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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

No. 96-3
March 22, 1996

Early fall frost and moist kernels contribute to problems

Test soybean seed for quality

Last year's soybean crop had problems from the start. These problems could be continued to this year's crop if producers don't check seed quality and plant only high quality seed.

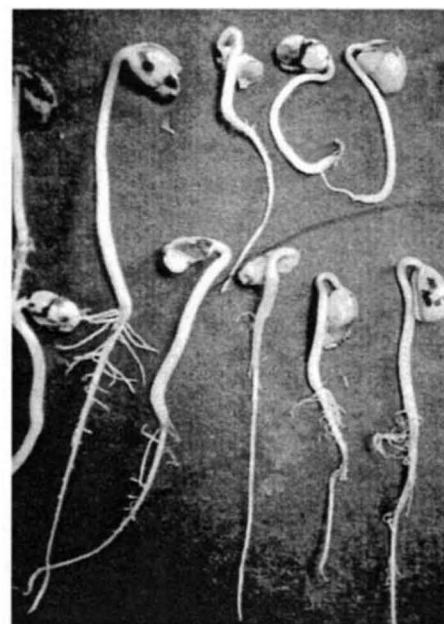
Problems arose from several sources in last year's crop. The late planting of many fields caused delays in soybean maturity. Compounded with the early frost last fall, many beans still had too much moisture to withstand freezing. The frost killed some beans outright, and caused others to lose leaves prematurely. The plants dried more rapidly than normal and left greenish soybeans in the pods. Many producers chose to leave the beans in the field to lose the green color.

The rapid dry down and standing in the field caused soybean seed moisture to be abnormally low

this spring. The results of both the frost and extremely low seed moisture have been lower seed germination and lower seed vigor than normal. Although many producers have excellent quality seed available, there is a concern for soybean producers who normally plant bin-run soybeans.

The potential for poor field stands is increased as the germ and vigor decreases. Many soybean producers "home test" their seed by planting a bin sample in a pie plate with moist paper towels. As soon as a sprout develops, usually in two or three days, the seed is counted as good. We have seen many germination tests where the "home test" results indicate 90% germination, while seed from the same bin tested by a reputable seed laboratory resulted in a 60% or 70% germination. The difference is in what happens after the initial sprout emerges. Official seed laboratories do not count the germs until seven or eight days after planting when the root systems are well developed and primary leaves are developing. This allows the seed analyst to accurately evaluate the extent of abnormalities caused by mechanical damage or frost.

Soybean germinations cannot be judged by seed appearance. The low seed moisture increases the fragility of soybeans and enhances the chance of mechanical damage. Many seed lots tested have germed in the 90s



Sprouting alone is not an indication of a quality soybean seed. All of these seeds are abnormal and not likely to produce a healthy plant.

while still in the bin, but after handling and conditioning germed in the 70s. If planting bin-run soybeans, be sure to handle the seed for the germ sample the same way the seed going into your drill or planter will be handled. Carefully wrap and pad the sample of soybeans and have it tested by a reputable seed laboratory.

Larry J. Prentice
Lab Services Manager
Nebraska Crop Improvement
Association

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Tips for applying anhydrous ammonia

With the recent warm, dry weather some producers have gone to the field, applying their anhydrous fertilizer before the spring rains begin. Unfortunately it's not as warm as some may think and the dry weather has created some application problems.

In many areas, there has been very little recharge of the soil moisture reservoir with off-season precipitation. Depending on the residue cover, there is fair soil moisture below the dry surface layer, but the soil temperatures are still quite low. Some producers are reporting that this moist soil is freezing to the knives because of the cooling effect of the anhydrous. This effectively widens the knife, creating problems by increasing the tillage action of the knife. In addition, some knives are freezing up, stopping the ammonia flow and creating a non-uniform distribution at a reduced application rate. These freezing problems can be avoided by waiting for warmer soil temperatures or they can be reduced by operating the knives shallower in the warmer surface soil.

With the lack of spring rains, the surface soil and previous crop residue are quite dry and fragile. The tillage performed by the anhydrous applicator knives is disturbing a lot of soil and covering a fair amount of residue, creating a condition in which the soil will dry out even more. The dry surface soil is easily thrown out by the knives, leaving a furrow behind. This unprotected furrow may become a channel for runoff

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Alfalfa producers...

