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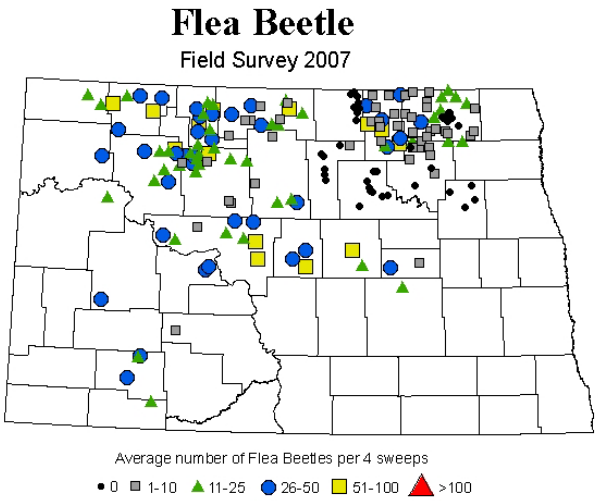
SPRING FLEA BEETLE POPULATIONS IN CANOLA

Fall populations of flea beetles in 2007 are generally indicative of the spring population levels in 2008. If high populations are seen at harvest 2007, there will be high populations in spring 2008. This past fall a total of 156 canola fields were surveyed in the swath (mature) stage for flea beetles in 24 counties in ND. This number represents approximately one field surveyed per 6,000 acres of canola. The survey was initiated on July 30 and continued through August 15, 2007. Flea beetles were surveyed using 20 sweeps per field with a 15-inch sweep net in freshly swathed canola fields. Flea beetles were found in 99% of the fields surveyed. Peak population densities occurred in the north central and northeastern regions of North Dakota. The average number of flea beetles per 4 sweeps was 24, with ranges between 0 and 94 (see map). These numbers are similar to the flea beetle populations that were found in swathed canola last year and represent low to moderate levels of flea beetles.



Crucifer flea beetles overwinter as adults in leaf litter of shelterbelts or grassy areas and are rarely found in canola stubble. Beetles emerge in large numbers when temperatures warm up to 57˚F (14˚C) for several consecutive days and there is a rainfall event in early spring. They feed on volunteer canola and weeds, such as wild mustard, and move to newly planted canola as it emerges. Depending on the temperature and rainfall, it may take up to three weeks for the adults to leave their overwintering sites. Warm, dry, and calm weather promotes flea beetle flight (flying up to several miles) and feeding throughout the field. In contrast, cool, rainy, and windy conditions reduce flight activity, and flea beetles walk or hop which leads to concentrations in field margins. When population levels are high, significant damage can occur within a 24-72 hour period. The most susceptible growth stage to feeding injury is the first 14-21 days after emergence.

More than 90% of North Dakota canola fields receive commercially applied seed treatments, like Helix XTra or Prosper FX. These systemic seed treatments can provide protection against flea beetles for about 21-25 days after seedling emergence. With the canola seed sitting in cool, dry soil conditions this year, crop emergence and growth is delayed. Without actively growing plants, systemic seed treatments are not readily taken up into the plant and this may result in reduced insecticide toxicity, residue, and efficacy. The take home message is to **regularly scout seedling to 6-leaf canola for feeding injury - pitting** (see photograph).

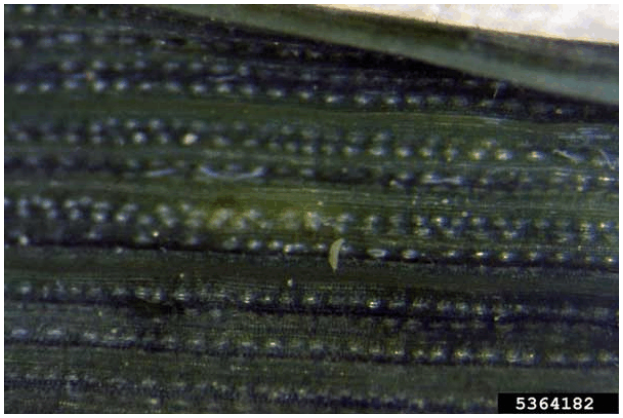
Feeding injury - pitting

An action threshold of 25% injury would justify a foliar spray on top of the seed treatment. Recent research indicates that the best insecticide strategy for management of flea beetle was the high rate of insecticide seed treatment plus a foliar insecticide applied at 21 days after planting, regardless of planting date. The foliar spray on top of the seed treatment controlled later-emerging flea beetles as the seed treatment residual was diminishing and the crop became vulnerable to feeding injury. The next few weeks will be critical for protecting canola against significant flea beetle damage!

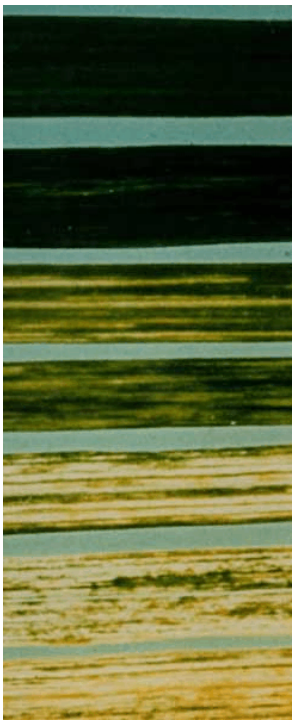
Note: Funding for the canola survey was provided by the Northern Canola Growers Association and CSREES Canola Research fund.

CAN WE CONTROL THE WHEAT CURL MITES THAT VECTOR WHEAT STREAK MOSIAC VIRUS?

