as well as the favorable profit potential for alfalfa. However, the spring of 1998 was challenging for producers establishing new alfalfa stands. In some cases, hot dry weather in May and June did not provide an environment for successful germination and seedling survival. Before considering replanting or interseeding options, it is useful to review how the alfalfa plant develops.

The alfalfa germination process begins when the seedling root emerges from the seed. Once the seedling root is firmly anchored in the soil, the cotyledons emerge from the soil surface. This is followed by the first true leaves which are unifoliate (single leaflet) leaves, which signal the end of seedling growth. Following the seedling stage, vegetative growth continues. Trifoliate (three leaflets) leaves emerge at nodes developing on the primary stem as well as secondary stems originating from the cotyledon axillary buds.

The young alfalfa plant, at about 8 to 10 weeks of age, undergoes a growth phase known as contractile growth. This process involves a change in the shape of the cells in the hypocotyl or seedling axis below the cotyledons and upper portion of the primary root from long and narrow to short and wide as a result of carbohydrate or food storage. This shift pulls the lower stem nodes below the soil surface. Most winter hardy alfalfa varieties have several nodes pulled well below the soil surface in the seeding year. Contractile growth greatly aids winter survival of alfalfa by providing soil insulation for the perennial over-wintering crown structures.

Alfalfa establishment alternatives at this time of year involve seeding directly into alfalfa to thicken up stands or new stand establishment through late summer seeding.

No-till can be used to thicken up stands of alfalfa. Stands that are less than one or two years old can be reseeded with minimal risk of autotoxicity. In thin or bare spots, direct seed eight pounds of alfalfa seed per acre. Plan to complete seeding by mid August. This method works very well to salvage new stands that have bare spots caused by establishment failures or moisture stress, assuming weed competition has been controlled.

Alfalfa Establishment

An alternative option is late summer seeding. The risk of late summer seeding is if dry seedbeds are experienced at the optimum planting time in early August. Seeding should be complete by August 15 in southern Minnesota so the alfalfa plant can accomplish seedling, vegetative contractile growth prior to the end of the growing season. Similar to early spring alfalfa planting, a firm seedbed is necessary to keep the small seeds in place at approximately one-fourth to one-half inch depth. Weed control and fertility adjustments should be completed prior to seeding.

Under proper management and favorable weather, late summer alfalfa establishment can be successful. More complete information on alfalfa production is available at the Extension Office.

Bob Byrnes
Lyon County Extension Educator

Extension Yard and Garden Line

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Deadheading Flowers

A number of callers have asked whether it's really necessary to deadhead (remove faded flowers to prevent seed production) their gardens. The answer is that it depends on which flowers you're dealing with. Once seed ripens, many plants slow their production of new flowers.

Stella d'Oro daylilies are prodigious seed pod producers. They also bloom off and on all summer long. Developing seeds use energy that could be going into more flower production, so leaving those pods form is really counterproductive. It's also unattractive. The same holds true for geraniums, large zinnias, and marigolds.

Luckily, it's relatively easy to remove these large flowers. Smaller, more numerous flowers such as bachelors buttons or petunias also produce seeds when you don't deadhead them. Because there are so many, however, it's usually unrealistic to think about removing each flower as it fades.

From an aesthetic viewpoint, it's important to deadhead flowers in containers that will be seen close up. In garden beds, if your time for maintenance is limited, just do your best to remove larger blooms.

Deborah Brown
Extension Horticulturist

Dying Shoots of Austrian and Red Pines

Diplodia shoot blight, also known as Sphaeropsis shoot blight, has been showing up on the ends of branches in Austrian and red pines. This fungal disease is able to infect the needles, branches, and cones of mature pines and seedlings, causing death of the new shoots. Since Diplodia infects young shoots during elongation and needle expansion, shoots may appear twisted, curled, stunted, and desiccated with the needles turning yellow to brown in color. Other symptoms associated with Diplodia may include resin exudation, green to brown staining of infected wood, and cankers on mature established trees. This disease can easily be identified by looking for pycnidia (black round, pinhead structures) which erupt from the cone scales and needles.

Infection begins in the spring following periods of rain and may continue throughout the growing season. Spores surviving the winter on infected needles and cones are dispersed to young, immature foliage or to second year cones by rain splash and wind. Spores can also infect branches through wounds such as those made by hail. Diplodia does not usually infect second year (previous) needles, shoots, or bark unless the tree has been subjected to drought stress.

Damage caused by Diplodia shoot blight is most severe when plants are stressed or predisposed by factors such as poor site, lack of moisture, competing vegetation, lack of nutrients, and physical injury. Therefore, nonnative species such as Austrian pine are usually more susceptible to this disease than are red pine. As a result of the environmental conditions earlier this year, severe hailstorms in May followed by hot dry conditions in July, many trees in the Twin Cities area have been subjected to infection by Diplodia shoot blight.

Control strategies for managing Diplodia include removing dead or dying trees, pruning infected branches, reducing drought stress, and applying fungicides the following spring.

Slime Molds

What exactly are slime molds? Slime molds are considered fungi, but are not parasitic and hence do not cause plant disease. Slime molds generally exist as single-celled organisms that aggregate on the leaves of grass, on wood chips, and on the surface of soil or compost. These organisms grow as a mass and eventually differentiate into specialized structures and spores.

Slime mold fungi develop during cool, wet periods, like those we had in June, and may continue when the weather is cool and humid. These fungi have a wide range of colors (white, gray, brown, and cream) and appear as jellylike masses that turn crusty or powdery. Often their appearance is described as looking like 'malt-o-wheat'.

Earlier this season (late June and early July), the yard and Garden Clinic received many calls regarding slime molds that were growing in compost piles, home lawns, and in wood chips. Although common earlier, slime mold fungi should have disappeared during the recent hot, dry periods. Control of slime mold fungi, when present, is not necessary. However, slime mold fungi can be washed, raked, brushed, or mowed from home lawns.

Chad J. Behrendt
Extension Plant Pathologist

Crickets

We have been receiving an increasing number of calls concerning crickets in homes. There are two common species seen in and around homes, field crickets and camel crickets. Both species are about the same length, about 3/4 inch. Field crickets are dark brown to black, relatively flattened with rounded wings that cover most of the body. Camel crickets are tannish brown, humpbacked, and lack wings. Field cricket are found in fields, roadsides, and yards. They feed on plants and dead and weakened insects. Camel crickets like dark, damp, cool areas and appear to be scavengers. Field crickets, especially when present in large numbers, are known to feed on fabric, including cotton, linen, and silk, while camel crickets rarely attack fabrics.

You can reduce crickets entering homes by repairing cracks and spaces in the foundation, doors, ground-level windows and areas crickets use to get indoors. It also helps to keep tall grass cut and to remove piles of firewood, bricks, brush, and other debris crickets may hide under. Field crickets are attracted to lights so using less attractive yellow lights minimizes their attraction to buildings. If large numbers are entering homes, you can supplement these tactics with an insecticide treatment (chlorpyrifos [Dursban] or diazinon) around the exterior of the house.

Once crickets are inside, make sure boxes, papers and other clutter is picked up. In the case of camel crickets, use a dehumidifier or fan to dry out damp areas. Physically remove crickets by hand or with the aid of sticky traps. Place sticky traps where crickets have been found. Camel crickets in particular are captured. Insecticides are not usually very effective indoors. In cases of large numbers, a product labeled for ants and cockroaches would be most effective when sprayed along edges, baseboards, cracks and crevices and similar areas where cockroaches are found. Crickets are a temporary problem and rarely survive indoors past fall. See *Crickets*, FS-1012.

Entomology Notes

Wasps continue to be our number one call. Some callers are describing hidden nests, i.e. where the nest is concealed in a wall or some other void and only workers are seen flying back and forth through an opening. Do not seal or spray that opening! That usually forces the wasps into a home. The best control is to apply a dust into the void, something an experienced pest control company may be best qualified to do.

Earwigs continue to be a common problem. They are a temporary nuisance like crickets. Treat as you would for crickets.

Coolly spruce galls are becoming noticeable now. They are long (2 - 4 inches long), pineapple-like growths on the end of new growth. They are purplish-green at first but turn brown later during mid summer. The gall producer is an aphid-like insect known as an adelgid. These adelgids require two host to complete their life cycle; spruce and Douglas fir. Adelgids can feed on spruce in the absence of Douglas fir. These galls are rarely a risk to tree health and control is primarily to protect the trees' appearance. See *Insect and mite galls* FO-1009.

Carpenter ants continue to be a common problem. See *Carpenter Ants*, FO-1015.

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MINNESOTA

CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

Harvesting Canola

For farmers growing canola for the first time, gauging the correct time to swath and combine calls for more care and adjustments than with small grains.

First of all, you must remember that within 40-60 days after the first flowers appear, the seeds in the lower pods will have ripened and fully changed color. Swathing at the optimum stage of ripening reduces green seed problems and seed losses, and insures the quality required for top grade and prices. Swathers and combines must be properly operated and adjusted to facilitate a smooth flow of crop material through machines while minimizing seed losses.

To know when to swath a field, inspections must take place every 2 to 3 days after some color change is detected in the first formed pods on the bottom of the main stem. To determine the exact time for swathing, plants from several different parts of the field must be examined because the stage of maturity in an evenly maturing field will vary from plant to plant and from area to area.

The ideal time to swath a field of canola is when the pods on the main stem are the following stages:

Bottom third—These pods mature first and all the seed will be yellow or dark brown to black. At this color, the seeds will be about 20 to 30% moisture.

Middle Third—Ninety percent of the seed will be green, very firm, and pliable. The other 10% may be light yellow or reddish brown to dark brown. These seeds will be about 30 to 40% moisture.

Top Third—Most of the seeds will be green in color, firm and pliable when rolled between the finger and thumb. These seeds will be about 40 to 45% moisture.

The swathers should be run just low enough to get all the seed pods, while leaving the maximum amount of stubble in which to anchor the windrow and ensure adequate air circulation through the windrow. In areas where light fluffy windrows could be lifted and blown by the wind, a lightroller pulled behind the swather will help anchor the windrow in the stubble. The roller should be set so that it just an-

Highlights . . .

chors the windrow into the stubble without shelling any ripe pods.

Canola in the windrow is ready to pick up and thresh when seed temperature and moisture content have dropped to a safe storage level and most seeds are mature with no green color. Canola is considered dry at 10% moisture but should be at 9 or 8% moisture for long-term storage. If there are some green seeds, a few more days in the windrow is probably all that is needed.

Curtis Nyegaard
Kittson Co. Extension Educator

European Corn Borer Status

The univoltine flight has diminished with captures continuing to drop at most locations in SW and WC Minnesota. Crop consultants, county extension educators and agronomists report fairly low incidence of larvae from this flight so far with most larvae in the first stage. This situation could change rapidly with warmer temperatures forecast again for this weekend. Based on light trap captures so far, prime univoltine scouting should begin earlier the week of June 20.

Location	Last week 2 - 8 July	This week 9 - 15 July
NW		
Crookston (NWES)	31	NA
Moorhead	4	8
WC		
Morris (WCES)	8	6
Fergus Falls	14	9
Montevideo N	14	14
Fairmont, ND	47	16
Twin Brooks, SD	38	16
C		
Olivia	20	16
Gaylord	15	NA
Arlington	2	2
Buffalo Lake	18	23
Bird Island	35	5
Fairfax	83	6
Willmar	262	72
Lake Lillian	55	5
EC		
Clear Lake	25	6
Rice	164	64
Big Lake	1	1
Rosemount	2.3 / 0.5	2.5 / 5

Location	Last week 2 - 8 July	This week 9 - 15 July
SW		
Lamberton (SWES)	NA	13
Lamberton (French)	4.4	3
Jeffers	69	7
Elkton, SD	80	25
SC		
Waseca (SES)	12	9
Waseca (Seneca)	2	NA
Henderson	3	0.4
LeSueur	8	2
St. Peter	3.5	NA
New Ulm	16	NA
Hanska	26	26
Sleepy Eye	19	17
Blue Earth #1 / #2	3 / 2	3 / 2
Faribault	7	NA
St. James	85	NA
SE		
Stanton	23	NA
Dodge Center	14	NA
Stewartville	2	0
Plainview	NA	NA

Ken Ostlie
Extension Entomologist

Scouting Univoltine Corn Borer

The univoltine generation poses a unique set of scouting and decision-making challenges.

1. Scouting becomes more labor intensive.
During first generation, the whorl provides a natural gathering place for larvae. As corn begins to tassel, larval distribution on the plant changes. Larvae, already present in the leaf-wrapped tassel, will leave as it breaks, moving to lower leaf axils. Newly hatched borers will move into leaf axils and sheaths in the middle part of the plant. As a consequence the quick and easy whorl dissections of first generation give way to the leaf by leaf examination of the middle and upper leaves of the plant. Once the ear silks, you'll also need to check the ear silks for newly hatched larvae. Finding first stage larvae within pollen captured by the leaf axils and within silks can be a challenge.

2. Check for both egg masses and larvae.
The univoltine moth flight typically drags out longer than the univoltine and, in some areas, grades into the second generation flight. Watch for adult moths in grassy field margins to gauge whether moth activity and egg laying are still underway. Once you start scouting in the corn, check lower leaf surfaces for egg masses before examining each leaf axil and sheath for larvae. Finally examine the ear silks, if present, for borers.

3. Decision challenges
The univoltine flight does not exhibit the strong egg-laying preferences of the first generation. Consequently, nearly all fields will be infested to some degree and will need to be checked. This dilution means that univoltine infestations are less likely to reach treatable levels.

The yield loss implications of univoltine tunnels is diminished slightly compared to first generation. Loss values in the range of 4-4.5% per tunnel should be expected based on research by Bode and Calvin (1991) on a 90-day hybrid in Pennsylvania. I don't know what yield loss values are typical of Minnesota hybrids but data from the last two years suggests higher losses may occur.

Insecticide performance declines as the leaf area of the corn plant increases and larvae are no longer concentrated in the whorl. While up to 75% control has been achieved in our trials, more typically we see insecticide effectiveness in the 65-70% range with products like Pounce 3.2E, Warrior 1E, and Penncap-M 2 FM.

Combined with lower prospective corn prices this fall, univoltine infestations will present a difficult treatment decision.

Ken Ostlie
Extension Entomologist

Corn Borer Concerns

In much of southwestern Minnesota, first generation European corn borer populations were low enough not to comprise corn yield potential or justify insecticide treatment. Now the management focus shifts to the univoltine single generation corn borer as well as the multivoltine second generation. Three factors are important in this management discussion: the univoltine corn borer, weather conditions, and Bt corn.

The univoltine corn borer is a fairly new player in the southwest Minnesota area. Historically, the multi-generation corn borer predominated in this area. Moth flights for the multi-generation corn borer occurs in mid to late June, and again in late July. This makes scouting and treatment decisions timed for early July for first generation corn borer and again in August for second generation corn borer. In some years a third generation is possible in mid September.

The univoltine corn borer has a single generation per year. The moth flight, egg laying, and larvae development typically occurs between the first and second-generation multivoltine activity. This results in an extended period for moth flights and risk for the corn crop.

Univoltine corn borer moth captures in light traps in the region were high from July 2 until July 6. Adding two weeks to these dates is the proper time to scout fields and, if necessary, make rescue treatment decisions. Check for egg masses on the underside of the leaf, and corn borer activity in leaf axils and on the developing ear. Treatment decisions are made based on egg masses per plant, borers per plant and potential yield loss as compared to preventable loss and cost of the rescue treatment. An easy to use decision aid worksheet on these factors is available at extension offices.

Weather conditions during the corn borer moth activity is important in the success of corn borer mating, egg laying, and larvae development. The absence of weather extremes, such as very hot or abnormally cool weather, lack of wind in evening hours,

and ample dew in grassy areas are ideal for successful corn borer moth flights, mating, and egg laying. These favorable conditions in 1997 contributed to high univoltine and second generation corn borer populations.

Bt corn provides the corn plant with excellent protection from first generation corn borer. The degree of protection for late univoltine and second generation corn borer varies depending on the Bt event. The Bt event controls where Bt protein is produced in the corn plant. Under heavy late season European corn borer pressure, events Bt11 and Mon810 provide a higher level of control than Event 176. This is because Event 176 hybrids produce Bt protein only in green tissues and pollen, whereas Bt11 and Mon810 events produce Bt protein through the plant. Because some late season hatching larvae initially colonize ears to feed on silks and developing kernels, these larvae may survive on Event 176 and may tunnel later into stalks and ear shanks. Bt expression differences may not be important in years with low late season corn borer pressure.

Farmers should begin scouting non-Bt corn for univoltine corn borer activity and continue in early August for late univoltine and second-generation corn borer in non-Bt and Event 176 Bt corn.

Bob Byrnes
Lyon County Extension Educator

Effect of Drought on Crop Growth and Yield

The lack of moisture in April, May, and June in southwestern Minnesota has created concern about the effect of drought stress on crop growth and yield. Inadequate moisture during any period of growth can result in reduced grain yield. Nutrient availability, uptake, and transport are impaired without sufficient water. Plants weakened by stress are also more susceptible to disease and insect damage.

During the growing season, the most visible evidence of drought stress is plant wilting. Four days of visible wilting can reduce potential corn yield by 5 to 10 percent during vegetative growth, and by 40 to 50 percent during silking and pollination.

Drought stress in corn in the vegetative stage, which is prior to tassel and silk emergence, may result in small ear size. Moisture stress may reduce both ear length and the number of potential kernels on each ear. If ear size is reduced during this period, it cannot be corrected by relieving the moisture stress later in the season.

Drought stress during corn silking and pollination can result in the greatest negative impact on yield potential. Plants under severe moisture stress during silking can lose more than 10 percent of their yield potential per day. Moisture or heat stress during this period can result in lack of synchronization between pollen shed and silk emergence. Tasselling is expected to begin in mid-July, which is nearly two weeks earlier than normal.

Unlike corn, soybeans are less sensitive during any particular phase of growth. Soybeans continue to grow vegetatively during the flowering and podding stages. Because soybean flowering and pollination occur over a longer period of time, soybeans are more likely than corn to escape serious damage from relatively short periods of moisture stress. Soybeans can branch, and thus compensate for delayed vegetative growth during a particularly dry period as long as adequate moisture is subsequently available. Soybeans are self-pollinated, and so do not encounter severe pollination problems due to moisture stress. Soybeans also overproduce flowers and pods, which offers a degree of escape from short periods of stress.

Soybeans that are stressed early in the season may still produce a good yield if subsequent water is available. For soybeans, the most critical period for adequate moisture is during pod fill.

Bob Byrnes
Lyon County Extension Educator

Topdressed Lime for Alfalfa

The benefits of lime for alfalfa production have been recognized for some time. In order to get maximum return for the money invested in lime, alfalfa growers are urged to apply the lime, when needed, and incorporate before planting. The incorporation is necessary to provide a favorable pH environment for the growth and development of the bacteria that form nodules on the root system. An examination of the root system of a healthy alfalfa plant will show that the nodules develop in the top 6 inches of the root zone. Therefore, we recommend incorporation to a depth of at least 6 inches.

Yet, there are always situations where growers plant the alfalfa, then take a soil sample and find that the soil pH is acid. The only choice is to topdress the lime to the established stand. Will this management practice work? Will it be beneficial? Will there be any return on the money invested in the lime?

With these question in mind, a trial was conducted in Dodge County in 1996 to evaluate the effect of topdressing lime to an established stand of alfalfa. The 1996 yields and pH values for soil samples collected in the fall of that year are summarized in the following table.

The liming material was applied in the fall of 1995. The yields are a total of three cuttings. The soil samples were collected in the fall of 1996, approximately one year after the application of lime.

Looking at the alfalfa yields, the topdressing of lime had no effect on alfalfa production. The treatments used did not produce yields higher than the yield of the control (no lime applied).

There was an increase in soil pH at the depth of 0 to 3 inches. The lime used, however, had no effect on soil pH at a depth of 3 to 6 inches. A pH of 6.5 or above is considered to be ideal for growth and development of the Rhizobia bacteria. The yield and soil pH information show that we cannot recommend to topdress applications of lime to established alfalfa.

Effect of lime topdressed to an established stand of alfalfa on yield and soil pH.

ENP* Applied lb./acre	Lime Source	Yield	Soil pH 0-3 in.	Soil pH 3-6 in.
		ton D.M./acre		
0	-	4.3	5.8	5.8
1,820**	ag lime	4.0	6.1	6.1
3,640**	ag lime	4.2	6.1	6.0
7,280**	ag lime	4.1	6.2	6.1
14,560**	ag lime	4.2	6.4	6.1
1,820	Cuttner-Magner	4.0	6.3	6.1

* ENP = Effective Neutralizing Power

** Finely ground ag lime

Many alfalfa growers choose to seed alfalfa in early August. This is a good practice in years when moisture is adequate, and it aids in weed control. If there are plans to seed alfalfa next month, don't forget to check soil pH and broadcast any needed lime, followed by incorporation.

George Rehm
Extension Soil Scientist

White Mold in Dry Edible Beans

White mold infection potential is high in many dry bean fields in Minnesota. Spray applications are the only preventative measure that can be used midseason. The window for economical sprays is quickly coming to a close, so growers need to make quick decisions if they haven't already sprayed. This pesky disease is caused by the fungus *Sclerotinia sclerotiorum* and develops as a white cottony growth on the stem and branches and pods of bean plants.

Controlling inoculum buildup starts by avoiding beans or other susceptible crops in fields with heavy infestation for 3 to 4 years. Crops such as sunflower, soybeans, Canola, alfalfa and potato are also hosts. Severe losses can occur in these crops due to white mold infection and their use will not do anything to decrease white mold inoculum.

The uses of tolerant varieties of dry beans with an upright growth habit in wide rows and the use of recommended fertility and seedling rates will alleviate the disease pressure. Careful irrigation management is also important, as disease development is worse when there is excess moisture in the plant canopy. Irrigation in the central sands when soil tension reaches 60 to 65 cb (average of 2 sensors at 4' and 10' depth) will reduce disease pressure. Research shows that a spray program will provide a return 65% of the time when there is over 5 inches of water applied to the crop between June 1 and 10 days into bloom. The spray program will be positive 85% of the time if there is over 7 inches of water on the crop during this same period.

Timely applications of Benlate or Topsin M are effective in reducing the disease on dry beans. One or 2 applications are can be used, however two applications provided the greatest return in the Staples trials the last 3 years. Applications should be made according to the instructions on the label. Research shows that excellent control is attained when the first application is made 4 to 10 days after 10% bloom (10% bloom is when 1 plant in 10 has at least one open flower). The second application can be made 7 days later.

Richard A. Meronuck
Extension Plant Pathologist

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic during the first two weeks of July included:
corn—*Pythium* sp and *Rhizoctonia* sp rot of mesocotyl tissue, high moisture corn for storage molds
soybean—*Phytophthora* sp and *Rhizoctonia* sp root rot, bacterial leaf spot, SCN
peas—bacterial leaf spot, *Ascochyta* sp leaf spot
silage—culture for storage molds
wheat—black chaff(*Xanthomonas* sp)
turf—*Rhizoctonia* sp root rot, Red thread
strawberry—leather rot(*Phytophthora* sp fruit rot)
oak—Oak wilt
Norway pine—*Sphaeropsis* sp (*Diplodia* sp) tip blight
sumac—bacterial tip blight
coral bells—*Pythium* sp root rot
potentilla—downy mildew
alpine currant—*Phytophthora* sp
vinca—Impatiens necrotic spot virus (INSV)
monarda—INSV

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Hydrangea Headaches

Every year about this time we get some calls from people whose snowball hydrangeas aren't "blooming properly." What they mean is that they have clusters of what they call little buds, but the buds never open up to become the showy "snowballs" they expect. In fact, these "buds" are the true hydrangea flowers; the showier so-called "petals" are really just bracts or modified leaves. If no bracts form, you don't get the pretty flowers.... it's as simple as that. Trouble is, we don't know what causes this to happen. All we can suggest is that you prune them back substantially early next spring, and work some fertilizer into the soil to see if they perform any better. If not, dig them out and replace them.

One theory has been that some "bad" stock (ie., not properly flowering) has made its way into propagation, and sometimes you're just the unlucky one who buys that "bad" plant. So, to insure that you get "good" hydrangeas, wait to buy them until they're blooming, so you know sure the plants you take home will have the flowers you want.

The other problem we run into annually is from people who are attempting to grow colored—usually blue—hydrangeas. They are not hardy here, and even though the plant will survive nicely with good winter protection, flower buds will not. The buds are begun the summer before they bloom, and must overwinter in their position on the tips of the canes. Again, while it's not impossible, it's very unlikely that they'll bloom for you in this climate. It's better to stick with the white hydrangeas that are fully hardy here.

Deborah Brown
Extension Horticulturist

Wasps

The most common insect call over the last couple of weeks has been wasps. Our early spring has allowed overwintering queens to get an quicker start in building their nests which will result in generally larger nests and more abundant wasp populations. In some situations, people have seen nests hanging in trees or attached to the outside of buildings. Although they may have just noticed them, those nests have been

there since spring. If these nests are close to human traffic, there is an increased risk of stings, and these nests should be controlled. The best way to do that is to spray an aerosol insecticide (something labeled for wasps and hornets) into the nest entrance (where you see the wasps fly back and forth). It is best to do this during late evening when wasps are less active.

Although we have not been receiving many calls on ground-nesting wasps, that is a very common place for wasp nests to be built. You can try to control a ground-nesting wasp nest by pouring soapy water into the nest entrance. Insecticide options include carbaryl (Sevin), diazinon, or acephate (Orthene). Dusts are more effective than liquids.

The most challenging type of wasp nest are those that are constructed inside buildings in wall voids, attics or other spaces. Outside, you can see a crack or small hole where the wasps are flying back and forth, but you don't actually see the nest because it is hidden within the home. It is important not to seal the opening; this often causes wasps to search for an alternative route which usually leads them into the living quarters of your home. It is also not a good idea to spray an aerosol insecticide into the nest opening. The nest itself is usually not close enough to the entrance that a spray would have much affect. But like sealing the opening, spraying the entrance often causes wasps to invade inside the home. The best way to control a hidden nest like this is to apply an insecticidal dust, such as bendiocarb or chlorpyrifos (Dursban) into the void. Small holes usually need to be drilled to do this. This often is a job best left to an experienced pest control service.

For more information, see FO-3732, *Wasp and Bee Control.*

Jeffrey Hahn
Asst. Extension Entomologist

Raspberry Anthracnose

Although the raspberry season is coming to an end, you may have noticed symptoms of raspberry anthracnose during picking. Anthracnose typically infects the canes of raspberry plants causing small purple spots, which later become gray and sunken, to appear on the canes. Canes infected by anthracnose are weakened, and may be killed as lesions enlarge and girdle the cane. Anthracnose may also infect leaves and berries causing small purple spots, which later develop white centers, to appear on the leaves, and the formation of small, dry, seedy berries that are slow to ripen.

Anthracnose survives the winter on infected canes and begins infecting young green tissue in late spring following periods of rain. Since older, mature plant tissue is more resistant than young tissue, early spring infections cause the worst damage. Secondary infections that occur later in the growing season are not of concern since they cause small, shallow lesions.

Anthracnose can be effectively managed through proper cultural practices such as watering at ground level, improving air circulation, properly fertilizing, removing weeds, spacing rows 1 to 2 feet apart, thinning dense stands, and removing and destroying old fruiting canes and infected primocanes (first year canes). If anthracnose has been a problem in the past or is severe this year you may want to consider a fungicide spray next season. Lime sulfur may be applied immediately after the buds open but before the leaves have expanded. Several resistant cultivars are also available.

Necrotic Ring Spot in the Home Lawn

Necrotic ring spot, a cool season disease of turf grass, has been showing up in home lawns, as a result of the cool, wet weather in June. This disease infects the roots and rhizomes of grass plants causing the leaves to turn reddish-brown initially and then fade to a straw color. Infected turf usually forms rings of dying grass. Symptoms of necrotic ring spot occur throughout the growing season following cool, wet periods, but are most prominent in late spring and early autumn.

Necrotic ring spot is a fungal disease that survives the winter in plant debris and begins infecting turf after cool, wet periods in the spring. As summer temperatures warm, patches may fade. However, necrotic ring spot regains activity with the onset of heat or drought stress, and again in the fall as cool, wet weather returns.

Necrotic ring spot can be controlled in the home lawn by properly watering to prevent drought stress, properly fertilizing with slow release nitrogen fertilizer, as well as other cultural practices that improve the vigor of turf. Fungicides may be applied if cultural practices do not improve the problem, but should be applied on a preventative basis.

Chad J. Behrendt
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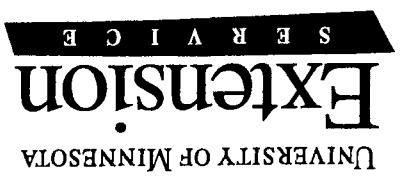

MINNESOTA

CROP NEWS

Vol. 4
No. 17

From the Crops System Team of the Minnesota Extension Service

Corn Stalk Breakage and Grain Yield

High velocity winds caused stalk breakage in several isolated areas of Southern Minnesota. The effect of this injury on grain yield will depend on a number of factors: the percent of plants broken, the distribution of broken plants, the location of the break on the stalk, and the growth stage of the crop.

Break location. The location of the break is a major factor in determining the effect of stalk breakage on grain yield. Yields are reduced more when the stalk is broken below the uppermost (top) ear compared with when the stalk is broken above the top ear. At the tassel stage, the size of the second ear (the one immediately below the uppermost ear) has sufficiently been determined and the plant cannot adjust the number of kernels that can be produced on the second ear. The potential size of the second ear has been determined with the plant "expecting to fill kernels in the top ear" and in most situations there usually is

Notice of Change in Soybean Cyst Nematode (SCN) Testing

Soil samples for Soybean Cyst Nematode (SCN) egg counts will now be processed at the Southern Experiment Station in Waseca and **NOT** at the Plant Disease Clinic. Samples and field information should be sent to:

Nematology Lab

Southern Experiment Station

35423-120th St.

Waseca, MN 56093

Remember to refrigerate samples until they can be sent to the lab.

Plant samples for disease diagnosis should still be sent to the Plant Disease Clinic.

Sandra Gould
Plant Disease Clinic

Highlights . . .

For comments/information contact Extension Plant Pathology at 612-625-6290

Corn Stalk Breakage/Continued

little to no grain produced on the second ear. In our trials, 40% of the plants broken above the top ear at tasseling caused a grain yield reduction of 13.5% compared with a 37.3% yield reduction in the 40% of the plants that were broken below the top ear.

Break time. Stalk breakage can occur any time after corn plants have reached knee high, but most frequently occurs in the one-to two-week window prior to tasseling. At this growth stage, stalks are growing rapidly, are brittle, and are very vulnerable to breaking when high velocity winds occur. We broke 40% of the plants prior to tasseling and just after tasseling. Breaking prior to tasseling caused a yield reduction of 18.8% and breaking after tasseling caused a yield reduction of 22%. Breakage earlier gives the plant more time to switch from filling the top ear to filling kernels in the second ear.

Break percentage. Grain yields decrease as the percent of plants broken increases. In a two year trial, the yield reduction was 0.42% per percent plants broken. For example, we would expect a grain yield reduction of 4.2% if 10% of the plants were broken in a field.

Break pattern. In our research, we broke plants in a constant pattern. When 25% of the plants were broken, every fourth plant down the row was broken. When stalk breakage occurs under field conditions, the pattern will not be that regular. With blotchy break patterns, the effect on grain yield could be slightly larger.

Grain moisture. Stalk breaking before versus after tasseling and above versus below the top ear did not have an effect on kernel moisture content. Kernel moisture content was slightly lower as the percentage of plants broken increased. This would be expected because removing plant tissue above the ear favors faster kernel drying.

D.R. Hicks
Agronomy and Plant Genetics

IPM Stuff (Southwest MN)

I hope you managed to ignore crop problems during the Fourth of July weekend. This is a good time of year. The spring rush of decisions and problems is drawing to a close. This is a good time to look at fields that have fertility, weed, and disease problems earlier and start making management plans for next year. Unfortunately, there are still potential pest problems that might occur. I don't think we can all take it easy for the rest of the summer.

Some of the early-planted cornfields were trying to tassel by the Fourth of July. A few made it. The corn crop (except for the fields I get to look at) looks good.

European corn borer:
On 7/02/98, I observed a newly molted 5th instar European corn borer at Lamberton. Fortunately, he did not have many little buddies. Stages observed ranged from egg mass to 5th instar. Plots averaged 0.25 % plants infested with no live borers. Light trap captures remain low at the SWES. The 1st generation of the multivoltine strain appears to be generally low in SW MN.

Now for the bad news: Without a distinct break between 1st generation, the univoltine flight appears to have started at several locations. This is verified by the increase in the percentage of male corn borers in the SWES light trap. Scouting for univoltine corn borers should start in about 10 days. This flight is early enough to cause a high percentage loss per borer/plant.

Since I have a corn borer experiment going this season, this flight, like first generation, may not amount to much at Lamberton. With the proper incentives, I can be convinced to conduct an experiment on low crop prices.

Soybean Cyst Nematode
Females are readily visible on soybean roots in many of the fields I have recently checked. There seems to be some confusion between soybean cyst nematode damage and herbicide carryover injury in the countryside.

Iron chlorosis symptoms are moderating with the warmer weather.

Root diseases are present including Fusarium and Rhizoctonia. Areas that had standing water can expect to see more symptoms of these as well as mid season Phytophthora occurring. Rhizoctonia lesions are reddish brown at or below the soil line. Lesions that penetrate to the pith are cause for concern. Fusarium infected roots often have red, orange or white mycelium visible. Externally, decay does not go above the soil line. Foliar symptoms can include interveinal chlorosis and necrosis as the fungi plug vascular tissue and phytotoxic compounds are produced. Phytophora infections will extend above the soil surface and cause wilting/death of the entire plant.

Grasshoppers:

As the season progresses, I continue to get calls and observe fields with high numbers of grasshoppers. SW Minnesota seems to be the hot spot for activity. The cold spell helped out temporarily with the early hatching grasshopper populations, especially in those areas that received rainfall at the same time. Additional differential grasshopper hatch has occurred since then. Soybean treatment decisions will need to be made in the near future for three reasons: 1) Soybeans cannot tolerate as much defoliation in the reproductive stage. Additionally, unlike hail defoliation, grasshopper defoliation is often chronic. 2) I believe that we should be nearing the end of the hatch for 1998 and subsequent hatch should be minimal. 3) Adult two striped will be present shortly. They can be very mobile and larger hoppers will be harder to kill.

Do not treat fields or borders unless you have populations in the threatening range. (8-14 late instar nymphs/adults or more in field, 21-41 or more late instar nymphs/adults in field margins.) Why the big range? Differential and Two-striped grasshoppers consume more foliage than the smaller red-legged and migratory. Additionally, losses from defoliation can be aggravated by dry conditions.

Bruce Potter
IPM Specialist

A Few Updates From The Bug World

Alfalfa — Should I Treat PLH Under Oats?

Potato Leaf Hopper (PLH) populations continue to be present throughout most of southern MN, and stable at low to just above threshold (0.5 to 2.5/ sweep). A recent concern this past week has been spring seeded alfalfa still under oats. If growers are within 10 days of oat harvest, they should wait and assess PLH infestations on the alfalfa, after oat harvest, then make a treatment decision. **IF** >10 days from harvest, and PLH counts are >1/sweep (alfalfa is still usually short under oats), and PLH nymphs are present (= indication of an actively breeding infestation), growers should consider treatment.

If treatment is warranted, only 2 materials can be used (labeled for both oats and alfalfa):

Penncap-M (methyl parathion), 2FM at 2-3 pt/ac (0.5-0.75 lb AI/ac), 15-day phi, OR

Malathion, 5E at 1.5 pt/ac (1 lb AI/ac), 7-day phi

Each material should be applied with 20 gal. water/ac.

Note: many other materials are labeled for other small grains such as Warrior; however, many of these are for wheat only; as always check the label carefully.

Alfalfa Blotch Leafminer (ABLM):

ABLM has shown some early-season movement south, e.g., to Dakota County, but still no detections in southeastern MN. We will not be able to completely update our distribution maps until October. ABLM is currently in its 2nd generation, and should go through at least 4 generations in southern MN. Our 1998 insecticide trials are underway. This year we are using a surfactant in an effort to get the insecticide into the leaf, where leafminer eggs hatch and maggot larvae start to feed. However, I want to emphasize at this point that none of the labeled insecticides have yet shown consistent control, and consequently we do yet know what the true yield/quality impact will be from ABLM. We will also be evaluating several alfalfa variety trials this year to see if any of our current varieties show some inherent resistance to ABLM.

European Corn Borer (ECB) Update:

As indicated in previous newsletters, the 1st gen. flight of our bivoltine ECB (typically 2 generations/ yr) was virtually wiped out by cold, rainy weather during the peak of the flight; we are not aware of any southern MN fields that had 1% of the plants infested.

The univoltine (single generation/yr) strain of ECB took off this past week at many of the southwest and west central sites. Detailed trap catch data should be in the next *MN Crop News*. Here, I provide a brief listing of some of the sites where trap catches increased over the past week, as well as those where only a few moths were caught (as expected, where we do not normally have a univoltine strain).

Location	Peak Catch/Avg. Catch for Week	Date of Peak Catch for Week
Olivia	133/34.3	7/1
Rice (Benton Co.)	64/23.6	6/29
Willmar	85/32.7	6/29
Montevideo	18/10	6/27
Jeffers (Cottonwood Co.)	57/33.5	6/30
Crookston	14/9.6	6/25
Lamberton-French AgRes	4/2.6	6/29
Lamberton-SWExpStn	10/3.9	7/1
St. James (Blue Earth)	38/24	6/30

Note: ECB counts for the S.Dakota trap (SD/MN border) also increased this past week, but data not available.

Bill Hutchison
Extension Entomologist

Corn Borer Status

The univoltine flight is definitely underway. While moth captures at some sites declined slightly from last week's initial emergence (see Olivia, Buffalo Lake, Twin Oaks, SD), moth captures in western Minnesota have increased at many locations, especially in central Minnesota (note Hanska, St. James, Jeffers, Fairfax, Bird Island, Lake Lillian, Willmar, Twin Brooks SD, Rice, Clear Lake). The surge in univoltine captures is spotty with many WC Minnesota sites still reporting rather static moth levels. We'll continue to monitor this flight. Meanwhile, prime scouting will occur about two weeks after peak moth captures.

Black Light Trap Captures

A network of blacklight traps is maintained by food processing companies, seed companies, private research firms, the Minnesota Department of Agriculture's Plant Pest Survey program, and the University of Minnesota to monitor European corn borer and other moths. Captures in light traps are loosely related to moth density and are strongly affected by trap location (proximity to crops and moth action sites) and weather (evening temperatures, wind, dew fall, and rain).

