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NDSU FIELD DAYS: JULY 2012
July 10: Hettinger Research Extension Center – Hettinger, ND.
July 11: Dickinson Research Extension Center – Dickinson, ND.
July 12: Pulse Tour: North Central Research Ext. Center – Minot, ND.
July 13: Pulse Tour: Carrington Research Ext. Center, Carrington, ND
July 16: Agronomy Seed Farm – Casselton, ND.
July 17: Carrington Research Extension Center – Carrington, ND.
July 18: North Central Research Extension Center – Minot, ND.
July 24: Williston Research Extension Center – Williston, ND.
July 25: Nesson Valley Irrigation Tour – Williston, ND.
July 31: Oaks Irrigation Research Site – Oakes, ND.

TOO HOT FOR SOYBEAN APHIDS
Soybean aphids continue to be stagnant or low (see IPM map) due to abundance of beneficial enemies in fields and hot weather (>90 F), which slow population growth to nil. At 95F, no nymphs are produced and longevity (life span) is significantly reduced. Avoid the temptation to tank mixing an insecticide with the herbicide application(s), especially when soybean aphid populations are below the economic threshold level (average of 250 aphids per plant and on 80% of plants in field). This will disrupt and kill the beneficial insects causing the aphid populations to recover and to increase their populations faster. Herbicide applications typically provide poor insect control due to the low pressure and large droplet size.
CEREAL APHIDS INCREASING

Pockets of increasing populations of cereal aphids are starting to show up in North Dakota; however, most of the wheat and barley are passed the susceptible stages (prior to the completion of heading) for yield loss from cereal aphids (see IPM maps below). The greatest risk of yield loss from aphids feeding on grains is in the vegetative to boot stages. Significant yield reductions after the onset of flowering could not be demonstrated in research published from South Dakota in 1997 (Voss et al., 1997. Journal of Economic Entomology 90: 1346-1350). Reasons for these conclusions were that: after heading the only major yield component aphids can affect is seed weight; aphids are unable to sustain the very large populations necessary to achieve significant impact on this factor. Other components of yield are determined earlier (number of spikelets - determined at jointing; number of seeds - determined at flowering). During flowering, if wheat is stressed with drought (or other stress) and >85% of stems are infested with cereal aphids, we could see some test weight reduction. Observe PHI intervals if any insecticides are applied late in crop development. Two insecticides that have a short PHI are Malathion (7 day PHI) and Mustang Max (14 day PHI) in wheat. Other insecticides registered in wheat or barley have a 28, 30 or 45 day PHI. Please see the 2012 North Dakota Field Crop Insect Management Guide for more information:

http://www.ag.ndsu.edu/pubs/plantsci/pests/e1143w1.htm
SUNFLOWER MOTH IN ND

The first sunflower moths of the season were captured in pheromone traps located in Walsh, Ward and McLean County, ND. This is several weeks earlier than last year. Pheromone trapping of sunflower moth can be used to indicate their arrival, local populations and treatment levels. The adult sunflower moth is a shiny gray to grayish-tan moth about 0.4 inch long, with a small, dark dot near the center of each forewing. However, the wing markings may be faint and difficult to detect. When at rest, the wings are held tightly to the body, giving the moth a somewhat cigar-shaped appearance. The larva is about 0.75 inch long at maturity and has alternate dark and light-colored longitudinal stripes on a light brown body.

Sunflower fields need to be scouted for sunflower moths and/or larvae as soon as buds or heads form. Scouting is most accurate in the early morning or late evening, when moths are active. Sampling sites should be at least 75 to 100 feet in from field margins. The X pattern should be used in monitoring a field, counting moths on 20 heads per sampling site for a total of 100 heads. The economic threshold for sunflower moth is one to two adults per five plants at the onset of bloom (R5.1) or within seven days of the adult moth’s first appearance. Insecticide applications should be considered when pheromone trap catches average four moths per trap per day from the R-3 through R-5 growth stages.

ALFALFA WEEVILS PAST FEEDING INJURY PERIOD

Alfalfa weevil larvae are at the end of their feeding period (595 DD) in North Dakota (see DD map below). Some producers are just going out to cut fields and have observed lots of weevil larvae on blades of cutter and frosted skeletonized leaves. However, it is too late to spray an insecticide for management of alfalfa weevil. Cut crop as soon as possible and hope for adequate moisture to stimulate regrowth for a good second cutting.