Wheat curl mites are very tiny, 1/100 in long (see photo) and feed with piercing-sucking mouthparts on the leaves of wheat, corn, volunteer wheat and other weedy grass hosts. It is a primary vector of Wheat Streak Mosaic Virus (WSMV), which can cause crop losses of 50 to 100% when severe.



Wheat curl mite *(photo by F. Peairs, Colorado State University, Bugwood.org)*



Early symptoms of WSMV

Early symptoms of WSMV are a yellow mosaic pattern of lines on the youngest leaves, distinct chlorotic spots and plant stunting (see photo). Wheat curl mites have a high reproductive rate with egg to adult development occurring in 8-10 days at 77 F (25 C). They overwinter in all life stages and can survive the cold winter temperatures of North Dakota.

Breaking the green bridge and avoiding early planting are the best pest management strategies for reducing the incidence and severity of wheat curl mites and WSMV. Mites cannot survive without green plants and a two week break with only dead plants will starve and kill any mites. For winter wheat, planting late in the fall will also provide for a longer break in the green bridge period, and as a result, mite populations will not build up. Although wheat varieties have been developed that show resistance to the wheat curl mite, mite biotypes can overcome this resistance in certain regions. Resistance to WSMV has also been developed; however, much better sources of resistance are needed. The relative susceptibility of wheat varieties in North Dakota is not known. Insecticidal control has limited effectiveness against wheat curl mites, partially due to the lack of efficacy with insecticides against mites (arthropods, not insects) and to their feeding behavior in protected areas of the plant, such as curled leaves or deep in the leaf whorls.

Please see the NDSU bulletin on wheat streak mosaic virus for more information:
www.ag.ndsu.edu/pubs/plantsci/smgrains/pp646w.htm

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SPRINGTAILS DAMAGE RED RIVER VALLEY SUGARBEET

Numerous reports of subterranean (soil-dwelling) springtail infestations in Red River Valley sugarbeet fields have been received this spring. Most reports have come from central and southern portions of the Valley. Sugarbeet seedlings are especially vulnerable this year because of the cool temperatures that have characterized much of the spring thus far. Symptoms of springtail infestations include failure of plants to emerge and

dead/wilting plants. Areas affected by springtails usually occur in multiple patches of 1 to 5 acres within a field. These patches will likely increase in diameter as affected plants continue to wither and die. Unfortunately, there is no recommended rescue treatment for springtails in sugarbeet because postemergence-applied insecticides are not likely to penetrate deep enough into the soil profile to reach springtails feeding on developing seedling roots and germinating seeds.

Sometimes, the best management option is to replant the affected areas of a field. Beets should be replanted if plant population is likely to be reduced to 50 plants per 100 row feet or lower. Springtails will likely continue to feed for several weeks. Therefore, an at-plant insecticide should be used at replanting. Producers are advised to avoid granular materials containing chlorpyrifos (Lorsban 15G, Nufos 15G, Chorfos 15G, etc.), which are relatively ineffective at controlling subterranean springtails.

For more information about springtails, see extension circular no. E-1205, "Springtails in Sugarbeet: Identification, Biology, and Management." It is also located on the web at:
www.ext.nodak.edu/extpubs/plantsci/rowcrops/e1205w.htm

CUTWORMS INFESTING AREA SUGARBEET FIELDS

Scattered reports of cutworm infestations in sugarbeet fields have been received from the Drayton sugar factory district all the way south to the Moorhead area. Early-season cutworms typically clip the stem of seedling plants as they feed. Most feeding activity occurs during late evening through early morning.

If cutworm activity is suspected in a field, further scouting should consist of sifting through soil in the upper 2 inches near the base of plants in affected areas of the field. Cutworm larvae will curl up into a C-shape similar to white grubs, but differ from grubs by having darker coloring, a variety of markings on their body, and several pairs of prolegs (false legs) on their abdomen.

Foliar insecticides are effective in managing cutworm infestations, and early detection is important for protection from major economic loss. A rescue insecticide should probably be applied if 4 to 5% of seedlings have been clipped by cutworm larvae.

For specific information on managing insect pests of sugarbeet, please refer to the "Insect Control" section of the ***2008 Sugarbeet Production Guide*** or the "Sugarbeet Insects" section of the ***2008 Field Crop Insect Management Recommendations***. The respective WWW locations for online versions of these publications are:

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

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plant science

ON FARM CROPPING TRIALS

It is a good strategy to evaluate new cropping practices on a limited scale on the farm before adopting the new technology on many acres.

Although published data from university research and other sources will indicate whether a practice will work and provide a financial return under the tested conditions, adapting the technology to specific fields and management systems requires local testing. Through careful testing and evaluation an agricultural producer can determine the economics of the product or practice and see if the change in practice will increase the farm profit.

Setting up proper field trials will require some careful planning to obtain meaningful results. Sometimes test strips do not follow proper protocol and there may be a bias for or against the new product or practice. Here are some guidelines for planning field tests.

Always compare the newly tested variable (product, variety, technology) against the current production practice.

1) The field test site should be as uniform as possible for the "current" and the "new" technology. Make sure the soil type, drainage, slope and location in the field are similar.
2) The size of the test area should be reasonably large to harvest enough crop so a weigh wagon can be used to determine yield differences. Excessively large plots such as 1/4 to 1/3 of a field may actually decrease the accuracy of the trial because too many variables affect the final results.
3) Test strips the length of the field are usually the most practical. They are easy to plant, manage and harvest. It is easy to change treatments such as herbicides, fertilizer, insecticides, fungicide rates or crop varieties.
4) One of the fundamentals in crop research is replication of observations. It is important to repeat treatments (control and whatever else is investigated) at least two times but preferably more.
5) Evaluate only one variable at the time and manage each strip trial exactly the same except for the variable evaluated. For instance if you are testing soybean varieties, each trial strip should have the same tillage, seedbed preparation, fertilizer application, weed and insect control during the season. The only difference would be the variety. Another example would be to use fungicides or insecticides as a treatment and compare them to the situation where no product is applied (an untreated control or check). In this way with replicated observations the yield potential of the different treatments can be established under the farm's unique set of environmental and management conditions.

