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

CROP WATCH

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Sudden death syndrome reported, more widespread in eastern Nebraska

Over the last two weeks we have had many calls and I have visited several fields that have all the symptoms of Sudden Death Syndrome (SDS). Last year was the first time that we had identified SDS in Nebraska; with occurrences confirmed in only two locations, but widely distributed in the eastern third of the state. This year the disease appears to be occurring throughout the eastern third of Nebraska in many more fields.

Sudden death syndrome of soybean is caused by the fungus Fusarium solani *f. sp. glycines*. This is a different fungus than the one that causes early season damping off problems associated with soybean stand. This year's weather pattern -- with early season moisture and moisture at the early reproductive stages -- is conducive to its development. Full symptom expression of the disease is likely evident from mid August to early September.

SDS is favored by high yield environments. Soil compaction and high fertility levels also have been associated with increased levels of SDS. One common condition in effected fields has been early planting, which is known to favor the disease. The foliar symptoms start with interveinal necrosis and then spots coalesce to form brown streaks between the leaf veins with yellow margins. Leaves eventually drop with the petiole (leaf stem) remaining attached. The root system will have a deteriorated tap-root and lateral roots will only be evident in the upper soil profile. The root cortex is light-gray to brown and may extend up the stem. Typically, plants can be easily pulled

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Inside

New soybean seed treatments: How and when to add to your system

Another insecticidal seed treatment for soybeans is now available. Bayer CropSciences announced registration of Gaucho® seed-applied insecticide for use against early season insect pests of soybean. The other currently available seed-applied insecticide is Cruiser® from Syngenta. Both are neonicitinoid insecticides -- the active ingredient in Gaucho® is imidicloprid and in Cruiser®, thiamethoxam.

The question is; "Where do these insecticidal seed treatments fit in Nebraska soybean production?"

Our major early season soybean insect pest is the bean leaf beetle. In early spring the over-wintered beetles become active and often enter soybean fields as soon as plants emerge. Although the defoliation the beetles cause can appear quite severe, research in Nebraska and elsewhere has shown that it usually does not result in economic damage. Soybean plants can compensate for a large amount of early tissue loss, so it takes a considerable amount of beetle feeding (generally over 50% defoliation) to impact yield.

A possible exception to this is in very early planted fields, when plants emerge well before those in surrounding fields. Because the beetles move to soybean fields during seedling emergence, early planted fields usually will have more beetles and suffer the most injury. For those who regularly plant before most of their neighbors and have a history of high beetle numbers, insecticidal seed treatments may be an option. Both products, Cruiser® and Gaucho®, have proved effective against early season bean leaf beetle in our insecticide trials.

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Ag briefs

John Wilson, Extension Educator in Burt County: A little rain over the weekend was too little, too late for most crops. Some cornfields are firing. Soybeans, especially on thinner soils, are starting to turn color prematurely. Some producers have decided that without significant rain they will not take a fourth cutting of alfalfa. The third cutting was short and the fourth is nonexistent.

Tom Dorn, Extension Educator in Lancaster County: Corn is fully dented and most varieties are very close to maturity. At this point rain is not going to have much effect on corn yield.

Group 2.2 - 2.5 soybeans are starting to turn color and group 3.0 - 3.5 beans are still filling the pods. All varieties of soybeans in areas receiving rain this past week will benefit and have increased yields. Group 3 and longer beans could still use a couple more inches of rain, if it comes right away.

Most fields of grain sorghum have turned color and are in mid to late dough stage or beyond, depending on variety. Grain sorghum yield potential is about average. The soil moisture conserved by no-till farming is going to show in the combine tank this year.

Gary Lesoing, Extension Educator in Nemaha County: The rains received in mid-August were very beneficial to this year's crops, especially soybeans. The soil moisture conditions are generally favorable for continued normal crop development. Most soybeans are in the pod filling stage. In scouting fields I have seen fairly high numbers of bean leaf beetles, with significant defoliation and some pod damage. I also have seen an increase in soybean aphids, although levels are well below treatment levels. Last week most fields had populations of less than 50 per plant, but there were a few plants with populations of almost 100 aphids per plant, still well below the treatment level of 250 aphids per plant. Corn is maturing and yields should be quite variable, depending on rainfall, hybrid and planting date. In some fields there should be some very good corn yields, but in other fields the hot, dry stressful weather in July will take a toll. Since the rains pastures have had good regrowth and some fourth cutting alfalfa has just been cut. In some drier areas in adjacent counties, corn has been harvested for silage.

Darrel Siekman, Extension Educator in Merrick County: It has rained about an inch, allowing many producers to start picking up irrigation pipe on the corn. Soybeans will probably need another irrigation or two depending on the rainfall. This last rain is a big help to pastures, newly planted alfalfa and rye. An early corn harvest is imminent.

Douglas Anderson, Extension Educator in Nuckolls and Thayer counties: Some silage -- a very small percentage -- is being chopped for green feeding to feedlot steers. Other fields will be cut as fields dry down. Good rains have boosted hopes of dryland beans and sorghum. Irrigation is almost done in wide areas of Nuckolls and Thayer counties. Alfalfa is responding and will probably have a third cutting.

John Hay, Extension Educator in Pierce, Madison and Wayne counties: Crops in northeast Nebraska are quite variable, depending on soil type and rainfall. Dryland fields in Pierce County are looking rough, especially those in sandy areas. Yields will most likely be down from last year, but probably will be somewhat close to the long-term average. Few insects are causing harm. Aphids are prevalent, but in low numbers. Their season is ending soon and we wouldn't expect them to be a major problem. There are a few bean leaf beetles, but not really enough to do much harm. Pierce County received nearly 2 inches of rain last week which shut some pivots off and will really help finish off the season. My sentinel soybean plots are turning color and thankfully we haven't seen any rust.

