North Dakota State University
CROP & PEST REPORT
NDSU Extension Service

No. 4 June 5, 2008

Inside this Issue...

Sugarbeet Root Maggot: Cool Weather Delays Development and Fly Emergence 1
A New Cutworm Species in North Dakota 2
Review of Wheat Stem Maggot - What Little We Know 2
Cutworm Activity Continuing 3
Alfalfa Harvest Is Nearing 3
Warm-Season Annual Forages 4
Crop Scouting 5
Frost Damage in Cereals 6
Wheat Streak Mosaic Virus and High Plains Virus 6
Early Season Tan Spot 7
Disease and Insect Survey Begins 7
First Report of Soybean Rust in Louisiana 8
Maximizing Glyphosate Activity in Glyphosate-Resistant Crops 8
Powdery Mildew Diseases on Lawns and Ornamentals . 9
Update from the NDSU Plant Diagnostic Lab 9
Around the State 10
Weather & Climate 11

entomology

SUGARBEET ROOT MAGGOT: COOL WEATHER DELAYS DEVELOPMENT AND FLY EMERGENCE

The cool temperatures that predominated the past several weeks have resulted in slow development of overwintered sugarbeet root maggot (SBRM) populations. The NDSU Root Maggot Developmental Model uses soil and air temperatures to predict 2 important events in the SBRM life cycle. Peak **fly emergence** from soil in previous-year beet fields typically occurs after an accumulation of at least 450 soil degree-day (DD) units. Peak **fly activity** in current-year sugarbeet fields occurs on the first warm (80 degrees Fahrenheit or above), low-wind day following the accumulation of **600 air DD**. Current DD accumulations for representative locations throughout the Red River Valley are presented in the following table:

Degree-day (DD) accumulations for sugarbeet root maggot development at selected sites as of June 3, 2008

Site	Soil temperature	Soil DD[1]	Air DD[2]
Baker, MN	56	237	391
Ada, MN	56	208	426
Grand Forks, ND	60	270	432
St. Thomas, ND	59	211	380

[1]Target soil DD for peak emergence = 450
[2]Target air DD for peak fly activity = 600

Anticipated DD accumulations, based on the extended weather forecast, suggest that peak activity is not likely to occur before the third week of June, and could be delayed as late as the end of the month. Temperatures during the next couple of weeks and wind conditions near peak fly will dictate when the exact peak occurs. **Bottom line: growers in high-risk areas should not rush to apply postemergence insecticides.** Those planning on applying a granular material should wait until at least the second week in June. Granules should provide excellent results if applied between June 16 and 21. Liquid insecticide applications should be targeted for 2 to 5 days before peak or within 3 days afterward.

WHAT ABOUT REPLANTED BEETS? Over 12,000 acres of beets in the Valley required replanting. Replanted beets will be smaller and more vulnerable to attack when root maggots begin damaging plants. Beet fields in areas of moderate to high risk of root maggot infestation will likely need added insecticide protection. NDSU research has shown gross economic return benefits of $80 to 100 per acre from supplemental insecticide applications to replanted sugarbeets. If no insecticide was used at replanting, consider applying a postemergence material. If an insecticide was used at replanting, a postemergence application may not be necessary. Continued updates on the root maggot fly forecast will appear in future issues of the NDSU Crop & Pest Report. For guidance on postemergence control strategies, consult the "Insect Control" section of the ***2008 Sugarbeet Production Guide*** or the "Sugarbeet Insects" section of ***2008 Field Crop Insect Management Recommendations***. Online versions of these publications are located at:

www.sbreb.org/Production/production.htm &
www.ext.nodak.edu/extpubs/plantsci/pests/e1143w1.htm

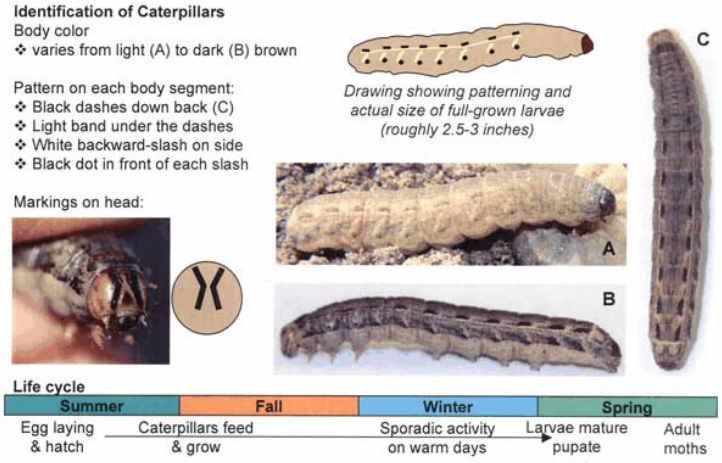
Mark Boetel
Research & Extension Entomologist
mark.boetel@ndsu.edu

A NEW CUTWORM SPECIES IN NORTH DAKOTA

The winter cutworm, *Noctua pronuba* (Lepidoptera: Noctuidae) was recently reported causing damage on crops in McKenzie County near Alexander this past week. It has also been reported in Divide, Cass and Richland Counties of North Dakota. However, entomologists believe that it is distributed across North Dakota. *Noctua pronuba* is native to Europe where it is one of the most common Noctuid moths. It was first found in the North America continent in Nova Scotia in 1979. It has spread rapidly across the northern U.S. Like other Noctuid moths, it is a strong flyer and active at night. It is called the winter cutworm, because it is very cold tolerant and often emerges to feed during warm periods in the winter. It has a wide host range feeding on many agricultural crops (alfalfa, grass hay, potato, sugarbeets, cabbage, carrots, grapes) and ornamental crops. Although there are no specific threshold developed for winter cutworm, NDSU Extension recommends that you follow the guidelines developed for cutworm management.

Noctua pronuba is a large cutworm with moths having a 3-inch wingspan and a bright orange-yellow hindwing with a black sub-terminal band (see figure). Caterpillars are up to 2.5-3 inches long when mature.

