7-23-1999

CropWatch No. 99-19, July 23, 1999

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Weather conditions not helping

Mid-season corn diseases evolving

Gray Leaf Spot: Gray leaf spot (Cercospora zeae-maydis) lesions (Figure 1) are evident on the lower third of plants in many fields in central Nebraska. In some fields the lesions have progressed to the ear leaf. For susceptible and moderately susceptible hybrids this is considered a potentially yield-limiting level of disease. The weather conditions of the last few weeks and the forecast for the next week are favorable for gray leaf spot. Fungicide applications may be warranted in some fields. See the Cooperative Extension NebGuide G1384, Gray Leaf Spot of Corn, released earlier this month for details on risk factors associated with this disease.

If the field is high risk, a fungicide application may be cost effective. The following fungicides are labeled for gray leaf spot on corn:

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Puzzling symptoms

(Above) Fig. 2. Early symptoms of an unknown disorder of corn first appear as though the leaves are losing color in discrete spots that eventually run together into streaks that can extend the entire length of the leaf. (Left) Fig. 3. Symptoms of an unknown disorder of corn progress from the bottom of the plant to the top. Eventually entire leaves are killed. Note lower leaves.
Gail Wicks, Extension weeds specialist at the West Central REC, North Platte: Crop consultants are reporting more western bean cutworm eggs are found in plants where maturity has been delayed, such as those affected by Balance. The insect threshold levels were high enough that the damaged areas had to be treated with an insecticide.

Ralph Anderson, Extension educator in Buffalo County: Crops are progressing well, but have a fairly high degree of variability within many fields. First brood corn borer infestation was extremely light and not many moths are in the light trap yet for possible second brood. We still have time for an infestation to build, but do not expect serious problems.

Corn rootworms are a different story and fairly high populations are present in many fields with some visible stalk leaning and root pruning. Soil insecticide may have provided a higher degree of control this year than in the past, while adult beetle treatments seemed less effective.

Many rusty colored rectangular lesions are present on the lower leaves in many corn fields. These appear to be gray leaf spot lesions based on visible symptoms and favorable weather patterns for that disease. Although I received about 1.60 inches of moisture over the weekend just south east of Kearney, much smaller amounts were reported nearby. Irrigation systems have been started and many are running at full capacity now.

Paul Hay, Extension educator in Gage County: Even with the hotter weather, the priority for irrigation water use in southeast Nebraska is with the corn. Watering soybeans during this flowering period does not pay many yield dividends. Many farmers in southeast Nebraska have limited water supplies and watering the corn has better profit potential, even if the loan deficiency payment is higher for soybeans!

Steve Pritchard, Extension educator in Platte County: Warmer temperatures have irrigation wells running in most areas, particularly on the lighter soils. The corn height appears a little shorter than normal. Overall, corn and soybeans look good. The second cutting of alfalfa was a little short, but the quality was excellent.

Ray Weed, Extension educator in Kimball and Banner counties: Our continuing saga of hail and severe storms in the southern Panhandle extended into this week. Areas of Kimball County received up to four inches of rain July 16 with more rain this week. On Monday southern Kimball County was hailed and hail and high winds damaged wheat north of Potter and east of Dalton in Cheyenne County, and irrigated alfalfa in Morrill County.

Wheat harvest progressed some in western Banner County, but most fields are still too wet to combine. The moisture, however, has been good for the dryland corn, sunflowers, and proso millet.

Irrigated and dryland sunflowers are growing rapidly with rain and high temperatures. Irrigated dry edible beans are also developing, and many fields will soon be at stage three development (when most plants have begun flowering and one blossom has opened).
Adjust insect thresholds for crop prices

Given the low grain crop prices, remember that crop price is a factor in calculating economic injury levels for insects and other pests. Sometimes the crop value is assumed to be a constant. More complete thresholds allow you to enter this information and adjust thresholds for different crop values.

Of the corn insects that we will be dealing with the rest of the season, our recommended thresholds for European corn borer and spider mites do allow adjustment with different crop values. The general trend is that with low crop prices, more insects need to be present before the potential value of yield loss equals the control cost (=economic injury level).

