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Inside this Issue...

Grasshoppers Increasing Problem 1
Get Ready to Scout for Banded Sunflower Moth 1
Regional Monitoring Network for Sunflower Moth and Banded Sunflower Moth 2
Soybean Plant Development 3
Winter Wheat Disease Ratings - Lisbon, ND 4
NDSU IPM Field Scouts Results 4
Early Appearance of Sunflower Rust Is a Cause for Concern in North Dakota 5
The Changing Value of Straw 6
Warnings on Following Pesticide Labels 6
Around the State 7
Weather 8

entomology

GRASSHOPPERS INCREASING PROBLEM

Field reports indicate that grasshoppers are increasing in numbers in the central and north central regions of North Dakota. Any crop (wheat, barley, corn, sunflowers, flax, ...) is susceptible to attack from grasshoppers. Several conditions that favor a 'grasshopper outbreak' have occurred in 2008:

- Cool and wet early spring prevented premature grasshopper hatch and insured an adequate food supply.
- Warm and dry late spring promoted uniform hatching time and good weather conditions for feeding.
- Hot summer with adequate rainfall in some areas of North Dakota have provided good food supply and low incidence of diseases.

A sweep net is an easy way to monitor for grasshoppers. In general, four 180-degree sweeps equals one square yard. Note that thresholds are different depending on whether you sample nymphs or adults, or whether you sample from the field margin or from inside the field. Grasshopper thresholds based on numbers of grasshoppers per square yard shown in the following table.

Grasshopper Thresholds: Infestation Ratings

	Nymphs (young hoppers) per square yard		Adults per square yard	
Rating	Margin	Field	Margin	Field
Light	25-35	15-23	10-20	3-7
Threatening	50-75	30-45	21-40	8-14
Severe	100-150	60-90	41-80	15-28
Very Severe	200+	120	80+	28+

There have been several inquires as to the status of Mustang Max (zeta-cypermethrin) insecticide on flax for control of grasshoppers this year. We are aware of this critical situation and will keep you posted as soon as more information is available. Since Mustang Max is receiving a full label in flax, we hope to receive a Section 24c instead of a Section 18 before the end of July.

GET READY TO SCOUT FOR BANDED SUNFLOWER MOTH

Banded sunflower moth is just starting to emerge in our area. NDSU Extension Entomology has had reports of high numbers of banded sunflower moth adults caught in pheromone sentinel traps in extreme southern Manitoba just north of Walhalla, ND. Fields should be monitored for adult moths and eggs when sunflowers are in the R3 (immature bud elongated 0.5 to 2.0 cm above the nearest leaf) stage.

Description: The adult has a dark band across the buff or yellowish-tan forewings (see photograph). The wingspan is about 0.5 inch. Early instar larvae are off-white; late instar larvae are pinkish to red with a brown head capsule (see photograph). Larvae will be about 0.4 to 0.5 inch at maturity.

Banded sunflower moth - adult and eggs (right side)

Banded sunflower moth - larva

Life Cycle: The adults emerge from local overwintering sites rather than migrating long distances. In the northern states the banded moths begin to emerge about mid-July and are present until mid-August. Adults tend to congregate in field margins or adjacent crops during the day and then move into the sunflower crop in the evening. Within a week after emergence they begin to lay eggs on the outside of the flower bracts. Eggs hatch in 5 to 8 days and may be found through early August. Larvae develop through five instars and are present in sunflower heads from mid-July to mid-September. After feeding to maturity, larvae drop to the ground to overwinter.

Damage: Newly hatched larvae move from the bracts (where they feed initially) to the florets of the sunflower head and enter open florets to feed. During later stages, the larvae tunnel through the bases of the florets into the seeds and consume the contents. Each larva may destroy 5 to 7 seeds. Silken webbing on the face of the head (see photograph) at maturity indicates the presence of larvae within the head.