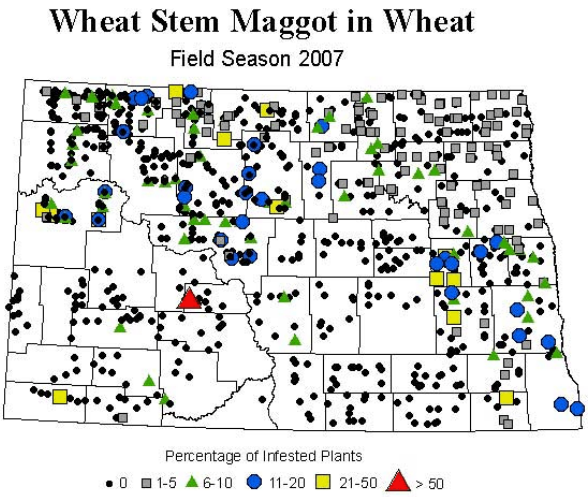
Winter cutworm moth



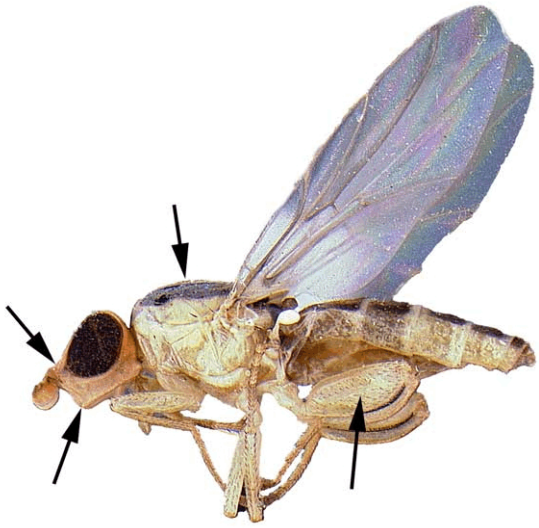
Source: H. Russel and C. DiFonzo, Ent. Dept., MSU, CCD #2007-06

REVIEW OF WHEAT STEM MAGGOT - WHAT LITTLE WE KNOW

Last year, there were a lot of complaints from wheat producers about white wheat heads caused by wheat stem maggot. The 2007 NDSU IPM Survey found maggots in 46% of fields surveyed from heading to maturity. White heads were observed from late June to the end of July. The average incidence was 19% white heads with a range from 0% to 50% (see map). Historically, infestation levels have been lower and rarely exceeded 5% in North Dakota.



Identification: Wheat stem maggot (*Meromyza americana* Fitch) is a small fly (about 1/5 inch long) in the family Chloropidae. Wheat stem maggot can be recognized by the following combination of traits: a mostly yellow body with three dorsal black stripes, swollen hind femurs, the head protruding forward between the eyes, and the corner of the mouth forming a nearly right angle (see figure). Wheat stem maggot is the most common chloropid fly infesting wheat in ND, though other chloropid species are found occasionally in wheat.

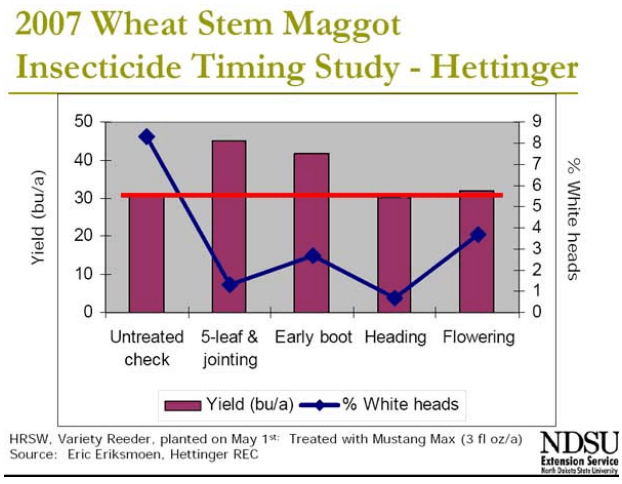


Adult wheat stem maggot fly

Biology: Wheat stem maggots overwinter in the larval stage, inside the lower parts of grass stems. In the spring, the larvae pupate and adults emerge in June. After mating, females deposit their eggs on the leaves or stems of grasses. The young maggot crawls down beneath a leaf sheath and tunnels into the stem. The stem is partially severed causing the head to turn white. The head and terminal straw of maggot-infested wheat will pull out easily due to the internal chewing damage by the larvae. The larva pupates within a cigar-shaped, pale green puparium. The adults emerge about midsummer and lay their eggs on wild grasses or volunteer grain. The resulting larvae overwinter in the stems of the wild grasses and volunteer grain. Host plants include HRSW, durum wheat, barley, rye, timothy, and several grassy weed hosts.

Integrated Pest Management: There are no scouting techniques or thresholds that have been developed for monitoring wheat stem maggot. However, flies can be collected using a standard sweep net and sweeping the wheat canopy. Research conducted in the 1930s found that the number of white heads was dependant on crop maturity (dates of first heading), variety, and planting date in relation to peak fly emergence. Early planting and early maturing varieties generally had a lower incidence of white heads from the spring generation of wheat stem maggot. At this point, it is not clear if variety differences are due to actual host plant resistance or differences in crop maturity and timing with peak fly populations.

Preliminary research data from NDSU suggests that tank mixing insecticides with the early season herbicides during 5-leaf to jointing wheat helped reduce the incidence of white heads and increased yields. However, it is not clear whether this was due to random chance of peak fly emergence coinciding with the timing of the herbicide-insecticide application. Research is continuing in 2008 to help determine the relationship between fly biology, crop development and crop damage (or yield loss). At this point, we do not know if this strategy will control wheat stem maggots, and therefore we cannot make any recommendations.