6) Keep accurate and complete records of all field operations and observations. These records will help to validate comparisons between the treatments. Record exactly where the "treatment" and the check plots are located. Also record weather conditions, dates of seeding and spraying, crop stand, and any pests developing during the season.
7) Some farms have advanced technology available and use global positioning to plant and apply products to the field. At harvest combines with GPS systems will be able to record exact yield in the field with yield monitors and data on treatments can be obtained from the yield maps.
8) Producers who do not have yield monitors can use weigh wagons to establish the yield of the harvested area. The width in feet x the distance traveled in feet gives the harvested area and yield per acre can be calculated.

With high commodity prices there is an increase in products which claim to have positive yield effects. Use available research data to see if the product has merit. The next step is to try out the product on the farm under controlled conditions and after harvest evaluate if the yield increase of the technology tested will pay for the additional cost of the product and application cost.

If producers need help setting up trials or evaluating test results, contact North Dakota State Extension staff for advice.

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GROWTH STAGING SMALL GRAINS

Most of the small grain crops in North Dakota have now been planted. Winter wheat is or will soon be jointing, and early planted spring wheat and barley are well established. The next few weeks are extremely important in determining the yield potential of small grains as many of the components that make up yield develop early in the season. Timely application of management practices is critical to achieving high yields. Since crop growth and development are affected by the environment and by the variety, the recommendations for most management practices for which timing is important (e.g. fertilizer topdressing and herbicide application timing, etc.) are based on crop growth stage rather than calendar date. Therefore, being able to properly identify the growth stage of your cereal crop will be important to ensuring that management practices are applied at the appropriate time. In this article I will briefly review how to determine the early growth stages of your small grains.

Early Growth Staging in Small Grains

Growth stage scales have been developed and are commonly used by researchers when describing experimental methods and results in scientific publications, but less so in communicating recommendations to farmers. The timing of early-season management recommendations are most commonly based on leaf numbers or other visible characteristics of the plants. Therefore, in this article I will focus on how to assess these various characteristics and will not delve into the details of growth scales.

When growth staging your crop you should begin by obtaining a representative sample of plants from the field or part of the field of interest. To give you a good feel for an "average" plant, use ten plants selected at random away from the edges of the field. Remove any soil attached to the plant so that you are able to observe the roots and crown. Leaf stage is the most common physical feature used to describe early development of small grain crops. Leaf stage is defined by the number of leaves that have visible collars on the main stem. Care must be taken to ensure that the earliest leaves are included when counting. The first leaf is small and is frequently lost from the plant during normal growth. It has a characteristically blunt tip. Look for the sheath remnants at the crown of the plant if you suspect that the first leaf (or second for that matter) is missing. Count only the leaves on the main stem, which is the tallest and most leafy of the stems. Include only those leaves that have a collar. When staging plants include all leaves, even those that have been damaged by hail or frost. The total number of leaves that a plant will develop is more or less fixed for a given variety; leaves that are stripped from the plant will not be replaced by additional new leaves.

Predicting Leaf Stages in Small Grains

Sometimes it is useful to be able to estimate or predict when a certain growth stage will be reached. Plant development is closely correlated to the accumulation of heat units or Growing Degree Days (GDD), much more so than calendar days. Based on plant emergence and historic temperature trends, you can predict with fair accuracy when a crop will reach a certain developmental stage. Growing degree days are readily available for a number of locations in North Dakota using the NDAWN website (http://ndawn.ndsu.nodak.edu/). Wheat requires about 140 GDDs and barley about 100 GDDs to produce a leaf. The actual number of GGDs required can vary between varieties, but these values will give estimates that will be accurate enough for most applications. Be sure to use GDD that were calculated for small grains which use a base temperature of 32 degrees. Other base temperatures are used for corn and sunflower and certain pests.

As an example, if you wanted to know what stage your wheat crop would be in at the end of the week, you could estimate it by using either historical weather data or predicted weather data. Fargo accumulates about 29 small grain GGDs daily during the last week in May and 31 GGD per day during the first week of June. Using these data, you could expect wheat to produce 1.5 leaves during the last week of May and 1.6 leaves during the first week of June. Barley could be expected to produce 2 and 2.2 leaves per week during these same periods.

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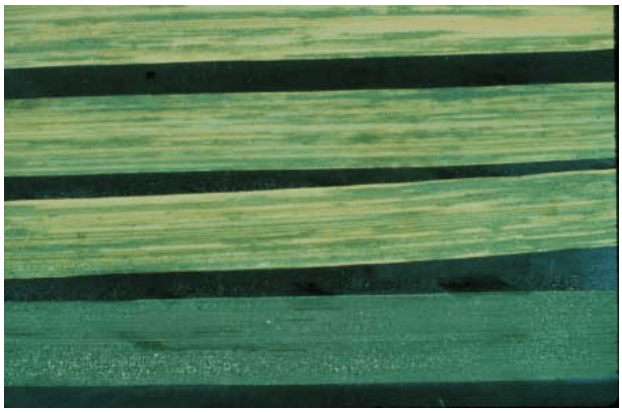
plant pathology

WHEAT STREAK MOSAIC CONFIRMED IN WINTER WHEAT

A sample of winter wheat from south central ND was confirmed on May 23 to have wheat streak mosaic virus (WSMV), with a positive ELISA test done by the NDSU Diagnostic Lab. The leaves tested had the yellow mottling and streaking pattern characteristic of WSMV (see figures).



