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Controlling early season weeds in corn

The planting season will be here before we know it and many producers are still sifting through the many weed control strategies available to them. Often there is no perfect strategy and analyzing all the information necessary to make a weed management decision can be frustrating. Economic factors such as herbicide costs, fuel, and time, combined with biological and environmental factors including weed species spectrum, soil type, organic matter, herbicide efficacy, herbicide restrictions, annual precipitation, precipitation at time of application, and ability to make a timely treatment application all must be considered.

Corn /weed competition

All weeds are not created equal. Each weed species competes differently with corn with some species being much more competitive than others. For example, common sunflower has a competitive index of 10 and is much more competitive than pigweed, which has a competitive index of about 3. Understanding the differences between species and their competitive factors can be important in determining what weed management strategy will provide the best return on investment.

Since weeds are not created equal, we should acknowledge that crops also aren't equal. Each crop differs in its competitive ability. Corn is one of the most competitive rowcrops planted in Nebraska. The relative competitive load necessary to cause a specific yield loss quantifies the competitiveness of a crop. For corn, it would take a competitive load of about 36 per 100 square feet to cause a 5% yield loss. For example, sunflower has a competitive index of 10 so it would take 3.6 sunflower plants per 100 square feet to cause a 5% yield reduction in corn. This is all under the assumption that the weeds emerge at the same time as the crop. Accurately calculating yield loss, especially when several weed species are present in the field, can be very difficult. WeedSOFT, a University of Nebraska computer program, is a type of weed management decision support tool that provides this information at the click of a button. Using this technology allows for more accurate yield loss analysis, providing better information for weed management decision.

Early preplant and preemergence weed management

Controlling weeds before they are a problem is a sound strategy. As the saying goes “an ounce of prevention is worth a pound of cure” and this is true with weed control in corn. Various techniques are available and depending on individual circumstances, one may be better than the other. Producers need to determine their seasonal goals before committing to any one strategy.

Before we dive into all of the strategies available, refer to Table 1 for an explanation of all the terms and acronyms with preemergent corn weed control.

Early preplant herbicide applications 10-30 days before planting, offer many advantages to most producers, especially no-till farmers. First and especially in no-till, early preplant treatments allow producers to burn down winter annuals including henbit and mustards and early summer annuals, including giant ragweed, common sunflower and lambsquarter. This can be important in a year characterized by drought conditions as these early weeds, while not competing directly with the crop, can quickly rob precious soil moisture. Second, an early preplant treatment reduces most if not all weed competition as the crop is emerging from the soil.
Updates to the 2001 Weed Management Guide

The 2001 Guide for Weed Management in Nebraska, formerly known as the Guide for Herbicide Use in Nebraska, has been available for several months. Users of the guide continue to be pleased with its detail and reliability. Several revisions and enhancements were made in this year’s edition, as outlined below:

The table, “Crop Tolerance to Herbicide Residue in the Soil” on page 5 has been revised and enhanced to include more herbicides and more crops. The combination herbicide table on pages 89-91 has been significantly revised, expanded, and enhanced as well.

As with any publication of this magnitude, a few errors were identified after printing and we would like to correct those here.

Cover – Domain is NOT a restricted use herbicide.

Page 6 – The latest version of Weedsoft is 6.0.

Page 27 – A Clearfield hybrid is not required for use with Bicep Lite II Magnum.

Page 39 – The rating for Canopy XL for ALS Kochia and Waterhemp should be a 1.

Page 62 – Zorial Rapid 80 is not registered for use on alfalfa in Nebraska.

Page 87 – The title of the table should be “Replant Options -- Corn, Sorghum, and Soybean Herbicides.”

Page 89 – Accept Gold 84 DF should read Accent.

Page 92 – Aim herbicide’s mode of action is group VIA3 not IVA3.

Page 96 – Expert’s active ingredients are metolachlor, glyphosate, and atrazine; it is used as a pre-emergent.

Page 101 – Rimsulfuron is NOT an active ingredient in Spirit.