At 814 DD, alfalfa weevil will be forming pupae or cocoons (non-feeding stage) on leaves or in debris. Adult weevils emerge from the cocoon in one to two weeks and then move to sheltered areas for aestivation (period of inactivity). With cooler weather in late summer or fall, adults will resume feeding on foliage; however, it is non-economic feeding before overwintering in shelterbelts and alfalfa crowns.
If high levels of alfalfa weevil were observed this year. Timely scouting needs to be conducted next year to determine if alfalfa weevil populations will be above action threshold. Parasitic wasps also help reduce alfalfa weevil populations. Using cultural control (early cutting) and biological control has helped reduce insecticide use in alfalfa for alfalfa weevil over the years.

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POTATO PSYLLIDS DETECTED IN POTATOES

Adult potato psyllids have been detected in North Dakota’s potatoes, about one month earlier than 2011 (Source: N. Gumestad, Dept. Plant Pathology, NDSU). Potato psyllids do not overwinter in North Dakota. For identification, the adult is small (2mm) long and has clear wings, white stripes on the head and thorax, and bold, white bands on the abdomen. Similar to leafhoppers, they can jump very quickly when disturbed.

Symptoms

Potato psyllids that do not carry the Liberibacter bacterium can injure plants by injecting toxins with their saliva. This is known as “psyllid yellows” and as a result leaves can turn yellow or purple, tuber number and size can be reduced, tubers can become malformed, and chaining of tubers. These symptoms take from one to three weeks to appear after feeding. Potato plants infected with the zebra chip bacterium can cause leaves to become yellow and curl up, leaf scorching, stunting, swelling of stem nodes, aerial tubers and leaf growth from the axillary buds, brown discoloration in tubers, and early plant death. The brown discoloration in tubers is visible in the vascular ring and the medullary ray tissues, and when potatoes are fried these discolorations become amplified. Although they are not harmful to consumers, the flavor is changed because starch is converted into sugars. Reduction in yield and tuber quality can cause significant loss of marketable potatoes.

Managing Potato Psyllids

Managing potato psyllids is achieved through vigorously scouting and applying insecticides. Scouting for potato psyllids can be done by using yellow sticky traps, sweeping, or collecting lower leaflets throughout the field and...
determining if adult, nymphs, or eggs are present. Research has not determined a treatment threshold for potato psyllids. At this time the threshold for action is if potato psyllids are observed start applying foliar insecticides that are effective against adult potato psyllids (see following table). There have been no reports of potato psyllids resistance to insecticides, however to prevent resistance rotate modes of action.

Table of Insecticides and Different Mode of Actions for Potato Psyllids. Each × indicates the insecticide has activity against that life stage of potato psyllid.

<table>
<thead>
<tr>
<th>Mode of Action</th>
<th>Group #</th>
<th>Potato Psyllid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Eggs</td>
</tr>
<tr>
<td>Monitor</td>
<td>1b</td>
<td>×</td>
</tr>
<tr>
<td>Pyrethroids</td>
<td>3</td>
<td>×</td>
</tr>
<tr>
<td>Platinum</td>
<td>4a</td>
<td>×</td>
</tr>
<tr>
<td>Cruiser</td>
<td>4a</td>
<td>×</td>
</tr>
<tr>
<td>Belay</td>
<td>4a</td>
<td>×</td>
</tr>
<tr>
<td>Admire</td>
<td>4a</td>
<td>×</td>
</tr>
<tr>
<td>Venom</td>
<td>4a</td>
<td>×</td>
</tr>
<tr>
<td>Radiant</td>
<td>5</td>
<td>×</td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>6</td>
<td>×</td>
</tr>
<tr>
<td>Fulfill</td>
<td>9b</td>
<td>×</td>
</tr>
<tr>
<td>Beleaf</td>
<td>9c</td>
<td>×</td>
</tr>
<tr>
<td>Rimon</td>
<td>15</td>
<td>×</td>
</tr>
<tr>
<td>Movento</td>
<td>23</td>
<td>×</td>
</tr>
<tr>
<td>Oberon</td>
<td>23</td>
<td>×</td>
</tr>
</tbody>
</table>


