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With 2,4-D: Is amine or ester best?

“Should I use an amine or ester formulation of 2,4-D?” is a question often asked, but not always easy to answer. In general, an ester form is better when temperatures are cool, such as in spring. Switching to an amine when the daytime air temperature is above 85°F reduces the risk of 2,4-D vapor (but not spray droplet) drift. Let’s look at some specifics.

The 2,4-D esters are oil soluble and form emulsions in water (milky appearance). An ester’s true water solubility is low, but its ability to penetrate the waxy leaf surface is high. The 2,4-D amines are highly water soluble, so they are more suited to root uptake than foliar uptake. Both forms degrade rapidly in the soil — average field half-life is 10 days. Since roots more readily absorb amines, amines require a longer planting delay when applied preplant to soybeans. At one pint per acre (4 lb/gal), an amine requires a 15-day soybean planting delay versus 7 days for an ester.

A variety of low volatile (LV) esters and amines are available. The reference formulations for this discussion are 2,4-D dimethylamine and isocotyl ester. Although LV esters usually cost more per gallon than amines, esters are normally used at lower rates so the cost per acre may be less.

Some other points to consider are:

1. Amines have long storage stability and are insensitive to light and temperature. Esters retain satisfactory emulsifying properties for three years or longer. Esters probably have a shorter shelf life than amines.

2. Ester formulations are less affected by water hardness than amines. Amines may precipitate in very hard water or suffer reduced activity due to complexing with iron. Amine formulations contain inhibitors to prevent this.

3. Esters resist washing from leaves better than amines. Rainfast intervals are two to three hours for 2,4-D esters and six to eight hours for amines.

4. Amines are less toxic to fish and preferred for aquatic weed control.

5. Esters are more difficult to clean from spray tanks and will adsorb more tightly to rubber and vinyl fittings.

6. Ester forms are more odorous and may be more objectionable near populated areas.

7. Both forms are rapidly converted to 2,4-D acid in plant cells, so formulation has little effect on active transport within the plant. Formulation does influence the amount that gets into the plant.

8. Both forms can be tank-mixed with other herbicides such as Banvel or Roundup. Because of compatibility, mixing, and stability considerations, 2,4-D premixes with Banvel (Weedmaster) and with Roundup (Landmaster) contain the amine form. Shotgun (2,4-D + atrazine) contains an ester.

9. None of the generally available 2,4-D formulations are restricted use pesticides, but there are product-specific differences in signal words and worker protection standards. Reentry intervals are broadly grouped as 12 hours for esters and 48 hours for amines, but be sure to check individual product labels. Signal words are likely to be “caution” for esters and “danger” for amines.

10. Pasture and rangeland restriction intervals between 2,4-D application and grass use are similar for all formulations: 7 days for lactating dairy animals, 30 days for forage or hay cutting, and 3 days for slaughter.

11. Since most 2,4-D products are designed for foliar application, they contain adequate surfactants. Adding more only increases the risk of crop injury. Mixing with fertilizers may require a compatibility agent; a jar test is recommended before these mixtures are made in the spray tank.


Fred Roeth
Extension Weeds Specialist
South Central REC, Clay Center
Cutworm ID critical to control

Reports of damage from cutworms are slowing, but still coming in. Some reports from wheat in the Panhandle have caused concern because wheat on the hillsides in a few fields has been ‘thinning out’ and tillers have been severed. Cutworms have been seen and blamed for the damage.

While cutworms are likely the cause, it’s more likely that pale western cutworms, rather than army cutworms, are to blame. Pale western cutworms are much more destructive than army cutworms because they feed below the ground and cut tillers as they feed.

Correct identification of cutworms in wheat is important because the thresholds for pale western cutworms in wheat are one-fourth to one-half (1-2 per row foot) the thresholds for army cutworms. These pale western cutworms are about 1 1/2 to 3 1/4 inch long and at about the stage to begin cutting off plants in earnest.

Cutworms in wheat should be identified carefully and if wheat begins to show signs of thinning or cut-off tillers are found, check for pale western cutworms. It is not likely that this will be a widespread problem, but the potential for damage should warrant checking, especially in problem fields.

