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Crop Watch No. 2005-5, April 8, 2005

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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

University of Nebraska Lincoln

No. 2005-5, April 8, 2005

In no-till start with a well-adjusted planter

Planters used in no-till have to cut and handle residue, penetrate the soil to desired seeding depth, establish proper seed-to-soil contact, and close the seed-vee. Keeping these four items in mind, a producer can evaluate the strengths or weaknesses of any piece of planting equipment and make any adjustments or changes necessary to make no-till successful. Fortunately, most currently available planters and drills can be used for no-till with few, if any, modifications.

Cutting and handling residue

Planters are now being built stronger and heavier with larger-diameter disk seed-furrow openers, making no-till easy. Check the double-disk seed-furrow openers on your planter before the planting season for wear and proper adjustment. The individual disks can be adjusted inward as they wear by removing spacer washers from behind them or they may need to be replaced to keep the two blades working together as one cutting edge. When properly adjusted, these seed-furrow openers can easily cut residue and penetrate the soil without coulters or row cleaners.

Evaluate seed-to-soil contact and seeding depth while checking planter performance in the field and as conditions change.

On well drained or highly erodible soils, residue left over the row will absorb raindrop impact, reducing erosion and crusting in the row and serving as a mulch to reduce drying of the seed zone. On poorly drained soils, producers often

(Continued on page 43)

Focus on corn

Panhandle winter wheat shows signs of a tough winter

Some wheat growers in the Nebraska Panhandle are concerned about the recent deterioration of some winter wheat fields. Fields, or portions of fields, appear yellow from the road and individual plants have many dead, or partially dead, leaves. We believe these symptoms are the result of a combination of stress factors.

The symptoms are most common in early planted wheat that produced good fall growth. These plants used a lot of the surface soil moisture acquired last fall and early winter and were showing signs of drought stress from the warm, dry weather since January. In addition to drought stress, these plants often have some level of crown and root rot, which is likely contributing to the problem. Add to all of this a fall outbreak of leaf rust, which may have weakened some plants and made leaves more susceptible to winter injury.

Also, these larger plants may have been more susceptible to leaf burn from some very cold night temperatures (in the teens) in early March, following some warm day time temperatures. Oh yes, did I mention the 50 and 60 mph winds that occurred in February and March. All together, these stresses have taken a toll on the winter wheat crop and it is not surprising that some wheat is looking worse for the wear. The good news is that recent rain and snow should go a long way to help the wheat recover. If there is still some green tissue, there is still hope. Growers are encouraged to give the wheat some time before deciding whether to give up on the field.

Drew Lyon, Extension Dryland Cropping Systems Specialist
Robert Harveson Extension Plant Pathologist
Both at the Panhandle REC

Ag briefs

Doug Anderson, Extension Educator in Nuckolls and Thayer counties: Wheat has taken off with the recent moisture and sunshine and is about 4 to 6 inches tall. Some fields are dry enough for disking and I'm seeing more machinery running up and down the road in preparation for planting.

Andy Christiansen, Extension Educator in Hamilton County: We have had decent pre-season moisture in this area and there doesn't seem to be any urgency for completing field work.

David Baltensperger, Extension Crop Breeding Specialist, Panhandle REC, Scottsbluff: Moisture during the past week, increases in soil temperatures this week and longer days have led to ideal conditions for getting spring crops planted in the Panhandle. Many are now in the process of planting canola, brown mustard, oats, barley and wheat throughout the region. The same conditions have led to rapid greenup in the winter wheat crop, reminding us to make spring fertilizer and weed control applications.

USDA Nebraska Agricultural Statistics Service (April 4): Currently, topsoil and subsoil moisture supplies are above average and a year ago levels. Fieldwork activities included stalk shredding, discing, and applying fertilizer. Other producer activities included caring for livestock. Overall, high temperatures averaged from 3 to 8 degrees above normals.

Precipitation was statewide although light across the eastern third of the state. Several locations, in southwestern areas, received amounts greater than one inch. Soil temperatures averaged nearly 3 degrees below year ago levels.

Wheat conditions rated 0% very poor, 5% poor, 33% fair, 49% good, and 13% excellent. Fields had begun to joint in southwestern counties. Planted oats increased to 43%, ahead of last year at 37% and average at 32%. Six percent had emerged, above last year and average at 3%. Cattle and calf condition rated 1% poor, 12% fair, 59% good, and 28% excellent. Spring calving was 72 percent complete with calf losses rated average to below average.

Cattle report, USDA Nebraska Agricultural Statistics Service: Nebraska feedlots with capacities of 1,000 or more head contained 2.32 million cattle on feed on March 1, up 2% from last year and 6% above March 1, 2003. Placements of cattle into feedlots during February totaled 315,000 head, down 10% from 2004 and 5% below 2003. Fed cattle marketings for the month of February totaled 330,000 head, down 4% from last year and 6% below February two years ago. Other disappearance during February totaled 15,000 head compared with 15,000 head during February 2004 and 10,000 head during February 2003.