DROUGHT STRESS BEGINNING TO IMPACT CORN GROWTH

It has been hot and dry this past week and the US Drought Monitor ([www.drought.unl.edu/dm/DM_highplains.htm](http://www.drought.unl.edu/dm/DM_highplains.htm)) characterizes the northeastern and far southwestern portions of the state as being under moderate drought conditions. If no rain is received soon, undoubtedly the area impacted by drought will expand rapidly as crop demand for water is now quite high. These last few days early planted corn has been using between 0.22 and 0.34 inches of water a day (data on water use can be obtained from NDAWN’s water use application). At these high rates of water use, stored moisture will soon be depleted and the crops will begin to exhibit symptoms of drought stress. In fact, some fields, particularly those with sandy soils are already exhibiting leaf curling during the heat of the day (see accompanying photo) indicating that the crop’s demand for water exceeds that which is available. Corn is one of the most water
efficient crops grown in North Dakota. Nevertheless, it has a high water requirement because of its high yield potential and large biomass and can be significantly impacted by drought. The impact of drought on corn growth and yield varies considerably depending on its timing and severity. Research has shown that there is little impact of short periods of drought on corn growth during early vegetative stages. During late vegetative development, however, short periods of drought stress (four days of sufficient stress to cause leaves to curl) can reduce yields by 5-10%. Currently, most of the corn in North Dakota is in the 8 to 12 leaf stage with some just beginning to tassel. Kernels numbers per cob are being set during this stage until just before silking, so drought stress now can impact the size of the cob. Drought stress during tassel emergence has the potential to reduce yields by 10 to 25%. The most sensitive period for drought stress in corn is during the period between silk emergence and the blister stage where yield losses between 40-50% can occur with just four days of severe water stress. Corn is most sensitive to drought during this stage because the male and female flowers are separated by a considerable distance and pollen and silks are sensitive to hot and dry conditions. When corn is severely stressed prior to flowering, silk growth is delayed and pollen shed will occur before the silks have emerged, resulting in barrenness. Silks can also dry before they are pollinated resulting in poor fertilization and missing kernels. Abortion of developing kernels is common, particularly towards the tip of the ear, with drought stress during early grain fill. Since the corn plant has the capacity to store considerable reserves in the stem, yield losses when drought stress is delayed until the dough stage usually are in the 20-30% range. These yield losses discussed above can be additive if stress occurs at more than one growth stage. With about half the growing season still ahead of us, the potential for yield losses due to drought appear to be quite high for a large part of the state this year unless we get some timely rains.

Water is essential for numerous chemical reactions in the crop plant and provides structure to cells and tissues. The vast majority of the water that the crop uses, however, is for transpiration. When moisture supplies are adequate, the transpiration stream brings nutrients and water from the soil via the roots to all parts of the plant, cools the plant, allows stomata to remain open and carbon dioxide to enter the leaves. When soil moisture is limiting, stomata close, reducing the availability for carbon dioxide, increasing the temperature of the leaf tissue, reducing photosynthesis, thereby slowing plant growth (and in some cases hastening plant development). Drought stress can reduce crop yields even before the plant begins to wilt, the first visible symptom of water stress. During the first stage of stress, the upper leaves curl or roll towards the midrib during the hottest part of the day (see photo). If stress continues, premature leaf death begins at the bottom of the plant and proceeds upward. Leaf death is the first sign of permanent damage to the plant. With severe stress, the upper leaves roll so tightly that they appear like “onion leaves”. These tightly wrapped leaves can restrict the emergence of tassels in some cases. With less leaf area capable of photosynthesis, plant growth is slowed even while maturing at an accelerated pace. After pollination, carbohydrates that had been stored in the stem earlier in the season can be moved to the developing ear. Not surprisingly, crops that are stressed later in the season are more prone to lodging because of poor stalk health.

Given the high demand for water from now until the end of grain filling (currently running at potentially more than 2 inches per week) and the limited supply of water in the soil in most regions of the state, significant rainfall is needed in order for our corn crop to realize the excellent potential yield that was established earlier in the season. After the last two seasons, it is seem odd to be writing about drought!

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FUNGICIDE EVALUATIONS FOR REDUCING LOSSES FROM PASMO DISEASE IN FLAX