Ken Ostlie
Extension Entomologist

Peak Captures Location	25 June-1 July Last week	2-8 July This week
NW		
Crookston (NWES)	14	11
Moorhead	4	4
WC		
Morris (WCES)	12	8
Fergus Falls	19	14
Montevideo N	34	14
Fairmont, ND	26	47
Twin Brooks, SD	21	38
C		
Olivia	133	31
Gaylord	14	15
Arlington	7	2
Buffalo Lake	52	18
Bird Island	6	35
Fairfax	16	83
Willmar	85	262
Lake Lillian	10	55
Brownton	NA	8
EC		
Clear Lake	9	25
Rice	64	164
Big Lake	3	3
SW		
Lamberton (SWES)	10	10
Lamberton (French)	4	9
Jeffers	57	69
Elkton, SD	134	80
SC		
Waseca (SES)	8	12
Waseca (Seneca)	4	2
Henderson	3	3
LeSueur	4	8
St. Peter	7	6
New Ulm	14	16
Hanska	10	26
Sleepy Eye	7	19
Blue Earth #1 / #2	NA	2.3 / 3
Faribault	2	7
St. James	NA	85
SE		
Stanton	28	23
Dodge Center	27	14
Stewartville	2	2

Corn Rootworm Emergence Beginning

Over the last few days, western corn and northern corn rootworms have begun emerging. Male emergence generally peaks before female emergence while northern corn rootworm emergence slightly leads western corn rootworm. Both species require about two weeks to mature sexually, mate and develop eggs before egg laying begins in earnest. During this time, beetles feed on silks, pollen, and, in the case of western corn rootworms, even leaves. Early emerging beetles initially congregate on early silking plants and then disperse throughout the field when most plants silk. Later as silks dry in most of the field, beetles may congregate where standing water or patchy weed competition has delayed silking. Alternatively they may leave the field in search of late silking fields.

Silk feeding may lead to pollination problems if beetles keep silks pruned to less than ½". This situation rarely develops since corn produces ample pollen and silks elongate rapidly when moisture is ad-

equate. Pollination problems usually occur when high numbers of beetles feeding early in pollination. "Nicking" problems (asynchrony between pollen shed and silk elongation) caused by droughty weather or typically inherent in hybrid seed production warrant close scrutiny.

Thresholds and optimal time to scout adults for 1999 soil insecticide decisions differ from silk clipping. Peak emergence should occur over the next 7 to 10 days. Considering the maturation requirement before egg laying begins, the optimal scouting window will be in three to four weeks, depending on weather. More on corn rootworm scouting next week.

Ken Ostlie
Extension Entomologist

Emergency Exemption for Tilt on Dry Beans has been approved.

Tilt will be available again this year for use to control rust on dry edible beans. The use is labeled from July 2 to Sept. 1, 1998. Label directions are as follows:

For control of rust, apply 4 fl. oz. of Tilt/A. Use a minimum water volume of five gallons per acre by air and 15 gallons per acre by ground. Begin application at the first appearance of disease and continue on a 14-day schedule.

Important: 1) On certain dry bean varieties, Tilt applications may cause smaller and/or greener leaves. Yields of dry beans displaying these characteristics have not been reduced due to Tilt treatments. 2) Do not apply Tilt to succulent bean varieties or crop injury may occur.

Notes: 1) Do not apply more than 12 fl. Oz. Of Tilt/A per season. 2) Do not make more than three applications per year. 3) Do not graze or feed forage within 7 days of application. 4) Do not harvest hay or beans within 28 days of application. 5) Do not apply tilt to dry beans within 300 feet of any permanent lake, stream or tributary. 6) Precautions should be taken to prevent introduction of Tilt laden sediments into aquatic habitats to decrease the likelihood of long term chronic effects on surrounding fisheries resources. Adequate measures should be taken to avoid spray drift and runoff.

Richard A. Meronuck
Extension Plant Pathologist

Quadris and Ronilan have Section 18 Emergency Approval for White Mold Control in Canola

Wet weather is creating favorable conditions for white mold (Sclerotinia Stem Rot) in Canola. With bloom in progress it may be too late for economical returns, as blossoms need protection for efficient control.

The label directions for Quadris is as follows:

For Sclerotinia stem rot control. QUADRIS Flowable Fungicide should be applied prior to or in the early stages of disease development. Applications may be made by ground (use sufficient water volume for adequate coverage) or by air (in minimum of 5 gallons of water per acre).

Crop	Target Diseases	Use Rate fl oz product/A (lb ai/A)	Remarks
Canola	Sclerotinia stem rot (0.24)	15.0 fl oz (0.24)	Apply QUADRIS as a Protectant spray from bolting to no later than 30% bloom.

Do not apply within 7 days of harvest.

The Label information for Ronilan is as follows:

Time and rate of application for control of White Mold, Sclerotinia Stem Rot (sclerotinia sclerotiorum) by Ground and Air application.

Ronilan EG may be applied up to one time per growing season. Application is recommended at 20-50% flower. This will normally be about 4-8 days after the beginning of flowering. A maximum of 1 pound of Ronilan EG per acre per application may be used.

Method of Application: Thorough coverage is essential. Therefore, use adequate spray volumes and

Quadris and Ronilan/continued

proper spray equipment. Note that plants grown in narrow rows from a dense canopy early. This may promote disease development and decrease spray penetration. Particular attention to spray coverage is required in this situation.

When applying Ronilan EG with ground equipment, use a minimum of 20 gallons of water per acre. When applying Ronilan EG with air equipment, use a minimum of 5 gallons of water per acre.

Restrictions and Limitations: Do not apply Ronilan EG within 40 days of harvest. Do not make more than 1 application of Ronilan EG per season. Do not apply more than 1 pound of Ronilan EG per season. Do not apply Ronilan EG during rain. Apply when conditions will permit spray to dry on the plant. Do not feed green or dry forage (canola) to livestock or permit livestock to graze in treated field. Do not feed succulent canola seed from treated fields to poultry or livestock.

Richard A. Meronuck
Extension Plant Pathologist

Root Rots in Dry Edible Beans Will Cause Significant Yield Loss

Root rot is very severe in many irrigated fields of dry edible beans this year. Severe stand losses and root decay in remaining plants will cause severe losses. *Fusarium* and *Rhizoctonia* sp. are common causes of such root decay. Many of these fields have experienced very wet conditions predisposing infection. The only rescue operations available for this year are to hill the plants by cultivation to stimulate lateral root development, and to irrigate frequently enough to minimize water stress.

The U of MN and NDSU are working on the root rot problem. Work with resistant varieties shows promise as does seed treatment with biological control agents. Combinations of Captan and Kodiak have shown positive results in our trials. Certain fields treated with this combination are showing positive results while others are not. Rotation with corn, small grain and alfalfa will also help reduce inoculum.

Richard A. Meronuck
Extension Plant Pathologist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Keeping Vegetable Gardens Productive

There are two areas to think about in keeping vegetable gardens as productive as possible this time of year. The first is caring for those plants that are already up and running. The second is replacing early maturing veggies with new plants that will still be productive before killing frosts cut them down.

* It's a good time to sidedress tomatoes, peppers and other plants with some additional fertilizer to give them a needed boost as they develop fruit.
* Water gardens thoroughly when needed. Watering early in the day means more water reaches the soil and less evaporates. Watering in the evening is never a good idea because moist foliage won't dry at night, and you're more likely to end up with disease problems.

(Most of the state has had ample—and in some cases, more than ample—rainfall this past month, so watering may not have been needed. Most vegetables, however, will perform best with a regular moisture supply. Overly dry conditions can result in bitter flavors in some veggies. When it's been dry for several weeks, then it rains heavily or you begin to water thoroughly, some vegetables will become irregularly shaped.)

* Keep weeds under control; they compete with your vegetables for moisture and nutrients, and they may harbor insects that can spread diseases such as aster yellows.
* Remove spent plants such as radishes or leaf lettuce that's bolted and gone to seed or peas that have dried up. Work additional fertilizer into the soil and replant with bush snap beans, broccoli, cabbage, onion seeds, or beets. Later on you can replant the radishes, leaf lettuce and peas, but they won't do well in July's heat.

Deborah Brown
Extension Horticulturist

Early Blight

Early blight is a fungal disease that infects the leaves and stems of tomatoes, as well as the leaves of potatoes. Early blight initially infects the older, lower leaves on the plant and appears as small brown to black circular spots. As lesions age they develop brown concentric rings. These lesions, commonly described as 'target shaped', are a good tool for detecting early blight. A large portion of the leaf surrounding these lesions usually turns yellow causing the leaf to die and either droop or fall from the plant.

Early blight can also infect the fruit and tubers of these plants causing dark lesions in potatoes and tomatoes and loss of immature fruit in tomatoes. In both potatoes and tomatoes the underlying tissue becomes dry and leathery.

Conditions that favor early blight include frequent rains and periods of alternating wet and dry weather. This disease is often considered a mid to late season disease and can severely affect senescing plants.

Control and management strategies for early blight include planting resistant varieties, sanitation (removal and destruction of infected debris at the end of the growing season), proper fertilization to increase plant vigor, and fungicides.

Terminology related to plant susceptibility—These definitions are derived from the *Dictionary of the Fungi* (eight edition), by Ainsworth and Bisby's (1995).

Susceptible: "able to be attacked by; non-immune to". This means that a pathogen is able to infect the host plant. There are no levels of susceptibility. Either the plant can be infected or not.

Immune: "exempt from infection". This means that the pathogen is not able to infect the plant.

Resistance: "the power of an organism to overcome, completely or in some degree, the effect of a pathogen or other damaging factor". This means that a plant, which is susceptible, is able to defend itself (to some degree) against attack by the pathogen. Plants use many different methods of defense, such as physical barriers, as well as different concentrations of defense compounds that result in varied levels of resistance. For example; some plants may become infected and die soon, others may become infected and live for a period of time, and still others may become infected and continue to live, based on their level of resistance (ability to defend against pathogen attack).

Tolerant: (of an organism) "giving little reaction to infection by a pathogen or to the effect of other factors". This term is similar to resistance, and often used interchangeably, but is not the same. Tolerance means that the plant is infected, but the pathogen does not kill the plant and therefore the plant does not try to defend itself. Rather, it just tolerates the infection.

Leaf spots on annual and perennial flowers

Recently the Yard and Garden Clinic has received many calls regarding spotted leaves of annual and perennial plants. There are many different factors such as wind abrasions, insect feeding, and leaf spotting fungi that may cause the leaves to become spotted. In most of the calls we received, leaf spotting was directly related to poor cultural practices such as watering with an overhead system and lack of sanitation practices. In addition, many of the problems were perpetual and continuing every year.

Control and management of leaf spotting fungi and other disease causing organisms should begin with thorough sanitation practices such as removing all dead debris at the end of the growing season, and removing and destroying infected leaves or plants as they appear in the garden. Plants should also be watered from the ground level to reduce the amount of water splash, which spreads spores from infected leaves to healthy leaves. Finally, fungicides may be applied if desired, but these should be applied only to perennial plants as fungicides act as a preventative treatment and are not curative.

Chad J. Behrendt
Extension Plant Pathologist

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MINNESOTA

CROP NEWS

Vol. 4
No. 16

*From the
Crops System Team
of the
Minnesota Extension Service*

Extension Yard and Garden Line

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Wacky Weather Takes its Toll on Woodies

It's deja vu all over again! Storms cut through the Twin Cities knocking down trees and power lines. Many massive trees lost large limbs and significant portions of their canopies, even though they remained standing. Callers wonder if they can handle some of the tree repairs on their own, particularly since most are finding there are dozens—if not hundreds—of people ahead of them vying for the services of local tree trimmers.

While it's certainly possible to get on a sturdy ladder (preferably with a friend to help steady it) to remove a branch that's partially broken off, that branch should be low enough, or the ladder tall enough, so that you're not using that chainsaw above your shoulders. Undercut the branch so when it comes off it won't rip a huge strip of bark off the trunk.

Except for that type of "easy" trimming, leave the job for professionals. It simply is not worth taking a chance on a debilitating or life-threatening injury doing it yourself. And if a tree must be taken down, you need someone who is experienced so it can be dropped where it will do the least amount of damage to your property and that of your neighbor.

Another common question has to do with the need for pruning paint. Paints and dressings do not help tree wounds heal; in fact, they may hinder the healing process. Oak trees wounded earlier in June should have had pruning paint applied to help keep away the beetles that spread oak wilt. By now there's no real need to use pruning paint.

Finally, there's the question **"Why"** so many trees are going down or leaning over. The most likely cul-

Highlights . . .

prit is the amount of rainfall we've had these past few weeks. When soil is saturated it is softer and will yield up tree roots far more easily than drier soil.

Deborah Brown
Extension Horticulturist

Yard & Garden Insects

We have been getting calls about borers in plants, especially tomatoes and potatoes. These have usually been turning out to be *stalk borers*. These caterpillars grow up to 1 ½ inches long and are cream colored with a purple saddle shaped mark behind the head. They feed on a wide variety of plants but fortunately are usually not common. Control is difficult and impractical. We continue to receive calls on *false Japanese beetles*, especially on roses, although they may feed on many types of flowers or shrubs. Don't confuse them with *Japanese beetles*, a quarantine pest. False Japanese beetles are a greenish bronze color and lack white spots on the abdomen, while Japanese beetles are an emerald green color and have 12 white spots on the side and tip of the abdomen. An insecticide treatment (e.g. acephate [Orthene], malathion, carbaryl [Sevin]) is effective if you need to spray large numbers. *Iris borer* damage also has been common. In many cases the injury has been quite severe. An insecticide treatment in the spring when iris were about 4 - 6 inches high and sanitation of old plants in the fall after the first hard frost helps manage iris borer. However, there are no effective control measures at this time of year. *Apple maggot* adults should begin to emerge and lay eggs in apples now. See the extension publication, *Apple Maggot Management in Home Gardens*, FS-1007, for information on management.

Jeffrey Hahn
Asst. Extension Entomologist

Household Insects

We are just starting to get calls on *earwigs*. These insects are about 3/4 inch long, reddish-brown, a pair of short wings (they rarely fly) with a conspicuous pair of pinchers on the tip of the abdomen. Although they are known to damage garden plants, earwigs are primarily a pest by entering homes. Once inside, they cause no real harm and are just nuisances. The best control is to try to prevent earwigs from entering homes. Seal spaces and cracks around the foundation. Clean up and/or remove any piles of bricks, brush, firewood or other accumulations of materials close to the house that earwigs may hide under. If large numbers are coming indoors, spray an insecticide (chlorpyrifos [Dursban] or diazinon) around the exterior of the building to help keep earwigs out. Physically remove earwigs found indoors. Insecticides are not needed inside homes. We continue to receive lots of ant questions, including *carpenter*, *cornfield*, *pavement*, and *yellow ants*. See the extension publication *What to do about Household Ants*, FO-1066. We also are still receiving a steady stream questions about 1/8 inch *reddish-brown weevils* which have been identified as *Barypeithes pellucidus*. They are harmless but quite difficult to keep out of the home. Physical removal with a vacuum or dust pan and broom is the best bet. They are a temporary problem and should go away on their own soon.

Jeffrey Hahn
Asst. Extension Entomologist

Black Rot of Grape

Black rot is considered to be one of the most serious diseases of grape, causing large losses in fruit production. This fungal disease is able to infect the leaves, petioles, and shoots of grapes, as well as the fruit.

Black rot survives the winter on old infected fruit, referred to as 'mummies', which remain on the ground or in clusters on the vine. Spores released from old fruit begin new infections following spring rains and continue through the middle of July, but begin to diminish shortly thereafter. In addition, infected tissue begins to produce secondary spores, which can also cause new infections. As the leaves mature and the fruit ripens, black rot is no longer able to infect grapes.

Symptoms of black rot include spotting on the leaves, lesions on the petiole, cankers on young shoots, and rot of the fruit. Leaf spots usually appear as small tan to yellow, circular spots, which may contain tiny round black structures, known as pycnidia. Infected fruit initially appear red to brown in color, but later dry and shrivel. Eventually the fruit becomes hard and turns blue to black in color.

Management strategies for black rot include fall sanitation (removal and destruction of infected fruit), application of fungicides, and the use of resistant cultivars when possible. Fungicides such as mancozeb and captan are listed for control of black rot on grape and should be effective at preventing infection. It is important to read the label and follow directions, since only captan can be applied up to the day of harvest.

Rotting Vegetables

Recently the Yard and Garden Clinic has received several different vegetable samples with rotten root systems. These vegetables included cabbage, squash, and tomatoes. All of the samples appeared stunted and wilted and had a small, brown, soft root system.

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CROP NEWS

From the Crops System Team of the Minnesota Extension Service

Soybeans and Yellow Color

After the Lamberton Summer Field Day the following observation is important. All yellow bean samples seen at the station were exhibiting root rot on the lower 1/3 to 1/2 of the main tap root system. These plants had none or few or small nodules. Adventitious roots were beginning to develop higher on the taproot, but most had few new roots. Those that have more roots were in soil that is mostly dry. Given the cool and wet weather of early June, the main taproots have suffered significant rot. The loss of the main root system is a major factor in increasing the amount of Iron Chlorosis symptomology.

Some had SCN also, but the number of "cysts" appeared to be low. I believe that much of the yellowing is due in large part to root rots reducing nutrient uptake, including iron and nitrogen. Plants in compacted soil often respond following cultivation, which improves soil oxygen levels and increases root growth. Moisture is needed to sustain the plants with reduced root systems and if the upper soil level remains dry, moisture stress will increase. Any tillage will also increase the moisture stress level. A decision to cultivate can increase the moisture problem. Samples received at the PDC exhibiting the tap root rot sypmtoms since early June have produced Pythium and more have shown Fusarium. These two fungi are commonly found on roots rotted in this manner.

A Great Thank You! to the Lamberton Station Staff and others in Extension for the wonderful Day of Appreciation this week at the Lamberton Field Day.

Ward C. Stienstra
Extension Plant Pathologist
University of Minnesota, St. Paul.

Highlights . . .

10th International Sclerotinia Workshop

The 10th Sclerotinia Workshop will be held September 9 (Wednesday) to September 12 (Saturday), 1998, at the Holiday Inn, Fargo, North Dakota. The meeting will begin with a social on Wednesday evening, followed by two days of meetings and discussions, plus a field trip in the Red River Valley on Saturday. The meeting brings together pathologists and plant scientists from industry, government, extension and Universities. Students are encouraged to attend. The theme is biology and control of Sclerotinia (*S. Sclerotiorum, S. minor,* and *S. trifoliorum*). Presentations and discussions will be grouped around specific topics such as biology, biotechnology, etiology, epidemiology, resistance, biocontrol, and chemical control.

WHO TO CONTACT

Co-organizers are Tom Gulya, USDA, Northern Crop Science Lab (phone 701-239-1316; e-mail: gulyat@fargo.ars.usda.gov) and Berlin Nelson, Department of Plant Pathology, North Dakota State University (phone 701-231-7057; e-mail: bernelso@plains.nodak.edu). Registration forms and hotel information can be obtained from Stephanie Carlblom, Department of Plant Pathology, phone 701-231-8363 (fax 701-231-7851) or e-mail: scarlblo@ndsuext.nodak.edu. There is a web site for this meeting with all meetings, registration and hotel information.

Http://www.ndsu.nodak.edu/ndsu/news/1998/090998.sclerotinia_ppth.html

HOTEL INFORMATION

A block of rooms has been reserved at the Fargo Holiday Inn, 3803 13th Ave. S., Fargo, ND. Telephone: 1-800-HOLIDAY or 701-282-2700. Mention you are attending the Sclerotinia Workshop. The room rate is $69.00 for a standard 2 bed or 1 king bedroom. The conference room rate will be in effect until August 1, 1998. Make your reservations before that date. A small block of rooms is also reserved (under Sclerotinia Workshop) at the Holiday Inn Express (next door to the Holiday Inn), 1040 40th St. SW. Telephone: 1-800-HOLIDAY or 701-282-2000. The rate is $59 for a standard room. Reservations must be made by August 1, 1998. There is a shuttle bus from the Holiday Inn to the airport.

Richard A. Meronuck
Extension Plant Pathologist

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in June included:
corn—*Pythium* sp. and *Rhizoctonia* sp. root rot, Holcus (bacterial leaf spot
Soybean—*Pythium* sp., *Rhizoctonia* sp. and *Fusarium* sp. root rot, iron chlorosis
White females of soybean cyst nematode were observed on plant roots in early June.
oats—bacterial leaf spot
peas—*Rhizoctonia* sp. root rot
barley—samples tested for loose smut
silage—cultured for storage molds
asparagus—*Fusarium* sp. crown rot
garlic—*Fusarium* sp bulb rot
tomato—bacterial leaf spot
strawberry—*Xanthomonas* sp. (angular leaf spot), *Diplocarpon* sp. (leaf scorch)
apple—*Phomopsis* sp. canker
crabapple—Fire blight
lilac—*Phytophthora* sp. stem rot
oak—Oak wilt
elm—Dutch elm disease
turf—*Pythium* sp. and *Fusarium* sp. root rot
hoya—Impatiens necrotic spot virus

Sandra Gould
Plant Disease Clinic

Crop Status

Central Minnesota:
Some areas in central Minnesota have received 7-inches of rain in the last week. Crops in low ground have suffered from frost and now flooding. Most corn is waist high.

Dave Schwartz
Meeker County Extension Educator

Southwest Minnesota:
Corn canopy closed or closing on most fields. Most soybean fields are showing plants in the V4 stage. Potato leafhoppers reported over threshold in some newly seeded alfalfa fields, rescue treatment is warranted. European corn borer counts are quite erratic from South Central to Southwest Minnesota. Individual fields should be scouted. Some grasshopper species are in the 4th instar (wing pads visible) in SW Minnesota.

Bruce Potter
IPM Specialist, Lamberton, MN

Southeast Minnesota:
Frost damage reported June 7 and some corn fields were replanted. Postemergent herbicides have been applied to most of the soybeans in the area; some minor crop injury reports observed which may have been enhanced by cooler temperatures.

Kevin Cavanaugh
IPM & Ag Professional Program Coordinator

In addition, each of the plants infected was removed from a low area in the garden and was growing in wet soil due to the recent storms and prolonged periods of rain.

Typically root rot pathogens cause poor seed germination or death of young seedlings (damping-off). However, root rot fungi are also able to persist in the soil near the root system for a period of time. These fungi, then, under optimum conditions (cool, wet weather), infect the root system causing a reduction in plant growth and yield, as well as death of the plant.

Controlling root rot fungi is very difficult, since these pathogens live in the soil and soil drench fungicides are no longer available for control of root rot diseases. Therefore, management strategies must focus on reducing soil moisture. Practices such as watering your garden less frequently but more thoroughly rather than watering lightly more often, along with increasing soil drainage should reduce the severity of disease. If you have a problem with root rot fungi, do not plant the same crop in the same location next year and try to increase soil drainage if possible.

Chad J. Behrendt
Extension Plant Pathologist

Univoltine Flight of Corn Borer Begins

The univoltine (one generation) flight appears to be starting. Examination of light trap captures over the last two years indicates that the univoltine flight usually begins about the fourth of July. With this year's earlier warm weather, the flight appears to be starting slightly earlier. Moth captures have jumped markedly at Olivia, Jeffers, Elkton, SD, Buffalo Lake, and Wilmar in the last three days. I suspect that other locations in WC and NW Minnesota will witness increased moth activity this week. Scouting in univoltine areas could begin in about two weeks.

Meanwhile in areas where only the multivoltine occurs. corn borer moth captures continue to sputter along and have even declined at some locations.

Black Light Trap Captures

A network of blacklight traps is maintained by food processing companies, seed companies, private research firms, the Minnesota Department of Agriculture's Plant Pest Survey program, and the University of Minnesota to monitor European corn borer and other moths. Captures in light traps are loosely related to moth density and are strongly affected by trap location (proximity to crops and moth action sites) and weather (evening temperatures, wind, dew fall, and rain).

Peak Captures Location	18-24 June Last week	25 June-1 July This week
NW		
Crookston (NWES)	20	14
Moorhead	9	4
WC		
Morris (WCES)	8	12
Fergus Falls	13.5	19
Montevideo	NA	18
Fairmont, ND	20	26
Twin Brooks, SD	15	21
C		
Olivia	8	133
Gaylord	15	14
Arlington	8	7
Buffalo Lake	22	52
Bird Island	5	6
Fairfax	12	16
Willmar	6	85
Lake Lillian	12	10
EC		
Clear Lake	8	9
Rice	3	64
Big Lake	7	3
SW		
Lamberton (SWES)	6	10
Lamberton (French	7	4
Jeffers	38	57
Elkton, SD	16	134
SC		
Waseca - (SES)	12	8
Waseca - Seneca	NA	4
Henderson	9	3
LeSueur	8	4
St. Peter	4	7
New Ulm	NA	14
Hanska	6	10
Sleepy Eye	15	7
Blue Earth #1/#2	6/11	NA
Faribault	NA	2
SE		
Stanton	29	28
Dodge Center	40	27
Stewartville	8	2

Ken Ostlie
Extension Entomologies

UNIVERSITY OF MINNESOTA
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SERVICE

Department of Plant Pathology
University of Minnesota
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Application of Fungicides for Suppression of Fusarium Head Blight or Scab

Introduction

The Fusarium Head Blight epidemic has cost growers in Northwest Minnesota and Eastern North Dakota close to 3 billion dollars since 1993. Early on, researchers at both North Dakota State University and the University of Minnesota evaluated the possibilities of controling this disease with fungicides. Using standard application practices, the available fungicides provided up to 50% suppression of the disease. More recent research, partially funded by check-off dollars, has focused on improving the efficacy of the labeled fungicides. This article is intended to inform you of the latest findings with regard to the ongoing research and review the available fungicides as well as the optimum timing for application.

Equipment Recommendations for Ground Application

The fungicides that are available to protect the crop from scab are either protectant or locally systemic. This means that is crucial to the deliver the product to the target for maximum efficacy. The target for suppression or control of Fusarium Head Blight obviously is the head or grain spike. The vertical position of the spike poses a problem as recent research by Terry Gregoire, NDSU Extension Agronomist, Ron Stover, NDSU Plant Pathologist, Jim Harbour, NDSU Extension Crop Protection Specialist, and Vern Hofman, NDSU Extension Agricultural Engineer, has shown. The deposition of fungicides on the head are greatly reduced with the standard vertical positioning of spray nozzles in comparison to creating an angled spray pattern. Research has shown that deposition of the spray solution on the head is best with a 'double swivel nozzle body' equipped with two 8001 flat fan nozzles (Figure 1). The second best configuration is a 8002 twinjet nozzle (Figure 2). A third alternative is the double swivel nozzle body with two 8002 flat fan nozzles. The twinjet nozzle has two flat fan orifices angled at 30° to the vertical. The double swivel nozzle body allows for any angle, but 60° of vertical (equal to 30° from the horizontal) provided the best deposition. Both the twinjet as well as the flat fan nozzles in the double swivel nozzle body should be mounted slightly off center to allow the spray pattern of each nozzle to overlap with its neighboring nozzles. With a 20" spacing of the nozzles on the boom, the boom should be raised 18"above the crop for the twinjet nozzles and 9" above the crop for the double swivel nozzle body (when angled at 30°) to create a uniform coverage. Most existing spray equipment can be retrofitted with either the twinjet nozzles or the double swivel nozzle body.

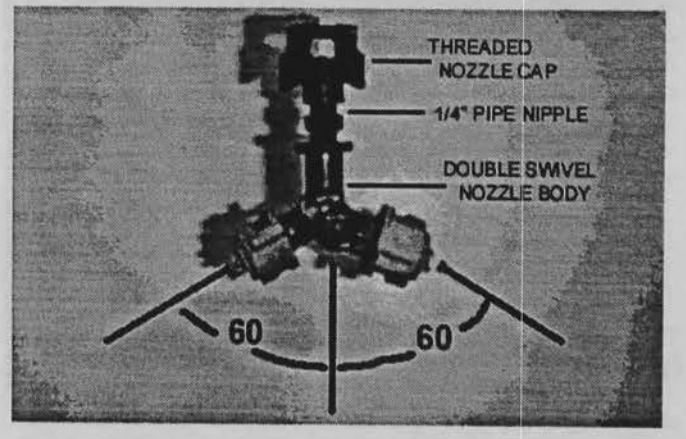


Figure 1. Double Swivel Nozzle Body equipped with two flat fan.

Equipment Recommendations for Aerial Application

Aircraft will probably apply a considerable amount of fungicides. Very little research has been done to optimize aerial application. However, there are three factors which may increase the efficacy of the applied fungicides. The first recommendation is to produce a fine drop by adjusting the spray pattern so it is directed perpendicular to the air stream. Also, applying 5 to 7 gpa should also should improve coverage. The third recommendation is to spray very early morning when heavy dews are present. The dew will function as additional spray volume and help with the distribution of the fungicide.

Ground Speed, Spray Pressure and Spray Volume

Using either the 8002 twinjet nozzle or the double swivel nozzle body equipped with two 8001 flat fan nozzles, the maximum deposition was achieved when using 40 to 50 psi pressure and a ground speed of 4 mph. When using double swivel body with 8002 flat fan nozzles, increase the ground speed to 8 mph. Using those settings and with a 20" spacing of the nozzles, the total spray volume is approximately 15 to 18 gallons per acre, which is the recommended volume for ground application for all of the labeled products.

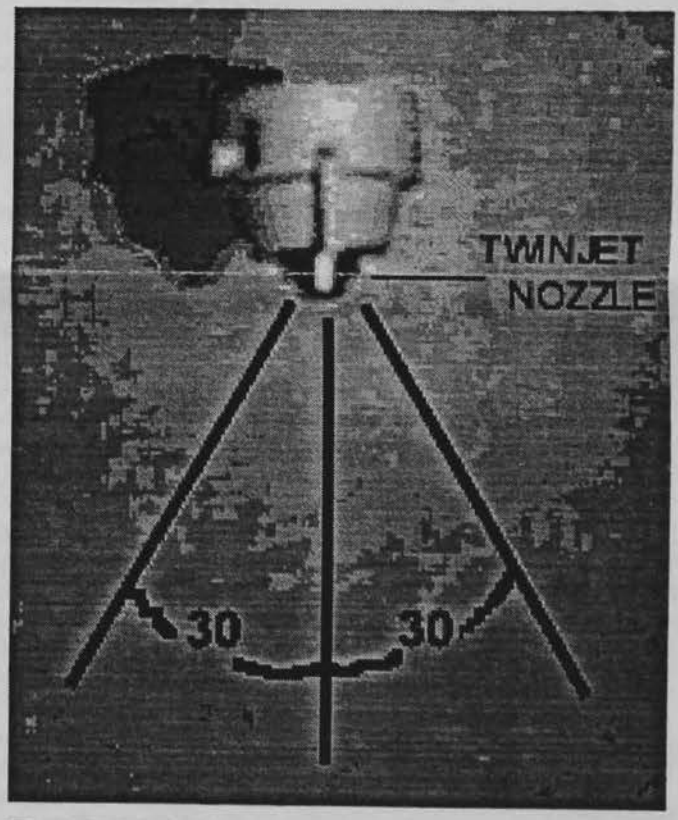


Figure 2. Twinjet Nozzle.

Fungicide Application/Continued

Timing

The optimum time for scab suppression with a fungicide is at early flowering, when about 25% of the main stems have started to flower. Flowering in wheat has started when the anthers are pushed outside the florets within each of the spikelets, which form the head. The anthers are easily recognized as a pale yellow to white tube of about a 1/8" length and about a 1/16" diameter and hanging on a very thin wire which extends from between the individual florets. Each floret contains three anthers, while a spikelet contains 3 to 4 florets. Within a spike, flowering will start in the center spikelets and progress upwards and downwards. This growth stage is also recognized as Feekes 10.51.

Labeled Fungicides

Four products labeled for a heading application of wheat have shown suppression of Fusarium Head Blight or scab. A section 2-ee label was issued in 1994 for the combination of benomyl (trade name Benlate) and mancozeb (trade names Dithane, Manzate and Penncozeb) at a rate of 0.5 lb/A benomyl and a 1 lb/A mancozeb. Last year a section 18 label was received for tebuconazole (trade name Folicur) at a rate of 4 fl oz/A. This section 18 has been granted also for the 1998-growing season. A new label for the 1998 growing season is a section 24C label for the use of propiconazole (trade name Tilt) at a rate of 4 fl oz/A. Mancozeb alone can be applied up to 26 days prior to harvest for up to three times in a season. Estimated prices per acre for each of the products are Benlate/Mancozeb – $10.28 to $10.48, Tilt – $9.13, Folicur – $9.14, and Mancozeb - $4.80 to $5.20 for a 2 lb/A rate.

In the trials conducted by North Dakota State University and the University of Minnesota, Tilt and Folicur have given the most consistent results. An advantage of both Tilt and Folicur in comparison to the other two options is the locally systemic action of the fungicides. Both fungicides also control leaf rust, tan spot, and septoria.

For barley, Folicur is the only labeled product for a heading application. Unlike wheat, barley already flowers in the boot and a fungicide application is best right after head emergence of the main tillers. Fusarium Head Blight or scab does not cause extensive yield losses in barley but does effect the malt quality due to the presence of the DON toxin which is associated with the fungus. In limited trials, Folicur has shown to slightly reduce the amount of toxin in the harvested grain. An economic return, however, is less likely in barley in comparison to wheat.

The Decision to Spray

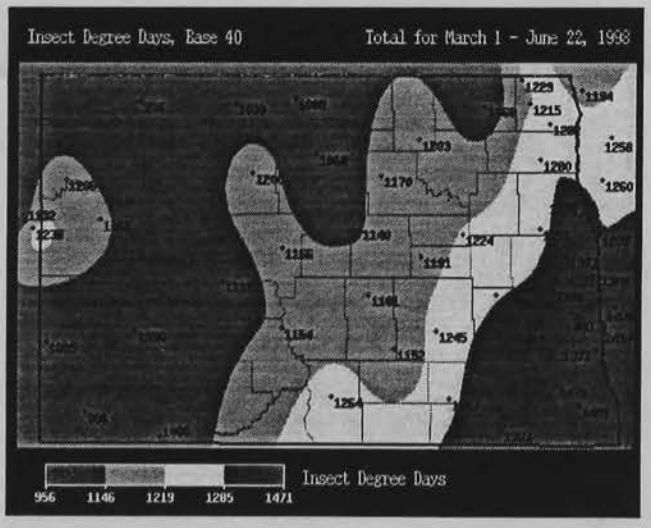
The decision whether or not to spray to suppress scab is the most difficult part of the equation. There is no reliable way to predict an epidemic yet, but weather conditions that favor the disease development and increase the chances for a successful infection are well documented. First a rain shower 5 to 7 days prior to flowering will allow the fungus to produce massive ascospore showers during flowering, which is the most susceptible growth stage. The ascospores subsequently will infect the crop. The optimum temperature for infection is 77°F, but infections can occur between 68°F and 86°F. Relative humidities above 80% and/or free water on the heads are also crucial for a successful infection. Under optimum conditions infections can occur within 12 hours or less.

In other words, if the temperatures and the relative humidities during the early stages of flowering, combined with the rain showers the previous week, are within the above mentioned parameters, a fungicide application is advised.

Vern Hofman, NDSU Extension Agricultural Engineer
Marcia Mc Mullen, NDSU Extension Plant Pathologist
Jochum Wiersma, University of Minnesota
Small Grains Specialist

Orange Wheat Blossom Midge Emergence Nearing Peak

Peak emergence for the Orange Wheat Blossom Midge is approaching in NW Minnesota. Peak emergence occurs at approximately 1450 degree-days (base 45). This map, indicating degree-day accumulation in ND & NW Minn., was produced by the North Dakota Agricultural Weather Network (NDAWN). In many locations in the southern Red River Valley, peak emergence may have already occurred. In addition, much of the wheat in those areas has headed and is nearing flowering, placing it at a higher risk for kernel damage from OWBM. Scouting for OWBM should be dome on warm, still nights (around dusk, with temperature > 59°, and wind < 6 m.p.h.). The orange colored adult female midges fly over the canopy, laying eggs on the wheat heads. Plants are susceptible as the head emerges from the boot. If 1 or more midge are observed for every 4 or 5 heads, treatment is warranted. Treatments after 50% of the first heads have flowered are not recommended due to reduced levels of efficacy. Scout at least 4-5 locations per field.



Ian MacRae
Extension Entomologist
Jochum Wiersma
Small Grains Specialist

Aphid Populations Rising in Small Grains

The recent weather conditions have favored the development of aphid populations in small grains. However, aphid populations in the region are very irregular and not all fields will need to be sprayed. It is important to scout fields before applying pesticides to avoid unnecessary chemical application. Select 100 tillers from each field, make sure the tillers represent the overall area of the field rather than taking all 100 from one location. If more than 83 tillers have one or more aphids, treatment is probably economically beneficial.

Insecticides registered for use against aphids on small grains in Minnesota include Penncap M, Lorsban 4E-SG. Dimethoate, Malathion 5EC.Treatment is not recommended after wheat has headed as most aphid damage has already occurred.

Ian MacRae,
Extension Entomologist
Jochum Wiersma,
Small Grain Specialist

Cold Weather Delivers Knock-Out Punch to Corn Borer

European corn borer captures in black-light traps continue to sputter along (see table). When the cold weather hit for about 10 days earlier this month, I speculated that moth mating, egg laying, and egg development would be put on hold and rebound when warmer temperatures returned. However, the lengthy cold weather period appears to have delivered a knock-out punch.

Trap captures have not rebounded. Larval infestations levels remain low (usually less than 1%) and borers are young (often first stage). Degree day accumulations indicate we're nearing the end of the prime treatment window (800 to 1000 degree days base 50°F) when predominantly second and a few third stage larvae should be present. However, borer infestations are eerily absent. Everyone I've talked to over the last week reports the same observation; less than 1% shotholing with live larvae rare and young (first instar). The exception is slightly higher infestation levels on the irrigated sands in the Hastings area. How the cold weather exerted this effect is not certain, but it's obvious that no larvae resulted from moths emerging during the peak flights in late May.

What does this mean for corn borer infestations during the rest of the summer? Cold weather should have had no effect on the univoltine biotype other that to slow post diapause development. With degree day accumulations now near normal, I'd expect the univoltine flight to begin in about 10 days, shortly after July 4th. The poor success of the first generation will have "ripple" effects on second generation, reducing the likelihood of severe second generation infestations. Remember last year: good weather during the second generation flight can make a tremendous difference. We'll just have to see what develops.

Black Light Trap Captures

A network of blacklight traps is maintained by food processing companies, seed companies, private research firms, the Minnesota Department of Agriculture's Plant Pest Survey program, and the University of Minnesota to monitor European corn borer and other moths. Captures in light traps are loosely related to moth density and are strongly affected by trap location (proximity to crops and moth action sites) and weather (evening temperatures, wind, dew fall, and rain).

Peak Captures Location	Last week 11-17 June	This week 18-24 June
EC		
Rosemount #1/#2	9/8	3/4
C		
Olivia	14	8
Gaylord	64	15
Arlington	19	8
Buffalo Lake	15	22
Bird Island	9	5
Fairfax	24	12
Willmar	2	6
Lake Lillian	18	12
EC		
Clear Lake	3	8
Rice	2	3
Big Lake	NA	7
WC		
Morris (WCES)	5	8
Fergus Falls	6.5	13.5
Montevideo	18	NA
Fairmont, ND	8	20
Twin Brooks, SD	15	11
SW		
Lamberton (SWES)	10	6
Lamberton (French)	3	7
Jeffers	20	38
Elkton, SD	15	16
SC		
Waseca - (SES)	NA	12
Waseca - Seneca	NA	NA
Henderson	18	9
LeSueur	17	8
St. Peter	8.5	4
New Ulm	70	NA
Hanska	10	6
Sleepy Eye	20	15
Blue Earth #1/#2	18/24	6/11
Stewartville	18	8
SE		
Stanton	23	29
Dodge Center	28	40
NW		
Crookston (NWES)	21	20
Moorhead	6	9

Ken Ostlie
Extension Entomologist

Corn Rootworm Feeding is Peaking

Corn Rootworm feeding is underway with eggs beginning to hatch about June 1. Second stage larvae should predominate the larval compositionon roots now with a few third stage larvae nearly completing their feeding and constructing pupal cells. Pupation of larvae should begin next week with adult emergence beginning in the third week of July.