Gary Hein
Extension Entomologist
Panhandle REC, Scottsbluff

Terry Hejny, Extension Educator in Fillmore County:
Corn planting is progressing very well. Most farmers have almost finished planting irrigated acres. The soil temperature could be warmer and germination has been slow. The April 27-28 rain was much needed.

Dave Baltensperger, Extension Crop Breeding Specialist at the Panhandle REC in Scottsbluff: It has been extremely dry in the Panhandle the past two weeks so field work has progressed rapidly, but there is little moisture for crops or pastures to grow. Wheat is showing stress from warm dry winds.

Dick Ronnenkamp, Extension Educator in Boone/Nance counties:
Corn planting in Boone and Nance counties is going well on the better drained soils. Some fields remain wet and will be the last to be planted. Cool mornings are a concern and keep the soil temperatures from increasing. Alfalfa fields are off to a good start for the season.

Ray Weed, Extension educator in Kimball and Banner counties:
People here are planting short-season corn and short-season dwarf corn hybrids on dryland acres in response to low wheat prices. Now

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Correction

2,4-D amine is registered preplant on soybeans (see “Burndown Herbicides in No-Till,” Crop Watch 98-5). Soybeans can be planted 15 days after a 0.5 lb/acre application of 2,4-D amine.

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Update on inoculants for soybeans

Since the article on soybean inoculation last week (Crop Watch 98-6, page 54), I have received calls asking for more information on materials and methods for inoculating soybeans. Inoculation with effective soybean inoculant is critical for soybean growth, development and productivity on soils that have never had nodulated soybean plants.

In addition to the soil-applied inoculant discussed last week, liquid, frozen, and sterile peat-based inoculants also are effective on these 'new soils.' These newer inoculant materials are generally more expensive ($2-$6/acre) than the normal non-sterile, peat-based inoculant ($0.50/acre), but if you are planting on new soils, these products are more effective than the non-sterile, peat-based materials. The cheaper materials could be used for insurance purposes on 'old soils' (soils that have had nodulated soybeans). The newer materials are probably available at most Nebraska agricultural cooperatives.

The new liquid and sterile peat-based materials contain bacteria strains that are more effective at nitrogen fixation. Nevertheless, our work has shown that these don't increase yields on old soils.

Two things can go wrong with any of the materials and limit the effectiveness of inoculation. 1) Inoculant contains live bacteria. Improper storage and handling can reduce effectiveness. 2) Soil pH's below 6.0 can reduce bacterial nitrogen fixation. Add lime to maintain soil pH above 6.0.

More information on our soybean inoculation tests can be found at: http://www.ianr.unl.edu/ianr/scrc/hotline/Inoculate/inoculate.htm If you are planning to conduct some in-field inoculation trials this year, please let me know. I'd like to hear about them. Roger W. Elmore Extension Crops Specialist

Research shows rotating soybeans, corn boosts yields, reduces need for nitrogen

Although past farm program provisions have favored feedgrains and wheat, soybean has risen from less than 10% of planted acreage in Nebraska to over 20% in the past 25 years. The planting flexibility provided under the current farm program presents an opportunity to further expand soybean acreage.

University of Nebraska research results have, with few exceptions, shown an increase in corn and grain sorghum yields after soybeans. Dryland corn yields after soybeans at Concord and Mead, for example, have averaged 20% above continuous corn in studies conducted over eight years or more. Research results for dryland grain sorghum at Clay Center and Mead have shown respective average yield increases of 5% and 14% for sorghum after soybeans versus continuous grain sorghum in studies conducted over seven or more years. Irrigated corn after soybeans at Shelton and Clay Center has shown average yield increases over continuous corn of 2% and 5%, respectively, over the last seven years. The irrigated studies included yields below 100 bushels per acre in 1993 due to wind breakage and still averaged over 165 bushels for the study period.

Some of the yield increase after soybeans may be due to additional weeds, insects or diseases in continuous cropping; however, most of the yield differences are likely due to organic compounds released when the residue of the previous crop is decomposed. Also, the influence of one crop on the physical properties of the soil may affect the next crop.