Nationally, the increase was similar. Cattle and calves on feed for slaughter market in the United States for feedlots with capacity of 1,000 or more head totaled 11.2 million head on March 1. The inventory was 2% above March 1, 2004 and 6% above March 1, 2003. Placements in feedlots during February totaled 1.52 million, 6% below 2004 and 8% below 2003.

Marketings of fed cattle during February totaled 1.63 million, 4% below 2004 and 6% below 2003. Other disappearance totaled 76,000 during February, 10% above 2004 and 7% above 2003.

Hot off the press: University of Nebraska Cooperative Extension this week released three new or newly revised publications:

G 01-1424, *Residential On-site Wastewater Treatment: Septic Tank and Drainfield Maintenance*

G 05-1554, *Heating With Wood: Producing, Harvesting and Processing Firewood;* and

EC 05-185, *Grazing Winter Wheat in Nebraska.* This six-page publication includes an economic analysis of grazing dryland wheat in the Nebraska Panhandle as well as steps to calculate an analysis for your operation, comparing the costs of protein from alfalfa and dryland wheat. Also included are variety and management recommendations for the Nebraska Panhandle.

CROP WATCH

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Planters *(Continued from page 41)*

use "spider wheel" residue movers to move residue off the row to aid in soil drying; however, some of the residue usually blows back over the row, making emergence less uniform because some of the seeds are now under residue while others are not. Rather than moving residue to dry the soil, a pop-up fertilizer applied in furrow for corn will reduce concerns about cold soils and slower root growth, improving early growth while conserving water.

> See this week's ***Market Journal*** on NETV as Extension Engineer Paul Jasa discusses and demonstrates planter adjustments in the field.

If residue movers are used, previously applied herbicides could be moved out of the row area. If soil is moved, a furrow could be formed in the row which may wash out or crust over. In addition, if the soil is wet under the residue, soil disturbed by row cleaners or coulters will stick to the planter's depth gauge wheels and other components, reducing the uniformity of seed placement.

Weight and downpressure springs

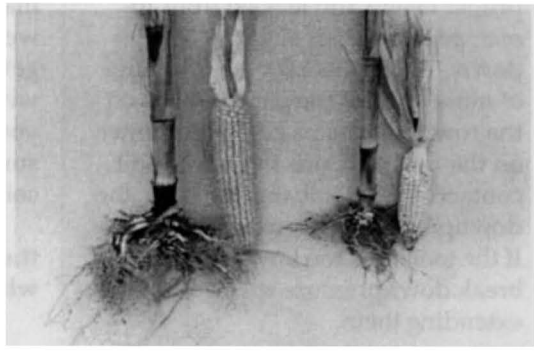
Getting the seed down through the residue and into the soil is a key for no-till. The seed must be placed into moist soil, at a depth suitable for proper rooting and growth, usually 2 to 3 inches deep for corn. A Keeton Seed Firmer or a Schaffert Rebounder will help get the seeds to the bottom of the seed-vee for a more uniform planting depth. Too often producers don't get their seeds deep enough into the soil to allow the corn plants to set proper nodal roots. If the planter unit is light and rides over the residue, the seeds may be placed too shallow or, worse yet, in the residue. The depth control must be set deeper than for tilled soils, deep enough to allow for the layer of residue that the depth gauge wheels run on.

To ensure penetration to desired seeding depth, downpressure springs may be needed to transfer weight from the planter toolbar to the individual row units. There must be sufficient weight on the units to keep the depth gauge wheels in firm contact with the ground to control planting depth. If the gauge wheels are loose, tighten the downpressure springs or add heavy-duty springs. In addition, there needs to be enough total weight on the toolbar to keep the planter drive wheels in firm contact with the ground to prevent slipping.

Having enough weight becomes more of a problem with drills simply because of the number of rows per unit width. For instance, a six-row planter on 30-inch row spacing may require more than 3,000 pounds of weight just for cutting the residue and penetrating the soil (six rows times 500 pounds per row). Whereas, a drill of the same width on 7.5-inch row spacing has 24 openers and may require more than 12,000 pounds. However, attachments like starter fertilizer openers and coulters require even more weight on the planter to ensure penetration.

Sufficient weight must remain on the press wheels to ensure firming of the seed into the soil. Operating the planter slightly tail down improves seed-to-soil contact and helps with closing the seed-vee. Wet soil is easily compacted and care must be taken not to over pack the soil, making it difficult for seedling roots to penetrate the soil. In dry soil conditions, extra closing force may be needed. The key is to evaluate seed-to-soil contact, not the top of the seed-vee. There are several attachments on the market to improve seed-to-soil contact and close the seed-vee. However, before purchasing any, evaluate what problems you may have and how does that attachment function to solve that problem and will it create another problem by changing something on the planting equipment.

Attachments are available to help get the seeds to the bottom of the seed-vee for more uniform emergence. The smaller corn plant on the left came up much later than its neighbors and is a yield-reducing weed as far as the other corn plants in relation to the rest of the field.