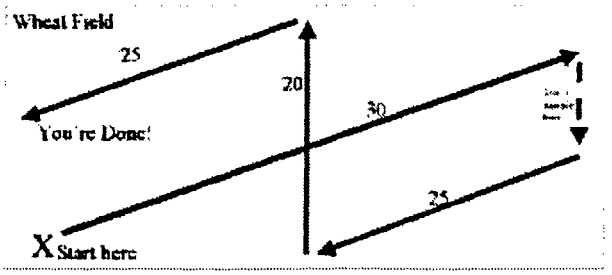
Ken Ostlie
Extension Entomologist

Aphids in Small Grains—is Tank Mixing with Fungicide Cheap Insurance?

The recent weather conditions in NW Minnesota have been favorable for increasing aphid populations and their numbers in small grains have been increasing, but not all fields have populations that warrant treatment. Because fungicide applications are also being considered right now, there have been questions about what insecticide to tank mix with either Folicur or Tilt. There has been little scouting of aphids and the feeling has been expressed that this is "cheap insurance". Is this really the case?

With wheat prices down in the $3 range, treatment thresholds for aphids have to be conservative (>83 out of 100 sampled tillers infested with aphids). Sampling for aphids in wheat really is as easy as a walk in the park – or at least a walk in a grain field. Simply walk the field, randomly selecting 100 tillers, ensuring they're representative of the entire field. As you collect tillers, examine them for aphids; keeping the tillers with aphids, tossing away the others. Then simply count the tillers you've collected. If 83 or more tillers are infested with aphids, an insecticide treatment is probably economically beneficial.

It takes approximately an hour to scout an 80 acre field. It would cost $480 to treat the same area with Penncap M.



Scouting pattern to evenly sample a field.

That cheap insurance may be costing you $480/hour for every 80 acres treated if the field doesn't require treatment! Also remember that different fields may have different aphid populations, so scout them all. Make informed treatment decisions—before you apply insecticide, scout the fields and establish whether they really require treatment.

Ian MacRae
Extension Entomologist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Yard And Garden Insects

Squash vine borer adults were reported last week. The best treatment to manage this challenging insect, is an application of Sevin dust weekly once adults are seen. We continue to hear about a small (1/4 inch) pale green weevil feeding mostly on the leaves of trees, especially in the east central part of the state. This weevil, known as *Polydrusus impressifrons*, has in at least one case been reported attacking garden flowers. These weevils are not likely to be causing much damage; in cases where plants are at risk, treat the weevils with carbaryl (Sevin).

We have started to receive reports of false Japanese beetles, *Strigoderma arboricola*, a native Minnesota insect. People sometimes identified them as Japanese beetles which is a quarantine pest in Minnesota. You can distinguish between these two similar beetles: false Japanese beetle is a golden green and lacks white spots on the tip and sides of the abdomen while Japanese beetles are a brilliant emerald green and has 12 white spots on the tip and sides of the abdomen. False Japanese beetles are reported in gardens feeding on a wide variety of flowers. Plants can be protected from large numbers of beetle with an application of carbaryl (Sevin).

There have been several reports of small (1/8 inch), dark-colored weevils eating small holes in hollyhock leaves. These insects are hollyhock weevils, *Apion longirostre*. The available information says the adults make small round holes in the leaves and lay eggs in flower buds. The larvae feed inside the seeds and eventually emerges as adults in August. Treat large numbers of weevils with carbaryl (Sevin). Cut and destroy stalks with infested seed pods.

Jeffrey Hahn
Asst. Extension Entomologist

Household Insects

We continue to receive a lot of calls and samples about *winged field ants* and *cornfield ants*. They typically start swarming in July but are early this year. We are also finding cornfield ants and *pavement ant* workers inside homes. Their activity in buildings seems to coincide with warm and humid weather. All three species live in the soil around or under homes. These ants are not destructive to homes and property and are just nuisances. Physically remove swarmers. For cornfield and pavement ants treat either the nest where you think they are coming from or treat around the foundation to help prevent

workers from entering the home. We continue to receive questions and samples about *larder beetles*. When people find larvae or both adults and larvae (which has usually been the case), this means there is an infestation. Larder beetles like to feed on dead insects and animals. However, their food source is usually in wall voids, chimneys or other inaccessible areas. Control is very difficult if the food source cannot be removed. We continue to receive a steady stream of calls and samples of small (1/8 inch), *reddish-brown weevils* (name unknown) that are getting into homes. They seem to be especially attracted to sources of moisture. They are harmless to people and property but they are also difficult to keep out homes. They are only a temporary nuisance and people should try to tolerate them.

Jeffrey Hahn
Asst. Extension Entomologist

Wild Fruit Samples

We're starting to get samples of wild fruit and berries sent into the Yard and Garden Clinic for identification. Aside from wondering if the fruit in question is edible, many people want to know if the tree or shrub it came from is a good candidate for growing in their home landscape.

One perennial question has to do with various prunus (cherry or plum) fruits, including some that develop from time to time on ornamentals that are grown primarily for foliage rather than fruit or flowers. **All cherries and plums are edible** and can be used for making jellies, juices or syrups. However, most are very astringent, and require the addition of lots of sugar to be palatable. (Sweet cherries are not hardy here.) They are not suitable for fresh eating. In addition, the stones or pits must be removed (sieved or strained out) as they are toxic when eaten.

Another common sample is from white mulberry, a tree that's characterized by its unusual leaves, some of which are lobed and some of which are not. Mulberry fruits look a bit like elongated raspberries, and are a favorite of birds that eat them and spread their seeds in their droppings. However, people also eat them fresh or process them the same as cherries. White mulberry fruits are not very flavorful, though.

White mulberry is an introduced tree, and is not very hardy. It can grow well (and fast!) for a number of years, then die rapidly after a particularly harsh winter. Only female trees bear fruit.

If you'd like to send in a plant sample for identification, enclose a description of where you found it, along with stem, leaves and berries or flowers **and** a check made out to the university for $5. Our address is Yard and Garden Clinic, 145 Alderman Hall, U of M, 1970 Folwell Ave., St. Paul, MN 55108.

Deborah Brown
Extension Horticulturist

Plum Pockets

If you are growing plum trees in your yard you may have recently noticed enlarged, deformed fruits. This deformity, commonly known as plum pockets, is caused by a fungus that infects the leaves and fruit of plum trees. Infection begins during periods of wet, warm weather in early spring as spores are released from infected, dead fruits. Later, infected tissue produces secondary spores, which continue the infection process.

Infected fruits usually appear yellow to brown/black in color, swollen, deformed, bladderlike, and/or hollow. Infected fruit may also be 10 times larger than healthy fruit and have a thick spongy flesh. Older, dry fruits, referred to as mummies, may drop from the tree prematurely or may remain hanging on the tree over winter.

Plum pockets can be controlled by maintaining tree vigor (properly watering and fertilizing), pruning infected branches to remove inoculum, and applying lime-sulfur as a dormant season spray.

Keep an Eye Out for Wilting Elm Trees

Dutch elm disease is still a common threat to elm trees in the Twin Cities and surrounding areas. New outbreaks of Dutch elm disease begin when bark beetles, carrying spores of the fungus, feed in the upper portion of the tree. Trees then try to defend themselves by producing defense compounds, which plug the water conducting tissue of the tree causing it to wilt. Once a tree is infected the disease can spread to neighboring elms by root to root contact. Symptoms of Dutch elm disease may appear in June, but become more prevalent in July and August. Newly infected trees appear wilted with yellow, curled, or dried leaves that later turn brown and fall from the tree. When the disease is initiated by beetle feeding, one main branch will wilt before the rest of the tree. The single wilted branch is known as a "flag". Infected branches also have a brown staining of the inner wood. Dutch elm disease is controlled and managed through a number of different practices including sanitation and eradication of infected and dying elms, therapeutic pruning of new infections, disruption of the root to root contact, chemical injections (as a preventative and curative), and planting of resistant elm varieties. In addition, many communities have a control program for identifying and removing infected elms.

Thinning Turf

Recently, the Yard and Garden Clinic has received many calls on thinning lawns. The symptoms reported include patches of dead and dying grass, and areas of thinning turf. Some of the dying grass plants have had spots on the leaves; others have not. Based on the samples received, the problem appears to be caused by either of two fungal leaf diseases: leaf spot or melting-out.

Since both of these diseases are promoted by improper cultural practices such as heavy nitrogen fertilization, excessive buildup of the thatch layer, and mowing the grass too short, it is important to try to maintain healthy turf. Management strategies should include fungicides only in combination with improved cultural practices, since lawn fungicides are not always effective in controlling fungal disease. Fungicides such as thiophanate-methyl, bayleton, or chlorothalonil may be effective in reducing the spread of disease if applied early.

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CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

La Nina

After nearly 15 months, El Nino has dissipated, only to be apparently replaced by La Nina. La Nina, meaning little girl, is in many ways the opposite of El Nino. It represents an abnormal cooling in the central and eastern equatorial Pacific Ocean, accompanied by stronger easterly surface winds, and dominance of high atmospheric pressure. Resulting changes in convection, tropical rainfall, and jet stream patterns tend to create some climate anomalies in the tropics and to a lesser degree in some mid-latitude locations.

The NOAA Climate Prediction Center forecasts suggest that a full fledged La Nina episode will develop by the fall, too late in the year to have any real impact on the 1998 growing season.

As with El Nino most of the unusual climate tendencies seen in Minnesota during La Nina episodes are during the winter months, which tend to be colder than normal. Less is known about the overall climate impacts of La Nina episodes, because there have only been 15 episodes during the 20th century (compared to 23 El Nino episodes). Undoubtedly, more questions about La Nina will arise during the year.

More information on La Nina can be found at the following web sites...

http://nic.fb4.noaa.gov:80/products/analysis_monitoring/ensostuff/index.html
(routine updates from the Climate Prediction Center)

http://www.pmel.noaa.gov/toga-tao/la-nina-story.html
(Pacific Marine Environmental Lab-Tropical Atmosphere/ Ocean Research)

Mark Seeley
Extension Climatologist

Highlights . . .

Those Yellow Soybeans

During the past 10 days as I've driven across Minnesota, I've seen many soybean fields that have the yellow color that is evident in many years. There is general agreement that this yellow appearance is usually caused by one of two factors (cyst nematode, iron chlorosis). The above ground appearance of the soybean plant is the same for both possible causes.

The examination of the root system with a small hand lens will detect the cysts if they are present. If no cysts are found, the yellow color is probably caused by iron chlorosis. The problem of iron chlorosis is usually associated with soils with a high pH and growing conditions are cool and/or wet. This chlorosis is not caused by a deficiency of iron in the soil. There is an ample supply. Under these conditions, however, the soybean plants are not able to absorb amounts needed for adequate growth and development.

Once the symptoms appear, there is no quick and easy cure for iron chlorosis. There are some management practices that can be used to keep damage from this problem to a minimum. The most effective practice is the ***selection of varieties*** that are tolerant of this condition. Most seed companies have a rating system for tolerance to iron chlorosis. Choosing a tolerant variety should be the first important step in minimizing yield loss from this problem.

Cultivation seems to help minimize the severity of the problem. If iron chlorosis is a problem, adjust row spacing so that cultivation is an option.

In some situations, the ***foliar application of an iron chelate*** may help. The treatment, however, is expensive and timing is important. Past research in Minnesota has shown that application of the chelated material at the third trifoliate stage of development is important. There are, however, no guarantees that this treatment will work.

Some have suggested that the use of ***ammonium sulfate*** will correct the problem by reducing soil pH. Results of trials at several locations in western Minnesota showed that the use of this fertilizer, either broadcast and incorporated, or applied in a band had no effect on the incidence or severity of iron chlorosis.

Researchers continue to look for management practices that might be used to overcome this problem. Some new ideas show promise. Perhaps we will overcome this problem in the near future.

George Rehm
Extension Soil Scientist

A New Web Page

In recent months, there has been increased interest in soybean nodulation, inoculants, etc.. There is a web page to help answer questions and provide information on this topic. The address is: http://www.rhizobium.umn.edu

George Rehm
Extension Soil Scientist

Blacklight Trap Captures

The blacklight trap at Crookston continues to capture low numbers of armyworm and European corn borer moths. The individual catches per night are:

Date	armyworm	ECB
June 11	3	1
12	19	7
13-15	11	21
16	1	7
17	13	8

Over the next week scouting for armyworm larvae should intensify. This insect is easily detected in wheat and barley with a sweep net and you should be checking upper leaves for leaf notching. The action level for control is 5 armyworm larvae/sq foot.

Insecticide comparisons haven't be done in several years but trials conducted in 1984 show the labeled compounds are very effective. The following table is a summary from a trial conducted in Chippewa county by Dave Noetzel former extension entomologist at the U of M.

Treatment	Rate/acre	% control (24 hour)
Penncap	1 qt	100
Pounce	4 oz	100
Pydrin*	6 oz	95.7
Lorsban	1 pt	92.9
Sevin XLR	3 pt	91.4

* Pydrin no longer manufactured but Asana contains same active ingredient

Warrior insecticide was not included in these trials but I would guess that armyworm control from this insecticde would be very good.

Carlyle Holen
IPM Specialist NW Minnesota

Closing Out CCC Crop Loans

Lower grain prices following the 1997 crop year increased the amount of bushels placed under the 9-month CCC Loan Program. As of March, 1998, Minnesota had 22,283 nine-month commodity loans disbursed statewide on all commodities. The outstanding loan principle on these loans was $713,405,693. Minnesota ranks second in the nation behind Iowa in total commodity loan volume. Table #1 shows the top ten County Farm Service Agency (FSA) office, out of the 90 FSA offices in Minnesota, for the amount of commodity loan principle as of March 1998.

The volume of bushels indicated in Table 1 for the top loan volume counties shows that there is a significant amount of grain still under CCC loan in farm storage. Most producers have been holding off on marketing the grain and closing out the CCC loans, hoping for a price rally sometime in June or July. Unfortunately, we have not seen that price rally up to this point.

Most of the CCC crop loans for corn and soybeans will expire in July, August, and September. By the end of the loan period, growers must liquidate the CCC loans by

Table 1. Top Ten CCC Loan Counties In Minnesota.

Rank	County	# of Loans	Bushel Quantity	Principle
1	Martin	747	12,498,476	$29,509,824
2	Renville	708	11,469,614	$27,490,198
3	Blue Earth	670	10,977,778	$26,682,563
4	Redwood	714	9,107,942	$22,370,378
5	Faribault	605	9,597,080	$22,167,458
6	Freeborn	561	9,682,010	$21,611,794
7	Mower	557	9,110,140	$21,600,254
8	Waseca	534	9,330,929	$21,528,006
9	Cottonwood	596	7,596,678	$18,950,386
10	Swift	532	7,585,483	$18,398,933

one of the following three methods:

✓ Repay the CCC loan principal (County Loan Rate) plus interest.

✓ Repay the CCC loan at the "Posted County Price" (PCP), if the PCP is lower than the loan rate plus interest.

✓ Forfeit the grain, instead of repaying the loan.

Following are some examples showing the net result of repaying the CCC corn loans with various methods:

Example #1—Repay the CCC Loan Plus Interest

* This option will normally be the option used if cash market prices are higher thanloan repayment plus interest ($1.85/Bu. in this example)
* **Assumptions:**
  $1.80/Bu. Loan Rate
  $ .05/Bu. Accrued Interest
  $2.00/Bu. Cash Corn Price (Example #1)
  $1.70/Bu. Cash Corn Price (Example #2)
* **Calculations:**
  $1.80/Bu. Loan Rate (Borrowed)
  $1.80/Bu. Loan Rate (Repaid)
  $ .05/Bu. Accrued Interest (Paid)

$ .05/Bu. Cost of the Loan

$2.00/Bu. Cash Corn Price
$ .05/Bu. Cost

$1.95/Bu. Net Corn Price

Example #2 — Loan Repayment At the Posted County Price (PCP)

* This option will normally be used when the PCP is lower than the CCC loan rate plus interest ($1.85/Bu. in this example).
* Calculations:
  $1.80/Bu. Loan Rate (Borrowed)
  $1.70/Bu. PCP (Repaid)

$ .10/Bu. Gain

$1.70/Bu. Cash Corn Price
.10/Bu. Gain

$1.80 Bu. Net Corn Price

* If the cash corn price is higher than the PCP, there could be a slight gain above the loan rate

* Calculations:
  $1.80/Bu. Loan Rate (Borrowed)
  $1.60/Bu. PCP (Repaid)

$ .20/Bu. Gain

$1.70/Bu. Cash Corn Price
$ .20/Bu. Gain

$1.90/Bu. Net Corn Price

Example #3 — Forfeit The Grain After 9 Months

* Forfeiture of the grain should only be used as a last resort, because there is usually an advantage to repaying the loan plus interest or to utilize the PCP.
* **The result of forfeiture in this example would be the $1.80/Bushel loan rate.**

BOTTOM LINE

✓ Start pushing a pencil to look at various options for CCC loan liquidation.

✓ Learn how the PCP price option works in the event that grain prices drop low enough to utilize the PCP for liquidating CCC loans. (We are currently within $.10 to $.20 per bushel on corn in many counties.)

✓ Paying the CCC loan back plus interest is usually the most profitable option, because that means cash grain prices are above that level. Watch for rallies in the grain market before your CCC loan matures and take advantage of those rallies.

✓ If you plan to feed the corn under CCC loan and the cash corn prices continues to drop, it may be wise to liquidate corn bushels as you need them. It is still possible that the PCP could drop lower than the loan rate plus interest, resulting in a slight gain on the corn liquidated for feed purposes.

✓ Avoid forfeiture of the grain under CCC loan, if possible. Forfeiting the gain is usually the least profitable option.

✓ If there are questions on liquidating CCC loans, PCP's, or other details on crop loans, contact your County Farm Service Agency Office.

Kent Thiesse
Blue Earth County Extension Educator

Foliar Fertilization of Vegetable and Fruit Crops with Micronutrients

Foliar fertilization is an effective means of supplying micronutrients to plants when soil conditions are such that micronutrient availability is restricted. The practice of foliar fertilization involves spraying a solution directly to the leaves. Micronutrients most frequently applied as a foliar spray include iron (Fe), copper (Cu), manganese (Mn), and zinc (Zn) and boron (B). The need for applying these nutrients should be based on one or more of the following criteria: 1) soil tests, 2) tissue analysis, 3) visual symptoms, and 4) crop being grown.

In Minnesota, soil tests are particularly well calibrated for B and Zn on all soils and for Cu on organic soils. The soil tests for Fe, Mn, and Cu on mineral soils are not well calibrated and soil pH is often a better indicator for the need of these nutrients than the individual soil test for each nutrient. In general, availability of these three micronutrients decrease as soil pH increases. Tissue analysis is useful to detect deficiencies for B, Zn, Cu, and Mn but is less reliable for Fe. Problems with the Fe tissue test are related to contamination with soil or dust and an apparent accumulation of iron in chlorotic leaves that is not active. Visual symptoms are usually distinct for each micronutrient and generally occur on the youngest tissue first. Different plant species differ in their susceptibility to micronutrients and these differences should be taken into account before an application is made.

Advantages of foliar applications compared to soil applications are: 1) the cost of application is usually less, 2) no tie up by soil reactions, and 3) faster response time. There are, however, some serious disadvantages of foliar application: 1) greater chance of toxicity, 2) repeated applications within the growing season are often required that increase costs, and 3) results can be inconsistent due to incomplete spray coverage or applying the material too late in the growing season.

Numerous products are available to supply soluble micronutrients for foliar fertilization, often leading to confusion about what materials are most effective. For boron, soluble inorganic salts such as sodium borates (e.g. Solubor) at rates of 0.1-0.2 lb B/A are the most effective for foliar application. Boron is highly soluble and does not precipitate. For the other micronutrients, additional compounds are often included to delay or prevent precipitation and improve translocation within the plant tissue.

A micronutrient labeled as "sequestered" means that a material is added to suppress the ability of the micronutrient to react. As an example, if iron is added to a high pH solution, the iron will precipitate as iron hydroxide. Sequestered iron will remain in solution for a longer time without precipitating. In most cases, sequestration is achieved by adding a chelate.

A chelate is an organic compound that combines with a metal ion forming a ring structure. The metal chelates are soluble in water. The term sequestering agent is often used synonymously with chelating agent. Types of chelates available include synthetic organic compounds such as EDTA, DTPA, and EDDHA which have strong binding abilities. Natural organic compounds can also be used to chelate metals. These include lignosulfates, polyflavanoids, and phenols, which are by-products of the paper industry. Various amino acids have also been reported to have chelating activity. These chelates generally have weaker binding with metal ions than the synthetic chelates. Weakest chelating activity includes smaller organic molecules such as citric acid and ascorbic acid. Differences in binding with metal ions are an important consideration for soil applications of the micronutrient, but are less important for foliar application. The synthetic chelates tend to be more phytotoxic than the natural or smaller organic compounds. Translocation of micronutrients applied in the chelated form has been reported to be better compared to an application as the inorganic salt. Studies comparing the effectiveness of the various different chelates in supplying micronutrients fro plant growth are some what inconclusive. In general, the decision on what micronutrient form to use for foliar application should be based on cost. Be sure to follow the label instructions for application rates and timing.

More information about: rates of micronutrients to apply, differences in micronutrient demand by crops, typical deficiency symptoms, and tissue sufficiency ranges can be found in BU-5886, *1996 - Nutrient Management for Commercial Fruit and Vegetable Crops in Minnesota.*

Carl Rosen
Extension Soil Scientist, Horticultural Crops

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Rose Chafers

We have received a few samples of rose chafers lately. Rose chafers are slender beetles, about 1/3 inch long. They have tan bodies, long, spiny reddish legs and soft, leathery shells. Rose chafers typically emerge as adult beetles starting in late-May (in central Minnesota), although theywere out earlier this year. They live about a month with only one generation a year. You typically find rose chafers in areas of sandy soil (that's where they prefer to lay eggs).

Rose chafers feed on the leaves of a wide variety of flowers, fruits, and vegetables. They skeletonize leaves (feeding on one layer of leaf tissue, except for the veins) giving foliage a transparent and lacey appearance. Later, damaged areas turn brown. They also love to chew ragged holes on flower blossoms, especially peonies and roses,

and can be found feeding on the fruit of grapes, strawberries, and raspberries.

You can keep rose chafers away from your plants by setting up a cheesecloth barrier around your garden, making it taller than the plants. Rose chafers fly over the barrier but do not land inside. If you don't use a barrier, try handpicking and destroying small numbers of rose chafers. If you find too many to handpick, try an insecticide, such as acephate (Orthene), carbaryl (Sevin), or malathion.

Field Ants

We have received several samples of winged male field ants in and around homes. Only the males and the new queens have wings. Males often emerge first with queens following in a day or two. Field ants don't nest inside homes but form colonies in the soil. If their nest is near or under the home, you could find these ants indoors. In one case, a homeowner was finding 100's of swarmers indoors in the foyer. Apparently they ants were coming up from the basement, perhaps through the walls.

In some cases, these insects are confused for flies. You can tell the difference because ants have a 'waist' between the thorax and abdomen while flies are more broadly joined. Ants also have 4 wings while flies only have 2. People can easily think they have carpenter ants when they see field ant swarmers as they are a similar size and color. Carpenter ants typically swarm in spring and reproductives would not be expected to be out now. The only other method to distinguish between the two winged ants is for someone familiar with wing venation to look closely at the wings to detect the small differences in the wing venation.

Field ants are nothing more than nuisances. In one case, a homeowner found sand and other debris that workers apparently expelled from the nest to allow the swarmers to leave the nest more easily. You can take care of swarmers indoors with a vacuum or a can of insecticide labeled for flying insects (e.g. something with an active ingredient of pyrethrins, tetramethrin, or resmethrin). You can ignore any swarmers that are found outside.

Jeffrey Hahn
Asst. Extension Entomologist

Plants Show up with Herbicide Injury, Spray Damage

The Yard and Garden Clinic has had numerous calls and samples of landscape and garden plants suffering from herbicide or spray damage. Windy weather is responsible for off-target drift of weed-killers showing up quite a distance from where they were applied..... across the street or down the block several houses, or anywhere halfway close to a farm field. Higher temperatures make the problem worse, since herbicides are more volatile as temperatures rise.

Not all herbicide injury is from spray drift. It occurs when there is root uptake of certain products, as well. Weed and feed combinations containing dicamba can move into feeder roots of young trees and shrubs, even though they were applied to the lawn. Heavy applications or pounding rain following application will drive the chemical into the root zone where it can cause trouble.

We also saw some onions with crimped leaves that were grown in a garden where Preen (the pre-emergent herbicide, Treflan) was applied. Trouble was, onions were not on the Preen label.

Except for an occasional spot treatment, it's probably best to wait for autumn to apply any more herbicide. Instead, concentrate on good lawn care so weeds don't flourish at the expense of the turfgrasses. Garden weeds should be hoed or dug at this point. Except for using grass killers in flower gardens, herbicides should not be considered.

Not all foliage problems are attributable to herbicide. We have seen some injury from fertilizer spray. In hot weather it's not a bad idea to follow foliar fertilizer applications with a light watering to make sure the nutrients reach the soil where roots may pick them up. Left on the leaves, you can get spotting and burning if the solution is mixed a little too strong and/or temperatures are high.

Deborah Brown
Extension Horticulturist

Bacterial Diseases of Garden Beans

There are three common bacterial diseases of garden beans: common blight, halo blight, and brown spot. All three of these diseases are able to infect both the leaves and pods of bean plants, and are most severe during rainy periods or periods of high humidity. Common blight and brown spot are usually considered warm season diseases, while halo blight is considered a cool season disease. However, all three diseases may occur at the same time.

Since all three diseases may occur at the same time and have similar symptoms, it can be difficult to identify which bacterium is causing the problem. Common blight initially appears as small dark green, angular spots on the leaves and brown, circular spots on the pods. Spots occurring on both the leaves and pods will later enlarge and turn brown. Halo blight appears on the leaves as dark-green, round spots with a yellowish-green halo, and as red-brown spots on the pods. Spots on the leaves eventually die and disintegrate leaving a hole. Brown spot appears as small, brown spots on the leaves and small, round spots on the pod that cause the pod to bend and twist. Later spots on the leaves dry and disintegrate leaving holes in the leaf.

All three of these bacteria are introduced into the garden from infected debris overwintering in the soil or on infected seeds. Bacteria can also be splashed by driving rain from infected debris surviving in neighboring gardens. After bacteria have infected healthy plants in the garden, they continue to spread by means of splashing water, insects, plant to plant contact, or people.

Fortunately, control measures are the same for all three diseases. To help prevent bacterial diseases from infecting beans, remove and destroy infected leaves and/or plants as they appear, water plants at ground level in the morning, and do not work in the garden when plants are wet. In addition, copper fungicides may be applied to help prevent the spread of bacteria. Fungicides will help prevent the infection of healthy tissue, but will not cure infected leaves or seed. Always, read the directions on the label before using fungicides.

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MINNESOTA CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

Timing of Weed Control

The early start to the 1998 crop season and the subsequent lack of rainfall in southwest Minnesota provides new challenges to an already complex weed management strategy for corn and soybean producers. The commercial availability of new technologies allows the use of herbicides on herbicide resistant crops. Examples of these technologies include corn hybrids, which can tolerate the herbicides Pursuit, Liberty, Roundup, or Poast, while in soybeans we have varieties which can tolerate Liberty, Roundup, Poast, and higher dosages of Pinnacle and Classic.

There are numerous attributes which herbicide resistant crops offer. Effective broad spectrum weed control, reduced crop injury potential, and reduced carryover concerns are but a few. However, the lack of residual control of many of the products used in a post-emerge weed control program means that the timing of application is important. The weeds must be eliminated after nearly all have emerged and before their competitive presence reduces crop yield potential. Several factors complicate the herbicide application timing consideration.

First, all weeds do not emerge at the same time. The time of weed flush varies by position of the seed in the soil profile, as well as type of weed. For example, common lambsquarter and giant ragweed emerge and develop much earlier than tall waterhemp. For a field with a diversity of weeds, it is unlikely that a one time application could be properly timed, making split or multiple applications necessary.

Secondly, the early planting date this year is good management from the yield potential standpoint, but also exposes the crop to weed competition for a longer period of time. In other words, early planting dates have lengthened the weed control season. In addition, tillage prior to planting occurred prior to weed emergence, putting additional pressure on the after planting weed control plan.

Finally, the dry weather in May and early June in southwest Minnesota can dramatically influence the post emerge weed control plan. This was demonstrated in 1997 in identical studies of a one pass post emerge weed control studies at the Waseca and Lamberton University Experiment Stations. The difference in the studies was moisture received between planting and mid-June. At the Waseca site, precipitation was adequate (3.1 inches); at Lamberton precipi-

Highlights . . .

Timing of Weed Control/Continued

tation was short (.60 inches). The result was that the one pass post emerge weed control program at Waseca was successful, at Lamberton it was not. Lack of rainfall dramatically influences the one pass weed control strategy.

The bottom line is that this year's weeds need to be controlled longer, shortly after their emergence and before their competition for moisture and nutrients reduces the yield potential of the crop. The practical recommendation for this year is to reduce by half the maximum height of weeds controlled by the post emerge herbicide and plant split or multiple applications of the product.

Bob Byrnes
Extension Educator

Cold Weather and European Corn Borer Status

Cold weather of the past week has put a damper on adult activity. Moth activity, as measured by light traps, is virtually nil once temperatures drop below 50 degree F. Obviously there were several nights over the last week when very little flight activity occurred. Compared to last week, light trap captures have plummeted markedly (see table). The timing of this cold weather raises the question of whether the peak had actually occurred or was created artificially. Heat unit accumulations through last week exceeded the 600 degree day (base 50 degree F) estimate for peak emergence so I suspect the peak had occurred already.

What impact did this weather have on the corn borers? Probably very little, other than to suspend egg laying and lengthen egg development time to hatch. Field observations in the Rosemount and Rochester areas indicate extremely low levels of infestation (<5% plants shotholed) at this point. Survival of larvae seemed good with 1 to 5 larvae per shotholed plant. As temperatures warm look for moth activity to rebound slightly in traps and shotholing to become more prevalent. Continue scouting.....we're not out of the woods yet on first generation. The typical treatment window is between 800 and 1000 degree days, about 250 degree days after hatch. Remember the objective is to let hatching borers accumulate as long as possible in the whorl and yet treat before 3rd and 4th stage larvae tunnel. The best time to treat whorl stage corn is usually when the bulk of the population is 2nd stage larvae.

Besides spring weather, disease and parasitism on overwintering larvae is reflected in this year's generally lower peak captures. Last fall overwintering borers were collected from 8 locations around the state to examine biotype status. Interesting differences in survival to pupation were observed (see table below).

Location	% Mortality
Rochester	42.5
Waseca	76.6
Lamberton	96.0
Rosemount	40.6
Litchfield	74.2
Morris	40.4
Fergus Falls	28.2
Crookston	36.3

Survival was generally better in WC and NW Minnesota with some very high mortality at southern locations such as Lamberton and Waseca. At this time I don't know how representative these results are for the whole area and what they mean for flight intensity during the first and univoltine moth flights.

Black Light Trap Captures

A network of blacklight traps are maintained by food processing companies, seed companies, private research firms, the Minnesota Department of Agriculture's Plant Pest Survey program, and the University of Minnesota to monitor European corn borer and other moths. Captures in light traps are loosely related to moth density and are strongly affected by trap location (proximity to crops and moth action sites) and weather (evening temperatures, wind, dew fall, and rain).

		Peak Captures	
Location		Last week	This week
EC			
	Rosemount #1/#2	77 / 192	0.5 / 4.5
C			
	Olivia	29	9
	Gaylord	210	50
	Arlington	NA	19
	Buffalo Lake	NA	1
	Bird Island	NA	2
	Fairfax	NA	3
	Willmar	NA	5
WC			
	Morris (WCES)	5	2
	Fergus Falls	4	NA
	Montevideo	59	6
	Fairmont, ND	8	NA
	Twin Brooks, SD	11	1
SW			
	Lamberton (SWES)	48	0
	Lamberton (French)	NA	6
	Jeffers	4	18
	Elkton, SD	40	1
SC			
	Waseca - (SES)	—	7
	Waseca - Seneca	NA	3
	Henderson	47	21
	LeSueur	125	2
	St. Peter	78	2.5
	New Ulm	172	NA
	Hanska	100	NA
	Sleepy Eye	70	NA
	Blue Earth #1/#2	66/NA	8/16.3
SE			
	Stanton	NA	14
	Dodge Center	NA	15
NW			
	Crookston (NWES)	18	9

Ken Ostlie
Extension Entomologist

Aphids Found in the Region

NDSU scouts have found the first aphids on small grains in the region this past week. Fields in the southeastern part of the state showed low levels of the insect. Associated with the presence of the aphids were symptoms of Barley Yellow Dwarf Virus or BYDV. Aphids are an economic pest in small grains as they rob the plants of nutrients with their feeding activity. A second problem with aphids is that they are a vector for BYDV. Symptoms of BYDV are somewhat ambiguous and depend not only on the cultivar and the time of infection, but also on the environmental conditions. In severe cases, when infections occur in the seedling stage, plants can die or plants will become severely stunted and discolored. The root system in such cases is under developed. Late infections will cause a yellowed or reddened flag leaf on otherwise normal plants. Especially early infections are a cause for concern as the stunted, discolored plants will not contribute much to grain yield. Timely control of aphids is the only control option to reduce the impact of BYDV, since feeding aphids have fewer opportunities to transmit the virus and cause more plants to be infected with the virus.

Fields should be scouted for aphids early in the growing season (now) and continue through to heading. Select 100 tillers from each field, make sure the tillers represent the overall area of the field rather than taking all 100 from one location. If more than 83 tillers have one or more aphids, treatment is probably economically beneficial. In cases where BYDV may be occurring, lower economic thresholds may be advisable. Insecticides registered for use against aphids on small grains in Minnesota include Penncap M, Lorsban 4E-SG, Dimethoate, Malathion 5EC. Treatment is not recommended after wheat has headed as most aphid damage has already occurred. Cooler summer temperatures contribute to the development of aphid populations.

Jochum Wiersma, Small Grain Specialist
Ian MacRae, Extension Entomologist

Orange Wheat Blossom Midge Adult Emergence Approaching!

Although recent summer weather has been cool, the degree-day threshold for the emergence of Orange Wheat Blossom Midge (OWBM) adults is approaching. Ten percent of males emerge at 1100 dd with emergence continuing to approximately 1600 dd, females begin to emerge at approximately 1300 dd. Currently, we have accumulated approximately 1075 dd in the southern Red River Valley and 950 dd in the north. Initial emergence of males might occur by this weekend (June 13, 14). Female midge fly over the crop canopy at dusk, looking for suitable wheat plants on which to lay eggs. Temperature must be above 59 degrees F and the wind below 6 mph for females to fly. Scouting for females in wheat fields should be considered on warm, still evenings early next week (after June 15). Treatment thresholds (1 adult per 4-5 wheat heads) can only be determined by scouting for females in the field; other monitoring methods, such as sticky traps, have not been proven to be effective estimators of OWBM populations. Lorsban 4E-SG is still labeled in Minnesota under a Section 18 registration for use against OWBM. The plantsare most susceptible at anthesis. Wheat-on-wheat fields which are flowering should be the first candidates for scouting.

Jochum Wiersma, Small Grains Specialist
Ian MacRae, Extension Entomologist

Leaf Rust Detected

Marcia McMullen from NDSU has found several incidences of leaf rust on both spring and winter wheat in the region. As with aphids, rust spores come into the area with southern winds moving the spores from the southern winter wheat states. Most of our spring and winter wheats have excellent genetic resistance against the disease. However, a new race of leaf rust, called the T-race, is virulent to some of our spring wheats. This race has become more prevalent in the winter wheat area and was detected last year in our area as well. The presence of the disease in this area at this point in time is an alert to closely monitor the disease progress. Some of the varieties which are more susceptible to the T-race are P2375 and AC Barrie, two varieties which are widely grown. As with the other leaf diseases, the optimum time for control of leaf rust is at Feekes 8 to protect the flag leaf. Work in Kansas has shown that delaying control is possible if the disease is not advancing rapidly. This would open the door for a heading application with Tilt or Folicur.

Jochum Wiersma
Small Grains Specialist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Cool Days, Cool Nights Slow Garden Growth

When you garden in Minnesota, you've always got to be prepared for Mother Nature to throw you a curve. This year it seems more like a boomerang!

We couldn't quite believe it when winter weather gave way to a mild/warm/even hot/spring. Then when June rolled around, we went back to chilly temps again, dropping down to freezing night temperatures in some parts of the state and coming quite close, even in the Twin Cities.

Needless to say, this reversal of temperatures slammed the brakes on gardens that had gotten off to such a fast start not too many weeks ago. Heat-loving vegetables such as tomatoes, peppers, and melons may not have been visibly damaged by frost, but the cold temperatures have slowed them down to the point where it's going to take quite a few warm, sunny days to get them moving again.

What can you do? Not a whole lot. If you haven't mulched your gardens yet, wait until sunny days have warmed the soil again before applying any. Reduce the frequency of liquid fertilizer applications to flower beds and containers. When cool damp weather slows plant growth, the need for nutrients is diminished.

On the other hand, if you've experienced lots of rain and you garden on sandy soil, you may need to replenish those nutrients, particularly nitrogen, sooner. Take your cue from foliage color and fertilize if it looks pale.

Deborah Brown
Extension Horticulturist

Diseases of Geraniums

Geranium, one of the most commonly used bedding plants, is susceptible to a variety of different diseases. These diseases may appear on the stem, leaves, or roots of the plant at different times throughout the growing season. Listed below are two common diseases that you may encounter.

Rust

Geranium rust, a fungal disease that occurs only on geranium, causes small, round, yellow spots on the bottom side of the leaf and pale yellow spots on the upper surface. Infected leaves later produce brown colored bumps (pustules) on the yellow spots on the bottom side of the leaf. Heavily infected leaves may turn yellow and drop prematurely. Spores produced on pustules are splashed by water to uninfected leaves. Rust can be controlled by preventing the leaves from becoming wet, properly spacing plants, removing infected leaves and plants, and spraying with fungicides such as chlorothalonil or mancozeb.

Bacterial Blight

Bacterial blight is also known as bacterial stem rot and bacterial leaf spot. Bacterial blight usually begins as a leaf spot disease. The bacteria then progress through the petiole and into the stem causing the leaves to wilt and the plant to die. Infected leaves usually wilt in an angular pattern, while infected stems usually discolor and rot. Blight can be spread from infected plants to healthy plants by contact, water, or white flies. Avoiding water splash, using sterilized soil and tools, removing infected leaves and plants, and rotating geraniums in beds can control blight. Fungicides like Bordeaux Mixture may also help prevent the disease from spreading to healthy leaves.

Ascochyta Stem Rot of Clematis

As a result of the cloudy, rainy weather that occurred over the last week, we may see more wilting clematis in the home landscape. Clematis is susceptible to a number of different diseases; however, Ascochyta stem rot is the most serious. Ascochyta is a fungal disease that produces spores in the spring and early summer during periods of wetness. These spores infect healthy stems near the soil. Eventually lesions enlarge and girdle the stem causing individual shoots to wilt, the stem to rot, and the plant to die.

Diagnosis of Ascochyta stem rot may be difficult since the fungus survives and reproduces in the lower portion of infected stems. Control measures should include removing and destroying infected stems, increasing ventilation, and applying fungicides containing thiophanate-methyl (Cleary's 3336). Read directions on the fungicide label for more detail.