CUTWORM ACTIVITY CONTINUING

Field reports are still coming in on cutworm damage to crops - pulse crops, sugarbeets, sunflowers, and crops in CRP. Remember to be vigilant scouting for cutworms on agricultural crops all the way through June in North Dakota. Late season cutworms are just starting to become active and still small (<½ inch). These small caterpillars have about 2-3 weeks of feeding before they become mature. The recent cool weather will delay cutworm development. If cutworms are above action threshold or significantly reducing plant stands, insecticide also should be applied in the evening, when cutworms are active feeding. There are many weeds starting to popup in fields now and early season weed spraying will be in full swing as soon as fields dry out. Many of the pyrethroid insecticides used for cutworm control are compatible with tank mixing with herbicides. However, check labels for compatibility or do a simple 'jar test' mixing the insecticide and herbicide. With the recent rains, insecticides need a minimum of 3-4 hours of drying time to be rain-fast and provide effective residue for insect control.

Janet Knodel
Extension Entomologist
janet.knodel@ndsu.edu

plant science

ALFALFA HARVEST IS NEARING

Alfalfa harvest is just around the corner for those lucky enough to have reasonable rainfall or for irrigated producers. The cool weather has delay the first harvest this year since we typically harvest the last days of May in warm early springs or the first days of June in average years. Alfalfa at Fargo on dryland is only 13 to 15 inches tall on May 30 when it typically would be 24 to 28 inches tall.

Use plant height to determine when to harvest the alfalfa if the weather cooperates. Plant height affects forage quality of alfalfa more than plant maturity (Table 1). As the plant grows taller, the relative feed value decreases within each maturity stage due to increasing fiber and lignin laid down to keep the plant erect. Likewise, as the maturity stage increases, forage quality decreases, but not as fast as with plant height. For example, alfalfa at the early bud stage decreases in relative feed value from 220 at 16 inches of growth to 156 at 35 inches of growth or 64 units. At 16 inches of height the relative feed value also decreases from 220 to 186 or only 34 units as the maturity increases from early bud to late flower.

Optimum harvest maturity is when prime hay of 150 to 170 relative feed value can be obtained in the bale. The values presented in Table 1 are for alfalfa standing in the field. Forage quality also decreased from harvesting losses, primarily leaf lost. It is estimated that 20 to 30 units of relative feed value are lost during harvesting with good technique; therefore, harvest must begin at 170 to 180 estimated relative feed value to get prime hay in the bale. If alfalfa reaches only 16 inches in height, optimum harvest maturity is late flower (defined as the most mature stem with two or more nodes having an open flower), which will likely be the case in drought affected areas this year. If alfalfa reaches about 28 inches common under irrigation or with good rainfall, the optimum harvest maturity is at the very-late vegetative stage.

Alfalfa growth has been delayed by the cold weather this year so the plant height is less than previous years, but the maturity stage is less affected by the cold weather. Forage yield increases with increasing maturity, so delaying harvest to a more advanced maturity will increase forage yield. Therefore, the optimum harvest maturity will be latter this year than previous years. Last year the first harvest was taken at medium-bud growth stage at Fargo, which was later than the previous three years when harvest occurred at the very-late vegetative to earliest-bud growth stage in order to harvest prime hay.

The PEAQ system described in the previous paragraphs works best on the first harvest when the maturity of stems is more uniform. The PEAQ system does not work well for the second and third harvest due to the most mature stem occurring much earlier than the average crop. But the same principal applies, the taller the alfalfa in general, the optimum harvest maturity occurs at an earlier growth stage.

The optimum harvest maturity for the second, third, and fourth harvests occurs at more advanced growth stages than the first harvest. The typical maturity at which we harvest alfalfa at Fargo has been late-bud, 20 to 30% bloom, and regrowth initiating at the bottom of the canopy in the second, third, and fourth harvests, respectively. In a dry year like 2006, the maturity at harvest was late flower (nearly 100% bloom) for the second and third harvests.

Table 1. Estimated forage quality of alfalfa by the PEAQ system

Plant height	Stage of most mature stem		
	Early bud	Early flower	Late flower
inches	relative feed value		
16	220	208	186
20	213	191	171
25	191	172	155
30	173	156	141
35	156	150	129

WARM-SEASON ANNUAL FORAGES

Drought in central and western North Dakota has reduced the forage yield of perennial forages like alfalfa, alfalfa/grass mixtures, and pure grasses like brome and crested wheatgrass.

Conservation reserve program (CRP) acreage was recently released, which should help producers meet their forage needs. If there is inadequate CRP acreage in your area or a higher-quality forage is needed, consider warm-season annuals.

Common warm-season annuals are foxtail or proso millets, sudangrass or sudan/sorghum crosses, and pearl millet. Pearl millet's major advantage is the lack of HCN or prussic acid, but pearl millet is the poorest choice for North Dakota. Forage yields in southeastern North Dakota have been equal or maybe slightly greater than sudan/sorghums, but generally lower yielding than the sudan/sorghums in the rest of the state.

Forage yield of foxtail or proso millet, sudangrass, and sudan/sorghums under a one-cut systems have been fairly similar with maybe a slight advantage to the sudan/sorghums. Forage yield will be substantially greater with sudangrass and sudan/sorghums than foxtail or proso millets when rainfall permits a second harvest. The major disadvantage of sudangrass and the sudan/sorghums is the presences of HCN (hydrocyanic acid). Under drought conditions, HCN can build to potentially toxic levels when rainfall restricts growth to less than 20 inches. If the sorghums are hayed under these conditions, be sure to get the forage tested for potential problems. Rarely will HCN be a problem in a hay or silage crop if the plant height is greater than 20 inches since maturity and the drying for hay and handling the silage after fermentation reduces the HCN in the forage. Grazing sudangrass or sudan/sorghums less than 20 inches under drought is the major concern for possible HCN poisoning.