Since the soybean is a legume, it can obtain its nitrogen from the air. Nitrogen-fixing bacteria develop nodules on the soybean roots and provide needed nitrogen for the soybean. There is evidence that some nitrogen will remain to benefit subsequent grain crops. Also, because of the lower residue levels with soybeans, less nitrogen is "tied up" in decomposing residue. As a result, most of the studies cited above applied less nitrogen when the previous crop was soybeans. Several studies support the current

Research supports reducing nitrogen application by 45 pounds per acre on corn or grain sorghum after soybean unless the soybean yield is below 30 bushels per acre.

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Soybean rotations (Continued from page 63)

recommendation to reduce nitrogen application by 45 pounds per acre on corn or grain sorghum after soybeans unless the soybean yield is below 30 bushels per acre. There is some evidence to suggest that 45 pounds is a conservative estimate.

A producer could save $13 or more an acre by eliminating corn rootworm insecticide. Planter box seed treatment may still be required. A producer could save $13 or more an acre by eliminating corn rootworm insecticide.

Budgeted costs and returns for irrigated continuous corn and a corn-soybean rotation indicate a savings of over $50 per acre for the rotation. These savings include eliminating corn rootworm insecticide, reducing nitrogen, eliminating stalk cutting and tillage prior to planting corn in soybean stubble, reduced water needs of soybeans and reduced drying costs on corn when corn is allowed to dry down in the field while soybeans are being harvested.

Breakeven soybean yields rotated with irrigated corn and dryland sorghum

<table>
<thead>
<tr>
<th>Corn</th>
<th>Soybean1</th>
<th>Sorghum</th>
<th>Soybean2</th>
</tr>
</thead>
<tbody>
<tr>
<td>225</td>
<td>60</td>
<td>120</td>
<td>38</td>
</tr>
<tr>
<td>200</td>
<td>51</td>
<td>100</td>
<td>32</td>
</tr>
<tr>
<td>175</td>
<td>43</td>
<td>80</td>
<td>26</td>
</tr>
<tr>
<td>150</td>
<td>35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Breakeven soybean yield for specified irrigated continuous corn yields based on historical average prices of $2.38 for corn and $5.97 for soybean, a 2% increase in corn yield after soybean and a $50 lower average per acre cost for corn-soybean versus continuous corn.

2 Breakeven soybean yield for specified dryland continuous grain sorghum yields based on historical average prices of $2.16 for sorghum and $5.97 for soybean, and a 5% increase in sorghum yield after soybean and the same average per acre cost for a sorghum-soybean rotation and continuous sorghum.

There also would be management differences and additional demands when adding soybeans to the crop mix, but the demand for labor, management, and machinery time would be spread out due to the later optimum planting date for soybeans. Because of differences in peak water use between corn and soybean, limited irrigation capacity can be spread over more acres with a mix of corn and soybean. Machinery ownership costs also would be reduced by eliminating stalk shedding and preplant tillage on the soybean residue although a row-crop or platform head would be an added cost unless soybean harvesting is custom hired.

A $50 per acre cost savings and a 2% yield increase with corn rotated with soybean results in a breakeven 43 bushel soybean yield with 175 bushel continuous corn yields using the past 10-year average harvest time prices of $2.38 for corn and $5.97 for soybeans. Soybean yields at Clay Center have, for example, averaged over 50 bushels per acre while continuous corn averaged 163 bushels per acre.

Rotating grain sorghum with soybean does not have as many advantages as does rotating irrigated corn. In fact, the savings in applied nitrogen may be offset by a higher seed and weed control cost with soybean. Budgeting a 5% yield increase for grain sorghum rotated with soybean and assuming per acre costs average the same for continuous sorghum and a sorghum-soybean rotation, results in a breakeven 32-bushel soybean yield with 100-bushel continuous crop sorghum yields using 10-year average prices. Continuous sorghum at Clay Center has averaged 103 bushels per acre in recent years while soybeans averaged 41 bushels per acre. Breakeven soybean yields for a range of continuous irrigated corn and dryland grain sorghum yields are reported in the table. Not reflected in these breakeven yields is the effect diversifying the crop mix has in reducing the risk of crop losses in individual years.