Chad J. Behrendt
Extension Educator

Entomology Notes

Yard and Garden

Sawflies have been a very common call lately. We received our first call of pear slug recently. This black, slug-like sawfly skeletonizes the leaves of cherry, plum, pear, mountain ash, cotoneaster and others, giving damaged leaves a lacy or transparent look. Skeletonized leaves later turn brown. Pear slug feeding normally does not kill landscape plants, although the appearance can be affected. Pear slug grows to be ½ inch full grown length; the best time to treat pear slug is when the sawflies are 1/4 inch length or less. A second generation occurs generally in August. We are also getting calls about full grown (3/4-1 inch long) yellowheaded spruce and mountain ash sawfly larvae. There is one generation of yellowheaded spruce sawflies while a second generation of mountain ash sawflies occurs in August.

We have encountered several insects feeding on trees and shrubs that are uncommon or rare in the landscape. We have received several reports of plum webspinning sawfly, including Pipestone Co. (southwest Minnesota). These larvae feed gregariously (in nonsocial groups) and web leaves together similar to fall webworm. These sawflies are usually not common insects, but when numerous, their defoliation can be severe. Healthy, well-established woody plants would not be greatly affected. Contact insecticide sprays would not be effective as the sawflies are protected inside the webbing and leaves. A systemic insecticide, e.g. acephate (Orthene), would be effective but its label probably does not include plum. Physical removal would be effective as long as not too many branches are being removed. We have received reports from Koochiching and St. Louis counties (north east Minnesota) of Polydrusus impressifrons. This insect is a pale green, slender, 3/8 inch long weevil. It was observed feeding on the leaves of oak, maple, and rose. The literature reports this weevil attacking many hardwoods, including willow, poplar, birch, apple, and plum. This insect can also be a nuisance by accidentally entering buildings. A sample was submitted from Clearwater Co. (north west Minnesota) of 1/8 inch long, iridescent blue, beetle. It was identified as a flea beetle, a type of leaf beetle. The literature and the Insect Museum verified this insect as the elm flea beetle, Altica carinata. This beetle is rarely present in the landscape, and management should not be necessary. If unusual circumstance exist, treat adults as you would leaf beetles.

We continue to receive questions on ash plant bugs and elm leafminers. Although grasshopper numbers are relatively low at present, it is expected that many areas will see above average to high numbers of grasshoppers in home gardens.

Household

We are answering a lot of questions about carpenter ants. People usually find them indoors and wonder where they are coming from and what to do about them. Locating the nest is very important in controlling carpenter ants. Signs that can help you find a nest include coarse sawdust, moisture damaged wood, swarm of winged ants, large number (20 or more) workers in an area, or a sound similar to rustling of leaves or crinkling paper. You can also try to follow the carpenter ants in the hopes that they will lead you back to their nest. Because nests are usually concealed behind walls or other voids, their control is often best left to an experienced pest control operator. We continue to receive a consistent number of calls about Indianmeal moths. This small brown moth is a pest in dried food products and is the most common type of moth found in homes. We received a sample of a seed weevil which is a less common type of dried food product pest. It is normally found infesting dried legumes, such as beans and peas. Sanitation is the best control for both Indianmeal moths and seed weevils. We also received a sample of a wood-boring weevil, Hexarthrum ulkei, attacking the wood around a window. These are uncommon insects in homes. They would be treated similarly as you would control powderpost beetles. Effective chemical treatment is best done by an experienced pest control company.

Chad J. Behrendt
Extension Plant Pathologist

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MINNESOTA

CROP NEWS

Vol. 4
No. 12

From the Crops System Team of the Minnesota Extension Service

Evapotranspiration (ET) Information

Crop and turf managers can now get daily crop water use "ET" information on color contoured statewide maps from the World Wide Web internet by linking to one of the following WEB pages:

Minnesota & Wisconsin:

http://www.soils.agri.umn.edu/research/climatology/doc/agwx.html

and Red River Valley & North Dakota:

http://www.ext.nodak.edu/weather/cropwater/

The Minnesota and Wisconsin ET daily statewide map gives only a reference ET potential. For a specific crop, the daily ET value must be taken times a crop coefficient that is dependent on growth stage. Generally, once a plant's canopy has nearly closed its coefficient is equal to one. For some crops the coefficient may increase to around 1.1 during a period of critical growth development like in corn between late pollination and early dough stages and then decrease to around 0.5 near maturity.

For lawns, daily ET will be approximately 80 percent of the daily ET potential on the map.

The WI-MN ET maps are created and managed by University of Wisconsin Extension Soils Scientist, Bill Bland. The reference ET daily contour maps are generated using data from airport automatic temperature recording stations across the state and solar radiation estimations calculated from a GOES satellite daily derived insolation maps.

Daily crop ET estimations based on local high temperature only are also available in *Irrigation Scheduling-Checkbook Method*, FO-1322, which is for sale through local extension offices. ET information can also be managed with computer software programs like WISDOM or PC-Irrigate. WISDOM was developed at University of Wisconsin and is sold through Gempler's (phone #800-874-4755) and PC-Irrigate from the University of Nebraska (phone #402 472-4259).

For more information on how to use daily crop ET information, contact Jerry Wright, Extension Engineer, at the West Central Experiment Station in Morris, MN (320) 589 -1711 or your local county extension office.

Jerry Wright
Extension Engineer

Highlights . . .

Daily Crop "ETs" Available Over Local Hotlines

This summer irrigators and crop advisors in central Minnesota near the Park Rapids, Perham, and Staples area can obtain estimated daily crop water use "ET" information for alfalfa, corn, dry beans, potatoes, and turf via telephone hotline messages any time of the day.

Park Rapids @ (218)732-1963—Hubbard SWCD office

Perham @ (218)346-4260 ext 123—East Otter Tail SWCD office

Staples @ (218)894-347— Central Lakes Ag Center

Keeping track of the crop's daily ET use and regular in-field soil moisture checking can go a long ways in help an irrigation operator optimize the crop's growth while minimizing the potential for leaching of some crop inputs like nitrogen into the groundwater.

These daily ET values best serve the user if recorded on a calendar log, like an irrigation checkbook worksheet, for quick reference when making your irrigation decisions. Consider assigning the calling task to one of the members of your family. Copies of these recording forms can be obtained from the respective hotlines of local county Extension or SWCD offices.

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

For more information on how to use daily crop ET information contact Jerry Wright, Extension Engineer, at the West Central Experiment Station in Morris, MN (320) 589 -1711, or your local county extension office.

Jerry Wright
Extension Engineer

Extension Plant Pathologist Retires June 30

Rots, Spots and Wilts or *Pathological Pointers* authored by Dr.Ward C. Stienstra, Extension Plant Pathologist, will soon end. Some of my audience know that 30 June 1998 will be my last day in this position. Yes, I've decided to retire, early due to health reasons. The position I've held for 28 years has been good for me and to me. The people I've served as a plant pathologist are very important to me. I expect someone better will soon be available to assist you. Presently the department suggests that disease samples be sent to:

Plant Disease Clinic
495 Borlaug Hall
1991 Upper Buford Circle
University of Minnesota
St. Paul, MN 55108
(612) 625-1275

or contact:

Fritz Breitenbach
SE District Extension Office
863 30th Avenue SE
Rochester, MN 55904-4915
(507) 280-2870

or contact:

Bruce Potter
SW Experiment Station
University of Minnesota
P.O. Box 428
Lamberton, MN 56152
(507) 752-7372

My plans are somewhat uncertain, but I expect to complete this growing season's grants dealing with Sclerotinia and SCN. I'm excited about the future and hope yours remains free of serious diseases. At least so far this year disease problems are very minor.

Ward C. Stienstra
Extension Plant Pathologist

Soil Compaction and Nutrient Uptake

The use of heavier and larger farm equipment in recent years has stimulated the concerns that revolve around soil compaction and crop production. The effects of compaction on several soil physical properties have been measured and documented. However, the exact mechanism by which soil compaction influences crop yield is not well understood.

Documented effects of compaction include:

✓ disruption of continuous pores
✓ altered water and heat flow
✓ root growth
✓ nutrient movement
✓ increased bulk density
✓ reduction in the volume of soil explored by roots
✓ reduction in root length

Until recently, the effect of surface and subsoil compaction on nutrient uptake was not studied extensively. However, a research project was conducted at the Southern Experiment Station, Waseca, to evaluate the effect of both surface and subsoil compaction on the uptake of P and K.

The subsoil at the test site was compacted in the

fall of 1981 with equipment with axle loads of 10 and 20 tons. Using heavy equipment, it was possible to get a layer of soil compaction at some distance below the soil surface. This compaction was described as "subsoil" compaction. Surface compaction was achieved by traveling over a designated area with equipment to provide an axle load of 5 ton. The resulting compaction was described as "surface" compaction.

Whole corn plans were sampled after tasseling, weighed, and analyzed for phosphorus. Uptake was calculated from this information. The effect of subsoil compaction is summarized in **Table 1**.

Table 1. The effect of subsoil compaction on phosphorus uptake by corn.

Axle Load	Year				
	1982	1983	1984	1985	1986
- tons - -	P uptake, lb. P/acre				
0	6.8	13.4	19.7	13.4	25.0
10	5.3	13.4	18.8	11.6	21.4
20	5.5	12.5	18.8	12.5	21.4

Source: Dolan and others.

Phosphorus uptake was reduced by subsoil compaction in 1982 and 1985. Uptake in these years was limited by dry soil conditions. Phosphorus uptake was higher in 1983, 1984, and 1986 because of more favorable soil moisture, and subsoil compaction had no major effect on phosphorus uptake. From this information, it would appear that the effects of subsoil compaction are most severe when the corn crop is under stress.

An axle load of 10 ton is equivalent to the weight of a combine with a 6 row head. The 20 ton axle load is equivalent to the use of a large grain cart. It's important to note that there was no difference in the use of either the 10 or the 20 ton axle load.

Surface compaction was also applied to each of the three subsoil compaction levels. The effect of surface compaction on phosphorus uptake is summarized in **Table 2**.

Table 2. The effect of compaction of the surface soil on phosphorus uptake by corn.

Axle Load	Year				
	1982	1983	1984	1985	1986
- tons - -	P uptake, lb. P/acre				
0	5.8	13.1	19.0	12.5	22.6
5	6.1	12.2	16.7	12.8	21.2

Source: Dolan and others.

In contrast to the effect of subsoil compaction, surface compaction reduced phosphorus uptake when soil conditions were favorable for higher uptake.

Results of this study showed that both surface and subsoil compaction can reduce nutrient uptake by corn. The effects, however, are inconsistent and there is much more to learn.

Once in place, soil compaction is difficult to correct. This is especially true with subsoil compaction. The emphasis should be on prevention rather than correction of soil compaction. The major manager practice for prevention is to avoid tillage when soils are wet.

George Rehm
Extension Soil Scientist

The Color Of Corn

As I travel across Minnesota at this time of year, there are numerous corn fields that do not have that dark green color that we like to see. Instead, there are all shades of light green to yellow.

It would be nice to attribute the off color to one cause. However, that's not the case. There are probably several factors responsible for the light green color.

For sandy soils, this off color usually indicates a shortage of nitrogen and/or sulfur. At this stage of corn development, it's nearly impossible to distinguish the difference between nitrogen and sulfur deficiency symptoms. Recent heavy rains where soils are sandy in North-Central Minnesota have probably moved both the nitrogen and sulfur below the roots. If sulfur and nitrogen have been applied, the green color should reappear as the roots grow deeper and reach these nutrients.

The positive effects of a starter fertilizer are obvious in research trials at Lamberton and Morris. Plants are green and growing where the starter was used. They have a light green color where higher rates of

Color of Corn/Continued

phosphate and potash were broadcast and incorporated before planting.

It also seems that heavy weed pressure and light green corn go together. This is logical because the weeds are using nitrogen making less available for the corn crop.

In general, the green corn is found on fields when starter fertilizer has been used at planting followed by a good preemergence herbicide program. Perhaps we've forgotten the importance of these two management practices in modern corn production.

George Rehm
Extension Soil Scientist

IPM Stuff—Southwest Minnesota

Corn:

Thin corn and uneven corn stands are not uncommon this year. In addition to the planting depth and dry soil problem mentioned in the last issue, other factors are at work in some fields.

Wireworms and White Grubs: This has been an exceptionally good year for wireworms and white grubs. As the weather continues warm and corn continues to develop, wireworm feeding should stop. White grub activity should also stop for the season in the next week or two as soils cool. I am uncertain why these two insects are so active this spring as soils were warm very early in the season. As I wrote this article some small year white grubs feeding on soybeans near Clements were brought in. These darn insects keep life interesting. An ability to accurately predict biological phenomenon would allow me to write this newsletter from a private island in the South Pacific in January.

European Corn Borer: Black light trap captures at the SWES remain low to moderate. May 28, 1998, was the high point, it may have been the peak, for first generation flight. You can compare '97 and '98 results at the experiment station website: http://www.swes.agri.umn.edu. The cool weather forecast for this week will slow light trap captures and corn borer development.

Alfalfa:

Potato leafhopper: No increase in numbers at Lamberton and Danube. Adults are still averaging less than 1/sweep. Scout alfalfa as soon as regrowth begins. You will have to scout alfalfa more or less weekly until August for leafhoppers.

Grasshoppers:

Grasshopper activity is starting to increase. Scouting now is important for several reasons. First, to determine where grasshoppers are hatching. Secondly, to determine the number of hoppers present, their size, and to a lesser extent the species present. Finally, scout fields to determine if and where unacceptable crop damage is occurring. Grasshoppers may be emerging in last years soybean fields in addition to field borders. I have not seen anything but two striped nymphs as of 5/28. This means that the hatch is not nearly complete. Since the hatch is not complete, I would try to delay treating production areas until the largest nymphs are 4th instar. This needs to be tempered by crop injury. I would not let soybeans go past 50% defoliation and some border treatments may be needed at this point. Treating this early probably means that a re-spray will be needed.

Remember that all grasshopper insecticides are not labeled for all crops. A revised grasshopper fact sheet, put together by Ian MacRae, Ken Ostlie, and myself, is available at county extension offices in Southwest Minnesota and on the SWES website. This fact sheet contains thresholds, scouting techniques and labeled insecticides.

Cool, wet weather will have a negative impact on 1st and possibly 2nd instar nymphs. As grasshoppers mature they are more tolerant of adverse environmental conditions. I was discussing grasshoppers and the severe weather on May 30th with Rich Kvols, Yellow Medicine County Extension Educator. A bright spot in the bad weather is that 1st and 2nd instar nymphs can be killed by a direct hit from a hailstone.

Bruce Potter
IPM Specialist

First Flight Of European Corn Borer Peaks

Light traps indicate that the first flight of European corn borer peaked around May 29 through much of southern Minnesota. Egg laying is underway. However, cool weather this week will put a damper on moth emergence, mating, and egg hatch. To make tracking corn borer flights more difficult, trap captures will also drop if temps fall below 50° F at night, a scenario likely to persist for several nights. The strong storms of last weekend may have caused significant local mortality of adults. Despite all these uncertainties regarding the first generation, it's wise to begin scouting corn borer next week.

A couple of tips may help target your scouting investment.

1. Take time to calculate the economic threshold for representative situations for you farmers. The economic threshold (or break-even infestation level) can be calculated from the following formula:

ET (borers per plant) = Treatment costs ($/acre) / Projected loss per borer ($/borer)

where projected loss = Expected Yield (bu/acre) X Expected Price ($/bu) X Loss per Borer (usually 0.05 to 0.06) X Insecticide Effectiveness (usually 0.75 to 0.90). With 150 bu/acre corn @ $2/bu and treatment costs of $15/acre, the ET will be about 1.0 borer per plant. If 50% of the plants are infested (shotholed), we need to find over 2 borers per infested plant to trigger treatment.

2. Pick a couple early-planted, taller fields with good canopy development to act as sentinel fields or barometers. Watch these fields more intensively to judge the phrenology of the infestation. How's egg laying progressing? Are moths still in the field borders? What stage are the larvae now?
3. When shotholing approaches 30 to 40%, it's time scout all the earlier planted fields. Remember that fields don't begin to recruit significant egg laying until they exceed 16-18 inches extended leaf height. For this reason, taller, earlier-planted fields often have older and heavier infestations than later planted fields. If you prioritize fields by planting date, first generation infestations rarely exceed thresholds in the youngest third to half of the fields. In addition infestations are older in older fields so you have a little more time to make decisions in later-planted fields.
4. Initially check the fields near the edge (for convenience). If shotholing appears to exceed 40%, pull a few whorls to judge borers per infested plant and the stage of the borers.

If survival is poor, less than 1 to 1.5 borers per plant, walk away from the field. If larvae are young (first and second stage) and moths are present in grassy borders, return in 3 to 5 days to re-assess the situation.

If survival is good, 2 or more larvae per plant, initiate a more thorough scouting. Visit at least 5 locations per 40 acres to assess the proportion of plants infested (check 20 plants per location for shotholing) and larvae per infested plant (dissect the whorls of at least 4 plants per location). Remember that mortality of young larvae is high. Never make a treatment decision based solely on first-stage larvae (ca. 1/8"). Revisit the field in 3 to 5 days to make a better decision.

Products of choice remain liquids such as Warrior 1E, Pounce 3.2E, Ambush 2E and Penncap-M or granules such as Lorsban 15G.

Black Light Trap Captures

Location	Peak Catch (moths per night)	Date of Peak Catch
WC		
Fergus Falls	4	May 30
Montevideo	59	May 29
Morris	5	May 29
SC		
Blue Earth	33	May 29-30
Gaylord	210	May 28
Henderson	47	May 30
LeSueur	82	May 27-28
St. Peter	78	May 29
Waseca	0	---------
SW		
Hanska	100	May 28
Jeffers	4	May 3
Lamberton	48	May 29
New Ulm	172	May 29
Sleepy Eye	70	May 28

For further information, see fact sheet FS-5969. *Quick Guide to European Corn Borer Management: Scouting and Decision-making for First Generation.*

Ken Ostlie
Extension Entomologist

Alternate Alfalfa Establishment Options

Several questions are coming in from Southwest Minnesota about poor alfalfa seedlings. The conditions I described indicate many problems are due to extremely dry soil and windy hot conditions during mid-May. Alfalfa seedlings establish best during spring or late summer, with conditions of cooler day and night temperatures and plenty of soil moisture. This year, May weather conditions in Southern Minnesota were like normal weather conditions of July. May 18 temperatures of 100 F were common. We do not recommend seeding alfalfa in July because we can often receive extremely hot windy days, which will bake alfalfa seedlings.

If the following conditions prevail, replanting options should be considered:

✓ less than 10 plants per square foot are growing
✓ after digging the soil to find more seed, you can not find seed or the seed you find has a radicle with a dried tip (dead root).

If seeds that have not germinated are still in the soil, replanting is not necessary. It is a difficult call for replanting because alfalfa seedings have variable emergence and not all the seeds are germinated. Both of these conditions occur due to variable seeding depths and under loose seedbed conditions. The radicle, first root tissue to emerge from the seed, must be surrounded by moist soil for continued growth and seedling development. Optimum stands are 15 to 25 plants per square foot. Stands of 20 plants per square foot in the seeding year will thin down to 10 to 15 in year 2 and 5 to 6 plants per square foot the 3rd year of production. A newly seeded stand of less than 10 plants per square foot will often be invaded by weeds.

Replanting options. If soil conditions continue to be dry I do not think replanting alfalfa now is a good option. However, the 30-day weather forecast for the June is for below normal temperatures and

Alfalfa/Continued

above normal precipitation. If cooler temperatures and wetter conditions prevail, replanting alfalfa is recommended. I believe that with the top several inches of dry soil, you need enough moisture to replenish moisture in that soil profile. The conditions required for success are:

✓ ideal moisture surrounding the seed (seeded at ½ to ¾-inch depth) to allow the seed to absorb water for germination,

✓ enough moisture in the soil surrounding the seed for the radicle to penetrate moist soil,

✓ and enough moisture to get root into moist soil, and control or annual grassy and broadleaf weeds.

I expect the best results from replanting with a no-till drill into a seedbed which has a pre-plant herbicide already applied or having the option of applying Poast or Pursuit after planting. Also, note I have suggested planting down to a ¾-inch depth because of dry soil conditions. A no-till drill minimizes soil moisture loss and often gives better depth control than many grain drills. Second, annual weed control is a must because the hot temperatures have warmed soil temperature enough to encourage germination of foxtails.

If you do not expect to get cooler, wetter weather, then replanting August 1 is the next best option.

In the many calls I have taken before June 4, I did not recommend replanting now; but I have changed my recommendation based on the long-term weather forecast—which is dangerous! You share with me in taking the risk of getting the weather conditions and creating the environment I have described to obtain alfalfa establishment success.

Neal P. Martin
Extension Agronomist—Forages

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Storms Leave Damaged Trees in their Wake

Aside from the misery of human injuries and destroyed or uninhabitable houses, one of the worst legacies of the storms that raged through Minnesota this past month was the number of damaged trees left in their wake. Regardless of whether tornadoes or straight line winds were the culprits, many trees were felled like matchsticks, while even more bent over or lost major limbs.

Besides cleanup, what can be done at this point? Trees that are sitting a bit askew in the soil, tilted but not uprooted, may be pulled back upright and staked, **PROVIDED THEY ARE STILL QUITE SMALL.** Even though their roots don't protrude from the soil, they have sustained root damage, and may not recover.

Where limbs have broken off, trim jagged edges as best you can. If the wounded tree is an oak, apply pruning paint or wound dressing to the freshly exposed wood to help mask its odor and exclude the insects that might transmit oak wilt disease. Other trees need not be painted, as these products have not been shown to hasten or improve the healing process.

If you have a tree that has lost a major portion of its canopy, it probably will have to come down. When in doubt, hire a qualified arborist to come out to assess the tree to determine whether it's worth saving.

Deborah Brown
Extension Horticulturist

Entomology Notes

Yard and Garden: We have been receiving a lot of calls and samples about *insect and mite galls*, including maple bladder gall, erineum galls on linden and viburnum, oak apple gall, and maple spindle gall. Galls rarely impact the health of woody plants and normally just affect their appearance. There is no control once galls are seen. We've been receiving a steady number of calls concerning *honeylocust plant bug* damage. Leaves become mottled and speckled similar to ash plant bug injury. When honeylocust leaves first come out, plant injury can also cause new growth to become dwarfed and cupped which can mimic herbicide injury. We received our first sample of *fourlined plant bug* adults. They are 1/4 inch long, greenish-yellow with four longitudinal black stripes running down its back. Nymphs hatched several weeks ago. Both feed on a wide variety of pe-

rennials. We received an *iris borer* sample. The caterpillar was 3/8 inch long. Iris borer growths up to 2 inches when fully grown. If iris borers are noticed at this time, crush them or remove and destroy the infested foliage. If left alone, they will eventually reach the rhyzome and consume it, killing plant. We had our first report of *mountain ash sawfly larvae* on mountain ash. They are greenish yellow with black spots. They feed on the leaf blade, leaving the midrib. A second generation occurs in August. A caller described *lilac/ash borers* emerging a couple of weeks ago from lilac. Adults are wasp-like and lay eggs on lilac or ash. Although healthy trees may be attacked, unhealthy ones stand the greatest risk of being infested. An insecticide application timed during adult egg-laying (usually mid May to June in central Minnesota) helps protect woody plants. Commercially available traps helps to determine this.

Household: A sample of *thief ants* was submitted to our office. Thief ants are the smallest ants people see in their homes, measuring less than 1/16 inch long. They normally are found feeding on greasy foods. These ants typically nest in soil outdoors but can enter buildings during summer, sometimes in large numbers. Although this is annoying to the homes' occupants, the ants cause no real damage. Thief ants can also nest in homes in voids and other small spaces, although we encounter this less commonly. Baits can eradicate a nest but that usually takes at least several weeks. An insecticide treatment around the home's exterior is a quicker, though temporary solution. If the ants are nesting outdoors, they go away on their own by the end of summer. Reports of *wood roaches* have been common. This cockroach lives in wooded areas. Although they may enter buildings, they don't persist indoors and are just a nuisance.

Larder beetle larvae have been found in homes lately. They are usually feeding on dead insects, such as cluster flies, or dead animals in wall voids and attics. Control is difficult as long as food source remains. However, many times it is not practical to remove the food source because it is inaccessible. Spraying the larder beetles is only a temporary solution. Preventing insects and animals from entering and dying is a long-term solution. We have has several samples and reports of large sized wasps with a very long 'stinger'. This is an ichneumonid wasp called *megarhyssa*. Its body length is as large as 1 ½ inches long with an ovipositor (egg laying apparatus) up to 2 inches long. Although the ovipositor looks formidable, it poses little threat to people. The ichneumonid uses the ovipositor to parasitize horntails living inside trees.

Jeffrey Hahn
Asst. Extension Entomologist

Fireblight is on the Burn!

Fireblight is a bacterial disease that infects the flowers, leaves, shoots, and fruit-bearing spurs of apple, pear, and mountain ash trees, as well as other plants. This disease usually begins in the spring during periods of wetness as bacteria surviving in the tree produce ooze (masses of bacteria and plant sap). These bacteria are then dispersed from infected trees to healthy trees by rain splash or insects such as honeybees.

Infected trees usually appear blackened or scorched, with the shoots turning brown to black in color and bending at the tip. These blackened, curled branches are known as 'Shepherds Crooks'. Later, infected trees produce cankers on the branches and main stem.

Fireblight can be controlled through therapeutic pruning and chemical sprays. Branches infected during the summer should be pruned at least 12 to 18 inches below the blackened area and destroyed. Infected branches appearing during dormancy should also be pruned. Since the bacterium thrives on young succulent growth, avoid heavy nitrogen fertilizing or other practices that promote excessive growth. Finally, a fungicide such as Bordeaux Mixture or Fireblight Spray (streptomycin sulfate) may be applied to help control fireblight. Read the fungicide label for additional directions.

Black Spot of Rose

Black spot of rose caused by the fungus, Diplocarpon rosae, is one of the most common diseases occurring on roses in Minnesota. This disease appears on the leaves as round, black spots. Heavily infected leaves will usually turn yellow and drop from the plant causing partial or almost complete defoliation of the canes.

Black spot survives on dead leaves and canes, and begins infecting healthy leaves in early summer. Secondary spores produced on infected leaves are dispersed to healthy leaves by rain splash throughout the growing season. These spores cause multiple infections and lead to severe defoliation.

Control of black spot should begin with sanitation (remove and destroy infected leaves/cut back diseased canes at the end of the season) since the fungus survives on infected leaves and canes. Fungicides may also need to be applied in order to prevent multiple infections and leaf drop. Fungicides such as Funginex, chlorothalonil, or mancozeb should be applied when the disease is first noticed or in early summer before the black spots appear.

Chad J. Behrendt
Extension Educator

UNIVERSITY OF MINNESOTA
Extension
SERVICE

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MINNESOTA
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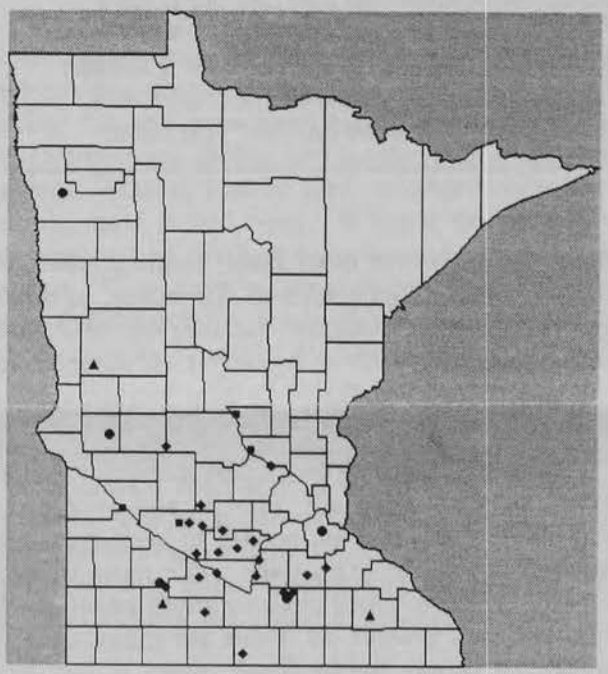
CROP NEWS
From the Crops System Team of the Minnesota Extension Service

European Corn Borer Flight Underway

The first flight began just over a week ago with a smattering of captures at Rosemount (beginning May 15) and Lamberton (beginning May 20). Warmer temps this spring have definitely triggered an earlier-than-normal flight. Initial catches agreed closely with a MN degree-day model that predicts 1st catch at ca. 300 degree days (base 50 F). The peak flight should occur around 600 degree days. Already some light trap captures are beginning to climb. Michael Lund, agronomist with Golden Harvest, reports that his Montevideo trap captured 59 Wednesday night. The moths captured so far are primarily male, which indicates the peak has not occurred yet, but I'd expect it within the next week.



The blacklight trap network is just beginning to come "on-line" with most traps set up over the last week. This network is a cooperative effort between food processing companies (Seneca, Pillsbury-Green Giant, Faribault Foods, Dean Foods, Del Monte, Owatonna Canning), seed companies (DeKalb, Golden Harvest, Interstate Payco, Pioneer), the Minnesota Department of Agriculture, and the University of Minnesota Ag Experiment Stations. The map at left indicates approximate locations of 36 traps that we've identified so far. In the weeks to come we'll keep tabs on moth flights via these traps and a network of pheromone traps that will be established this year for the first time. Besides *Minnesota Crop News*, we hope to have moth flight information available on the internet.

Ken Ostlie and Bill Hutchison
Extension Entomologists

Highlights . . .

Plant Disease Clinic

Samples Submitted to The Plant Disease Clinic in May included:
alfalfa—downy mildew
soybean—soybean cyst nematode and *Xiphinema* sp (dagger) nematode
silage—cultured for storage molds
barley—samples tested for loose smut
potato—*Fusarium* sp dry rot
turf—*Bipolaris* sp crown rot, *Rhizoctonia* sp root rot
oak—oak wilt
spruce—*Rhizosphaera* sp needlecast
fuchsia—*Rhizoctonia* sp root rot, *Botrytis* sp stem rot
rose—*Phytophthora* sp root rot, *Coniothyrium* sp canker
impatiens—impatiens necrotic spot virus (INSV)
ajuga—alfalfa mosaic virus
Physostegia—INSV

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Misconceptions about Moss

Among the calls this spring from people who are dissatisfied with their lawns are a number of questions about moss. Common misconceptions about moss include a focus on soil acidity as an important causal agent and the idea that moss should only thrive in shade. While moss does thrive in shady acidic conditions, it also can also grow well in sunny areas where soils are not acidic.

There are two additional factors to consider when moss encroaches on lawn grasses. The first is soil compaction and the poor drainage that's associated with that compaction. The second is soil infertility. These conditions can and do occur irrespective of shade and soil pH.

When soils are compacted, moisture stays close to the surface rather than draining well. This suits moss just fine as it has very shallow "roots" and it needs to stay fairly moist in order to remain green. (One of the complaints about moss is that it turns brown and looks more obvious when weather gets hot.) Grass, on the other hand, needs to send down deeper roots, roughly four to six inches, in order to grow well. When available moisture sits near the surface of the soil, shallow rooting is encouraged, leaving grass more vulnerable to heat and drought, and eventually thinning out.

Moss has much more modest nutrient needs than grass, so when soils are infertile and people don't add the nutrients that are needed to keep grass growing well, again the grass thins while moss is not adversely affected. And because moss needs far less sunlight than grasses do, there are many situations where all things being equal, moss is just better adapted to the site than lawn grass..... and there's little that can be done about it.

You can rake moss out of a lawn with a heavy metal garden rake, but unless you can correct the underlying problems, it will just come back again.

Deborah Brown
Extension Horticulturist

Entomology Notes

Spittlebugs have been common on a variety of herbaceous plants. They produce a white frothy mass which protects them from the elements. Spittlebugs rarely are numerous enough to damage flowers; physical removal is the only necessary control. Pesticides are not effective or necessary to protect flowers from spittlebugs. Ash plant bugs continue to be extremely numerous. We have also received several calls about 'bugs' on lilac. Samples have turned out to be ash plant bugs. Apparently, the large numbers of ash plant bugs on ash have forced the plant bugs to find alternate plants to feed on. Lilac is related to ash so this does make sense. European pine sawfly and forest tent caterpillars are finishing their feeding in central Minnesota. Yellowheaded spruce sawflies should be out now in central Minnesota. They feed on the new needles of spruce.

Management is most effective when sawflies are ½ inch or less in size. We are receiving descriptions of insect and mite galls on variety of trees and shrubs, especially oak and maple. Management of galls for the health of plant is not necessary in most cases.

We have received several reports of masked hunter adults being found in homes. These insects are black and about 3/4 inch long. Like all true bugs, masked hunters have needle-like mouth parts, although theirs are shorter and stouter than plant feeding bugs. Masked hunters feed on other insects; their favorite meal is bed bugs. It is not uncommon to find one or two masked hunters in a home during summer. They have accidentally entered the building in their search for food. Physical removal is the only necessary control. Handle these insects with care as they can bite if mishandled. More rarely, masked hunter populations are found in larger, persistent numbers. An infestation would indicate there is an abundant food source which probably means bed bugs. The most common bed bug in Minnesota is the bat bed bug which, like the name suggests, is associated with bats. Controlling the bats and the bed bugs control the masked hunters in these rare cases.

Jeffrey Hahn
Asst. Extension Entomologist

Botrytis Blight of Peony

Peony, one of the most popular garden plants in Minnesota, may suffer from disease when grown on unfavorable sites or when exposed to extensive rainfall. Botrytis blight, a fungal disease, is one of the most serious diseases of peony. Although this disease may be present throughout the growing season, botrytis blight is most severe during cloudy, rainy weather.

Infection typically begins in young plants during the spring causing a wilt near the base of the stem. This wilt and death of the shoot may continue throughout the season if wet conditions continue. In addition to wilt symptoms early in the spring, botrytis blight may cause leaf spotting and/or browning of flower buds later in the growing season.

Fungal material produced on infected tissue usually appears after periods of rain or watering. This material, usually fuzzy and gray in color, is a good diagnostic tool for detecting botrytis blight.

Control strategies for botrytis blight include sanitation and eradication of infected material (old flower blooms, infected buds, leaves, and stems), improving air circulation, avoiding excessive moisture on foliage by watering plants near the base during the day when necessary, removing infected plants in the fall by cutting them near the ground, and fungicide sprays. Although fungicides may be used, the cultural practices listed above should greatly reduce the severity of botrytis blight.

If fungicides are going to be applied, they should be applied before the disease is present or shortly after detection so that healthy tissue is protected. Fungicides such as basic copper sulfate or mancozeb may have limited effectiveness.

Red Spotted Rhubarb Leaves

If your rhubarb has red spotted leaves, they may be infected by a leaf spotting fungus. Although the damage caused by the leaf spotting fungi may appear severe, losses are usually minimal. Therefore, control of leaf spotting organisms typically includes practices such as harvesting infected stalks first, sanitation and eradication of infected leaves at the end of the season, and proper watering. Control does not usually require fungicide sprays.

Chad J. Behrendt
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MINNESOTA

CROP NEWS

Vol. 4
No. 10

From the Crops System Team of the Minnesota Extension Service

Insect Updates

Alfalfa

Potato leafhopper — We now have potato leafhopper in the state, with about 1-2 per ten sweeps at our Anoka (Ham Lake) and Dakota County (Rosemount) sites. Higher counts were also noted on yellow sticky. It is too late for the first crop to be an issue. Typically, the leafhopper builds up on the regrowth for the second crop, and can sometimes be a problem on the third crop. As in past years, new seedings, particularly before the first cutting, are often vulnerable to potato leafhopper. Thresholds range from 0.5 to 2 per sweep for 3- to 12-inch alfalfa. All labeled insecticides are effective against potato leafhopper.

Alfalfa Blotch leafminer — Many of you are now aware of this insect new to Minnesota, Wisconsin, and now North Dakota and Illinois. Note that this is not necessarily a new insect pest, but rather is an insect new to the Midwest. Alfalfa Blotch leafminer has now been found at Rosemount for the first time, and will likely continue to move south this year. Farmers in southeastern Minnesota should be looking for it; virtually all counties north of Interstate 94 down to Dakota County are now infested. This leafminer was only first detected in northern border counties in 1994.

Our yield/quality studies from last summer, under severe Alfalfa Blotch leafminer pressure, did not show any significant losses or numerical trends. Our explanation for this is that none of the insecticides, at least without a surfactant, was very effective. This year we are specifically looking at good leafminer materials (though not labeled) to see what the yield impact is. We are also looking at a surfactant in an effort to "move" insecticide into the leaf, where it would be more active on leafminer maggots as they hatch. An information brochure on this pest is available for anyone who would like more information about it.

Corn

European Corn Borer — We caught our first European Corn Borer moth at Rosemount Thursday night, a little early this year, but with the heat we have had, not surprising. Using our Minnesota degree-day model, we expect the first catch at 300 degree days, and this is where we are at for most southern Minnesota sites. Peak (50 percent of the flight) should occur at 600 degree days.

Eric Burkness, in my lab, has been monitoring ECB larval survival this spring at Rosemount. He found that ECB larvae in our plots incurred about 65 percent mortality caused by parasitism and Beauvaria fungi. At this site, we were down

Highlights . . .

For more information contact Extension Plant Pathology at 612.625.6290

to about 25 percent live larvae or pupae as of last week. Ken Ostlie has more extensive overwintering mortality data for several Minnesota sites, and this information should be available soon.

Regarding our light trap network and new cooperators who plan to collect data this year (light trap or pheromone traps), traps should be set up ASAP. Any new cooperators who may not be on our mailing list for data sheets should request them from me immediately:

Bill Hutchison, Extension Entomologist
219 Hodson Hall
University of Minnesota
St. Paul, MN 55108
Phone: 612-624-1767
FAX: 612-625-5299

Bill Hutchison
Extension Entomologist

Crop Problems This Spring

At planting, we always hope that there will be no problems with our crops throughout the growing season. Yet, there are always problems with some crop at some location in Minnesota each year. This year is no exception. Some problems that we've look at this spring are described below.

Alfalfa Stand Establishment

A dairy farmer was not able to get a satisfactory stand in one particular field. Using the same variety and seeding practices, he was successful in getting a satisfactory stand in other fields. There were no major differences in soils from field to field.

In the problem field, there was one small area where there was an acceptable stand. Soil samples were collected from this area as well as the area where few alfalfa plants existed. There was a substantial difference in soil pH. The pH was 6.6 in the area with a satisfactory stand and 6.2 where few alfalfa plants existed. Ag lime had been applied before seeding, but the rate was apparently not adequate to provide for a satisfactory stand. Sugarbeet lime has been used at the same rate of application in the other fields where there was a good stand.

If applied at the same rate, the sugarbeet lime would have supplied more pounds of ENP per acre. This would have resulted in the higher soil pH and a more favorable environment for the rhizobia bacteria. The end result would be the satisfactory alfalfa stands observed in the good fields.

Placement of Fertilizer With Corn Seed at Planting

Soils dried considerably this spring as we moved through the corn planting season. We placed a combination of urea and Sul-Po-Mag in contact with seed and planted into a very dry sand at the Staples Irrigation Center. Emergence was delayed by about four days and there was a substantial amount of stand reduction. The reduction appeared to be directly related to the rate of urea used. We will take stand counts and you will get this information next winter.

There have also been reports of damage caused by placement of 10-34-0 with the seed. In these situations, however, some other factor or factors may have been involved.