Some other insects such as western bean cutworms, have a ‘static’ threshold. Our current threshold for western bean cutworms (8% infested with eggs or newly hatched larvae) is based on $2 per bushel corn price. Now that prices are $1.50-1.60, that threshold should be raised to 10-12%.

The corn rootworm thresholds discussed in last week’s Crop Watch should also be raised somewhat with the current low grain price. Similar considerations should be given to thresholds for other field crop pests that do not require you to use crop value to calculate an economic injury level.

Bob Wright
Extension Entomologist
South Central REC

Short crop? Yield won’t necessarily suffer

We’ve received a number of reports about corn and soybean plants that are unusually short this year.

Should you be concerned if your crop looks shorter than normal? Not necessarily. Height does not directly affect yield. Our high yielding milo hybrids, for example, contain dwarfing genes that make the crop easier to harvest, without a yield penalty. Research with some herbicides and growth regulators also show that a shorter plant can produce a full yield.

Causes

Wind is a factor that can shorten a crop. Stems thicken and internodes elongate less when they are subject to mechanical stresses like wind. Check your plants. The combination of thick stems and smaller internodes makes wind a likely cause of the shorter crop. It is unlikely that you will have any yield loss as a result of the wind. A thinner than normal stem will indicate a stress other than wind.

Delayed planting — something experienced by many soybean growers — is a simple reason a crop might be shorter than normal. In this case internodes won’t be shortened, but there will be fewer of them. One possible problem with short soybeans is row closure. If the crop doesn’t create a full canopy by beginning pod, sunlight will be wasted and yield potential will be lower.

A short crop may lose yield if weeds become a problem. Height has a direct effect on weed suppression. The taller the crop, the more likely the crop will be to steal light from the weeds. Weed escapes will be more serious where height growth has been slowed.

We often associate short crop plants with severe stress, like flood damage or nitrogen deficiency. Yield-robbing stresses can shorten plants, but not all short plants have lost yield potential. A close look at stem diameter and internode lengths could help reassure you that your crop is okay.

Bob Caldwell
Extension Cropping Systems Specialist

Yields reported from NU wheat variety trials

Average wheat yields from University of Nebraska wheat variety trials are beginning to be posted to the Department of Agronomy’s web site at http://ianrwww.unl.edu/ianr/agronomy/variest2.htm. Further results from central and western Nebraska will be added to the site as they become available. A booklet of the results will also be published and be available from local Extension offices later this year.

Following are averages for a number of varieties tested and the top producer at each site:

**Saunders County**, 52.5 bu/A, 57.4 lbs, and 37.9-inch plant height; top producer, NE94644, 63.6 bu/A.

**Perkins County**, 62 bu/A, 58.5 lbs, and 31 inch-plant height; top, XH9806, Quantum, 69.7 bu/A.

**Hitchcock County**, 81.8 bu/A, 59.5 lbs, and 36-inch plant height; top, NE94654, 96.9 bu/A.

**Furnas County**, 71 bu/A, 60.8 lbs, and 41-inch plant height; top, XH9806, Quantum, 90.9 bu/A.

**Lincoln County**, 69.2 bu/A, 60.2 lbs, and 36-inch plant height; top, XH9806, Quantum, 82.4 bu/A.

**Lancaster County**, 49.4 bu/A, 57.5 lbs, and 39.1-inch plant height; top, Niobrara, 57.9 bu/A.
Are your soybean leaves puckered? Weed scientists explore causes

Fred Roeth, Extension Weeds Specialist, South Central Research and Extension Center: We have received many plant samples and calls concerning soybean leaf cupping and puckering. To help understand this, the following article from the July 9 Illinois Pest Management and Crop Development Bulletin is reprinted. It was written by Aaron Hager, Extension specialist for crop sciences, and Marshal McGlamery, professor of crop sciences, both at the University of Illinois at Champaign-Urbana.