Husker Harvest Days

Visit Extension specialists at the Big Red Building Sept. 13-15.

CROP WATCH

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Lisa Jasa, Editor; Email: ljasa1@unl.edu

Soybean seed treatments *(Continued from page 179)*

The other soybean insect pest that some have suggested can be controlled with insecticidal seed treatments is the soybean aphid. Although early season aphid mortality and sub-lethal effects have been observed with insecticidal seed treatments, **we do not recommend seed treatments for controlling soybean aphids in Nebraska**.

Dr. David Ragsdale and Brian McCornack of the University of Minnesota, have conducted soybean aphid mortality and fecundity (number of offspring) studies to investigate the questions "How long can we expect systemic activity of thiamethoxam to last in the soybean plant?" and "How successful will female soybean aphids be at reproducing on Cruiser-treated soybean leaves?"

In lab bioassays, they exposed soybean aphids to soybean leaves pulled from thiamethoxam-treated plants (50g/100Kg seed) at successively later intervals after planting. They placed aphids on treated leaves and recorded percent mortality and the number of offspring produced per female at 24 hour and 48 hour exposure/feeding times. Ragsdale and McCornack found that soybean aphid mortality was significant up to about 35 days (V3/V4 growth stages), but beyond that point, aphid mortality decreased toward zero and was no longer significant. They also found that soybean aphid fecundity was significantly reduced up to about 40 days after planting. However, beyond 40 days they saw no difference in the number of nymphs deposited by aphids on treated and untreated leaves. The Minnesota researchers concluded that under normal planting dates they did not expect thiamethoxam seed treatment efficacy to hold, particularly under high and/or late season soybean aphid pressure.

In a field study, Dr. Michael Catangui and colleagues from South Dakota State University examined the effect of insecticidal seed treatments (thiamethoxam, imidicloprid, and clothianidin, another neonicitinoid) on soybean aphid populations during R5 soybeans in August. They found that none of the seed treatments significantly reduced aphid numbers or increased yield and concluded that insecticidal sprays would be necessary to control late season aphid infestations. Their findings are similar to our trials in Nebraska.

To date in Nebraska, the soybean aphid has not been an early season pest; it has been a late season pest. Most of our soybeans are planted in May, and we generally don't begin to see aphids until mid to late July, well past the early vegetative stages. In most fields soybean aphid populations peak in August. This is too long a period of time to expect currently available seed treatments to have a significant effect. In addition, not all soybean fields in Nebraska will have economic populations of soybean aphids, even in the northeast part of the state where we have seen the most soybean aphid injury. This year is a perfect example Why spend money up front when the need may not arise? With the cost of a seed treatment at approximately \$12-\$14 an acre, it is an expensive "insurance" with a high probability of either not being needed or not being efficacious when used to manage soybean aphid. At current prices foliar insecticide treatments are cheaper than seed treatments and need only be applied when necessary.

In conclusion, we believe that insecticidal seed treatments have a role to play in early planted soybeans for early season bean leaf beetle management, but we do not recommend insecticidal seed treatments for soybean aphid management in Nebraska. Manage soybean aphids by scouting and using economic thresholds. In Nebraska, one well-timed foliar insecticide application, based on two or more field visits, will adequately control soybean aphids and protect yield.

Thomas Hunt
Extension Entomologist
Haskell Ag Lab, Northeast REC
Keith Jarvi
IPM Assistant
Northeast REC

Sudden death *(Continued from page 179)*

from the ground and a dark blue fungal growth will be visible on the roots. The blue color will not be evident in dry soil conditions.

One disease which can look like SDS is brown stem rot, which we have found in some fields. The key symptom to differentiate the two is internal stem discoloration. If the center of the stem is brown or discolored, it is brown stem rot; if the discoloration is confined to the outer stem margin when split, then it is most likely SDS if the other symptoms match.

We are currently collecting information on how widespread SDS is this year. If you have a field which is exhibiting SDS symptoms, please contact us (402-472-2559, lgiesler1@unl.edu) so we can confirm it and get a better idea of how prevalent this disease is. You also can send a sample of 6 to 10 whole plants (including roots) to the UNL Plant and Pest Diagnostic Clinic. Please put a copy of this article with the sample and you will not be billed for the sample.

Loren J. Giesler
Extension Plant Pathologist

Precipitation up in western NE; reservoirs benefit

As this year's warm season crops mature, it's time to focus on the implications of this year's weather on the 2006 production season. Western Nebraska has seen a dramatic rebound in precipitation from 2004, setting the stage for substantial improvements in drought depleted reservoirs as winter rapidly approaches.

If you live in western Nebraska, you may be under the belief that it has been unusually wet this year. In comparison to 2004, you would be correct. Through August 29, Scottsbluff had received 16.34 inches of moisture, 3.68 inches above normal. In 2004, Scottsbluff recorded 6.50 inches of moisture in the same period. Similar patterns have been noted in the Sidney and Valentine areas. Valentine received 22.67 inches of moisture in 2005, compared to 12.90 inches in 2004; Sidney received 16.11 inches in 2005, compared to 10.34 inches in 2004.

Central and west-central Nebraska precipitation trends are generally closer to normal, but are substantially improved compared to 2004. Grand Island had received 23.84 inches through August 29, compared to 14.07 inches in 2004. Hastings received 17.95 inches, compared to 16.76 inches last year. For the year Grand Island is 4.14 inches above normal, while Hastings is 1.87 inches below normal.