We Would Like Your Help

In early summer of 1997, there was a substantial amount of stunted corn with a purple color in central Minnesota. The most severe stunting was observed where corn followed sugar beets. Limited observations indicated that this problem could be associated with the Mycorrhizae which grow close to the fine roots and root hairs. The experts who study the Mycorrhizae would like to get additional samples. So, if you see purple corn in fields this spring, please give us a call. We would like to make arrangements to collect samples.

George Rehm
Extension Soil Scientist

Corn And Soybean Injury From Soil Abrasion And Hail

Plant damage and stand reduction have occurred in some areas because of soil or sand blasting and hail. There are also some areas with poor stands because of dry surface soils. For those areas, plants should emerge now because of the rainfall last weekend.

Damage to Corn

Leaves can be damaged and completely cut off by soil abrasion. Typical damage to young corn plants is lower leaves and leaf sheaths that are shredded, split, or surface tissue beaten up such that the leaf or sheath tissue dries up. If the leaves emerging from the whorl are healthy, the plant should recover with no stand loss. Excessive soil blasting may cut the entire plant off at or near the ground line. These plants should recover, but some leaf knotting and twisting might occur.

If there is no stand loss, the leaf injury due to soil abrasion or hail will not affect corn grain yield or maturity. This leaf loss does not set the corn back, as commonly believed.

The relationship of corn population to grain yield is given in Table 1. Plant stand is expressed as a percentage so growers can evaluate the relationship regardless of their original population. For example, an original stand of 32,000 plants per acre reduced to 30,000 plants per acre is a stand reduction of 6.3% that results in a yield reduction of 2%.

Table 1. Relationship between corn stands and grain yield.

Plant Stand (%)	Grain Yield (%)
100.0	100
93.7	98
87.5	96
81.2	94
75.0	92

Damage to Soybean

Leaf and stem damage to young soybean plants from soil abrasion can reduce stands because of excessive stem injury that results in complete desiccation of the plant tissue above the point of injury. If the injury occurs below the cotyledonary node, then the plant will not recover and stand loss occurs. Hail injury to soybeans can reduce stands if the main stem is cut below the cotyledonary node. There are no growing points from which the plant can regrow if the main stem is cutoff below the cotyledonary node. If cut above the cotyledonary node, the plant could recover and usually does. Regrowth is faster when cotyledons and/or some leaf tissue is left for an energy source to aid the development of new leaves.

The relationships between soybean stands and yield of soybeans grown in 30-inch spaced rows and drilled are given in Tables 2 and 3. Yields are not affected with major changes in soybean stands if the plants are uniformly spaced. However, branching occurs and branches may break from the main stem prior to harvest which may increase the harvest loss. When gaps occur in the soybean stand, there is a yield loss (Table 2). The larger the gap, the greater the yield loss.

Application of Postemergence Herbicides

Postemergence herbicides should not be applied until the corn or soybean have recovered from the soil/sand blasting or hail damage and resumed growth. With the current weather conditions, emergence of new growth should not be more than five days.

Table 2. Relationship between soybean population and yield (30-inch rows).

Plant Population plants per acre	Spacing Condition	Yield Bu/A
150,000	uniformly spaced	50.0
125,000	uniformly spaced	49.6
100,000	uniformly spaced	50.6
75,000	uniformly spaced	49.7
50,000	uniformly spaced	47.8
75,000	1 foot gaps*	47.5
75,000	2 foot gaps*	43.9

*gaps alternate down the row with normal stands in the row section with plants.

Table 3. Relationship between soybean stands and yield in drilled soybeans (Illinois study).

Plant Population (plants per acre)	Stand Reduction %	Yield %
166,200	100	100
126,500	24	100
85,800	48	96
49,000	71	89

Obviously you will want to be as close as possible in your application schedule to the proper weed height for a given herbicide and rate, however, adding another stress (i.e. a herbicide) to an already stressed crop could result in more crop injury. Wait until new plant growth occurs before resuming postemergence weed control. Until weeds resume growth, the weather-induced stress could reduce herbicide effectiveness on both broadleaf and grass weeds.

D.R. Hicks and J.L. Gunsolus
Extension Agronomists

1998 Ag Professional Field School

The 1998 Ag Professional Field School will be offered at two Minnesota Agricultural Experiment Station locations this summer. The first will be held on July 7-8 at the Northwest Experiment Station-Crookston. The second will be on July 14-15 at the Southern Experiment Station-Waseca.

This is a hands-on, in-field program emphasizing corn, soybean and small grain management skills. Participants will have the opportunity to enhance their troubleshooting and crop management skills in specially designed plots that display actual cropping situations.

The Field School is targeted towards chemical, fertilizer, and seed dealers, crop consultants, crop production specialists, agronomists, and county extension educators. Applications for CCA CEU credits have been filed for each location. The Crookston Field School will offer 13 hours (Soil & Water-2 hr; Pest Management-8.5 hr; Crop Production-2.5 hr) and Waseca will offer 12 hours (Soil Fertility-.5 hr; Soil & Water-2 hr; Pest Management-7 hr; Crop Production-2.5 hr). Participants will be placed in small groups based on their professional experience.

The registration fee for the 1998 Ag Professional Field School is $250.00 and registrations must be received by June 22, 1998. For more information on the program and on registering, contact Tracey Benson at (612) 624-3708 or 800-367-5363. If you have questions regarding program content, contact Mike Schmitt at (612) 625-7017 or Kevin Cavanaugh at

(612) 625-2778. Brochures will be mailed to many of you next week.

General session topics and instructors will include:

Crookston Field School, July 7-8

- Soils Under the Landscape, John Lamb, Mike Schmitt, Albert Sims-University of Minnesota, Dave Franzen-NDSU
- Weed Identification, Beverly Durgan, Brad Kinkaid-University of Minnesota.
- Field Crop Diagnostics, Kevin Cavanaugh, Lee Hardman, Russ Severson, Jochum Wiersma-University of Minnesota.
- Weed Management, Alan Dexter-NDSU/U of MN, Eric Spandl-Cenex/LOL, Rich Zollinger-NDSU
- Entomology, Carlyle Holen, Ian MacRae-University of Minnesota
- Plant Pathology, Roger Jones-University of Minnesota

Waseca Field School, July 14-15

- Weed Identification, Lisa Behnken, Beverly Durgan-University of Minnesota
- Weed Management, Jeff Gunsolus, Gregg Johnson-University of Minnesota; Zack Fore-Cenex/LOL
- Corn Insect Management, Ken Ostlie-University of Minnesota
- Field Crop Diagnostics, Kevin Cavanaugh, Lee Hardman, Dale Hicks, Paul Porter-University of Minnesota
- Landscape and the Yield Potential, Lowell, Busman, John Lamb, Gyles Randall, Mike Schmitt-University of Minnesota; Bob Schoper-Farmland Industries

Kevin Cavanaugh
Department of Agronomy and Plant Genetics

New Fungicides Registered for Use in Battling Wheat Diseases

The Environmental Protection Agency has authorized the use of Folicur on wheat and barley for 1998. The Section 18 registration allows for the application of 4 ounces per acre at heading for the suppression of Fusarium head blight (scab).

On May 5th, the Minnesota Department of Agriculture approved a label change for Tilt fungicide that authorizes applications of Tilt on headed wheat.

These new registrations represent significant help to Minnesota producers in their battles against diseases. Fusarium head blight, Septoria diseases and powdery mildew have robbed wheat producers of 20 to 30 bushels during five of the last seven years.

Roger K. Jones
Extension Plant Pathologist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Lawns Thin in Shady Areas

Minnesotans love their trees, but often fail to grapple with the consequences of having large spreading shade trees in their yards. As those shade trees grow and mature they cast larger shadows, and send out more and more feeder roots that compete with grass for moisture and nutrients.

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

Typically, grass thins in these shady areas, and a combination of weeds such as creeping charlie and moss move in and ultimately take over. It's common to focus on weed and moss control, but even though they can be eliminated — at least temporarily — grass will never grow well in shady places, so it won't be too long before the offending weeds take over again.

Something will definitely move in to fill those holes left bare by the removal of undesireable plants. Unless you can establish a shade-tolerant groundcover, you're probably better off putting up with the weeds and moss and enjoying the trees. At least you can walk on creeping charlie and moss -- most groundcovers can't take any amount of foot traffic.

One other possible solution is mulching a rather large circle out from each tree, using shredded bark or wood chips. You could create plantings towards the edges of the mulched

areas, using shade-tolerant perennials such as ferns or hostas, or shade loving shrubs. And a comfortable garden bench under the trees can be wonderful on a hot, sunny day.

Deborah Brown
Extension Horticulturist

White Pine Blister Rust

White pine blister rust, one of the most important diseases of white pine, is a fungal disease that spends a portion of its life on white pines and the other portion on species of ribes (currant and gooseberry). Needles of white pine become infected in the fall by spores released from infected currant or gooseberry. In the spring and early summer, three to six years after the initial infection, diseased pines produce spores which in turn infect currant or gooseberry.

The name white pine blister rust is derived from the blister like appearance of the pine bark. Blisters are formed when the fungus grows beneath the bark causing the bark to swell and break open (blister). Orange colored spores produced in blisters on the branch and/or main stem are good diagnostic tools for identifying this disease.

White pine blister rust is worst when temperatures are cool and conditions are wet and moist. Control measures for white pine blister rust include pruning out infected branches and increasing airflow in areas where conditions are wet and moist. There is no chemical control for blister rust.

Chad J. Behrendt
Extension Educator

Protect Your Damaged Oak Trees From Wilt

If your oak tree was wounded during the recent storms or high winds you should protect it from oak wilt by painting the wounds with a wound dressing or paint as soon as possible. Painting the wound helps mask the scent of the tree, but more importantly acts as a barrier to prevent the picnic beetle from introducing the fungus into the fresh wood. Remember painting the wound does not help the tree to heal.

Chad J. Behrendt
Extension Educator

Ash Plant Bugs

Ash Plant Bugs hatched last week and have been very abundant on green ash. Ash plant bugs are black when they first hatch, later turning green and then into a brown and yellow 1/4 inch long adult. They feed on the bottom of leaves, inserting their needle-like mouthparts into the tissue. Every place they feed, causes a small circular whitish or yellowish discoloration. As the plant bugs feed, the leaves appear to be speckled or mottled. If feeding is severe enough, these discolorations can coalesce into brown areas. Despite the apparent injury, the damage only affects the tree's appearance not its health.

There has been many reports of ash trees dropping leaves. Despite the circumstantial evidence of insect feeding, it is anthracnose and physiological factors, not ash plant bugs, that are the causes for this defoliation. Insecticide sprays (e.g. acephate [Orthene], malathion, carbaryl [Sevin] can prevent further aesthetic injury but is not important for the tree's overall health. Insecticides will not prevent leaf drop.

Jeffrey Hahn
Asst. Extension Entomologist

Entomology Notes

We have had numerous reports of forest tent caterpillars from the central counties. Forest tent caterpillars have been seen at fairly low numbers the last several years but their populations appear to be increasing in 1998. The best time to treat for these caterpillars is when they are one inch or less. In most cases, the have been considerably larger. Sprays are not justified when forest tent caterpillars are large and nearly done feeding.

We received several calls at the beginning of the week about half grown (about 1/2 inch long) European pine sawflies on Mugho pine. Once sawflies are larger than this, treatment is marginal and does little to protect the pine.

Fourlined plant bugs have recently hatched. They are about 1/16 inch long and bright red with a little black. They are commonly found on perennials, including herbs. Their damage appears as small, circular, depressed brown areas on leaves. Fortunately, this injury does not seriously affect the plants' health, only the plant's appearance.

We have also received several reports of leaf beetles, including red turnip beetles, in home gardens, chewing on a variety of vegetables and plants. You can protect plants with carbaryl (Sevin). Be sure the plant you intend to protect is listed on the label.

We have received calls and samples of winged carpenter ants. Finding a few in a home may only mean they accidentally entered the building. However larger numbers found in a home is likely the result of an indoor nest. Discovering a swarm inside confirms that a nest is inside and can help determine where the colony is. Finding the nest's location is very key in carpenter ant control.

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MINNESOTA CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

Foxtail (Pigeongrass) Control in Small Grains — 1998

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

There are some situations when the cost of a herbicide treatment for foxtail control is not justified:

- When foxtail infestations are light—fewer than 20 plants per square foot.
- When the foxtail emerges after the crop is in the 3- to 4-leaf stage. This is especially true for barley. Once the small grain is in the 3- to 4-leaf stage, it can usually out compete foxtail, there by making a herbicide treatment unnecessary. However, control may be needed if the foxtail population is heavy—30 plants or more per square foot.

Moisture stress is another complicating factor. Weeds will generally cause greater yield losses under drought conditions, therefore foxtail control would be more important in droughty fields.

Spring wheat variety is also a consideration. Research has shown that the spring wheat variety "2375" does not compete well with foxtail. Therefore, it is more important to control foxtail in "2375" fields than in fields planted to other varieties.

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

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

Non-chemical Foxtail Control:

It is important to consider all methods of foxtail control. Harrowing or rotary hoeing the field can be an effective

Highlights . . .

method of foxtail control if it is done when foxtail is just emerging. Once foxtail is in the 2- to 3-leaf stage, harrowing or rotary hoeing will not give effective foxtail control. Small grains can be harrowed or rotary hoed until the 3- to 4-leaf stage with little effect on yield.

Once it is decided that foxtail needs to be controlled with a herbicide, there are currently three postemergence herbicides to choose from.

Herbicide Postemergence Foxtail Control:

Hoelon (diclofop)

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

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

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

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

Stampede EDF

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

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

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

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

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

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

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

Apply Tiller after the spring wheat begins to tiller (3- to 4-leaf stage) but prior to jointing stage (6-leaf stage). Tiller will control larger foxtail (3-leaf to 2-tillers) and can be applied later than other postemergence herbicides used for foxtail control in hard red spring wheat. In University of Minnesota research, Tiller has given good to excellent control of both yellow and green foxtail. DO NOT apply Tiller to durum wheat, oats or rye. DO NOT apply more than one application of Tiller per season.

Spring wheat tolerance to Tiller is fair to good. Barley tolerance to Tiller is only fair. DO NOT apply Tiller to barley that is stressed. Always use the lowest rate possible to reduce crop injury.

Tiller can be tank mixed with some broadleaf herbicides for additional broadleaf weed control, however, it is important to carefully select the proper broadleaf herbicide. When tank mixed with Tiller, many broadleaf herbicides will decrease the grass control of Tiller.

The following is a summary of the tank mixing options for Tiller, however, it is important to also read and follow all restrictions on the label. For control of green foxtail, Tiller at 1 pt/A can be tank mixed with Banvel, Buctril, MCPA ester, Stinger, and Tordon. Tiller at 1.2 pts/A, for green foxtail control, can be tank mixed with Harmony Extra and Express. However, in fields with mixed populations of green and yellow foxtail, Tiller applied at 1.2-1.7 pts/A, can be tank mixed with Stinger, MCPA ester, Tordon, and Banvel. DO NOT apply Banvel after the 5-leaf stage, and since Tiller should not be applied until the 3-leaf stage, the time when Banvel and Tiller can be tank mixed is very short. DO NOT apply Tiller + Banvel (dicamba) on barley due to the potential for crop injury.

There were several cases of hard red spring wheat injury due to Tiller applications last year. The injury was associated with cool, wet weather conditions and late applications. In most cases, the spring wheat recovered from this injury, and there was no yield loss. To decrease the crop injury potential, DO NOT apply Tiller after jointing stage. Read the label for additional restrictions or precautions.

Cheyenne (fenoxaprop + MCPA ester + thifensulfuron + tribenuron)

Cheyenne is labeled for postemergence control of foxtails and wild oats and most annual broadleaf weeds in hard red spring wheat. Cheyenne is NOT labeled for use in durum wheat, barley or oats. Apply Cheyenne to spring wheat from the 3-leaf stage to the end of tillering (6-leaf stage). DO NOT apply after jointing. Apply when grass weeds are 4 inches tall or less. DO NOT tank mix Cheyenne with any other herbicide, additive, or fertilizer. See the label for mixing instructions. Cheyenne can NOT be applied by air.

Beverly R. Durgan
Extension Weed Scientist

Tiller Labeled for Barley

Tiller (fenoxaprop + 2,4-D ester + MCPA ester) has recently received a label for foxtail and wild oat control in barley in the states of Minnesota, North Dakota, and South Dakota. See the article on "foxtail control in small grains" (above) for details and precautions associated with its use.

Beverly R. Durgan
Extension Weed Scientist

Immobilization of Nitrogen in Soils

Crop producers sometimes ask if nitrogen fertilizer can be "tied up" in soils. In reality, nitrogen in soils is used by soil microorganisms that are active in decomposing plant residues. The nitrogen used for this purpose is not immediately available for crop growth. This nitrogen is referred to as being "immobilized."

Whenever crop residues are incorporated into the soil, the microorganisms quickly begin the decomposition process. If the residue contains small amounts of nitrogen in relation to carbon (the carbon to nitrogen ratio is wide), the microorganisms will use nitrate-nitrogen (NO_3-N) in the soil for their growth and development. Some examples of residues which have a wide carbon to nitrogen ratio are wheat straw (80 C to 1 N) and corn stalks (50 C to 1 N). If the residue has a narrow carbon to nitrogen ratio, the microbial population will require much less NO_3-N. Alfalfa and clover are two crops which have a narrow carbon to nitrogen ration (10 C to 1 N).

The level of NO_3-N in soils will usually decline when residues with a wide carbon to nitrogen ratio (wheat straw, corn stalks) are rapidly decomposing. As the decomposition process nears completion, the microbial population in soils begins to decline and NO_3-N is released back into the soil. This NO_3-N is then available for crop use. The time required to complete this cycle depends on the amount of residue added, the supply of NO_3-N in the soil, soil moisture, and soil temperature.

The understanding of immobilization has affected our thinking about nitrogen recommendations for corn planted into CRP acres. The plant residue that has accumulated for several years started to decompose following the first tillage operation. Any NO_3-N present in the soil in the early stages of decomposition would have been immobilized. Therefore, our recommendation for nitrogen rates were the same for these acres as if corn followed corn. The NO_3-N that was immobilized will probably become available during the later stages of the growing season. It may be used by the growing crop or it may be carried over until next year. Therefore, it would be a good management practice to collect soil samples for measurement of NO_3-N where corn or small grains will be planted on these acres in 1999.

Some have suggested that it might be a good practice to add additional nitrogen fertilizer to speed up the decomposition of crop residues. In theory, this might reduce immobilization of soil NO_3-N. However, there is no research to document the effect of this practice on crop yield.

George Rehm
Extension Soil Scientist

Early Season Fungicides on Wheat

The rains most of the Red River Valley received this week will be a perfect precursor for development of tan spot and Septoria. Winter wheat will be especially susceptible when planted in wheat stubble. Spring wheat may also develop the fungal diseases and a fungicide may be warranted when applying herbicides. Presence of wheat residue will increase the chances for development of tan spot or Septoria leaf spotting as the residue will provide the inoculum for the disease.

Wheat in the 4- to 5-leaf stage may benefit from a foliar fungicide if the disease is present. Fungicide options are:

- 1 lb/acre rate of mancozab or (Dithane, Manzate, Penncozab)
- 2 fluid oz/acre of propiconazole (Tilt)

The low rate of Tilt will provide good control of the leaf disease this early. Using the reduced rate allows you to apply another 2 fl. oz/acre later in the season. University research, however, has shown that the reduced rate is not adequate for complete control of Septoria and tan spot at Feekes 8.0. The reduced rate gives excellent control of powdery mildew. Both fungicides can be tank mixed with certain herbicides if allowed or not prohibited by the label. Consult the herbicide as well as the fungicide labels for restrictions and instructions on mixing and the use of adjuvents.

Jochum Wiersma
Small Grains Specialist

Cutworm Problems in Corn

With the warmer spring its natural to wonder about cutworms, particularly the black cutworm. This migratory cutworm could pose a threat in warmer years if the jet stream moves north earlier and opens the door to these "snowbugs" from Texas and the Gulf Coast. To track these migratory flights, more than 110 cooperators volunteered to monitor pheromone traps

this spring. With five weeks of trapping under their belts and corn planting largely completed, it's nice to know that our concerns were unfounded. While incidental cutworms have been readily detected, no large migratory flights reached Minnesota. Only handful of trap locations exceeded the threshold, of more than eight cutworms over a two-night period, at any time over the last five weeks. With corn largely planted and off to a vigorous start, black cutworm will not be a significant threat this spring. Thanks are due the cooperators who diligently monitored the traps!

Meanwhile, a wide diversity of "native" cutworms who overwinter here as eggs or larvae have been reported attacking corn. Bruce Potter, IPM specialist at the Southwest Experiment Station in Lamberton, reports abundant leaf feeding (up to 52%) and minor cutting (<<1%) in corn, primarily from dingy cutworm. Common leaf feeding has also been reported from Tom Ahlberg, crop consultant at Worthington. Dingy cutworm was also reported following alfalfa sod near Rice Minnesota by Fran Marier. Sandhill cutworms infestations on sandy soil have been reported in the Princeton/Zimmerman area by Lee Nelson, Howe Co. The bottom line is that native cutworms are active now so watch emerging crops closely.

Scouting tips:

- Watch for leaf feeding, wilting, and cutting as signs of cutworm activity.
- If cutting activity is detected, examine where plants are cut. Cutting below ground will likely diminish stand. However, cutting of emerging leaves at the soil surface will not affect stand since the growing point is underground.
- Confirm the presence of cutworms. Search under surface debris, dirt clods, or in the soil within 4 to 6 inches of a cut plant. If the soil is too wet, mid-day detection may be difficult. You may want to revisit the field in the early morning or near dusk to catch cutworms on the plants or near freshly cut plants.
- Note size of cutworms. If over 1" there may not be much feeding potential left and revenge may be the only payoff.

Treatment:

Treatment decisions should be based on presence of actual stand loss. It only takes 3-6% stand loss to pay for an insecticide treatment. From a production standpoint it's better to err on the side of treatment. There's no recovery or compensation for stand loss. If a replant is required, definitely protect the replant with insecticides.

Cutworms are relatively easy to kill with insecticides. Insecticide options vary with crop but, in general, pyrethroid insecticides, such as Ambush, Asana XL, Baythroid, Pounce and Warrior, and organophosphates such as Lorsban, are quite effective. Never incorporate a pyrethroid but Lorsban can be incorporated.

Insecticides can be tank mixed with many herbicides but read both labels carefully. Contact company representatives if you have tank mix questions. Note: we do not advocate insurance use of insecticides without evidence of cutworm infestation in the field.

Remember the three most common mistakes with cutworms:

- Catching the problem too late to treat.
- Treating too late to protect stand.
- Misdiagnosing the insect cause of stand loss

Ken Ostlie
Extension Entomologist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open weekdays from 9 a.m. to 1 p.m. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Plantainleaf Pussytoes..... Antennaria plantaginifolia

We've received a number of calls this past week about pussytoes, a perennial weed of waste places that seems to have wintered over especially well this year in a number of lawns, particularly in more rural areas north of the Twin Cities.

As you might expect, pussytoes have rather downy leaves with clusters of little greyish-white puffy flowers (the "toes"). The flower stalks can range from about four inches to a foot or so in height. When you try to dig them up you'll see they spread by underground runners, so each plant can send out many more.

Pussytoes is a poverty weed, in other words, a weed of neglected or waste sites. It doesn't say much for a person's lawn care routine to have pussytoes spreading rapidly in their yard. The presence of a pussytoes infestation may point to badly compacted soil, low fertility or a general lack of routine lawn maintenance.

Everyone wants the name of a good herbicide that will wipe out this particular weed because it sticks out like a sore thumb amongst lawn grasses. But we don't have any good, solid recommendation. Spot treatment with glyphosate (sold as Round Up and other brand names) is probably as good as anything.

Whatever approach is taken, spot treating with herbicide,

digging or a combination of both, keep in mind that pussytoes are symptomatic of a lawn that is in need of help. Figure out what's missing and supplement the weed control with cultural methods that will help the grass to grow better.

Deborah Brown
Extension Horticulturist

Tip Blight of Junipers

Tip blight caused by the fungus Phomopsis juniperovora is present on junipers and occasionally on other gymnosperms in landscape and windbreak plantings. This disease infects new growth throughout the growing season as spores from infected branches are splashed by water onto young/immature foliage. Newly infected foliage appears red to brown in color beginning in mid to late May. As the growing season continues, infected foliage may turn ash gray in color and fall from the plant. Eventually the fungus moves from the immature foliage into the branch causing death of the branch tip (tip blight).

Tip blight tends to be most severe during periods of rainy weather. Control strategies for tip blight include pruning and destroying infected twigs during dry periods, watering during the day to keep foliage dry, planting resistance varieties when possible, and applying fungicides like thiophanate-methyl (Cleary's 3336) as the new growth begins.

Chad J. Behrendt
Extension Educator

Oak Wilt Reminders

- Do not prune oak trees until July 1. (The optimum time for pruning trees is during the dormant season/late winter.)
- If a tree is wounded or pruned before July 1, paint the wound to prevent picnic beetles, which carry the oak wilt fungus, from introducing the fungus into the sapwood. Remember paint only acts as a barrier to prevent the fungus from entering the sapwood and does not help the tree to heal.
- When removing infected oaks, dispose of infected wood or properly store infected wood (debark wood, wrap wood in plastic, or chip wood and branches).
- Be careful to not wound adjacent healthy oak trees when removing infected trees.

Chad J. Behrendt
Extension Educator

Cornfield Ants in Turf

There has been questions recently about small ant mounds in lawns. Most of these nests are caused by cornfield ants which are very common soil-nesting ants in Minnesota. Because the mounds are usually found in areas of sparse or bare grass, there is concern that the ants are killing the lawn. However, this is not true. The ants take advantage of these areas; they do not cause thinning grass. It is not advisable to attempt to treat all or even most of the nest in a lawn as it would be neither practical nor environmentally sound.

The presence of cornfield ants is a symptom, not a cause, of declining areas of grass. If it is desirable to treat nests close to the home because the ants are nuisance coming indoors or if you wish to treat a very limited number of ant nests that are particularly conspicuous in the landscape, you can apply an insecticide such as carbaryl (Sevin), chlorpyrifos (Dursban), diazinon, or acephate (Orthene). If you do treat nests, be discriminating and judicious in your use of pesticides. Keep in mind that the effect of chemicals is only temporary and ants will eventually recolonize those areas unless grass is encouraged to grow there.

Jeff Hahn
Extension Entomologist

Maggots In The Carpet

We have received several calls and samples of maggots appearing on floors especially in carpets. These insects are whitish, legless and with no apparent head. They are narrow at one end of the body (head end) and broader at the other. Despite the circumstantial evidence, these blow fly maggots are unrelated to carpets or rugs. They spend most of their life feeding on dead animals.

When blow fly maggots are found indoors, that means an animal has become trapped and died indoors, e.g. in a wall void, attic or chimney. Adult blow flies (metallic green flies) are attracted to the carcass to lay eggs. The maggots hatch and act as nature's garbage service to decompose and remove the corpse. As the maggots mature, they often move away from where they were feeding to pupate (make cocoons). This is when they move through light fixtures or other spaces or cracks and may end up on the floor of a room. The maggots are harmless and physical removal is the only necessary action for them. To eliminate the problem altogether requires removal of the animal which is not possible in many cases. If the dead animal can not be found and removed, you can only wait for the maggots to go away on their own which may take about a week depending on the size of animal.

Jeff Hahn
Extension Entomologist

Entomology Notes

Pine needle scale crawlers were reported in the Twin Cities last Monday. Scales are most vulnerable to management when they are in the immature crawler stage.

European pine sawfly should be out in central Minnesota. Treatment is most effective when larvae are ⅜- to ½-inch long or smaller. Yellowheaded spruce sawfly should be out now in southern Minnesota. Watch for them in central Minnesota the week of May 18. Treatment for these is also most effective when larvae are ⅜- to ½-inch or smaller.

One-inch long forest tent caterpillars have been reported in east central Minnesota. They are unlikely to injure healthy, mature trees, although young trees may be at risk. Management is most effective when treatment is aimed at caterpillars 1-inch or smaller.

Slugs and their damage are starting to show up in home gardens. Sanitation, moisture control, and traps can be effective in managing slug numbers. Metaldehyde bait can be used to supplement nonchemical efforts.

Jeff Hahn
Extension Entomologist

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MINNESOTA

CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

Wild Oat Control in Wheat and Barley

Once again it looks like we are facing another bumper crop of wild oats! Wild oats are quickly emerging in many fields, and in most cases the wild oats are emerging faster than the crop.

So when is the best time to apply wild oat herbicides? In most cases, wild oat herbicides applications should be based on wild oat leaf number. For example, Assert should be applied to 2- to 4-leaf wild oats. However, Tiller and Cheyenne applications should be based on both the wild oat leaf stage and crop stage. Tiller and Cheyenne need to be applied before the jointing stage of wheat.

As for fields in which wild oats have emerged or are emerging before the crop, should a wild oat herbicide be applied now? There are two factor to consider, wild oat density and additional wild oat emergence (flushes). Our advice is to wait until that crop emerges (at least one leaf on the wheat and barley) and for any addition flushes of wild oats. However, if the wild oat density is heavy (over 20 wild oats/ square foot), do not wait too long, as wild oats are very competitive and can cause significant yield losses.

The *Post Emergence Wild Oat Control* article found elsewhere in this issue, provides additional information on wild oat control.

There are several herbicides available for wild oat control in spring wheat and barley. Each herbicide has advantages and disadvantages.

Good wild oat control with herbicides requires proper timing of applications. Post-emergence wild oat herbicides require application to wild oats and crops at precise leaf stages. Leaf number on wild oats is determined by counting the leaves on the main stem and disregarding the tillers. The youngest leaf is counted as a full leaf only when another leaf becomes visible. Lower leaves, which may have died from various stresses, such as frost, should be counted in the total leaf number. An accurate leaf count is important for optimum wild oat control.

Climatic conditions must also be considered when choosing a wild oat herbicide. For example, some wild oat herbicides work better under dry conditions than others. Under dry conditions, do not reduce rates below the labeled rates. The drier the conditions, the harder it is to control wild oats. Therefore, herbicide rates should probably be increased for the best control.

There are a number of tradeoffs for the advantages any postemergence wild oat herbicide might offer. Early wild oat control can mean better yields because the weed has less time to compete with the crop. However, when a herbicide treatment is applied early, odds are great that a late flush of wild oats will require a second herbicide application, or that some wild oats might escape treatment.

Highlights.....

Any uncontrolled wild oats can reduce yields, and will produce seed that contributes to next year's wild oat problem. In general, under heavy wild oat pressure (over 30-plants/square foot) research has shown that a herbicide treatment should be applied as soon as possible to prevent high yield losses.

Wild oat herbicides currently labeled for post-emergence applications in Minnesota

Assert (imazamethabenz)

Assert is labeled for wild oat control in spring wheat, durum, barley and sunflowers. Assert will also give control of many plants in the mustard family, including wild mustard.

In research conducted at the Northwest Experiment Station--Crookston and the West-Central Experiment Station--Morris, Assert has given consistent wild oat control. Spring wheat, durum and barley have good to excellent tolerance to Assert.

The use rate of Assert LC is 1-1.2 pts/A. For best control, apply Assert at 1-1.2 pts/A when wild oats are in the 1- to 4-leaf stage. good wild oat control has been obtained when the 1 pt/A rates have been applied to 1- to 3-leaf wild oats; however, for larger wild oats, the 1.2 pt/A rate be used. Assert must be applied with a non-ionic surfactant at a rate of 2 pints of surfactant per 100 gallons of spray solution. For control under adverse conditions, such as dry condition or heave wild oat pressure, Assert should be applied with a crop oil concentrate at 2 pt/A in addition to the surfactant. **DO NOT** apply crop oil concentrate with 2, 4-D ester because of potential crop injury.

Assert can be tank mixed with 2, 4-D ester, MCPA ester, Bronate (bromoxynil + MCPA ester), Harmony Extra (tribenuron + thifensulfuron). Do not tank mix with Banvel/Clarity (dicamba), MCPA amine, or 2, 4-D amine as reduced wild oat control will result.

Assert has soil activity, and may persist for more than one year in the soil; therefore, do not plant any crop other than barley, wheat, corn, sunflowers, soybeans, or edible beans for at least 15 months after an Assert application. Do not plant sugar beets for at least 20 months following an Assert application.

Avenge (difenzoquat)

Avenge can be used for wild oat control in spring wheat, durum or barley. Barley has good tolerance to Avenge, however, some spring wheat and durum varieties will be injured by Avenge. Many new hard red spring wheat varieties were added to the Avenge label last year, but there are still several newer varieties not listed. One variety in particular that is not on the regular Avenge label, is 2375. However, there is a supplemental label that allows Avenge to be applied to 2375 at 2.5-3 pts/A. 2375 will probably be planted on a large number of acres this year, however serious injury may result if Avenge is applied at rates greater than 3 pts/A. Avenge can also be applied at 2.5-3 pts/A to the following hard red spring wheat varieties: Norm, Sonja, Sharp, AC Barrie, AC Domain, Bacup, Ernest, Forge, Hamer, Hi-Line, Kulm, Lars, McNeal, Norlander, Oxen, Russ, and Sharpshooter. See the label for a complete list of hard red spring and durum wheat varieties that have tolerance to Avenge. Common hard red spring wheat varieties that are **NOT** on the Avenge label include Grandin, and Gus.

Avenge should be applied when the majority of wild oats are in the 3- to 5-leaf stage. In Minnesota research trials, Avenge gave the best control when wild oats were in the 4- to 5-leaf stage. Avenge should be applied at the highest labeled rate when applied to heavy infestations of 3-leaf wild oats, and should not be applied until the wild oats have reached the 3-leaf stage. Use rate for Avenge is 2.5-4 pts/A.

Avenge can be tank mixed width 2,4-D, MCPA, Harmony Extra (tribenuron + thifensulfluron), Express (tribenuron), Buctril (bormoxynil), Curtail (clopyralid + 2, 4-D amine), and Bronate (bromoxynil + MCPA ester). Do not tank mix Avenge with Banvel/Clarity (dicamba).

Cheyenne (fenoxaprop + MCPA ester + thifensulfuron + tribenuron)

Cheyenne is labeled for post-emergence control of foxtails and wild oats, and Cheyenne can be applied to most annual broadleaf weeds in hard red spring wheat. Cheyenne is **NOT** labeled for use in durum wheat from the 3-leaf stage to the end of tillering (6-leaf stage). **DO NOT** apply after jointing. Apply when grass weeds are 4 inches tall or shorter. **DO NOT** tank mix Cheyenne with any other herbicide, additive, or fertilizer.

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

There were several cases of hard red spring wheat injury due to Cheyenne applications in 1997. The injury was associated with cool, wet weather conditions and late applications. In most cases, the spring wheat recovered from this injury, and there was no yield loss. To decrease the crop injury potential, **DO NOT** apply Cheyenne after jointing stage. Read the label for additional restrictions or precautions.

Hoelon (diclofop)

Hoelon con be applied to all varieties of wheat, barley and durum. Hoelon should be applied when wild oats are in the 1- to 4-leaf stage. For best control research has shown that Hoelon should be applied before the 3-leaf stage, especially when using the 2 pt/A rate. Hoelon can be applied at 2-3.3 pts/A (0.75-1.25 lb/A) in spring wheat and durum, and 2-2.67 pts/A (0.75-1 lb/a) in barley. Do not use more than 2.67 pts/A in barley, as barley injury will result.

When using the 2 pt/A rate of Hoelon in spring wheat and durum, the addition of 1 qt/A of crop oil concentrate has been shown to increase wild oat control. **DO NOT** use crop oil concentrate on barley. When wild oat plants have reached the 3- to 4-leaf stage and/or plants are under moisture area stress, the higher labeled rates should be used. Cool temperatures following application increase wild oat control with Hoelon.

Wild oat control with Hoelon will be reduced when wild oats are growing under moisture stress. Increasing the rate used can somewhat overcome this problem.

Caution should be used before applying Hoelon to barley. Hoelon has the potential to give severe barley injury under cool, wet conditions. The Hoelon label states not to apply Hoelon to barley if daily minimum temperatures reach 40 degrees Fahrenheit or cooler for three consecutive days before application. Also do not apply when moisture content of the field is at field capacity. Hoelon should also be applied to barley before tillering.

It is important to carefully select the proper broadleaf herbicide to tank mix with Hoelon. Many broadleaf herbicides, when tank mixed with Hoelon, decrease the grass control of Hoelon. Hoelon can be tank mixed with Buctril (bromoxynil) and a low rate of MCPA ester (0.05 lb/A) plus Buctril. **DO NOT** tank mix Hoelon with Harmony Extra as decreased oat control will occur. **DO NOT** tank mix Hoelon with any other broadleaf herbicide. If a broadleaf herbicide is used, separate the Hoelon treatment and the broadleaf treatment by a minimum of five days.

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

Tiller is labeled for postemergence control of foxtails and wild oat in hard red spring wheat and barley. For wild oat control apply Tiller at 1.7 pts/A after the spring wheat and barley begin to tiller (3-4 leaf stage) but prior to jointing stage (6-leaf stage). Tiller will also control larger foxtail (3-leaf to 2-tillers). In University of Minnesota research, Tiller has given good to excellent control of both yellow and green foxtail. **DO NOT** apply more than one application of Tiller per season, or apply within 70 days of harvest. Tiller can be applied by air.

Tiller at 1.7 pts/A is labeled for tank mixing with Stinger, Buctril, and Tordon for wild oat control. Check the label for tank mixing instructions.

There were several cased of hard red spring wheat injury due to Tiller applications in 1997. The injury was associated with cool, wet weather and late applications. In most cases, the spring wheat recovered from this injury, and there was no yield loss. To decrease the crop injury potential, **DO NOT** apply Tiller after jointing stage. Read the label for additional restrictions or precautions.

Tiller received a label for the use in barley in April 1998. University of Minnesota research has shown that barley tolerance to Tiller is only fair. Therefore, do not apply Tiller to barley under cool, wet conditions or after the jointing stage.

Beverly R. Durgan, Extention Weed Scientist
Jochum Wiersma, Small Grains Specialist

1998 Custom Rates Announced

Most custom rates for farm machinery work are expected to be up slightly for 1998 as compared to 1997. This small rise is due to slight increases in machinery ownership and operational costs. Custom work is more competitive now than it was a few years ago. As a result, there are more farmers doing custom work today than there were a few years ago, which tend to keep rates down.

Both the ***1998 Iowa Farm Custom Rate***sheet and the ***1997 Minnesota Farm Custom Rate Sheet*** are available at the Blue Earth County Extension Office, 410 South 5th Street, P. O. Box 8608, Mankato, MN 56002-8608 (507-389-8325), and from other area Extension offices. The custom rate sheets list the average custom rate, as well as the range in rates for each custom operation. They report the rates actually being charged for custom work that is being performed.

The Iowa and Minnesota Custom Rate sheets are based on an annual survey of about 170 operators and farm managers across the two states. Iowa does a Farm Custom Rate Survey each year and Minnesota does a survey every two years.

The accompanying table shows average custom rates for some common farming operations listed in the 1998 Iowa and the 1997 Minnesota Custom Rate surveys.

The Custom Rate Survey sheets also include rates for other miscellaneous farming practices such as snow removal, manure handling, etc.. The custom rates listed in the survey can serve as a guide in determining final custom rates. Actual custom rates may vary according to the availability of machinery, timeliness of the operation, operator skill required, field size and shape, and other unusual circumstances surrounding the custom work that is to be performed.

For more information on local custom rates, contact your local County Extension Office

Kent Thiesse
Blue Earth County Extension Educator

[See Table on Next Page]

Table: Average custom rates expected to be paid in Iowa (1998) and Minnesota (1997) for common farm operations.

