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Sorghum ergot likely to reach Nebraska; little impact expected

Sorghum ergot has been confirmed in Kansas and is likely to move into Nebraska yet this season; however, extensive damage is not expected.

Ergot was present in Texas for the entire 1997 growing season, however reports indicated there was little measurable impact on yield or quality of the commercial grain crop. Where ergot was found, no negative effect on harvesting was experienced. Ergot contamination, however, may have affected export of some grain shipments to Mexico.

If the disease is transmitted to Nebraska fields yet this season, it will likely be too late to cause significant widespread problems, although localized areas may sustain damage. Heads on the main stalk of the commercial grain sorghum crop have been fertilized and are nearly full. Since this pathogen only infects through unfertilized florets, the chance for widespread infection and significant damage to grain sorghum is minimal. Newly developing tillers (side branches) on grain sorghum plants are still producing florets that could become infected if exposed to ergot spores. This could result in some fields experiencing observable levels of the disease. Forage sorghum fields with high levels of male sterility might be at greater risk if tillering is prevalent. Newly developing tillers of johnsongrass, shattercane, or other uncultivated sorghum and sudan grass populations also may be susceptible.

In the hybrid seed production areas of Texas, ergot was present but not widespread. In most fields disease incidence was low, primarily affecting the side branch tillers of certain hybrids. In a few fields ergot infection of the main head occurred and disease incidence was higher. Special seed conditioning and fungicide treatments may be required after harvest, possibly causing higher seed costs next season.

Researchers, who have watched the disease spread quickly in the Western Hemisphere the past two years, continue to study its life cycle, spread, and toxicity. (See story on page 169.)

Jim Stack, Extension Plant Pathologist
South Central Research and Extension Center

More on sorghum ergot
Page 169
Ralph Anderson, Extension Educator in Buffalo County: The corn crop is maturing in Buffalo County with the "moisture line" halfway or more down the kernel. There are many good looking corn fields, but almost all of them show some heat and moisture stress from earlier in the year. We expect a good average yield but few records.

Soybeans are starting to turn and most fields are looking good. Soybean yields are harder to predict than corn, but many fields also have stressed areas and record yields are not expected.

August moisture was near record in Kearney, and many irrigators were able to avoid extensive late season irrigation. Most wells are being shut down and pipe is being picked up.

Gary Hall, Extension Educator in Phelps and Gosper counties: The corn is drying down quickly with some corn silage being harvested. Some dryland pivot corners were chopped for silage about two weeks ago. Some stalk rot is starting to appear, but overall the irrigated corn crop looks good. Custom harvesters are moving into Phelps County and will start harvesting the early corn soon.

Karen DeBoer, Extension Educator in Cheyenne County: Wheat planting is in full swing in Cheyenne County. The concern now is for areas with high grasshopper populations feeding in the newly emerged wheat. Insecticide treatments may be necessary in border rows if populations above seven grasshoppers per square yard are detected. If the problem is severe, some border rows may need to be replanted.

Paul Hay, Extension Educator in Gage County: Grasshoppers are causing some problems in fall-seeded alfalfa and will likely cause problems on the margins of wheat fields planted later this month.

Dryland corn, milo, and soybeans are showing signs of premature ripening due to dry weather stress in most areas of the county. It is likely that yields will suffer from this late dry spell. We would expect a normal harvest season beginning by September 25 for beans, milo, and early season corn.

To ensure quality grain storage, now's the time to fully clean bins and augers and any piles of spilled grain near bins. Combines also should be cleaned and readied for harvest. Burn or bury all cull grain to keep insects from having a direct path into new grain.

Ray Weed, Extension Educator in Kimball and Banner counties: Proso millet continues to mature here in the southern Panhandle. Proso is usually swathed with a windrower before threshing through a combine. Unless farmers have a bin drying system, threshing should be delayed until the grain is below 13% moisture.

If the grain is above 13%, the elevator may only take one load from the farm. Storage of high moisture proso is difficult and it must be monitored closely to maintain grain quality.