Soybean plants demonstrating injury symptoms commonly described as “puckering” were somewhat common and apparently widely distributed during the 1997-1999 growing seasons. This phenomenon was not restricted to soybean fields in Illinois as weed scientists in Iowa and Indiana (and Nebraska) also reported instances of puckered soybeans. The symptoms that were frequently reported include:

1. Extreme cupping of trifoliolate leaves, usually most pronounced on the upper trifoliate.
2. Veins of affected leaves tend to assume a parallel orientation instead of the usual net veination pattern.
3. Tips of cupped leaves with parallel veins are often brown.
4. Plants are stunted and may remain stunted the rest of the season or they may grow out of it.

Weed scientists across several states in the north central region have offered theories to the puckering. These are presented here. It is, however, unlikely that only one of these possibilities will explain the cause in all instances.

Possible causes

1. Somehow, the plants have been exposed to a growth regulator herbicide. Growth regulator herbicides tend to mimic the effects of endogenous plant hormones, particularly auxins. Hormones control many growth and development processes affecting the plant. These hormones are physiologically active within the plant at extremely low concentrations (parts per million or billion); exposing a soybean plant to a synthetic type of hormone (i.e., a plant growth regulator herbicide) can induce a wide range of responses within the plant ranging from slight morphological modifications (leaf abnormalities, for central Nebraska field.

Cupping and puckering of soybean leaves in a south central Nebraska field.

(Continued on page 112)

Corn diseases (Continued from page 167)

Tilt, Penncotz 75DF, and Penncotz 80WP Recently, Novartis Corporation was granted a 24C Registration for Tilt; this is the only fungicide with eradicative action. This new label will allow application to field corn up to 30 days pre-harvest. Unlike last year, the 50% silk deadline no longer applies. Consequently, Tilt can be applied if the 2-2-1 threshold is exceeded past silking. Continue to monitor the fields.

Anthracnose: Anthracnose leaf blight (Colletotrichum graminicola) has been observed in many fields within the huge area outlined by Gage, Washington, Holt, and Gosper counties. The early season leaf blight may or may not be yield limiting but could be an indicator of fields to scout for anthracnose stalk rot later in the season. Last year the top die-back phase of anthracnose was widespread becoming apparent in early-to-mid August. In many fields the top one third of the plants were killed. Unfortunately, there are no fungicides labeled for control of anthracnose.

Undiagnosed problem: An as yet undiagnosed problem of corn is affecting many seed corn fields in central Nebraska. In some fields the male rows are affected to a much greater degree than the female rows; in other fields the female rows area harder hit. The symptoms first appear as though the leaves are losing color in discrete spots that eventually run together into streaks that can extend the entire length of the leaf (Figure 2). The symptoms progress from the bottom of the plant to the top (Figure 3). Eventually entire leaves are killed.

Whether this is a disease or the result of a genotype-environment interaction has not been determined. If anyone has information regarding the nature or cause of these symptoms, please call Loren Giesler, coordinator of the UNL Plant and Pest Diagnostic Clinic at (402) 472-2559.

Jim Stack, Extension Plant Pathologist, South Central REC,
Pucker
ed soybean leaves  (Continued from page 170)

e example) to plant death. The degree of
response depends partly on the
concentration of herbicide, environment-
al conditions and crop variety.
The response time after encounter-
ing the herbicide is usually one to
three weeks depending on the dose
and growing conditions.
The literature has many refer-
ces to research on the response of
various crops to exposure of sub-
lethal amounts of various growth
regulator herbicides. Most of these
studies were conducted more than
20 years ago, but the symptoms of
exposure they describe were very
similar to those encountered during
recent growing seasons.
How much (concentration)
growth regulator does it take to
induce symptoms? Dicotyledonous
plants vary in their sensitivity to
growth regulator herbicides. In field
demonstration studies, leaf cup-
ing/distortion was observed when
soybean plants were exposed to
Banvel at a rate of 1/10,000 of the
field use rate. Stage of plant growth
at the time of exposure also influ-
ence the amount of injury induced.
Several studies in the literature
report that soybeans were more
tolerant to exposure to growth
regulators when in early vegetative
development as compared to
exposure when the plants were
larger and nearing the reproductive
stage.  (Ed. note: See Timing of
Herbicide ... , page 172)
The herbicide most often
discussed or implicated in the
cupping response of soybeans is
dicamba, which is found in Banvel,
Clarity, Marksman, Distinct, Celeb-
rity, Northstar and Resolve herbi-
cides. How would the plants be
exposed to this corn herbicide?
Three possibilities are:

a. Residues remaining in/on
the spray equipment from previous
applications in cornfields are
detached and applied with the
soybean herbicide at low concen-
trations. Labels of products contain-
ing dicamba provide techniques for
cleaning application equipment to
remove residues. The procedure
from the label of Banvel states to:
• Hose down thoroughly the
inside as well as outside surfaces of
equipment while filling the spray
tank half full of water. Flush by
operating the sprayer until the
system is purged of the rinse water.
• Fill tank with water while
adding one quart of household
ammonia for every 25 gallons of
water. Operate the pump to circu-
late the ammonia solution through
the sprayer system for 15 to 20
minutes and discharge a small
amount of the ammonia solution
through the boom and nozzles. Let
the solution stand for several hours,
preferably overnight.
• Flush the solution out of the
spray tank through the boom.
• Remove the nozzles and
screens and flush the system with
two full tanks of water.
If these cleaning procedures are
not followed exactly, how much
residue would remain in the appli-
cation equipment and would it be
enough to injure soybeans? Many
producers and applicators who
reported puckered soybeans in 1997
indicated that the symptoms
appeared to follow the spray equip-
ment “to the row.” Drift
(discussed next) generally does not
stop at a selected row in a field.
Rather, there is often the feathering
effect — symptoms are most severe
on the side of the field closest to the
source of drift and lessen with
increasing distance.
Unfortunately, failure to thor-
oughly clean the application equip-
ment does not appear to explain the
reported cases of “… the soybeans
sprayed with the first load puck-
ered, those sprayed with the second
and third loads are fine but the ones
sprayed with the fourth load
puckered” when all other factors are
held relatively constant. [Roeth
notes: The type of sprayer (polyvi-
nyl vs. stainless), water temperature,
and how long the spray mixture or
rinse water is left in the tank are
factors that affect the amount of
chemical adsorption onto and
desorption from the tank and hose
surfaces.]

b. Herbicide vapors on the
plant or soil surface move out of
the treated area and are absorbed
by soybeans (vapor drift).
The volatility of a herbicide is a
function of several factors: those
related to the formulation of the
herbicide and those related to
prevailing environmental condi-
tions. Vapor pressure is a measure of
the tendency of a herbicide to
volatilize. As the vapor pressure of a
herbicide increases, the potential for
volatility also increases. Ester
formulations of 2,4-D are generally
much more volatile than amine
formulations. Banvel is formulated
as the dimethylamine salt of
dicamba, Clarity as the diglycol-
amine salt, and Marksman as the
potassium salt. Each of these salt
formulations differs in its potential
to volatilize. With respect to envi-
ronmental conditions, volatility
tends to increase as soil moisture

(Continued on page 172)

Insect update

Ron Seymour, Extension
assistant, integrated pest manage-
ment, West Central REC: The
western bean cutworm moth flight
has been moderate here. Many
fields have infestation levels of 10% 
to 30% of the plants with egg
masses. Some areas have only
pockets of high infestation, gener-
ally areas with sandy soil types.
Egg development varies widely
within fields. There are a number of
freshly laid eggs mixed with eggs
that have begun to hatch.

Rootworm beetles have begun
to emerge. I have noticed mostly
males with a few females. European
corn borer larvae are now in the
fourth instar with most of them
beginning to bore into corn stalks.
Timing and herbicide rate factor into damage

The susceptibility of soybeans to damage from 2,4-D, Banvel and dicamba varies with the rate of the herbicide and the plant's growth stage at the time of exposure. In general, damage increases with increasing herbicide rates and plant age. Banvel and 2,4-D applied to soybeans during the flowering stage (see table) have reduced yield. Soybeans also exhibited yield reductions when treated with Banvel during the prebloom stage. Soybeans treated with Banvel during podfill produced seed with reduced germination.

For more information see Banvel and 2,4-D Damage to Fieldbeans and Soybeans, University of Nebraska Cooperative Extension NebGuide G802.

