

No. 6

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**MOSQUITO SEASON TAKES FLIGHT:  
PROTECTION AND CONTROL TIPS**

Mosquito activity is on the rise, and will probably increase during the coming weeks as a result of recent rains and warmer weather. Mosquitoes are a major annoyance during outdoor work and leisure activities, and a few species pose human health concerns because they transmit pathogens that cause West Nile virus (WNV) and other forms of encephalitis. The elderly and individuals with compromised immune systems are most at risk. Although over 600 cases of WNV and 5 deaths were recorded in North Dakota in 2003, its incidence was down to 20 known cases and 2 confirmed deaths in the state last year. Western equine encephalitis occasionally pops up in North Dakota and surrounding states on rare occasions.

Most cases involve horses, but humans can also become infected. Mosquitoes also transmit WNV and Eastern equine encephalitis to horses, and heartworm to dogs.

**Personal Protection.** Wear long sleeve shirts and pants outdoors during peak mosquito activity (late afternoon/evening to morning). **Repellents** are available as sprays, liquids, creams, solids (sticks), and wristbands, and many work well. Wristbands are not as effective as other forms. Choose products that contain one of the following ingredients: 1) diethyl phthalate, 2) diethyl carbate 3) ethyl hexanediol, and N, N,N-diethyl-m-toluamide (DEET). DEET is a very effective repellent. *Permethrin*-containing repellents can be used on clothing, shoes, bednets and camping gear. Permethrin is an insecticide, but also repels ticks and mosquitoes, and maintains repellency after repeated laundering of treated items. *Oil of citronella* is used for space repelling of mosquitoes outdoors. It is available in candles, torches, or coils for burning, produce a mosquito-repellent smoke. These products are of some use, but only under windless conditions. Citronella products are not as effective for personal protection those applied to the body or clothing.

**Common sense rules for using repellents:**

1. Apply sparingly to exposed skin or clothing.
2. Avoid contact with eyes, nostrils and lips, and do not inhale or ingest repellents.
3. Apply low-concentration (15-30% DEET) products to the skin (less than 15% for children).
4. Avoid applying repellents to children's hands that are likely to have contact with eyes or mouth.
5. Pregnant and nursing women should minimize use.
6. Never use repellents on wounds or irritated skin.
7. Use repellent sparingly. Saturation does not increase performance. An application of DEET lasts for 3 to 8 hours, depending on concentration.
8. Wash repellent-treated skin after coming indoors.

**Health concerns about repellents.** Although rare, skin irritation or slight to severe neurological side effects can occur in infants and young children as a result of DEET application. Adults with elevated sensitivity to the repellent could also have problems. Most cases of severe side effects have resulted from overapplication of high-concentration products and/or repeated applications for several consecutive days to bedding, clothing, and skin of young (< 5 yrs old) children. If a suspected reaction to an insect repellent occurs, promptly wash treated skin and seek medical attention. Take the repellent container to the medical facility.

**Cultural Control:**

Eliminate potential mosquito breeding sites:

1. Old tires, buckets, and other unused containers that collect rainwater.
2. Plugged rain gutters.
3. Stagnating water in wading pools on flat roofs, or on tarps used to cover boats, hot tubs, pools, etc.
4. Puddles near leaky outdoor faucets and air conditioner units.
5. Birdbaths and kiddie pools (change water weekly).
6. Seepage/accumulation from cisterns, cesspools, and septic tanks.
7. Standing water around animal watering troughs. (flush stock water troughs weekly).

Other cultural management steps include leveling areas of the yard where puddles form and taking care to avoid puddle formation while watering the garden.

**Indoor Control.** Keep windows, doors, and porches tightly screened. The fly swatter is still the best option for eliminating small numbers of mosquitoes that enter the home. The garage is another issue, especially if pets are kept in the garage at night. Constant vigilance in keeping garage lights off when not needed or keeping garage doors and windows closed or screened when lights are on can help minimize evening infestations. Household aerosol space sprays containing synergized pyrethrum or synthetic pyrethroids (allethrin, resmethrin, etc.) can help rid the garage of mosquitoes, but will not manage insects for long periods of time.

**Outdoor Control.** Adult mosquitoes commonly rest on weeds, tall grass, and other vegetation. Maintaining a well-groomed lawn and removing weeds adjacent to buildings minimizes these sites. Hand-held ULV foggers or attachments for tractors/lawn mowers can be used to apply insecticides for temporary relief from mosquitoes in larger areas. Pyrethrins or 5% malathion can be fog-applied outdoors.

Spraying insecticides to lower limbs of shade trees, shrubs, or other tall vegetation, may help. Apply as coarse sprays to vegetation using a compressed air sprayer.

Ornamental pools can be stocked with top-feeding predacious minnows (such as the flathead minnow, available as a bait fish), or may be treated with biorational larvicides containing *Bacillus thuringiensis israelensis* (Bti) or S-methoprene (an insect growth regulator). Most products can be found at home/garden, hardware, and discount stores.

Consult NDSU Extension circular no. E-472, "Mosquito Management", for more information on specific products for mosquito control. It is located online at:

<http://www.ext.nodak.edu/extpubs/plantsci/pests/e472w.htm>

**SUGARBEET ROOT MAGGOT: COOL AND RAINY WEATHER EXPECTED TO DELAY ACTIVITY**

**Weather impacts on flies.** Recent rainy and slightly cooler weather during the past couple of weeks is likely to delay emergence of root maggot flies. The extended forecast suggests several more days of low to mid-70s are ahead. Cool, breezy, and rainy conditions, especially in late afternoon hours, can create unfavorable flying weather for sugarbeet root maggot flies. Movement of flies into sugarbeet fields will continue at a slow pace until better flying weather returns. **IMPORTANT:** fly emergence is expected to continue "creeping" along. A couple of days at 80-degrees or warmer could result in a major influx of flies into beet fields. A rapid response with a liquid insecticide application would be the best tool to manage that type of situation.