Farming Practice	Custom Rate ($/acre): Iowa Avg.	Minnesota Avg.	Range
Tillage:			
- Moldboard Plow	$11.15	$11.14	$8.00 - $15.00
- Chisel Plow	9.65	9.08	7.50 - 13.00
- Tandem Disk	7.25	6.55	5.50 - 10.00
- Field Cultivator	7.00	5.86	5.00 - 10.00
- Harrow	3.75	3.96	2.50 - 5.00
- Subsoiler	11.85	11.47	9.00 - 15.00
- Disk/Chisel	10.70	10.72	8.00 - 13.00
- Chop Stalks	6.50	5.70	4.00 - 10.00
Planting:			
- Planter with attachments	$ 9.95	$ 9.17	$7.00 - $14.50
- Planter without attachments	8.85	8.53	6.00 - 13.00
- Minimum tillage planter	11.70	11.92	8.00 - 15.00
- Grain drill	8.90	7.38	6.00 - 13.00
- Soybean drill	10.95	9.72	7.50 - 15.50
- No-till Soybean drill	12.40	11.29	7.50 - 15.50
Harvesting:			
- Combine - Corn	$23.40	$21.03	$18.00 - $30.00
- Combine - Soybeans	22.55	19.37	18.00 - 29.00
- Combine - Small Grain	21.15	17.33	16.00 - 25.00
- Handling Grain - Auger (per bushel)	.031	.040	.01 - .06
- Hauling Grain - On Farm (per bushel)	.043	.050	.02 - .10
- Hauling Grain - Truck) (one way) (per bushel)	.07	NA	.03 - .12
Forage:			
- Windrowing	$ 8.45	$ 7.66	$ 7.00 - $10.00
- Hay Baling - Small Square baling	.35/bale	.31/bale	.25 - .50/bale
- large square bales	8.00/bale	NA	5.00 - 11.00/bale
- large round bales	7.20/bale	6.33/bale	5.00 - 10.00/bale
- one ton stack	11.70/stack	NA	11.50 - 12.00/stack
Custom Farming (Growing and Harvesting):			
- corn (per acre	$75.80	$69.30	$60.00 -$100.00
- soybeans (per acre)	70.65	62.80	51.00 - 100.00
- small Grains (per acre)	52.55	NA	45.00 - 60.00
Farm Labor:			
- Average Farm Labor Wages (per hour)	$ 7.20	$ 7.41	$ 6.00 - $10.00

Are Soils Getting Harder?

During the past winter meeting season, crop producers made the frequently comment that they thought their soils were getting harder. They were searching for answers or explanations.

There is no single explanation for either an actual or only perceived increase in the hardness of soils. Any explanation could very easily change with the grower and the specific soils. Some possible explanations of the factors that could increase the actual or perceived bulk density of soils in Minnesota are:

Use of Anhydrous Ammonia

Each year, there are some individuals (usually selling or promoting some "new" product or program") who claim that the repeated use of anhydrous ammonia increases the bulk density of soils (makes soils harder). A comprehensive study, conducted in Kansas, showed very clearly that a yearly application of anhydrous ammonia at a high rate (200 lb. N per acre) did not increase the bulk density of soils.

A high concentration of 82-0-0 in the small injection zone will cause the pH to rise to about 9.0. This high pH will kill soils organisms in the injection zone which is approximately 1% of the total soil volume in the top 6 inches. After the rapid pH rise, there is a decrease in pH as the ammonium-nitrogen is nitrified to nitrate-nitrogen. When nitrification is complete, the final pH might be slightly lower than the initial pH and more favorable to growth and development of soil organisms. So, use of anhydrous ammonia should not make soils harder.

Tillage of Wet Soils

Tillage when soils are wet is probably the best substantiated reason for an increase in the bulk density of soils. It's logical to some that we see more tillage on soils that are too wet to work. Crop producers continue to farm more acres each year and, thus, feel that they must till and plant earlier each year.

In addition, high flotation tires that can be used for tractors now allow the producer to till high moisture soils without excessive wheel slippage. The repeated use of heavy tillage equipment when soils are too wet is probably the biggest factor contributing to increased bulk density in Minnesota soils.

Depth of Tillage

Crop producers are using equipment with more horsepower each year. As a result, we will tend to till deeper than we did in the past. This deeper tillage obviously gives the tractor operator the impression that soils are harder. Soil hardness cannot be measured by perceived power needed for tillage. An instrument called a penetrometer is needed for an accurate measurement of bulk density and changes in this soil property over time.

Crop Residue Management

Emphasis on the harvest of crop biomass for energy and other uses raises one important question. Will residue (biomass) removal result in more dense soils? Incorporation of crop residues is a management practice that is widely used to reduce the bulk density of soils. These residues provide the carbon energy sources needed by soil organisms. The organisms excrete a sticky substance which binds some soil particles together. This binding reduces bulk density and allows for more rapid water infiltration into the soil. Any shift in residue management such as repeated removal of crop residues will eventually increase the bulk density of some soils.

Erosion

Losing surface soil because of wind or water erosion always results in a net loss of soil organic matter, stable soil aggregates, and plant nutrients. With continued and excessive erosion, crop producers will farm more of the subsoil which usually has a higher clay content. Bulk density increases more rapidly as the clay content increases.

George Rehm
Extension Soil Scientist

Full Registration for Asana XI on Sugarbeets

DuPont's insecticide, Asana XL (esfenvalerate), has received a full label registration for sugarbeets. The target insects include grasshoppers, Beet Armyworm, Cutworms (seedling spray), Saltmarsh Caterpillar, Cabbage Looper, and Beet Webworm. The application rate is 5.8-9.6 fl. oz / acre (0.03-0.05 lbs. of a.i./acre). It can be applied as needed but must not exceed 0.15 lbs. of a.i./acre per season. See "Spray Recommendations and Precautions for Sugarbeets" on the label. This synthetic pyrethroid may prove a valuable tool this year as we are already seeing cutworms and grasshoppers in young sugarbeets in the southern Red River Valley.

Ian MacRae
Extension Entomologist

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5 (soil samples, $7). ***All other services are free-of-charge,*** *including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open from 9 a.m. to 1 p.m., weekdays. When you call with a question for a Master Gardener you will will be asked to enter the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.*

Dealing With Dog Blight

Last winter was so mild that we've had almost no calls about browned out evergreens or trees leafing out poorly. There's one perennial problem that presents itself regardless of the winter's severity, though: dog blight.

It's bad enough when it's your own Fido that answered the call of nature in your yard last winter. People are considerably less tolerant when it's someone else's pooch that did the dirty deed. Either way, there's not a whole lot you can do about it.

The best approach is to soak any "blighted" areas thoroughly, to dilute whatever excess fertilizer still lurks in the soil. If the dead spot is smaller than your fist, and most of the lawn looks fairly healthy, surrounding grasses should fill in without further work on your part. If, however, the dead area is larger, you'll need to scruff up the soil and reseed. The easiest way is to spread one of the lawn repair mixes containing seed and mulch.

Another alternative would be to prepare the soil as you would for seeding, but then cover it with a patch of sod the same size, cut from a less conspicuous part of your yard. *In neither event would gypsum be helpful,* despite the frequent advice given to use it where dog spots have killed parts of the lawn.

Deborah Brown
Extension Horticulturist

Wood Decay and Hazard Trees

Wood decay is usually caused by fungal organisms, which invade non-living trees and wood products, as well as wounded living trees.. Although these fungi can be highly beneficial in a natural forest system as decomposers, they are usually considered detrimental to individual trees within the home landscape. The presence of rotten wood or shelf mushrooms (also known as conks) on the outside of the tree indicates that decay fungi are present. Unfortunately, there are no control practices either culturally or chemically that effectively stop wood rotting fungi. Prevention (avoid wounding) is the only control practice available. Trees colonized by wood rotting organisms are usually structurally weakened and prone to wind throw. Therefore, decayed trees may be considered hazardous.

What is a hazard tree? A hazard tree is a defective tree that is likely to fail or break causing a portion of the tree or the whole tree to fall over. However, before a tree is considered a hazard tree it must first have a target. A target may consist of physical property that can be damaged or people that may be injured. Evaluation of hazard trees in cities, parks, home yards, forests, and recreation areas should begin with an inspection of the site, followed by an assessment of the trees condition (defects, size, age, species, etc.). Basic corrective measures include one of the three options:

1) remove the target,
2) remove the hazardous portion of the tree through pruning,
3) remove the tree.

Chad J. Behrendt
Extension Educator

Cedar Apple Rust

Cedar apple rust is a disease that usually occurs on apples and native red cedar. This disease may also occur on other plants such as crabapples and rocky mountain juniper. In order to survive, cedar apple rust must spend a portion of its life on apple trees and a portion of its life on cedar trees. In the spring two-year old brown galls on the cedar tree turn orange and gelatinous, and produce spores that are wind disseminated to nearby apple trees. Infected leaves on the apple tree then produce spores in late summer and early fall, which reinfect nearby cedars.

Identification of cedar apple rust is most easily accomplished in the spring when the orange, gelatinous "telial horns" are being produced on the cedar. Control practices for this disease will vary depending on which of the two hosts you are trying to protect. Control measures include removing the alternate host, planting resistant varieties, pruning out galls on infected branches of the cedar, and spraying apple trees with a fungicide in the spring to prevent infection.

Chad J. Behrendt
Extension Educator

Black Flies Are Out

These small insects, commonly called gnats, can be vicious biters of people. They are about 1/20 inch long, robust, and dark-colored. black flies mature in rivers and can fly a couple of hundred of miles away from their breeding sites.

Black flies commonly bite people around the head, especially along the hairline, on arms and other exposed skin. Black flies are particularly common early in the morning, at dusk, during cloudy days, and calm days. You are less likely to notice them on windy, sunny days. Although black flies can occur throughout the spring and summer, their biting is worse in the spring, lasting until June.

Unfortunately, their is no magic bullet to avoid their bites. Long sleeved shirts, long pants, and hats help minimize exposed skin. DEET is a repellant that you can spray on clothes and skin (the same material that you would use to repel mosquitoes). However, it is only mediocre in keeping black flies off of you. Be careful not to overapply DEET.

Jeff Hahn
Extension Entomologist

Birch Leafminers Are Active

Early birch leafminer mines have been reported in the Twin Cities. This is about ten days earlier than normal and about three weeks earlier than last year. They appear as light greenish or gray blotches. Birch leafminers have little impact on tree health, although the brown leaves may not look attractive. If management is attempted, the best timing is when mines first appear. A foliar treatment with a systemic insecticide (acephate [Orthene], dimethoate [Cygon]) effectively manages these insects.

Jeff Hahn
Extension Entomologist

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MINNESOTA CROP NEWS

Vol. 4
No. 7

From the Crops System Team of the Minnesota Extension Service

Problems Possible with Early Planting

Most of the corn and a good share of the soybeans in southwest Minnesota have been planted much earlier than normal. The dry weather in late April and warm sunny days contributed to ideal field working conditions. What happens now is the question on many farmers' minds.

When will the crop emerge? What weed control complications can be expected? Will insect and disease be a problem? What is the moisture status? Emergence of both corn and soybeans is expected to be slow. With soil temperatures fluctuating around fifty degrees, emergence may not occur until twenty to thirty days after planting. Dry soil conditions could further delay emergence and contribute to uneven emergence.

Weed control may be more challenging due to the early season. The early planting occurred prior to the emergence of the first flush of annual weeds. In many years, tillage prior to planting eliminates the early season weed pressure. With the first flush of weeds emerging after planting, extra pressure is put on weed management plans. Early season weed control is important to provide the crop with a head start ahead of weeds. Performance of preplant and pre-emerge herbicides is critical. The use of the rotary hoe when weeds are in the white stage and beginning to emerge is a very good practice. The rotary hoe will also help the preemergence herbicide activity. Producers planning on a total post emerge herbicide should anticipate the need for multiple split applications due to the extended weed emergence time frame.

Seedling diseases such as pythium could be a problem if extended cool wet soils are encountered during the germination to emergence period. However, if dry soil conditions continue, disease pressure should be minimal. Cutworm damage potential and the grasshopper hatch in late May need to be monitored carefully.

While the dry conditions allowed for near-perfect planting conditions, moisture is needed for crop germination and emergence. In much of the area subsoil moisture is adequate, though a general rain is necessary to replenish surface moisture. In the absence of that wide spread precipitation, uneven and incomplete emergence can be anticipated.

Bob Brynes
Lyon County Extension Educator

Highlights.....

Alfalfa Pest Management Update

Early Season Insects To Watch For:

Although it has been 9 years since we experienced severe alfalfa weevil (AW) infestations, the early, warm, dry spring can be very conducive to AW development. AW is generally limited to southeastern, south-central and central MN. Warm weather favors AW development over crop growth, i.e., allows late instar larvae to develop before typical harvest dates (mid- to late-May), or continue to develop on the new regrowth just after harvest. Dry conditions suppress development of the naturally occurring fungal pathogen, which usually keeps AW in check during normal "wet" springs.

One of our graduate students, Brian Thoreen, has initiated an intensive sampling effort for AW and beneficial parasites, in all southeastern counties. To date, he has not found many AW, but we are also only at about 140 Degree-days; if present, larvae will start showing up at approximately 200 degree-days, and peak between 400-600 degree-days.

Also note that this same weather pattern is conducive to pea aphid growth as well.

Bill Hutchison
Extension Entomologist

Planting Wheat and Orange Wheat Blossom Midge

Most of northwest Minnesota passed the lower threshold for the synchronization between the development of orange wheat blossom midge and spring wheat (Tables 1 & 2). This means that wheat planted after the below mentioned dates is at some risk to midge infestation during heading. This is no cause for alarm nor should it be a reason to quit planting wheat. The decision of whether an insecticide is needed to control economic losses will have to be made when the crop is in the susceptible growth state, namely heading. However, the above mentioned threshold can be used to prioritize scouting activities during that period.

Table 1. Wheat Midge Degree Days Used as a Guideline for Risk Assessment

HRSW planted PRIOR to accumulating 200 DD will head before wheat midge emerge.
HRSW planted FROM 200 to 600 DD will be heading at the time wheat midge are emerging.
HRSW planted AFTER 600 DD will head after peak emergence and should be at low risk to midge infestation (higher risk of frost, however).

Table 2. Calendar dates for different locations in northwest Minnesota and eastern North Dakota at which 200 GDD for Orange Wheat Blossom Midge were accumulated.

Fargo	April 24
Hillsboro	April 25
Eldred	April 25
Grand Forks	April 25
Warren	April 27
Stephen	April 27
Humboldt	April 29

Jochum Wiersma, Small Grains Specialist, Northwest Experiment Station
Ian MacRae, Extension Entomologist, Northwest Experiment Station

Plant Disease Clinic

Samples submitted to the Clinic in April included:
soybean—soybean cyst nematode
barley—samples tested for loose smut
turf—cultural, no disease was found
penstemon—Impatiens necrotic spot virus (INSV)
pachysandra—*Volutella* sp stem rot
N.G. impatiens—INSV
fuchsia—*Pythium* sp and *Rhizoctonia* sp root rot
petunia—Tobacco mosaic virus (TMV)
coleus—INSV
heliotrope—INSV
ajuga—Alfalfa mosaic virus

Sandra Gould
Plant Disease Clinic

Extension Yard and Garden Line

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When you call with a question for a Master Gardener you will punch the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.

Bring out the Borax, it's Creeping Charlie Time Again

One of the most common questions recently has been about the efficacy of using borax on creeping charlie (ground ivy). It does work fairly well, but you can't keep applying it year after year. Two years is probably about all that's safe, because boron collects in the soil and will kill the grass if there is too much. Then you'd have to scrape away and replace the top soil, because the boron won't break down and disappear.

Twenty Mule Team Borax is a naturally occurring mineral salt, sodium tetraborate. Boron is needed in minuscule quantities by all plants, but rapidly becomes toxic when too much is applied. Creeping charlie is more sensitive to boron than are most grasses, which is why we can attack the creeping charlie without permanently damaging surrounding grass (you might see some temporary browning).

If the creeping charlie is growing in a shady place where it's difficult to grow grass, I'd think long and hard before killing it. Unless you have a good plan for the area and know what will replace the creeping charlie, you're better off leaving it as is. Once the creeping charlie is gone, you need to do all you can to encourage the remaining grass to grow as vigorously as possible, including regular mowing (but not too short), fertilizing, watering when necessary, thatch control (again, if necessary), and so on. If you can't create a thick, healthy stand of grass (or other groundcover), it will just fill with weeds again.

Here's the formula suggested by researchers at Iowa State University. You can spray in spring as soon as the creeping charlie leaves are fully developed.

To cover 1,000 square feet (adjust as needed for smaller areas):

* dissolve 10 ounces of Twenty Mule Team Borax into 4 ounces of warm water
* dilute your mix into 2 1/2 gallons of water (mix it well)
* **spray it EVENLY over 1,000 square feet of lawn with creeping charlie interspersed in it**

Deborah Brown
Extension Horticulturist

Birch Leafminers will be Early this Year

The birch leafminer is one of the most common insects that affects birch trees in the landscape. The larvae feed inside the leaves of most birch species and leave meandering trails that eventually cause the leaves to turn papery brown.

The adults usually emerge about mid-May in central Minnesota. In southern Minnesota this can be a week earlier, and in northern Minnesota a week later. This year however, we can expect the birch leafminer to emerge two to three weeks earlier, about the time birch leaves are 1/8th of an inch long. The female leafminer lays her egg into the center of the leaf which results in a characteristic white blotch. Watch for this early sign of damage to determine if treatment is necessary. Birch trees can tolerate up to 60% leaf damage if well watered and in good health. Due to the unpleasant appearance of an affected tree, treatment may be used to prevent aesthetic damage.

Homeowners can treat the tree by using systemic insecticides such as acephate (Orthene), or dimethoate (Cygon). These insecticides are sprayed on and absorbed by leaf tissue. Licensed pesticide applicators, such as arborists and lawn service companies, can inject the tree with suitable insecticides. This treatment may be more effective and has the advantage of reducing pesticide drift.

The birch leafminer feeds for about two weeks, then drops to the ground to pupate. By the time the leaves appear papery brown (unfortunately, this is when most people notice), it is too late to treat the tree. See FS-6134 *Birch Leafminers*, for more information.

Joseph Pedretti
Entomology Technician

Clarification of Rhizosphaera Needlecast Control Strategies

In the last two volumes of *MN Crop News,* I have provided two slightly different recommendations for controlling Rhizosphaera Needlecast. The first recommendation given in volume 4, number 5 stated that spruce trees should be sprayed with a protectant fungicide when 10% of the buds had broke, again 1 week later, and again 3 weeks later. In the next issue I recommended to spray trees when the needles were half elongated and again 3 to 4 weeks later. According to the label, chlorothalonil is to be applied when the new shoots are 1/2" to 2" in length and again 3 to 4 weeks later. Therefore, the second recommendation is the correct recommendation for homeowners. Although the first recommendation is similar to the second (two initial sprays instead of one) and may be more effective, it does not follow recommendations on the chlorothalonil or other registered fungicide labels. Thus, Colorado Blue Spruce trees should be sprayed for Rhizosphaera Needlecast when the needles are half-elongated (1/2" to 2" in length) and again 3 to 4 weeks later or as stated on the label. In Minnesota the buds of Colorado Blue Spruce usually open in May or June, however, this year the buds may open earlier. I apologize for the confusion.

Determining the Severity of Anthracnose

Anthracnose, a very common disease of ash trees in Minnesota, can be observed in the spring. This disease infects leaves and shoots causing blight on young leaves and/or shoots as well as a necrotic leaf spot (blotch). In most cases, anthracnose infects the lower portion of the tree causing a leaf spot and very little defoliation. In severe cases anthracnose causes blight of young leaves and premature leaf drop. The severity of anthracnose in any given year is closely related to environmental conditions and the physiological stage of the tree. Infection can occur at anytime after bud break, provided moisture is present. Maximum infection occurs when prolonged periods of wetness and moderate temperatures are present during the development of new leaves. Since the leaves on many ash trees are beginning to mature and we have not had many prolonged periods of wetness, anthracnose will most likely cause minimal damage this year. However, if environmental conditions change and we begin to encounter prolonged periods of wetness, anthracnose will be more severe. Chemical control of anthracnose is very seldom required, but may be needed if a tree has been infected for several seasons.

Chad Behrendt
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MINNESOTA CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

The Spring Soil Nitrate Test

The use of the soil nitrate test in the fall has been recognized and accepted as a best management practice for several years. This test was not promoted for use in south-central, southeastern, east-central, and central Minnesota because there can be substantial changes in amounts of soil nitrates between fall and spring in these areas. Recent research, however, has been the basis for the development of a spring nitrate test.

This test is also used to fine-tune nitrogen fertilizer recommendations for corn. The soil samples are collected in the spring rather than in the fall. In order for this test to be effective, soil samples must be collected to a depth of 2 feet and analyzed for nitrate-nitrogen. These soil samples should be collected either before planting or very close to the time of planting. The amount of nitrogen fertilizer that is recommended as a result of the use of this test can then be applied as a sidedress treatment.

This spring soil nitrate test is not appropriate for all fields. A crop rotation where corn follows corn generally provides the greatest potential for carryover of nitrate-nitrogen. In contrast, lower amounts of residual nitrate-nitrogen are usually measured when corn follows soybeans. This test should not be used when corn follows alfalfa in rotation.

This test works best for the medium and fine-textured soils derived from loess or glacial till. The use of this test on sandy soils is not worthwhile because these soils consistently have low amounts of residual soil nitrate.

This spring nitrate test will not accurately measure the amount of nitrate-nitrogen mineralized from manure applied late last fall or early this spring. It does work well for situations where manure was applied in the spring or summer of 1997 and the 1998 corn crop will follow a 1997 corn crop.

The detailed procedure for the use of the soil nitrate test is spelled out in the Extension publication FO-3790, *Fertilizing Corn in Minnesota.* This folder is available in the local county Extension offices.

George Rehm
Extension Soil Scientist

Highlights.....

Assess Alfalfa Stands: Winter Injury Minimal

Alfalfa in variety trials throughout Minnesota is growing well. Alfalfa at Lamberton, Lewiston, and Rosemount is or has grown through a six-inch plant height. When the spring growth of alfalfa grows through a six-inch height we are assured it is actively growing and starts producing its own food reserves; and, it is no longer dependent on food reserves stored in the crown and roots. North of a line from Rosemount to Morris, additional growth is needed to determine the fate of alfalfa in those regions.

Assess Stand Density

Even though extensive damage is not eminent, winter injury is present and in some badly managed areas I expect some plant mortality. An excellent time to assess stand density is after plants have reached a six-inch height. Walk the fields and determine the stem density (< 39 stems/ft^2, consider plowing, 40-55 stems will result in some yield reduction and > 55 stems will result in no yield loss). The University of Wisconsin publication *Alfalfa Stand Assessment: Is This Good Enough to Keep?*, A3620, is excellent.

We expect to see more damage on south facing slopes of fields, on varieties with higher fall dormancy scores (3's and 4's) with little winter hardiness (winter survival index > 3.0), on older stands, in areas with no snow cover, and areas without last years fall growth (fields cut late last fall).

The only risk besides hail damage we need to escape to have an early productive season is a killing frost. Now that alfalfa is six-inches tall, the tops will not tolerate extensive temperatures below 25 to 28 F. If we do have killing frost, it will not kill plants; but will reduce yield.

Neal Martin

Extension Agronomist-Forages

Extension Yard and Garden Line

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5.00 (soil samples, $7). **All other services are free-of-charge,** including talking to someone at the Bell Museum or Water Line. You can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open from 9 to 1, weekdays.

When you call with a question for a Master Gardener you will punch the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.

Pruning Shrubs

People are calling the Yard and Garden Line with questions about pruning their shrubs, now that warmer weather has arrived.

It's the perfect time to prune hedges, assuming you're not growing them for their flowers (like lilacs), in which case you should wait until they're through blooming. It's easy to see if there's any winter die-back to trim off, and it's also easy to spot older, thicker stems that might need to be removed.

Prune hedges so they're slightly broader at the base than at the top, so sunlight reaches the lower limbs. If you allow them to grow too wide on top, they'll suffer from an "umbrella" effect. The tops will shade the bottoms, and you won't get many leaves developing close to the ground. The hedge will look "leggy."

It's still a little early to trim evergreens such as junipers, yews, and arborvitae. Wait until you see the growth sprouting, then be careful to allow some of that new growth to remain. If you prune these plants too heavily, they may quit sending out new growth altogether, which means ultimately they'll just dry up.

Most shade trees aren't terribly fussy about when they're pruned. Oak trees are an important exception—so, possibly, are elms. Pruning oaks or wounding them in any way during April, May or June leaves them vulnerable to the devastation of oak wilt. Wait until July to have them trimmed. If you have an oak tree that's storm damaged this spring, apply wound dressing to all exposed sites as soon as possible.

Refrain from pruning or wounding elms during the growing season if you can. There is some thought that the odor of fresh wounds may attract bark beetles that may be carrying fungal spores that can cause Dutch elm disease.

Deborah Brown

Extension Horticulturist

Mosquitoes

We have received questions throughout winter and spring about what the forecast for mosquitoes will be given the mild weather and early spring. There is no question that mosquitoes are active earlier than normal. In fact, according to Nancy Read at the Metropolitan Mosquito Control District, several Aedes species (e.g. canadensis, excrucians) already are active in the water. But does this mean that we are in store for an above average summer for mosquitoes? Not necessarily, the important factor in mosquito abundance is rainfall. If we experience a dry summer (think back to 1988), mosquitoes will be below average in numbers. If we encounter a wet season (remember 1993), mosquitoes populations will be high. Although mosquitoes are active now, it is not until Aedes vexans starts to emerge around the end of May that our encounters with mosquitoes start to significantly increase.

Jeffrey Hahn

Assistant Extension Entomologist

Problems with Colorado Blue Spruce!

Every spring the clinic receives numerous calls regarding dead or dying needles on Colorado Blue Spruce trees. Branches with dead or dying needles can be observed throughout the tree. There are several diseases that cause needle loss on Colorado Blue Spruce, as well as abiotic factors and insect activity. Therefore, proper diagnosis of the problem is necessary before accurate management strategies can be recommended.

Colorado Blue Spruce, a non-native tree to Minnesota, is less resistant to common diseases and less tolerant of stressful environmental conditions than native spruce trees. As Colorado Blue Spruce age, two diseases known as Rhizosphaera Needlecast and Cytospora Canker commonly infect these trees. Diagnosis of these two diseases can be obtained by observing the pattern and type of infection. Rhizosphaera Needlecast is a foliar disease that infects just the needles, causing the inner needles on the branch to die and fall off. Cytospora Canker is a canker disease that infects just the branches, causing all of the needles on the branch to die and fall off beyond the point of infection. Usually Rhizosphaera Needlecast and Cytospora Canker randomly infect needles or branches near the base of the tree. These diseases then spread to healthy branches higher in the tree. Note that both of these diseases can be present on the same tree at the same time. Damage caused by insects such as sawflies can also cause needle loss on spruce trees as they feed on needles near the end of the branch, and can be confused with Rhizosphaera Needlecast and Cytospora Canker.

Spruce trees that have branches with dead needles only on one side of the tree or only at the top of the tree (in comparison to randomly located branches near the base) are most likely affected by abiotic factors such as cold-blowing winds. These winds can desiccate needles on the tree, resulting in death of the needles. Winter injury usually affects only one side of the tree, the side facing the wind. In some cases winter injury may also affect the terminal leader (upper branch) of the tree.

Control strategies for Rhizosphaera Needlecast and Cytospora Canker include pruning of dead or heavily infected branches and increasing tree vigor (watering, fertilizing, and mulching). There are no chemical sprays available for controlling Cytospora Canker. Applying a fungicide such as chlorothalonil (Daconil 2787) can control Rhizosphaera Needlecast. For optimum control of Rhizosphaera Needlecast, watch for Colorado Blue Spruce buds to open this spring and treat when new needles are half elongated, and again 3-4 weeks later. **Note,** complete control of Rhizosphaera Needlecast may require 2 to 3 years of treatment. Remember to read and follow directions on the label.

Chad Behrendt

Plant Pathology Extension Educator

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MINNESOTA CROP NEWS

Vol. 4
No. 5

From the Crops System Team of the Minnesota Extension Service

Precautions for Fertilizer Placed with Corn Seed

There appears to be substantial interest this year in placing some fertilizer for corn in the seed furrow at planting. This is an acceptable practice and is especially popular when soil test values for P and/or K are in the medium range. There are, however, some risks associated with this practice. Therefore, a brief discussion of some of the precautions is appropriate.

Urea fertilizer applied in contact with the seed can have a damaging effect on emerged stand and subsequent yield. Results from a study conducted by the University of Wisconsin illustrate this effect:

N Applied	N Source	
	Urea	Ammonium Nitrate
lb./acre	bu./acre	
0	137	137
5	60	142
10	36	143
20	33	92

The lowest rate of N applied as urea (5 lb./acre) produced a substantial reduction in yield. When ammonium nitrate was used as the N source, stand damage was not measured until the N rate was 20 lb./acre. So, it would be wise to avoid the use of urea in contact with the seed.

The liquid material, ammonium thiosulfate, can also reduce emergence if placed in contact with the seed. This material with an analysis of 12-0-0-26 is frequently used to supply the sulfur in some fluid fertilizers. Since sulfur is only needed in a fertilizer program for corn production when soils are sandy, this material should not be a component of fluid starter in most of Minnesota.

The micronutrient, boron, is another concern. Stand reduction has been measured when boron has been placed in contact with the seed. The explanation for this damage is not known at this time. Boron, however, is only needed in a fertilizer program in a small part of Minnesota. As with sulfur, damage from this nutrient should not be a concern for corn production in most of Minnesota.

It's also important to remember that the potential for damage from any fertilizer placed with the seed increases as soil moisture decreases. At this time, we can't predict what the soil moisture content will be at planting. But, those who plan on using fertilizer with the seed should pay attention to soil moisture content during the planting season.

George Rehm
Extension Soil Scientist

Highlights.....

Weed Emergence and Weed Identification

As growers gear up for their spring planting and wait to see what the post-El Nino spring weather delivers, likewise so are the weeds lying in the weed seedbanks. The wide range of weed species present in corn and soybean cropping systems can complicate the prediction of weed emergence. Many factors, such as crop rotation, weed control history, and weather patterns can regulate the weed population of a field. However, weed emergence among species is predictable.

Winter annuals and biennials are already beginning to emerge. Some examples of these weed species are Horseweed/Marestail, Downy brome, Field pennycress, Shepherd's purse, Dandelion and Biennial thistles. Other weed species that are likely to emerge before spring planting are Foxtail barley, Kochia, Wild mustard, Russian thistle, Quackgrass, Common lambsquarters, Wild oats, and Giant Ragweed. There is a wide range of species that can emerge during the time of crop planting. Some of the more common species in this group are Common ragweed, Wooly cupgrass, Velvetleaf, Canada thistle, Common Cocklebur, Redroot pigweed, Barnyard grass and Yellow foxtail. Weed species likely to emerge after crop planting would include Black Nightshade, Common Sunflower, Venice Mallow, Fall panicum and Waterhemp.

If there is a weed identification problem that cannot be solved locally, you can follow the following instructions and mail the plant species to:

Kevin Cavanaugh
Department of Agronomy & Plant Genetics
411 Borlaug Hall
1991 Upper Buford Circle
St. Paul, MN 55108

✓ **DO NOT** put weeds into plastic bags or wrap in plastic wrap. The plants will turn to mush.
✓ Put the plants in a fold of a paper towel or newspaper. Press overnight under the weight of a heavy book and mail them in the paper. If necessary, plants can be folded to accommodate the envelope
✓ Mail all plants samples at the beginning of the week. This will help to avoid having the plant samples sit in the post office over a weekend.
✓ Send an identifiable portion of the plant. This would include the top growth of the plant with the flowers and/or fruits, if available. Roots are not normally needed for identification of older plants. However, if sending weed seedlings or vegetative plants please send the entire plant.

NOTE: This weed identification service is intended for commercial agriculture field crops. Weed problems in lawns or curiosity weeds should be sent to the Extension Yard and Garden Clinic.

Information on weed management, herbicide application, and timing is available in the University of Minnesota Extension Service publication BU-3157-S *Cultural and Chemical Weed Control in Field Crops-1998*, available in county Extension offices.

Kevin Cavanaugh
Department of Agronomy and Plant Genetics

Extension Yard and Garden Line

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When you call with a question for a Master Gardener you will punch the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.

Early Spring Lawn Care

* Rake the lawn lightly to remove leaves, dead plants, and any debris that might be picked up and sent flying by your power mower. It's neither necessary nor desirable to gouge into the soil with a heavy rake.... unless you plan to overseed the area.
* Wait until grass is growing and needs to be mowed before you fertilize the lawn. If you fertilized twice last fall, it probably won't be necessary to fertilize again this spring.
* Don't apply crabgrass preventing, pre-emergence herbicide too early. Even though this has been an early spring, the end of April should be soon enough in the southern part of Minnesota; the first week of May in the Twin Cities area and a week later for every hundred miles further north.
* If you prefer not to use synthetic herbicides on your lawn, try one of the new crabgrass preventers made of corn gluten meal. Apply it the same as you would other pre-emergence herbicides, but for best results, plan to use the corn gluten meal a second time in mid-August.
* Water the lawn after spreading fertilizer or pre-emergence herbicide to wash them into the soil where they'll become active. Be careful, particularly on sandy soil, not to water heavily. You don't want to wash them down so far they won't be of any benefit.
* Remember, these products prevent most seeds (from desirable and undesirable plants, alike) from sprouting. Don't apply them any time that you plan to seed the grass.

Deborah Brown
Extension Horticulturist

Have you noticed black growths on the branches of cherry trees?

Recently the clinic has received numerous calls and samples relating to the black growths on the branches of cherry trees. A fungus commonly known as Black Knot causes these growths. Black knot is a very common disease that infects many different species of Prunus (cherry and plum). This disease is frequently observed in the spring when trees do not have foliage to hide the black galls. Black knot usually occurs on the branches of trees but may also occur on the main stem. Initial infections appear as swellings on new shoots or branches, while older infections appear as hardened black knots. Infected branches usually die and bend at the point of infection.

Control strategies for black knot include pruning branches at least 6 inches below the knotted or swollen area in late winter, and applying lime-sulfur or Bordeaux Mixture as a dormant spray when needed (read label for directions). Continue to prune new infections as they develop throughout the growing season. Pruning should be done when the weather is dry. In some cases pruning alone may be effective at controlling black knot.

Protecting Apple Trees from Disease.

Based on the environmental conditions this spring (warm temperatures and frequent spring rains), it will be very important to protect apple trees from disease and to closely observe untreated trees for early disease symptoms.

Now is the time to begin your apple scab spray program. The first recommended spray for apple scab is when the buds have opened and the leaves are about 1/2 inch in length (referred to as "1/2 inch green tip"). Additional sprays should follow to maintain control during bloom and flower petal fall, as well as throughout the summer. Fungicides such as Captan and Benlate should be effective (read label for directions). For more information on chemicals and additional spray times see the extension publication *Home Fruit Spray Guide* (FO-0675-B).

Also, be on the lookout for Fireblight this spring and summer! Fireblight is a bacterial disease that infects many different plants in the Rosaceous family such as apple, pear, and mountain ash. Last year this disease caused damage to many trees throughout Minnesota. Since this disease is most severe when temperatures are warm and the relative humidity is high, Fireblight may again cause large amounts of damage. Remember that pruning of infected branches and applying a copper-based fungicide can help to control Fireblight.

Reminders:

NOW IS THE TIME TO APPLY FUNGICIDES, If you are spraying Colorado Blue Spruce trees for Rhizosphaera Needle Cast. Trees should be treated with a registered fungicide such as chlorothalonil (Daconil 2787). Fungicides should be applied when 10% of the tree has broken buds, 1 week later, and again 3 weeks later for optimum control. Note treatment of this disease may take 2 or more years to cure the problem.

DO NOT PRUNE OAK TREES FROM APRIL 15 (NOW) UNTIL JULY 1.

Chad Behrendt
Extension Plant Pathologist

Blacklegged Ticks Active Now

As a result of the mild weather, we have been received a few blacklegged tick samples (formerly known as deer tick). It is important to note that temperature triggers the end of their hibernation and not a specific time on the calendar. Blacklegged ticks are active as soon as temperatures rise above 40 degrees F so an early spring means they are active sooner. I bring this up because we received a report by a person who was recently bit by a tick. A nurse from an HMO told the patient that the tick couldn't be a 'deer tick' because 'deer ticks' aren't out yet (it did turn out to be a blacklegged tick [=deer tick]).

Blacklegged ticks are potential carriers of Lyme disease, but not every tick you see is a blacklegged tick; American dog ticks (a.k.a. wood ticks) are also very common during spring but are not known vectors of Lyme disease. When you do encounter a blacklegged tick, it does not necessarily result in disease transmission. If the tick is only crawling on you, it can not transmit Lyme disease; it needs to be attached (biting) for at least 36 hours. And not every blacklegged tick is infected with Lyme disease.

If you discover a tick that is identified as a blacklegged tick and has been biting for over a day, watch for the early signs of Lyme disease. If you experience any of the following symptoms, a bull's eye rash, fever and chills, fatigue, headache, or muscle and joint pains, see a physician right away. Not every one experiences or recognizes the rash, or may have the rash without other symptoms.

If you plan to go outdoors in known tick areas, protect yourself from ticks by wearing protective clothing, such as long pants and long-sleeved shirts. Tucking pants tucked into socks gives added protection. Walk in the middle of trails and avoid nearby grassy areas when possible (this is where ticks are more likely to be). Apply repellents to your clothing to repel ticks. Products that contain DEET or permethrin (Permanone) are very effective. Check yourself periodically for ticks and save any suspicious ticks for identification.

Jeff Hahn
Assistant Extension Entomologist

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MINNESOTA
CROP NEWS

Vol. 4
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From the Crops System Team of the Minnesota Extension Service

Planting Date for Corn and Soybeans

With the current weather conditions, it is likely that corn and soybean planting could be earlier than usual in Minnesota this year. Common questions are: How early can I plant? What should the soil temperate be? Should the seeding rate be increased with early planting? How long will it take for emergence? Should I be concerned about a late spring frost?

Soil Temperature. Warm soil in the seed zone promotes rapid germination. Soil temperatures of 80 to 85 degrees F are optimum for corn and soybean germination. However, soil temperatures are not that high during the calendar date that is optimum for corn and soybean planting in Minnesota. Therefore, soil temperature is not a dependable guide for when to begin planting corn and soybeans in Minnesota. When soil temperature is less than 50 degrees F, very little germination activity occurs. Soil temperature in the seed zone will vary each day during the germination period; part of the day the temperature will be lower than 50 degrees and part of the day the temperature will be higher than 50 degrees. With each day, the portion of time that the soil temperature is higher than 50 degrees normally increases from late April through May. Time required for germination depends upon the temperature of the soil where the seed is located. Corn and soybeans will emerge in 3 to 6 days when the seed zone soil temperature is near optimum, but germination often takes 20 to 30 days when the soil temperature is fluctuating around 50 degrees as it does in late April and early May.

Seeding Rate. Corn seeding rates should be 10 to 15% above the target harvest population when planting occurs in April. For planting between May 1 and May 15, seeding rates of 10% higher than the target harvest population should be ideal to produce good plant stands. Seeding rates for soybeans could be increased 5 to 10% with planting dates earlier than May 5 and no adjustment for planting dates after May 5.

