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Lisa Brown Jasa
University of Nebraska-Lincoln, ljasa1@unl.edu

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Laboratory soil samples show effects of 1993 weather on fertilizer needs

The most often asked question about the 1993 crop year concerns carry over of nitrogen for 1994. Because crop yields were reduced on many acres, it is logical to ask if some of the nitrogen not used by the 1993 crop will be available for 1994. The table shows the distribution of nitrate-N in samples analyzed by the Agronomy Department Soil Testing Laboratory from October to March 15.

As shown in the above table, 63% of the 1,659 samples analyzed averaged 64 or less pounds of Nitrate-N in the top 3 feet. This level of carry-over nitrogen indicates that nitrogen applied in 1993 was either used by the crop or generally moved out of the 0-36 inch zone. Further, 37% of the soils show that considerable amounts of nitrogen remain in the top 3 feet of the root zone and will need less nitrogen than the fields with 64 pounds or less.

The distribution of Nitrate-N in the 1,659 samples is similar to distributions found by commercial Nebraska laboratories with whom I have talked. There appears to be considerable variation in carry-over of nitrogen from 1993. The only way to be sure of the nitrogen status of your fields is to test for residual Nitrate-N.

Phosphorus availability this spring, especially in cold wet situations, may have been influenced by last years crop season. First, last year’s wet conditions caused some soils to be water logged for some time. Under water logged conditions, lack of oxygen in the soil system could have changed some iron compounds such that some phosphorus could be tied up in less soluble forms. Another possible area of concern is for fields that were fallowed due to flooding or the 0-92 program or wind damaged fields where the crop was destroyed. Under prolonged fallow periods, the Mycrohiza population declines. Mycrohiza fungi grow on plant roots which increases the ability of the plant to take in phosphorus. Dr. Jim Ellis, soil microbiologist in the Department of Agronomy, indicated this is a severe problem in Australia where the soils undergo longer periods of fallow, have higher temperatures and low amounts of phosphorus in the soil. However, he indicated a low probability for problems in Nebraska as long as the fields were not fallowed for a whole year or more. Fields coming out of the CRP program that were in grass would definitely not have a problem due to insufficient mycrohiza fungi.

In order to minimize any potential phosphorus deficiency problems with wet or fallow fields, producers should:
1) be sure the soil test value for phosphorus is in the high range for the crop to be grown, and/or
2) apply phosphorus at planting as a starter. If starter is to be placed with the seed, do not exceed more than 8 pounds of salt for corn. For rates of nitrogen, phosphorus and potassium that exceed 8 pounds of salt, place the starter at least 2 inches to the side and preferably 2 inches below the seed. Don’t apply any type of starter fertilizer with soybeans.

K.D. Frank
Department of Agronomy

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Newsletter changes reflect reader interests

Results of our 1993 CropWatch readership survey gave us new insight into who our readers are and what kinds of information they want. While the survey wasn't formal, the 162 respondents from the more than 1,000 subscribers provided valuable information. The top subjects they identified were: insect control, agronomic information, weed control, pesticide updates, disease control, weather impacts and biological controls.

By far the majority of respondents said timely information, especially related to pest management, was what was most valuable about the newsletter. Many felt the mix of subject areas worked well, while others suggested adding more agronomic information.

Several changes have been made in this year's newsletter to incorporate reader suggestions and better address identified needs. Soil fertility and crop production issues will be addressed regularly by Extension specialists from the Department of Agronomy. Several readers also said they would like more advance notice of what pest problems might be moving into the state. We will include reports from the Kansas Department of Agriculture on crop pest developments, as the situation warrants.

Of those responding to the survey, about 27% were farmers and about 14% were business or farm managers; 26% were consultants; 25% were in sales or application; 14% were in higher education; and 11% described themselves as fitting outside these categories and included technical service, federal agricultural representatives, and journalists. For those in production agriculture, size of operation ranged from 20 acres to a farm manager covering 12,000 acres. The average farm was about 1,200 acres.

