PLANT DISEASE AND INSECT ADVISORY

Entomology and Plant Pathology
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Wheat Disease Update
Preplanting Considerations to Control Bunts and Smuts

Dr. Bob Hunger, Extension Plant Pathologist

Nearly every year (2005 was no exception), I observe and receive reports of "smutty heads" emerging in fields in the spring, and of "stinking smut" occurring in harvested grain because of a foul and musty odor associated with the grain. These reports are describing loose smut in the first case and common bunt (also called stinking smut) in the later. The similarities of the names of these two diseases can be confusing.

Loose smut: Heads emerging in the spring from loose smut-infected plants are a mass of black spores of the fungus (Figure 1) that spread to the flowering heads of healthy wheat plants where immature kernels are infected. Hence, the loose smut fungus is carried inside of wheat seed, and when that infected seed is planted in the fall the loose smut fungus grows with the plant through the fall and winter. At head emergence in the spring, masses of black, powdery spores emerge instead of a typical wheat head. Hence, wheat grain infected with loose smut does not appear different from uninfected wheat grain, and there is no foul odor associated with loose smut-infected grain as there is with wheat grain contaminated with common bunt.

Figure 1. Various views of heads (ears) of wheat plants infected with the loose smut fungus. Note the replacement of kernels with a loose mass of black, powdery spores.

<u>Common bunt (also called 'stinking smut')</u>: Wheat kernels from plants infected with common bunt are slightly smaller than an uninfected wheat kernel and are dark brown or black in color (Figure 2). The seed coat on these bunted kernels is easily crushed, which releases the bunt spores and the foul smelling odor. During harvest, these bunted kernels are broken and the spores are released to spread to the coat of healthy wheat (Figure 3) and to the soil. Hence, the common bunt fungus survives the summer in the soil and on the seed coat. These spores germinate in the soil when temperatures are cool (<75 F), the fungus infects young, germinating seedlings, and then the fungus grows with the developing wheat plant through the year. As the plant matures, common bunted kernels rather than healthy kernels are formed in the head.

Figure 2. Wheat seed from a healthy wheat plant (left) and from a wheat plant infected with common bunt (right).

A

B

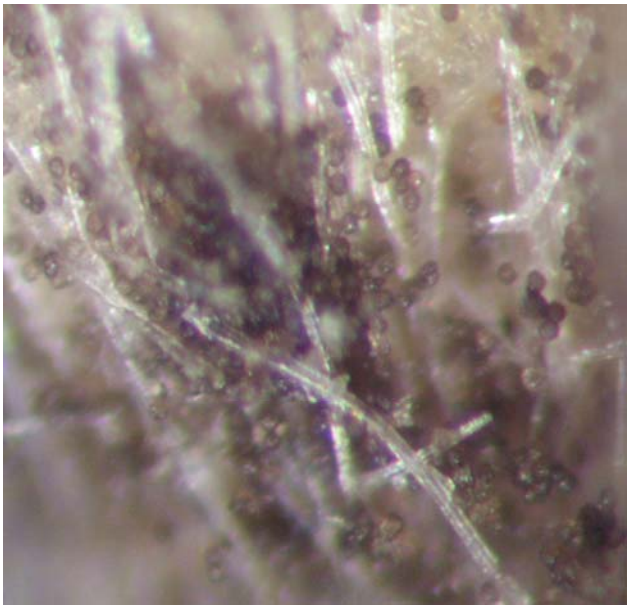


Figure 3. (A) Wheat seed infested with common bunt spores (note all the small black specks on the seed coat, especially in the "brush"). (B) A view of the "brush" end at 63X. Note the number of common bunt spores in this small area.

Control of common bunt and loose smut: Control of both of these diseases is readily accomplished by treating seed with a registered fungicide effective against the bunts and smuts. Most of the fungicides available for control of common bunt are systemic fungicides (fungicides that are taken up by the plant). In general, the systemic fungicides are more effective in controlling common bunt/stinking smut than the protectant fungicides (fungicides that stay on the surface of the plant). In some cases, a treatment is a mixture of a systemic with a protectant fungicide, and sometime the treatment includes an insecticide along with the fungicide. HENCE, be sure to read the labels to see which are effective against common bunt and loose smut. Remember, a systemic fungicide is critical for controlling loose smut because the fungus that causes this disease actually resides inside of the seed. Hence, a protectant fungicide on the seed coat will not enter the germinating seedling and will not control the disease. ALSO, be sure seed is completely and thoroughly covered to obtain effective control. Planting treated seed every year (or at least every other year) is a sound practice to follow to avoid the initiation and increase of common bunt and loose smut. Further, if you have seed that you know came from a loose smut or common bunt infected field, don't use that seed to plant fields the next year. Controlling common bunt and loose smut is particularly important because of the always-present threat of Karnal bunt, which is a bunt that has the same "fishy' or "musty" smell as common bunt. Hence, elimination of common bunt and loose smut also helps to avoid the risk of common bunt being misidentified as Karnal bunt.