**Fly activity.** Although fly emergence from soil got started several days ago, numbers of adults resting on utility poles and entering sugarbeet fields have been low. Currently, flies are being frequently observed in low numbers in sheltered areas (farmsteads, shelterbelts, road ditches, smallgrain fields and down-wind sides of utility poles). Soil samples collected by NDSU personnel recently indicate that high numbers of maggots are still in the larval and pupal stages, and will take several more days to reach the adult fly stage. Despite a few flies being out for almost 2 weeks, large numbers of flies are expected to gradually invade beet fields during the next 2 weeks. Pembina and, to a lesser extent, Walsh County are again most likely to have major infestations. However, fields in northern Grand Forks county should be monitored closely.

**Control strategies.** Growers in high-risk areas for maggot problems should prepare to apply a postemergence insecticide in the next several days. Granular materials will work well this year because soil moisture is adequate to high. Granules can be applied anytime from June 13 to 18.

Growers preferring to apply a liquid insecticide should wait until the next report to time the application close to peak fly activity (within 3 days) in current-year beets. Last year's late fly emergence could delay or result in a prolonged emergence period this year. It may be another good year for using 2 split applications of a liquid insecticide for maggot control. The first could be applied late next week, and the second at peak activity. Monitor farm radio, DTN, and Crop & Pest Report for further updates.

*Always read, understand, and follow all pesticide labeling instructions and precautions - it's the law.*

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## FIGHT LEAFY SPURGE WITH BIOLOGICAL CONTROL

It is time to prepare for collecting and redistributing *Aphthona* flea beetles for leafy spurge control. Several county Weed Control Officers host field days during June for collecting and redistributing the flea beetles. Contact your county weed control officer for the date, time, and location of a field day in your area. Also, the North Dakota Department of Agriculture has created an e-mail distribution list at [ndda-weeds@state.nd.us](mailto:ndda-weeds@state.nd.us) where county Weed Control Officers can announce their field days for the collection and redistribution of the *Aphthona* flea beetles. If you are interest in receiving the distribution list contact the Department of Agriculture noxious weeds staff at 701-328-2980 or 701-328-2983.

### Beetle Collecting and Redistribution

The overwintering larvae are currently finishing with their spring feeding on the spurge roots are moving near the soil surface where they will pupate. Expect to see adults feeding on the spurge foliage during the next few weeks.

Mid-June to early July is the best time period to collect adult flea beetles for redistribution. To collect the adult flea beetles you will need a sweep net, paper bag or paper container, and a cooler with blue ice. It is best to collect beetles after 10:00 a.m. when the air temperature has warmed to at least 70 °F and the spurge is dry. Beetles are easiest to collect when there is little or no wind.

Beetles can be collected from an established population only when the population has increased enough for redistribution. Using a sweep net, make five sweeps in a 10 square foot area and count the number of beetles in the net. If there are numerous beetles to count individually, remove the vegetative trash and other insects and pour the flea beetles into a graduated container. Every 10 ml equals approximately 1,000 flea beetles. You need to redistribute flea beetles when an established population yields 500 to 1,000 adults per five minute sweeping period.

For redistribution, the beetles need be placed in the paper bag or container with some leafy spurge. Transport the beetles in a cooler with blue ice. Remember the beetles are living organisms and the containers of beetles should not be left in the sun or a hot vehicle. The beetles need to be released preferably the same day of collection into the new release site. If the beetles cannot be released as soon as possible, they can be stored for a maximum of one week at 40 °F.

The flea beetles usually establish and control spurge sooner when large numbers are released into habitats that are similar to the habitat they were collected from. A minimum of 1,000 adults should be released at a single point, marked with a stake, along the margins of the spurge when the infestation is dense. Make multiple releases in a large spurge infestation. The new flea beetle release should yield at least 50 beetles per five sweeps the following summer. When the population is less than 50

beetles, make additional releases.

The flea beetles do have limitations and do not have an equal impact across all habitats. Flea beetles will establish sooner when released in moderate spurge densities of 60-90 stems per square yard with little grass cover and thatch. The *Aphthona* flea beetles establish faster on the south facing slopes followed by the western and eastern slopes and usually noticeably slower on north facing slopes.

The black flea beetle, *Aphthona lacertosa*, establishes at sites ranging from high and dry to cooler and moister habitats with shade and denser stands of spurge, and where spurge is growing in soils of silt loam, silt clay loam, clay loam, loam, or loam/fine sand loam. The brown flea beetle, *Aphthona nigriscutis*, is more successful in areas that are higher and drier with well-drained loam soil. When releasing beetles into a spurge infestation for the first time, release a mixture of both species to determine the species that is best suited for that spurge habitat.

### Integrating Beetles With Other Management Methods

The *Aphthona* flea beetles can successfully be integrated with other management methods. Herbicides plus flea beetles have shown to give better results than either tactic used alone. Tordon (picloram) plus 2,4-D at 1 quart plus 1 quart per acre (0.5 + 1 pound per acre) can be applied during early September to mid-October on leafy spurge with an established flea beetle population. The herbicide treatment will help to open up the canopy, and allow the flea beetles to deposit their eggs at the base of the spurge plants.