Seventy-three percent of those answering a production question said they had changed a management practice based on information in CropWatch, mainly in the areas of scouting and pesticide timing and selection. Individuals reported saving $2-$20 an acre because of these changes.

A pet peeve mentioned by several respondents was the practice of continuing stories from one page to the next. This practice will be minimized this year, although it's impossible to totally avoid it. On the cover, instead of starting stories in the three columns, one story usually will be featured.

Throughout the year if you have questions or suggestions concerning the newsletter, please feel free to call. We want to know what information you need.

Lisa Jasa
Crop Watch Editor

Kansas disease report

Wheat disease activity has picked up during the last few weeks. Speckled leaf blotch was found widespread across Kansas. Leaf rust and viral infections were also noted in various areas of the state. It now appears more leaf rust overwintered than had been anticipated. (March 17)

Kansas Board of Agriculture
Plant Disease Survey Report

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Lisa Brown Jasa, Editor

For more information about a particular subject, write the authors at the addresses below:

**UNL Department of Entomology**
202 Plant Industry Bldg.
Lincoln, NE 68583-0816

**UNL Weed Science**
Department of Agronomy
279 Plant Science Bldg.
Lincoln, NE 68583-0915

**UNL Department of Plant Pathology**
406 Plant Science Bldg.
Lincoln, NE 68583-0722

**UNL Department of Agricultural Meteorology**
236 L.W. Chase Hall
Lincoln, NE 68583-0728

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Crown and root rot at a minimum

**Season approaching for wheat viruses**

Wheat in much of Nebraska is rapidly greening up. In south central and eastern Nebraska most stands are uniform with the only bare spots being low areas where water stood. In the areas surveyed, the wheat looks better this year than it has for several years. If the moderate weather continues into April without a sudden drop in temperature to well below freezing, the wheat should continue to do well. Because of good moisture and firm seedbeds last fall, very little crown and root rot is present. This disease should not affect production much this year.

Within the next few weeks, symptoms of soilborne wheat mosaic and wheat spindle streak will become obvious in many fields in eastern and south central Nebraska. Spindle streak symptoms develop best at temperatures between the mid 40s and mid 50s, and the soilborne wheat mosaic produces symptoms at temperatures in the mid 50s to mid 60s. Even though we have had these temperatures since mid March, the wheat is so small that symptoms are not visible. As the wheat begins to grow the symptoms also will develop. Of the two virus diseases, soilborne wheat mosaic is the most predominant in Nebraska. The most evident symptoms will be yellowing in terrace channels, drainage patterns and other low areas in fields, although they are not confined to these locations. Leaf symptoms are a light green to yellow mosaic pattern on the leaves. Symptoms of wheat spindle streak are very similar except that the leaves will show spindle-shaped spots or dashes. Although symptoms of both diseases may become obvious, they may not stay around long if warm weather persists. I doubt if either disease will cause significant yield loss this season. A new virus disease of wheat has been discovered in the High Plains. It has tentatively been identified as a “tenuivirus” and appears to be vectored by the wheat curl mite. It has not been found in Nebraska. Since it has been confirmed in Kansas, I wouldn’t be surprised if we find it in Nebraska this year. Although the epidemiology of this new disease is not clear, I suspect it is similar to that of wheat streak mosaic since the two are often found together and share a common vector. We will do a thorough statewide survey in May to determine if and where this new virus occurs. Since it is vectored by the wheat curl mite, it will be managed the same way as the wheat streak mosaic through post harvest weed control and proper planting date. I’ll keep you advised as more information on the tenuivirus develops.

John Watkins
Extension Plant Pathologist

**On-farm waste disposal severely limited**

Until recently, small communities and rural residents were exempt from having to comply with laws that regulate the disposal of solid waste. However, regulations effective Oct. 1, 1993 are significantly changing the way solid waste is managed in rural areas. These regulations prohibit disposing of solid waste at any location, including private property, unless it is a facility permitted by the Nebraska Department of Environmental Quality (NDEQ). There are a few exemptions to this prohibition that recognize the inherent nature of rural areas.