Scouting: Sampling plans have been developed using both adult and egg counts. Adult moth and egg counts should be made when most of the plants are at the R3 stage (see photograph). A low power magnifier is recommended for egg counts. The new sampling system for adult moths should be conducted during the day (late morning or early afternoon). The moths remain quiet, resting on upper or lower surfaces of the leaves of sunflower plants during the day. When disturbed, they flutter from plant to plant. For details on adult moth and egg scouting and economic thresholds go to *Banded Sunflower Moth E-823 (Revised)* -. http://www.ag.ndsu.edu/pubs/plantsci/pests/e823w.htm

Sunflower at stage R-3

Control: The economic threshold level has changed with the current high market value. When monitoring for adults during daylight hours, one banded moth per 100 plants is a reasonable threshold given the high 2008 sunflower market prices. For egg counts, the threshold level in 2008 is about 2-3 eggs per six bracts. Chemicals should be applied from the late bud stage (R4) to early bloom (R5.1). Border spraying can be an option. Spraying in early morning or late evening is preferred to minimize the impact of pollinators. Some common control mistakes include: not scouting; waiting too long to spray; and perimeter spraying only and not scouting the interior of the field.

REGIONAL MONITORING NETWORK FOR SUNFLOWER MOTH AND BANDED SUNFLOWER MOTH

Sunflower moth and banded sunflower moth traps are being monitored on a weekly basis in the sunflower producing areas of the Great Plains from Texas to North Dakota. Insect maps are being produced weekly to provide a general indication of population levels in 2008. Please see the following websites for maps.

Sunflower moth: The pheromone trap catches for the male sunflower moth does provide a reliable indicator of the economic populations (treatment levels) for sunflowers in the R3-R5 crop stage. The current threshold is >28 moth per trap per week.
www.sunflowernsa.com/growers/default.asp?contentID=357

Banded sunflower moth: The pheromone trap catches for the male banded sunflower moths is not a reliable way to determine treatment thresholds. Therefore, pheromone trapping of banded sunflower moths should be used only to determine whether moths are emerging and present in the area.
www.sunflowernsa.com/growers/default.asp?contentID=364

Pheromone trap

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plant science

SOYBEAN PLANT DEVELOPMENT

At this time of the year the soybean plants are starting to flower. Soybean plant development has two distinct growth phases. The first is the vegetative stage (V) that covers emergence and leaf development (Table 1). The second phase in the development is the reproductive (R) stage which starts with flowering and ends at the time the seed is mature. Plant stages are determined by the leaf, flower, pod, and seed development within the pods. A leaf is considered fully developed when the leaf at the node directly above it (the next younger leaf) has expanded enough so that the three leaflets, which make up the "trifoliate leaf", are fully visible. A node is a part of the stem where a leaf is attached. Although the plant will change from the vegetative stage to the reproductive stage, leaf development will continue and plant stature will still increase. Growth stages can overlap. On a field level a growth stage begins when 50% or more of the plants are in or beyond that stage.

Table 1. Growth stages of Soybean.

Stage	General Description	Specific Description
VE	Emergence	Plant is emerging
VC	Cotyledon	Unifoliate leaves fully developed
V1	First true leaf	The first trifoliate leaves are fully developed
V(n)	Leaf development	Additional trifoliates are fully developed
R1	Beginning bloom	One open flower at any node on the main stem.
R2	Full bloom	Open flower at one of the two uppermost nodes on the main stem with fully developed leaf.
R3	Beginning pod	Pod is 3/16 inch long at one of the four uppermost nodes on the main stem with a fully developed leaf.
R4	Full pod	Pod is 3/4 inch long at one of the four uppermost nodes on the main stem with a fully developed leaf.
R5	Beginning seed	Seed is 1/8 inch long in the pod at one of the four uppermost nodes on the main stem with a fully developed leaf.
R6	Full seed	Pod containing a green seed that fills the pod cavity at one of the four uppermost nodes on the main stem with a fully developed leaf.
R7	Beginning maturity	One normal pod on the main stem that has reached its mature pod color (normally brown or tan, depending on variety).
R8	Full maturity	Ninety-five percent of the pods have reached their mature pod color.[1]

[1.] The crop will have to dry down to less than 15% before the soybeans can be harvested.

Table 2. Average number of days after planting for the soybean plant to reach different growth stages, Carrington 2004-2007.

	Soybean Growth stage					
	VE	V1	R1	R5	R7	R8
	Days from planting					
0.0 maturity group	18	31	52	78	112	118
0.4-0.5 maturity group	18	30	54	81	119	124

Source: G. Endres.

Flowering of the soybean plant is initiated on the third to sixth main stem node and continues upward and downward from there. Pollination and fertilization are usually accomplished before the soybean flower opens.

The critical growth stage in soybean for water stress is from flowering to seed fill. Any stress from the R4-R6 (late pod development to early seed fill) will cause more yield reduction than if the stress takes place at another time in the plant's development.