Corn needs to be planted 2 to 3 inches deep for proper root development. The reduced plant development and reduced yield potential of the shallow planted one on the right is obvious. (Photo courtesy of Schaffert Manufacturing)

With appropriate weight, downpressure, and adjustments, most current planters and drills will perform well in no-till conditions. Producers need to pay attention to the four functions of planting equipment and make adjustments necessary for uniform seeding to improve their stands and yields. A little time spent now will help avoid headaches and delays later during the planting season. (See *page 44* for a preseason planter check for no-till.)

Paul Jasa
Extension Engineer

Conduct a preseason planter check

Before planting season starts, check how well your planter will perform in no-till. As with any piece of equipment, the owner's manual is the starting point for the initial settings and adjustments. Valuable recommendations and trouble-shooting tips are in the manuals and also available from others who own and operate similar equipment. To check your planter in your conditions, take it to the field as soon as the weather and field conditions allow, without any seed in it, and make adjustments to improve its performance.

1) Level the planter in the field, making sure that the toolbar is at the proper height and leveled front-to-rear, perhaps even slightly "tail" down. This allows for the full range of movement of the parallel links on the row units, helps keep the planter on the row, and aids in seed-to-soil contact. If the toolbar is too high, the downpressure springs are ineffective. If the toolbar is too low, you may break downpressure springs by over extending them.

2) Make sure that the planter carrying wheels are exactly centered between the rows and that they are carrying some weight while setting the toolbar height. This is especially important if there are any ridges in the field from cultivation last year.

3) Once the planter is leveled, try blind planting with no seed in the boxes or other products on the planter. Stop with the planting units in the ground and check to see if the depth gauge wheels are in firm contact with the soil surface. If they are not, tighten the downpressure springs and try planting again. If you cannot tighten the springs, you may have to add extra springs or add weight directly to the planter unit to get the gauge wheels in firm contact with the ground. On wetter soils, you may have to reduce downpressure to avoid over-compacting the soil near the seed-vee.

4) Check to see if you can slip the seeding mechanism drive wheels as the downpressure springs will be lifting the toolbar. You may have to add weight to the planter for the springs to work against and to keep the drive wheels firmly on the ground to reduce slip. Don't loosen the springs to get the drive wheels back in contact with the soil as penetration to seeding depth is necessary. Extra weight will be needed for dry soils or heavy residue.

5) Place a small amount of seed into a couple seed boxes and plant a short distance. Check seeding depth, seed-to-soil contact, seeding depth uniformity, and seed spacing uniformity. Evaluate seed-vee closing and check to make sure you're not overcompacting the seed zone.

Make the necessary adjustments or add the required equipment to improve planter performance and check the planter again. Even though a preseason planter check was made, all of these items should be rechecked when actual planting begins and as conditions change during the planting season.

Paul Jasa, Extension Engineer

UNL releases free fertilizer selection software

Fertilizer Chooser is a user-friendly computer program to help producers select a cost-efficient fertilizer application.

To begin using the software, a target recommendation for balanced plant nutrition such as that based on soil testing and existing guidelines will need to be input Fertilizer Chooser then helps the user to:

1) translate the nutrient recommendation into the correct amount of fertilizer; 2) select the least costly combination of fertilizer nutrient sources based on quoted prices for fertilizer products and the cost of application; and 3) evaluate the cost of different fertilization programs.

The program uses a linear optimization procedure to find the best combination of fertilizer materials to minimize the overall cost of fertilization, including application.

The Fertilizer Chooser software is free and can be downloaded at *http://soilfertility.unl.edu*

Unless specified otherwise, all calculations are performed under the constraint that the calculated amounts of fertilizer will meet the recommended nutrient levels.

The user is encouraged to compare different nutrient management recommendations and fertilizer sources and consider aspects that are not part of Fertilizer Chooser. These would include:

- product quality and consistency;
- product preference;
- the need for other nutrients;
- available application technology and dealer services;
- ease of handling and storing fertilizer;
- how it fits into the cropping system; and
- reactivity/solubility of the fertilizer.

It was developed by: Dr. Achim Dobermann, soil science and nutrient management professor, UNL Department of Agronomy; Dr. Thomas Fairhurst, Pacific Rim Palm Oil Limited, Singapore, and Dr. Christian Witt, South East Asia Program, Potash and Phosphate Institute/Potash and Phosphate Institute of Canada (PPI/PPIC) and International Potash Institute (IPI), Singapore.

For more information, contact Dobermann at (402-472-1501).

Entry-level field scout training set for May 17

Training for entry level crop scouts who will be working for crop consultants, industry agronomists or farm service centers is scheduled for Tuesday, May 17 at the University of Nebraka Agricultural Research and Development Center near Mead.