The ramifications of this ban are quite significant, with perhaps the primary implication being that individuals who dispose of solid waste on their own property are violating state law. For example, it is illegal to take household garbage out to a nearby gully and add it to an existing pile of garbage. It is also illegal to put trash from your production operation (i.e., feed sacks, oil filters, antifreeze, pesticide containers, water tanks, etc.) into the nearby “hole in the ground” for disposal. In essence, individuals who dispose of solid waste in any location, other than a permitted facility, are breaking the law and placing themselves in a potentially uncomfortable situation.

The Nebraska Department of Environmental Quality can levy fines of up to $5,000 per day until the violator complies with regulations. It should be noted that counties and municipalities are responsible for providing reasonable alternatives and access to facilities for solid waste management (including disposal) to residents within their jurisdictions. There are a few exemptions from the ban for rural residents. These include:

1) Using clean dirt, brick, stone, or other inorganics for beneficial

(Continued on page 10)
Waste disposal  

(Continued from page 9)

fill, or if generated and disposed of on an individual’s property. A U.S. Army Corps of Engineers permit may be required if water ways are affected.

2) Using tires, posts, or clean ferrous objects for bank or blowout stabilization. Bank or blowout stabilization must be done in accordance with State and Federal laws pertaining to the clean water act. A U.S. Army Corps of Engineers permit may be required for this activity.

3) Incinerating yard waste if it is permitted by the county and a burn permit is obtained.

4) Using burn barrels for household waste generated on the premises, and if the county permits burning. Ashes from the burn barrel must be disposed of in a permitted facility.

5) Accumulating junk that is agricultural in character to the extent that it does not present a potential health hazard.

6) Stockpiling tires; however, consult the State Fire Marshall or your local fire department, and the local health department to avoid fire and health hazards.

7) Dead animals should be picked up by a licensed renderer, or buried at least 500 feet from a house, dwelling, or barn and four feet below ground. Obtain additional information on handling dead animals from the Nebraska Department of Agriculture.

An exemption also might be granted in another situation, which is more complex and involves interpreting the regulations. In this case, disposal on private property is permitted if:

1) the property is outside the corporate limits of a municipality; and

2) the county has not provided reasonable access to a permitted facility, or the county has not provided for the transportation of waste to a permitted facility. This is a difficult exemption to interpret because it requires that the term reasonable access be defined. For example, does this mean that reasonable access is a facility within 30 minutes driving time, or one hour driving time?

A first recommendation is to get involved in the planning process for new solid waste management systems in your area. This involvement can range from making an inquiry about the current status of the planning process to becoming a member of a local planning committee. Regardless of the degree of involvement, you should make sure that you have a reasonable disposal alternative in place before ceasing current practices.

Wayne Woldt, Extension Waste Management Specialist

Kansas insect survey highlights

The following information was developed from a March 18 report. (See page 13 for chinch bug results from an earlier survey.)

Late winter greenbug buildups in wheat are continuing in several counties in south central Kansas. Moderate numbers that might reach treatment levels soon were found as far north as Butler, Sedgwick and Reno counties. Moderate to high numbers of greenbugs seemed to be fairly common in wheat in an area south of Gueda Springs in Sumner and Cowley counties. Winter-kill of greenbugs was high in Butler and Geary counties.

A heavy infestation of a mixture of pea aphids and blue alfalfa aphids was found during surveys in a field of one-inch alfalfa in Sumner County.

Very low infestations of Russian wheat aphids were commonly found in wheat surveyed in Sherman, Wallace and Logan counties of northwest and west central Kansas. The mild winter has been favorable for survival of the Russian wheat aphid.

Wayne Woldt, Extension Waste Management Specialist

Kansas Board of Agriculture Cooperative Economic Insect Survey Report

Cleaning up a farm dump site

While not required by law, it is recommended that current, as well as old, private disposal sites be closed to eliminate the temptation of future use and to establish that disposal has ceased.