Copies of the 108-page 2001 Guide For Weed Management in Nebraska can be purchased for $2 each at your local University of Nebraska Cooperative Extension County Office. The guide is also available on the Internet at http://www.ianr.unl.edu/pubs/fieldcrops/ec13001.pdf

Brady Kappler
Extension Educator, Weed Science

Stopping algae, moss in nurse spray tanks

A simple way to keep moss and algae out of nurse tanks is to paint them black. Algae needs sunlight to grow and photosynthesize so the black paint prevents that growth. It’s simple and effective. For those of you unwilling to paint your tank black, page 74 in the 2001 Guide for Weed Management in Nebraska also lists a copper sulfate solution that can also be used to control algae growth. Begin by preparing a solution of 1 oz of copper sulfate in 1 pint of water. Add 7.5 tablespoons of this solution to each 1000 gallons of water. The disadvantage of this method is that every time fresh water is added to the tank, the copper sulfate solution is diluted. Additional copper sulfate will need to be continually added to maintain control of the algae. Black paint is cost effective, easy to apply, and doesn’t have to be adjusted every time you fill the tank.

Brady Kappler
Extension Educator, Weed Science

Correction

Information regarding the following herbicides was incorrect in the March 23 Crop Watch story on new herbicides for 2001.

Aim – Carfentrazone is the active ingredient not Sulfentrazone

Callisto – will only be marketed by Syngenta. Mesotrione the active ingredient will be marketed by Syngenta and Dow.

Page 101 – Rimsulfuron is NOT an active ingredient in Spirit.

Copies of the 108-page 2001 Guide For Weed Management in Nebraska can be purchased for $2 each at your local University of Nebraska Cooperative Extension County Office. The guide is also available on the Internet at http://www.ianr.unl.edu/pubs/fieldcrops/ec13001.pdf

Brady Kappler
Extension Educator, Weed Science
Weed strategies  (Continued from page 31)

Although this early competition may not be the most critical with respect to yield, it can quickly reduce yield as corn enters the 2-leaf stage. Another advantage of the early preplant strategy is that in years with limited moisture the herbicide has a greater chance of being activated before the crop emerges. A disadvantage of the early preplant treatment is the decreased longevity of the residual activity. The earlier a herbicide is applied to the soil, the earlier it will stop working. Post-emergence programs need to be carefully evaluated before making such a decision. Knowledge of the field’s weed history also is helpful.

Preplant is similar to early preplant and uses many of the same herbicides. Treatments are typically made 0-10 days before planting. Preplant doesn’t give you the advantage of catching early weeds but at the same time it may give you the needed residual for setting the stage for a good POST treatment.

A preemergence treatment, applied after the crop is planted but before emergence, can offer many of the same advantages. An additional advantage over the early preplant application is that it allows the producer to increase the longevity of control. This makes good sense in tilled fields. This also provides increased management flexibility later in the season when summer annuals begin to emerge.

Table 2 lists labeled preemergence herbicides and their application timings. As always, read, understand, and follow label directions. For further evaluation of herbicide efficacy on weeds and weed/crop competition, see the 2001 Guide For Weed Management in Nebraska, available from your local University of Nebraska County Extension Office.

Brady Kappler, Extension Educator – Weed Science
Alex Martin
Extension Weed Specialist

<table>
<thead>
<tr>
<th>Table 1. Pre-emergence herbicide terms</th>
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<tbody>
<tr>
<td>Acronym</td>
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<td>EPP</td>
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<td>PP</td>
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<td>PPSA</td>
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<td>PPI</td>
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<td>PRE</td>
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<table>
<thead>
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<th>Table 2. Preplant/preemergence herbicides for corn</th>
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<tr>
<td>Treatment</td>
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<td>-----------</td>
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<tr>
<td>Aatrex/Atrazine</td>
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<tr>
<td>Axiom</td>
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<tr>
<td>Axiom AT</td>
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<tr>
<td>Balance Pro</td>
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<tr>
<td>Bicep II Magnum</td>
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<tr>
<td>Bicep Lite II Mag.</td>
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<tr>
<td>Bicep Magnum TR</td>
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<tr>
<td>Broadstrike + Dual</td>
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<tr>
<td>Bullet/Lariat</td>
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<tr>
<td>Contour (IMI Corn)</td>
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<tr>
<td>Degree</td>
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<tr>
<td>Degree Xtra</td>
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<tr>
<td>DoublePlayb</td>
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<tr>
<td>Dual II Magnum</td>
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<tr>
<td>Dual IIG Magnum</td>
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<tr>
<td>EPIC</td>
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<tr>
<td>Eradicane</td>
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<tr>
<td>Frontier</td>
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<tr>
<td>Fultimea</td>
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<tr>
<td>Guardsman/LeadOff</td>
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<tr>
<td>Harnessa</td>
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<td>Harness Xtraa</td>
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<tr>
<td>Hornet WDG</td>
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<tr>
<td>Lasso II</td>
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<tr>
<td>Micro Tech/Lasso</td>
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<tr>
<td>Prowl/Pendimax</td>
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<tr>
<td>Python</td>
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<tr>
<td>Surpassa</td>
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<td>TopNotcha</td>
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</tbody>
</table>