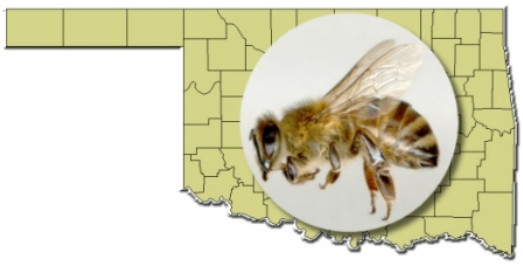
Karnal bunt: Testing of wheat produced in Oklahoma for the presence of Karnal bunt is necessary in order to obtain a phytosanitary certificate indicating that wheat in Oklahoma was tested for the presence of KB. If all samples are negative, the certificate is issued stating the wheat was produced in an area not known to be infested with KB. This certificate than allows wheat produced in Oklahoma to freely enter international markets.

Testing of wheat produced in Oklahoma in 2005 for the presence of Karnal bunt has been completed. All 73 grain samples from Oklahoma tested negative for the presence of Karnal bunt. This wheat was part of the USDA-APHIS National Survey program that is used to help ensure the marketability of U.S. wheat into the international (export) market.

For more information on common bunt, Karnal bunt & loose smut, see http://entoplp.okstate.edu/ddd/hosts/wheat.htm, consult the, "2005 OSU Extension Agents' Handbook of Insect, Plant Disease, and Weed Control (OCES publication E-832)," and/or contact your County Extension Educator.

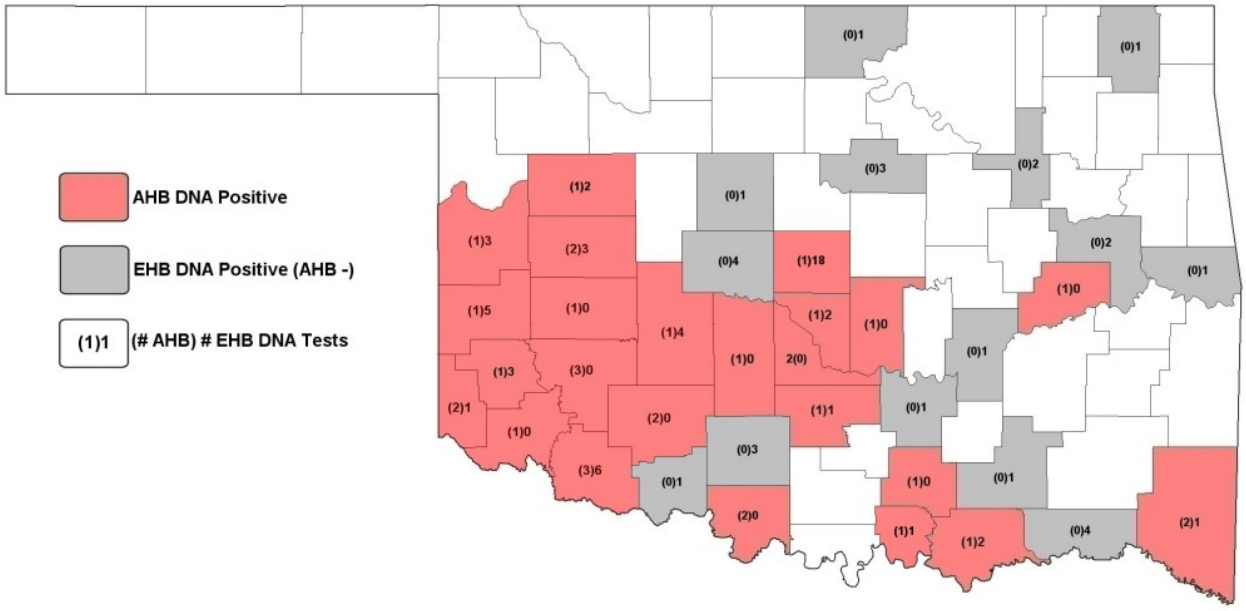
Africanized Honey Bees Continue to Move Across the State

Phil Mulder[1] and Richard Grantham[2]
Extension Entomologist[1] and Director of Plant Disease and Insect Diagnostics Lab[2]