A dump site can be closed with a minimum of effort and expense. Dump sites should be surveyed for potentially dangerous waste such as spent lead-acid batteries, paint cans, pesticide containers, oil storage containers and filters, antifreeze containers, etc., which should be removed from the site for recycling or disposal at a permitted facility. Once undesir-
Using rotation to reduce pests, chemicals

This article is the second in a series of four reviewing the range of cultural practices useful for crop insect pest management. This article is broken into two parts and addresses the use of crop rotations.

Crop rotations have long been recognized as having a major effect on some crop insects. Two important factors influencing the impact of a particular rotation on an insect are the host range of the insect and its degree of mobility. Insect species vary in the range of plants that they will accept for either adult egg-laying behavior or larva or adult feeding. Some species have very specific requirements and will die or move away if the required host is absent; other species have a broad range of plant species upon which they will feed or lay eggs.

Mobility of the insect species is important because it influences how far an insect can travel to search out an acceptable host plant when it is presented with a less preferred plant species due to crop rotation. Depending on the species and stage (adult or immature), the insect's mobility may vary from a few inches to several miles. The European corn borer is a good example of a Midwestern insect pest not affected by rotating corn with a nonhost because the adult moth will easily fly to another plant.

Many of our best examples of pests controlled by crop rotation involve soil insects, such as white grubs, wireworms and corn rootworms. The major feeding stage of these insects is the larval stage, and due to the soil environment their mobility is measured in inches or at most a few feet over their life span. The host selectivity may occur in either the egg laying behavior of the adult or the feeding behavior of the larva. Recommendations on the use of crop rotation in pest management may focus on either selecting rotations that decrease certain pest populations or avoiding rotations that are known to favor certain pests.

Pests controlled by rotations

The western and northern corn rootworms are responsible for the majority of insecticide used in Nebraska crops. The western corn rootworm is the predominant species throughout Nebraska,

(Continued on page 14)

Software aids herbicide selection

NebraskaHERB, a herbicide selection model based on economic thresholds, has been developed at the University of Nebraska. This weed management software program has been updated to provide postemergence weed control information on sorghum, wheat and sugar beets as well as corn and soybeans.

NebraskaHERB runs on IBM compatible personal computers. This user friendly program quickly determines: whether it is cost effective to treat a field, identifies the most economically effective treatment (including broadcast and band-applied herbicides, and cultivation), and ranks all other treatments in order of net profitability.

The user enters the grower's name, field location, anticipated crop selling price, crop cultivar, crop growth stage, row spacing, method of herbicide application, and herbicide costs. Field scouting information on plant size, soil moisture, and weed species and density are collected and entered. The model then calculates a damage estimate — the expected loss if no weed control measure is employed. The damage estimate calculation draws on many years of research on the effects of weeds on crop yield. This is a critical step in the model because the costs associated with no weed control treatments can later be compared with the economic benefits of available herbicide and cultivation treatments. Once the damage estimate is computed, the model searches its control efficiency files for effective herbicide treatments.

The computer then identifies the most cost effective herbicide treatment and ranks all possible treatments in order of net gain. The program also lists the effectiveness of each treatment on each weed.

Future upgrades will address preemergence weed control and environmental assessment of management strategies.

For more information contact:
John McNamara
362A Plant Science Building
University of Nebraska
Lincoln, NE. 68583-0915
(402) 472-1544

Alex Martin
Extension Weeds Specialist
John McNamara
Extension Assistant, Weeds
## Combination herbicides