Roger A. Selley, Extension Farm Management Specialist
South Central REC, Clay Center
Robert N. Klein, Extension Cropping Systems Specialist
West Central REC, North Platte
Robert M. Caldwell, Extension Cropping Systems Specialist
Southeast REC, Lincoln
Sorghum yields similar to dryland corn

A number of my farmer client friends have been teasing me about my support of milo. The teasing doesn’t bother me, nor does it bother me that they have chosen to plant dryland corn in place of milo in 1998. Farmers have to choose the crops they plant and accept the risks associated with their choice. Choosing dryland corn and selecting the population level for the crop is part of the risk. Buying crop insurance and diversifying crop acres are ways to reduce risk. Every farmer has to find the risk level they can accept comfortably.

Hybrid milo began replacing corn acres when it was introduced in Gage County in 1956. It is a vital crop and an alternative to corn in the harsher climates of the southern High Plains. Leading milo production states are Kansas, Texas, Nebraska, and Oklahoma.

A study comparing milo and dryland corn yields in Nebraska indicates an even race. Twenty years of farm records from the Nebraska Farm Business Association indicate a 79 bu/ac average for corn and a 76 bu/ac average for milo. The high and low yield years were 121 and 58 for corn and 111 and 61 for milo. Corn is the race horse in good years and milo is a steady yield performer with lower production costs.

The Farm Business Association data for net return above all costs show similar parallels. Corn averages $12.43 per acre while milo in the same years comes in at $11.37 per acre. The high and low years show corn at $93 and a low of ($67) per acre. Milo shows a $73 per acre high and a ($39) low. Producers have a choice — riding the roller coaster with corn or choosing the bumper cars with milo. Both can give you a thrill, but if things go wrong the landing may be easier with milo.

Crop choices should be made for profit, for best management, to best fit the farm resources, and for a manageable risk. Milo is a viable profit choice for dryland farmers in southeast and south central Nebraska. Milo production:

1) allows for a broader planting and harvest window;
2) smooths out the variability of yields and costs;
3) adds an important rotation alternative; and
4) can reduce soil losses on terraced ground in a three-year or four-year rotation.

University of Nebraska milo researchers are breeding food grade sorghum hybrids and introducing genetic improvements to increase market opportunities for the state’s producers.

Paul Hay, Extension Educator
Gage County

Sorghum acres down

New markets, herbicides sought

Acres of sorghum planted in Nebraska have been declining in recent years as cooler, wetter summers, commodity prices, and changes in the farm program have made it easier to switch dryland acres from sorghum. In addition, in some areas ground that might formerly have been planted to sorghum is under CRP contract.

In 1997 there were 750,000 harvested sorghum acres, down from 1,030,000 in 1996 and 1,300,000 in 1987. In both 1987 and 1997 average sorghum yield in Nebraska was 82 bushels per acre.

Historically sorghum often has been thought of as providing less feed value than corn, however Barbara Kliment, executive director of the Nebraska Sorghum Board, noted that recent UNL research by Rick Grant, Extension Dairy Specialist, and Todd Milton, Extension feedlot specialist, indicates otherwise. Their results showed that the nutritive value of distiller’s sorghum is equivalent to that of distiller’s corn.

While the largest consumer of U.S. sorghum (nationally and internationally) is livestock, there is growing demand for sorghum for ethanol production and food consumption. Nebraska ethanol plants annually consume nearly 20 million bushels of grain sorghum. New sorghum hybrids are being developed to specifically appeal to the food industry.

“We are receiving an increasing number of calls from people throughout the country who are interested in sorghum because of its gluten-free characteristics,” she said. “When people are intolerant to gluten (a wheat product), their options become limited quickly.”

The Nebraska Sorghum Board is working to support research of new markets and uses for sorghum, as well as working with the EPA to broaden the array of products available to growers for post emergence grass control.

A lack of products available for successful weed and insect control is one reason some growers may be looking to other crop options, she said. The board has been working with the Nebraska Secretary of Agriculture’s office to pursue a Section 18 use permit for a product to provide postemergence weed control in grasses. It also has been working to protect other sorghum herbicides to allow for continued, diversified cropping options.