Flax is an excellent rotational crop for the region; it is a non-host for the pathogens that cause head blight (scab) in small grains, it is seldom affected by *Sclerotinia sclerotiorum* which causes white mold in most broadleaf crops, and it uses less nitrogen than several of the other common crops grown in the region. The principal use of flax is for the oil extracted from the seed. The oil has been historically used as industrial oil. Some flax types (yellow seed color) have recently been promoted for their nutritional value and benefits to human health. The fiber from the flax straw has been used historically for cigarette papers, fine linen, and as a substrate to make quality documents like high quality print paper. North Dakota leads the United States in flax production. However in 2011, only 150,000 acres were planted; the smallest planted area since 1997. Planted acres for 2012 in North Dakota are estimated to be 260,000. The high variability in planted area has been driven by a combination of favorable economics in other crops and a reduction in obtainable yield and income due to losses from Pasmo disease. Pasmo, caused by the fungal pathogen *Septoria linicola* (teleomorph *Mycosphaerella linorum*), affects the leaves, stem and seeds of flax. Fungicides are effective for managing this disease, and the fungicides Headline (pyraclostrobin) and Quadris (azoxystrobin) are registered for Pasmo control on flax in the USA. The active ingredients in Headline and Quadris, which are assigned to the same Fungicide Resistance Action Committee group (FRAC group 11), share the same mode of action; they are both QoI (strobilurin) fungicides. In 2011, a study was conducted to evaluate the efficacy of fungicides for control of pasmo. Seventeen fungicide treatments (mostly experimentals) and a non-treated control were evaluated in replicated field trials conducted at North Dakota State University’s (NDSU) Langdon Research Extension Center, NDSU’s Carrington Research Extension Center, and at a site located in central Towner County, North Dakota. Applications were made as a single application approximately 10-14 days (B) after bloom initiation or as sequential applications with the initial application 3-5 (A) and the second application 10-14 (B) days after bloom initiation. The cultivar ‘CDC Bethune’ was seeded in Carrington and Langdon, and the cultivar ‘York’ was seeded in Towner County.

Table 1. Yield, Pasmo Severity, and Oil Concentration by Environment by Fungicide Treatment, 2011.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Application Rate</th>
<th>Yield</th>
<th>Pasmo severity</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Carrington</td>
<td>Langdon</td>
<td>T.C.</td>
</tr>
<tr>
<td>Non-treated</td>
<td>NA</td>
<td>509b</td>
<td>322a</td>
<td>1189a</td>
</tr>
<tr>
<td>Headline (B)³</td>
<td>6 fl. oz./a</td>
<td>1030a</td>
<td>770a</td>
<td>1098a</td>
</tr>
<tr>
<td>Quadris Top (B)⁴</td>
<td>14 fl. oz./a</td>
<td>1240a</td>
<td>572a</td>
<td>1019a</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td>453</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
</tbody>
</table>

¹T.C. = Towner County.
²Pasmo severity scale 1 = 0-10 % of leaves with visible symptoms, 9 = 90 – 100 % of leaves with visible symptoms or dead.
³Fungicides tested were Headline 250EC and the premix Quadris Top 1.67 + 1.0SEC (azoxystrobin 18.2%, difenoconazole 11.4%).
⁴Application approximately 10-14 days after bloom initiation (B).

Disease was assessed on two dates, late bloom and post bloom with a 1-9 severity scale, with 1 approximately representing infection on the lower 10% of the emerged leaves on the plant and 9 representing infection on the top 90 – 100 % of the emerged leaves on the plant. Only data of labeled products for yield, disease severity and oil content are reported in Table 1. Yield differences across treatments were observed only in Carrington (Table 1). The results in this article are from one year only. However, previous research with fungicides also provided a positive flax yield response when fungicides were applied according to labeled recommendations. Only use labeled fungicides to control Pasmo disease and follow the instructions on the label.

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BE READY FOR CERCOSPORA LEAF SPOT IN SUGARBEET!

Cercospora leaf spot is the most common and damaging foliar disease of sugarbeet in Minnesota and North Dakota. The disease is caused by the fungus *Cercospora beticola* which overwinters in infected sugarbeet debris. After canopy closure, the disease develops rapidly in warm, humid and wet conditions, typically after canopy closure. Day temperatures of 80-90°F and night temperatures above 60°F favor disease development. Day temperature above 93°F is unfavorable for disease development. Typical foliar symptoms are circular spots about 1/8 inch in diameter with ash gray centers and dark brown or reddish-purple borders. Under favorable conditions, the fungus may have 4 to 5 disease cycles during the season, and with each cycle there is a substantial increase in the pathogen population. As such, early control (at first symptoms) is necessary to effectively manage the fungus. Since the fungus damages sugarbeet leaves, it adversely impacts the photosynthetic capacity of plants and early infection significantly reduces tonnage. The oldest leaves are the most productive leaves and they are the first to become infected. After death of the oldest leaves, plants use stored sugars to grow new leaves. Premature leaf death adversely impact sugar quality.