Table 2 indicates that the start of flowering at Carrington was on average only two days later for a later maturing soybean variety. However, the plants reached full maturity six days later within the 0.4-0.5 maturity group compared with the 0.0 soybean maturity group.

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plant pathology

WINTER WHEAT DISEASE RATINGS - LISBON, ND

A winter wheat variety trial at the Randy Mair farm near Lisbon, ND, was rated for disease pressure on July 9th, at early soft dough. The following data shows the ratings of untreated plots and plots treated with fungicides (early season application of 3 fl oz/A of Headline followed by flowering application of Prosaro at 6.5 fl oz/A). Disease levels were relatively low on July 9th. At a field tour of this same site on July 14, however, disease levels had approximately doubled, by late dough stage.

Fungicides controlled scab levels by 83%, leaf rust by 100%, and leaf spot diseases by 76%. The varieties with the most susceptibility to diseases generally were Jagalene and Wesley, but individual varieties, such as Radiant, CDC Falcon, and Expedition showed considerable leaf rust and/or fungal leaf spotting. Radiant also showed stem rust infection. These plots are a cooperative effort among NDSU Extension and Ducks Unlimited, with support from BASF and Bayer Crop Science.

Lisbon Winter Wheat Disease Ratings, July 9, 2008

Named Variety	Untreated			Fungicide Treated*		
	Scab index (%)	Leaf rust (%)	Leaf spot (%)	Scab index (%)	Leaf rust (%)	Leaf spot (%)
Roughrider	0	8.5	6.5	0	0	0.9
Jerry	0	1.9	6.4	0	0	1.2
Darrell	0	7.8	2.9	0	0	0.6
Overland	0	0	5.4	0	0	1.4
Radiant	0	13.3	12.6	0	0	1.8
Alice	0.03	6.2	6.8	0	0	1.4
Millennium	0.03	1.1	6.1	0	0	0.7
CDC Buteo	0.03	6.8	5.5	0	0	2.3
Expedition	0.1	14.5	13.8	0.1	0	0.8
CDC Falcon	0.1	1.0	13.2	0	0	2.8
Hawken	0.9	0	5.8	0.8	0	2.0
Yellowstone	1.3	5.1	5.4	0	0	4.9
NuDakota	1.9	0	6.7	0	0	1.6
Jagalene	3.0	18.9	6.8	0.03	0	1.5
Wesley	4.2	3.5	8.7	0.9	0	1.6

NDSU IPM FIELD SCOUTS RESULTS

NDSU field scouts surveyed 88 wheat fields and 29 barley fields during the second week of July. Nine percent of the wheat fields showed wheat leaf rust, while two of the barley fields showed barley leaf rust. Only one occurrence of scab was recorded, in a winter wheat field at low severity.

Field scouts are noticing more bacterial blight (stripe) symptoms in fields now, with 8% of wheat fields and 18% of barley fields with symptoms . High winds with rain result in more leaf wounds, which allow for bacterial infection and spread. Symptoms are brownish, necrotic streaks on the leaves, often with dried, shiny bacterial colonies still evident on the leaf surface.

Bacterial infection symptoms on wheat leaves.

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EARLY APPEARANCE OF SUNFLOWER RUST IS A CAUSE FOR CONCERN IN NORTH DAKOTA

Sunflower rust is a disease that is capable of causing significant yield loss to sunflowers. Sunflower rust appears most years in North Dakota, but isn't usually observed until late July or early August. However, the presence of sunflower rust in North Dakota was recently brought to my attention by crop consultant Mike Hutter (Renville County), and the disease has since been observed in other counties throughout the state.

Symptoms. Rust will often appear initially on the lower leaves and spread upward as new leaves are produced. The disease produces small (approximately 1/16 inch) dusty cinnamon-brown pustules full of brown spores (Figure 1). Brushing your thumb across rust pustules will leave a dusty brown streak on it. Rust can also infect the stems, bracts and head.

Figure 1

Disease Cycle. Once pustules are observed, they each are capable of producing many more spores and many cycles of infection. These spores can be dispersed long distances by wind, which may rapidly spread the disease to other fields. Spores need a minimum of 2-3 hours of free water (either dew or rainfall) to germinate, but 6-10 hours of free moisture will produce higher levels of germination and infection. Optimal temperature for infection ranges from 60-75 F, but can occur between 39 and 86 F. At temperatures above 90 F, rust spores do not germinate on sunflowers. Once infection occurs, temperature is the only environmental factor that will determine how fast the disease progresses. During cool conditions (65 F day/55 F night) it may take up to 14 days for new pustules to form, but at warm conditions (85 F / 75 F) new pustules can form in as few as 8 days. Thus, warm temperatures will often speed disease development.