Grazing by sheep or goats, or fire, can also be used to open up the spurge canopy and remove excess trash from the soil surface. When integrating these management tactics with an established flea beetle population, they should only be used after mid-August, when egg laying by the beetles is completed.

An important point to remember is that the *Aphthona* flea beetles do have limitations and are not a "quick fix" for controlling leafy spurge. The beetles may take several years to reduce a leafy spurge infestation. Every spurge infestation is different and the flea beetle population development will vary across habitats. The beetles may need to be integrated with other management tactics to achieve desirable results.

For more information on using the *Aphthona* flea beetles for leafy spurge control, refer to Leafy Spurge Control Using Flea Beetles (W-1183) at:

<http://www.ext.nodak.edu/extpubs/weeds.htm>.

### **NEW NEONICOTINOID INSECTICIDE AVAILABLE FOR POTATO INSECT PESTS**

Assail 70WP, a neonicotinoid insecticide, is now labeled for potato insects. This insecticide has foliar activity against Colorado potato beetle (CPB), aphids, leafhoppers and flea beetles. Assail is a systemic insecticide that protects the new foliage and has translaminar movement across the leaf to protect the entire leaf. Acetamiprid is the active ingredient in Assail and provides fast knock down and long residual control of the target insect pests. Assail is classified as a "Reduced Risk" pesticide by the EPA because of its favorable environmental profile; only a 5-day soil residual and no concern with ground water contamination. This product can be applied by air or ground, and CANNOT be applied as chemigation under the current label. The recommended rates are 0.6 – 1 oz of product per acre for CPB, 1 – 1.7 oz/A for aphids and 1 oz/A for leafhoppers and flea beetles. Use the higher rate for CPB and aphids under conditions of heavy pest pressure and/or dense foliage. To reduce the risk of insect pests developing resistance to the neonicotinoid insecticides, rotate to an insecticide of a different mode of action for each treatment application. For CPB, only one application of a neonicotinoid should be restricted to a single generation. Assail 70WP is currently available through your local supplier of potato pesticides. REMEMBER to always read and follow the label directions.

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### **STRAWBERRY ROOT WEEVIL – ACCIDENTAL INVADERS IN HOMES**

A black weevil, about 1/5 inch long, called the strawberry root weevil (*Otiorhynchus ovatus*), is a very common insect throughout North Dakota. In June, the adults emerge from the soil and feed on plant foliage but cause no significant damage to the plants. However, larvae can injure roots of hemlock, spruce, Taxus and arborvitae in nurseries and plantations. Other hosts include strawberry, raspberry, grape, apple, peach, etc. They would go unnoticed except that large numbers regularly wander into houses by mistake as "accidental invaders." They are not damaging to the house or furnishings and do not harm people or pets, but are a nuisance to homeowners. They crawl rapidly (they can not fly) throughout the house, and hide in clothing, bedding, and carpet or appear in sinks, bathtubs, drains and other places where moisture is present.

Combating strawberry root weevils in the house can be difficult and frustrating. Adults already inside need only be vacuumed or swept up and discarded. Household aerosol insecticides are not very effective for controlling these weevils, because weevils may become widely scattered throughout the house. To prevent invasion into houses, look for and seal off any points of entry, such as

cracks and gaps in the foundation and around windows and doors. Spraying an outdoor insecticide on and along the foundation may reduce the number of weevils outside and thereby reduce the number wandering in. Be sure to read and follow the label directions and safety precautions.

### **DIAMONDBACK MOTH LARVAE CAUSE DEFOLIATION TO SEEDLING CANOLA**

A few fields were sprayed for diamondback moth larvae defoliating seedling canola near Mohall, Renville County (source: C. Michels). In May, diamondback moth adults migrated into the north central region of North Dakota earlier than normal. This has resulted in high trap counts (>100 moths per trap week) over the past several weeks. Injury to seedling canola is not typical, but has been observed previously in North Dakota during 2001. Larvae are about 1/2 inch long and light green in color with a forked posterior. They have the habit of spinning down of a strand of silk when disturbed. It is difficult to predict if canola producers will have problems with the next generation (second) during flowering. Recent heavy rainfalls can drown many larvae of the first generation and favor development of fatal fungal diseases, such as Entomophthorales. Pheromone traps are a good indicator on whether scouting for the larvae of the second generation will be necessary during bolting to early flowering. Larvae prefer to feed on the buds, flowers, and pods. Economic thresholds are 10-15 larvae per square foot during flower or 20 larvae per square foot during podding.

### **PEAK CRUCIFER FLEA BEETLE ACTIVITY UNDERWAY BUT LOW LEVELS OF DAMAGE**

The statewide cool, wet weather continues to suppress feeding activity of flea beetles and subsequent injury to canola. There have been no reports of foliar spraying for flea beetles in canola.