Research shows that application of effective fungicides at first symptoms with subsequent applications based on the presence of leaf spots and favorable environmental conditions (Daily Infection Values for two consecutive days of 7 or higher) consistently provided the most effective and economical control. Sugarbeet fields with more susceptible varieties that closed rows the earliest and are close to shelter-belts, waterways, and those close to previously infected fields should be the first to be scouted since they would be the first to become infected.

The following guidelines will help in effective disease control.

1. The first fungicide application should be made when conditions first favor disease development or at first symptoms. If the first application is late, control will be difficult all season.
2. Use the recommended rates of fungicides to control Cercospora leaf spot - do not cut rates when using one fungicide.
3. Only one application of Topsin in combination with a protectant fungicide such as TPTH should be used during the season. When mixing fungicides, use at least ¼ of the labeled rate of each fungicide. Over the past decade, timely application of Topsin and TPTH resulted in effective early season control, and when followed by other effective fungicides either alone or mixtures in an alternation program, typically resulted in high tonnage and high sugar concentration which translated into high recoverable sucrose.
4. The fungicides that were most effective individually and in rotations at efficacy trials at Foxhome, MN over the past five years include Proline, Inspire, and Headline EC. Eminent and TPTH in mixtures also provided effective control. One year’s data showed that mancozeb, an EBDC, used at full labeled rate significantly increased the disease control of a triazole also used at full labeled rate.
5. Never use the same fungicide or fungicides from the same class ‘back-to-back’.
6. Avoid using fungicides of a particular class of chemistry as a stand-alone where there is known resistance to that chemistry. The use of tetraconazole over a long period has resulted in some small, discrete populations of *C. beticola* developing resistance. Check with your agriculturists to determine if your field is affected and take appropriate actions.
7. If using one application annually do not use the same product year after year – resistance will develop. If using just one application, mixtures such as TPTH + Topsin, TPTH + a triazole (Inspire, or Proline, or Eminent), or TPTH + Headline or Gem will be ideal.
8. *C. beticola* resistance to strobilurins has adversely impacted disease control in Michigan. As a result, we should strive to use all available chemistries and avoid multiple use of any product, when possible, and to use fungicides only when necessary. The use of a different chemistry - that does not provide effective disease control - in a rotation program is not an effective resistance management strategy.

9. Use of high spray pressure (100 psi) and high water volume of 15 to 20 gal/ac for ground rigs will result in better disease control.

Currently, sugar price is still favorable for growers. As such, growers should make an extra effort to get the highest recoverable sugar per acre possible to reap the benefit of a good sugar price. However, one must always remember the law of diminishing returns. Applying fungicides unnecessarily will lead to lower profits. Most growers have done an excellent job of controlling *Cercospora* leaf spot over the past decade resulting in low levels of *Cercospora* inoculum. Current conditions are very favorable for disease development. Have your ground rig or aerial applicator all ready for the first application. Fungicides should be applied as soon as first symptoms are observed. Fungicides typically provide 14 days of protection under heavy disease pressure. Scouting of fields will contribute to better timing of fungicide applications which will result in better disease control. Get your harvesters ready for a great sugarbeet crop!

Work safely!

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**WHITE MOLD REVIEW**

White mold is a concern in broadleaf crops once they enter bloom. Below is a brief review of favorable environmental conditions, crop susceptibility, and fungicide timing for white mold.

Sclerotinia survives in the soil as sclerotia; hard, black structures. When there is ample soil moisture the sclerotia will germinate, produce apothecia (little mushrooms: Figure 1), and release ascospores. Although the pathogen is really tough, the spores are not. The spores need to land on a nutritional source to begin the infection process, usually the flower petals. Once the flower petals become infected the pathogen easily penetrates the plant and produces the characteristic light tan / white lesion (it looks like dry bone), takes on a shredded appearance, and black sclerotia are produced.

The environmental conditions need to exist for white mold to develop are...

1. Soils need to be moist *before* bloom. Generally, 1-2 inches of rain falling in a 1-2 week period before plants enter bloom is the minimum amount of water needed for sclerotia to germinate, produce apothecia, and release ascospores.

2. Moderate temperatures and wetness *during* bloom. Above 85 F is uncomfortable for the pathogen. In years where we hit the 90’s F during bloom, we don’t have as much white mold. Sclerotinia prefers the 70’s. Similarly, the canopy needs to be wet. Rain, fog, and heavy dews during bloom are all favorable for disease.