Lisa Jasa, Crop Watch Editor
Controlling insects in sorghum in ‘98

Seed and seedling pests

Sorghum can be damaged by a number of seed and seedling pests such as wireworms, seedcorn maggots, and seedcorn beetles. Damage from insect feeding on seed is often greater in fields with high amounts of plant residue and when cool soil conditions slow germination. Seed feeding pests can be controlled with planter box seed treatments, planting-time granular/liquid insecticides, or Gauchotreated seed.

Planter box seed treatments are relatively cheap and provide effective protection in most instances. If planter box treatments are used, seed must be planted soon after treatment.

Granular/liquid insecticides applied at planting or Gauchotreated seed are more expensive than planter box treatments. These insecticides provide early season control of greenbugs and moderate infestation levels of chinch bugs. Based on the current Gaucholabel, it is illegal to plant corn or soybeans (or other non-Gaucho labeled crops) for 12 months after a field has been planted with Gauchotreated seed. We hope this restriction will be removed soon. Please keep this restriction in mind as you make your cropping plans. For more information check the UNL Department of Entomology web site’s Insect Management Guide for Sorghum: http://ianrwww.unl.edu/ianr/entomol/pgguides/sorguide.htm.

Greenbugs

A relatively new greenbug biotype, Biotype I, capable of damaging Biotype E resistant sorghums, has been increasing in number over the past few years. We found both Biotype E and I greenbugs in Nebraska fields last year with Biotype I being the predominate greenbug in southeastern Nebraska. Consequently, heavy greenbug damage occurred in many fields in southeastern Nebraska in 1997. Biotype E resistant sorghums did not provide consistent greenbug protection in southeast Nebraska (field tests in Gage, Saline, Lancaster, and Fillmore counties). However, in Saunders County, where Biotype E was still the predominate greenbug, Biotype E resistant sorghum hybrids provided excellent protection from greenbugs in most fields. Biotype I resistant sorghums provided excellent greenbug protection in all tests last year. Based on the spread of Biotype I through Texas, Oklahoma, Kansas and now into Nebraska, we expect Biotype I to be the predominate biotype throughout most of Nebraska this year.

Another biotype, Biotype K, has been reported but it is too early to make a prediction regarding its impact on sorghum production. Some Biotype I and K resistant sorghums are on the market and more will be available next year. In our tests last year, the combination of greenbug resistant sorghums, greenbug predators (mainly lady beetles and lacewings) and parasites was effective in controlling greenbugs. Predators and parasites also helped reduce damage on greenbug susceptible sorghums but did not hold greenbug populations below economically damaging levels in many fields.

Occasionally greenbugs damage seedling sorghum in Nebraska. Seedling sorghum infestations are often eliminated by adverse weather conditions such as rain and hot dry winds. If greenbugs migrate into sorghum fields early and weather conditions do not eliminate them, populations can develop quickly and severe damage may result. Sorghum fields should be examined frequently — at five to seven day intervals — to detect greenbugs early to enhance chances of prevent-

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**Sorghum insects (Continued from page 66)**


**Chinch bugs**

Chinch bug numbers have been relatively low since 1992 but have increased over the past three years. Based on field observations last summer and our fall and spring chinch bug surveys (see table), we do not anticipate widespread serious problems in 1998. Some individual fields, however, may sustain serious damage.

Dry weather, poor wheat stands, planting sorghum into wheat stubble with volunteer wheat, and planting sorghum or corn next to wheat are factors that can lead to increased chinch bug damage. Not planting sorghum or corn next to wheat during outbreak years is still the best recommendation for reducing chinch bug damage. Planting time insecticides (Gaucho-

**Average chinch bugs per square foot**

<table>
<thead>
<tr>
<th>County</th>
<th>Fall 1997</th>
<th>Spring 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gage</td>
<td>7.1 (23)</td>
<td>4.3 (16)</td>
</tr>
<tr>
<td>Jefferson</td>
<td>57.3 (232)</td>
<td>0.7 (4)</td>
</tr>
<tr>
<td>Lancaster</td>
<td>19.7 (44)</td>
<td>2.7 (4)</td>
</tr>
<tr>
<td>Pawnee</td>
<td>22.6 (76)</td>
<td>8.3 (4)</td>
</tr>
<tr>
<td>Saline</td>
<td>21.0 (51)</td>
<td>23.0 (36)</td>
</tr>
<tr>
<td>Saunders</td>
<td>4.0 (12)</td>
<td>—</td>
</tr>
</tbody>
</table>

Number in parentheses indicates the highest population count in each county.