Winter wheat seeding is over 50% complete for Kimball County and is progressing well in Banner County. Higher elevations require earlier seeding for adequate estab-
Disease update

Sorghum ergot spreads north from Texas in ’97

Sorghum ergot has occurred in India and South Africa for several decades. The pathogen infects the plant only through unfertilized florets. In 7-10 days, a very viscous exudate with high sugar content is present on the panicle (See figure, page 167).

This disease is sometimes referred to as sugary disease. If the relative humidity is low, the exudate crystalizes and secondary conidia are produced on the surface (see figure at right). These conidia can disperse long distances to initiate infections on other plants in other regions. If the humidity remains high, other fungi can colonize the exudate. The significance of these other fungi is undetermined. Although ergot can limit yield and reduce grain quality when severe, the sorghum industries of these two countries remain healthy.

The disease in India is caused by Claviceps sorghi, while the disease in South Africa, Australia, South America, Central America, and North America is caused by Claviceps africana. There are many similarities between these two, as well as some important differences, including the production of secondary conidia for long distance dispersal by C. africana and the sexual reproduction of C. sorghi. Sexual reproduction by C. africana has only been observed in laboratory experiments and is believed to be unimportant to its survival in nature.

The dispersal of secondary conidia over long distances (ca. 300 km/day) is believed to be the primary reason for the rapid spread of sorghum ergot throughout South America, Central America and into North America within two years (1995-1997). Shipment of contaminated seed also can contribute to pathogen movement. The mechanism by which ergot was introduced into South America has not been determined.

On March 28, 1997, sorghum ergot was observed in the Rio Grande Valley of South Texas. Since then C. africana spread north through Corpus Christi (6/17), Uvalde (6/25), on to Hillsboro (7/24) and then into the major seed production area of Texas between Lubbock and Amarillo (8/15). On August 28 ergot was observed in a field of sterile forage sorghum just north of Wichita, Kansas, approximately 185 miles south of Nebraska. It has now been observed in eight fields in Kansas within 14 miles of the original site. The incidence of disease (number of heads infected) in a few fields of forage sorghum was estimated to be approximately 60%, while in other fields it was much lower.

For a pathogen to exploit an area and expand into adjacent areas depends on many factors including, 1) a timely source of viable inoculum, 2) effective dispersal mechanism(s), 3) spatial and temporal availability of susceptible host tissue, and 4) environmental conditions conducive to pathogen survival, dispersal, and disease development.

Potential impact on Nebraska

Several critical questions must be answered before predicting the eventual impact to the Nebraska sorghum industry. Chief among them is whether this pathogen can survive harsh Nebraska winters. If this pathogen only survives the winter in Texas and disease in Nebraska is dependent upon inoculum dispersed from Texas, then in normal years the amount of disease in Nebraska will not likely be high enough to cause significant effects on either yield or grain quality. However, if the pathogen becomes endemic in Nebraska, then the population may reach levels capable of causing damage to the commercial crop in seasons where the weather conditions favor disease development.

Research needed

There are several key aspects of the life history of Claviceps africana that need verification in the environments typical of the sorghum growing areas of the United States and Mexico. Of immediate importance are the ability of the pathogen to persist in these environments, the role of collateral hosts, dispersal limits, and the role of secondary colonizers of honey dew in toxicity and production of secondary conidia by C. africana.

To develop a management plan for sorghum ergot in Nebraska will require additional research. UNL scientists in cooperation with other

(Continued on page 171)
Sooty stripe earlier than usual this year

Sooty stripe has been identified in sorghum in south central Nebraska, with 30-40% of upper leaves blighted in some fields. This occurrence is earlier than in previous years.

While sooty stripe may look like northern corn leaf blight with a bright yellow margin surrounding a tan center, mature lesions will have a “sooty” appearance.

Sooty stripe is caused by the fungus *Ramulispora sorghi*, one of the most common leaf diseases of sorghum. It is found in Africa, North and South America, Asia, and Australia. It was first reported in Alabama in 1903 on johnsongrass (*Sorghum halapense*). Since then it has been found in most sorghum producing areas of the United States, including Nebraska.