Fungicides. We have almost no fungicide data from early rust epidemics, simply because they are rare. However, after conversations with colleagues in other sunflower growing states and provinces, I would recommend being aggressive controlling this disease. We have a long growing season in front of us, the disease is well-known to cause yield and quality losses, and the price of sunflowers is high enough to justify managing the disease. I think it is important to scout your fields weekly for the disease, and use the figures in this article to help assess severity (Figure 2). In fields where rust is not found, be happy and scout again next week. In fields where rust is found, you likely need to consider a fungicide application this season.

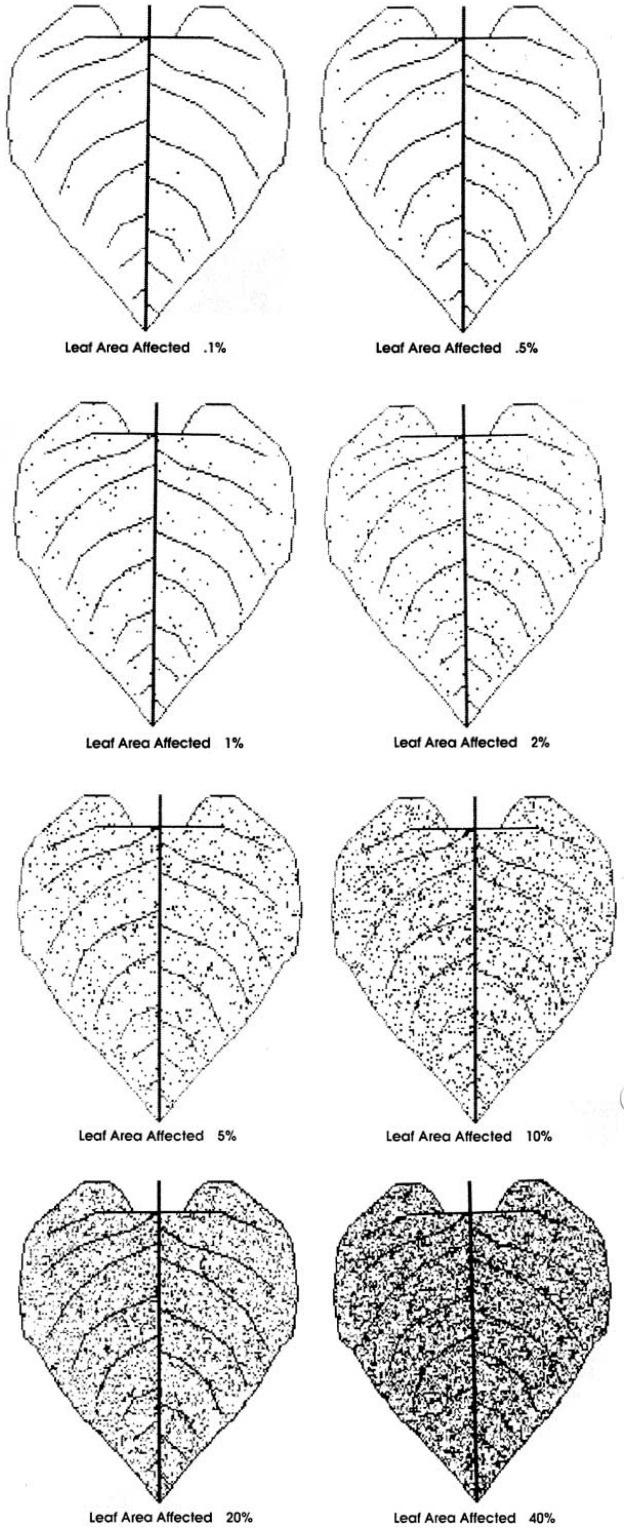

Figure 2

Currently, Headline and Quadris are labeled for rust control. If rust is absent or present at very low levels, it may be prudent to wait until the upper leaves have emerged. However, if severity on the lower leaves is higher (3-5% or more average for all leaves) and favorable conditions for disease exist (prolonged dew and relatively warm days), a fungicide application to arrest the development of the disease may be warranted. In this case, a follow-up application could be necessary later, depending on severity and plant growth stage. Headline is labeled at 6 – 12 oz/A and Quadris has a North Dakota Section 2(ee) label at 6 - 7 oz/A, but both disease control and residual will be better if a higher rate of either product is applied (9 oz/A or more for Headline). Remember to read the label, follow directions, and pay attention to the PHI.