Chinch bugs treated seed or Furadan 4F) are effective on light to moderate populations of chinch bugs. For more information on chinch bugs, refer to University of Nebraska NebGuide G86-806, *Chinch bug Management and the Insect Management Guide for Sorghum* on the University of Nebraska, Department of Entomology web page at http://ianrwww.unl.edu/ianr/entomol/pmguides/sorguide.htm

Z B Mayo

Extension Entomologist, Lincoln

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**Crop management/diagnostic clinic set for June 9**

An Early Season Crop Management and Diagnostic Clinic will be June 9 at the NU Agricultural Research and Development Center (ARDC) near Mead.

Instruction is aimed at agricultural industry representatives — crop consultants, farm managers, seed and chemical company representatives, farm service center staff and other professionals — as well as agricultural producers. Certified Crop advisors will have the opportunity to receive at least 5 CCA-CEU credits for this one-day clinic.

Topics include weed management, genetically engineered crops, soil assessment, GPS/GIS interpretation and utilization, and best management practices for erosion reduction.

Preregistration ends June 2. Cost is $110 if preregistered or $125 at the door. The fee includes training, lunch and reference notebook.

Because of the individualized training, each clinic is limited to 72 participants. Presenters include NU Institute of Agricultural and Natural Resources scientists, instructors, Extension specialists and educators. The clinic is sponsored by Cooperative Extension, the Agricultural Research Division and ARDC, all in IANR, with financial support from private industry.

For more information, call the ARDC at (402)624-8030 or fax (402)624-8010.

Keith Glewen, Extension Educator, Saunders County
Barbara Ogg, Extension Educator, Lancaster County

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Field updates (Continued from page 62)

we'll just hope that corn prices make the venture worthwhile.

There also will be soybean acres planted in the Panhandle this season, both seed and forage types. The seed-producing soybeans are likely Roundup Ready at 1.9 maturity and the forage types are in the 5.0 maturity group. Reportedly, forage type soybeans have good overall feed quality which makes them attractive to integrated crop/livestock producers here with dryland acres.

We're still having difficulty with army cutworms in alfalfa and wheat.
Reduce pesticide drift and avoid unnecessary crop damage

It's estimated that two-thirds of pesticide drift problems involve mistakes which could have been avoided. Drift takes the pesticide from the intended target, making it less effective, and deposits it where it is neither needed nor wanted. The pesticide, which is then an environmental pollutant, can injure susceptible vegetation, contaminate water or damage wildlife. Drift cannot be eliminated, but it can be limited by using proper equipment and application procedures.

There are two kinds of drift: Particle drift is off-target movement of spray particles.

Vapor drift is the volatilization of the pesticide molecules and their movement off target.

J. L. Matthews and G. Kapusta at Southern Illinois University studied corn and soybean tolerance to simulated glyphosate (Roundup) and glufosinate (Liberty) drift. Corn was stunted more by glyphosate than by glufosinate two weeks after treatment. Corn plants injured by glyphosate were also more likely to die than corn plants injured by glufosinate. Even when corn population was not reduced, glyphosate-injured corn yielded lower than glufosinate-injured corn.

Glufosinate was more likely to reduce soybean population than glufosinate. When soybean population was reduced, soybean yield also was reduced. Though soybeans were more tolerant of glufosinate than glyphosate, a full rate of either herbicide caused significant soybean yield reduction.

Corn and soybean injury caused by glyphosate drift may not be apparent the first week, especially with larger plants. Glufosinate drift injury is apparent within a few days, however injury assessment should be delayed until after the second week. Corn that was stunted 20% or more two weeks after drift of glyphosate will probably yield less than corn which escaped drift. The relationship between glufosinate injury and yield reduction depends on growing conditions. Good growing conditions will allow corn and soybeans to recover from injury from glufosinate drift.