* Rates dependent on soil type and application type
b Do not use on sandy soil if water table is shallower than 30 feet
Selecting the right sprayer nozzle tip for the job

Selecting the right sprayer nozzle tip can mean the difference between success and failure of a pesticide application. Using the wrong nozzle tip can reduce pest control and may even cause crop response. For example, where broadcast nozzle tips were used instead of the “E” even flow tips for band application, significant crop response occurred because of the double rate over the center 4 inches.

With the development and increased use of herbicide resistant crops there has been greater concern about herbicide drift. This has led to the development of many new nozzle tips to reduce drift and improve the performance of the post-applied herbicides.

Selection of spray nozzle tips is an important criteria in herbicide application. The tip type, orifice size, boom height, pressure, ground or air speed, and wind all greatly affect drift potential and damage to nearby crops. These same criteria affect herbicide coverage on the plants or soil surface.

Nozzle types commonly used in low-pressure agricultural sprayers include: flat-fan, flood, raindrop, hollow-cone, full-cone, and others. Special features, or subtypes such as “extended range, low pressure, drift guard, air induction, and turbos” are available for some nozzle types.

Flat-Fan

Flat-fan nozzles are widely used for broadcast spraying of herbicides and produce a tapered-edge spray pattern. These nozzles have several subtypes such as standard flat-fan, even flat-fan, extended range flat-fan, drift guards, air-induction, Turbo TeeJet®, and some special types such as off-center and twin-orifice flat-fan.

The standard flat-fan normally is operated between 30 and 60 psi, with an ideal range between 30 and 40 psi. The even (E) flat-fan nozzles (nozzle number ends with E) apply uniform coverage across the entire width of the spray pattern. They are used for banding pesticide over the row and should not be used for broadcast applications. The band width can be controlled with the nozzle height, spray angle, and the orientation of the nozzles.

The extended range (XR or LFR) flat-fan provides excellent drift control when operated between 15 and 25 psi. This nozzle is ideal for an applicator who likes the uniform distribution of a flat-fan nozzle and desires lower operating pressure for drift control. The extended range nozzles have an excellent spray distribution over a wide range of pressures (15-60 psi). These are one of the few nozzle tips available in ceramic and are priced less than their counterpart in stainless steel making them very cost effective.

The Turbo TeeJet® has a pressure range of 15 to 90 psi. It produces larger droplets for less drift and is only available with a 110-degree spray angle. With this wide pressure range these nozzle tips should be used with a sprayer equipped with a rate controller.

The drift guard flat-fan has a pre-orifice which controls the flow. The spray tip is approximately one nozzle size larger and therefore produces larger droplets and reduces the small drift-prone droplets. These nozzles usually have a very limited pressure operating range.

The venturi-type nozzle produces large air-filled drops through the use of a venturi air aspirator for reducing drift. These include the Delavan Raindrop Ultra, Greenleaf TurboDrop, Lurmark Ultra Lo-Drift, Spraying Systems AI Teejet, ABJ Agri. Products Air Bubble Jet, and Wiger’s Combo-Jet. These nozzles have a pre-orifice and a larger final orifice which greatly drops the pressure. The venturi-type nozzles may experience pattern distortion with some drift reduction additives especially when the additives are used at maximum or higher rates.