However, pictures of this field indicated that symptomatic leaves were a small percentage of the field and, overall, the plants across the field looked green and healthy. Because of the overall appearance of the field, and limited moisture for a new crop, I advised that this field should not be torn up and replanted. This kind of decision is always difficult and has to be made on a field by field basis, based on extent and severity of the disease and replanting options.

DROUGHT AND SMALL GRAIN DISEASES

Some areas got much needed rain over the Memorial Day weekend, while other areas are still in great need of rain. Lack of rain and dry soils may favor some diseases. Not much can be done at this time to alleviate these diseases, but growers should be aware of the potential.

Small grain diseases that are more severe under dry soil conditions in ND include **wheat streak mosaic virus** (see above) and **certain root rots**. These diseases add stress to the small grain plant which is already under stress from lack of moisture and too much heat.

Wheat streak mosaic: Wheat streak mosaic virus is carried from plant to plant by wheat curl mites. Wheat curl mites are very tiny (1/100 in long). Their populations generally increase rapidly under extended warm dry weather, and with high mite numbers the chance of infection of susceptible crops becomes higher. The mite transmits the virus during feeding and the virus infection causes yellow streaking of leaves, stunting of the plant, and reduced yields. The mite needs a green bridge for survival; it frequently overwinters on winter wheat or perennial grassy weeds, and then moves from these plants to adjacent spring grains in the spring or early summer.

Mites move more frequently during heat and drought stress, seeking green, healthy plant tissue. They move to the outer edge of leaves where they are positioned for easy movement in the wind to adjacent healthy plants. The virus disease severity is greater under drought stress because the plant has fewer nutritional and water resources to compensate for virus infection.

Wheat streak mosaic management: Wheat streak mosaic is managed by two cultural practices: elimination of volunteer wheat plants and grassy weeds with herbicides or tillage at least two weeks prior to planting a new grass crop, and use of appropriate planting dates. Each practice helps to break the green bridge needed for mite survival.

Elimination of volunteers and grassy weeds: At this time of year, control should be directed at any infected fields prior to replanting. Roundup or other glyphosate-containing compounds may be used to destroy infected hosts. This should be done two weeks prior to planting a new, susceptible grass crop into that field or adjacent field, because the herbicides act slowly to kill plants, and mites on these plants will move out of the infected volunteers for up to 10 days after herbicide treatment.

Planting dates: Replanting a spring grain into a field with previous infection at this time would be risky. Wheat curl mites continue to develop and increase populations during warmer months. A late planted spring wheat crop could be infected at emergence and be severely damaged.

Additional information about wheat streak mosaic disease may be found in NDSU Extension Circular PP-646 "Wheat Streak Mosaic"
http://www.ag.ndsu.edu/pubs/plantsci/smgrains/pp646.pdf

Common root rot: Common root rot is caused by a soil-borne fungus, *Bipolaris sorokiniana*. The common root rot fungus is widespread in North Dakota soils, causing root rot of wheat and barley. Common root rot is characterized by a dark-brown discoloration of the roots, sub-crown internode, and often the crown. The disease interferes with water uptake and subsequently affects grain fill. When the season provides adequate moisture, wheat and barley plants can often compensate for infected roots, and yield losses may not be noticed in a cool growing season. However, a diseased root system can't absorb enough water for the plant under stress conditions.

Common root rot management: At this time of year, little can be done to reduce the risk of common root rot. Three preventative strategies generally used to combat common root rot are: crop rotation, variety choice, and seed treatment.

Crop rotation: Crop rotation is the most effective method of reducing the risk of common root rot. Non-host crops include broadleaf crops such as soybean, canola, dry beans, and flax. Oats also are a good rotation crop if small grains must be grown.

Varieties: Varieties of spring wheat, durum, and barley differ in their susceptibility to common root rot. The latest information on spring wheat variety susceptibility can be found in the NDSU Extension publication on spring wheat varieties "NDSU Ext. Publication A-574".

Seed treatment: Several currently registered seed treatments have suppression activity against the common root rot fungus in wheat and barley. Further information on seed treatments for wheat and barley may be found in NDSU Extension Circular P-622, "ND Field Crop Fungicide Guide".

Fusarium root rot: Root rot caused by several fungi in the genus *Fusarium* may be associated with very dry soils or areas that get low annual precipitation. Fusarium root rot on wheat often is called dryland foot rot, and may be found on wheat, barley, and oats. Fusarium root rots are characterized by a brown to reddish-brown discoloration of the roots and crowns. Affected plants may be in patches, appearing as prematurely ripened plants. As with common root rot, plants infected with Fusarium root rot cannot absorb enough water to carry plants through grain fill.

Fusarium root rot management: As with common root rot, crop rotation and seed treatments help reduce the risk of Fusarium root rot. More information about common root rot and Fusarium dry rot may be found in NDSU Extension Circular PP-785 "Root and Crown Rots of Small Grains".

www.ag.ndsu.edu/pubs/plantsci/smgrains/pp785w.htm

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ROW CROP DISEASES IN DROUGHT YEARS

Drought impacts many diseases of row crops. In some cases, drought conditions will impact disease by making the environment more (or less) favorable for infection, disease development, and/or disease spread. In other cases, drought may not impact the pathogen at all, but may exacerbate the damage caused by disease in drought stressed plants. Although the effects of drought on disease are variable, certain diseases of some crops tend to be consistently more or less severe in drought conditions (Table 1).