University of Nebraska Weed Scientists Fred Roeth, Alex Martin, Gail Wicks, and Robert Wilson have conducted research on glyphosate injury to corn using Golden Harvest 2547, Pioneer 3394, Pioneer 3475, and Pioneer 3751IR. Roundup Ultra plus ammonium sulfate was applied in 10 gallons of water to reflect drift of 2%, 4%, 8%, and 16% of a 32-ounce rate at three-collar corn (early post), six-collar corn (late post) and early plus late. The early plus late application received twice the dose of the single application. The table shows the percent corn yield for the various treatments.

Dave Smith, a Mississippi State University ag engineer, analyzed data from more than 100 studies involving drift from ground sprayers. Of the 16 variables, three were most important: wind speed, boom height, and distance downwind.

When the wind speed was doubled, there was almost a 700% increase in drift when the readings were taken 90 feet downwind from the sprayer. Spray when winds are 10 mph or less.

When the boom height was increased from 18 to 36 inches, drift increased by 350% 90 feet downwind.

If the distance downwind is doubled, the amount of drift decreases five-fold. If the distance downwind goes from 100 to 200 feet, you have only 20% as much drift at 200 feet as at 100 feet and if the distance goes to 400 feet, you only have 4% of the drift you had at 100 feet. Check wind direction and speed when starting to spray a field. You may want to start spraying the side of the field where the wind is less than on the other side. It also may be necessary to only spray part of a field because of wind speed, wind direction and distance to susceptible vegetation. The rest of the field can be sprayed when conditions change.

(CoContinued on page 69)
Thoroughly cleaned sprayers essential with new herbicide-tolerant crops

With producers increasing their use of herbicide-tolerant crops, the cleaning of sprayers becomes even more important. The potential for crop injury from post emergence applications sprayed on the crop foliage is greater than with soil applications. Small amounts of herbicides still in the sprayer can cause serious crop injury.

The largest number of recent herbicide crop injury problems from contaminated sprayers has been on soybeans with growth regulator herbicides. The herbicide residuals in the sprayer can be dissolved by herbicides, solvents and/or adjuvants. A contaminated sprayer can even cause crop injury for several months if it wasn’t properly cleaned.

Pesticides may settle to the bottom of the tank if agitation is not adequate or they can settle out in the tank, hoses, and boom if the sprayer is shut down. Always end the workday, if possible, with an empty tank. A tank of fresh water mounted on the sprayer will provide water to flush the system in the field and the rinsate can be sprayed on the field of the product’s labeled use.

Always keep the sprayer’s inside and outside clean. Sprayers with stainless steel booms, which reduce the number of hoses and fittings on the sprayer, are easier to keep clean and have less area for pesticide buildup. Screens and strainers need to be cleaned or replaced. Check sumps and pumps along with the inside of the sprayer tank, especially the top and around baffles and plumbing.

When going between crops follow the specific cleanup procedures listed on the label. Some cleanups require special cleaning agents. Following is the spray cleanup procedure discussed in University of Missouri publication G4852, Cleaning Field Sprayers to Avoid Crop Injury.

This procedure is recommended for all herbicides unless the label specifies a different procedure.

1. Add one-half tank of fresh water and flush tanks, lines, booms and nozzles for at least 5 minutes using a combination of agitation and spraying. Rinsate sprayed through the booms is best sprayed onto cropland to avoid accumulation of pesticide-contaminated rinsate. Thoroughly rinse the inside surfaces of the tank, paying particular attention to the surfaces around the tank fill access, baffles and tank plumbing fixtures. The use of a 360-degree nozzle, such as the TeeJet Model 27500E-TEF rinsing nozzle, permanently installed to the spray system can automate the thorough cleaning of tops and sides of the tanks. Several nozzles may need to be carefully positioned to clean tanks with baffles. Pressure sprayers are useful for removing caked-on internal and external residues. Hot water can increase penetration of dried residues, but rinsing with hot water may cause unacceptable health hazards due to the vapors produced. Carefully review labeled safety precautions for the agrichemicals and cleaning products used.

2. Add more water and rinse the system again by using a combination of agitation and spraying. Remove nozzles, screens, and strainers and clean separately in a bucket of cleaning agent and water.