Although sooty stripe is present in most locations every year, it is thought to rarely cause measurable economic loss. However, in some years it has destroyed crops in India and Africa.

In the United States, yield impact data are lacking. Recent studies at Kansas State University indicate that sooty stripe at low incidence (two lesions per leaf on a few leaves) can reduce yield by 10% and moderate levels can reduce yields 26%. There is significant variation in hybrid response indicating resistance/tolerance is a viable management option. In certain hybrid yield trials in Africa, there was a lack of correlation between leaf area damaged and final yield indicating that hybrids differ in their ability to withstand disease.

**Disease symptoms**

Symptom expression is a function of the hybrid in which the disease is developing. In general, young lesions (1-2 cm X 3-5 cm) are elliptical in shape with a tan center and a reddish-brown margin *(See top photo)*. As the lesions mature, the center becomes gray as a result of conidia production and then turns black as sclerotia are produced. In some hybrids a yellow halo appears around the outside of the lesion. As the disease progresses, the lesions enlarge, coalesce, and can blight the entire leaf blade.

**Pathogen life cycle**

Sclerotia are the survival structures of this pathogen and can remain viable in the soil and surface residue for several years. Sporodochia (the structure upon which conidia are produced) in leaf residue can also play a role in survival. In the spring when conditions become favorable to the pathogen, conidia are produced on the sclerotium surface (or on the sporodochium). These conidia are dispersed by wind and rain to the leaf surface where they penetrate and initiate lesion development. As lesions develop conidia are produced from the stomata and can disperse to initiate infections on other leaves of the same or adjacent plants. When the lesions are mature, superficial sclerotia are produced. These sclerotia are easily dislodged from the leaf surface by gentle rubbing. The sclerotia can survive in plant residue or free in the soil for several years.

**Management recommendations**

Host plant resistance is the most practical and effective means of managing this disease. As mentioned above hybrids vary greatly in their tolerance of this disease. Most seed catalogs do not specifically list a hybrid rating for sooty stripe tolerance; inquire with your seed representative for information regarding hybrid reaction to sooty stripe. Crop rotation is also listed as a viable management option in order to reduce the amount of infected plant residue on the soil surface. Other residue management practices could be effective in minimizing the amount of disease.

Jim Stack
Extension Plant Pathologist
South Central Research and Extension Center
Check corn for stalk rot; harvest damaged fields first

Stalk rot is always a possibility in Nebraska corn, depending on stresses occurring in individual fields throughout the season. Plants sustaining considerable insect or disease damage are especially prone to stalk rot. A few severe cases in south central Nebraska have already been reported and early harvest has been recommended. Stalk rot may be more severe in fields with a high incidence of gray leaf spot.

Producers concerned about the possibility of stalk rot in corn should be scouting their fields every five days until harvest.

Several species of fungi cause stalk rot of corn. In Nebraska stalk rot is usually caused by one or more fungal pathogens, most commonly *Fusarium moniliforme* and *Gibberella zeae*. The most striking early external symptom of stalk rot is premature plant death. Leaves and diseased stalks suddenly turn dull and grayish green. The lower internodes of infected stalks lack the greenish-white color of healthy tissue. The internal pith may be pink or exhibit a bleached or light brown appearance. The disease ultimately destroys a major portion of the pith tissue. The remaining strands of vascular bundles within the intact stalk are usually light brown or bleached. In some instances the fungal pathogen is visible as white or pink, web-like strands within cavities of decaying pith tissues. In advanced stages of deterioration the stalks become spongy and soft. A wind velocity of less than 20 mph will cause the stalk to break or lodge. Yield reduction is caused not only by the disease, but also by the downed ears, many of which may not be harvested.

To estimate the severity of stalk rot, pinch stalks at the first or second internode above the brace roots on many plants at several locations in the field. Select at least four random areas with 100-200 plants in each area. A shallow shell of a stalk that collapses easily indicates advanced stalk rot. If 10% or more of the plants show advanced stalk rot development, harvest the field following physiological maturity. Remember, stalk rot will continue to develop through the field until harvest so it’s important to harvest before lodging occurs. Grain saved by harvesting diseased fields early will more than offset the additional cost of drying high moisture corn. In the case of an unusually early frost, severe stalk rot and lodging could result.