Diseases less severe in droughts

Root Diseases. Many different species cause root rots in North Dakota. Oomycete organisms (commonly called water molds, or near-fungi) such as *Phytophthora*, *Pythium*, *Aphanomyces*, and *Plasmopara* need wet soils to cause disease. Some common diseases caused by oomycete pathogens that are usually less severe in drought conditions include downy mildew of sunflower, Phytophthora root rot of soybeans, Aphanomyces root rot of sugarbeet, and damping off of many plants caused by *Pythium* species.

Leaf Diseases. Many foliar pathogens are able to infect plants only when leaves are wet. In drought situations, there may be a lack of free moisture on the leaves, which reduces the pathogens ability to infect plants. Fungal or bacterial pathogens causing leafspots and some rusts tend to fall into this category.

Additionally, many foliar pathogens produce spores that are only dispersed by rain splash. Pathogens that need rain to spread are unlikely to cause epidemics in drought years. Many pathogens causing leaf spots fall into this category, but rusts do not.

Stem Diseases. Some stem diseases may be less likely to occur in drought years. White mold (caused by *Sclerotinia sclerotiorum*) infects many broadleaf crops grown in North Dakota including canola, edible beans, soybeans and sunflower. The soil must be wet for the white mold pathogen to germinate and produce spores, and an extended wet period is needed for those spores to infect plants. When soils are dry and limited wet periods occur in the canopy, white mold is unlikely. One notable white mold exception is sunflower wilt, which is caused when the white mold pathogen infects sunflower plants through the roots. This method of infection is less likely to be influenced by drought.

Table 1. General impacts of drought on different diseases.		*Disease Damage		
Disease	Crop	Greater	No Effect	Less
Oomycete root rots (Phytophthora, Pythium, Aphanomyces)	Many			X
Fungal root rots causing wilt (Verticillium, Fusarium spp.)	Many	X		X
Downy Mildew	Sunflower			X
White Mold (Sclerotinia)	Many broadleaf crops			X
Sclerotinia Wilt (root infection only)	Sunflower		X	
Charcoal Rot	Soybeans, Sunflower, Edible Beans, Corn, others	X		
Leaf Spot Pathogens	All			X
Powdery Mildew	Most crops	X		X
Rusts	Most crops	X		X
Late Blight	Potato, Tomato			X
Rhizoctonia Stem Canker	Potato		X	
Early Dying (Verticillium)	Potato	X		
Black Scurf (tuber)	Potato			X
Ascochyta Blight	Pulse crops (pea, lentil, chickpea)			X
*These are general effects only; exceptions occur in all catergories. In categories with more than one box checked, drought may cause different effects under different conditions. See text for detail.				

Diseases more severe in droughts

Root Diseases. Most root rot pathogens need some soil moisture to cause infection. However, once disease has been established in a drought stressed plant, the impact of the root rots may be significant. Some fungal species (*Fusarium* and *Verticillium*) that cause wilts reduce the plants ability to transport water. The pathogen plugs the xylem tissue that transports water through the plant. When root rots caused by these pathogens occur in drought stressed plants, the damage may be much greater than might occur in plants in a non-drought situation. These wilts are most severe when there is enough moisture to cause infection in the early part of the growing season, but the rest of the season experiences a drought.

Leaf Diseases. Droughts occur when there is a lack of rainfall, but that does not necessarily translate into a lack of humidity. Dew is likely to form if the air is humid and nights are cool. Dew on leaves creates a favorable environment for some pathogens, and in drought stressed plants, damage from some leaf diseases may be extreme. Dew on leaves often provides enough moisture for rust pathogens to infect plants. While many leaf spot pathogens cause dead spots on leaves, rust pathogens produce an open wound in living plant tissue. This open wound allows moisture to readily escape from the plant, causing a drought stressed plant to lose water more quickly. Additionally, rusts do not need rain to disperse spores, so if adequate dew is available for infection, rust epidemics may occur. In some drought situations, rusts are a major concern.

Powdery mildew is occasionally found on most crops in North Dakota. High humidity provides a favorable environment for the infection and development of powdery mildew. Powdery mildew is likely to occur in drought years when the humidity is high.

Stem Diseases. Many stem diseases that begin as infections on leaves or florets (*Phomopsis* and *Phoma* of sunflower, white mold) are inhibited by drought conditions. However, stem diseases that first infect roots are largely unaffected. Charcoal rot is a stem disease of corn, soybean, sunflower, edible beans and other crops grown in North Dakota. The disease begins when microsclerotia (the pathogen's survival structure) germinate in the soil and infect the plants roots. Once infection progresses into the stem, the disease partially degrades the pith. This limits the plants ability to transport water. Charcoal rot is favored by high temperatures and water stressed plants, so the disease is more likely to be a problem in drought years.

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soils

PREPAY FOR 2009 FERTILIZER?

I have received several questions regarding the wisdom of prepayment of fertilizers for the 2009 crop. This is odd because the 2008 crop is not yet entirely seeded, with fertilizer decisions still remaining for this growing season. Although I am certainly not a seer by trade, and don't have a 900- number that one might call for this information, I will offer my insight into why these offers might be happening and what I would do if I were confronted with this issue. Having spent eighteen formative years in the retail fertilizer business, I have at least some background to help form these thoughts.

There are several reasons for offering a prepayment for fertilizer and other ag-goods. The first is to lock in business for the next season. The second is to help with cash flow. The third might be to bail out of higher priced goods knowing that next seasons costs will either remain the same or go down.

The first reason might explain discounts to products and services offered before the first of the year. Prepayment for spring is common during December and early January for winter/spring delivered goods and services. However, I do not think this is the reason for wanting a grower to lock in product now.