Piper sudangrass has been the standard sorghum used in North Dakota. Piper is an open-pollinated sudangrass known to be lower in HCN. Sudangrass hybrids and sudan/sorghums will be higher in HCN. In recent years, the BMR (brown midribbed) sudangrass, pearl millet, and sudan/sorghums have been released. The BMR character reduces the lignin content of the plant, which increases the digestibility and animal performance compared with non BMR species. The major rap on BMR sorghums or pearl millet has been that they are considered lower yielding, but preliminary data in North Dakota does not show this yield drag. If considering a sorghum, I suggest considering the BMR types.

A major problem with sorghums and pearl millet is getting good-quality hay. The sorghums should be hayed at 2.5 to 4 feet in height. The large stems at this height makes it very difficult to get proper drying to preserve the forage in the bale. Always use a hay conditioner to either crush or break the stem to speed drying and be careful to reduce the size of the window, especially when the crop is heavy, to facilitate drying. Pearl millet does dry better

than the sorghums since it has a greater leaf to stem ratio compared to the sorghums.

Foxtail millet, both siberian and german, and occasionally proso millet are commonly grown in North Dakota as emergency forage crops. Manta siberian millet is the most common species grown due to its drought tolerance. German millet is slightly latter maturing and higher yielding under good rainfall. Forage quality of foxtail millets tends to be the poorest of the common warm-season annuals and they may cause a diuretic action in livestock. Foxtail millets should never be feed to horses. Proso millet, commonly used as a grain crop, sometimes is harvested for forage. Due to the grain, forage quality is higher in proso than foxtail millets.

Cool-season forages like oat, barley, and triticale probably should not be planted in June or July. The warm summer temperatures forces maturity and reduces tillering causing poor forage yields. If considering a cool-season forage, Paul oat has performed the best. Recent Wisconsin data indicates that a late seeding of oat (about August 1 to 15) produced 1 to 2 tons of hay with good quality. If rainfall is inadequate to seed warm-season annuals, consider this late seeding if soil moisture is adequate.

Dwain W. Meyer
Extension Forage Specialist
Dwain.Meyer@ndsu.edu

CROP SCOUTING

Most of the field crops have been seeded and the attention is shifting to in season crop management. Scouting is an important part of the crop production decision making process. It is essential to have a good understanding about the weeds, insects or diseases present in a field in order to take proper action. Driving by a field and observing from the road will not provide the correct information needed for the right management decision. When scouting enter the field at different points during the summer so the sampling locations will reflect the whole field. It is important to stop and inspect the crop at multiple locations in the field away from the head-lands.

In order to obtain a good record during the season write down the observations about weeds, insects and diseases found, preferably on a map or a drawing with the field boundaries. If problems only occur in small areas you can consider spot application of pesticides instead of applying over the whole field. As Global Positioning Systems become more affordable it may be a good idea to write down the global coordinates of problem areas. Later in the season a repeat visit to the exact same location can be made.

When scouting cover as much of the field as possible. Try to cover areas of the field where indications of a pest are likely. For instance grassy areas at field margins might be the place to find grasshoppers. Weed and insect management decisions are generally evaluated on a plant or insect per square yard basis. Know the density of the pest in order to determine if an economic threshold is reached.

It is important to evaluate the plant stand early in the season. To determine plant stand, select the area of the field with lowest plant stand, and make at least 10 random stand counts in an area where the stand is reasonably uniform. Also take plant stands at locations with normal stands. Use a tape measure and mark off 1/1,000 of an acre for each count. The lengths of rows equal 1/1,000 of an acre with different row widths is indicated in Table 1. Multiply stand count per length of row by 1,000 to obtain stand per acre.

Table 1. Length of row to equal approximately 1/1,000 of an acre

Row Width	Length of row to equal 1/1,000 of an acre
30 inches	17 feet and 5 inches
20 inches	26 feet and 2 inches
15 inches	34 feet and 10 inches
10 inches	52 feet and 3 inches
7 inches	74 feet and 9 inches

Another method used to evaluate plant stands in drilled or narrow row canola, soybean, or other crops is to use a hula hoop. Throw the hoop randomly into the field and count the number of plants inside the hoop. Multiply the number of plants by the multiplication factor found in table 2 to obtain the plant population. Use the average of at least five to ten observations per field to estimate the plant stand. For instance, if a 30 inch hoop is used and 17 plants are counted the stand per acre would be 17 x 8,900 = 151,300 plants per acre.

Table 2. Multiplication factor for different hoop diameters

Hoop diameter in inches	Multiplication factor
30	8,900
32	7,800
34	6,900
36	6,200
38	5,500

When the plant stand is low and uneven record the possible causes so next year corrective action can take place. It is very difficult to determine a cause for poor stands at the end of the season. The recorded plant stand will provide baseline information for the remaining of the season. Drought, disease, hail and other factors may reduce the plant stand during the season, but you would not be able to document these plant stand losses without

an early season stand count number. Good scouting methods, proper identification of problems and diligent recording of the findings will greatly assist in making the correct management decisions.

Hans Kandel
NDSU Extension Agronomist Broadleaf Crops
hans.kandel@ndsu.edu

FROST DAMAGE IN CEREALS

There are reports of frost damage, some severe, after the cold weather that moved through the region last week. Frost is generally most problematic in low lying areas as cold air tends to flow towards the lowest elevations. When assessing frost damage, visit the lowest spots of your farm first. Many factors affect how sub-freezing temperatures impact a crop; temperature alone does not always accurately predict damage.

Some of the main factors that influence frost damage in cereal crops are: crop tolerance, growth stage, moisture content of the soil, duration of the sub-freezing temperature, location in the field, and environmental conditions before the occurrence of the sub-freezing temperature.

Cereal crops are generally considered to be frost tolerant early in their growth cycle. There is considerable variation for tolerance between crops, however. In general terms for cereals crops in a similar growth stage, winter rye is the most tolerant followed by winter wheat, oats, barley, spring wheat, and finally corn (least tolerant).