Planting Date and Yield Relationship. Grain yields are maximized for corn planted during April 20 to May 1; soybean yields are maximized for planting

Highlights.....

dates of May 1 to 10. Yields of both crops will be lower when planting occurs after these optimum planting dates. Calendar date and soil conditions are the main factors that should determine when corn planting begins. Number of acres to plant, equipment size, and calendar date to finish are also considerations. If a good seedbed can be prepared, corn planting can begin as early as April 12 in southern Minnesota and April 15 in northern Minnesota, and soybean planting should follow as soon as possible. Completing corn and soybean planting by the optimum planting dates will set the stage for excellent grain yields of both crops.

Late Spring Frost. A late spring frost may kill some leaves or entire plants. Leaf injury of corn in the seedling stage will not affect grain yield. Corn grain yield will only be affected by a late spring frost if a significant stand reduction occurs such that the plant population is below optimum. Soybean leaves are thicker than corn leaves and can endure lower air temperatures and for a longer time without leaf injury. Should the low temperature kill some soybean plants, yield is not likely to be affected because the remaining soybean plants compensate for a few missing plants. The probability of a damaging late spring frost is low and should not be a factor in determining when to plant corn or soybeans.

D. R. Hicks
Extension Agronomist

Black Cutworm Migrations: Is this the Year?

Potential El Nino effects on spring weather systems are generating concerns about problems with migratory insects, such as the black cutworm. If last weekend's storm system is any indication, warmer weather is likely to move the jet stream northward earlier this spring. Earlier northward movement of the jet stream, and associated storm systems, will provide earlier and more frequent opportunities for southerly air flows that bring black cutworms. Minnesota hasn't seen a significant black cutworm outbreak since 1986, but that may change this spring.

Pheromone traps provide about 2-3 weeks warning of cutting activity from these flights. Volunteers are needed for a black cutworm monitoring network. This network depends on volunteers who monitor pheromone (sex attractant) traps daily for about 6-7 weeks (ca. April 4 to May 22) and report their daily weekly to me. A summary of those captures will be presented each week in *Minnesota Crop News*.

The IPM program is providing about 120 traps on a first-come, first-serve basis. Past experience suggests a minimum of two traps per county provides adequate coverage. County extension educators are already contacting some cooperators. Additional traps are likely to be available. If you'd like to monitor black cutworm flights or know someone who would, let me know by phone (612) 624-7436, by fax (612) 625-5299, or by email, kostlie@extension.umn.edu. All it takes is a few minutes each morning. I'd hate to let the black cutworms catch us by surprise.

Ken Ostlie
Extension Entomologist

Seed Treatment and Soil Temperature

Soil temperatures at the beginning of planting small grains this growing season more than likely will be relatively cool. Recent studies conducted by NDSU and the U of M at Crookston have shown that commonly used seed treatment will benefit emergence and stand of small grains at these cool temperatures, especially if the seed has any seed-borne fungal infection or is of poorer quality.

Trials conducted at 45 and 55 degree Fahrenheit soil temperatures all showed significant increases in stand with seed treatment. When this study was done at 65 degree Fahrenheit soil temperature, the seedlings emerged rapidly (within 7-9 days), and the untreated check and the seed treatments had approximately the same percentage emergence.

With small grain planting just around the corner, producers would be wise to use a seed treatment early on in the season to increase germination and emergence of the small grain crop.

Russ Severson
Polk County Extension Educator

Phosphate Suggestions for Spring Wheat

For many years, spring wheat producers have had the choice of either broadcasting and incorporating needed phosphate before planting or applying it with the seed at the time of planting. The use of the seed-placed phosphate requires lower rates of fertilizer without reducing yields. With concern over lower commodity prices and the possible negative effect of scab on yield, many growers are taking a renewed look at the use of phosphate fertilizer with the seed (drill applied). A comparison of suggested rates for broadcast and seed-placed phosphate is provided in the following table.

The choice of placement can have a substantial effect on fertilizer costs. Consider a yield goal of 65 bu. per acre and P soil test (Olsen procedure) of 6 ppm. The suggested rate of phosphate would be either a broadcast application of 45 lb. P_2O_5 per acre or a drill- applied application of 25 lb. P_2O_5 per acre. If P_2O_5 is priced at $.25 per pound, the cost of the phosphate is either $11.25 per acre (broadcast) or $6.25 per acre (drill applied).

Phosphate fertilizer suggestions for spring wheat production.

	Phosphorus (P) SoilTest (ppm)									
	v. low		low		med		high		v. high	
Yield Bray (P-1):	0-5		6-10		11-15		16-20		21+	
Goal Olsen:	0-3		4-7		8-11		12-15		16+	
	Bdcst	Drill	Bdcst	Drill	Bdcst	Drill	Bdcst	Drill	Bdcst	Drill
bu./acre	---------- P_2O_5 to apply (lb./acre) ----------									
less than 40	40	20	30	15	15	10	0	10-15	0	0
40 - 49	40	20	30	15	15	10	0	10-15	0	0
50 - 59	50	25	35	20	20	15	0	10-15	0	0
60 - 69	60	30	45	25	20	15	0	10-15	0	0
70 - 79	70	35	50	25	25	20	0	10-15	0	0
80 or more	80	40	55	30	25	20	0	10-15	0	0

There have also been several questions about the rate of phosphate to use with the various air seeders. Because of the wide variety of shoes and sweeps used with these seeders, it is currently difficult to provide rate suggestions for each option. Studies are now in progress to define how the various placements affect the efficiency of use of phosphate fertilizer.

George Rehm
Extension Soil Scientist

Phosphate and Soybean Production

A study designed to evaluate the effect of phosphate use for soybeans grown in two tillage systems was continued at the West-Central Experiment Station at Morris in 1997. Various rates of phosphate have been applied annually in a corn-soybean rotation since the fall of 1994. In the fall chisel planting system, the phosphate fertilizer is incorporated with the fall chisel tillage operation. Except for planting and one light cultivation, there is no soil disturbance in the no-till planting system.

In 1997, the response to phosphate was substantial. The largest increase in yield was produced by the application of 23 lb. P_2O_5 per acre. The optimum rate for both tillage systems was 69 lb. P_2O_5 per acre. The phosphorus soil test at this site was in the low range and a substantial response to applied phosphate would be expected.

For many growers, there is an emphasis on fertilizing the corn crop in the corn/soybean rotation. The soybeans are thought to use the phosphate that's not utilized by the corn crop. The yields in the previous table show that phosphate application preceding the soybean crop can be highly profitable if soil test values for phosphorus are in the low and very low ranges.

Response of soybeans to applied phosphate — 1997.

P_2O_5 Applied	Tillage System	
	fall chisel	no-till
lb./acre	-------- bu./acre -------	
0	24	22
23	37	37
46	40	39
69	42	41
92	42	39

Soil test P = low

The results of the soil test should be the guide for phosphate fertilization of soybeans. Expect a profitable yield increase if the P test is below 10 ppm (Bray) or 8 ppm (Olsen).

George Rehm
Extension Soil Scientist

Current Soil Conditions and Dismissal of the Dry Summer Rumor

Soil moisture conditions around the state as determined from research locations of the agricultural experiment station and an operational soil moisture model show adequate to surplus amounts in the top 5 feet of the soil profile. This should be regarded as an asset for the 1998 crop production season. The table on page 24 summarizes the regional estimates of soil moisture around the state.

Soils have warmed significantly in the past week. Even northern Minnesota locations are reporting average 4 inch soil temperatures around 40 degrees F. In southern counties the 4 inch soil temperatures are averaging above 40 F, and on some of the sandy soils near 50 F. The Minnesota Weekly Crop-Weather Reports will begin on Monday, April 13 and contain updates on soil conditions, climate, and field working progress. They can be accessed over the Internet using the following URL: http://www.nass.usda.gov/mn/

Many concerns have been expressed about having a dry summer attributed to the El Nino episode or to the very warm winter conditions. Examination of

Current Soil Conditions/Continued

the Minnesota climate record in the context of 23 separate El Nino episodes of this century reveals no correlation with a drier than normal summer. In addition, examination of the 25 warmest winters and subsequent summer precipitation patterns reveals no stacked probabilities which favor dryness.

Mark Seeley
Extension Climatologist

Minnesota Soil Moisture Summary - 4/9/1998
Water (inches) in 60.0 inch soil profile (current year's value compared with historical record)

climate division	current year	last year	deviation	lowest value	highest value	%ppam current year	%ppam last year	%ppam deviation
NW 1	5.5	4.2	0.7	1.8	8.0	63	48	8
NC 2	5.4	5.0	0.2	2.2	6.1	94	88	4
NE 3	9.6	7.5	1.7	3.0	9.2	118	92	21
WC 4	8.7	4.5	3.3	2.5	8.5	107	56	41
C 5	5.9	5.1	0.8	2.7	6.0	105	91	14
EC 6	7.3	5.8	1.5	3.3	7.0	111	88	22
SW 7	9.0	7.4	2.6	2.0	8.7	108	89	32
SC 8	9.5	8.0	1.7	2.5	9.6	114	96	20
SE 9	9.8	8.3	1.6	0.0	9.8	113	96	18

Deviations are from the records of 1951 - to present
%ppam == percent of avail. moisture / pot. plant avail. moisture
*Above estimates derived from the soil moisture model of the Midwest Climate Center, Champaign, IL.

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in March

corn—cultured for storage molds
soybean—soil for soybean cyst nematode counts
sunflower—cultured for storage molds
silage & haylage—cultured for storage molds
barley—samples for loose smut testing
sugarbeet—soil for *Aphanomyces* sp root rot testing
N.G. impatiens—*Pythium* sp root rot, *Myrothecium* sp leafspot, Impatiens necrotic spot virus(INSV)
ajuga—*Rhizoctonia* sp root rot
cineraria—INSV
begonia—INSV
penstemon—INSV
evolvulus—*Botrytis* sp stem rot
lobelia—*Phytophthora* sp stem and root rot

Sandra Gould
Plant Disease Clinic

Dial U

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

In the April 17th issue, this section will be called the YARD AND GARDEN LINE instead of DIAL U.

April 15, Dial U Insect and Plant Information becomes part of the new University of Minnesota Extension Service Yard and Garden Line.

After over a year's worth of meetings and hard work, the folks at Dial U have completed a total reorganization. The resulting system, to be known as the University of Minnesota Extension Service Yard and Garden Line, or **Yard and Garden Line** for short, combines the former Dial U Clinic with the state-wide Master Gardener program, Info U tapes and other services.

Our new toll-free phone number is 888-624-4771 outside the Twin Cities metro area. In the metro area it is 624-4771.

We are increasing our ability to handle the growing number of plant and insect questions by offering

callers a wide range of options including localized responses from experienced Master Gardener volunteers.

Among your options when you call the **Yard and Garden Line** are:

* leaving a question for a Master Gardener who will call back
* listening to an Info U tape
* instructions on sending in a sample
* talking to someone at the campus-based **Yard and Garden Line** clinic (formerly called Dial U)
* talking to Bell Museum of Natural History staff about wildlife questions
* talking to someone on the Water Line about water quality

The fee to talk to someone at the campus-based Clinic (formerly the Dial U) or to submit a plant or insect sample is $5.00 (soil samples, $7). , including talking to someone at the Bell Museum or Water Line.

After April 15th, you can call our phone numbers (888-624-4771 or 624-4771) any time of day or night, but the campus-based Clinic will only be open from 9 to 1, weekdays. When you call with a question for a Master Gardener you will punch the first three letters of your county, then leave your name, question, and phone number so someone in your area can call you back.

If you have questions or comments, please contact Deb Brown (624-7491), Chad Behrendt (625-7022), or Jeff Hahn (624-4977).

Deborah Brown
Extension Horticulturist

Ant Swarms

When people find a swarm of winged ants in their home, this tells them a nest is inside or under the building. A swarm of ants consists of queens and males. At a certain time of the year, they fly out of their nest, mate, and the queens fly off to start new colonies. However, when a nest is within a structure or in the soil underneath the house, the swarmers become trapped in the home.

We have been receiving calls and samples about several types of swarmers that are active now.

The most common type winged ant samples we've been receiving are pavement ants. These ants nest in soil underneath concrete slab construction. Yellow ants also nest in soil and their swarmers are very common in homes during winter. Both ants are only considered nuisances and are not damaging to homes. Both types of nests are difficult to control because they are hidden (you can bait pavement ants when workers are present). The only necessary control is to vacuum or remove the winged ants that you see. Swarmers are temporary and usually do not last more than a week. We have also received samples of winged carpenter ants. You can treat the swarmers the same as pavement and yellow ants. However, the presence of a carpenter ant nest in a home is not good news as they can damage a home's structure by tunneling and excavating into wood.

Control of carpenter ant is most effective and permanent when the nest's location is discovered and treated directly. Finding a swarm of carpenter ants indoors can help determine where the nest is located.

Identification of winged ants is usually quite challenging; using color and size often is not enough. If you have a sharp eye, you can identify pavement ant swarmers by their two humped (node) petiole and spines on the back of the thorax. Live yellow ants smell lemony when crushed. The queens of a common species of carpenter ant are big (up to one inch long) and black. However, males are smaller and different carpenter ant species vary in color and size. You can find other ant species. The definite method for identifying winged ants is to examine the wing venation. If you encounter winged ants you can't identified, submit a sample for diagnosis. See FO-1066, *What to do about household ants.*

Note: Starting next week when Dial-U becomes part of Yard & Garden Line, all samples coming to the campus-based clinic (the old Dial-U Clinic) will be charged $5.00 (unless solicited). See article on **Yard & Garden Line** for more information on Yard & Garden Line.

Jeff Hahn
Assistant Extension Entomologist

Disease Prevention in the Home Lawn

Recently, the Dial U Clinic has received calls about dead patches of grass within the home lawn. These dead patches, brown in color, begin to appear as the lawn starts to grow. Any one of several different factors including poor cultural practices that stress the turf, environmental conditions such as winter freezing, or fungal organisms that cause plant disease may be responsible for causing death of the grass. Since most turf problems appear as dead circular patches of grass, diagnosis can be quite difficult.

Disease management in the home lawn should begin with cultural practices, which promote healthy vigorous turf. The promotion of healthy vigorous turf will enhance the defense system of the grass plants and in turn disease resistance. Cultural practices that promote healthy turf and disease resistance include:

Avoid and/or reduce soil compaction.

Manage the thatch layer and remove excessive thatch build up.

Aerate the soil. This helps reduce compaction, increases water and nutrient penetration, and promotes microbial activity.

Properly fertilize the lawn. Do not apply excessive nitrogen (N) in the spring or during hot weather in the summer.

Properly water the turf to reduce drought stress. Reseed dead areas with recommended bluegrass varieties.

Fungicides should only be applied in combination with good cultural practices. In many cases cultural practices will prevent the spread of disease and help to cure the disease problem, without any need for fungicides. Fungicides can be applied in the early spring as a preventative treatment if disease has been a problem in the past.

Chad J. Behrendt
Extension Plant Pathologist

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MINNESOTA CROP NEWS

Vol. 4
No. 3

From the Crops System Team of the Minnesota Extension Service

Potassium Fertilizer for Corn in Southeast Minnesota

Potassium fertilizer could be one of the best crop input values for corn production on fields that have silt loam (loess) soils with potassium soil tests less than 80 ppm. Significant yield increases have been attained with on-farm test plots in Fillmore (1996 & 1997) and Goodhue (1997) counties using the University of Minnesota recommended rates of potash for starter or broadcast applications on soils with a low K test.

If any of the following apply to your farm, you may want to take a closer look at the K soil test results from your fields.

1. Last year's corn crop before the canopy closed had areas of stunted, uneven growth that was light green and the edges, or margins, of the lower leaves were scorched.
2. In the affected areas, mature ears were small with pointed unfilled tips and chaffy grain.
3. There was increased lodging from weak spindly stalks in those parts of the field.
4. There has been high crop use of soil K such as with corn silage or alfalfa in the rotation.
5. Fields are located so that it's difficult to get to them for manure applications.
6. Planter changes from granular to liquid starter fertilizers.
7. The land had been previously rented.

One reason for the K deficiencies that have become more prevalent in corn in southeast Minnesota is that many row-crop farmers in the region prefer to handle fluid fertilizers rather than granular fertilizers for the ease in tending their planters, and for the adaptability with reduced tillage systems. Liquid fertilizers containing relatively low levels of K_2O (7-21-7 or 9-18-9) or no K_2O at all (10-34-0), and have been the starters most often used. None of the above liquid starters that contain K_2O would be cost effective for meeting the potassium levels needed for corn when K soil tests are less than 80 ppm. Therefore, supplemental broadcast K_2O applications would be required to meet the recommended fertilizer rate. Suspension fluid fertilizers could provide sufficient levels of K_2O for the needs of the crop, but these products have limited availability in the area and require constant agitation when handling.

Tim Wagar,
Extension Educator, SE District

Highlights.....

CRP Production Best Management Practices

Area landowners who had land accepted into the new CRP program need to consider the best management practices for successful establishment of the CRP vegetation. A critical factor in the management is weed control. Adequate weed control reduces the risk of failure of new seedlings. Anticipate weed problems based on field history. Annuals that produced seed during the last one or two seasons can be expected to be a significant part of the problem. Perennial weeds persist from year to year. Extra efforts are required to weaken and reduce stands to reduce competition and prevent spread.

Most land entering CRP falls into three general categories: previous crop land; previous CRP prepared for planting; previous CRP unprepared for planting. Weed management considerations vary for each of these situations.

For previous crop land entering CRP, landowners need to consider if the previously applied herbicide may have carryover potential which could injure the CRP planting. Many native grasses which will be planted on CRP acres are susceptible to injury from herbicide carryover. Many corn and soybean herbicides do not have carryover potential, but some commonly used crop herbicides have label restrictions which eliminate native grass plantings in the year following application. Consult the herbicide label for planting restrictions. A complete listing of carryover restrictions is available at the Extension Office. Given the high cost of seed, farmers will want to eliminate the risk of establishment failure due to herbicide carryover injury. If there are herbicide carryover concerns, a temporary cover crop should be planted until the carryover restriction has expired.

Landowners having land that was previously in CRP and now entering the new CRP most likely bid the land into the new program with the agreement to re-establish the CRP vegetation with a native grass cover. Because of this agreement, the previous CRP cover, as well as any weeds, must be eliminated. If spring planting is anticipated, the elimination of the previous CRP vegetation should have been done last fall. The preparation involves the application of a burndown herbicide in mid September followed by any tillage in October. If this was accomplished last fall, the land should be ready to seed this spring.

If previous CRP land was not prepared last fall, the focus this year is on preparation for 1999 planting. CRP land which was plowed last fall with no previous burndown herbicide application should be seeded to a temporary cover. During the duration of the temporary cover, efforts need to be made to eliminate the perennial plants such as brome grass or quackgrass. If nothing has been done to prepare the land for the new CRP program, the goal is elimination of the vegetation by the end of the 1998 growing season. If the land is extremely rough, plan to level out the gopher mounds this spring to allow herbicide application equipment to travel the field later in the year. If there are patches of nasty weeds such as Canada Thistle, plan to spot treat those areas with a herbicide in mid summer. Follow this up with an August mowing to facilitate regrowth prior to application of a burndown herbicide. The burndown herbicide should be applied in mid to late September.

One of the purposes of adequate preparation prior to CRP planting is the elimination of undesirable perennial vegetation. As the new CRP vegetation is established, we also need to be concerned about annual weeds. Annual grassy weeds such as foxtail or barnyard grass compete with spring seeded grass. Selective control of grasses, especially some species, is difficult. Tillage or herbicide burndown just prior to seeding reduces the foxtail problem. Annual broadleaves can be very competitive. Clipping above the seedling grass is an option. Clip before weeds become so large they smother the seedling. Mowing should not remove more than 60 percent of the leaf area from CRP species.

A number of herbicides are available for use in new CRP seedings. A complete listing of these herbicides and their use information is available at the Extension Office.

Bob Byrnes
Extension Educator

Getting a Jump on Grasshoppers

It may be some time yet before spring, but continued drier conditions combined with warm spring weather could set the stage for serious local grasshopper outbreaks.

There is nothing that can be done to control the hatch, but the damage can be controlled. The key to control is early scouting and detection. Scouting could begin in late April or early May, depending on degree day accumulations. This early scouting should focus on known "hot spots" from last year.

In 1996 and 1997, I located several spots where grasshoppers were doing damage to young crops in early June during the short dry spell we have in the area. The grasshoppers were moving into the fields from ditches, field windbreaks, and other grassy areas. Protective treatments may be needed along field borders and margins. For the best treatment, control measures should be applied when most of the hoppers are in the 5th instar. If done too early, the treatment will have to be repeated. It treatment is done when hoppers are larger, they are more resistant and those with wings can cause more damage than nymphs which cannot fly.

The two-striped, migratory clear-winged, red legged, and differential grasshoppers are known to cause problems in Northwest Minnesota and Northeast North Dakota. For detailed information on scouting and control measures, contact me at the Kittson County Courthouse at (218) 843-3674, or 1-800-770-7029 and ask for the publication on *Grasshopper Management.*

Curt Nyegaard
Kittson County Extension Educator

The Magnesium Hoax

Magnesium (Mg) is an essential nutrient for crop production. When levels of this nutrient in soils are low, the addition of Mg to a fertilizer program will frequently improve crop yields. In Minnesota, the probability of measuring a yield increase from the use of Mg is highest when sandy soils are very acid.

Normally, there is a concern when there are low levels of Mg in soils. During the past winter, however, there have been several questions about the consequences of high levels of this nutrient in soils. Apparently, there are some who believe that high amounts of Mg in soils can "make the soil hard" or cause the soil to be "out of balance." Those who subscribe to this theory that high levels of Mg are bad also believe that there is an "ideal ratio" of calcium (Ca) to magnesium (Mg) in soils. According to this theory, the ratio of Ca to Mg should be in the range of 4.3 to 1 to 7.5 to 1.

Several researchers have thoroughly evaluated the impact of these ratios on crop production. In Ohio research, the ratios of Ca to Mg were varied over a wide range and corn and soybean yields were measured. In this study, the highest corn yields were measured when the Ca:Mg ratio varied from 5.7 to 26.8. The lowest corn yields were measured when the Ca:Mg ratio varied from 5.8 to 21.5. Soybean yields in this same study were not related to Ca:Mg ratio.

In Wisconsin, researchers adjusted the ratio of Ca:Mg in a sandy soil and then measured alfalfa yield. The results are summarized in the following table.

Ca:Mg Ratio	Alfalfa Yield ton dry matter (acre)
2.6	4.1
3.5	4.4
4.8	4.1
7.6	4.3
8.1	4.4

The amount of Mg in Minnesota soils available for crop production varies over a wide range. Levels of calcium carbonate and magnesium carbonate are high in the calcareous (high pH) soils. Yet, high levels of Mg in these soils have not caused problems with crop production.

George Rehm
Extension Soil Scientist

Foolish Spending

Considering current commodity prices and various projections for the 1998 growing season, it appears that profit margins will be narrow again. Those crop producers who work for the highest possible profits will be taking a very close look at the amount of money spent for various crop production inputs. In order to keep input costs at a minimum without reducing yield, it's important to avoid the foolish expenditure of dollars that will not either increase yield or efficient use of various production inputs.

Various trials conducted at numerous location throughout Minnesota, for several years, have identified various products and/or concepts that can be expensive but have little or no probability of increasing yield and/or profits. It would be foolish to spend money for something that has a very low probability of providing something in return.

Looking ahead to the 1998 growing season, you could be spending your money foolishly if:

- ✓ you agree to let someone "balance" your fertilizer program by adjusting calcium to magnesium ratios.
- ✓ you buy a product which is supposed to "activate" the bacterial life in your soil.
- ✓ you buy a product which promises to make soils "drier in wet years" but "wetter in dry years."
- ✓ you purchase products which promise to improve crop yields if used as a foliar application.
- ✓ you think that there are really some fertilizers that are 2 or 3 times more effective or available than others.
- ✓ you buy a product that smells like dead fish, yet is supposed to do great things when applied to soils at very low rates.

George Rehm
Extension Soil Scientist

Thoughts On Precision

In the last five years much has been said about precision management in Agriculture. A struggle is continuing to get the most out of this idea. First a common definition is needed. I use the following, Precision Agriculture: The practice(s) which uses improved information to institute better management practices in an agricultural operation. This is a wider definition than some have used. It includes variable rate fertilizer application and herbicide use, but it also includes tuning up planting equipment to do a better job of seed placement which will add more precision to their operation. Some questions come to my mind when I think about precision farming:

1. Are there advantages for using precision farming practices and will they pay?
2. Do all farms need precision farming?
3. Has precision farming been oversold?
4. Where to start?
5. Where are we headed?

Are there advantages and will precision management pay? This is a loaded question. From research conducted so far on practices such as yield mapping and variable rate nutrient application in low margin cropping systems (such as corn, soybean, and wheat), the answer is not obvious.

Thoughts On Precision/Continued

Recent findings indicate that the use of a yield map for management decisions has the potential to be disastrous. Yield monitors identify differences in yield but do not identify the causes. Also yields across some landscapes are not stable over time and the reason for this lack of stability over years is not known. Unless the yield is affected by something obvious (which in most cases a good farmer knows), the best use for this information would be for record keeping purposes. As for variable rate fertilizer application, the crop must be of high value (sugar beet or potato) or be in a field with a significant amount of variability in soil nutrient status and also have a significant area of that field that needs fertilizer application. In comparison, if a grower who is applying P and K with a broadcast method switched to a banded placement, he could be better off economically. This is a move up in precision that will pay back because of the reduction in amount of fertilizer applied caused by the increased efficiency of plant uptake and the a lower cost for the technology used (fewer soils samples to analyze, no maps to make, and no variable rate truck fees). Two factors that are not figured in this analysis are the value of the increased information (i.e. better records) to the farmer for use in future decisions and environmental impacts from being able to put an agrichemical in the part of the field where it is needed. In years to come this value will increase with continuing environmental and food safety concerns.

Do all farms need precision farming? Yes, but all farms may not need variable rate technology or a satellite telling them where they are or where they are going. (In my case the GIS/GPS technology would tell you where all the Dairy Queens are in Minnesota). In some cases having a field intensively soil sampled and not variable applied maybe correct because the grower identified that there was no need. There is power in being informed. As farms get bigger, it is harder to remember things about each field or part of a field as in the past. Precision technology will be very useful in keeping that information together for management decisions.

Has the technology been oversold? I think that academia, industry, and farmers have gotten the cart before the horse with these high technology practices. The technology is so seductive that good agronomic principles have at times been ignored with the thought that the technology must be made to work because it is new. In the future, precision practices must be based on sound basic agronomic and economic principles or the concept of precision will be abandoned.

Where do we start and in what direction are we headed? The answer will be different for each farming operation. Start by correcting obvious problems such as getting equipment in working order, selecting the correct seed, and soil testing on a field basis. Then start gathering information, whether it involves the use of more intensive soil testing, increased use of integrated pest management, or better record keeping of crop management practices and yields. I think if we could get growers to bring their management up to current best management practices, a great gain in precision overall would occur.

As for future research, a good economic evaluation is needed. This will require an integrated approach involving researchers from several disciplines and growers. The only way to evaluate precision agriculture will be on a large scale which will reflect conditions the growers face in their decision making.

John Lamb
Extension Soil Scientist

Dial U

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

Effective April 13, Dial U service along with several other Extension programs will be offered through a new phone line called ***Yard and Garden Line****. At that time the Dial U 900 number will no longer be in service. More information will be announced in the April 10th issue.*

Uncovering Tender Plants

The majority of callers to our Dial U Clinic recently have been concerned with the timing of uncovering tender plants such as hybrid tea roses, bulbs, flowering perennials, and strawberries.

Though we usually shoot for mid-April on the roses, warm weather suggests the process should be accelerated this year. Rose canes can actually withstand temperatures down as low as the high teens, though any leaves that are expanding would be damaged if it gets that cold. This isn't so bad though, because new ones will take their place.

Strawberries are also damaged when temps drop below 20. Check under the straw mulch to see if they're sprouting. If many are, you'd better remove the mulch so they don't mold. Keep it handy (between the rows or nearby), however, so you can quickly rake it back over the plants if a cold snap threatens.

The same holds true for bulbs and flowering perennials. Begin to remove the mulching material, but leave some behind for emergencies. Bulb foliage has an amazing ability to bounce back after extreme cold, but flowering perennial shoots such as peony or bleeding heart will be killed by a hard frost. If they do die back to the ground their roots will send up more shoots, but the plants will be less full than usual.

Don't worry about late snowfall on any tender plants. Snow is not cold enough to damage them. In fact, it insu-

lates them from the colder temperatures that may accompany the snow. Snow can bend plants down, but they usually grow back upwards once the weight of the snow is gone.

Deborah Brown
Extension Horticulturist

Cluster Flies in Homes

We have been receiving many calls about **cluster flies** in homes. These flies are medium-sized, gray, and often found in large numbers. They typically move sluggishly and are commonly found around windows and sunlight. Despite the circumstantial evidence, these flies are not laying eggs in homes but are survivors from last fall. During summer, these flies parasitize earthworms. At the end of summer and fall, cluster flies instinctively search for sheltered, protected places to hibernate which usually means buildings. They wedge themselves into any small crack or crevice they can find under siding, around windows, molding, vents, chimneys, and roofing. Many flies end up in wall voids and attics where they stay until temperatures start to warm.

As cluster flies emerge during spring they try to make their way outside. However many become trapped indoors. Although they are often a nuisance, they are harmless to people and property and are short-lived indoors once they emerge. Once cluster flies enter buildings, there is little you can do, except to kill them as you find them. To deal with the problem next year, caulk and seal spaces and cracks you find on the outside of the house, especially on the on the upper half of south and west facing exposures (where cluster flies are most likely to congregate). You may need to supplement this with an treatment of permethrin during late summer or fall when cluster flies first start to show up. A reputable pest control company can be hired to performed this service. If you find cluster flies outdoors in spring, ignore them. They have successfully found their way out of the building and are not trying to come indoors.

We also have been answering calls about **wasps** found indoors. These are overwintering queens. Despite the circumstantial evidence, there is not a nest in your home. It also does not mean that there will automatically be a nest built in or on your home this summer. For the wasps that you find indoors now, kill them with a fly swatter or rolled up newspaper. If you find a lot of them, use an aerosol insecticide labeled for flying insects to spray them. See FO-03732, *Wasp and Bee Control.*

Moths in homes Another common question has been about small, brown moths in homes. In a lot of cases, callers were suspicious of clothes moths. However, nearly all of the samples have been of Indianmeal moths which is a stored product pest (e.g. flour, cereal etc.). Indianmeal moths are about 5/8 inch long and has wings that are half tannish and half reddish-brown. Small (no larger than ½ inch long) cream colored worms (caterpillars) may be found on walls or ceilings. It is common for Indianmeal moth larvae to move away from infestations to pupate (make cocoons). Control of Indianmeal moths is largely a matter of throwing away infested products and protecting insect-free products to avoid infestations. See FO-1000, *Insect Pests of Stored Food.*

Clothes moths are a little smaller (about ½ inch long) with uniform light brown/gold colored wings. Clothes moths are uncommon in Minnesota homes and we only see samples occasionally. The larva is similar in appearance to Indianmeal moths. You can distinguish between them according to where they are found. While Indianmeal moth larvae are found feeding on dry food products, clothes moths are found feeding on material of animal origin, such as wool, fur, hair, and feathers. When a clothes moth problem is discovered, inspect your home for any infestations. Vacuuming and keeping susceptible clothes clean is also important. Supplement this with an insecticide treatment in the area around the infestation, including baseboards, closet corners, and under carpeting. See FS-1005, *Carpet Beetles and Clothes Moths.*

Jeffrey Hahn
Assistant Extension Entomologist

Controlling Plant Disease in the Home Garden

Disease management should begin with the selection of disease free stock, since many diseases are introduced into the garden on infected seeds and transplants. Rotate plants within the garden every year, so that each crop is planted in a different location than the previous year. Keep a record of when and where each crop was planted to help determine future rotations. Separate crops that are susceptible to the same disease. For example, tomatoes and potatoes are both susceptible to late blight, and should not be planted next to each other. Use disease-resistant plant varieties when possible. Planting resistant varieties helps to reduce disease severity and prevent new infections.

If you have previously had problems with damping-off, you may want to apply a seed treatment. Fungicides such as Captan or chlorothalonil (Daconil 2787) should be effective at reducing damping-off, as well as preventing subsequent root rot problems.

Establish good cultural and sanitation practices to help minimize disease in the home garden. Water plants during the early morning hours to prevent the foliage from remaining wet for extended periods of time. Plants should also be watered at ground level to prevent spores from being splashed to healthy plant tissue. Destroy weeds within the garden and around the edge of the garden throughout the growing season, since many disease organisms are able to survive on weeds. Detect early disease infections and promptly remove the infected material.

Once plants have emerged from the soil, thin them to allow for air circulation. It is also important to properly space seedlings during transplanting. Providing adequate spacing between plants allows for air movement and helps to reduce disease severity. Do not work in the garden when plants are wet to help prevent the spread of disease.

In addition to cultural and sanitation practices, fungicide applications may be needed for control of specific plant diseases. Fungicides are generally applied in the home garden after plant disease has been detected. Many different fungicides are registered for use in the home garden. Read labels carefully to determine which plants they may be used on and when to apply them.

Chad J. Behrendt
Plant Pathology Research Specialist

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MINNESOTA CROP NEWS

Vol. 4
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From the Crops System Team of the Minnesota Extension Service

Placement of Fluid Fertilizer with Corn Seed

A management practice of placing some fertilizer in contact with the corn seed at planting has been an option for crop producers for several years. This placement, usually referred to as "pop-up" fertilizer has some risk when soils are dry at planting. The "starter" placement, where fertilizer and seed are separated, was used extensively for many years and provides little risk of germination damage caused by relatively high rates of fertilizer coming in contact with the seed.

Wet soil at planting and the use of larger planters to cover more acres are two major factors which have caused crop producers to move away from the use of a starter fertilizer. However, because fertilizer placed close to the seed at planting frequently produces higher yields and more mature corn at harvest, there is still interest in applying fertilizer very near the seed at planting.

A study has been conducted at the Waseca and Lamberton Experiment Stations to evaluate the effect of fertilizer applied with the seed on corn emergence, early growth, and yield.

Three fluid fertilizers (4-10-10, 7-21-7, 10-34-0) were each applied at rates of 5, 10, and 15 gallons per acre in contact with the seed at planting. A control (no fertilizer with the seed) was also used. The soil test values for phosphorus and potassium were high and all treatments received ample nitrogen to provide for high yields. Stand counts were taken at approximately four weeks after emergence, whole plant samples were collected at that time, and grain yields were measured.

The corn was planted with a John Deere Max-Emerge planter equipped so that the fluid fertilizer was placed in the seed trench. The probability of soil coming between the fertilizer and the seed in the planting operation was low.

In each of the three years, the fertilizer placed in contact with the seed had no negative effect on emergence. The emergence information from Waseca is summarized in Table 1. In this table, average emergence from each treatment for the three years of the study is compared to the emergence of the control treatment. Emergence was nearly equal to the control when the fertilizer was used, and there was no reduction in emerged stand even when a rate of 15 gallons of product per acre was used.

In evaluating this information, it's important to realize that soil moisture levels were relatively high at planting each year. Some stand reduction may have been measured if the soil at seed depth had been dry at the time of planting.

The influence of the fertilizers placed in contact with the seed on yield at the Waseca location is shown in Table 2. As with the emergence information, yields from the various treat-

Highlights.....

Table 1. Corn emergence at the Southern Experiment Station as affected by 3 rates of 3 fluid fertilizer applied in contact with the seed at planting.

Fluid Analysis	Rate Applied (gallons/acre) 5	10	15
	% of control—3-year average		
4-10-10	101	100	100
7-21-7	100	101	98
10-34-0	102	100	96

Table 2. Grain yield at the Southern Experiment Station as affected by 3 rates of 3 fluid fertilizers applied in contact with the see at planting.

Fluid Fertilizer	Rate Applied (gallons/acre) 5	10	15
	% of control—3-year average		
4-10-10	96	95	97
7-21-7	98	95	101
10-34-0	103	99	99

ments are shown as a percentage of the control.

The information summarized in Table 2 shows that fluid fertilizer applied in contact with the seed had no negative effect on yield even though relatively high rates (15 gallons per acre) were used.

Results from the same study at the Lamberton Experiment Station are summarized in Table 3. As at Waseca, the application of relatively high rates of fluid fertilizer with the seed had no negative effect on yield.

These results show that seed-placed fertilizer can be used as a substitute for the more traditional starter placement. When calculating the use of these three fluid materials, one gallon of 4-10-10, 7-21-7, and 10-34-0 will supply approximately 1.0, 2.2, and 4.0 lb. P_2O_5 per acre. When soil test values for phosphorus are in the medium range, high rates of 7-21-7 and 10-34-0 are not needed to supply the amount of P_2O_5 recommended for a band application for corn. A rate of 10 gallons of 10-34-0 per acre will also meet phosphate recommendations for most yield goals if the soil test for P is in the low range.

Corn growers who find that starter fertilizer attachments will not work for their production situation may want to choose a seed placed option. In evaluating this option, it's important to remember that the risk of damage decreases as soil moisture content at planting increases.

Table 3. Grain yield at the Southwest Experiment Station as affected by 3 rates of 3 fluid fertilizers applied in contact with the seed at planting.

Fluid Fertilizer	Rate Applied (gallons/acre) 5	10	15
	% of control—3-year average		
4-10-10	100	97	98
7-21-7	96	99	96
10-34-0	97	97	98

George Rehm
Extension Soil Scientist

High Oil Corn

Twenty-eight high oil corn topcrosses were grown in 1997, at the Southwest Experiment Station, Lamberton, and the Southern Experiment Station, Waseca. Hybrid maturities ranged from 95 to 110 relative maturity. Trials at both locations were planted in early May with a seeding rate of 33,000 seeds per acre. Grain yield, kernel moisture at harvest, test weight, kernel hardness, kernel weight, protein, starch, and oil content were determined. Table 1 shows the results averaged across the two locations.

Oil

Oil contents averaged 7.1% and ranged from 6.1 to 8.1%. Oil content of a number of normal corn hybrids averaged 4.0%. This increase in oil content of 3.1% on average is a 77.5% increase in oil content.

Yield

Grain yields ranged from 125 to 168 bushels per acre Lamberton averaged across locations. The Least Significant Difference values for all traits are given at the bottom of each column on Table 1. These values indicate that one can be 95% confident that differences occur when any two values within the column differ by an amount equal to or greater than the LSD. For example, topcrosses in this test differ for yield potential if they differ by 14 or more bushels per acre.

Table 2 presents the topcrosses averaged by relative maturity and compares the group average to that of similar maturity groups of normal hybrids tested in performance trials at Lamberton and Waseca in 1997. Numbers of topcrosses and hybrids in each maturity group differ, but it is meaningful to compare the groups. This comparison shows that these high oil topcrosses have lower yields, on average, than the normal hybrids. Given the yield range for the topcross entries, some yielded as well as or higher than some of the normal hybrids. However, the highest yielding normal hybrids were higher in yield than the highest yielding high oil topcrosses in all maturity groups.

Since high oil yields are lower, we calculated the yield required of a high oil topcross to give the same gross income per acre that can be obtained with various yield levels and selling prices for normal corn hybrids. An increase in the seeding rate of 2000 kernels per acre, an extra seed cost of $30 per

bag, and a $0.20 per bushel premium are included in the calculations in Table 3. Premiums paid for high oil grain are determined by the oil level; the premium currently for 7.0% oil is $0.20 per bushel.