The potential for winterkill in alfalfa may be high in some areas this year. The question of stand quality is especially timely for individuals considering whether they should destroy a stand or protect it by treating the winter annual weeds with herbicides before green-up.

A producer who applies a herbicide such as Karmex, Sencor/Lexone, or Velpar may have limited planting options if rotating to a nonlabeled crop. Gramoxone Extra, which has no soil residual, may be applied during alfalfa dormancy, which will leave replanting options open.

John McNamara
Extension Assistant--Weeds

Dry summer forecast

The most recent long range forecast model, updated March 17, indicates a tendency toward below normal precipitation from April through July for most of Nebraska. The models indicate that the northern two-thirds of Nebraska east of the Panhandle has the best chance of receiving below normal precipitation from April through June. This area expands to include all of the state, except for the western half of the Panhandle in the May through July forecast.

Western Iowa, southern Minnesota, and eastern South Dakota are forecast to have below normal precipitation through June.

Al Dutcher, State Climatologist
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Lisa Brown Jasa, Editor

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Row crop strategies to adopt for limited soil moisture situations

Dry conditions predominate in much of Nebraska. If conditions persist (see page 20), several strategies are available to producers to reduce the risk of planting spring-seeded row crops?

1. Reduce tillage. Each pass of a tillage tool dries the soil. In a dry spring, every fraction of an inch of moisture is precious. Ridge till, no-till, and reduced till planting systems will help reduce soil moisture loss at planting. All of our spring-seeded row crops have some degree of drought hardiness after emergence, but crops germinate erratically and grow poorly in a dry seed bed. Keep as much residue on the soil surface as possible to reduce evaporation.

2. Irrigate fields. If surface soil is moist enough at planting to germinate seed, subsoil moisture in gravity irrigated fields may be sufficient to develop the crop to the point where irrigation is possible. With center pivot or other sprinkler irrigation systems, the crops can be irrigated immediately after planting to assure good emergence and growth.

3. Choose appropriate crop (see table) Total water use (inches) during a growing season (evapotranspiration) varies with the crop grown, length of growing season, and region of the state.

Dryland corn has produced relatively well the last couple of years in southeast and south central Nebraska. Although genetics have improved, dryland corn is still probably not as drought tolerant as grain sorghum. Shorter season corn hybrids planted early are an option. These may avoid some of the temperature stress at pollination and will spread risk. Early maturing

Total water use in inches during a growing season with varying crops and areas of Nebraska.

| Crop | Western Nebraska | Central Nebraska | Eastern Nebraska |
|---------------|------------------|------------------|------------------|
| Corn | 23-26 | 24-27 | 25-28 |
| Soybeans | 20-22 | 21-23 | 22-25 |
| Dry Beans | 15-16 | -- | -- |
| Grain Sorghum | 18-20 | 19-22 | 20-23 |
| Alfalfa | 31-33 | 32-35 | 34-36 |

(Table adapted from UNL Cooperative Extension NebGuide G90-992, *Evapotranspiration (ET) or Crop Water Use.*)

hybrids in general though do not yield as well as longer season hybrids.

Grain sorghum is the most drought tolerant of the row crops listed in the table and is a good option for a year with low probability of sufficient precipitation. It also requires less moisture than either soybeans or corn. Planting a wide range of maturities will spread the risk of dry conditions as well as a premature fall frost.

A major management decision is whether **dryland corn or grain sorghum** should be planted in a given field. The optimum time to plant corn in southern Nebraska is in late April or early May. There is plenty of opportunity to receive moisture before then. If it is still dry in mid-May, grain sorghum is a viable option. Its optimum planting extends into the first week of June.

Soybeans are a good rotation crop with either dryland corn or grain sorghum. Again, spread the risk by using a broad span of maturities. It was obvious after the early frost last fall that most of the varieties planted were "full"

season. Yield potential of soybeans is not nearly as closely tied to maturity as it is with corn and grain sorghum. Plant a range of maturities.

4. Plant at appropriate seeding rates. In good years yields of dryland corn and grain sorghum can be increased with higher seeding rates. High seeding rates could lower productivity in a dry year. For grain sorghum, a seeding rate of 50,000 plants per acre is adequate to get good yields without causing problems in either wet or dry years. Dryland corn is planted as low as 12,000 plants per acre in Cheyenne county and as high as 20,000 plants per acre in southeast Nebraska.