Bee samples from across the state continue to come into the Plant Disease and Insect Diagnostics Lab. Last year, our busiest time for new counties to be confirmed with Africanized honey bees was in the fall. Recently, after processing 18 negative samples from Oklahoma County, over the last several months, the first positive sample was collected on August 2, 2005. This large colony was sampled from a cavity within an elm tree near the 300 block of SE 25th Street. Two additional counties were added to the pool, with Dewey County (sample collected 7/12/05) and Marshall County (sample collected 8/1/05) sending in Africanized honey bees. All bees in these colonies were destroyed. Only one stinging incident was reported. In Marshall County, a horse was stung when moving through the area, however, according to reports, the horse is fine. These last two discoveries provide some important benchmarks for the state. First, we now have the Africanized honey bee (AHB) in an urban county, where the threat to

interact with people is enhanced. Second, Dewey County marks the northernmost location within the state that AHB has been recovered. Presently, we do not know how far north to expect these insects to become established. If records from Arizona are any indication, AHB is widespread across that state with colonies and swarms being found at very high elevations that are often snow-covered. It appears that nature can indeed find a way around many inhospitable situations.



The general public, particularly those associated with outside duties (mowing, gardening, tree trimming, etc.) should be aware that these insects could be widespread across Oklahoma and found in nearly any environment. AHB have been known to establish colonies in water meters, tires, barrels, tree cavities, and in homes. From all external appearance, AHB do not differ significantly from their more docile European cousins; however, they can be very defensive in protecting their hive. AHB are more likely to attack intruders simply because of noise in the area (mowers, weed trimmers, blowers, chain saws, etc.). In addition, if they attack an intruder they are likely to do this with 6-10 times the number of workers stinging the victim than a European honey bee colony. Complicating the problem even more is that these defensive bees will pursue an intruder further (up to ¼ mile) and stay angry longer (up to an hour) than European honey bees.

People who work outside, during the spring, summer, and fall should be aware of their surroundings and cautious about approaching any potentially dangerous situation involving honey bees. We recommend that people associated with outside duties involving noisy equipment take the time to assess the area before starting up their equipment. Any large crews of workers that trim trees or similar jobs should have an evacuation plan mapped out beforehand and have a vehicle nearby. This particular safety issue can also justify the purchase of several bee suits, in case of emergency. Any worker that has a history of allergic reaction to insect stings or bites should notify his employer and always carry their reaction kit with them into any potentially dangerous situation.

Oklahoma State University in cooperation with the Oklahoma Department of Agriculture, Food and Forestry will continue to assess samples throughout the state; however, where a positive collection has taken place that county is considered infested with AHB and the cost of any subsequent testing may be passed on to the landowner (currently $35).

For those in need of additional information on Africanized honey bees and related species, consult our website at: http://www.entoplp.okstate.edu/ahb/ or the website for the Oklahoma Department of Agriculture, Food and Forestry at: http://www.state.ok.us/~okag/agri-ahbhome.htm

Diligence with Pecan Weevils Still Important

Phil Mulder, Extension Entomologist

Pecan weevil season is in full swing with several areas across the state reporting moderate to heavy populations moving out of the soil and into trees. In a previous issue of this newsletter, I voiced the concern that growers should keep good records of rainfall, pecan weevil numbers (using some form of trapping), and nut maturity. Now that the time for oviposition (egg-laying) by female weevils is quickly approaching we need to re-visit the importance of nut maturity and ovipositional behavior associated with pecan weevil.

Rainfall or lack of moisture may accentuate soil permeability; however, if it were the only determinant of weevil emergence why would weevils wait until late in the season to emerge? The weevil has been in the adult stage for approximately one year; so why wait till the latter part of the season? Simply put; survival and propagation of the species. The pecan weevil like the pecan is native to Oklahoma and consequently has evolved over the eons in perfect synchrony with the fruit maturity of its host and each year emerged accordingly. Studies by Boethel (1978), Dupree and Bissell (1965) have provided strong evidence that this synchrony is true. In several years of study in Louisiana and throughout the southeast, these scientists showed that the weevil emerged in late August to Early September depending on the predominant variety for that area.