Dave Wysong
Extension Plant Pathologist

You asked about it: What’s this pest?

I’ve had a couple of calls on insects in corn ears and ear tips that look somewhat like corn borer but aren’t? The have a buff head and are similar in color to corn borer, but are a little thinner. They were found earlier in the tips of sweet corn, but have been showing up in ears that may have had earworm or corn borer damage. They’re not Western Bean Cutworm larva. Any ideas or suggestions? **Gary Zoubek, Extension Educator in York County**

I’ve looked at a lot of corn ears in the last few weeks. My guess is that they are corn borers. Some of the ones I’ve seen in ears are darker than normal and don’t look like typical corn borers, but they are. Otherwise sometimes true armyworms, fall armyworms or variegated cutworms can be found in corn ears. I haven’t seen any of those myself yet this year though. See NebGuide G1300, *Insects that Feed on Corn Ears*, for more information.

Bob Wright, Extension Entomologist

Sorghum ergot
(Continued from page 169)

states are already addressing some key questions, including:

1) the role of alternate hosts (johnsongrass, shattercane, *Sorghum alnum*, as well as other sudan-sorghum hybrids) in the epidemiology of sorghum ergot,

2) breeding sorghum hybrids for enhanced pollination efficiency and cold tolerance, and

3) the development of weather-based disease forecasting models to predict high and low risk periods for disease development.

Most studies have indicated that ergot-contaminated grain is of low toxicity, however further research is underway in Texas and Australia.

Jim Stack
Extension Plant Pathologist
South Central Research and Extension Center

Field reports
(Continued from page 168)

lishment although wheat streak mosaic virus and insect pressures are higher early in the season.

We are hoping for a few more weeks of warm weather to get all of our corn mature enough to handle a freeze.

Dick Ronnenkamp, Extension Educator in Boone and Nance counties: Soybeans are turning color especially mid Group II varieties. There have been varying amounts of pod damage from bean leaf beetles and grasshoppers. Ear tip damage can be found in many fields. Recent rains will help finish the crops and start growth of pastures and alfalfa.

Andy Christiansen, Extension Educator in Hamilton County: Beans are turning and corn should reach the black layer stage over the next two weeks. Quite a lot of the seed corn was harvested this week. Irrigation is complete and pipe is being removed. Overall, the crops look good in Hamilton County.
Watch alfalfa for anthracnose

With alfalfa selling for around $100 a ton, producers can lose their margin of profit. Anthracnose is one of the most serious diseases affecting cutting yields and stand longevity in Nebraska. It can occur after the second cutting but is usually most evident on the final cutting in September.

From a distance, infected fields show dead, straw-colored stems scattered throughout the stand. Infected stems are curved at the tip similar to a shepherd’s crook.

Leaves wilt, turn tan, and the entire stem dies. Typical stem lesions are diamond-shaped and ash-gray in color. They have a dark brown to purple border and usually form on the lower stem. The gray centers of the lesions are dotted with small, black fruiting bodies of the fungus. Several lesions may appear on a single stem. On susceptible varieties 30% to 50% of the plants within the crop canopy can be affected by one-tenth bloom.

Nothing can be done to control the disease once it appears in a stand. Cutting affected stands last and cleaning the debris for haying equipment will reduce spread of the disease into non-affected stands. The best defense against losses from anthracnose is to plant resistant varieties.

John E. Watkins
Extension Plant Pathologist

Precipitation
(\% = percent of average)

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Degree day accumulations for wheat, corn, soybeans and sorghum*

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*Growing degree days to maturity for early season (1), mid season (2) and late season (3) crops:

MC = maturity class
Corn: MC1 = 2400; MC2 = 2500; and MC3 = 2750
Wheat: MC1 = 1600; MC2 = 1840; and MC3 = 2000
Soybeans: MC1 = 1950; MC2 = 2360; and MC3 = 2450
Sorghum: MC1 = 2125; MC2 = 2200; and MC3 = 2369

The next CropWatch will be published Sept. 26.