Conditions across eastern Nebraska are showing the most variability in precipitation with Lincoln and Omaha showing negative departures for the period of 1.87 and 1.14 inches, respectively. Lincoln received 19.00 inches of moisture in 2005, compared to 16.76 inches in 2004. Omaha received 19.30 inches this year, compared to 21.36 inches last year. The Norfolk area is currently 1.97 inches above normal for the year at 19.91 inches, but down considerably from 2004 when 29.53 inches had been recorded though August 29.

What has been the significance of above normal precipitation across western Nebraska this year? Significant improvements in streamflow rates on the Platte River upstream of Lake McConaughy are being observed. Flow have been averaging 900 cfs during the past couple weeks, compared to virtually no flow during the same time last year. As of August 29, Lake McConaughy stood at an elevation of 3205.2 feet above sea level, compared to 3199.4 feet last year. It is now 7.6 feet higher than the record low elevation set last September at 3197.6 feet above sea level. In terms of capacity, Lake McConaughy is currently 25.5% full.

If current streamflow rates continue through the fall, coupled with normal winter precipitation, it is possible that Lake McConaughy will top 50% of capacity prior to the onset of the 2006 irrigation season. In addition, it has been exceptionally wet in the Wyoming region of the Platte River basin during the past few months. Above normal snowfall this winter could easily translate into a higher proportion of the spring snow melt making its way into the Platte watershed.

The Republican River watershed has begun to slowly respond to the increased precipitation events in 2004, but average flows within the Nebraska border consistently have remained in the lower 20 percentile of historical flow rates. It will be necessary to see a wet fall and winter for substantial improvements to occur within the watershed. Reservoirs levels within the watershed should be improved by the start of the 2006 production season, but will probably not approach the improvement potential of the Platte River basin.

The latest long range weather outlooks for this winter and spring fail to offer any clear indication of defined precipitation pattern across the central Rockies and central High Plains. Temperatures do show a warmer than normal tendency in the December-February period. At present, there is no sign that the upper atmospheric ridge that blocked the movement of significant storm activity into the central United States is trying to re-establish itself. Therefore, the current pattern of frequent storm systems moving into the central United States should continue with a minimum of normal precipitation expected.

Soil water recharge

Since there is no clear delineated precipitation tendency shown for this fall, eastern Nebraska dryland corn producers can evaluate their risk of sub-normal soil moisture recharge through the fall and spring by simply tracking the amount of precipitation received during the October-April period. Studies have concluded that if 12 inches of moisture is received during the off-season, coupled with normal growing season precipitation, normal corn yields can be expected. These 12 inches would translate into full recharge of the top 4 feet of soil profile. For each inch of moisture short of 12 inches in the off-season, coupled with normal growing season moisture, expect a 2.5-5.0% yield reduction.

October and November precipitation are extremely important in the soil moisture recharge equation. If 5.0 inches of moisture is received during the two-month period, there is a 50/50 chance of obtaining 12 inches of moisture through the end of April. If only 2.0 inches are received during the period, there is a 22% chance of obtaining full

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Panhandle crops status

Most of the crops are doing well throughout the Panhandle. The dry bean crop is maturing and water needs will be minimal to complete the crop. Although corn growth is a little behind average, a full profile now should mean adequate water is available to reach maturity. If continuing to irrigate, remember that corn at the beginning dent stage of growth requires 5 inches of water to reach maturity and those water needs can be met either through irrigation or rainfall. Sugarbeet growth will continue until harvest, which begins in early October. Water use will average between 1.0 and 1.5 inches a week in September. The biggest concern for sugarbeet growers without a well will be whether adequate soil water will be available for harvest. Alfalfa water use will average between 1.2 and 1.6 inches per week during September. As the case with any crop, cooler than normal weather will mean less water use and hotter weather will mean more water use. Irrigation wells will keep the crop going until frost. For those without wells, precipitation is needed to meet crop water needs and avoid a premature end to the growing season.

C. Dean Yonts
Extension Irrigation Engineer
Panhandle REC

North Platte Valley crops status

Late spring snow and timely spring and summer rainfall have allowed irrigators in the North Platte Valley to have a better water supply in 2005 when compared to recent years. Irrigation districts in the North Platte Valley will begin shutting down operations starting September 5. Although this schedule is a little earlier than normal, the North Platte irrigation district boards made the decision to close the gates now in order to carry over 250,000 to 300,000 ac-ft of water for the 2006 growing season. The last time the irrigation districts were able to carry over this much water was in the fall of 2000. Since then, end of year carryover during most years has been minimal. Normal carryover is slightly more than 410,000 ac-ft.

The carryover volume doesn't mean 2005 was a "business as usual" year. Irrigators still faced water restrictions and limitations. In anticipation of water shortages this year, a number of acres were planted to spring crops to reduce irrigation needs. Those crops were nearly mature before water entered the canal systems and as a result, water available for those acres could be used on remaining acres.

The irrigation districts are counting on precipitation this fall to help finish crops and avoid late season water stress. This winter, the districts also are hoping for an above average snowfall that will come closer to meeting their normal diversion needs of 1.1 million ac-ft of water. Currently, total water in storage in the North Platte system stands at only 69% of normal. Without above normal snowfall in the Rocky Mountains this winter, the North Platte projects will face another year of short water supplies and North Platte Valley irrigation districts could see their carryover supplies diminish.