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## GROWTH STAGING OF CANOLA

Canola planted this spring is now 84 per cent emerged. There have been a few reports of very early plantings now starting to bolt and flower. Determining the growth stages of canola is relatively simple using a scale developed in Canada. This scale uses five principal stage designations and subdivides these into secondary stages. These stages are described below:

Stage	Description of main Raceme
0	Pre-emergence
1	Seedling - cotyledons showing
2	Rosette
	2.1 First true leaf
	2.2 Second true leaf expanded
	2.3 Etc. For each additional leaf
3	Bud
	3.1 Flower cluster visible at center of rosette
	3.2 Flower cluster raised above level of rosette
	3.3 Lower buds yellowing
4	Flower
	4.1 First flower open
	4.2 Many flowers opened, lower pods elongating
	4.3 Lower pods starting to fill
	4.4 Flowering complete, seed enlarging in lower pods
5	Ripening
	5.1 Seeds in lower pods full size, translucent
	5.2 Seeds in lower pods green
	5.3 Seeds in lower pods green-brown or green-yellow, mottled yellow
	5.4 Seeds in lower pods yellow or brown
	5.5 Seeds in all pods brown, plant dead

With the herbicide tolerant canola varieties, one has to pay special attention to plant stage for last application. For the Roundup Ready canola, glyphosate application can be made from seedling emergence to start of bolting (3.1 to 3.2). For Liberty Resistant canola, the Liberty application can be made from seedling stage up until early bolting stage (3.2). For Clearfield canola varieties, Beyond application can be made up to just prior to bloom. Watch the blooming stages closely also when spraying fungicides to prevent white mold or sclerotinia stem rot. This would be between the 4.1 and 4.2 stages. Check NDSU Extension Cir. A-1208 entitled Canola Flowering and Fungicide Application Timing. It is also available on the NDSU Extension web site at: <http://www.ext.nodak.edu/extpubs/plantsci/crops/a1208w.htm>

Later in the summer, canola in the 5.3 to early 5.4 stage should be near or at swathing stage. These stages change very rapidly during the ripening period if temperatures are warm and under dry conditions.

## WET, SATURATED SOILS AND CROP GROWTH

Recent heavy rains in some eastern and east central production areas have caused some real concerns. Not only has the wet conditions prevented farmers from completing planting but can be very damaging to emerged seedlings. Prolonged soil saturation affects crop growth and yield. In early growth stages, corn or soybeans can survive for only two to four days under water in anaerobic conditions. Most dry bean classes or types are extremely sensitive to flooding. One or two days can completely destroy bean plants. Corn is also somewhat sensitive to flooding in the early vegetative stages (especially prior to the fifth or sixth leaf stage). It appears that soybean are more tolerant to flooding than either corn or dry beans. Moderate water movement can reduce flood damage by allowing some oxygen to get to the plants, keeping them respiring and alive. Drainage within one to two days increases the chance of survival.

The injury extent to seedlings is determined by the plant stage of development at ponding, duration of flooding and the air/soil temperatures as well as if axillary buds are present on damaged plants. If temperatures are warm during flooding (greater than 77 F), plants may not survive 24 hours. Cool temperatures and cloudy conditions may prolong survival. However, wet weather favors disease development. Seed treatments are effective, but limited in protection. Seedling development slowed or delayed two to three weeks allow soil-borne pathogens a greater opportunity to cause damage. Seed rots, seedling blight, corn smut and crazy top affect corn plant development later even though ponding occurred earlier. Delayed soybean growth allows diseases such as Fusarium root rot, Phytophthora rot and Pythium rot to establish and weaken or destroy seedlings. Carefully assess damage before tearing up or abandoning an existing stand.

Rotted seed or damped-off seedlings will reveal probable crop losses. On surviving stands, remember that favorable weather for plants after ponding is important. Cultivation, once soils are dry enough, will open and aerate surface soil and promote root growth. Be careful working the soil. Working wet soil causes compaction that impacts crop growth. One must be patient in waiting for the soils to dry.

An additional nitrogen application in corn may be necessary in fields that show signs of yellowing or uneven growth. A late test for nitrate when corn plants are still six to twelve inches tall can determine if more nitrogen is needed. Maintain a good weed control program so that crop plants are not robbed of nutrients and moisture later in the season.

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**CORN GROWTH AND DEVELOPMENT: ROOTS**

Corn growth is beginning to pick up pace with the warmer weather of recent weeks. Though this spring has been cooler than normal, corn growing degree day accumulations for most stations this year are actually running ahead of accumulations for the same period for the three previous years. Due to cool wet soils this spring, corn generally lacks the deep green color that characterizes corn plants later in the summer. Constraints to early growth under typical North Dakota spring conditions can be attributed to sub-optimal root growth. Hence the need to consider roots, the unseen half of the plant, when evaluating plant health and growth potential.

Corn has two rather distinct rooting systems. The first is comprised of the seminal roots that arise from the seed at germination. The seminal root system is limited in size and function but provides a mechanism for the emerging plant to access nutrients and water. The nodal roots develop at about 1 inch below the soil surface beginning at about the first collar leaf stage. Nodal roots (2-10 per node) generally develop from all of the subterranean nodes (typically 5). They quickly supplant the seminal roots as the primary source of nutrients and water by the three leaf stage. It is also common for roots to arise from nodes that are above the surface of the soil. These roots are called brace roots and if conditions are favorable are able to penetrate into the soil and effectively extract water and nutrient from the top layer of the soil.