If you have or are planning to hire summer employees to scout grower fields or support your business, this is an excellent opportunity for introductory level training. This one-day, hands-on class will focus on corn and soybean diseases, insects, weeds, crop growth and development and nutrient deficiencies. This also would be a good course for experienced agronomists seeking a refresher course. Class will be held from 8:30 a.m. to 5 p.m.

Topics will include:

- Corn and soybean growth and development — understand how to stage corn and soybean growth and why this is important to pest management.
- Corn and soybean insect pests — identification, damage, life cycles
- Natural enemies — predators, parasites, and pathogens
- Weed identification
- Crop diseases
- Nutrient deficiencies and application injuries in corn and soybean
- Sampling methods
- Scouting do's and don'ts

Past participants have given the training high marks — 90% of the 2004 participants rated the program as above average or one of the best programs of its type available. Participants said the training helped them become more confident in their scouting and work with growers and helped them improve their identification skills. Other participants appreciated the hands-on, practical format.

Early registration is recommended. The fee is $75, with a $10 discount ($65) for those registering by May 10. Certified Crop Advisor Continuing Education Units are anticipated in the integrated pest management (4), crop production (1), and soil fertility (0.5) categories.

Presenters include: Dale Flowerday, agronomist; Brady Kappler and Keith Glewen, Extension educators; Keith Jarvi, integrated pest management Extension assistant; Amy Ziems, plant pathology graduate research assistant; and Aaron Waltz, agronomy graduate student.

Register online at *http://ardc.unl.edu/registration.htm*, call (402) 624-8000, fax (402) 624-8010, e-mail cdunbar2@unl.edu, or write ARDC, CMDC Programs, 1071 County Road G, Ithaca, NE 68033

Additional Crop Management Diagnostic Clinics are planned for July 14-15 and Aug. 24. For more information about these training opportunities, visit the Web site at *http://ardc.unl.edu/CMDC.htm*

New corn/sorghum pathologist joins IANR faculty

The extension plant pathology team welcomes Dr. Tamra Jackson to the Department of Plant Pathology. Dr. Jackson started on April 1 and has a 75% extension and 25% research appointment with statewide responsibility for corn and sorghum. Dr. Jackson's program will have a strong presence and field research at the South Central Agricultural Lab at Clay Center. She can be reached at the Department of Plant Pathology in Lincoln at (402) 472-2559.

Following is a brief introduction from Dr. Jackson:

Hello and thank you for welcoming me aboard! My Ph.D. is from the University of Illinois in crop sciences with an emphasis in plant pathology. I'm originally from Arkansas where I completed my B.S. in biology and M.S. in plant pathology. I look forward to meeting a lot of people soon and hope that you'll help me become familiarized with Nebraska and the challenges that you face in corn and grain sorghum production. I'll be with your other Extension faculty conducting numerous programs around the state and beginning my research program. In addition to your common diseases of corn and grain sorghum, I also intend to focus on nematodes that can cause significant damage, but are often overlooked or misdiagnosed as other problems. So, I hope that you'll help me identify areas of concern.

Tamra Jackson

Best wishes for a safe and productive year!

Tamra Jackson
Extension Plant Pathologist

Staging corn aids with management decisions

With any successful business, the manager must have thorough and complete knowledge of the product and the production process, understanding every detail of it and the factors of influence.

Is this any different for us as producers, agronomists, crop scouts or researchers with our product — corn? Before we consider why some factors, such as insects, diseases, etc, affect our corn crop, we should first make sure we understand *why* a certain stress affects the plant. To understand this and why similar stresses can have different effects at different points in the season, it helps to understand how the plant functions physiologically. The first step is learning how to easily identify the crop's growth stage to determine if its rate of development is normal.

In this issue we'll examine early season development of corn, in early May we'll look at the later vegetative stages, and in early June we'll look at reproductive stages. Vegetative stages begin at emergence (VE) and then are increasingly numbered until the plant is tasseled (VT). We will look at stages VE through V6 here.

Several methods are used to stage corn – the **leaf collar method** is the most recognized and used by agronomists. Variations on this method are used by insurance adjustors (see the reference on page 47 to an R.L. Nielsen article for more information) and on herbicide labels.

When using the leaf collar method, we determine the growth stage by identifying the uppermost leaf, which has its leaf collar visible. The collar is where the leaf blade visually breaks away from the sheath and the stalk. The first vegetative stage, VE, is determined when the plant (coleoptile) pushes through the soil surface. In warm conditions this can occur within four to five days after planting, yet in cool or dry conditions it may take 14 days or more. At VE, the growing point of the plant is 1 to 1.5 inches below the ground. This depth is not dependent on the planting depth. At this point, the plant also shifts from having roots that emerge from the seed to having roots that develop from the nodes on the stalk. Upon examination, you can see that the main root system actually lies *above* the seed, and these roots are what the plant depends on for season-long nutrition and water.