The second reason is a major consideration for retail/wholesale businesses right now. Two years ago, the entire fertilizer purchase for spring by a company might be $20 million. This year, with rising costs, the credit required might be $60 million. There is a credit problem in the entire country according to news sources that is far larger than just agriculture. In a normal credit environment tripling a credit line would be difficult. In a tight credit market, increasing credit lines is even harder. Therefore there is incentive to encourage prepay to help cash-flow. This is particularly important since decisions for retailer "fall-fill" for fall applications need to be made really soon to have product on-hand in September-November.

The third reason may or may not be happening. It is difficult to know. However, in my experience, if product were really tight businesses seldom offer prepay. Why take less money now if you are guaranteed more later? Doesn't make much sense. Prepayment is usually only offered if there is adequate product on hand. Also, if I were stuck with several hundred tons of product that tripled in price in the last 6 months, but people lowered the product they bought due to the price and I was stuck with it, I would want to get rid of it before the price dropped to half of what it is right now. I heard a report that the prepayment for MAP was $1,200/ton (today's price) but that it was probably going to $1,900 next year according to the prepay source. I will boldly take the opinion that the chances of MAP going to $1,900 are incredibly slim and if it did, no one would care because no one could afford to buy it. Our data show that on low testing P soils, a yield increase for most crops would be about 25%. Given a yield potential for wheat on fertile soils in central ND of 40 bu/acre, that means that without P, yield might be 32 bu/a. Our current recommendation encourages application of 40 lb P_2O_5 (about 80 lb/a MAP) under those conditions. 8 bu/a wheat at $7/bu is a $56/acre potential return from P. The MAP required to make that happen would cost $76/acre at $1,900/ton. Even at $1,200/ton, the return would be under $10/acre. Given the risk at putting in the crop, I would suggest to producers that with MAP at $1,200, they should only put on half of a normal rate. The response curve of crops to P is curvilinear, meaning that the greatest increases are due to the first ½ of the application rate. So you lose a couple bushels by not putting on the full amount, but you might gain $10/acre and don't have to borrow as much or risk as much. Growers cannot and will not apply as much fertilizer at current or higher prices. So I believe that the chance of prices going lower are good.

My recommendation? Prepayment in the fall for spring needs is good. Prepayment in the spring for next springs needs is probably not good.

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forestry

RHIZOSPHAERA NEEDLECAST

The cool weather this spring has slowed the growth and development of several tree species, including Colorado spruce. Here in Fargo, the spruce trees have begun to send out new growth, but they are definitely behind. Memorial Day is usually our rule-of-thumb date for beginning treatment for Rhizosphaera needlecast. Rhizosphaera needlecast is a fungal disease that infects spruce trees, especially Colorado blue spruce. The classic symptoms of Rhizosphaera include death of the older needles, with healthy new growth towards the tips of the branches (Figure 1). The other key characteristic of Rhizosphaera is the line of small black dots (fungal fruiting bodies) along the length of the needles (Figure 2). It is easy to confuse the fruiting bodies of Rhizosphaera with those of *Stigmina lautii* (Figure 3). Stigmina is a fungus that is similar to Rhizosphaera, though it is still unknown if it is a pathogen or not. These fruiting bodies are noticeable with a 10X hand lens and are located in the needles' stomates which are normally white (Figure 4).

Rhizosphaera can be controlled with fungicides containing chlorothalonil, but it takes a total of four applications over two years. The first application should occur when the new needles are half elongated; usually that is approximately Memorial Day, but this year it should occur in the next week or two. The second application should occur three weeks later. The third and fourth applications follow next year at the same times. For further information on Rhizosphaera, see the NDSU Extension service publication PP-1276, "Spruce Diseases in North Dakota."

Rhizosphaera needs wet conditions to thrive and is more common in the northern and eastern parts of our state. Although I have seen Rhizosphaera as far west as Minot, I doubt that it would be seen west of U.S. Highway 83. It is most common east of U.S. Highway 52 and is especially prominent in the Devils Lake basin.

Figure 1. Spruce tree severely infected with Rhizosphaera needlecast near Walhalla, N.D. Notice that most of the older needles are gone, with only current-year needles remaining.

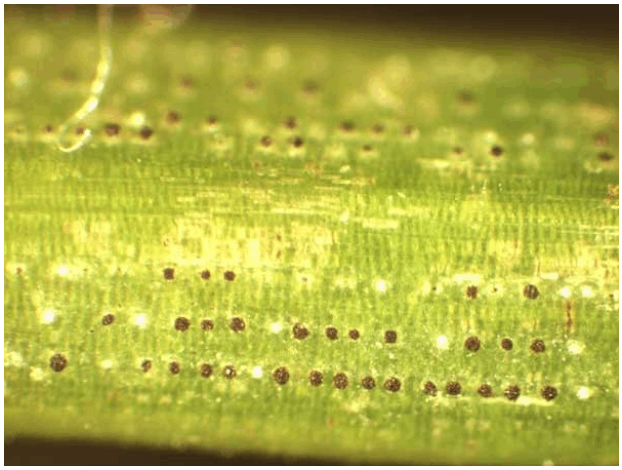

Figure 2. Spruce needle with lines of black dots, indicating the fruiting bodies of Rhizosphaera needlecast. Note that the fruiting bodies have defined margins, unlike those of *Stigmina lautii* (Figure 3). Not all of the stomates show this sign.