Factors that affect root growth to consider and manage when possible:

- Soil temperature - the optimum soil temperature for corn root development is 79°F; there is little or no growth below 50°F. The cool temperatures this spring have generally limited root development causing plants to be pale green or show symptoms of P deficiency. No-till soils with high residue tend to be a few degrees colder than soils that are tilled. Furthermore, well drained soils warm up faster than wet soils.
- Inadequate soil moisture - Roots will not develop or grow through soil that is below the permanent wilting point. They will follow water in the soil, however, in that they will branch and develop in regions of the soil that have favorable soil moisture even if surface layers are depleted of moisture. If the soil surface is dry, hot or compacted during nodal root development, nodal roots may be limited resulting in young plants that easily lodge. This has been referred to as the 'rootless corn syndrome'. There were a few reports of this problem last year in North Dakota.
- Excess soil moisture - Excess moisture this spring is a much bigger problem for corn root development than inadequate soil moisture. When soils become saturated, the amount of oxygen available to the roots decreases rapidly as plants and microorganisms deplete available sources. Corn roots need oxygen for respiration, cell division and nutrient uptake. Water-logged conditions can also predispose plants to root rots later in the season, so the ultimate effect of

excess moisture may not be known until late in the season. Promoting rapid field drainage can directly benefit root development in wet seasons like this year.

- Nutrient status - Root growth is favored by phosphorous. Roots will not preferentially grow towards a band of fertilizer but if they grow into one, they will develop more profusely there if nutrients are otherwise limiting. Pop-up fertilizers are recommended in North Dakota in order to enhance P uptake by corn seedlings that typically have restricted root growth due to cold soil temperatures. Mycorrhizae fungi also aids corn roots in extracting P from the soil. Add additional P when corn follows a black fallow, canola or sugar beets as these crops/practices reduce the amount of Mycorrhizae fungi in the soil.
- Compaction and chemical barriers - Roots are not able to penetrate very compacted layers of soil or grow into layers that are high in salts or calcareous hardpans. For fields with soils known to be prone to compaction, check for compaction layers by digging a root pit.
- Insect damage - the most common root damaging insects in ND are white grubs, wireworms and corn root worm larvae (there are currently only a few areas known to have a problem of corn rootworm). As part of your scouting program examine the roots for damage from insects. I am aware of at least one report of serious white grub damage to corn this year. Most root-feeding insects are best controlled with insecticides applied on the seed or at the time of planting.

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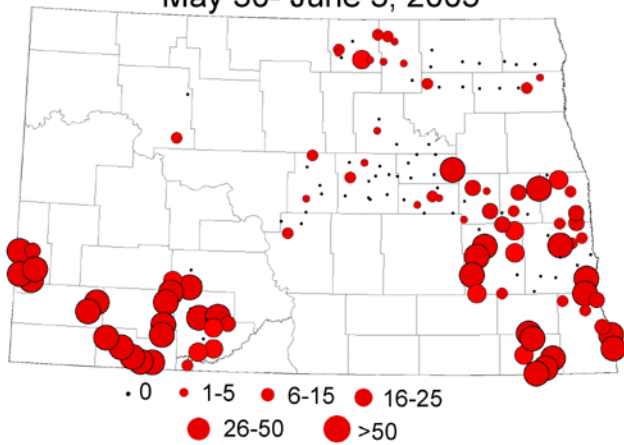
# plant pathology

**NDSU IPM SURVEY, 5-30 to 6-3**

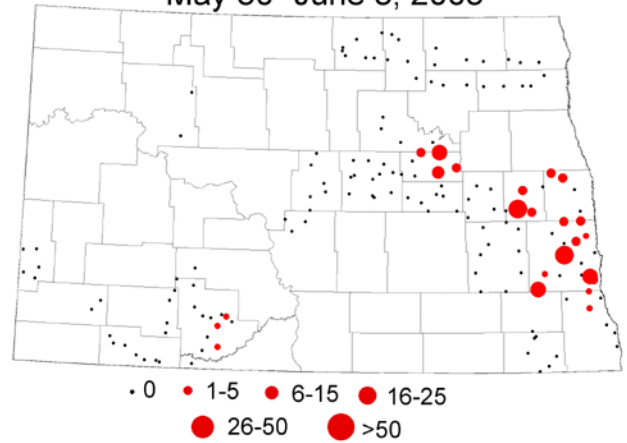
NDSU IPM field scouts surveyed 136 wheat fields during the week of May 30 to June 3. Of those fields, 60% were showing **tan spot** symptoms, with incidence (% tillers infected), as high as 100%). Severity of tan spot ranged from 1 to 25% in infected fields.

**Wheat leaf rust** was detected in 16% of the surveyed fields, with incidence of infected tillers ranging from 2% to over 50%. Severity of wheat leaf rust remained low, generally between trace levels and 5%.

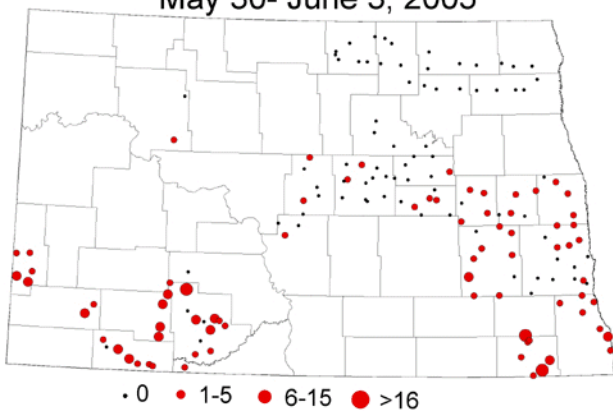
**Tan Spot Incidence**  
May 30- June 3, 2005



**Wheat Leaf Rust Incidence**  
May 30- June 3, 2005



**Tan Spot Severity**  
May 30- June 3, 2005



Additional findings of the field scouts included detecting **stripe rust in four wheat fields**, including ones in SW North Dakota, and some fungal **leaf spotting in barley** in the southwest. Clara Presser found very low populations of **grain aphids** in two fields, one in Burleigh county and one in Sheridan county. Grain aphids may transmit barley yellow dwarf virus, but this virus disease has not yet been confirmed in fields this year. All scouts observed few or very low populations of **grasshoppers** the first week in June.