If conditions are favorable for white mold when plants start blooming, fungicides can help *manage* the disease in some crops. Sunflowers are very susceptible to white mold but consistent benefit from fungicides in trials has been elusive. Dry beans are also very susceptible and every dry bean grower will remember 2009 and 2010. When conditions are favorable (or even moderately favorable) for infection, fungicides are a very important management tool if you are a dry bean grower. Soybeans are susceptible as well; however, there is a range of susceptibility among varieties. In addition, soybeans tend to be more tolerant than dry beans; they can take low levels of disease and it may not affect...
yield. Canola is susceptible and flowering is well underway; articles in the last couple crop and pest reports discusses white mold in canola. Other broadleaf crops are susceptible as well, but generally not plagued by white mold as much as the ones I just mentioned; either because they are sprayed frequently (i.e. potatoes), grown in a region where white mold is less common (i.e. pulse crops), just more resistant (i.e. flax) or all of the above.

If the decision is made to use a fungicide the key is the timing; fungicides are most efficacious if applied during the early bloom stages. There are two reasons that fungicide applications made during bloom are the most effective. The first is that the spores colonize flower petals to start the infection process; no flowers = no infection (very little anyhow). The second reason is that the earliest infections will cause the most damage. Those infections have more time to develop into a debilitating lesion and often occur lower in the plant. Infections can occur a month after bloom but may not have enough time to do much damage.

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SMALL GRAIN SCOUTING REPORT, WEEK ENDING JUNE 29

The ND IPM field scouts surveyed 94 wheat fields during the last week of June. The average growth stage across all fields was early flowering, but ranged from flag leaf emergence to early dough stage. The youngest fields in the survey were in the northwest or north central counties. Tan spot was the most common disease observed, with 61% of fields having evident symptoms, with an average 5% severity on the flag leaf. Stripe rust was found in 35% of surveyed fields, across all parts of the state. Average incidence of tillers showing symptoms in these fields was 40%. Leaf rust was observed only in one field, in Cass County. Other diseases, such as BYDV, WSMV, bacterial leaf streak, and loose smut, were observed in less than 10% of fields surveyed. Fusarium head blight was observed in 2% of the fields, at very low severity.

Nine barley fields were surveyed in ND during the same week. Their average growth stage was full head emergence. The most common diseases observed were spot blotch, BYDV, and loose smut, but all at low levels. As if July 3, very little disease risk was indicated for wheat by the NDSU Small Grains forecasting site. Some high dew points are possible, but the current, very warm temperatures across most of the state will limit disease development.

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EQUISETUM – HORSETAIL AND SCOURING RUSH

Along with cattails left over from dried up pot holes in fields it seems the past wet years have produced a vigorous crop of equisetum, a prehistoric plant that reproduces by spores instead of seeds.

Equisetum is the Latin genus name for Horsetail and Scouring rush. Horsetail looks like small Christmas trees about 1 foot tall. Scouring rush is pencil thick-long stems that have no leaves or branches and reach about 3 feet tall. Both types are perennial with deep, spreading rootstock. Stems are rough with high silica content and have a terminal spore-producing cone at the tip.
As with ALL perennial species control of equisetum is especially difficult because there are no leaves to intercept spray droplets. With no flat surface to catch droplets, droplet retention (sticking droplets on the plant surface) and herbicide deposition (herbicide active ingredient forming a uniform interface with plant cuticle) is difficult. The rough waxy texture also inhibits herbicide absorption.

Control options are listed in the ND Weed Control Guide on page 67. Glyphosate has not proven effective but droplet retention may be limited as there are no leaves to intercept the spray droplets. MCPA, Permit, Python, Garlon, and Glean have shown some level of control. Remember the phrase that accompanies all perennial weeds – “You cannot kill any perennial weed with one application of anything”. Control strategies will be similar to Canada thistle, leafy spurge, and field bindweed – control requires a sustained, multi-year, effort of multiple applications of effective herbicides. Always add the most effective adjuvant to improve spray droplet retention and herbicide deposition.

Do not confuse equisetum horsetail with horseweed. Horseweed is a winter-annual type broadleaf plant that forms a rosette the first year and then bolts the second year. It can also germinate in early spring and bolt the same year. Horseweed is primarily found in no-till environment. Control of horseweed is also addressed in one of the publications listed in the previous section - “The Glyphosate, Weeds, and Crops Series”:
http://www.glyphosateweedscrops.org/

DANDELION – ILLEGAL??