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Equivalent Amount of Each Component Contained in 1 gal or 1 lb of Product</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamix</td>
<td>4 qt Betanal + 4 qt Betanex</td>
<td>Nor-Am</td>
</tr>
<tr>
<td>Bicep 6E</td>
<td>3.3 pt Dual + 5.3 pt atrazine</td>
<td>Ciba</td>
</tr>
<tr>
<td>Bicep Lite</td>
<td>3.3 pt Dual + 3.5 pt atrazine</td>
<td>Ciba</td>
</tr>
<tr>
<td>Broadstrike + Dual</td>
<td>0.2 lb Broadstrike (active) + 7.5 pt Dual</td>
<td>Dow Elanco</td>
</tr>
<tr>
<td>Broadstrike + Treflan</td>
<td>0.25 lb Broadstrike (active) + 3.4 pt Treflan</td>
<td>Dow Elanco</td>
</tr>
<tr>
<td>Brominal 3+3</td>
<td>3 qt Brominal + 3 qt MCPA</td>
<td>Rhone-Poulenc</td>
</tr>
<tr>
<td>Bronate</td>
<td>2 qt Buctril + 2 qt MCPA</td>
<td>Rhone-Poulenc</td>
</tr>
<tr>
<td>Bronco</td>
<td>2.6 qt Lasso + 1.4 qt Roundup</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Buctril + Atrazine</td>
<td>2.0 qt Buctril + 2.0 qt atrazine 4L</td>
<td>Rhone-Poulenc</td>
</tr>
<tr>
<td>Bullet</td>
<td>2.5 qt Lasso (active) + 1.5 qt atrazine</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Cannon</td>
<td>2.5 qt Lasso EC + 0.5 qt trifluralin</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Canopy 75 DF</td>
<td>0.86 lb Lexone DF + 0.43 lb Classic</td>
<td>DuPont</td>
</tr>
<tr>
<td>Commence 5.25 EC</td>
<td>3.0 qt Treflan + 4.5 pt Command</td>
<td>Elanco/FMC</td>
</tr>
<tr>
<td>Concert</td>
<td>2 oz package equals 1 oz Classic + 1 oz Pinnacle</td>
<td>DuPont</td>
</tr>
<tr>
<td>Crossbow</td>
<td>1 qt Garlon + 2 qt 2,4-D</td>
<td>Dow Elanco</td>
</tr>
<tr>
<td>Curtail</td>
<td>2.0 qt 2,4-D amine + .38 lb ai clopyralid</td>
<td>Dow Elanco</td>
</tr>
<tr>
<td>Cycle</td>
<td>2.0 pt Dual + 2.0 qt cyanazine</td>
<td>Ciba</td>
</tr>
<tr>
<td>Extrazine II 4-L</td>
<td>3 qt Bladex + 1.0 qt atrazine</td>
<td>DuPont</td>
</tr>
<tr>
<td>Fallow Master</td>
<td>1.5 qt Roundup + 0.6 qt Banvel</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Freedom</td>
<td>2.67 qt Lasso MT + .033 qt trifluralin</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Fusion 2.66E</td>
<td>8.0 qt Fusilade 2000 + 5.3 pt Option</td>
<td>ICI Americas</td>
</tr>
<tr>
<td>Galaxy</td>
<td>3.0 qt Basagran + 1.3 qt Blazer</td>
<td>BASF</td>
</tr>
<tr>
<td>Gemini 60 DF</td>
<td>1.1 lb Lorox DF + 0.18 lb Classic</td>
<td>DuPont</td>
</tr>
<tr>
<td>Guardsman</td>
<td>2.18 qt Frontier + 2.67 qt Atrazine</td>
<td>Sandoz</td>
</tr>
<tr>
<td>Laddok</td>
<td>1.66 qt Basagran + 1.66 qt atrazine</td>
<td>BASF</td>
</tr>
<tr>
<td>Landmaster BW</td>
<td>1.2 qt Roundup + 1.9 qt 2,4-D</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Landmaster II</td>
<td>1.2 qt Roundup + 1.0 qt 2,4-D amine</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Lariat 4 F</td>
<td>2.5 qt Lasso EC + 1.5 qt atrazine</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Lasso + atrazine</td>
<td>2.5 qt Lasso EC + 1.5 qt atrazine</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Lorox Plus 60 DF</td>
<td>1.1 lb Lorox DF + 0.12 lb Classic</td>
<td>DuPont</td>
</tr>
<tr>
<td>Marksman</td>
<td>1.1 qt Banvel + 2.1 qt atrazine</td>
<td>Sandoz</td>
</tr>
<tr>
<td>Matrix 75 DF</td>
<td>0.67 lb Harmony + .033 lb Express</td>
<td>DuPont</td>
</tr>
<tr>
<td>Milocep</td>
<td>3.33 pt Milogard + 3.3 pt Dual</td>
<td>Ciba</td>
</tr>
<tr>
<td>Preview 75 DF</td>
<td>0.90 lb Lexone DF + 0.27 lb Classic</td>
<td>DuPont</td>
</tr>
<tr>
<td>Prozine 70 DF</td>
<td>0.35 qt Prowl + 0.35 qt atrazine</td>
<td>Am. Cyanamid</td>
</tr>
<tr>
<td>Pursuit Plus</td>
<td>2.8 qt Prowl + 0.8 pt Pursuit</td>
<td>Am. Cyanamid</td>
</tr>
<tr>
<td>Ramrod &amp; atrazine</td>
<td>3 qt Ramrod + 1 qt atrazine</td>
<td>Monsanto</td>
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<tr>
<td>Salute 4 EC</td>
<td>2.7 qt trifluralin + 1.3 qt Sencor</td>
<td>Miles</td>
</tr>
<tr>
<td>Squadron 2.33 EC</td>
<td>2.0 qt Prowl + 1.75 pt Scepter</td>
<td>Am. Cyanamid</td>
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<tr>
<td>Surpass 100</td>
<td>3.75 pt Surpass + 2.0 qt atrazine</td>
<td>Zeneca</td>
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<td>Sutazine</td>
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<td>Zeneca</td>
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<tr>
<td>Trimec Super Brush Killer</td>
<td>4 parts 2,4-D + 4 parts 2,4-D + 1 part Banvel</td>
<td>PBI-Gordon</td>
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<tr>
<td>Trimec Turf Herbicide</td>
<td>2,4-D, MCP, Dicamba in 9:3:1 ratio</td>
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<tr>
<td>Tri-Scept 3 E</td>
<td>2.6 qt trifluralin+2.3 pt Scepter</td>
<td>Am. Cyanamid</td>
</tr>
<tr>
<td>Turbo 8 E</td>
<td>6.6 pt Dual + 1.45 pt Sencor</td>
<td>Miles</td>
</tr>
<tr>
<td>Turflon D</td>
<td>2.0 qt 2,4-D ester + 1 qt Garlon</td>
<td>Dow Elanco</td>
</tr>
</tbody>
</table>
Using the Ounce Calibration Method for sprayers