C. Dean Yonts
Extension Irrigation Engineer
Panhandle REC

Precipitation

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recharge, increasing to 33% if 3.0 inches are received. If conditions are wetter than normal and there is 5.0 inches of precipitation, there is a 62% likelihood of receiving 12 inches by the end of April, increasing to 72% if 6.0 inches is received during the two-month period.

The data used in the listed risk analysis scenario is based on 110 years of climate data. No forecasting techniques are included in the probability calculations, as they are entirely based on historical climate events. This information simply gives the producer a means of assessing his risk prior to undertaking 2006 productions decisions.

Al Dutcher
Extension State Climatologist

Conference highlights women in ag issues

Women involved in agriculture can gain management education tailored to fit the specific challenges they face at the 21st annual Women In Agriculture Conference in Kearney Sept. 15-16. This year's theme is "Making the Critical Difference." Keynote speaker is Christine Burton, assistant deputy minister of Manitoba Agriculture, Food and Rural Initiatives in Manitoba, Canada.

Registration is $75 before Sept. 3 and $85 afterward. The fee includes workshop materials, breaks, lunch and dinner on Sept. 15, and breakfast and lunch on Sept. 16. Lodging is available by contacting the Kearney Holiday Inn at (800) 248-4460. For more information, call (800) 535-3456, fax (402) 472-0776 or go online to *wia.unl.edu/*

The proof is found in the field and the yield

Check now for uniformity of water application

This time of year can present the opportunity for center pivot and furrow irrigators to evaluate how uniformly water was distributed in the fields. Overwatering causes deep percolation of water that results in the leaching of nutrients and increased pumping costs. Areas of the field that are underwatered due to poor uniformity will likely result in reduced yield.

For center pivots, problems with uniformity usually occur in a circular pattern and not in the planted row direction. Because the center pivot cuts across crop rows planted in straight lines, the combine integrates the good and bad areas so that it's not always easy to tell if water distribution was an issue. Even with a yield monitor, some water distribution problems can be masked by the number of rows entering the combine. In severe cases, water distribution issues can be exhibited by shorter corn or by obvious water stress during the growing season. More subtle problems may be documented by soil water monitoring.

Water distribution uniformity is impacted by elevation changes in the field that are significant enough to cause more or less water to exit each sprinkler than the original system design called for. Pressure regulators installed on each sprinkler will tend to minimize nonuniformity due to field topography. The University of Nebraska recommends that if the field elevation difference results in a change in flow rate that is more than 10% different than the original design, regulators should be installed.

Another source of nonuniform water distribution can be the position and spacing of the sprinklers on the system. For example, low pressure spray nozzles mounted on drop tubes and spaced greater than 10 feet apart can result in water distribution uniformity issues if the sprinkler is operating in the crop canopy. This issue has emerged during the past few years when the number of irrigation events per year has been high and little rainfall has been recorded in many areas of the state. Thus, even minor nonuniform water distribution problems will tend to accumulate over the season. Sprinkler spacings should be 7.5 feet or less if the sprinkler is operating in the crop canopy -- 5 foot spacings are preferable.

Non-uniform yields can be due to a number of factors. If water distribution issues are suspected, the easiest way to evaluate the problem is to isolate and hand harvest a small area or harvest two rows at a time in the suspect area of the field. The best place to determine the direct link between water distribution and yield is where the center pivot becomes perpendicular to the crop row direction. At this point yields can be tied directly to the position on the center pivot and to a series of sprinklers on the system.

If the hand harvest approach is taken, it is best to harvest and shell the ears from two rows of corn at least 20 feet long. After shelling the corn, weigh the corn wet and then take a moisture sample so that the yield can be converted to the standard 15.5% water content. By comparing the yields of side-by-side rows, it is easy to determine if water distribution uniformity due to the sprinkler position and spacing are the cause.

Systems with sprinklers mounted on top of the pivot pipeline can have problems too. In some cases, a series of sprinklers may be installed out of order. To eliminate this possibility, check the computer printout for the sprinkler package and check to see that the right sprinkler is in the right place. Though misplaced sprinklers are not common on new systems, worn out or broken sprinklers are often replaced with whatever happens to be available at the time. Over time this could lead to water distribution uniformity problems that are not the result of the original system design.

Another cause of nonuniform irrigation can be broken or plugged sprinklers. If sprinklers are operated within the canopy, plugged sprinklers or other distribution problems may not be directly observed. The best way to identify incanopy sprinklers that are not operating properly is to walk along the system during the first irrigation. Later in the growing season the sprinkler operation can be evaluated on the access road. Plants can be good indicators too. Prior to harvest try to select a high point such as a hill, pivot tower or the combine, from which you can observe the field and see any potential problems.

Unformity problems with furrow irrigation will need to be evaluated a little differently. For example, a patchy area in the field could receive too little water as a result of soil compaction. A soil probe will often find any compaction layers that may be causing problems. Compaction also can be traced back to spring tillage operations, especially if the soil was wet when tillage was being done. These areas will show up as straight lines through the fields in the direction of tillage.

If irrigation timing is the problem, those differences should show up according to the width of irrigation sets that are used and will likely be most evident at the far end of the field where water application

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Fall management

Test corn stalks for nitrogen; adjust plans

With energy prices climbing again, higher nitrogen prices could develop next spring. If prices increase, there may be a temptation to lower nitrogen application rates. Taking time this fall to evaluate the efficiency of the nitrogen application rate you're currently using can help provide information on which to base any changes next spring.

Taking corn stalk samples now can help determine if the corn was under, adequately or over fertilized with nitrogen. If the nitrogen applied this year was greater than that recommended by the University of Nebraska and this fall's stalk nitrate samples indicated excess nitrogen, consider reducing nitrogen rates for next season.