Flat-fan nozzles also include the off-center (LX) flat-fan which is used for boom end nozzles so a wide swath projection is obtained and the twin-orifice (TJ) flat-fan which produces two spray patterns – one angled 30 degrees forward and the other angled 30 degrees backward. These are used in a Venturi nozzle

Table 1. Suggested minimum spray heights. (100% overlap preferred).

<table>
<thead>
<tr>
<th>Spray Angle Degrees</th>
<th>20&quot; Spacing With Overlap of</th>
<th>30&quot; Spacing With Overlap of</th>
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<tbody>
<tr>
<td></td>
<td>30%</td>
<td>100%</td>
</tr>
<tr>
<td>65</td>
<td>22</td>
<td>-NR-</td>
</tr>
<tr>
<td>73</td>
<td>20</td>
<td>-NR-</td>
</tr>
<tr>
<td>80</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>110</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

NR: Not recommended because of drift potential.

(Continued on page 36)
Nozzle selection (Continued from page 34)

Although wide-angle nozzles produce smaller droplets which may be more prone to drift, the reduction of boom height reduces the drift potential. Boom height is the second most important factor in drift. The nozzle spacing and orientation should provide for 100% overlap at the target height. Nozzles should not be oriented more than 30 degrees from vertical. With 100% overlap there is coverage from two directions, with a plugged nozzle we still have some coverage. Also, if we start with 100% overlap and are on uneven terrain this helps maintain the spray pattern.

Most nozzle manufacturers identify their flat-fan nozzles with a four or five digit number. The first numbers usually are the spray angle and for most manufacturers the other numbers signify the discharge rate at rated pressure. For example, an 8055 has an 80 degree spray angle and will discharge 5 gallons per minute (GPM) at the rated pressure of 40 psi. An 8004 nozzle has a 80 degree spray angle and will discharge 0.4 GPM at the rated pressure of 40 psi. Output values for flat fan nozzles are based on a standard operating pressure of 40 psi.

When to replace nozzles

Replace sprayer nozzles when:

- Spray pattern is distorted
- Nozzles show irregular wear
- Nozzle flow rates are 10% greater than the rated output

Note: Each nozzle’s flow rate on the spray boom needs to be within 5% of the average flow rate of nozzles.

Nozzle selection and considerations

It is important to select a nozzle that develops the desired spray pattern. The specific use of a nozzle, such as broadcast herbicide application or insecticide spraying on row-crops, determines the type of nozzle needed. Examine current and future application requirements and be prepared to have several sets of nozzles for a variety of application needs. In general, do not select a nozzle with an orifice so small that it requires a nozzle screen finer than 50 mesh because they plug too easily.

Bob Klein, Extension Cropping Systems Specialist

Making surface nitrogen applications more profitable

Surface application of urea or urea-containing fertilizers (UAN) is a common practice in reduced and no-till corn production. If urea or UAN fertilizers are not incorporated by rainfall, irrigation or tillage, nitrogen losses to volatilization can be significant. With higher nitrogen fertilizer prices in 2001, these losses are costly. Early incorporation of these fertilizers or use of a urease inhibitor deserves additional consideration.

Urea reacts with water and breaks down, releasing ammonia. This hydrolysis of urea is facilitated by the universal and abundant enzyme, urease. If urea or UAN are incorporated in the soil, the ammonia will be converted to and retained in the soil as ammonium. With surface application, however, much of the ammonia will be lost to the atmosphere. The reaction begins with application and 10-20% of the urea nitrogen typically may be lost within five days with the greatest loss in the first days after application. The rate of loss increases with wetness of the soil surface, temperature, soil pH and wind.

Incorporation at the time of application, or immediately after, will minimize nitrogen volatilization. More than 1/2 inch of rainfall or irrigation water will adequately incorporate the fertilizer nitrogen and greatly reduce ammonia loss. Urease activity will be inhibited if the soil surface is dry but will be acti-

vated by a heavy dew or light rain.