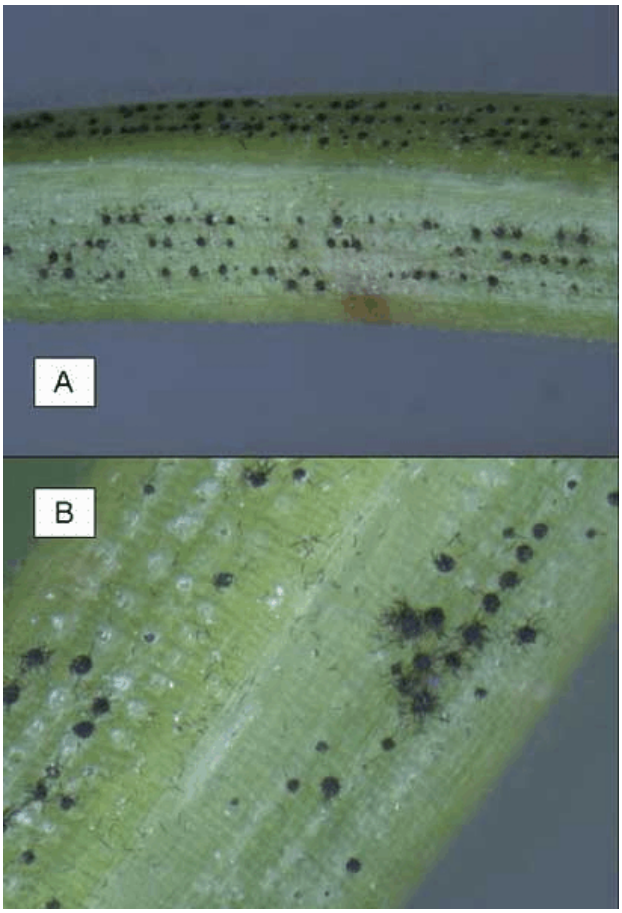

Figure 3. *Stigmina lautii* fruiting bodies on spruce needles. Fruiting bodies may occur in most of the stomates (A), resulting in black rows replacing the white rows of wax, or the fruiting bodies may be more scattered (B). The spores appear as tendrils sticking out from the central fruiting body(s) (B). Some non-sporulating fruiting bodies appear smooth, similar to pycnidia of *Rhizosphaera*. Photos by Justin Knott.

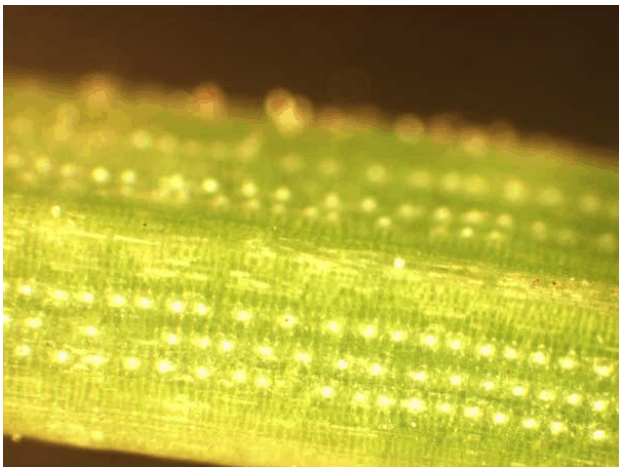

Figure 4. Normal spruce needle with lines of white stomates.

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diagnostic lab

UPDATE FROM THE PLANT DIAGNOSTIC LAB

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

Table 1. Number of Sample Submissions by Sample Category from 21-May-2008 through 28-May-2008.

Sample Category	No. of Samples
Seed Health/Phytosanitary	10
Woody Ornamental - Evergreen	6
Other	6
Woody Ornamental - Deciduous	2
Field Crops	2

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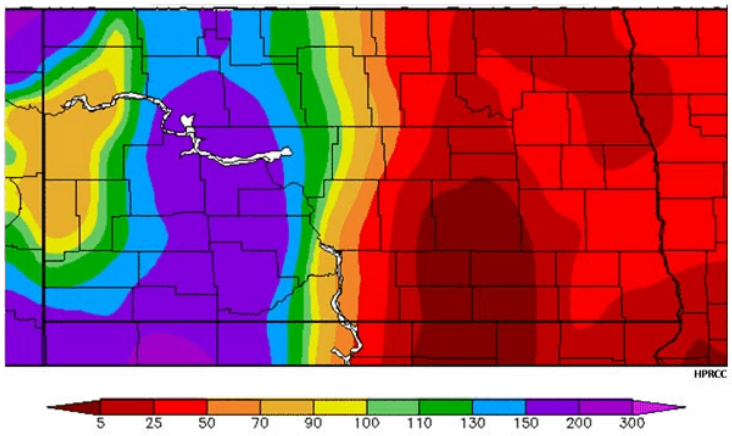
Table 2. Diagnoses by State, County, and Host from 21-May-2008 through 28-May-2008.