Use the corn stalk nitrate test in irrigated fields where moisture was not limiting. Fields that tend to have high stalk nitrate tests are those where manure or excess nitrogen was applied and fields following alfalfa. Iowa State University developed the corn stalk nitrate test, and its usefulness has been verified in other states. A full explanation and discussion of the test can be found in the NU Cooperative Extension publication, *The Corn Stalk Nitrate Test*, NF01-491. (Available online at *http://ianrpubs.unl.edu/fieldcrops/nf491.htm)*

What does the test show?

The results of the corn stalk nitrate test indicate whether the corn was over fertilized during the season. The test shows low, optimal and excess stalk nitrate values (*Table 1*). Low values indicate nitrogen may have been deficient. Excess values indicate that there was more nitrogen than the plant needed to produce grain. The scientific basis for this test is the fact that corn will continue to accumulate nitrogen past the level at which grain yield is increased. Since corn does not show visible symptoms of excess nitrogen, analysis of the stalk tissue can determine when this occurs. This test is probably best used for finding excess nitrogen since deficiencies can be spotted visually by leaf yellowing.

Take an 8-inch segment of corn stalk from 6 inches to 14 inches above the ground.

This season, if the test comes back in the "excess" range, that indicates that reductions in nitrogen may be possible next season. (For more information on recommended rates, see the NU Extension NebGuide, *Fertilizer Suggestions for Corn*, G174, available online at *http://ianrpubs.unl.edu/fieldcrops/g174.htm* or visit the Web site, *Managing Nitrogen Efficiently in Nebraska Crop Production* at *http://cropwatch.unl.edu/nitrogenissue/focusnitrogen.htm*, where there are worksheets and an on-line calculator to help determine recommended nitrogen rates.)

How to take the test

Take corn stalk samples up to three weeks after black layer formation in 80% of the kernels. Newly published information indicates that the stalk test can be taken as early as when the milk line

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Table 1. Interpretation of the test results

Plant nitrogen status	*Stalk nitrate (ppm)*	*Management suggestions*
Low	0-250	Increase nitrogen
Marginal	250-700	Increase nitrogen
Optimal	700-2000	Yields are not limited by nitrogen stress
Excess	Greater than 2000	Plant nitrogen greater than needed

Nitrate test *(Continued from page 195)*

Table 2. Summary of diagnostic techniques, critical values and error rates. (after Fox et al., 2001. *Agronomy Journal* 93:590-597)

Samples in database	*Diagnostic Technique*	*Critical value*	*Falsely predict N deficient*	*Falsely predict N sufficient*
			%	%
702	Chlorophyll meter	52	13.4	1.7
702	1/4 milkline growth stage	48	2.7	4.6
209	Stalk nitrates	250 ppm	5.3	1.9
209	at black layer	700 ppm	12.0	0.0

is one-fourth of the way down the kernel. To take the test, remove an 8-inch segment from 6 inches to 14 inches above the ground.

Remove the sheaths. Don't take diseased stalks or stalks damaged by hail or insects. Take 15 stalks per sample, keep them cool and send to the laboratory immediately. Samples should be sent in paper wrapping and not plastic since plastic wrapped samples may mold. Have the samples analyzed for nitrates.

An article (Fox et al., July 2001) in the *Agronomy Journal* compared the stalk test, late season chlorophyll meter, and green leaf count techniques.

Based on this article, I have summarized their analysis of the results in *Table 2*. The authors used experimental data to determine the error rate of using different critical levels to interpret the test results. Because the tests were conducted on corn grown in replicated experiments, they could determine if the diagnostic test level accurately matched the plant response. Their criteria for whether the test was valid was whether the yield was at 93% of maximum yield. For example, with the chlorophyll readings taken at one-fourth milk line they used a critical value meter reading of 52. They derived the 52 reading from their previous research.

Once the criteria was set, they determined if the treatment correctly predicted sufficient nitrogen. They also divided the errors into two groups: one predicted the plant was nitrogen deficient when it wasn't while the other predicted the plant had adequate nitrogen when it was deficient. Using the chlorophyl meter reading to determine if the plant had adequate nitrogen wrongly predicted the crop was deficient 13.4% of the time. The plant actually had adequate nitrogen even though the meter suggested it was low. Using the same meter reading criteria, 1.7% of the time it falsely suggested the plant had adequate nitrogen when it was low.

When the authors lowered the criteria from 52 to 48, the total error rate actually decreased from 15.1% to 7.3% because the percent the meter falsely predicted deficiency decreased from 13.4% to 2.7%. There was not a corresponding increase in the false prediction of adequate nitrogen.

The data on the stalk nitrates also shows the change of error rates when the criteria for predicting deficiency changes. The Fox et al. data indicates that using 250 ppm would keep prediction errors to 7.2%. Using the 700 ppm critical value used by Iowa had a 0% error rate for falsely predicting nitrogen sufficiency and a 12% overall error rate.

The Fox et al. data provide more evidence that corn stalk nitrate tests are a useful tool in nitrogen management. They are best used to determine if adequate nitrogen was available. They would be especially useful in fields with manure history where the producer needs reassurance that reducing fertilizer nitrogen will not affect yields. This year they may also help producers determine if reducing nitrogen rates decreased yields.

Charles Shapiro
Extension Soils Specialist
Haskell Ag Lab, Northeast REC

Corn condition

According to USDA's Nebraska Agricultural Statistics Service on Aug. 28, corn condition rated 5% very poor, 9% poor, 21% fair, 47% good, and 18% excellent. Irrigated fields improved to 83% good or excellent while dryland fields remained at 35%. Ninety-five percent of the crop was in the dough stage, ahead of 91% last year and the average at 93%. Sixty-nine percent of the crop had dented, ahead of 44% last year and 59% for the average. Three percent of the corn crop had reached maturity, ahead of one percent last year.