Cereals tolerate frost early in the season relative to broadleaf crops because their growing points remain below the surface of the soil for several weeks after emergence and are therefore protected from the extremes in the temperature of the air above. This does not mean that leaf tissue will not be burned or damaged, but that the potential for relatively normal regrowth is high. In small grains the growing point extends above the soil's surface at about the 6 leaf stage or just prior to jointing and in corn at about the 5 leaf stage. Fortunately, all of the spring sown cereals in the state were still relatively young and their growing points were below the soil's surface during last week's cold weather. Winter wheat, however, has started to joint in parts of the state and is potentially more susceptible to frost damage than its spring sown counterpart. I would recommend that you carefully inspect growing points in your winter wheat if you had temperatures below 25 degrees for any extended period of time. The growing point is more susceptible to damage than leaf tissue during jointing. A damaged growing point will appear brownish or water soaked. A dead leaf may appear in the whorl if the growing point has been damaged. Prolonged (or very low) sub-freezing temperatures can kill growing points of cereal crops even if they are below the surface of the soil. Corn is the most sensitive and temperatures of less than 28 degrees can be lethal.

Temperatures change more slowly in wetter soils than in dryer soils. Therefore, there is more risk of low temperatures killing plants if your soils are also dry. Plants are capable of hardening themselves against freezing and plants that had previously been exposed to near freezing temperatures are more likely to tolerate lower sub-freezing temperatures than those that have not.

Inspecting for damage

Foliage that has been damaged by frost will initially appear yellow and within a few days turn black usually towards the tips of the leaf first. If the growing point was not damaged, after 3 to 5 days of reasonably warm weather, new growth should appear from the whorl. If this occurs, then you can be assured that the growing point was not killed. Loss of leaf tissue at this early stage will have little if any effect on yield. For corn that has not yet emerged, I would suggest that you dig up a few seeds to check for germination and to see if the emerging seedling is viable. Seeds that had not germinated will not be adversely affected, but emerging seedlings could be killed if soil temperatures were very cold. Nevertheless, corn seedlings that are still below ground are rarely killed by cold soil temperatures! If you have winter wheat that was beginning to joint, I would also advise you to check the health of its growing point if you had visible damage to emerged leaves.

Joel Ransom
Extension Agronomist - Cereal Crops
joel.ransom@ndsu.edu

plant pathology

WHEAT STREAK MOSAIC VIRUS AND HIGH PLAINS VIRUS-MORE SAMPLES

The NDSU Diagnostic Lab last week received winter wheat samples from several locations across the state that were either positive for Wheat Streak Mosaic Virus (WSMV), High Plains Virus, or for both. The level of severity of symptoms in the fields varied, from only scattered plants infected to portions of the field having severe symptoms. Last week's Crop and Pest Report contained a story about WSMV, its symptoms and management options, so please see that article for further information.

High Plains Virus is a relatively new disease confirmed in the state, but this virus in wheat is also transmitted by the wheat curl mite, the degree of injury is similar to that caused by WSMV, the symptoms are similar, and the management of this virus is similar to steps to needed for WSMV.

A good summary of the two virus diseases is available on-line, in an article by plant pathologists from Oklahoma State University. The web address is:
http://entoplp.okstate.edu/ddd/diseases/wsmv-hpv.pdf

This publication also has a table that estimates yield losses caused by wheat streak mosaic virus in three winter wheat cultivars. *For example, in Oklahoma, in the winter wheat cultivar 'Chisholm':*

Time of infection	WSMV severity (0-3)*	Yield (bu/A)
Fall	2.7	19
Spring	1.3	42
Not infected	0	51

* Severity rated on scale: 0 = no symptoms; 3 = severe symptoms (Source: Bob Hunger, OKSU)

EARLY SEASON TAN SPOT

With the recent rains in some locations across the state, the NDSU small grains disease forecasting site indicates some favorable infection periods for tan spot of wheat. Growers with wheat in the herbicide application stage at these locations may want to consider applying fungicides in conjunction with their herbicides for tan spot control, especially where wheat has been planted into wheat stubble.

A large number of fungicide products are available that do a good job against early season tan spot. Generally, when tank mixed with herbicides, additional adjuvants are not needed.

The NDSU disease forecasting site, that provides information on risk of tan spot, is available at:
http://www.ndsu.edu/scabforecast

The leaf disease predictions are obtained with a 3 step process:

1) choose the nearest NDAWN station and highlight;
2) click on the leaf disease stages of the crop;
3) click on *get forecast*

The scab forecast information, which we should not have to think about yet, is only achieved by clicking on the flowering growth stage.

DISEASE AND INSECT SURVEY BEGINS

NDSU IPM Field Scouts were trained on survey procedures on May 28th at the Carrington Research Extension Center. These field scouts will be looking for major disease and insect pests in wheat, barley, soybean, canola, and sunflower across the state. Their goal is to identify the distribution and severity of the major pests, in order to alert producers of any management needs, as well as verify that our field crops don't have pests of export concern.

The 2008 field scouts are:

Andrew Friskop, Hankinson, ND native, surveying in the southeast and east central counties (Marcia McMullen, Sam Markell, and Jan Knodel coordinators, NDSU Plant Pathology and Entomology);

Amanda Schoch, New England, ND native, and *Kayla Hutzenbiler*, Belfield, ND native, surveying in the southwest and west central counties (Roger Ashley coordinator, DREC);

Taylor Mattson, Carrington, ND native, surveying in the central and south central counties (Greg Endres coordinator, CREC);

Tracy Samson, Max, ND native, surveying in the north west and north central counties (Denise Markle coordinator, NCREC);

Valerie Wilson, Edmore, ND native, surveying in the northeast and several north central counties (Mike Liane coordinator, Devils Lake Area Extension Office).

Last year, the NDSU IPM scouts surveyed over 1100 wheat fields, 318 barley fields, 268 soybean fields, 130 sunflower fields, and 156 canola fields. Highlights of the 2007 survey included: an increased detection of wheat leaf rust and wheat stem maggot in wheat, very low levels of Fusarium head blight in wheat and barley, the absence of soybean rust, relatively low populations of soybean aphid and canola flea beetle, and high populations of banded sunflower moth.