If mechanical incorporation of the fertilizer or irrigation are not desired or feasible, consider using the urease inhibitor, Agrotain. (This is not a promotion of this product, but it is the only available urease inhibitor registered for crop production). Urea can be impregnated with Agrotain or this inhibitor can be mixed in solution with UAN. The urease inhibitor is effective for up to 14 days.

Assuming urea or UAN-N costs $0.35 per lb nitrogen applied and the application rate is 100 lb N/A, a 15% urea-N loss costs $5.25/A for urea and $2.62 for UAN. If Agrotain retails at $40 per gallon, and one

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Take time now to prepare your planter

Planters have to cut or handle residue, penetrate the soil to the desired seeding depth, establish proper seed-to-soil contact, and close the seed-vee. To do this correctly, the planter has to be set-up, adjusted, and operated properly. By taking some time before planting season to check each of these steps, you can evaluate your planting equipment and make any adjustments necessary to make planting successful.

Check the double-disk seed-furrow openers for proper adjustment. The two blades should be sharp, without a gap between them to effectively cut residue and prevent soil from getting between them. Blades mounted side-by-side should have about two inches of contact. Staggered seed-furrow openers should have the rear blade tucked in behind and just touching the leading blade. When blades are adjusted properly, coulters or residue movers are not needed for no-till.

To penetrate to the desired seeding depth, downpressure springs may be needed to transfer weight from the toolbar to the row units. There must be sufficient weight on the units to keep the depth gauge wheels in firm contact with the soil. There needs to be enough total weight on the toolbar to keep the seed metering drive wheels from slipping since the springs are "lifting" the toolbar especially when the planter is nearly empty.

Level the planter in the field, making sure that the toolbar is at the proper height so that the parallel links connecting the row units to the toolbar are level. Leveling in the field is especially important if there are any ridges in the field from cultivation last year or if the tractor tires sink into soft, tilled ground. To improve seed-to-soil contact, operate the planter slightly tail-down by raising the hitch point on pull-type planters or by lengthening the third link on mounted planters.

Once the planter is leveled, try planting with very little seed in the hoppers. Evaluate if there is enough weight and downpressure by planting a short distance and stopping with the planting units still in the ground. Check the depth gauge wheels on each row to see if they are loose and if you can rotate them. If you can, tighten the downpressure springs or add heavy duty springs. Plant a little farther and check if you can slip the seed metering drive. You may need to add weight to the toolbar for the springs to work against and to prevent slippage of the drive.

Check the closing of the seed furrow by first evaluating seed-to-soil contact, not the top of the seed-vee. As long as the contact is there, do not increase the closing force on the press wheels because this can over-compact the soil and reduce the stand. An attachment or harrow may be needed to finish closing the seed-vee.

Also check the seed depth and seed spacing on each row. When using angled closing wheels, make sure that the corn seeds are planted about 2 inches deep (1.5 inches for soybeans and grain sorghum) to avoid over-compact the soil and reduce the stand. A Keeton Seed Firmer or a Schaffert Rebounder will help place the seeds at a constant depth resulting in more uniform emergence and higher yields.

Weed control in trees and shrubs

For preemergent weed control in trees, Princep 80W no longer has an active label in Nebraska; however both Princep 4L and Princep Caliber 90 are registered for use on trees. For Princep 4L the use rate is 2-4 qts per acre in at least 25 gallons of water.

For Princep Caliber 90 use 2.2 – 4.4lbs per acre in at least 25 gallons of water. Apply before weeds emerge. To avoid injury with either product, follow these precautions.

1. For fruit trees apply only to areas where trees have been established for one year or more.
2. For Christmas trees and other conifers do not apply to trees less than two years old.
3. Do not use on seedbeds or cutting beds.
4. Do not use until soil is firmly settled around roots.
5. Do not apply more than once a year.
6. Read and follow all label directions.

Brady Kappler
Extension Educator -- Weed Science

Paul Jasa
Extension Engineer
How much field buffer is enough in corn

How much field buffer is required to limit pollen drift contamination to less than 1%? That was the question addressed when producers and NU faculty cooperated in an on-farm research trial to study pollen drift in summer 2000 in central Nebraska. The research included two scenarios – one where possible contamination situations were created and one where contamination was likely to occur due to neighboring fields. The following update addresses the research using yellow and white corn to differentiate the levels of contamination at various distances from the contamination source in a natural setting. The research was conducted in cooperation with Loren Bangs in two of his fields southwest of Phillips.