Seeding wheat on time pays yield rewards

Seeding date can have a major effect on winter wheat yields (Table 1). Wheat seeded early in the fall of 2004 had more freeze injury this spring because it used more moisture last fall. Drier soils cooled down faster and hence there was more freeze injury to the wheat.

Table 1. Winter wheat seeding data and yield at North Platte.

Seeding date	*Yield (bu/ac)*
September 2	2
September 15	27
September 25	42

In one University of Nebraska test a replication located in a low area yielded 70 bu/acre while the entire plot averaged 21 bu/acre because it had more soil water.

The recommended seeding dates for Nebraska's winter wheat vary substantially from one end of the state to the other – from September 1 in the extreme northwest area to October 1 in the southeast tip – and have been proven and verified through years of research and farmer experience. Some years an earlier seeding may have an advantage and some years a later date may have an advantage, but in the long term, the suggested seeding dates will give the highest average yield.

The recommended seeding date represents a goal for seeding completion. As farm size and the number of acres increases for individual farmers, so does the length of time needed to complete seeding. The goal should be to have all the wheat planted by the ideal date. Plan your field order for planting accordingly. For example, plant higher elevation fields and those containing sandy soil first and leave lower fields and those with higher clay content until last.

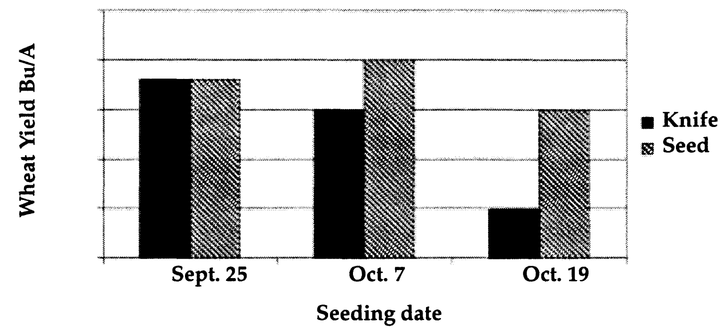

Figure 1. Effect of seeding date on performance of seed and dual placement methods of phosphorus application at three locations and seeding dates.

If the seeding date is delayed or growing conditions prevent or delay root growth to the dual placement fertilizer band, seed fertilizer placement is the preferred application method (*Figure 1*). Poor root growth for whatever reason limits root-fertilizer contact and tillering, which affects yield. Much of the grain yield of winter wheat occurs on tillers that develop from buds in the axils of lower leaves. Under normal conditions, as much as 70% of the grain yield comes from tillers. Tillering also enables the plant to adapt to different conditions. Few tillers develop when moisture, nutrition, and other conditions are poor, whereas numerous tillers that increase the yield potential form when conditions are favorable.

Date of seeding greatly affects development of tillers in winter wheat. Seeding during the optimum period enables wheat to form

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Table 2. Mean date and number of plants that emerged; maximum, surviving, and productive fall tillers; maximum and productive spring tillers; and total productive spikes by Jagger and 2137 wheat varieties planted on four dates (Kansas State University at Hutchinson, Kansas).

Date (1995) Planting	Emergence	Plants (no/yd)	Fall tillers (no/yd²) Max	Spring tillers (no/yd²) Surviving	Total spikes Productive	Yield Max	Productive	(no/yd²)	bu/A
Sept. 28	Oct. 12	141	1266	578	281	584	195	476	39.0
Oct. 11	Oct. 18	207	916	594	360	659	192	552	57.7
Oct. 28	Nov. 15	141	183	183	152	600	272	424	54.8
Nov. 13	Nov. 30	143	147	147	117	213	144	260	30.2
LSD (0.05)		38	136	191	92	147	53	106	4.9

Wheat planting dates *(Continued from page 187)*

sufficient but not excessive tillers. Early seeding results in too many fall tillers, which may compete with each other, become diseased, and deplete soil moisture so that grain yields are low. Late seeding gives plants little time to develop tillers, resulting in an inadequate numbers of spikes (heads) for high yields the following spring.

Senescence and death might eliminate excessive tillers that form during the fall. Conversely, if too few tillers develop during fall, additional tillers may form during spring; however, the yield potential may differ between tillers that develop during fall and those that develop during spring.

A study by Kansas State University to determine the seeding date effects on tiller development and productivity of winter wheat was conducted in a corn/soybean rotation at Hutchinson, Kansas. Two hard red winter wheat varieties, Jagger and 2137, were planted on four dates in the fall of 1995 (*Table 2*). The first date, September 28, was during the early part of the recommended period, September 26 to October 20. The second date, October 11, was one day after the Hessian fly-free date, and the last two dates, October 28 and November 11, were after the recommended period. Wheat varieties were planted at 60 lbs/ac of seed in plots. Plots received 70 lbs N/A and 25 lbs P/A before planting and 50 lbs N/A in late February 1996.

Data for Jagger and 2137 were pooled, since results for the two varieties were similar. Nearly equal numbers of seedlings emerged after all planting dates except October 11, when considerably more plants emerged (*Table 2*). Plants from the first two dates tillered profusely, developing most of their tillers before they became dormant in late fall. Plants from the latter two seedings did not form any tillers before they became dormant, but those from the October 28 seeding developed a few tillers over winter. Only 46% and 65% of the fall tillers on plants from the first two dates, respectively, survived the winter, whereas 100% of the fall tillers on plants from the last two dates survived. About 50% to 60% of the surviving fall tillers from the first two dates formed spikes, while approximately 80% of the surviving tillers from the last two dates produced grain.