In some fields, a threshold model for rust control developed by researchers in Israel in the mid 1990's may be useful, with some modifications. The model is based on fungicide timings around flowering, so it may be relevant in some areas. The research group found that yield loss was limited if a fungicide application was made when the upper four leaves had an average pustule coverage of 3% (Figure 2). They also found that at 27 days after flowering, a fungicide application no longer benefitted the crop, since the seed filling period was largely finished. However, two things about this study suggest to me that we might want to be more aggressive than this. First, this data was based on an application of a triazole fungicide (Folicur, which is not labeled on sunflower), which has been shown to have more curative activity than strobilurins (Headline and Quadris) on rusts of other crops (strobilurins should be viewed more as a protectant for sunflower rust). Thus, an application ***before* the 3% severity threshold** is reached is critical when using the strobilurins, and I would strongly encourage the use of a higher application rate. Second, we should expect our climate to be more conducive to disease development, further suggesting that an application before the 3% severity threshold is reached would be prudent.

If rust is in your area and you are considering a preventative application, I would recommend waiting until early flowering. That way you protect the upper leaves for a prolonged period of time, removing much of the window for new infections to cause damage.

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soils

THE CHANGING VALUE OF STRAW

With wheat harvest now in sight, there has been renewed interest in the fertilizer value of straw. The amount of N, P and K in straw will vary with native and applied fertility. However, a reasonable average is:

13 lb/ton N
4.5 lb/ton P_2O_5
16 lb/ton K_2O

Using current costs (N at 80 cents/lb N, P_2O_5 at $1/lb, and K_2O at 50 cents/lb), the fertilizer value of the straw will be about $23/ton. Growers should use their current N, P and K costs along with the content figures above to determine real-time costs on their farm.

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weeds

WARNINGS ON FOLLOWING PESTICIDE LABELS

Weather extremes can place enormous pressure on growers and applicators to use pesticides in manners that violate label directions. This year's weather has certainly been a case in point. With the replanting of some fields, many questions have been asked about the potential to replant different crops after herbicides had been applied to corn or other crops. However, residual pesticides greatly restrict the crops that can be replanted because of the rotational restrictions on the label. These restrictions are in place to protect the next crop from injury and also to ensure that the next crop does not contain illegal or elevated pesticide residues.

The consequences of not following label restrictions can be costly. For example, two or three aerial applicators were making late applications of a fungicide to wheat in Kansas. The fungicide had a 45-day preharvest interval, but applications were made too close to harvest. As a result, the wheat was at risk of having fungicide residues in the grain that exceed the level permitted by EPA. This has the potential to affect both growers and industry alike.

One of the approximately 30 affected growers had 250 acres that were initially embargoed and three elevators had restrictions to prevent grain movement. Fortunately, after testing the grain for residues and not finding any, the restrictions to the elevators were lifted. One tested wheat field was extremely close to having illegal residues with 0.099 ppm azoxystrobin in the grain while the legal limit is 0.100 ppm. Imagine the cost of not being able to sell $8 wheat if illegal residues were found!

I believe the loss of public confidence in the safety of foods could be one of the biggest dangers concerning the misuse of pesticides. In agriculture, many growers rely on pesticides as an important part of their pest management programs. We have a rigorous system in place in the US regulated by the EPA through the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to test for potential health and environmental effects. Based on this scientific information, labels are written with allowed uses and specific restrictions to ensure that potential risks are minimal. What happens if growers or applicators believe they can start using pesticides in ways that have not been tested? Will the public lose faith in our claims that we are using pesticides safely in producing their food? I hope that we do not find out what the answers are to these questions. As it has often been stated, **"Read and follow the label. The label is the law."**

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around the state

Northwest ND

During the past two weeks (July 1 – July 15), the region has received very little rainfall ranging from a sprinkle near Sidney, MT to about 0.35 of an inch near Ross based on NDAWN site data. The northwest region is well behind average in rainfall, with Williston over three inches under normal precipitation. Crop conditions are declining every day because of the very dry conditions. Seed yields and quality in small grains are becoming a concern for producers in the region. Temperatures have been in the 90's F for several days, and along with high winds have had a dramatic impact on the crops.