Field A had yellow corn planted on the south and east sides of a white corn field. In Field B white corn was bordered on the north side with yellow corn. The use of yellow and white corn made contamination easily visible on the resulting ears since yellow is the dominant color over white. Ears were examined at 50, 100, 150 and 200 feet into the white corn from the yellow corn borders. Ten ears, 15 feet apart, were checked at each distance. Ears typically ranged from 500 to 600 kernels/ear. The tables show percent yellow kernels based on an assumed 500 kernels/ear.

(Continued on page 38)
Field buffers (Continued from page 37)

Results and recommendations

Field A, where yellow corn bordered the field on the south and east sides, had less than 2% contamination at 50 feet from either direction. There was a difference in level of contamination from the two directional sources at different distances. Two samples, 150 feet away from the south source, would not comply with the 1% tolerance level. By comparison, every sample 100 feet or more away from the east source was within the 1% tolerance.

In Field B, where the yellow corn was placed in rows north of the white corn, contamination was higher at the shorter distances. All of the samples at the 50-foot interval averaged about 2.6% contamination. At one site, 23 yellow kernels were found and it barely met a 5% tolerance. If the sample had been drawn from the 40-kernel site, contamination would appear to be 8%.

There is little contamination in both fields at 200 feet, the maximum distance studied.

Bigger is always better when it comes to buffer size and meeting contract requirements. While a 660-foot buffer (typical for seed corn isolation from white and popcorn) will almost guarantee less than 1% contamination, this size buffer may be unnecessary for a grain contract. Results from this field research indicate that for these fields in this year, a 200-foot buffer was adequate to achieve less than 1% contamination and 100 feet was adequate for less than 2% contamination. It would be expected that most of the fields had even less contamination and the overall field average would be well within the 1% tolerance.

Timing is critical to pollen drift

Pollen begins to be shed two days after tasseling and continues for five to eight days. It is estimated that 97% of the kernels are pollinated by neighboring plants, 70% of the pollen falls within 30 feet and pollination is nearly complete within two days of silk emergence.

This study also indicates that it's not reasonable to expect a contamination-free field, regardless of the buffer, due to the uncontrollable possibility of planting seed that is contaminated with an unwanted characteristic, such as planting a seed containing the Bt gene in a non-Bt field. An ear that had two-thirds yellow kernels was found more than 200 feet into Field B, contaminating surrounding plants with yellow pollen. This plant most likely came from a yellow seed that was in the bag of white seed. The same thing would be expected from Bt seeds that are likely found at some low level in non-Bt corn.

Andy Christiansen, Extension Educator, Hamilton County
Gary Zoubek, Extension Educator, York County

Take steps to limit unwanted pollen contamination

Short of a micro fiber tent that allows in moisture and sunlight but not pollen, there are no absolute barriers to stop pollen drift and contamination of a field; however, NU faculty do have some recommendations for limiting potential damage caused by unwanted cross fertilization.

1. Communicate. Talk to your neighbors about what they’re planting and where they’re planting it and plant your crop accordingly to avoid potential contamination. Consider the geography and prevailing wind. If possible, plan so that potential sources of contamination are limited. If rows can be planted perpendicular to the source of contamination, you can separate the most contaminated rows from the bulk of the field at harvest.

Research part of producer project

This study on pollen drift was conducted as part of an ongoing four-county cooperative initiative among producers and the University of Nebraska Cooperative Extension to conduct application oriented research under existing field conditions.

Other topics studied in 2000 were: The Effect of Chloride Fertilization on Stalk Rot and Grey Leaf Spot; Late Season Nitrogen Fertilization of Soybeans; Effect of Early Planting on Soybean Yields, and Irrigated Corn Cost of Production Estimates. The project includes producers and NU Extension faculty from York, Hamilton, Fillmore, and Clay counties.