It appears the city of Burnsville, MN may enact laws to make having dandelion weeds on your property illegal. The city may follow a “complaint based system” and anyone can file a complaint. Volunteers can screen neighborhoods, make inspections, and file complaints with the city. The city intends to switch from a complaints-only system of code enforcement to inspections from the street of every building in town. The motivation behind this action is the increasing burden on the ones that are already taking care of their property to fight off the invasion of weed blossoms coming from next door. A quick Google search can reveal more information if you want read more about this. As noble as this movement might be eradication of a weed is difficult. Let’s hope folks around here are a bit more patient with city and home owner weed control efforts.

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CORRECTION TO UPCOMING WEED SCIENCE AND SUGARBEET FIELD DAYS

A Weed Science Field Day will be held July 12th beginning at 10:00 AM near Holloway, MN (From Intersection of Hwy 12 & Hwy 59 go east 3 miles on Hwy 12; South 1.5 miles on 130th Ave.; plots on west side of road in corn field. Coordinates are: N45º 15.652', W095º 51.431'). The focus of this Field Day will be management of glyphosate-resistant waterhemp in Roundup Ready sugarbeet with various herbicide combinations and to compare various weed control programs in LibertyLink and Roundup Ready soybean. There will be a few treatments applied to Roundup Ready corn. For additional information contact Jeff Stachler at 218-790-8131 or jeff.stachler@ndsu.edu

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UNSIGHTLY LEAF GALLS: ARE THEY AS BAD FOR TREES AS THEY LOOK?

Mites and insects that form galls on the leaves and twigs of trees have been especially prevalent this year and have caused significant concern among tree owners. Galls occur on many species, vary in size and take on a range of forms. Gall forms include: large, round bumps or woody galls; smaller, thin, finger-like projections called bladder galls; red felt-like patches referred to as erineum and even multicolored hair-covered galls called ‘hedgehog’ galls. Galls are formed as a tree’s response to feeding or egg-laying, when gall-forming mites and insects inject leaves and stems with growth-altering compounds using specialized body parts. The compounds stimulate irregular growths that form the gall which may serve as a food source and/or a protective structure for various stages of insect development.

The major groups of organisms that cause galls are:

- Eight-legged mites, primarily eriophyid mites (pronounced ‘air-ee-oh-fy-id’) that cause various types of erineum, bladder galls and growth deformations.
- Psyllids (sill-ids), which are tiny insects that resemble flies (a common example is hackberry nipple gall).
- Gall-forming adelgids (small fly-like insects that are responsible for eastern spruce gall and Cooley spruce gall, both found in North Dakota).
- Gall-forming aphids (for example, the poplar petiole gall aphid).
- Tiny cynipid wasps that are responsible for the formation of corky round galls on the branches oak trees (oak bullet gall).

Certain species of cynipid wasps also form furry-looking ‘hedgehog galls’.
Despite the sometimes severe appearance of these galls, they are seldom a threat to tree or shrub health – reduced aesthetic qualities of landscape trees is the major consequence of galls. In cases where gall formation is very heavy and compromises more than 30 percent of the leaf area of the entire tree, control may be warranted. Also, if less than 30 percent of the circumference of a section of a twig is free of galls, dieback can be expected and control efforts are advisable.

Controlling mites and insects that form galls on broadleaf trees is difficult. While an early spring application of a systemic insecticide soil drench may provide effective control, this has occasionally been documented to make other insect problems worse. Foliar sprays of a systemic insecticide can provide some level of gall-forming mite and insect control, but will also kill beneficial insects that prey on gall-forming mites and insects and could eventually represent a natural control. Further, mite and insect populations can achieve some level of resistance to a repeatedly applied pesticide, thus, rotating classes of control chemicals is recommended.

Horticultural oils can be applied in spring before bud break, and again directly after bud break, but the timing of this application is critical for achieving control. Horticultural oils and soaps are considered reduced-risk treatments and generally will not harm beneficial insects.

Since the populations of gall-forming mites and insects fluctuate greatly from year to year, patience and maintaining overall tree and shrub health is often the best prescription.

If you have questions about leaf galls, the insects that make them and their effects on tree health, contact: North Dakota Forest Service, Forest Health Specialist aaron.d.bergdahl@ndsu.edu or call (701) 231-5138.

CORRECTION – APHIDS ON BROADLEAF TREES PHOTOS
Correction on the photo labels of the Crop and Pest Report from June 28th article titled “Aphids on Broadleaf Trees”. The leafcurl ash aphid was incorrectly labeled as ‘wooly ash aphid’.