Pre-season visual checks of application equipment are not adequate for accurate application, nor is the fact that the equipment and nozzle tips are new. A Nebraska survey found only one of all nozzles have the correct discharge and adequate for accurate application, charge rate and are applying their estimated rate. Sprayers may need to be checked to ensure that all nozzles have the correct discharge rate and are applying pesticides uniformly and at the correct pesticide rate. Manufacturer's nozzle catalogs are guidelines, but fine-tuning a sprayer is the operator's responsibility.

The purpose of any calibration method is to determine the number of gallons of spray solution (both pesticide and carrier) being applied per acre. Subsequently, the solution volume applied per acre can be used to determine the quantity of pesticide to be added in the spray tank.

Ounce calibration method

The following method has four steps. No calculations are required. Calibration equipment needed includes: a stopwatch, a container to collect nozzle discharge, a tape measure, marking flags, and a container graduated in ounces. The procedure is:

Step 1. Select the travel distance according to the nozzle spacing on the sprayer using Table 1. Measure the travel distance in a level field. The travel area should be typical of the surface and soil conditions of the area to be sprayed. Many tractors and sprayers will gain or lose in excess of 10 percent of desired travel speed while moving up and down slopes.

If field variations exist, several speed check areas may be needed. Remember, the time required to drive the travel distance will give the speed of the sprayer, so the measured distance and timing must be exact.

Step 2. Drive and time the sprayer in seconds at the throttle setting, pressure setting and load used during spraying (spray tank should be 1/2 to 2/3 full). Engage incorporation equipment (disks, planter, etc.) or other devices used while spraying. Repeat at least three times and average the results. Do not change the gear or throttle setting after you have chosen a spraying speed. A change in ground speed will change the sprayer application rate and will require recalibration.