Producers participating in the 2000 research trials included: Dan Aspegren, Geneva; Loren Bangs, Doniphan; Rick Hughes, Geneva; Duane Keller, Aurora; Ray and Ron Makovicka, York; Scott Schelkopf, Geneva; Lyle VonSpreckelsen, Clay Center; David and Adena Kreutz, Aurora; Larry Bankson, Hordville; Mike Campbell, Aurora; Jay Hunnicutt, Giltner; Steve Kluver, Fairfield; Todd Roehrs, Hampton; Alan Songster, Exeter; Jerry Stahr, York.

For more information about these and other projects conducted through the Quad County Research Initiative contact any of the following Cooperative Extension educators: Gary Zoubek, York County; Andrew Christiansen, Hamilton County; Terry Hejny, Fillmore County or Chuck Burr, Clay County.
The two main reasons for off-colored pines this year are winter injury and pine wilt. Understanding the conditions can help you determine if it’s caused by a disease which necessitates tree removal or by an abiotic injury due to weather conditions.

### Winter Injury

Winter desiccation and damage from a freeze early in the fall are two causes of winter injury. Needles dry out in winter when they lose more water than the roots take up. The needles will often remain green until the weather begins to warm in the spring. Then the needles will show symptoms of injury that occurred during the winter. Needles will often turn brown from the tips back toward the branch, leaving the base of some needles green. Needles may also have a mottled appearance, with yellow to brown discoloration. Drying of needles may occur more on one side of the tree than the other, or a whole tree can be affected. An early fall freeze may damage pines by killing needles when temperatures suddenly drop. Damaged needles will turn brown to orange color when the weather is warmer. Winter injury usually affects the newer growth of a tree that is more exposed to wind and temperature changes. Most trees that have sustained winter injury will produce healthy growth from buds this spring. For this reason, it is advisable to allow new foliage to emerge from winter-damaged trees before the overall condition of the trees is evaluated.

### Pine Wilt

The other cause for off-colored pines is pine wilt. Pine wilt is caused by the pinewood nematode *Bursaphelenchus xylophilus*, and can cause a sudden death of mature pines. The pinewood nematode is transmitted from pine to pine by an insect vector, the pine sawyer. The pine sawyers are wood borers and emerge throughout the summer months as adults carrying the nematode from infested or non-infested pine trees. The primary management strategy for pine wilt is sanitation. Therefore, removal of a tree killed by pine wilt is essential to limit the spread of this disease. It is because of the insect vectors’ emergence time that we recommend removal of pines killed by pine wilt by May 1.

The pinewood nematode has been found in Nebraska mostly in Scots and Austrian pine. It is considered to be a potentially serious problem in these pine trees in landscape settings, windbreaks, and recreational plantings and typically affects trees over 10 years old. Symptoms for pine wilt usually appear from August through December and may occur initially on only one portion of the crown (canopy) of the tree. In general, the trees wilt and die rapidly within a short period of time but trees may survive for more than one year. Needles initially turn a flat-green color and then brown and remain attached to the tree for over one year. Pine wilt can be differentiated from winter injury by when symptoms developed, as most winter injured trees turned color in late December through January. Also, trees killed by pine wilt will not have needles with green at the base when the sheath is pulled back, as is often the case with winter injury.

If you have problems differentiating these types of disorders, contact the UNL Plant and Pest Diagnostic Clinic at (402) 472-2559.

Jennifer Chaky, Plant and Pest Diagnostic Clinic Coordinator

Loren J. Giesler

Extension Plant Pathologist

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### Limiting Contamination

*(Continued from page 38)*

2. **Plant buffer strips of corn.** If you’re growing for a specialty market, your contract may specify the size of buffer strip required. In an effort to reduce contamination to 0%, seed corn companies often require a 660-foot buffer. NU on-farm research in central Nebraska indicated that a 200-foot buffer strip could provide for less than 1% contamination. While it’s rare, pollen can drift a sizeable distance.

3. **Use seed certified to be free of the contaminate.** For example, use seed certified as non-GMO if that’s your goal. Check with your local elevator to ensure it’s accepting the hybrid your planning to raise. If not, have a backup plan.

4. **If it seems contamination cannot be avoided, market the crop accordingly.** Assume that all grain brought into an elevator will be tested for one or more GMO attributes, including the StarLink event.