### EARLY SEASON FUNGICIDE USE, WHICH PRODUCT BETTER?

I have received some questions the past week on my preference for fungicides for early season application to control tan spot. Studies at several NDSU Research Extension Centers and at Fargo over the past few years have indicated that when tan spot is a potential problem because of wet weather and wheat residue being present in the field, all the products tested and registered for this use provided significant improvements in yield over the untreated check. Often there were no significant differences among products, however. In one location in one year, one fungicide may have provided 1-2 bushels better than another, but in another location or another year, the yield performance between the two products may have been just reversed.

So, my recommendation is to use any of the products registered for this use, as all will potentially provide good disease control and economic yield increases. Decisions on which product to use would be based on price, availability, relationships with dealers or crop protection companies, or plans for later season fungicide use. All products have season use-rate restrictions and these must be followed.

### WHEAT DISEASE FORECASTING SITE

The NDSU wheat disease forecasting site (<http://www.ag.ndsu.nodak.edu/cropdisease/>) indicates high potential for tan spot infection in most NDAWN locations in the state. No surprise, considering all the wet weather across the state the past week. Some sites also indicate high risk of leaf rust infection.

The eastern half of the state also is at high risk for *Fusarium* head blight infection, although the risk at this time would primarily apply to winter wheat fields that may be approaching the flowering stage. Keep in mind that we do not have spore counts of *Fusarium* available, so the risk reported is strictly based on temperature, rainfall and dew periods over the past 7 days. We do not know the population of *Fusarium graminearum* spores in a location. Risk of spores being present is higher in areas with scab infection last year or in areas with considerable corn residue present.

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### ROOT ROTS AND WET SOILS

With all of the rain hitting several locations in North Dakota the past week, much of the soil is saturated. Plant pathogens that belong to a group known as **water molds** or **oomycetes** require saturated soil to infect plant roots and cause disease. These oomycetes produce spores that actually swim (thus the need for saturated soil) to plant roots and cause infections. The three main oomycete pathogens that can cause problems on some of the

broadleaf crops in North Dakota are *Aphanomyces*, *Phytophthora*, and *Pythium*. Diseased plants infected by these three pathogens tend to be observed in the field in patches.

*Aphanomyces cochlioides* causes damping-off and root rot of **sugarbeet**. This disease tends to show up more often in warmer soil (68 to 86 degrees). Infected roots may turn black and shrink to a dark, slender thread. Sugarbeet is the only crop affected by *Aphanomyces cochlioides*, but some weed species are also hosts. Sugarbeet cultivars with partial resistance to *Aphanomyces* root rot are available, and Tachigaren seed treatment can also provide some protection. Extending crop rotations may help reduce inoculum levels in a field; however, this pathogen can survive in soils for a very long time. Preliminary research with applying spent lime (precipitated calcium carbonate) has shown some promise in reducing *Aphanomyces* root rot; however, much more research is needed for confirmation and determining rates and the mechanism of the lime on the pathogen.

*Aphanomyces euteiches* can cause a root rot of **pea, lentil, alfalfa, dry bean**, and different weed species. A recent dry pea root rot survey conducted in 2004, revealed the presence of *Aphanomyces euteiches* for the first time in North Dakota. Disease symptoms include sloughing off of the root cortex (leaving a central strand of root vascular tissue attached), and dark, shrunken roots. Crop rotation and partially resistant cultivars are the primary ways to control this disease.

*Phytophthora sojae* can cause damping-off and root rot of **soybean**. *Phytophthora* root rot is the most damaging disease of soybean present in North Dakota. Root infection can occur anytime throughout the growing season. Symptoms appear as rotted roots with dark lesions progressing up the stem from the soil. See the June 2, 2005 issue of the Crop and Pest Report for more information about *Phytophthora* root rot.

Several *Pythium* species are able to cause damping-off and root rot on several crops grown in North Dakota. Symptoms on the root may appear as sloughing off of the cortex, leaving the central vascular tissue attached. *Pythium ultimum*, one of the most common species, can be most damaging when soil temperatures are below 60 degrees. Apron XL or Allegiance seed treatments are registered on many crops for control of *Pythium* seed and seedling blight.

**Management** of diseases caused by oomycetes generally require an integrated approach. Management tools available for oomycete disease management include **crop rotation, fungicide seed treatments, and resistant varieties**.

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## TOPDRESSING N ON SPRING WHEAT AND DURUM

Topdressing N on fields with inadequate N can be helpful if:

1. The field can be entered with ground spray equipment.
2. It rains shortly after application at least ½ inch.
3. The small grains are not too advanced in maturity.

The quantities needed for yield enhancement are at least 30 lb N, and sometimes more depending on preplant N supplied. There are 3 lb N in each gallon of 28%. Therefore, while aerial application has its place, this is not one of those places.

Application should be made with stream nozzles or stream-bars. On taller wheat, stream nozzles are preferred because the stream-bars have a habit of catching on foliage and breaking off sometimes. However, they do work well and with care can last a long time. Because the stream application is not a foliar treatment, rather a concentrated soil band in effect, it needs rain to work it into the soil. So far, this has not been a problem for those who have applied topdress this season in most of the state. But this is North Dakota, so who knows what will happen this week.