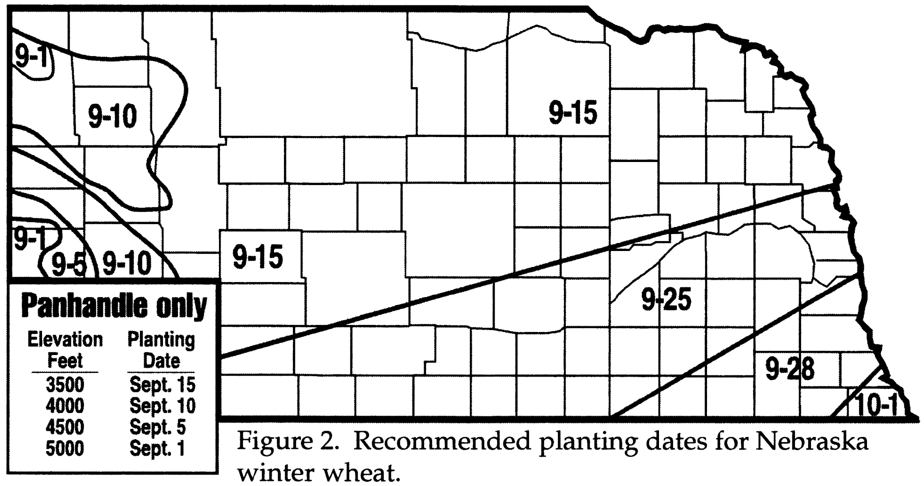

Figure 2. Recommended planting dates for Nebraska winter wheat.

Plants from the first three seeding dates developed nearly 600 spring tillers per square yard, but plants from the last date formed only 213 spring tillers per square yard (*Table 2*). About 30% of the spring tillers from the first two dates, 45% of the spring tillers from the third date, and 68% of the spring tillers from the fourth date produced grain. The total number of productive spikes ranged from 260 to 552 per square yard or 1.8 tillers per plant from the last seeding to 3.4 tillers per plant from the first seeding.

Table 2 also lists the yield from the four seeding dates. These dates need to be adjusted for the area in Nebraska to be seeded.

Several factors were considered when developing the recommended seeding dates (*Figure 2*). In the Panhandle, the dates depend on elevation. Producers can determine the ideal date for each field by knowing the elevation. Using a starting point of September 15 for 3500 feet, one day should be added for each 100 foot decrease and subtracted for each 100 foot increase in elevation. For the rest of the state, September 25 or later seeding dates are recommended to avoid Hessian fly infestation.

Delayed planting dates also may be due to a need to avoid wheat streak mosaic virus, Russian wheat aphid, crown and root rot, and too much fall growth. Excessive fall growth causes excessive moisture use and stress. There are several other reasons for planting early. One is to get adequate ground cover to avoid erosion from wind and water. Another is to get adequate plant growth to assure winter hardiness. A third reason is to quicken maturity the following summer and avoid excessive heat stress.

The map is a guide rather than an absolute deadline. Each producer should make changes to ensure the planting dates fit the conditions of his or her farm.

Bob Klein
Cropping Systems Specialist
West Central REC

Nebraska wheat info available 24/7 on the Web

With winter wheat seeding just around the corner, wheat growers should be aware of a number of wheat educational materials available on the Internet. The first of these resources, **Nebraska Wheat** (*nebraskawheat.com*), serves as a portal to wheat information from the University of Nebraska-Lincoln Extension, the Nebraska Wheat Board, and the Nebraska Wheat Grower's Association. It is a one-stop shop for all your information on Nebraska winter wheat.

Wheat Production Systems (*wheatbook.unl.edu*) is a page of links to the most recent information from the University of Nebraska-Lincoln Extension for Nebraska wheat growers. Site visitors can sign up to receive e-mail messages when the site is updated throughout the year.

Wheat variety tours are held every summer throughout Nebraska to allow wheat growers to see, compare, and learn about the many winter wheat varieties available and to get an early glimpse of new experimental lines. For those unable to attend or who just want to refresh their memory, the **Wheat Varieties Virtual Tour** (*www.panhandle.unl.edu/wheat*) was developed. Virtual tourists can see a list of wheat varieties recommended for their part of the state, read about a variety's characteristics and compare those characteristics to other varieties of interest. Tourists also can see how different varieties performed in nearby wheat variety trials and locate a certified seed dealer that carries the varieties they are most interested in buying. The selection of adapted and complimentary varieties is one of the most important decisions a wheat grower will make for this season.

Hard white wheat has some significant advantages over hard red winter wheat. Millers, bakers and consumers prefer white wheat whenever they have a choice. This preference is particularly strong in some international markets which buy wheat from the United States. Despite overseas buyers' strong interest in hard white wheat for such products as noodles, tortillas and breads, the United States continues to produce much more hard red winter and other types of wheat than it does hard white wheat.

Western Nebraska growers are ideally located to take advantage of the international demand for hard white wheat and establish the region as the source for quality product into the future. Learn more about this promising opportunity by visiting the **Hard White Wheat** Web site at: *www.hardwhitewheat.unl.edu.*

Drew Lyon, Extension Dryland Crops Specialist
Panhandle REC, Scottsbluff

Irrigation uniformity

(Continued from page 184)

was less. Seldom will you find uniformity problems at the head end of the field.