Wooly alder aphid on alder with a natural predator (wasp)

Leafcurl ash aphid on green ash

Leafcurl ash aphid on green ash

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South-Central ND

With the exception of Robinson (1.2 inches) and Harvey (0.6 inches), the region received 0.3 inches or less of rain during the past week (June 26-July 2; NDAWN data). The region would welcome an inch of rain and moderate daytime high temperatures. Corn growing degree day (GDD) units, with a planting date of April 20, range from approximately 100 units (Harvey) to 200 units (Linton) ahead of the 5-year average. With April 20 planting to the current date (July 2), corn accumulated GDD units range from 835 (Harvey) to 1040 (Oakes). Tasseling occurs at 1100 to 1200 GDD units, depending on relative maturity.

Winter wheat is reaching maturity, barley is in the dough stage, and spring wheat is heading to dough stage. Corn is rapidly growing and currently yield factors of initial ear establishment and number of rows per ear have been established. During the V12 to V14 stages (12 to 14 leaf collars), the number of kernels per row is determined. Soybean planted during the first week of May or earlier have started flowering during the past week. Continue monitoring fields for soybean aphids. Flower buds are present in dry bean planted during mid May. While the recent weather is stressing our field crops, it generally has been cooperative for haying!

Upcoming crop tours for ag audiences conducted by the NDSU Carrington Research Extension Center (CREC) and cooperators including county extension agents include:

* Tri-county (Wishek area), July 9, 6:30 p.m.
* Barnes County (Dazey area), July 10, 6:30 p.m.
* Pulse - primarily field pea (CREC), July 13, 9 a.m.
* Field Day (CREC), July 17, 9 a.m.
Southwest ND

Rainfall in southwest North Dakota has been highly variable over the past two weeks but mostly below normal. NDAWN sites in southwest ND indicated rainfall over the past two weeks from 0.06 inches (4% of normal) at Dickinson to 1.5 inches (110% of normal) at Watford City. Other NDAWN sites are reporting only about a third of normal precipitation. Bowman and Beach experienced high temperatures of 105°F and 102°F on June 26 and since then high temperatures have been in the upper 80s and lower 90s most days. Dry conditions are particularly visible in Billings, Bowman, Golden Valley, and Slope Counties. The hay crop in these counties is very short though county agents in Grant, Stark, and Hettinger Counties have reported some areas of their counties will a hay crop that is less than normal. Spring wheat and barley crops for the most part have flowered with the most advanced seen in the milk stage. Winter wheat is about two weeks from harvest with some reports of winter wheat harvest occurring just south of the North Dakota/South Dakota state line. Most producers are reporting the crop is in good to excellent condition except in the far southwest counties where the crop is stunted by dry conditions. Corn and sunflower appears to be in good conditions and advancing rapidly with warm conditions though corn is exhibiting moisture stress earlier in the day as conditions continue to remain dry and hot.

“Take-all,” a fungal disease that attacks roots, crown and the lower portion of the stem was found in a spring wheat field that was seeded on what was CRP up until it was terminated last year. The producer is likely to lose about a third of his yield to this disease and possibly more. This should serve as a reminder crop rotation is important even when the field has been in a grass/alfalfa cover for several years. Seed treatments provide only minimal control for a short period of time. Host plants for the organism that causes this disease include wheat, barley, Agropyron species such as quackgrass, a number of other wheat grasses as well as Bromus species including downy brome and smooth bromegrass. Better choices of crops following CRP termination are corn, flax, canola, sunflower, and oat.

Earlier this week I visited a durum field brought to my attention by Corey Blaser, crop consultant, Bowman. This field had heads of durum with awns that were perpendicular to the head. Heads were bleached but the rest of the plant appeared healthy. The majority of these symptomatic heads were found in the low areas and side hills interspersed with healthy heads. Anthers in the affected heads were dead. No pattern could be established such as associated with a pesticide application or pesticide drift. No disease or insect feeding could be found in affected plants. In all likelihood what we were seeing in the field was the result of freeze injury resulting from a weather event that occurred a month ago. Though the crop was not headed at the time of the freeze event, sensitive parts of the plant (developing anthers) were injured and now the injury is very evident.

Though weather, disease, and insect problems continue to plague some fields the majority of the crops in southwest North Dakota continue to look good. Measurable rainfall would be appreciated over much of the area.

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