Winter wheat is ripening, and harvest will begin within a month. Early barley is maturing quickly and will be harvested in a couple of weeks. Field peas and lentils for the most part have finished blooming and are maturing. There is some concern of empty pods for both crops. Canola and mustard have completed blooming and are setting seed as well. Safflower should begin blooming soon. Sunflowers are in the reproductive stages. Corn is rapidly growing with these temperatures but still behind in development. For the growing season, Williston has about 1010 gdd units with all sites minus 50 to minus 120 gdd units compared to the 5-year average. NDSU's forecasting models indicate little risk for small grain diseases. Wheat stem maggot injury is starting to appear in the crop.

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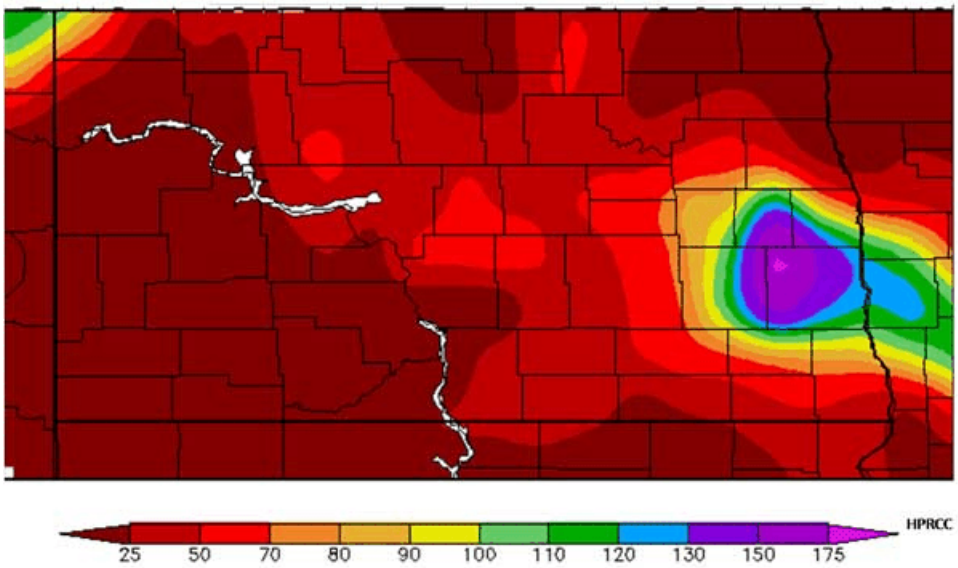
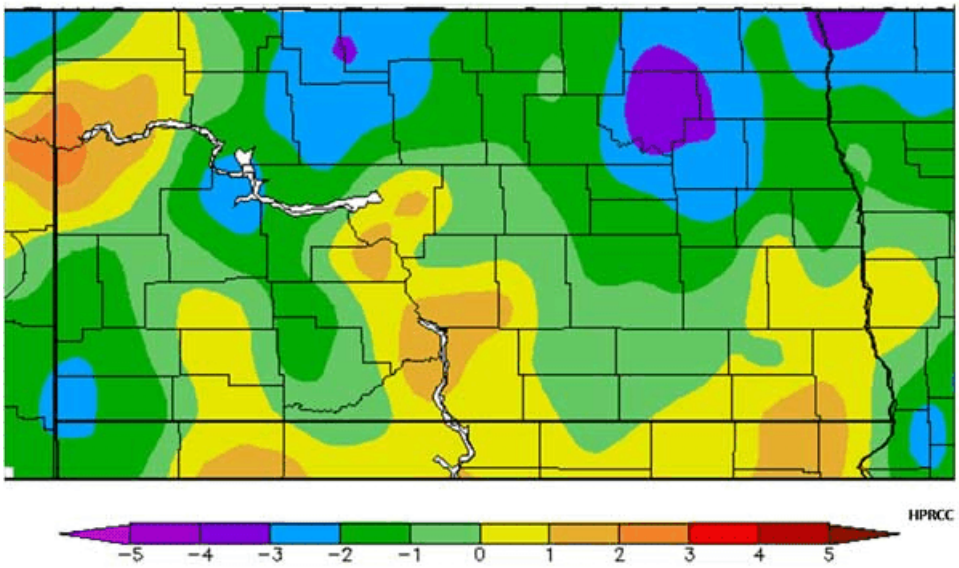
weather