Recommended seeding rates of soybeans are similar in both dryland and irrigated situations: 150,000 seeds per acre.

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 Extension Crops Specialist
 South Central R&E Center
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 Extension Crop Variety and
 Seed Production Specialist
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 Engineer
 South Central R&E Center

Computer models predict pesticide runoff so producers can avoid it

Some of Nebraska's most important resources — its lakes, rivers and streams — have been contaminated by runoff and inadvertent discharge of certain chemicals from agriculture and industry. Occasionally, concentrations of pesticides in surface waters have exceeded established drinking water standards or maximum contaminant levels set by the U.S. Environmental Protection Agency.

Research and computer modeling are helping identify how different factors affect pesticide runoff to provide solutions for producers who want to keep costly pesticides exactly where they were meant to be.

To better understand how surface waters become contaminated from pesticide runoff, the various factors and processes influencing runoff are tested in field experiments that measure

Table 1. Comparison of average monthly rainfalls (1961-1990) during April and May of selected cities across Nebraska.

| Location | April -- inches-- | May |
|---------------|----------------------|------|
| Alliance | 1.72 | 3.32 |
| Broken Bow | 2.19 | 3.27 |
| Fremont | 2.68 | 4.41 |
| Grand Island | 2.50 | 3.82 |
| Lincoln | 2.76 | 3.90 |
| Nebraska City | 3.24 | 4.17 |
| Norfolk | 2.29 | 3.68 |
| Omaha | 2.66 | 4.52 |
| Scottsbluff | 1.58 | 2.77 |
| Sioux City | 2.34 | 3.67 |
| Valentine | 1.67 | 3.16 |

Herbicide applications in early April can mean less loss to runoff, according to computer modeling of a Nebraska situation.

runoff losses under various conditions. Unfortunately, this process is expensive, labor intensive, and not practical for every soil, pesticide, and management practice used in Nebraska. Computer simulation models provide a more practical means of evaluating how these factors influence pesticide runoff in complex "real-life" situations.

We used the computer simulation model *GLEAMS* (Groundwater Loading Effects of Agricultural Management Systems) to provide examples on how rainfall patterns and timing of applications influence atrazine runoff. Because rainfall intensity and amounts can vary from year to year, multiple year simulations were conducted using 50-year rainfall patterns for a site in York County. Computer simulations that assumed standard farming operations for irrigated continuous corn production were used to predict pesticide runoff.

Because soil type, field and climatic conditions differ throughout the state, actual runoff results are likely to be somewhat different. The examples provided are meant to show *relative differences* in atrazine runoff when various factors such as timing of application and rainfall patterns are changed. In many cases, these relative differences would occur for other soil types and field conditions in Nebraska.

Rainfall intensity, amount,

frequency, and timing in relation to chemical application all affect pesticide runoff losses. While rainfall is beyond human control, it may be possible to adjust irrigation schedules or avoid chemical applications at peak rainfall times.

When is pesticide runoff most likely to occur?

Runoff begins when precipitation exceeds the rate at which water can enter the soil (infiltration rate) and overcomes the surface storage capacity from residue cover. As runoff water leaves the field, it can carry soil particles and dissolved chemicals including fertilizers and pesticides.

Researchers at the University of Nebraska and elsewhere have shown that the first runoff event after application generally contains the highest pesticide concentration and accounts for the greatest loss. Results from a 50-year simulation showed that 72% of the total annual atrazine runoff occurred within the first 30 days of application. Further analysis of atrazine runoff losses indicated that 42% of the annual runoff occurred with the first runoff. The range over 50 years was from 0% to 95%. This wide range is because the amount lost during the first runoff event depends on the timing of runoff in

(Continued on page 23)

Pesticide runoff

(Continued from page 22)

relation to application.

In general, pesticide loss is greatest when runoff occurs immediately after application. With time, pesticide runoff from the first post-application storm will decrease. The time frame between pesticide application and first runoff event has been termed the "window of vulnerability". The importance of this time frame is illustrated in Figure 1. It shows the amount of atrazine lost in the first runoff event for 50 different years. Since each year's precipitation pattern was different, the timing of the first significant runoff also differed. Years in which the first runoff event occurred shortly after application (May 1) generally resulted in more atrazine runoff. Years in which the first major runoff occurred later resulted in less atrazine runoff. These results indicate that the time frame that pesticides are most vulnerable to runoff is generally within 10 to 15 days after application. While producers can not plan rainfall, applications and irrigations often can be scheduled to reduce potential runoff. A Best Management Practice (BMP) for irrigated lands would be to delay major irrigations after application and assure that runoff is minimized during the first post-application irrigation.