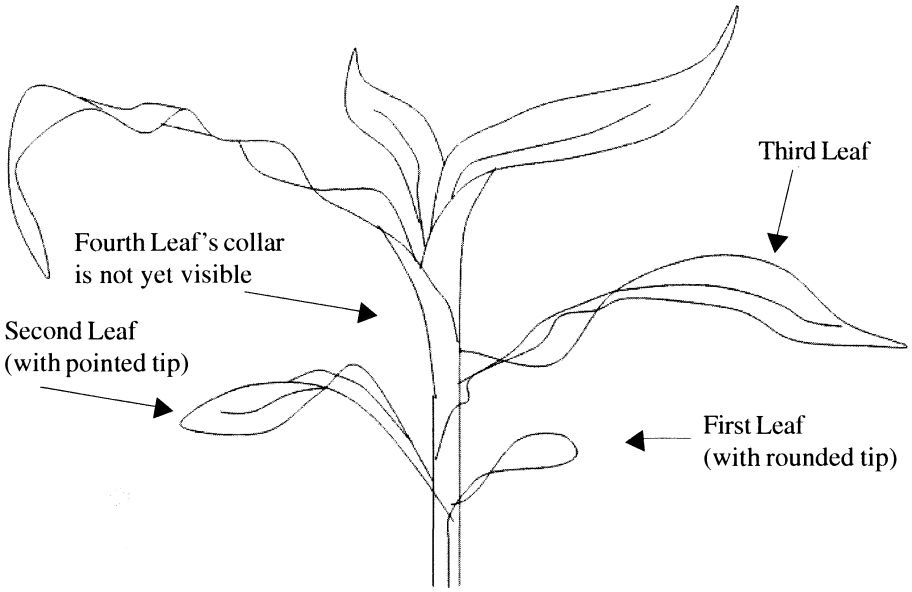


Figure 1. Corn plant in V3 growth stage. Note that the collars are visible on the first, second, and third leaves so they are counted when determining the growth stage. For example, V3 indicates the plant is in the vegetative stage and three leaf collars are visible.

Once the plant has emerged, you should expect, on average, to have a new growth stage every three days. The first leaf that emerges has a rounded tip as compared to the pointed leaves that emerge later. This rounded leaf is counted as Leaf 1 in the leaf collar method even though it has a slightly different shape than the other leaves. (Note this difference between Leaf 1 and later emerging leaves in *Figure 1*.)

At V3, the growing point is still below the ground, which is important to remember in case of hail storms, wind events, or frost. When the growing point is underground, these stresses normally will have little effect on final seed yield. Yet a cool soil can affect the plant by slowing the rate of development and decreasing nutrient availability.

All leaves and ear shoots that we will eventually see are formed during the period between V3 and V5. This initiation time is important for the plant, and documenting crop conditions during this time may provide great insight when explaining crop growth later in the season. At V5, the tassel is initiated.

By V6, the growing point and tassel are above the soil surface and we begin to see a great increase in stalk elongation. The plant will begin to lose lower leaves at this time and we must begin staging the plant by examining the stalk instead. We will address how to identify these stages in later issues of *Crop Watch*.

References

Hanway, J.J. and S.W. Ritchie. 1984. *How a Corn Plant Develops: Special Report No. 48* – Iowa State University.

(Continued on page 47)

Corn kernel size depends on order of pollination

Seed from an ear of corn falls into many classes of size and shape. Usually, large-rounds come from the butt of the ear, flats from the center, and small-rounds and small flats from the tip. Medium rounds can come from either end of the ear. Seed weight of various classes are shown in *Figure 1*. We probably still worry too much about seed size and weight -- a factor important to old plate planters, but less important to today's planters -- while almost ignoring test weights.

Why do corn kernel shapes differ? A brief discussion of tasseling and silking processes will help us understand this better. Pollen shed for modern hybrids occurs over a five- to eight-day period in good conditions. High temperatures hasten this and drought delays it. Pollen shed begins about three-fourths up the tassel and then proceeds upward and then downward from the starting point. Older hybrids had large tassels producing pollen up to two weeks. Modern hybrids (and inbreds for that matter) have smaller tassels than the older hybrids.

Silks of some modern hybrids emerge before pollen shed and some a few days after. With good conditions, most modern hybrids usually shed pollen and silk about the same time. Silks are receptive for about seven days. Again, pollen tube growth and eventual ovule fertilization are temperature and moisture dependent.

Variation in kernel size is due to the timing of ovule fertilization and this is dependent on kernel position on the ear. Kernels an inch or two from the butt end silk first and thus are fertilized first. Then the butt end kernels silk, followed in succession by those just above those first silking and working toward the tip. Tip kernels are the last to fill. Tip kernels not fertilized within four to six days of butt kernels either fill poorly or abort. Some have said that kernels fill more like "pigs at a trough" than if they were attached to a manifold. The first ones to the trough get the most. Thus, the kernels at the butt are larger and those at the tip are smaller.