Table 3 shows that a grower with normal corn now averaging 130 bushels and selling at $2.50 will generate the same gross income per acre with high oil corn if the high oil corn yields 116 bushels per acre, a yield difference of 14 bushels per acre. But, if the yield difference is less than 14 bushels per acre, there will be a higher net income per acre with high oil compared with normal corn for the cash grain market. For livestock growers, high oil corn will provide more energy and reduce the amount of supplemental fat required in the livestock ration.

Protein and Starch

Significant differences for protein and starch occurred among the topcrosses. Protein averaged 9.6% and starch averaged 68.1%. Chemical analyzes were completed on seven

Table 1. Protein, starch, kernel density, test weight, yield, harvest moisture, oil, and 100 kernel weight of high-oil corn topcrosses grown at Lamberton and Waseca, 1997.

Brand	Hybrid	RM	Protein[1] %	Starch[1] %	Density[2] g/cc	Test Wt.[3] lb/bu	Yield[4] bu/A	Moisture[5] %	Oil[1] %	100 Kernels[6] g
Brown	4144VP	95	**10.5**	68.0	**1.268**	**59.0**	141	16.5	6.7	25.0
Brown	4240VP	95	**10.5**	67.8	**1.267**	**58.4**	138	16.2	6.9	24.9
Kaltenberg	K5901	105	8.5	**68.5**	1.226	55.6	**163**	23.6	**7.6**	22.8
Trelay H.C.	6002TC	105	8.8	**68.7**	1.238	56.7	147	23.1	7.3	23.4
Kaltenberg	K6209	105	9.9	68.2	**1.268**	58.3	**160**	24.0	7.0	25.8
Trelay H.C.	7004TC	105	9.9	68.3	**1.270**	58.3	148	23.6	6.9	25.2
Brown	5001VP	100	9.6	68.0	1.242	56.7	150	21.6	7.2	24.9
Brown	5141VP	105	**10.3**	68.1	1.256	57.5	148	20.4	6.7	26.6
Brown	5241VP	105	9.5	68.0	1.250	58.0	**156**	22.8	**7.6**	23.8
Brown	6681VP	105	9.6	68.0	1.245	56.8	149	21.5	7.3	24.2
Brown	6781VP	105	8.8	**68.4**	1.238	55.9	141	23.9	**7.4**	22.4
Cargill	4990TC	105	9.4	68.2	1.243	56.6	150	22.4	7.2	24.5
Cargill	5990TC	105	9.6	68.0	1.244	56.7	153	21.9	7.2	25.0
Croplan G.	4401ED	100	9.1	68.1	1.245	57.1	140	21.3	**7.5**	27.2
Croplan G.	5503ED	105	8.8	**68.4**	1.226	55.9	141	23.7	**7.4**	22.3
Croplan G.	5501ED	105	9.6	68.0	1.253	57.6	**161**	23.5	**7.4**	23.9
NC+	RE271	105	10.1	67.7	**1.268**	**58.5**	**160**	22.4	7.3	26.2
Novartis	NX4206	100	**10.2**	68.3	1.261	57.2	146	19.4	6.8	26.0
Pioneer	PIO97TC	100	**10.4**	67.7	**1.266**	57.2	125	18.0	7.2	26.0
Trelay H.C.	5004TC	100	**10.3**	67.7	1.255	57.7	151	19.9	6.9	25.6
Brown	6853VP	105	9.5	**68.8**	1.242	53.9	149	26.7	6.1	**32.3**
Brown	6843VP	105	**10.3**	67.6	**1.263**	58.2	145	25.6	7.2	26.9
Brown	7053VP	110	9.4	**68.5**	1.243	55.7	**162**	**27.8**	6.7	**32.3**
Cargill	6690TC	110	9.4	**68.5**	1.237	53.9	141	**27.3**	6.5	**31.6**
Kaltenberg	K7001	110	9.2	**68.9**	1.242	55.1	**168**	**28.1**	6.4	**32.5**
Novartis	NX5526	110	9.7	**68.4**	1.248	55.1	150	**27.3**	6.5	**31.5**
Croplan G.	EDX16	105	**10.3**	67.2	1.234	55.7	150	22.2	7.2	26.0
Croplan G.	EDX11	105	9.0	67.0	1.205	53.3	138	**27.0**	**8.1**	22.6
Average			**9.6**	**68.1**	**1.248**	**56.7**	**149**	**22.9**	**7.1**	**26.1**
LSD[7]			0.36	0.53	0.008	0.66	14.1	1.35	0.26	1.51

[1] Protein, starch, and oil content are at 0.0% moisture
[2] Density is a measure of kernel hardness
[3] Test weights were determined at approximately 15.5% kernel moisture
[4] Yields (adjusted to 15.5% moisture)
[5] Kernel Moisture content at harvest
[6] 100 kernel weight of samples at approximately 13 to 15% kernel moisture
[7] LSDs are at 0.05. There were 4 replicates per hybrid at each location
Numbers in **bold** represent the statistically highest values in each column

Table 2. Average yield, yield ranges and number of entries for High Oil Topcrosses and Normal Hybrids grown at Lamberton and Waseca, 1997.

Relative Maturity	High Oil Topcrosses			Normal Hybrids		
	Number of Entries	Yield	Yield Range	Number of Entries	Yield	Yield Range
100	5	142	125-151	50	162	139-201
105	17	150	138-163	59	166	143-195
110	4	155	141-168	26	166	142-177

normal corn hybrids that averaged 9.3% protein, 72.1% starch, and 4.0% oil. These normal hybrids, assuming they represent normal hybrids, were lower in oil as expected, slightly higher in protein, and higher in starch.

Other Traits

Test weights of grain from topcrosses were similar to those of normal corn and kernels were smaller. Kernel moisture contents of grain from topcrosses and normal corn at harvest time were similar and drying rate for high oil grain was similar to that of normal oil corn hybrids.

Dale Hicks, Extension Agronomist
Paul Porter, Southwest Experiment Station
Tom Hoverstad, Southern Experiment Station

Table 3. Yield required of a High Oil Corn to give the same gross income per acre with a $.20/bu premium at various normal corn yield levels and selling prices.

Normal Corn Yield (bu/a)	Normal Corn Selling Price ($/bu)				
	2.00	2.25	2.50	2.75	3.00
	bu/a				
100	85	87	88	89	90
110	94	96	97	98	99
120	103	105	106	107	108
130	112	114	116	117	118
140	121	123	125	126	127
150	130	132	134	135	137
160	140	142	143	145	146
170	149	151	153	154	155

Potential Winter Injury of Alfalfa

Alfalfa in Minnesota many fields broke dormancy during early March. I have received calls about alfalfa "green-up" from Southern Minnesota North to Ada (Norman County). Southwest Minnesota has experienced the warmest days during March.

Is Alfalfa Dead?

No, not yet. We have had two snow events since early March. The snow cover received after green-up is welcomed. The snow is not cold enough when it comes at the air temperatures we have experienced to kill the newly generated shoots from alfalfa crown buds. The more snow we have the more insulation we have to protect the new shoots from direct exposure to cold temperatures.

However, near zero air temperatures experienced this week is not good. Since alfalfa has broken dormancy, it's likely the new growth has been damaged potentially killing the plant.

Will Alfalfa Go Dormant Again?

No. Once alfalfa has broken dormancy during the winter it will not go back into dormancy. We are pretty certain after alfalfa breaks dormancy it will also have less resistance to sub-zero temperatures.

What Soil Temperatures Will Kill Alfalfa?

Normally, alfalfa crowns (root region below the soil surface--the level at which is variety specific) will tolerate soil temperatures above 15 degrees F. To my knowledge, no regions within Minnesota have measured soil temperatures below this threshold yet this winter. However, we don't know what the threshold temperature is for plants that have broken dormancy. Last year at Lamberton a soil temperature of 29 degrees F for one week in early April was enough to cause damage to alfalfa. Air temperatures lag behind soil temperatures. Also, we are uncertain about the exact air temperature which will kill the newly generated alfalfa shoots.

This temperature is dependent on exposure time and conditions during exposure. Normally, excessive exposure time to temperatures in mid-twenties will kill the plant tissue. Remember air temperatures quoted at weather stations represents temperatures at three feet above the ground, all alfalfa shoots are close to the soil surface which could warm them; thus, moderating the temperatures.

What Actions Should We Recommend?

First and foremost don't panic. There is nothing that can be done until we see the weather conditions which will occur

between now and spring. Growers with the majority of their acreage in older stands, older than four years old (seeding year the stand is one-year old) should order seed to expand their seeded acreage. The younger the stand the greater the tolerance to cold temperature.

Is There Potential For Damage?

It is too early to give an indication of the extent of damage. We will need to determine how many crown buds have died and if the existing plants have enough energy to initiate and grow new buds. This means stands will need assessment between now and spring to determine the stand density of healthy plants. The final test will be the number of stems per square foot growing through a 6-inch plant height (< 39 stems/ ft^2, consider plowing, 40-55 stems will result in some yield reduction and > 55 stems will result in no yield loss). The publication "Alfalfa Stand Assessment: Is This Stand Good Enough to Keep?", A3620 is excellent.

We expect to see more damage on south facing slopes of fields, on varieties with higher fall dormancy scores, 3's and 4's, on older stands, in areas with no snow cover, and areas without last years fall growth (fields cut late last fall).

If temperatures continue to fluctuate between freezing and thawing we could experience "heaving" (plants physically lifted out of the soil). This does not often occur in Minnesota; but, the temperature swings we have been experiencing could trigger this event.

Neal Martin, Extension Agronomist
Mark Seeley, Extension Climatologist

Mild Weather Increases Grain Storage Risk

To minimize mold, insect, and moisture migration problems in stored grain, we generally suggest holding grain in the upper Midwest at a temperature of 20 to 30 degrees F during the winter months. Since we had a lot of days with temperatures in the 20 to 30 degree F range December to early February, stored grain should have made it through that time period without too many problems.

After outdoor temperatures climbed above 30 degree F in late February, however, stored grain might have become warm enough to trigger mold and insect activity. It would be worthwhile to check your stored grain now for visible signs of insects, molding, and crusting; for musty or sour odors; and for warm spots.

If you detect any problems, uncover the fans, open the vents, and aerate the grain for as long as it takes to move a cooling front all the way through the bin. The amount of time required to complete an aeration cycle could be as short as 15 hours for large drying fans to as long as 150 to 300 hours for small aeration fans. It is important to complete aeration before the weather gets too warm. Mold and insect growth rates increase rapidly as temperatures climb above 40 degrees F, so if possible, try to keep the grain at 40 degrees F or less going into spring and summer, but definitely avoid aerating when the temperature is greater than 60 degrees F.

If you plan to store grain for several more months and the moisture content is too high (wetter than 15% for corn, or wetter than 13% for soybeans or small grains), you need to dry the grain before the weather gets too warm. Grain stored in bins equipped with full drying floors and large fans can probably be dried with unheated air. Start the drying fan about March 15 for corn that is 19 to 21% moisture, about April 1 for corn that is 17 to 19% moisture, and about April 15 for corn that is 15 to 17% moisture.

Grain that is dry, is in the 20 to 30 degrees F temperature range, and does not have any mold or insect problems can usually be stored into spring and summer without additional aeration. Just keep the fans covered and vents closed, and check the grain every week or two until it is fed or sold. Remember, if you do decide to aerate this spring, make sure you complete the process before the weather gets too warm.

Bill Wilcke
Extension Engineer

Soybean Cyst Nematode

This is the most serious soybean yield reducing factor in Minnesota. SCN is present in Minnesota and should not be ignored. The nematode is confirmed in 37 counties and 113 townships and it is widespread in Minnesota soybean growing fields.

SCN symptoms above ground that are often not seen and recognized are: yield loss and root damage, fewer nodules, smaller nodules and less efficient nodules and a dwarfed plant. Symptoms you can see and recognize are: stunting, yellowing, up and down plant growth patterns in fields or oval stunted areas, rows that fail to close or close later or additional weed growth. Observed symptoms are often attributed to other problems like compaction, herbicide injury, nutrient deficiency or iron chlorosis and high pH.

One grower test in 1997 shows a yield loss with a susceptible variety from 56.8 bu/A in a noninfested site to 40.9 bu/A in the infested soil, nearly a 16-bushel loss.

The SCN soil samples received by the Plant Disease Clinic in 1997 show 54% have egg counts above the level where a resistant line will perform well. Even resistant plants suffer damage from this nematode and planting resistant lines is not always the right choice. Rotation to non-hosts to lower egg counts is suggested in 42% of the fields sampled in 1997. Another 12% are questionable for planting resistant varieties. On the positive side, 46% can be planted to resistant varieties and the grower can expect a reasonable yield.

SCN varieties have improved over the past several years. Check out the local information on SCN variety performance. Check out your SCN egg counts and make a decision to manage the SCN problem before it severely limits your yields.

Ward C. Stienstra
Extension Plant Pathologist

Plant Disease Clinic

Samples submitted to the Plant Disease Clinic in February included:

corn—culture for storage molds
soybean—soybean cyst nematodes
sugarbeet—soil tests for *Aphanomyces* sp root rot, soil tests for Rhizomania
barley—loose smut testing
silage—culture for storage molds
impatiens—Tobacco mosaic virus(TMV)
kalanchoe—Impatiens necrotic spot virus (INSV)
fuchsia—rust
geranium—*Botrytis* sp, *Xanthomonas* sp bacterial wilt testing
phlox—TMV, powdery mildew
portulaca, hibiscus and clematis—tested negative for INSV and TSWV and leaf spot diseases

Sandra Gould
Plant Disease Clinic

Dial U

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

Effective April 13, Dial U service along with several other Extension programs will be offered through a new phone line called "Yard and Garden Line." At that time the Dial U 900 number will no longer be in service and callers will be informed of the new phone number and menu options. Menu options will include voice mailboxes for local master gardeners, transfer to the campus clinic, Info-U, Water Line, Bell Museum, etc. County educators should have received e-mail information last week from Mary Meyer, Jeff Hahn, or Deb Brown or a call from a staff member on the Yard and Garden Line implementation committee.

Temperature and Moisture Work Together to Regulate Fungal Growth and Plant Disease

Two key environmental factors, temperature and moisture, work together to regulate fungal activity, the infection process, and in turn the severity of plant disease. Fungi, like plants, require a minimum temperature and sufficient moisture for growth. The minimum temperature required for fungal activity varies greatly between species. For example, snow molds in turf become active at temperatures near 32 degrees F, while fungi causing apple scab are most active around 68 degrees F. When temperatures are below the minimum requirement (such as those in winter), fungi are inactive. However, when temperatures rise in the spring, fungi regain activity.

Spring rains also regulate plant disease. Frequent heavy rains initiate fungal activity and in turn plant disease. When rainfall is absent or infrequent, fungal activity is minimized along with plant disease. Spring rains also cause plants to be more succulent and, therefore, less resistant to infection. Several diseases such as late blight of potato, apple scab, and anthracnose of ash and oak are directly affected by rainfall.

Chad Behrendt
Asst. Extension Plant Pathologist

Trouble Germinating Seeds?

Recently we have received questions regarding the control of damping-off. Damping-off is caused by a variety of soil borne fungi which affect plant emergence. Pre-emergence damping-off results in poor seed germination and poor emergence of seedlings, while post-emergence damping-off results in plants that fall over at the soil line due to infected stems. Some simple cultural practices to help avoid this problem include: sterilizing pots, containers, and soil, watering thoroughly to avoid frequent sprinkling, increasing soil drainage, and increasing air flow around the plants.

Chemical control of damping-off is very difficult for homeowners since there are very few effective chemicals available as a soil drench. However, captan and chlorothalonil (Daconil 2787) can be tried as a preventative seed treatment. Be sure to read and follow al label directions for correct application procedures. *(See also FS-1167, "Damping-off of Seedlings.")*

Chad Behrendt
Asst. Extension Plant Pathologist

Ants In the Home

Winter in Minnesota usually means that we get some relief from the insect pests of summer, however a few manage to remain bothersome. One of the most common complaints is ants in the home. The time of year does narrow the list down, but there are still several possible species and each has a different control method. For any control program to be effective proper identification is a crucial first step.

A common ant that we see during the winter months is the pavement ant. This small 1/8th inch reddish brown ant

nests in the soil. Usually this is underneath sidewalks, driveways and other concealed sites. Sometimes, however, they will nest under heated concrete slab foundations or in cracks in the foundation blocks. These sites stay warm even in the winter, enabling the ants to stay active. Pavement ants prefer greasy foods and will often feed on pet food. It is difficult to locate their nest, so baiting is the best control option. You can buy ready-to-use baits or make your own (*see also FO-1066-C, "Household Ants"*).

Carpenter ants are also commonly seen in winter, especially on warm, sunny days. Carpenter ants build their nests in wood and can establish these nests in homes. They prefer wood that has been water damaged. There are two species of carpenter ants, one is 1/4 to 1/2 inch in length and solid black, while the other is smaller at 3/16 inch, and is red and black. It is necessary to find the colony and treat it directly with an insecticide. This is best accomplished when the nest is completely active (i.e. spring, summer). The baits that are currently available do not eliminate carpenter ant colonies.

Yellow ants are a frequent nuisance pest during winter. Homeowners will rarely see workers, but usually encounter the winged reproductives called swarmers. These yellowish-brown or darker ants are males and queens released by the colony to reproduce. Yellow ants give off a distinctive lemon or citronella smell when crushed. The actual colony is subterranean and is probably located underneath a concrete slab or next to a foundation wall. Yellow ants are harmless and control is rarely warranted. Vacuum the swarmers or apply an insecticide registered for indoor flying insects.

There are also some less common species that show up in the winter such as pharaoh ants, thief ants and cornfield ants. For more information on ants see FO 1066-C, "*What To Do About Household Ants.*"

Joseph Pedretti
Entomology Technician

Houseplants Respond to Increased Light

Longer days and sunnier weather combine to reawaken "sleepy" houseplants that didn't grow much over the winter months. Increased light means a higher rate of photosynthetic activity and a build-up of the food energy that's needed for growth. Now is the time to resume fertilizing (still at half-strength, though) to support that additional growth. It's also a good idea to check your plants more frequently to see if soil needs watering.

If any houseplants need repotting, this is a good time to do it, before outdoor yard and garden chores relegate houseplant care to the back burner. And while it's rarely necessary to prune houseplants, there is no reason you can't shape them a bit now, especially if there is scraggly, weak "winter growth" you'd like to remove. Sturdier new growth should fill in fairly quickly.

Deborah L. Brown
Extension Horticulturist

Crazy Weather Worries Horticulturists

Our mild weather in February and early March encouraged spring-flowering bulbs and some other perennial plants to emerge prematurely, particularly on south-facing slopes and on the south and west side of houses. Buds on trees and shrubs also began to swell and come out of dormancy.

This would have been fine if the weather had continued in its unusually mild mode, unabated. However, it dipped to 5 degrees F this morning, with hardly any snowcover, making fast work of those early bulb and perennial leaves. Whether the buds on woody plants were actually advanced enough to be damaged or killed remains to be seen.

If the buds were damaged or destroyed, secondary buds should swell later to take their place. If they were flower buds, however, they won't be replaced; secondary buds will just produce leaves. Flowers and subsequent fruit could be lost this year. Time will tell.

Many Minnesota trees suffered the same sort of trouble a year ago in April when temperatures plummeted after several weeks of mild weather. Green ash, oaks and others were extremely late to bud out a second time. If it happens two years in a row horticulturists are worried the trees will be further weakened, and thus more susceptible to disease and insect infestations as the growing season progresses.

Deborah L. Brown
Extension Horticulturist

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MINNESOTA CROP NEWS

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From the Crops System Team of the Minnesota Extension Service

Random Inspections of Pesticide Applicators This Summer

The Minnesota Department of Agriculture will be conducting random inspections of pesticide applicators this summer.

The random inspections will include:

1. **Applicator's license**—A proper license must be obtained prior to taking physical possession or applying a restricted use pesticide.

   A recent law change has made it possible for a private applicator to order and pay for a restricted use pesticide (RUP) before they become certified as a private applicator.

2. **Pesticide label requirements**—Is the applicator following all the label information? Is the pesticide labeled for the crop, livestock, or site being treated?

   Proper application rate

   Re-entry interval—Length of time that must pass before a person can enter the treated area

   Pre- harvest interval—Length of time between treatment and harvest

3. **Personal Protective Equipment (PPE)**

   Pesticide Label lists specific PPE that an applicator must wear during mixing, loading, and applying a pesticide. PPE is clothing and devices that protect the body from contact with pesticides or pesticide residues.

4. **Wind speed/drift**—Certain pesticide labels have specific wind speed language—Discontinue application above ?? mph.

   When pesticides move to where they don't belong, they may cause serious and long-lasting effects on humans, plants, and animals.

5. **Incidents—Remember pesticide and fertilizer spills must be reported and properly cleaned-up.** Incident reporting telephone number is 800-422-0798

For further information contact the Minnesota Department of Agriculture 612-296-6121 or your local County Extension Office

Tom Hovde
Wadena County Extension Educator

Highlights.....

Dry Field Pea Production

Field pea is a very good rotational crop. Peas in the rotation will break the fusarium head blight (scab) and wheat root rot disease cycles, add nitrogen to the soil, and mellow the soil. Field pea is an early, cool season crop which can be seeded in late April to mid May. Peas can withstand mild frost of 20-24 degrees F without damage. Seeding rates are in the range of 170-180 lb./acre for large seeded varieties, 150-170 lb./acre for medium seeded and 120 lb./acre for small seeded varieties. In general it is recommended to aim at a plant population of 8 plants per square foot. Peas can be planted on nearly all soil types but soil should be well drained. The seeding depth is 2-3 inches. Regular wheat seeding equipment can be used.

Peas can have a yellow or a green seed coat. The yellow peas yield a little more than the green peas but the green peas are preferred for the human consumption market. There are two plant types available at this time; the standard, long vined and full leaf types and a shorter, earlier maturing, semi-leafless type.

Following is a table with results from a variety trial which was conducted at four locations, Fosston (East Polk County), Red Lake Falls, Oklee (both in Red Lake County), and Kennedy (Kittson County), in 1997.

Table 1. 1997 Dry Pea Variety Trial in MN. Combined results for Fosston, Red Lake Falls, Oklee, and Kennedy.

Pea Variety	Yield bu/acre	Height inch	Plants per ft2*	Harvest Index
North Y	57.8 a	28.6 c	9.9 a	48.3 a
Grande	55.8 ab	33.6 b	8.1 b	43.7 b
Highlight	53.2 a	26.7 cd	8.1 b	48.1 a
Carneval	52.1 bc	28.6 c	6.8 cd	43.6 b
Mustang	51.2 bc	24.2 e	8.4 b	48.7 a
Carrera	47.5 cd	22.8 f	7.8 b	47.1 a
Majoret	45.4 d	28.1 c	6.6 d	42.2 b
North X	45.0 d	25.7 de	7.6 bc	43.3 b
Profi	43.0 d	28.7 c	7.5 bcd	41.8 b
Trapper	28.7 e	36.8 a	7.9 b	33.7 c

**just after germination*

Varieties within a column, with the same letter behind them, are not significantly different. The harvest index indicates the dry pea seed as a percent from the total above ground dry plant (at harvest). For wheat the harvest index is in the range of 50+ %. Due to breeding, and selection, the newer plant types have a higher harvest index and production as compared with Trapper, the old standard. Among the varieties tested only Majoret has a green seed coat.

Pea seed needs to be inoculated with the proper Rizobia strain bacteria ("C"). A sticker is recommended to attach the inoculum to the seed. Nitrogen fixation may take 30 days or longer to become established. A nitrogen credit for the subsequent small grain crop, as a rule of thumb, is about 1 lb. of N per bushel of peas produced.

Pea fertilizer requirement:

N If soil test is lower than 20 lb. of N in the top 12 inches, apply 20 to 30 lb. N as starter.

P If soil test shows medium level, add 15 to 20 lb. per acre of P_2O_5.

K About 300 lb. is required from the soil.

S Add 15 lb. to fields with lower testing soils.

Zn If medium soil test (0.6 to 1 ppm) add 2 lb. per acre Zn. With high soil pH or >high level of P, add more Zn.

For harvesting a regular wheat combine can be used. Peas can be swathed when there is a heavy weed pressure or an uneven crop at maturity although swathing may increase harvest losses. Peas can be utilized for human food, livestock feed or forage, seed, cover crop and or green manure. For more information call Hans Kandel, at 1-800-770-1244.

Hans Kandel
Red Lake County Extension Educator

Phosphorus Forum

Are you interested in learning about the impact of phosphorus use in agriculture on water quality? Are you interested in hearing the viewpoints of various state agencies and their interest in regulating this problem? If so, you will want to attend a Phosphorus Forum. The details are listed below.

Wednesday, February 25 — Mankato Civic Center

Thursday, February 26 — Southwest State University, Marshall

The program is scheduled from 8:00 a.m. to 4:00 p.m. each day. Call (612) 361-6590 for registration and other information.

George Rehm
Extension Soil Scientist

Ridge-Till and Yields

Results of yield checks from farmers' fields are used for several purposes. Frequently, it's interesting to look at this information in an effort to identify management practices that are used by farmers who are achieving high yields.

Looking at results from the National Corn Growers Association contest and the contest conducted by the Minnesota Corn Growers Association, it was obvious that several farmers who achieved high yields used the ridge-till planting system. Some excellent yields from Minnesota farmers who participated in the contests are listed below.

Name and Address	Yield bu./acre
Crow River Farms, Darwin	173
Jon Zaske, Renville	192
James Wendland, Northfield	173
Scott Anderson, Litchfield	168

There were, no doubt, yields from other ridge-till farmers that were just as good. These yields do show that there is no decrease in production when the ridge-till planting system is used.

George Rehm
Extension Soil Scientist

Sulfur For Canola

There is substantial interest in growing canola in northern Minnesota. Canadian research trials have shown that this crop will respond to sulfur fertilization when grown on many soils in that country. Sulfur uptake and removal by the canola crop is substantial. There is also a substantial amount of variability in soils in northern Minnesota. Therefore, there was a need to evaluate the effect of sulfur fertilizers applied to this crop.

Two sites were selected for trials in 1997. The soil texture at one site was a loamy fine sand. The texture at the second site was a silty clay loam. Three rates of sulfur (0, 20, 40 lb./acre) were evaluated for each of two rates of nitrogen (50, 100 lb./acre). Adequate phosphate and potash were applied to all treatments. The canola was planted late (mid-June). Nevertheless, yields were reasonable.

The effect of nitrogen and sulfur application on canola yield at each site is summarized in the following tables.

The effect of nitrogen and sulfur application on yield of canola grown on a soil with a silty clay loam texture.

N Applied	S Applied (lb./acre) 0	20	40	Ave.
lb./acre	---------- lb./acre ----------			
50	1656	1742	1725	1708
100	2047	2060	1997	2035
Ave.	1852	1901	1861	

The effect of nitrogen and sulfur application on yield of canola grown on a soil with a loamy fine sand texture.

N Applied	S Applied (lb./acre) 0	20	40	Ave.
lb./acre	---------- lb./acre ----------			
50	1027	1490	1579	1365
100	873	1364	1208	1148
Ave.	950	1427	1394	

There was no response to sulfur fertilization when the soil is not sandy. This is consistent with the results of sulfur research with other crops in Minnesota. At this site, the use of 100 lb. N per acre increased production by about 300 lb. per acre when compared to the N rate of 50 lb. per acre.

There was a significant response to sulfur fertilization at the site with the loamy fine sand texure. The broadcast application of 20 lb. sulfur per acre was optimum.

Another study was conducted at this sandy site to evaluate sulfur sources. In 1997, the sulfate-sulfur source was superior to the use of elemental sulfur.

Additional research is needed. However, the results from 1997 show the importance of sulfur in a fertilizer for canola.

George Rehm
Extension Soil Scientist

Weed Biology and Management Workshop March 5-6, 1998

The University of Minnesota Extension Service is sponsoring a new workshop on weed biology. This workshop, entitled *Weed Biology and Management*, will offer intensive training in the area of weed biology dynamics. Successful weed management not only requires an understanding of herbicides and their specific uses, but also requires an understanding of weed biology, weed/crop competition, weed seedbanks, herbicide resistant weeds, and herbicide resistant crop management.

This workshop is designed for anyone doing crop advising who wishes to learn more about managing weeds. Some of the topics that will be covered are weed seedbanks, predicting weed emergence and growth, weed/crop competition, herbicide-resistant crop management, perennial weed biology, plus a computer lab session on modeling weed population and dynamics. Instructors from the Universities of Minnesota, Iowa State, Wisconsin will be involved, plus one instructor from the USDA-ARS laboratory at Morris.

The Weed Biology and Management Workshop will be held March 5-6 at the Earle Brown Continuing Education center located on the St.Paul Campus. The nature of this workshop is to foster good discussions on weed management between the instructors and those attending. In order to obtain this learning environment, the size of the workshop will be limited to 40 people. Preregistration is required for this workshop. Cost of the program is $225, and 10.0 CEUs for CCA accreditation have been applied for in the area of Pest Management.

To request a registration form, contact Kevin Cavanaugh at (612) 625-2778; EMAIL address:
kevinc@puccini.crl.umn.edu
To request disability accommodations, please contact Tracey Benson at (612) 624-3708 or 800-367-5363, or by EMAIL at
tbenson@extension.umn.edu
on or before February 20, 1998.

Kevin Cavanaugh
Extension Coordinator, Department of Agronomy

New Vegetable Production Guide Available

The new *Midwest Vegetable Production Guide for Commercial Growers - 1998* (BU-7094-S) is now available through county extension offices, or from the Distribution Center, St. Paul Campus. This new publication is a regional effort, incorporating: integrated pest management (IPM) practices for diseases, weeds and insects; seeding rates, varietal information and other production guidelines. The publication also includes all pesticide label changes for the 1998 season. As with previous publications, this regional guide will also be revised each year, and available in early January. The guide also lists access to weekly *Pest Management Newsletters* available on the World Wide Web, for several midwest states. The publication is $6.00 plus 6.5% tax (MN residents), plus shipping. To order the publication, contact Univ. of Minnesota Extension Service, Distribution Center, at 800-876-8636, or 612-625-5749.

Bill Hutchison
Extension Entomologist

New Listserve for Crop Consultants, Agronomists, Extension Personnel

This past December, a new e-mail Listserve was set up within the College of Agricultural, Food and Environmental Sciences, to facilitate more rapid transfer of information regarding crop production practices and questions as they arise throughout the growing season. Many crop consultants and agronomists now have access to email, and many of us are not always available by phone when questions arise. The listserve may provide a convenient way for both extension specialists to get new information out quickly (e.g., pest alerts, label update/changes) as well as a way for consultants in the field to get questions to extension specialists and county extension educators.

To subscribe to the listserve, send message to:
crop-consultants-request@coafes.umn.edu
Type SUBSCRIBE in the body of the text (do not type in subject area)

You will receive notification and a welcome message about the listserve

Once on the listserve, send all subsequent messages to:
crop-consultants@coafes.umn.edu

Specifically, the listserve can be used to facilitate rapid transfer of questions, answers, new information, and meeting and publication announcements relevant to all aspects of profitable, yet environmentally sound crop management and crop pest management. Geographically, we anticipate the initial focus of the problems discussed will emphasize southern Minnesota, S. Dakota, and Wisconsin. However, we are not necessarily limited to these states. Growers, as well as seed company agronomists and ag-chem industry representatives, are also encouraged to participate. We anticipate that most of the activity may occur during the growing season, but this venue can also be useful during the "off-season" for meeting announcements and pre-season planning questions that may come up. As with all effective listserves, we would appreciate participants keeping their questions brief.

Also note: the listserve is to not be used for commercial advertisements.

Any questions should be directed to Bill Hutchison, Dept. of Entomology (612-624-1767).

Bill Hutchison,
Extension Entomologist

Clinic Reports

Samples submitted to the Plant Disease Clinic in late January and February included:
soybean—soybean cyst nematode(SCN), SCN identified in Carver Co. for the first time.
barley—samples for loose smut testing
sugarbeet—soils for *Aphanomyces* sp root rot index, soils for Rhizomania testing
corn—culture for storage molds
silage—culture for storage molds
tomato—powdery mildew
E. ivy—*Phytophthora* sp root rot
Vinca—*Pythium* sp root rot
geranium—*Xanthomonas* sp bacterial wilt testing
Fuchsia—*Rhizoctonia* sp root rot
Artemsia—downy mildew
Gerbera, N.G. impatiens, sprengeri, Streptocarpus, Kalanchoe & Mandevilla all tested negative for Tomato spotted wilt virus and Impatiens necrotic spot virus.

Sandra Gould
Plant Disease Clinic

Dial U

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

Pruning Trees and Shrubs

In the dead of winter, horticultural calls to the Dial U Clinic range over a wide area of topics. The one concern that comes up repeatedly, however, is the question of timing the pruning of various trees and shrubs.

This past fall, Mike Zins and Deb Brown completely revised the old extension folder on pruning; FO-0628, *Pruning Trees and Shrubs*. Along with timing, it covers the reasons one should prune and how to prune properly. You should be able to order a copy through your local county extension office.

According to the authors, "the late dormant season is best for most pruning. Pruning in late winter, just before spring growth starts, leaves fresh wounds exposed for only a short length of time before new growth begins the wound sealing process. Another advantage of dormant pruning is that it's easier to make pruning decisions without leaves obscuring plant branch structure."

So late February or March is the ideal time to prune most shade trees. Evergreen trees usually don't need much pruning, but spruce, firs and douglas-firs may be pruned late in the dormant season also. Pines, however, should not be pruned until their new "candles" have expanded. And even then, you only want to reduce the length of the new growth, not eliminate it or prune further back into the branch.

Flowering shrubs also present a different story. Any plant that blossoms in spring should not be pruned until **after** it has bloomed — unless, of course, you don't mind sacrificing this year's flowers.

Deborah L. Brown
Extension Horticulturist

Winter and Sunscald Injuries

What is winter injury? 'Winter Injury' is damage caused to perennial plants by desiccation or freezing during dormancy. Woody plants undergo seasonal changes that begin in early autumn and end in late spring. As the temperature begins to drop, plants begin to acclimate to withstand low temperatures. This process of acclimation varies with species and ambient temperature. The hardiest plants become fully acclimated to withstand temperatures of -4 to -40 degrees F.

Acclimation to low temperatures occurs by removing all water from the cell and displacing it into intercellular spaces where freezing can occur without disrupting cellular structure or function. The remaining cellular fluid is then supercooled or chemically bound. Acclimation appears to involve the removal of ice nucleating particles from the cell and the development of barriers to ice crystal formation.

Once ambient temperatures begin to increase, plants begin to deacclimate. This results in plants that are now susceptible to freezing temperatures. Therefore, the onset of freezing ambient temperatures after plants have become deacclimated (began to grow) results in death of the plant tissue affected.

Symptoms associated with winter freezing or 'winter injury' include dieback, browning of foliage, sunscald, and bark splitting. Fluctuations in fall, winter, and spring temperatures may cause plants to break dormancy early or enter dormancy late. This may subject unacclimated plant tissue to freezing temperatures. For example, warm temperatures in the late fall will cause plants to acclimate more slowly. If these plants are then subjected to very low temperatures plant tissue may be damaged by freezing temperatures.

As everyone knows this winter has been quite mild and enjoyable. However, mild winter temperatures can still cause damage to woody plants when warm daytime temperatures are followed by freezing nighttime temperatures.

In thin, smooth barked trees warm late winter temperatures may cause death of the outer bark and cambium. This phenomenon known as 'Sunscald' occurs on the south/southwest side of thin bark trees in late winter. As daytime ambient temperatures rise the bark becomes active and begins to grow (deacclimate), then as nighttime temperatures fall below freezing the deacclimated tissue is killed (frozen). The damaged bark and cambium usually dry, crack, and fall off exposing dead sapwood. Sunscald damage can be prevented by wrapping trees in winter with tree wrap which aids in reflecting light and preventing excessive heating of the bark.

Frost damage on woody plants can also occur in the spring when actively growing tissue is subjected to severe temperatures below freezing.

Oak Wilt Reminder

Oak wilt can be spread overland from tree to tree by Nitidulid beetles (picnic beetles) actively feeding on freshly wounded oak trees in the spring. Management strategies for oak wilt recommend no pruning of oak trees from April 15th to July 1. Therefore, now is the time to prune oak trees. Management strategies also recommend removing infected trees prior to spring growth.

Chad Behrendt
Asst. Extension Plant Pathologist

Warm Weather is Waking Up Insect Hibernators

The unusually warm winter weather has been an enjoyable change of pace from the last few years, but it does have a downside. We have been receiving a lot of calls from homeowners regarding insect sightings in their homes. Many insect species hibernate the winter as adults in Minnesota. Normally they would do this in tree hollows, logs, and under bark, but our homes make adequate substitutes. These insects make their way into cracks, crevices and other openings in the fall of the year in response to falling temperatures. Some of these insects may make their way into interior walls, attics and other voids.

The warm winter temperatures may wake these insects up from their slumber. They may then find their way inside the home, much to the annoyance of the homeowner. These insects are often slow and easy to kill, and are often attracted to sunny windows. None of these insects cause any harm to people or property, and none reproduce inside. We call this type of insect an accidental or incidental invader. Their appearance is a nuisance, but only a temporary one.

There are different species of insects that will behave this way, but all are handled in essentially the same manner. Finding their hiding places within a wall is very difficult and it is not a legitimate control option. Really about all a homeowner can do is vacuum them up or kill them as they are seen. Insecticides are rarely needed. Reassurance that they are harmless and not breeding within the home helps homeowners deal with this nuisance.

The only real solution to these types of insects is to try to keep them out in the first place. Prior to late summer and fall the homeowner can inspect the house and repair any weather stripping, caulking or screening that needs repair. Seal any cracks in the foundation and screen up weep holes, vents and chimneys. An insecticide can be applied to the exterior walls of the building in late summer or fall or when insect activity is seen. These barrier treatments will help kill the insects before they enter. Diazinon and chlorpyrifos are available at hardware stores and nurseries for this purpose. Pest control operators have access to longer lasting and more effective insecticides.

A partial list of nuisance pests is as follows:

The cluster fly is a housefly-sized gray fly with curly yellow hairs on it's thorax. They can occur in large numbers. They are usually slow and easy to kill and will be attracted to sunny windows. They are parasites of earthworms during the summer. They do not breed in trash or filth and thus are not a health hazard. A very common winter pest.

Leaf-footed bugs are brown and orange insects that can be 1/4" to 1/2" in length. Their back legs are greatly enlarged and may resemble a leaf. They will often fly about and will remind people of wasps or bees but they cannot sting. They may hibernate in firewood so this may be the source.

Boxelder bugs are 1/4" to 1/2" black insects with distinctive orange markings on their back. Boxelder bugs feed on female boxelder trees during the summer months. The population of boxelder bugs varies greatly from year to year becoming more numerous during warm and dry summers.

Ladybugs are considered one of our most beneficial insects and most people like or at least tolerate them, but not when they invade the house. Ladybugs congregate in groups to spend the winter, and although not as common as the others mentioned here, can occur in large numbers.

Elm leaf beetles are 1/4" to 3/8", oval, yellow to green beetles with long dark stripes running down each side of the wing covers. They feed on elm trees during the summer and can be a serious pest of these trees. Controlling them on the tree may reduce the number that make their way indoors.

Some winter insect pests, such as carpenter ants, can cause damage so it is best to identify the insect pest to confirm the status of the infestation.

Joseph Pedretti
Entomology Technician

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