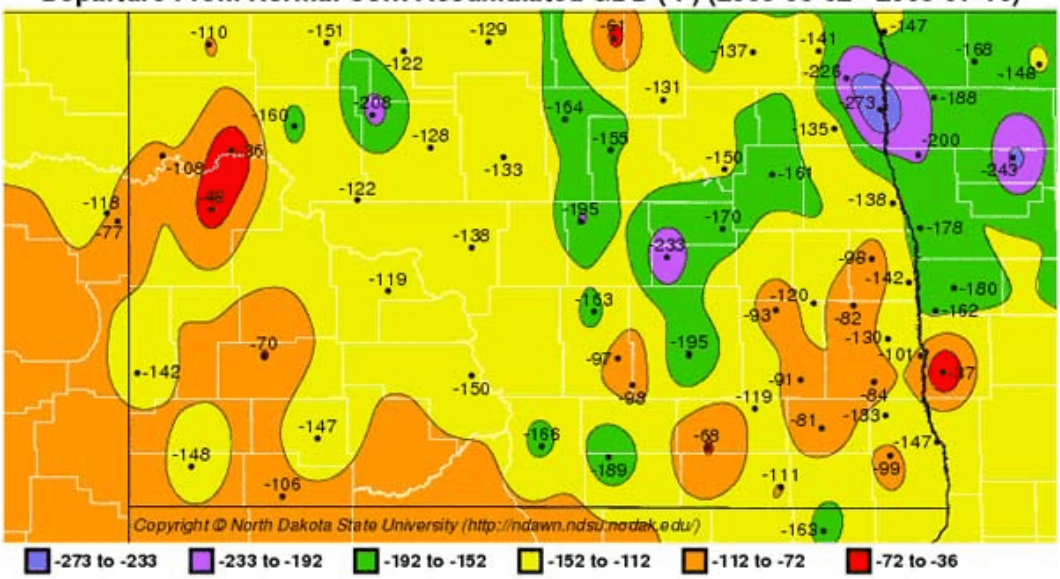
Last 7-Day Percent of Normal
Precipitation(%)
7/9/2008-7/15/2008



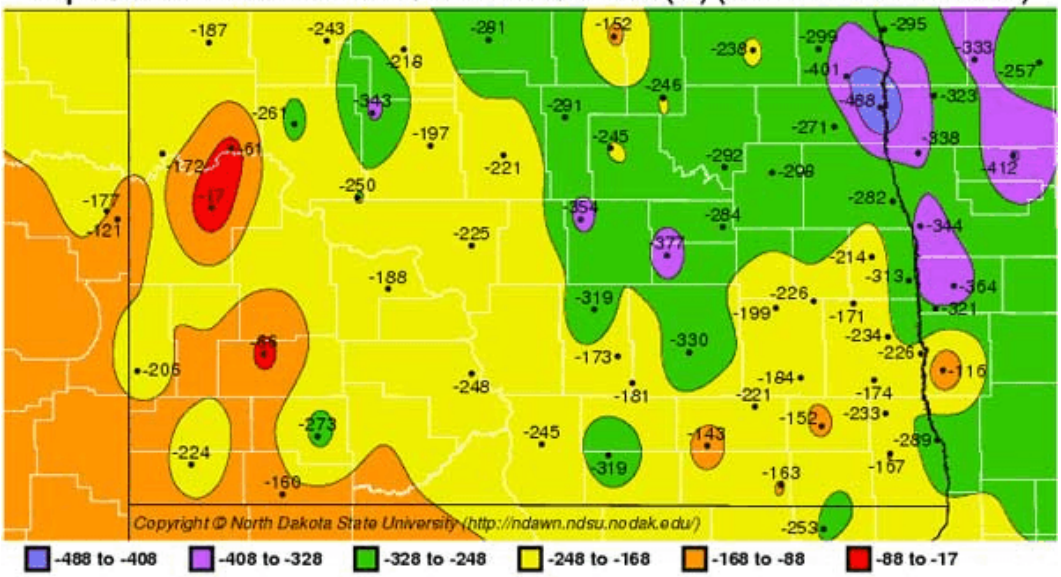
Last 7-Day Departure From Normal
Temperature(°F)
7/9/2008-7/15/2008



Departure From Normal Corn Accumulated GDD (˚F) (2008-05-02 - 2008-07-16)



Departure From Normal Wheat Accumulated GDD (˚F) (2008-04-16 - 2008-07-16)



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