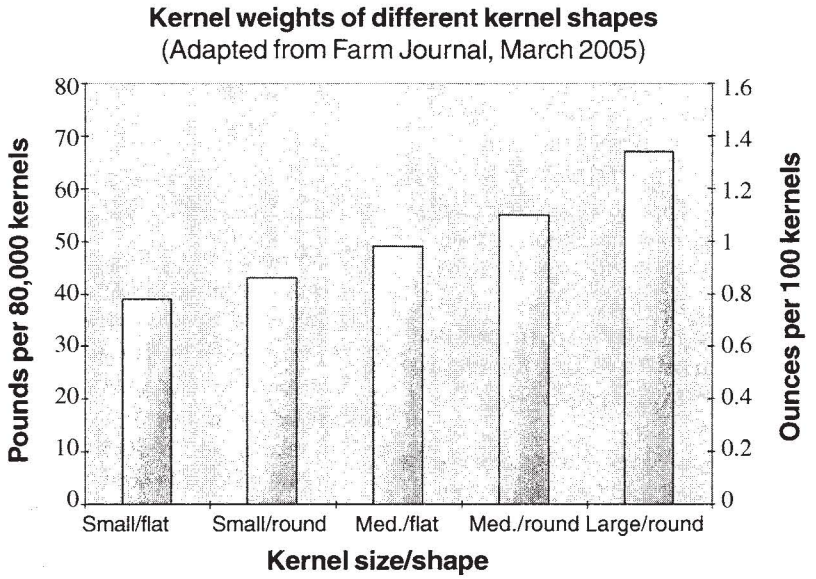


Figure 1. The bar chart shows weights of kernels of different shapes and sizes from a Farm Journal study.

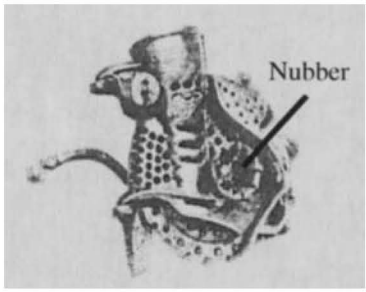
In two years of work related to post-black layer dry matter, University of Nebraska Extension Specialist Fred Roeth and Roger Elmore measured kernel weights on several hybrids from three sections of ears. Kernel weights varied in this order:

Butt ≥ midsection > tip (0.96-0.99, 0.93–0.95, 0.72–0.78 oz/100 kernels, respectively).

Roger Elmore
Extension Crops Specialist
Ken Russell
Assistant Professor of Agronomy
Lori Abendroth
Research and Extension Associate

A bit of corn history

One of the consequences of the corn fertilization pattern is that kernels fertilized first and last are somewhat more likely to be pollinated by "stray" pollen. Perhaps that is one reason some old hand corn shelling machines had "nubbers" or tipping attachments. This attachment removed the grain from the tips and the butts of ears before shelling the seed for next year's planting. Doing this made the resulting seed more consistent in size and shape. This is probably the main reason tip and butt kernels were removed in the days of open-pollinated corn.



A box-mounted, hand powered corn sheller with nubbing/tipping attachment (Rocky Top General Store – Online Catalog, Harriman Tenn).

Do corn kernel size and shape really matter?

Farmers and researchers alike have concerned themselves with the possibility that seed size and shape may affect corn yield. As early as 1937, Kiesselbach,working in Nebraska, compared across several years large (29.2 g or 1.03 oz/100 seed) and small (15.8 g or 0.56 oz/100 seed) seed of open-pollinated corn. He concluded, "There may be considerable difference in seed size without greatly affecting the yield of corn under ordinary planting conditions."

In the 1990s scientists across the U.S. Corn Belt and in Europe compared corn with different seed sizes and shapes. They found that when plant stands were similar across different seed sizes, the yields were usually the same no matter the size or shape of seed planted, just as Kiesselbach had concluded. However, Kiesselbach also noted that small seed would be at a disadvantage with greater than normal planting depths. We've found no recent research that addresses that question.

Although recent research seems to answer the yield question conclusively, there are some advantages and disadvantages of small seed to consider in selecting and planting corn. Small seed does not germinate well in laboratory stress tests relative to larger seeds. It is not surprising then in the field that small seed subjected to various stresses at planting, had reduced stands (5-15% in one study) as compared to larger seed. These stresses are sometimes associated with: early planting, cool soil temperatures, and soil crusting. The poorer performance of small seed in these environments is perhaps related to increased mechanical damage to smaller, round seed during handling, especially relative to larger, flat seeds. Small seed, on the other hand, germinate faster than larger seed in dry soils.

What's the physiology behind different sizes and shapes of corn kernels?

See story, page 48

Small seed also produce smaller and less vigorous plants in the vegetative period before tasseling. These differences, reported by different researchers, include: less shoot dry weight through the 8th leaf stage, shorter plants, less leaf area, and slower development. By tasseling, or soon thereafter, these differences disappear.