Marcia McMullen
Extension Plant Pathologist
marcia.mcmullen@ndsu.edu

FIRST REPORT OF SOYBEAN RUST IN LOUISIANA

On May 27th soybean rust was found approximately 50 miles south of Baton Rouge, Louisiana, near the small town of Jeannerette. The disease was observed Kudzu, a common weed in parts of the south. Although the incidence was low, the severity on the leaves with rust was approximately 50%. This is the first report of Soybean Rust in Louisiana in 2008.

Confirmation of soybean rust in Louisiana is not a surprise; the disease has appeared in the state in previous years. Soybean rust has already been confirmed in Texas on Kudzu. Spores from both finds will likely blow north and infect soybeans as the crop emerges. We will be tracking the disease as it progresses northward in 2008. At this point, the soybean rust finds have little impact on North Dakota. However, it is best to be aware of the disease development to our south. We will provide updates as things change. Further information is available at http://www.sbrusa.net.

Sam Markell
Extension Plant Pathologist
samuel.markell@ndsu.edu

weeds

MAXIMIZING GLYPHOSATE ACTIVITY IN GLYPHOSATE-RESISTANT CROPS

The goal of all growers should be to maximize glyphosate activity whenever it is applied to glyphosate-resistant crops. This goal should maximize profitability and weed control, and reduce the risk for herbicide resistance. Below are the most important management strategies for improving glyphosate activity. For additional information, consult pages 68 and 69 in the 2008 North Dakota Weed Control Guide.

1. Apply glyphosate to small (< 4") annual weeds.
2. Apply glyphosate to perennial species in the bud to early-flowering stage of development.
3. Apply the most effective rate for the most difficult to control species in the field. For many annual species the minimum rate of glyphosate should be 0.75 pounds acid equivalent/acre (lb ae/A). Species such as lambsquarters, velvetleaf, wild buckwheat, common ragweed, common mallow, smartweeds, horseweed/marestail, and waterhemp can be difficult to control with glyphosate. Consider using the maximum single-use rate of glyphosate for these species, especially if a reduction in control has been observed over time. Rates of glyphosate greater than 0.75 lb ae/A usually improves control of perennial species, compared to lower rates. Multiple glyphosate applications can also improve control of perennial species.
4. Always add ammonium sulfate (AMS) to glyphosate mixtures. Ammonium sulfate should be added at a minimum of 4 pounds per 100 gallons of spray mixture (lbs/100 gal) for most of North Dakota. Add additional AMS if water hardness is greater than 1600 ppm.
5. Allow at least a 6 hour rainfast period for all glyphosate formulations for maximum activity. A shorter rainfree period can be acceptible for the most susceptible species. Lambsquarters control is usually reduced if the rainfree period is less than 6 hours.
6. Apply glyphosate during the warmest and most humid weather conditions to maximize activity.
7. Most glyphosate formulations include nonionic surfactant (NIS) at a high enough concentration for maximum activity. However, some glyphosate formulations do not include NIS. For these formulations add a quality NIS product at 0.5 to 1.0 % v/v. Some weed species, especially lambsquarters, may be more effectively controlled with the addition of NIS at 0.25 %v/v to "loaded" glyphosate formulations. Know which glyphosate formulations prohibit the use of additional NIS.
8. Glyphosate activity is influenced by the time of day of the application. Maximum activity occurs between 10:00 AM and 4:00 PM. Velvetleaf and common ragweed control may be the most negatively affected by the time of the glyphosate application.
9. Application of glyphosate in low water volumes improves glyphosate activity. However, when spraying large weeds and/or dense weed canopies, higher spray volumes usually improves glyphosate activity.
10. Glyphosate is strongly and irreversibly absorbed to clay particles and organic matter. Therefore dust of any amount, especially initiated by the wheels of the sprayer, will cause a reduction in glyphosate activity. The best methods for decreasing this problem are to drive slower and put higher volume nozzles in the boom over the wheels. These solutions will not completely solve the problem and growers must remember to not apply greater than the single-use rate of glyphosate when using the higher volume nozzles.
11. When mixing other herbicides with glyphosate, add the most effective adjuvant for that herbicide being added. This strategy will maximize the activity of the herbicide being added to the glyphosate mixture. If the alternative herbicide recommends the addition of an oil adjuvant for maximum activity, add only Superb HC or Destiny HC at 0.5 %v/v to the mixture with glyphosate. The reason for this is that most oil adjuvants antagonize glyphosate activity.

Jeff M. Stachler
Assistant Professor - Sugarbeet Weed Science
jeff.stachler@ndsu.edu

horticulture

POWDERY MILDEW DISEASES ON LAWNS AND ORNAMENTALS

Part of my lawn is almost entirely shaded. It lies under a huge silver maple (probably the biggest in Fargo!), and it is on the north side of my house, surrounded by a tall fence. This particular patch of lawn gets very little sun and even less air-flow. So, it should come as no surprise to me that my nice green lawn turns whitish-blue every year under cool, humid conditions. I noticed the white powdery growth coating my turf leaves, and it seemed to have appeared over night! This patch of lawn annually suffers from a disease known as powdery mildew. The close-up image shows infected blades of a lawn (from a newer lawn in West Fargo; photo by Sam Markell).