Step 3. While in a stationary position, bring the power unit to the proper throttle setting and sprayer to the boom pressure used in Step 2. Catch the nozzle discharge for the time recorded in Step 2. Measure the discharge in ounces (Figure 1) with a graduated container. For an accurate assessment of the sprayer, measure all nozzles and average the results.

Remember, from a safety point of view, the collection of discharge should be done using water only! Even while collecting water use proper safety clothing and protection.

Step 4. The measured ounces from a nozzle are equal to gallons per acre that will be applied. Check nozzle discharge uniformity by repeating Steps 3 and 4 for all nozzles. If a single nozzle has a discharge output 10% more or less than the other nozzles, replace it. After adjustment or correction, recalibrate.

Calibrate frequently. The Ounce Calibration Method describes a procedure with minimal calculations in order to evaluate a liquid sprayer. Wallet size plastic cards (EC 87-726) outlining this method of sprayer calibration are available through the Nebraska Cooperative Extension.

### Table 1. Calibration Distances and Speeds for Varying Nozzle Spacing

<table>
<thead>
<tr>
<th>Nozzle Spacing (in)</th>
<th>Calibration Distance (ft)</th>
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<tbody>
<tr>
<td>40</td>
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Bobby Grisso
Extension Engineer

### Kansas chinch bugs

(More insect survey results on page 10.)

The annual survey of chinch bugs wintering in bunch grasses near old milo fields showed that numbers were generally higher than expected, particularly in parts of central and east central Kansas. Numbers were generally low to very low, however, in most of the more northern and eastern areas of Kansas where the pest is often a serious problem. Last winter the highest numbers of wintering bugs were found in some of the more northern counties, just the opposite of what was found this year.

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Cooperative Economic Insect Survey Report
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accounting for 80-95% of corn rootworms. According to the most recent pesticide use survey in Nebraska, in 1987, 4.6 million pounds of insecticide active ingredient was applied to corn (96% of total insecticide use), with most applied against corn rootworms.

However, it has long been known that corn rootworms can be controlled by crop rotation. Corn rootworms have a host range restricted to grass species and an annual life cycle. Eggs are laid in corn field in the soil during July and August, then overwinter and hatch the following spring. If corn is rotated the following year with a corn rootworm nonhost, hatching larvae will starve and die in the absence of corn. Rotation with a broadleaf crop such as soybeans greatly reduces the need for pesticide use in the corn following soybeans; based on observations in Illinois, the chance of economic damage from corn rootworms changes from 2/3 for continuous corn to 1/1000 for corn after soybeans. Even some grass crops (e.g., wheat and sorghum) can be rotated with corn to control corn rootworms.

Under certain situations however, rotating corn with another crop has not provided the expected degree of corn rootworm control. Some factors commonly identified as contributing to less effective control with crop rotation include, high populations of volunteer corn or certain flowering weeds in rotational crops (which attract corn rootworm beetles to feed and lay eggs in the field). Recently, it has been documented that some populations of northern corn rootworms can survive over more than one winter. This has not been commonly reported in Nebraska, but has been reported from adjacent areas of South Dakota and Iowa.

Although not well researched, reduced insecticide use in corn should encourage populations of various insect predators, especially those which spend a portion of their life in the soil (e.g., various beetle or fly larvae, soil mites).

This article will continue next week with information on which rotations favor pests and why some rotation plans may not fit individual pest management plans.

Bob Wright, South Central Research and Extension Center, Clay Center

Adjust practices to control compaction

Deep tillage is being used more to eliminate soil compaction. While it can be effective in reducing severe compaction for a single growing season, practices throughout the year determine whether the benefits will last.

Fewer trips over the field, controlled wheel traffic, rotation with grass or alfalfa, staying off wet soil and reducing tillage are among the best options to reduce compaction.

Some soils are naturally compacted and deep tillage will have little long-term benefit. Also, the $12 to $15 per acre cost of deep tillage usually won't pay as an annual operation in these cases.

Alice Jones, Extension Soil Erosion Specialist