If rain doesn't fall before the wheat reaches jointing, the N may help boost protein, but will do little to increase yield. Application is best made at 4-5 leaf stage, with a 6-leaf application effective only if rain chases the applicator out of the field. Earlier application is better than later application.

To boost protein, it is better to wait until right after pollination at the watery-ripe stage of growth and apply a broadcast foliar treatment of 10 gal 28% mixed half and half with water and apply during the cool of the day. This has resulted in a protein boost from ½ to 1 % in ND trials, with ½ % being more common.

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## UNUSUAL WEEDS YOU MIGHT NOTICE

A dominance of three plant species are being sent for identification.

**Swamp ragwort** - a plant looking similar to a sowthistle, having large hollow, hairy stem with small yellow flowers. The plants proliferate where there where wet areas and drown-out areas in fields. Pictures of this plant are not in may ID books. Pictures and descriptions can be found in W-1103 North Dakota Noxious and Troublesome Weeds Pocket Book available from the NDSU Extension Distribution Center. Pictures and plant description can also be found at the Griggs County Extension Service website:

<http://www.ext.nodak.edu/county/griggs/agriculture/2003agalerts/03-6-20.htm>

**Swamp smartweed** - is another plant you might find in wet areas of the field. Pictures can be found in most weed ID books.

**Dame's rocket** - a mustard plant that usually thrives on roadsides, ditches, and near shelterbelts and tree plantings. It has a distinctive purple flower. Pictures can also be found in W-1103 North Dakota Noxious and Troublesome Weeds Pocket Book.

## CONTROLLING ROUNDUP READY VOLUNTEERS IN ROUNDUP READY CROPS

Which are the most effective herbicides and at what rates are question asked how to control different Roundup Ready crop volunteers in Roundup Ready crops. Refer to page 126 of the 2005 ND Weed Control Guide for a table that contain control information. This is the first addition of new material in the weed guide for several years. The ratings are from a compilation of research conducted by NDSU Weed Scientists at Fargo, Carrington, and Minot.

## LATE HERBICIDE APPLICATIONS IN SMALL GRAINS

Rains have caused a delay in some herbicide applications in small grains and increased the demand for aerial applications. The cool weather has facilitated tillering in small grains but now plants from early seedings are beginning to joint. Many herbicides can be applied during tillering and others after jointing begins. See page 12 of the 2005 weed guide for a quick summary of those products that can be applied after small grains begins jointing. Those that cannot be applied after jointing begins are Aim, Assert, Dakota, dicamba, Everest, Maverick, Olympus, Puma (barley only), and Silverado. Follow label for the correct application window for herbicide application.

### GRAZING/HAYING RESTRICTION FOR RAPTOR ON FIELD PEA

The 2005 ND Weed Guide incorrectly list the haying/grazing restriction for Raptor on field pea as 120 days after application. The correct restriction is 0 days for Raptor on field pea and all other crops. Field pea can be hayed or grazed immediately after application.

### POST HERBICIDES ON STRESSED CORN AND SMALL GRAINS

Wheat is a cool-season grass and is adapted to cool conditions. The likelihood of small grains being stressed from the environment is low except those plants affected by standing water. Small grains should tolerate POST herbicides well as long as label directions are followed with respect to proper application timing, allowed tank-mixes, and appropriate adjuvants.

Corn is warm-season grass and thrives in hot weather especially with good soil moisture. The cooler conditions have probably caused much of the corn to appear yellow and stunted. The best solution is warmer temperatures.

Many are asking about the impact of POST herbicides on corn stressed by environment. Cold or cool temperatures slow corn metabolism increasing the risk of injury from herbicides. Section A4 on page 67-68 of the 2005 ND Weed Control Guide describes general temperature effects on weed control and crop tolerance of several herbicides. Normally, growers would wait to apply herbicides until soil dries and plants resume normal growth. However, weeds are also growing vigorously and large weeds are more difficult to control and require full label rates for adequate control.

Several POST herbicide labeled in corn are generally very safe, such as, atrazine, bromoynil, Basagran, Starane, Hornet, Stinger, WideMatch, Callisto, Accent, and Option. Option contains a safener (isoxadifen) which impart excellent safety. Roundup Ready corn, Liberty Link, and Clearfield corn have excellent safety to prescribed herbicides allowed for use. Avoid using 2,4-D or Curtail on corn, if at all possible, to avoid injury. If so, follow the label with exactness.

Penultimately, follow all label directions with regard to application. All herbicides have directions for use to maintain crop safety. Another practice to assure greater corn tolerance is to avoid spraying at the upper limit of the crop stage. For example, do not spray Basis to corn beyond the 6 inch stage, dicamba beyond the 8 inch stage, Distinct from corn emergence to 4 inches tall, Accent past the 20 inch tall stage of corn, or Steadfast past the 12 inch stage of corn. Use the most restrictive application window when tank-mixing two or more herbicides together. Adjuvants can make a difference also. MSO type adjuvants do not cause herbicide phytotoxicity in cool weather but rather in very humid and hot weather. MSO type adjuvants usually give greater herbicide enhancement than nonionic surfactants and petroleum oil (COC) adjuvants. Basic Blend adjuvants are non-oil type adjuvants that perform similar to MSO type adjuvants.