Provided runoff is avoided, another possible best management practice for pivot irrigated land would be to apply a light irrigation shortly after application as a means of incorporating the pesticide below the mixing zone.

Can pesticide application dates influence runoff?

Rainfall patterns have a major influence on the amount of pesticides lost in runoff. While it is difficult to predict the weather,

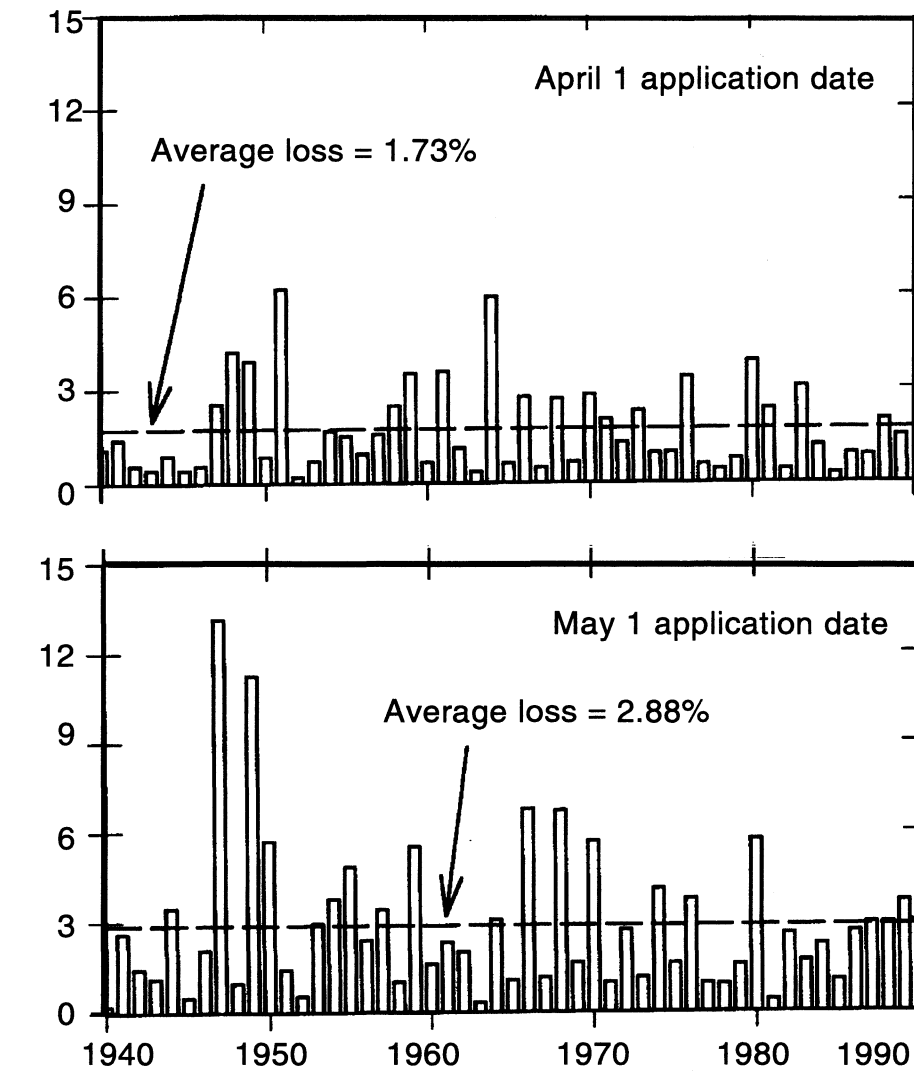


Figure 1. Comparison of percentage of atrazine lost in runoff from an April 1 versus May 1 pesticide application date. Simulations used 50 years of rainfall data for York.

precipitation patterns over many years can provide a clue. Long-term (1961-1990) average rainfall patterns during April and May for various cities across Nebraska (Table 1), indicate that, on average, more rain occurs in May than April. Considering this, we compared the amount of atrazine runoff occurring after an April 1 versus May 1 application date for 30 days after application. Computer simulations were run using 50 years of rainfall data for York. As expected, the 30-day loss varied

from year to year, but on average more atrazine runoff occurred after a May 1 application than an April 1 application. This indicates that when climatic conditions allow for an early pesticide application (early April), the odds are that there will be less rainfall during the window of vulnerability and consequently, less pesticide runoff.