Fred Roeth
Extension Weeds Specialist
South Central REC

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Control yield 40 bu/acre


Puckered soybean leaves

(Continued from page 171)

and temperature increase. As soil moisture decreases, the amount of herbicide adsorbed to soil particles can increase, reducing the amount of herbicide available to volatilize.

c. Physical drift of spray particles during application.

This cause of exposure may be the easiest to identify based on field observations. The labels of many postemergence herbicides have statements regarding wind speed and drift. Most specify that applications should not be made when wind speed is in excess of x miles per hour or moving toward a sensitive crop.

2. The soybean plant is expressing a physiological response to somewhat adverse growing conditions.

This theory generally attempts to exclude exposure to a growth regulating herbicide in the explanation. Rather, soybeans express puckered symptoms due to environmental factors adversely impacting their growth. Very few components

in the puckered soybean "equation" have held consistent over the past several years except that most cases are not noticed or reported until after the first few days when air temperatures exceed 90°F. Soybeans may be entering into a phase of very rapid growth and development and some speculate that this phase may disrupt the hormonal balance within the plant. This theory exists because there have been cases of puckered soybeans that had not been sprayed with any postemergence herbicide and no cornfields were nearby.

3. A postemergence herbicide application induces response.

Most puckering samples received at the [VICU] Plant Clinic were previously treated with a postemergence herbicide, usually a translocated herbicide such as Pursuit, Classic, Pinnacle, Concert, or Roundup Ultra. Many applications had included spray additives such as oil concentrates (petroleum or vegetable base) and an ammonium nitrogen fertilizer (28% UAN or ammonium sulfate). How could this induce puckering?

Some explanations include:

• Translocated herbicides move into the apical meristem, the location of hormonal control, and disrupt the hormone balance of the plant. Afterward, the plant exhibits some response such as leaf cupping or puckering.

• The spray additives are able to remove dicamba residues from the spray equipment (see 1a above).

• If 28% UAN was used, the level of biuret may be high enough to induce the response.

So what exactly is the cause of puckered soybeans? In short, no data exist that definitively explain every case of puckered soybeans. It is unlikely that one "blanket" explanation exists — each case may be somewhat unique. Data exist which describe the response of soybeans to exposure to growth regulator herbicides, but other factors may also be at work.
Monitor rust in dry edible beans

Rust is a disease of dry beans caused by the fungus *Uromyces appendiculatus*. Many growers are aware that it has caused epidemics in dry beans since the 1950s and in some cases losses have exceeded 50%. The level of disease varies greatly from year to year. For example, dry beans during the 1998 growing season had a lower overall incidence of rust than in many previous years.

The variability in rust occurrences may be due to changes in weather patterns, varietal differences in rust susceptibility, and cultural practices that affect canopy moisture or survival of the rust fungus. For example, volunteer beans sometimes found in corn fields in the spring may provide an early host for the fungus and an opportunity for sexual recombination leading to new pathogenic races. However, genetic sources of rust resistance in dry edible beans have led to new resistant varieties and breeding lines. Plant Breeder Dr. Dermot Coyne has released two new rust resistant varieties, Pinto Chase and G. N. Weihing. Matterhorn, Vision and Apache are also resistant to our local rust races. Some of these varieties may be susceptible to white mold or other diseases (Apache and Vision, for example). We need to understand pathogenic variability of the rust fungus and compare each year’s isolates with previous years’ known pathotypes and races. The number of rust fungus variants has been shown to increase when infection is widespread.

We are cooperating with growers, scouts, crop consultants and field managers and other Panhandle Research and Extension Center staff and Extension educators to conduct a bean rust variability study during the current growing season. A similar study will be conducted in the southwest bean growing region by Dr. Dale Lindgren and Dan Schaaf, research technician, at the West Central Research and Extension Center at North Platte.

A major component of the bean rust study will be the operation of a Rust Mobile Monitor Nursery. Rust symptoms usually begin to appear in early August. When rust symptoms are observed, growers, consultants and managers should notify an Extension educator of the location of the infected field and bean variety or class. The Extension educator will contact the Panhandle Research and Extension Center to plan a site visit. In the southwest contact Lindgren or Schaff directly (308/532-3611, ext. 146).