Regardless of what type irrigation system is being used, uniform water application is becoming more important as water supplies become more limited and fuel costs increase. As the season draws to an end, make sure you look for crop height differences that may reflect yield reduction caused by nonuniform irrigation practices.

For more information, see these NebGuides: Application Uniformity of In-Canopy Sprinklers and Managing Furrow Irrigation at *ianrpubs.unl.edu/irrigation/.*

William L. Kranz
Extension Irrigation Specialist
Northeast REC
C. Dean Yonts
Extension Irrigation Specialist
Panhandle REC

Wheat seeder

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in western Nebraska row spacings of 10 to 14 inches are recommended. Narrow row spacing offers an advantage for weed competition. For irrigation, row spacings of 6 to 8 inches are preferred. Following is a table on the pounds of seed/acre for 6 to 14 inch row spacings and seed sizes of 12,000 to 18,000 seeds/lb based on 18 seeds per foot of row. If planting is delayed, increase seeding rates up to 50% on dryland fields and up to 2.7 million seeds per acre on irrigated fields to offset the reduction in tillering that occurs with cooler temperatures.

With the seeding rate determined, how can we be sure the seeder will seed the desired amount? First, set the seeder by the operator manual to get close to the seeding rate. Use one of several items available to help calibrate the drill. For example, see NebGuide G03-1511, *Calibration of Sprayers (Also Seeders)*. Problem 10 from that NebGuide illustrates how to calibrate a seeder and is included on page 190.

Bob Klein
Cropping Systems Specialist
West Central REC

Featured stories to be added on the Web (cropwatch.unl.edu) and in the next printed *Crop Watch*:

- **More fuel efficient grain drying**
- **Fuel-saving tips for harvest**
- **Assessing the effect of crop stress at various plant stages**

Use seeds/acre to calibrate winter wheat seeder

When determining the seeding rate for winter wheat this fall, using "seeds per acre" rather than "pounds per acre" will provide a more accurate means of planting the intended number of seed.

If we examine the seed size in the UNL Extension Fall Seed Guide 2005 (EC05-103), the smallest winter wheat seed had 20,110 seeds/lb and the largest had 12,910 seeds/lb. Some years the largest seeds will have fewer than 10,000 seeds/lb. All seed should be cleaned and the small and cracked seeds eliminated. Shriveled seed can reduce yields because germination is slower emergence is reduced.

Winter wheat will respond to a limited range of seeding rates without affecting yields. Using seeding rates below that range can lead to excessive tillering. It also may delay maturity, increase weed competition and fail to make use of full yield potential; however, rates above that limited range may increase costs, increase lodging and possibly reduce yields.

Too much competition, even among the small-grain plants, may lead to fewer kernels per head and lower kernel weight. The key is an optimum plant population with uniform distribution for efficient use of available resources.

A review of how seeding rate affects yield potential is helpful. On the average, there are 22 seeds per head and 5 heads per plant, or 110 seeds per plant. With an average seed size of 15,000 seeds per pound or 900,000 seeds per bushel, a pound of average-sized seed with 80% germination and emergence has a yield potential of approximately 1.5 bushels per acre. Seeding 40 pounds of seed with a weight of 15,000 seeds per pound has a yield potential of 60 bushels.

Seed cleaning and sizing is essential to remove straw, chaff, dirt, stones, weed seeds, and broken, diseased or small shriveled kernels. Generally, seed cleaning will add 1 to 2 pounds to the seedlot's test weight by removing the small kernels. Taking a germination test is essential to determine the seed viability. After seed germinability has been determined, the seeding rate can be determined. Seed for planting should be above 85% germination.

There are several views on how many winter wheat seeds the grower should plant per acre. Floyd E. Bolton, crop scientist at Oregon State University, says 18 seeds per foot of row seems to be the point of diminishing yield increases, no matter what row spacing from 6 to 18 inches. For dryland winter wheat

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Calibrating seeders

How may pounds of seed should we collect if we want 18 seeds/ft of row with 10-inch row spacing. Seed size is 15,000 seeds/lb and we collect seed for 500 ft.

To determine lbs of seed needed/acre:

$$\frac{12 \text{ in/ft}}{10 \text{ in/row}} = 1.2 \text{ ft of row/ft}$$

$1.2 \times 43{,}560 \text{ ft}^2/\text{A} = 52{,}272$ ft of row/acre

52,272 ft of row/acre x 18 seeds/ft row = 940,896 seeds/acre ÷ 15,000 seeds/lb = 62.7 lb/acre

Determine area seeded with one opener on one acre:

10 in per row or

$$\frac{10 \text{ in}}{12 \text{ in/ft}} = 0.83 \text{ ft}$$

Test Box 500 ft long		Acre Box
Wt for weight of seed calibrated	=	62.7 lb seed/acre
415 sq ft (500 ft x 0.83 ft)		43,560 sq ft acre

$$\frac{Wt}{415} = \frac{62.7}{43{,}560}$$

43,560 x Wt = 26,020.5 (62.7 x 415)

Wt = 0.6 lb/opener or 9.6 ounces/opener (26,020.5 ÷ 45,560)

Seeding rate for winter wheat with 18 seeds/foot of row.

Row spacing	Feet of row/acre	12,000	13,000	14,000	15,000	16,000	17,000	18,000
		Wheat seeds/lb						
		lb/acre of seed						
6"	87,120	131	121	112	105	98	92	87
8"	65,340	98	90	84	78	76	69	65
10"	52,272	78	72	67	63	59	55	52
12"	43,560	65	60	56	52	49	46	44
14"	37,337	56	52	48	45	42	39	37