Powdery mildew diseases affect many different plants, including ornamental plants and field crops. The various related fungi that cause these types of diseases are fairly host specific, so, for example, a fungus that causes powdery mildew on lilac will not cause powdery mildew on turf. Below is a standardized report that you might receive in the mail if you submit an ornamental sample afflicted with powdery mildew:

> "The sample is infected with a powdery mildew disease. The fungi that cause these types of diseases are fairly host specific, so it is unlikely that unrelated plants will be affected by the same genus and species of fungus causing powdery mildew on the sample. Powdery mildew diseases are common on many trees and ornamentals, often occurring in plantings that are concealed in dense shade or have poor air circulation due to many trees, shrubs, or fences. The disease is favored by cool, humid weather, and high levels of nitrogen. Free moisture (dew) is not necessary for powdery mildew fungi to infect the leaves, so infection can occur even during dry periods as long as humidity is high.
>
> Powdery mildew diseases can be managed by improving aeration, by planting species in appropriate sites to reduce stress (for example, sun-loving plants should be planted where they get adequate sunlight), and by using resistant varieties when possible. Often, pruning and thinning surrounding trees and bushes can help minimize disease development.
>
> Fungicides are not typically recommended for powdery mildew diseases in the landscape. Some fungicides may help with the control of this disease, but most fungicides available to the homeowner do not cure already infected plants; most only protect leaves from new infections. Fungicides may be available at lawn and garden centers, but they must be applied season long or as long as weather conditions favor disease, and they will not cure powdery mildew diseases by themselves. As a result, the use of fungicides is seldom warranted for managing powdery mildew in a landscape. Neem oil or sulfur may also be somewhat successful in controlling this disease by protecting new growth from infection. If chemical control is used, be sure to read, understand, and follow the label instructions carefully to avoid injury to yourself, the plant, or the environment."

Kasia Kinzer
NDSU Plant Diagnostician
NDSU.PlantDiagnosticLab@ndsu.edu
701.231.7854
http://www.ag.ndsu.nodak.edu/diaglab/

diagnostic lab

UPDATE FROM THE NDSU PLANT DIAGNOSTIC LAB

The tables below summarize samples received and processed by the NDSU Plant Diagnostic Lab for the past week.

Table 1. Number of Sample Submissions by Sample Category from 28-May-2008 through 04-Jun-2008.

Sample Category	# of samples
Seed Health/Phytosanitary	19
Field crops	9
Woody ornamental - Evergreen	7
Woody ornamental -Deciduous	6
Annual	2
Turf	1
Perennial ornamental	1
Total	45

Table 2. Diagnoses by state, county, and host from 28-May-2008 through 04-Jun-2008.

State-County	Host	Diagnosis
MN-Wilkin	Sugar beet (*Beta vulgaris altissima*)	Aphanomyces damping off
MN-Wilkin	Sugar beet (*Beta vulgaris altissima*)	Pythium root rot
ND-Burleigh	Spruce (*Picea* species)	Root damage
ND-Burleigh	Spruce (Picea species)	Winter injury
ND-Cass	Turfgrass (mixed species)	Fairy ring
ND-Cass	Winter wheat (*Triticum aestivum*)	Barley Yellow Dwarf Virus
ND-Dickey	Winter wheat (Triticum aestivum)	High Plains Disease (HPV)
ND-Dickey	Winter wheat (Triticum aestivum)	Wheat Streak Mosaic Virus
ND-Hettinger	Winter wheat (Triticum aestivum)	High Plains Disease (HPV)
ND-Hettinger	Winter wheat (Triticum aestivum)	Wheat Streak Mosaic Virus
ND-McHenry	Winter wheat (Triticum aestivum)	High Plains Disease (HPV)
ND-McHenry	Winter wheat (Triticum aestivum)	Wheat Streak Mosaic Virus
ND-Ward	Black Hills spruce (*Picea glauca densata*)	Spider mite injury
SD-Brown	Winter wheat (Triticum aestivum)	High Plains Disease (HPV)
SD-Brown	Winter wheat (Triticum aestivum)	Wheat Streak Mosaic Virus

Kasia Kinzer
NDSU Plant Diagnostician
NDSU.PlantDiagnosticLab@ndsu.edu

around the state

Southwest ND

NDAWN rainfall totals for past two weeks ranged from 0.63 inches at Beach to 1.80 inches at Mandan. Showers have produced highly variable totals across the entire area with some producers reporting lesser and greater amounts reported at the NDAWN sites.

Winter wheat is jointing while many spring wheat fields are at the 3 ½ to 4 ½ leaf stage. Tan spot infections have been reported as low to very low probably due to dry conditions. However weather conditions have been more favorable recently for development of tan spot. A sample of winter wheat from a field near Mott was confirmed to have both wheat streak mosaic virus (WSMV) as well as high plains virus (HPV). Infection occurred early enough to warrant the destruction of the crop and to seed the field to sunflower. Canola is in surprisingly good condition with very good emergence and growth. Field pea seeded in mid-April has advanced to 7 to 9 nodes. Corn seeded about May 10 has emerged. Sunflower seeded on May 23 has emerged.

Crested wheat grass is heading and smooth bromegrass has begun to head but plant height is short due to early season dry conditions when vegetative plant development was occurring. Alfalfa is about 10 to 14 inches tall.

Roger Ashley
Area Extension Specialist/Cropping Systems
NDSU Dickinson Research Extension Center
Roger.Ashley@ndsu.edu

South-Central ND

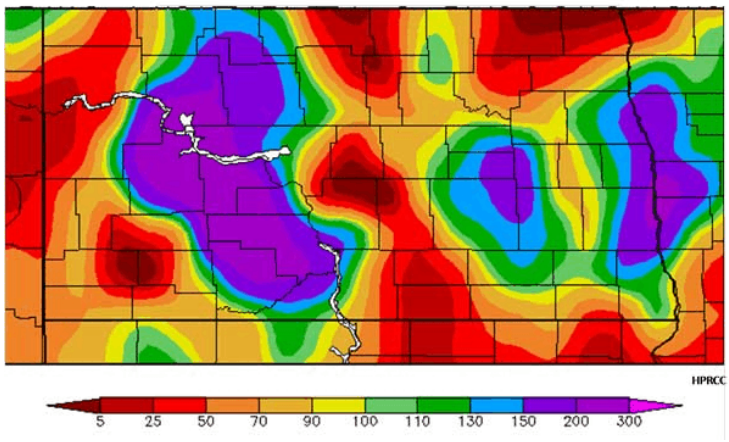
During the past two weeks (May 21 to June 3), the region received rain ranging from less than 0.1 inch at Wishek to 2.2 inches at Lisbon, based on NDAWN (North Dakota Agricultural Weather Network). Rains were spotty and the region needs considerably more rainfall to replenish subsoil moisture. Adequate and uniform row crop stands continue to be a concern, especially in areas not receiving recent rains. Frost occuring on May 23 and 27 injured crops including barley, corn, canola, and soybean. Soybean is the most frost-susceptible crop of the group, but affected acreage appears very low.