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### Surface Nitrogen

*(Continued from page 35)*

A gallon of Agrotain is used to treat one ton of urea fertilizer, the added cost is $4.35 per 100 pound of urea-N. The gain is $0.90/A. Use of Agrotain with UAN or dissolved urea costs about 4 cents a pound of applied nitrogen.

Control of the applied nitrogen is improved with the urease inhibitor, eliminating the “need” to apply extra nitrogen to compensate for potential nitrogen volatilization while creating potential for increased leaching. Agrotain does not reduce the leaching potential of applied nitrogen, as does N-Serve.

To learn more about the effects of weather conditions and management practices on volatilization of urea supplied nitrogen, you can test different scenarios with a calculator available at [www.agrotain.com](http://www.agrotain.com).

Charles Wortmann

Extension Soil Fertility Specialist
Avoid tilling wet soil and causing compaction

With the cool, late spring, many producers may feel like their tillage and planting are lagging behind. Some may start tilling to dry out the soil so they can begin planting; however, tilling wet soil causes compaction and should not be done. Instead, producers should wait several days for the soil to dry before tilling or they should consider no-till planting.

When tilling wet soil, the excessive moisture lubricates the soil particles, allowing them to “slide” under the weight of the tractor and tillage implement. This destroys soil structure, squeezes the air spaces out of the soil, and reduces the pore spaces available for water storage. This also reduces the infiltration rate of the soil which actually makes wet spots in the field larger with the next rain. The weight of the tractor and implement is supported by the soil below the tillage layer, forming a tillage pan.

By staying off wet soils, the natural soil structure can build, infiltration improves over time, and the wet spots can heal themselves. Many no-tillers and ridge-tillers have reported this after several years of not tilling the soils. In addition, they have seen that as the natural soil structure builds, the fields are firmer and they can actually get into them earlier after a rain. A tractor and planter are usually quite a bit lighter than tillage implements and the larger tractors required to pull them, further reducing compaction.

With the improved structure, pivot tracks and ruts at harvest also become less of a problem. Typically, ruts are as deep as the tillage because the soil has very little structure in the tillage layer and the tires cut down through to the compacted soil of the tillage pan. When compaction is severe, this pan reduces root penetration and water infiltration and can affect yields.

Tillage pan formed by disking. Notice the lack of soil structure in the tilled zone and good soil structure below the tillage pan.

Tilling deeper than the tillage pan can open up the soil but it also destroys soil structure, making the soil more susceptible to compaction with the next pass in the field. This fracturing can only occur with dry soils normally found with fall tillage and should not be attempted in the spring. After the deeper tillage, care must be taken with subsequent field operations to avoid recompacting the soil.

With the good soil moisture this spring, producers should reduce their tillage depth to avoid making compaction deep in the soil. The reduced depth of operation will require less weight on the tractor to develop the pull needed for tillage, further reducing compaction. If compaction does occur when tilling shallow, it will be much easier to till below the compaction layer this fall when the soil is dry, to break it up. Better yet, consider no-till planting and leave the tillage implements out of the field.

Paul Jasa, Extension Engineer

Kappler joins NU Extension weed science team

Brady Kappler joined the NU Department of Agronomy and Horticulture Feb. 1 as Extension Educator — Weed Science.

Kappler’s responsibilities include weed science Extension programs for the southeast district as well as statewide Extension support. He also will coordinate and support WeedSOFT.

A native of Alabama, he moved to New York state when he was 12. He received his BS degree from Mercyhurst College in Erie, Pennsylvania in 1994 and his MS degree from UNL in 1996.

Kappler was an Extension educator in Cedar County from 1997 to 1999 and an Extension educator for water quality working with irrigation and high nitrate concerns in the Lower Loup Natural Resources district from 1999 to 2000.

“We will be looking for ways to enhance the weed science extension programming and will be adding a web page and a special demonstration plot this summer on woolly cupgrass control. In addition I will be striving to improve the weed management guide and WeedSOFT,” Kappler said. “He also is a regular contributor to Crop Watch and helped coordinate the Focus on Corn issues.”

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