### HERBICIDE UPDATE - PART 1

#### Affinity (Dupont)

**Mode of action:** ALS inhibitor (1)

**a.i.:** thifensulfuron + tribenuron

**Crops:** Small grains

**Comments:** The label for DuPont's new "Affinity TankMix" herbicide for wheat and barley has been approved by the EPA. Affinity is a 50% soluble granule formulation, available in 48 oz jugs and via the Precision Pak bulk machines. With a rate range of 0.6 oz to 1.0 oz/A, one 48 oz container will treat 80 acres at the 0.6 oz rate. Affinity 50%SG (4:1 ratio of thifensulfuron:tribenuron) is similar to Harmony Extra 75%XP (2:1 ratio of thifensulfuron:tribenuron). Harmony Extra will be sold in higher value and speciality markets. Affinity is a new formulation containing TotalSol soluble granules or SG formulation as opposed to the XP formulation of many other Dupont products. SG formulation makes more product soluble in the spray tank and facilitates easier and more effective sprayer cleanout.

#### Harmony GT XP (Dupont)

**Mode of action:** ALS inhibitor (1)

**a.i.:** thifensulfuron

**Crops:** Clearfield canola (imazethapyr tolerant canola with the Smart trait)

**Comments:** Supplemental labeling has been approved allowing Harmony GT to used on imazethapyr tolerant canola possessing the Smart trait. Apply at 0.4 oz/A with an approved NIS to canola in the 3 to 6-If stage. Can be tank-mixed with Assure. Allow a 65 day PHI. Follow all guidelines and restrictions on the label.

#### Option (Bayer)

**Mode of action:** ALS inhibitor (1)

**a.i.:** foramsulfuron

**Crops:** Corn

**Comments:** ND Dept of Ag has issued a 24(c) Supplemental Label allowing aerial application. Apply Option at 1.5 oz/A + MSO at 1.5 pt/A + UAN 1.5-2 qt/A or AMS 1.5-3 lb/A. Aerial application should be made in a minimum of 5 gallons of water per acre.

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### Southwest ND

Very few days were available for fieldwork in southwest North Dakota last week. Rainfall provided an inch or more generally over the entire area with Bowman NDAWN site receiving the least 1.11 inches and Hazen NDAWN site receiving the greatest amount at 3.53 inches. Some small hail was reported with a few reports of fields being damaged. Friday, Saturday, and Sunday were suitable for spraying. Monday was too windy to spray with wind speeds reported at 40 to 45 mph at most locations although seeding of late seeded crops continued until it began raining late afternoon or early evening. This past week stripe rust and leaf rust infections in spring wheat were confirmed in southern Grant County fields and leaf rust in a western Adams County field. Incidence and severity of rust infections in both counties was low. Aphids were found in a Dunn County field in very low numbers.

In southeast Stark County large numbers of Armyworm moths were found in a wheat field. This should be an early warning to producers to include scouting for Armyworm larva. When Armyworm larvae are young they will be pale green turning a dark green as they mature. Fully developed larva will grow to a length of 1 ½ to 2 inches. A series of stripes down the back and side of the body will be found. Armyworms feed at night and hide under vegetation or in loose soil during the day. When scouting, look for fecal pellets and feeding damage. Then look for larvae under plant trash, soil clods or in soil cracks. Treatment threshold in small grains is at 4 to 5 or more larva per square foot. Armyworms will also feed on other small grain crops as well as corn, alfalfa, clover, flax, and millet.

Weeds such as Persian dandelion, Japanese brome, and downy brome are becoming more prevalent in wheat fields in the southwest. Fenoxaprop has done an excellent job of controlling wildoat and foxtails but provides no control of Persian dandelion, Japanese brome or downy brome. This makes proper weed identification very important. Once found, producers should consider using products such as Achieve, Discover, Everest or Olympus. Consult the label for specific weeds controlled and directions for use.

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### Northeast ND

The region received from 1 to 2 inches of rainfall in the last week. Extremely wet soil conditions north of highway 66 and east of highway 1 and in the Red river valley counties has prevented planting soybeans and wheat in Pembina county, cool season crops in Cavalier county, and soybean, sunflower and dry beans in Walsh and Grand Forks. Cool season crop development is very good. Earliest planted wheat and barley is in the 6 leaf stage. May planted soybean, sunflower and dry bean are emerging to having initial leaves developed. Earliest canola is about 10-14 days from first bloom. Some flax is 3 inches tall and being sprayed for weed control. Earliest planted corn is about 4 leaf stage. Winter wheat flag leaves are emerging and head emergence will be common in 10 days and growers will need to gear up for fungicide spraying if wet weather continues. Growers are mainly concerned with controlling weeds in wheat and barley. Continued wet conditions in the next couple of weeks will bring concerns of white mold development in canola. Scouts are looking for cutworm in row crops and sunflower beetle infestations in the next week in sunflower.

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### South-Central ND

During the past week (June 1 to 7), the south-central region's rainfall ranged from 0.3 inch at McHenry to 3.4 inches at Edgeley as recorded at NDAWN (North Dakota Agricultural Weather Network) sites. Considerably higher amounts of rain were unofficially reported in south-eastern counties. The region's soil moisture is currently adequate to surplus. Due to rain, growers continue to struggle to complete planting of the less than 10 percent of the remaining acres due to rain. The region's cool-season crop fields generally continue to have good to excellent plant stands and yield potential. Canola planted on April 8 at the Carrington RE Center is beginning to flower. The majority of the region's spring wheat crop is in the 5-leaf to jointing stages. Herbicide application in small grain is nearing completion (except in northern counties) and is in progress in corn, flax, and soybean when weather conditions are cooperative. Last week, white grub injury to corn in LaMoure County was detected and a few small grain aphids were found in Burleigh and Sheridan counties.

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