Winter wheat is in the tillering to flag-leaf emergence stages, spring wheat and barley are in the tillering stages, and corn has 2 to 3 leaves emerging. Soybean, dry bean and sunflower planting is essentially complete with much of the acreage containing emerged plants. Alfalfa, pasture and hayland growth is slow. Small grain POST herbicide application has been delayed due to delayed weed emergence, wind and recent wet weather but currently is in progress. Tan spot incidence is low in winter wheat but the disease will become more common in all wheat due to the current wet period. Winter wheat should be monitored for wheat streak mosaic and high plains viruses; canola monitored for flea beetles; and row crops for cutworms.

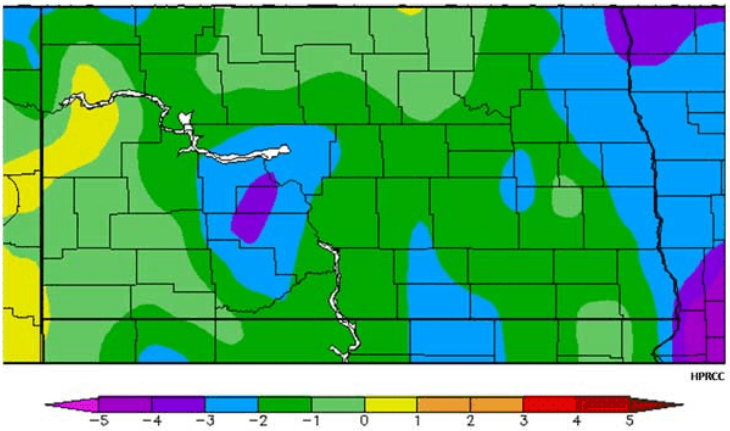
Greg Endres
Area Extension Specialist/Cropping Systems
NDSU Carrington Research Extension Center
gregory.endres@ndsu.edu

weather

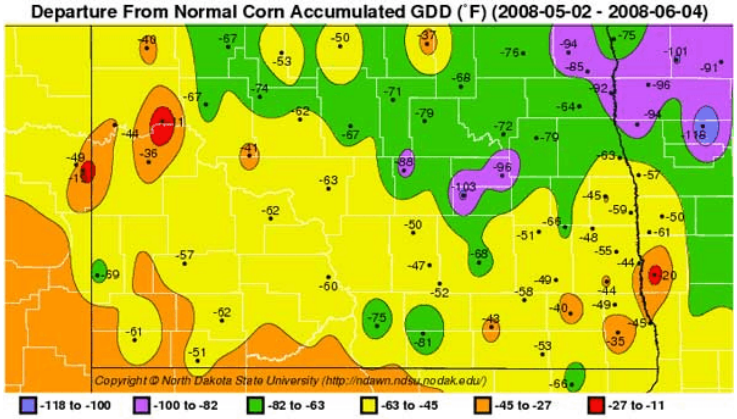
Last 7-Day Percent of Normal Precipitation(%)
5/28/2008-6/3/2008



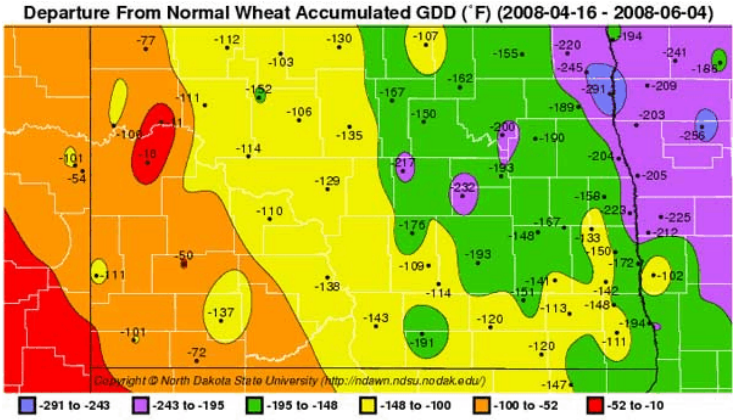
Last 7-Day Departure From Normal Temperature(°F)
5/28/2008-6/3/2008



Departure From Normal Corn Accumulated GDD (˚F) (2008-05-02 - 2008-06-04)



Departure From Normal Wheat Accumulated GDD (˚F) (2008-04-16 - 2008-06-04)



F. Adnan Akyüz, Ph.D.
Assistant Professor of Climatology
North Dakota State Climatologist
http://www.ndsu.edu/ndsco/

North Dakota State University
CROP & PEST REPORT
Extension Entomology
Hultz Hall 202
Fargo, ND 58105-5346

Janet Knodel, *Co-Editor*
Entomology
231-7582 phone
231-8557 fax

Sam Markell, *Co-Editor*
Plant Pathology
231-8866 phone
231-7851 fax

Plant Sciences
231-7972 phone
231-8474 fax

NDSU
Extension Service

Soils
231-8881 phone
231-7861 fax

Weeds
231-7972 phone
231-8474 fax

Ag Engineering
231-7261 phone
231-1008 fax

Helping You Put Knowledge To Work

The information given herein is for educational purposes only. References to a commercial product or trade name is made with the understanding that no discrimination is intended and no endorsement by the North Dakota Extension Service is implied.

NDSU Extension Service, North Dakota State University of Agriculture and Applied Science, and the U.S. Department of Agriculture cooperating. Duane Hauck, Director, Fargo, North Dakota. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. We offer our programs and facilities to all persons regardless of race, color, national origin, sex, handicap, age, Vietnam era veterans status, or sexual orientation; and are an equal opportunity employer.
This publication will be made available in alternative formats for people with disabilities upon request (701) 231-7881.