3. Rinse and flush the system once again with clean water.

Robert N. Klein, Extension Cropping Systems Specialist

Pesticide drift
(Continued from page 68)

New nozzle types such as Turbo FloodJet®, Turbo TeeJet®, Air Injection, Raindrop® Drift Reduction, Turbo Drop®, and Low Drift can reduce drift. Surfactants and crop oil concentrates added to spray solutions affect droplet size.

Spray pressure also is important. Higher spray pressures produce smaller droplets which are more susceptible to drift. If using a rate controller, be careful of increased speed. Since most rate controllers increase the pressure to maintain the same gpa, when the speed increases, try to maintain the speed within ±10%. For example, if you are applying 20 gpa at 8 mph at 40 psi and you increase the speed to 11 mph, the pressure will now be 75.5 psi which will produce a lot of small particles prone to drift and be above the operating pressure range of most nozzles. Drift reduction agents are helpful.

Robert N. Klein, Extension Cropping Systems Specialist
You asked about it

Nitrogen at planting

Edwin D. Siffring, Extension Educator in Butler County: I’ve been asked when corn can be safely planted after applying anhydrous ammonia. Conventional wisdom says a week — give or take — which makes sense, due to the dessicating effect of the NH₃ on the seed.

Ken Frank, Extension Soils Specialist in Lincoln, responded: Several factors can influence how fast corn can be safely planted after anhydrous application.

First, how much anhydrous was applied, how deep was it placed, and what was the soil moisture status when anhydrous was applied?

Second, what is the soil temperature, the soil texture, i.e. how much sand silt and clay, (texture and organic matter account for the cation exchange capacity of the soil). A sandy soil with a CEC of 5 versus a silt loam with a CEC of 20 will have a larger band diameter from a given amount of ammonia.

In general, after 72 hours there should be little seedling damage unless the corn was planted right in the knife tract. Planting may be delayed for just 48 hours if the soil temperature is above 60 degrees, the application depth was at least 8 inches, the corn is planted at an angle to the anhydrous application, and the soil is a sandy loam. Planting within 48 hours may result in some seedling damage for plants near the knife tract.

Prepare to treat for early season turf diseases

Several turf diseases typically become active in the spring or early summer and, depending on weather and contributing factors, can seriously damage your turf areas. Identifying the problem correctly can help you provide the right solution.

Leaf Spot/Melting Out: This disease is the most common spring disease of Kentucky bluegrass. When temperatures range from 65°F to 75°F, the melting out fungus produces numerous spores on plant debris in the thatch layer. These spores are spread to new growth by wind, mowers and other turf equipment, and splashing water. Infected clippings, if properly mulched, usually do not contribute to the spread. Symptoms are yellow leaf blades with dark spots. To reduce the severity, don’t overfertilize with nitrogen this spring. Keep the turf vigorous but not lush. On turfs with a history of melting out, apply a preventive fungicide twice during May.

Necrotic Ring Spot: If your Kentucky bluegrass develops “doughnut” like patches in May and early June, it’s probably caused by necrotic ring spot, a fungus that infects the roots. The symptoms are 6- to 24-inch circular or semi-circular patches. The dead grass is light tan and matted, and many patches will have a tuft of healthy grass in the center. Preventive measures include spring aerification and application of a fungicide in early May to areas with a history of necrotic ring spot. Some fungicides need to be drenched into the root zone, so read the label before applying.

Powdery Mildew: Powdery mildew develops on shaded turf. It usually is not severe but can become a problem during extended cloudy weather. The mildew fungus attacks the surface of grass leaves where it produces a white to light-gray powdery growth. Prevent mildew injury by selective pruning of shade trees to increase light penetration and improve air movement that dries the grass canopy. Use fungicides on turf with a persistent mildew problem.

Stripe Smut: This is a cool weather disease that develops during May. Once a plant is infected, it remains infected for life. Smut spores are spread by mowing, wind, rain and irrigation. Stripe smut causes the turf to exhibit a general decline and yellowing. It can easily be confused with melting out or nitrogen deficiency. Smutted plants show long, narrow black stripes along the leaf blades. Infected blades may twist and curl. Once the disease is detected, apply a systemic fungicide.

NebFact 95-214 lists available turfgrass fungicides. This NebFact, which is available from local Extension offices, was recently updated and lists both commercial and homeowner turf fungicides.

John E. Watkins
Extension Plant Pathologist