Steve Comfort
Extension Soil Chemist
Thomas Franti
Surface Water Management Engineer

Applying anhydrous

(Continued from page 20)

once the spring rains start, creating an erosion problem. The depth of the furrow is also making it harder to "seal" the anhydrous in the soil because the knife is effectively operating at a shallower depth. Reducing travel speed will decrease some of these problems.

Anhydrous applicators with coulters can be adjusted to minimize the problems with the tillage effects of the knives. Typically producers think of rolling coulters as residue cutters, but coulters can effectively cut a slot in the soil for the knives. Since the soil is dry, the coulters can be adjusted deeper without the risk of ribboning out mud. This cuts a deeper slot in the soil for the knives to slide through without doing as much "chisel-type" tillage. Less soil is thrown out by the knives, covering less residue and making it easier to seal the anhydrous.

With the reduced soil disturbance, the knives can be operated at a shallower depth, requiring less power. Producers should resist the urge, however, to use the power savings to travel faster. Increasing the operating speed increases the tillage, reducing the benefits of the coulters.

Producers do need to watch the anhydrous tank pressure to ensure proper application during this cool weather. The tank pressure is reduced because the anhydrous doesn't vaporize in the tank as readily as when it is warmer. Depending on the metering system used, standard calibration procedures may not be accurate, especially as the tank becomes empty. Producers may have to switch tanks before they are empty to avoid under-application since the reduced pressure may not provide the proper application rate.

Paul Jasa
Extension Engineer

Plant oat varieties resistant to barley yellow dwarf disease

Since the mid-1980s barley yellow dwarf has become increasingly widespread in Nebraska and can cause serious yield losses to oats and wheat.

Symptoms in oats vary according to the variety, the virus strain, the growth stage of the plant at the time of infection and the general health of the plant. The main color change is to shades of yellow, reddish-orange, reddish-brown, or purple. Severely infected plants are shorter, produce lower test weight grain and have more blasted florets.

Epidemics of barley yellow dwarf in Nebraska generally are caused by passive migrations of the winged form of the aphid

vectors carried south to north by low level jet winds.

Early seeding of oats may not give full protection against barley yellow dwarf, but it does allow plants to develop past the seedling stage before they might become infected. This delay significantly reduces damage to the crop. The best control approach is based on varietal resistance or tolerance. The oat varieties Bates, Don, Hazel, Horicon, Larry, Monida, Ogle, Prarie, Settler, Troy and Whitestone are either resistant or moderately resistant to barley yellow dwarf.

John E. Watkins
Extension Plant Pathologist

Be alert to symptoms of soil-borne wheat mosaic

Soil-borne wheat mosaic virus primarily infects wheat in central and eastern Nebraska but on occasion has caused yield loss in irrigated wheat in west central Nebraska. In the last five years, the incidence of this disease has steadily increased, probably due to continuous wheat cropping and the use of susceptible varieties.

Leaf symptoms first appear in early spring, persist until heading and then disappear. The youngest leaf shows the truest mosaic pattern. Symptom expression is favored by temperatures below 68°F. Infected plants are often stunted. In the field the disease appears as irregular patches of yellow or pale green wheat. The pattern may conform to low areas or drainage paths, or it can be distributed across the field.

The soil-borne wheat mosaic virus survives in the soil from season to season protected by its fungus vector. Once a field becomes infested, the virus and vector persist for many years. The disease is associated with wet soil and is usually found in terrace channels and low areas. The virus and its fungal vector are spread from field to field in soil on equipment and probably also with wind blown dust particles.

Growing resistant or tolerant varieties is the only method of control. These include Abilene, Buckskin, Hickok, Ike, Jagger, Karl 92, Ponderosa, Thunderbird, Tomahawk, AP7501, AP7601, 2163, Coronado and Big Dawg.

John E. Watkins
Extension Plant Pathologist