Thus during the critical seed-fill stages there are no differences among plants coming from seed of different sizes and shapes. This helps us understand why there are no reports of yield reduction associated with planting different seed sizes and shapes. However, we can speculate that because of the less vigorous plants during vegetative stages, plants from small seed may suffer more from vegetative stresses (weed pressure, drought, etc.) than plants from large seed during that time period. No one has looked at that question.

Based on this analysis, there is no need for concern over the productivity of seed of various sizes and shapes with normal planting and vegetative period conditions. What is important is obtaining the optimum plant population. If small seed are planted in cool wet conditions early in the planting season, consider increasing planting rates. If emerged plant populations are the same, silking dates and grain yield likely will be similar among all sizes and shapes of seed planted. Instead of focusing on seed size and shape, farmers should focus on selecting hybrids with the best package for yield and genetic traits, seed quality, and seed price.

Key References

Graven, L.M. and P.R. Carter. 1990. Seed size, shape, and tillage system effect on corn growth and grain yield. Journal of Production Agriculture 3: 445-452.

Nafziger, E.D. 1992. Seed size effects on yields of two corn hybrids. Journal of Production Agriculture 5:538-540.

Roger Elmore
Extension Crops Specialist
Lori Abendroth
Research and Extension Associate

Ethanol plant update

Of Nebraska's 17 ethanol plants, 11 are in operation and consuming the equivalent of nearly one-quarter of Nebraska's annual corn crop, according to the Nebraska Ethanol Board.

As of June 30, 2004, seven plants met a minimum production of 8,500 gallons over 30 days to receive state incentives. The seven plants were at Sutherland, Lexington, Norfolk, Cambridge, Madrid, McCook, and Ravenna. Following the completion of this goal, six of the plants (Sutherland is the exception) shut down to begin building a larger facility or to secure financing needed for expansion.

Corn staging

(Continued from page 46)

R.L. (Bob) Nielsen. 2001. "What Exactly Do You Mean by 'Leaf'?" *http://www.agry.purdue.edu/ext/corn/news/artciles.01/Corn_Leaf_Staging-0423.html*

Flowerday, D., *Corn Morphology, Development, and Stress Response.* 1995. Nebraska Corn Expo.

*Reference to a certain product does not signify endorsement and exclusion of a product does not signify nonencorsement by the University of Nebraska.

Lori Abendroth
Research and Extension Associate
Roger Elmore
Extension Crops Specialist

Maximizing western Nebraska dryland corn yields with no-till skip-row planting

Research in western Nebraska, Kansas and Colorado has demonstrated the benefits of skip-row corn planting in areas where water is at a premium. Skip-row planting involves leaving some rows unplanted. Since plant roots can't reach and use the water early in the season, more water is available to the plant in July and August.

Following two years of trials at sites across Nebraska, researchers have found that skip-row planting offers increased yields in water-limited fields. The greatest benefits were found in ecofallow corn fields. Also, fields where no-till was practiced with appropriate levels of crop residue had a much greater moisture savings than fields where it wasn't used.

After base soil moisture needs are met (10 inches of moisture), corn yields can increase 12.5 bushels per acre with every one-inch increase in soil moisture available to the crop. No-till also helps facilitate faster soil infiltration of the water (*Table 1*), leading to higher yields. The following recommendations for managing the skip-row corn planting system are based on the Nebraska research.

Crop residue is key

Research has shown that yield of the following corn crop increases as the amount of wheat crop residue increases, up to 6,000 pounds per acre (60 bushels of grain per acre).

Kansas State University research has shown the importance of maximizing stubble height and preserving more standing residue. Taller stubble traps more snow and takes longer to disintegrate in the field than straw that has gone through the combine. In Kansas they found a two-bushel increase in corn yield for every inch of height increase in wheat stubble.

Failure to harvest one average sized wheat head, which has approximately 22 kernels per square foot, reduces harvested yield by about one bushel per acre, but the yield of the following crop can be increased significantly by leaving taller stubble. Many lower wheat heads have only 7-15 kernels and in many cases it would take two or more ears per square foot to equal one bushel.

To get the most use from your residue, spread the straw and chaff uniformly and then spray wheat stubble shortly after harvest to control weeds. Don't harvest ecofallow corn for silage if you intend to plant corn there the following year or you plan to no-till winter wheat. (Residue is critical to moisture savings.)

Fertilize appropriately

Fertilize according to your yield goal. Apply nitrogen over the entire area. Use UAN solution with preplant herbicides. Later applications (UAN or anhydrous ammonia) may not receive sufficient rainfall to move nitrogen into the root zone.

Anhydrous ammonia application is also discouraged because the knives can increase evaporation loss from the soil and plant weed seeds.

Practice skip-row planting

Skip-row planting works because it helps provide moisture from the blister to silk stages -- critical growth periods for corn. Early in the season the plants compete for moisture in a high plant population situation within the row. Later, as roots extend into the skip-row area, they take advantage of the stored soil moisture. (This is analogous to limited irrigation strategies that limit water applications early in the season for better utilization of available water during the critical reproductive period.)