It will take about six to eight days to germinate and grow the 12 bean cultivars used in the mobile nursery to the primary leaf stage. The nursery will be placed in the field for two to three hours during mid-day and then returned to the Center to be misted overnight. Bean leaves also will be collected at the field site and sent to Lincoln, where disease reaction data will be compared to that obtained by the nursery.

For more information on rust, refer to NebGuide G95-125, *Rust of Dry Bean, Dry Bean Production and Pest Management* (Regional Bulletin 562A), or contact your local Cooperative Extension Office, Dale Lindgren or Dan Schaaf at the West Central REC or James Steadman, UNL plant pathology professor, at 472-3163.

**J.R. Steadman**  
UNL Professor, Plant Pathology  
Ray E. Weed  
Extension Educator  
Kimball/Banner counties

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Schaaf, research technician, at the West Central Research and Extension Center at North Platte.

Last year approximately 210,000 acres of dry edible beans were planted. Nebraska’s ranks third nationally in dry bean production (following North Dakota and Michigan), first in production of great northern beans and third in pinto production.

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**Moths in sunflowers**

When sunflowers are in the pre-bloom or budding stages, producers should begin to monitor sunflower head moth infestations. These grey, cigar-shaped moths will lay eggs on the blossoms where the resulting larvae will feed. The adults are about 1/2 inch long (3/4 inch wingspan) and are active during late evening and at night. These moths migrate into Nebraska from the south and infest native and cultivated sunflowers. Early planted sunflowers are more likely to attract the moths.

Monitoring the sunflower head moth population with pheromone traps is the best method to determine if an infestation may cause yield damage. A pheromone trap contains a scent that will attract male moths.

Pheromone traps should be placed within a field, about 15 feet in from the edge, beginning in the late bud stages. Place two traps on the northwest side and two on the southwest side. These traps should freely hang from a post so they are slightly above the top of the plants.

Pheromone traps (Pherocon IC wing style) and lures are available from several commercial suppliers (Ecogen, Inc., 2002 Cabot Blvd. West Langhorn, PA 19047, (800) 220-3326; Gempler’s, Inc., 211 Blue Mounds Rd, Mt. Horeb, WI 53572, (800) 382-8473 or Great Lakes IPM, 10220 Church Rd NE, Vestaburg, MI 48891, (517) 268-5693). Home made milk jug traps can

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Sunflower moths

(Continued from page 173)

be used instead of the commercial traps (See Crop Watch, page 152, July 9, for details on building a trap.) Monitor these traps two or three times a week from the bud stage through the end of the bloom stage.

If the number of moths per trap is less than one per day there is little risk of significant larval damage. If there are more than four per trap per day, there is a high risk of damage and producers should plan on spraying the field. If the number of moths caught is between one and four per trap per day, a treatment decision should be based on additional field scouting. In this situation, fields should be checked in the late evening when the moths become active. Check in at least five locations spread across the field in an 'x' pattern. Count the number of sunflower moths on each of 20 heads in each field location.

If two or more moths per five heads are found at the early bloom stage, consider an insecticide application. Continue scouting until the late blooming stages. These thresholds apply to oil seed hybrids. The economic threshold for confection sunflowers has not been established but should be about half that of the oil seed.

Insecticide applications target control of the moth so early detection is essential. If an insecticide application is necessary, apply it when 35% of the plants are beginning to bloom (5.1 stage). An additional insecticide treatment may be necessary if the sunflower moth flight, as measured by pheromone trap counts, continues to be high 5-7 days after initial control measures. Use caution to avoid killing nearby bees and inform local beekeepers of your intention to treat the sunflowers. Also, an evening application is preferred, because honey bees that collect pollen on sunflowers are less active in the evening.

Ronald C. Seymour, Extension Assistant, IPM, West Central REC
Gary L. Hein, Extension Entomologist, Panhandle REC

Precipitation
Maps courtesy Al Dutcher, State Climatologist, Agricultural Meteorology

Percentage of normal precipitation, April 1 to July 18