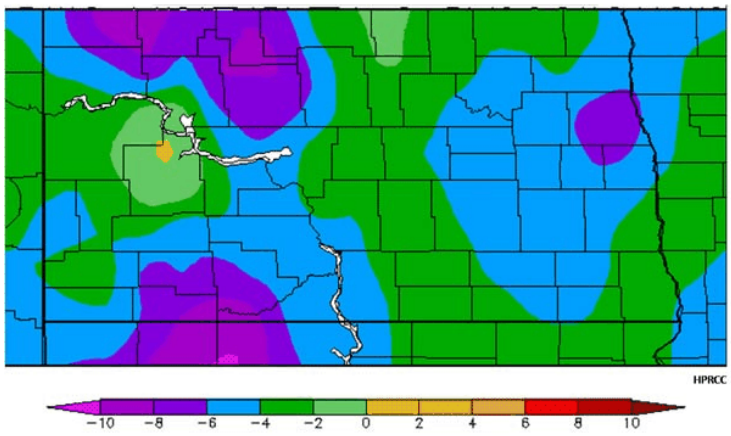
County, State	Host - Common (& *Taxonomic*)	Diagnosis -Common *(& Taxonomic)*
Clay, MN	Green Ash (*Fraxinus pennsylvanica*)	Lecanium scale (*Parthenolecanium* spp.)
Clay, MN	Spruce (*Picea* spp.)	Chemical injury (abiotic)
Burleigh, ND	Blue Spruce *(Picea pungens)*	High salts (abiotic)
Burleigh, ND	Blue Spruce *(Picea pungens)*	Winter injury (abiotic)
Burleigh, ND	Blue Spruce *(Picea pungens)*	Phytotoxic effect (abiotic)
Burleigh, ND	Blue Spruce *(Picea pungens)*	Tordon exposure (abiotic)
Burleigh, ND	Blue Spruce *(Picea pungens)*	Insufficient light (abiotic)
Emmons, ND	Winter Wheat (*Triticum aestivum*)	Wheat Streak Mosaic (WSMV)
Mclean, ND	Blue Spruce *(Picea pungens)*	Unknown (abiotic)
Walsh, ND	Pine (*Pinus* spp.)	Environ. stress (abiotic)
Walsh, ND	Spruce (*Picea* spp.)	Spider mite injury

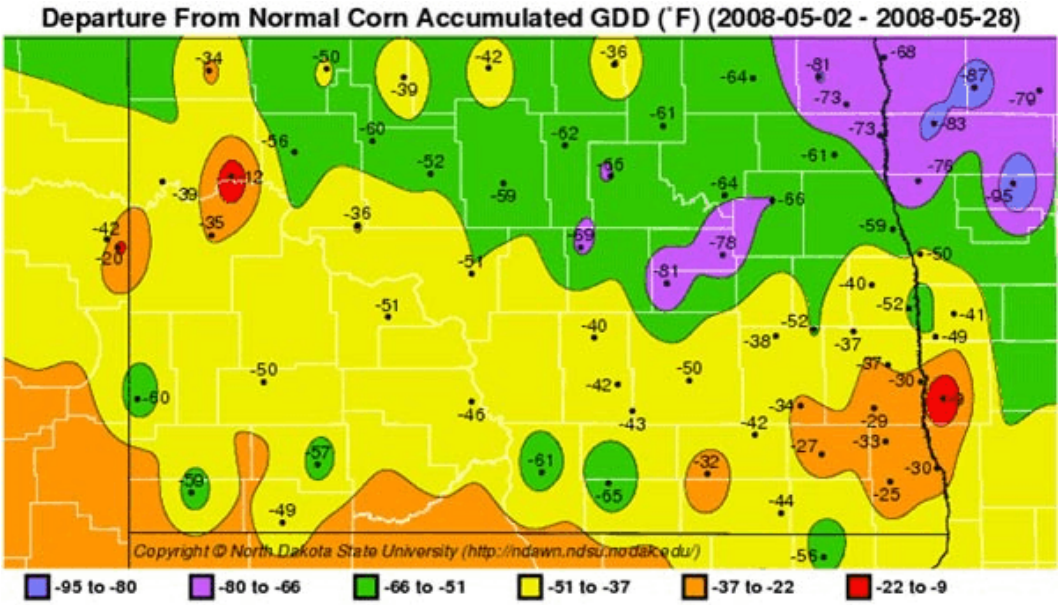
weather

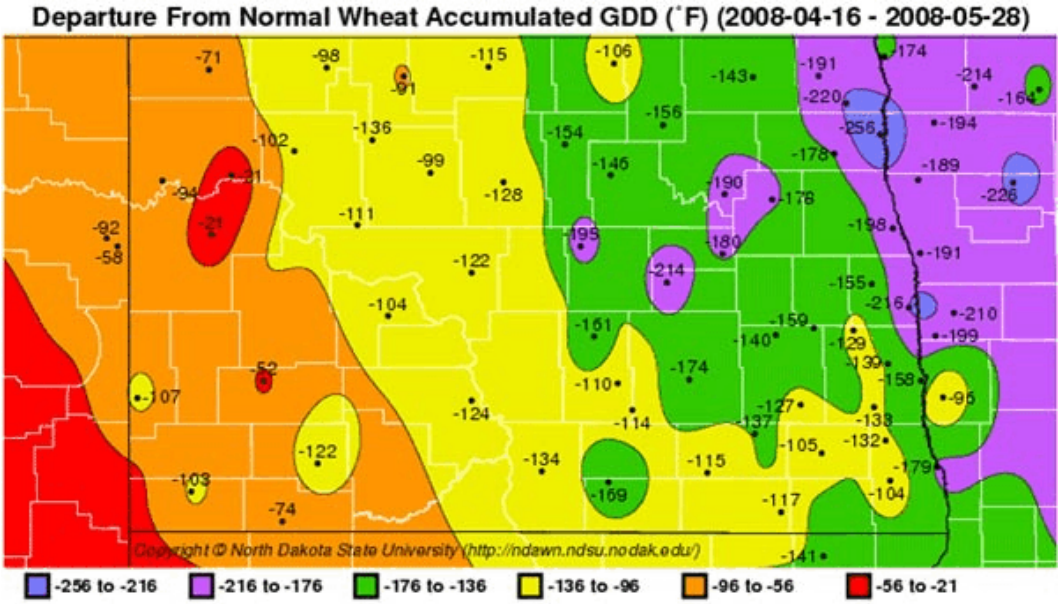
Last 7-Day Percent of Normal Precipitation(%)
5/21/2008-5/27/2008



Last 7-Day Departure From Normal Temperature(°F)
5/21/2008-5/27/2008







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