Do it correctly

- **To successfully implement skip-row planting,** follow the recommendations listed above for growing ecofallow corn.
- **Select Bt, Roundup-Ready hybrids** that perform well under ideal *or* stressful situations.
- **Typically, on a 30-inch row system, two rows are planted and two rows are skipped.** For higher rainfall areas and/or fields with large amounts of crop residue and a full soil profile, the *plant-two, skip-one* option may be the better choice. Also, plant-two, skip-one may be a better choice in short season areas and where corn does not get very tall.
- **Plant appropriate populations: 10,000 to 13,000 plants per acre.** On a *plant-two, skip-two* system,

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Table 1. Rainfall infiltration rates in conventional and no-till fields at the University of Nebraska Rogers Memorial Farm east of Lincoln.

	Rainfall infiltration rate: inches per hour	
	In wheel-traffic areas	In "soft rows" (no wheel traffic)
Conventionally tilled	0.2	0.4
Long-term no-till	0.4	>4

KSU research also proves benefits of skip-row planting

Skip row farming is catching on in the Great Plains and that could mean yield help in dry years for some Kansas, Colorado and Nebraska producers, a Kansas State University agronomist said.

Research on no-till corn in Kansas and Nebraska has shown that planting two 30-inch rows and then skipping a row can keep a supply of moisture in the skipped row available for corn to tap into later in the season, said Dale Fjell, KSU Extension state agronomy leader.

The Kansas studies so far have been in a wheat-corn-fallow rotation.

"This is a new twist on an old concept, where new technology is allowing us to use an old management scheme," said Dale Fjell, Kansas State University Extension state agronomy leader, of the practice that he said originated in cotton and sorghum in the Texas Panhandle.

"It works particularly well with Roundup Ready corn. We've just started looking at [skip row planting] with soybeans."

Early studies indicated that skip row planting won't harm yields in a good year, such as in 2004, but that it could help in a drought year, Fjell said. To maintain yields, however, since farmers would not be planting one-third of the rows in any given field, they need to increase the seeding rate by one-third in the other rows.

"The idea is to plant the same number of plants per acre -- just in one-third fewer rows," he said.

This skip row methodology should not be confused with skip row practices being used in some Midwestern soybean fields, where farmers are skipping rows to save on seed costs and to leave unplanted rows for sprayer wheels to follow, Fjell said.

Kansas State University

Prospective Nebraska plantings

As of March 1, Nebraska producers expect to increase acreage devoted to corn, hay, dry edible beans, oats, and sunflowers and decrease acreage planted to winter wheat (sown last fall), sorghum, and sugar beets, while leaving soybean acreage unchanged from a year ago.

Nebraska **corn** growers expect to plant 8.4 million acres in 2005, up 2% from last year and up 4% from two years ago. Expected plantings of **soybeans**, at 4.8 million acres, would be unchanged from last year. This would tie for second highest on record, behind only the 4.95 million acres planted in 2001.

Last fall, **winter wheat** was sown on 1.8 million acres, down 3% from a year earlier and down 5% from two years ago. **Sorghum** growers expect to plant 390,000 acres, 29% less than 2004 and 41% less than 2003.

Hay acreage for harvest, at 2.85 million, would be up 2% from last year. **Dry edible bean** producers intend to plant 160,000 acres, up 33% from a year earlier. **Oat** planting intentions, at 150,000 acres, are up 7% from 2004. **Sunflower** planting intentions, at 95,000 acres, are up 70% while **sugar beet** plantings of 49,000 acres would be down 2% from a year ago.

USDA Nebraska Agricultural Statistics Service

Skip-row planting *(Continued from page 49)*

this translates to 20,000 to 26,000 plants per acre in the planted rows. Since every row is an outside row, consider reducing these in-row populations by 20%. If you normally plant a population of 12,000 seeds per acre in conventional no-till fields, doubling that would be a rate of 24,000 in the planted rows of a plant-two, skip-two system. Reduce that by 20% (4,800) to get a population of 19,000 plants.

At Akron, Colorado in 2004 12,000 seeds planted in 30-inch rows yielded 16 bushels per acre while the same 12,000 population in a skip-two, plant-two (24,000 plants per acre in the two rows planted) yielded 50 bushels.

Other tips:

- **It usually works best to fill the outside seed box on each end** of the planter and skip the appropriate boxes from there.
- **Apply a preplant herbicide treatment.**
- **Spray glyphosate post-emergence,** as needed, to keep weeds under control.

Potential drawbacks to skip-row planting

- Yields will be limited to 120 to 150 bushels per acre (not a likely deterrent in western Nebraska).
- Crop insurance may not be available.
- The Farm Service Agency may not count all acres as planted acres.
- Fields may be more attractive to corn borer because they are greener and healthier (plant Bt corn hybrids).

Note: Skip-row planting is not recommended for sorghum, because of post-emergence weed control concerns. Skip-row planting is recommended only for no-till, ecofallow corn, with good crop residue in place. Crop residue helps suppress weeds.

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