After emerging from the soil, there is a preovipositional period before egg laying occurs. This period of time generally averages around 6.5 days but can occur as early as two days after emergence from the soil. Peak egg production is reached 10-12 days after emergence. Almost all of the literature does agree that oviposition does not begin until the shells are nearly hardened and contained well developed kernels. The amount of oviposition conducted by the female weevils in any given tree is very dependent not only on nut maturity but also on nut load. Weevils will mover higher into trees with fewer nuts, and begin to disperse to other trees if few nuts are discovered on the first tree. Most of the latter type of movement; however, is limited to late in the season, after peak emergence periods. Once this occurs; however, weevils have been known to move up ¼ mile. Obviously, this does not bode well for well-tended orchards near unmanaged pecans.

The next logical question to ask might deal with weevil longevity. This is an area where weevils, especially females excel. Once a weevil emerges from the soil the average period of time for survival may range from 8 to 24 days, with female weevils capable of living about 6 days longer than males. When early emerging weevils are present before the pecans are ready for oviposition, they can expand their life span until the nuts are suitable. Unfortunately, these early emerging weevils, which tend to live longer, also have an increased capacity to inflict more damage than weevils that will emerge later in the year.

The message behind much of this information is to stay diligent in combating the weevil problem, at least up until shuck split. Chemical choices may be related to several factors including other pest problems. Sevin insecticide still seems to be the standard for pecan weevil control; however, in situations where hickory shuckworm and/or stink bugs are a problem other options should be considered. These options might include a tank mix with Confirm or Intrepid to control shuckworm infestations, or a synthetic pyrethroid to control stink bugs and other important pests.

With the heavy rains experienced across the state the last week many growers have called to voice their concerns about the residual capacity of the chemicals. Many of the Sevin labels suggest an adjuvant be used to provide some modifying of the pH. To insure the best performance of the chemicals used, always follow label directions. Some of the chemicals have gone out without a spreader/sticker during this rainy

period. Interestingly, I received a call from a producer that used Warrior just before (4 hours) a rainfall period. He subsequently reported effective weevil mortality for a seven day period after application. His observations were confirmed using tarps to capture fallen weevils. I would not have guessed Warrior to have this kind of residual; however, it did perform the best of all chemistries tested in Oklahoma pecan trials in 2004.

Whitefringed Beetles Found in Oklahoma Alfalfa

Phil Mulder, Extension Entomologist

On August 17 samples sent to the diagnostics laboratory revealed damage on alfalfa from the whitefringed beetle, *Naupactus* (= *Graphognathus*) *leucoloma*. This beetle pest is associated with 385 different plant species including cotton, peanuts okra, soybeans, alfalfa, cowpeas, sweet potatoes, beans and peas. Adults seem to prefer plants with large, broad, smooth leaves. Larvae feed on agricultural crop roots, newly germinated acorns and nuts, and the roots of woody plants (e.g. peach, pecan, willow) and pines. While this beetle is not native to Oklahoma (originally from South America – Argentina, Peru, Chile, Uruguay) it is widely distributed throughout the southern United States. In fact, adult specimens were recovered from Enid, Oklahoma in 1995 and 1996. No damage to any crop was noted by the collector (Don Arnold).

This recent finding is a different story; agronomic damage was widespread across a field of alfalfa in Hammon, OK (Roger Mills County) and resembled the stunting symptoms often associated with stem nematode damage. This species and three others comprise a complex of whitefringed beetles in North America. Female (males are unknown) weevils are light to dark gray or brown, with a characteristic lighter band along the outer margins of the wing covers, and two paler longitudinal lines on each side of the thorax and head, one above and one below the eye. The larval stage is a creamy yellowish white, C-shaped grub with a strong thoracic swelling.

Adult beetles (only one generation per year) emerge from the soil from May to October and feed on foliage. Egg laying occurs five to 25 days after emergence. This species is parthenogenetic, which basically means they don't need to mate to produce eggs. Egg masses are laid on plant stems, roots, and soil. They can also oviposit on lumber, firewood, farm tools and machinery. The eggs hatch on average in 17 days (summer) or 100 days (winter). The larvae of whitefringed beetles feed on roots, tubers, and underground stems as well as dead plant material. The larva is the overwintering stage and pupation takes place from late April to late July. Some larvae may spend a second year feeding on plants before they pupate. Pupal cells (constructed by the larvae) are found 5-15 centimeters below the soil surface but have been recovered at depths of 36 centimeters. The pupal stage typically lasts for about two weeks.

Damage from root feeding larvae can range from a few scattered areas of dead plants to large areas in circular spots across a field. Larval feeding appears as small to large amounts of taproot

removal, below ground. Some of the lateral roots may also be affected. Because the larvae reach a mature size of about 12 centimeters, to sample for this stage requires sifting soil through soil sieves of 8, 16, 24 and 40 mesh/2.5 cm screens.

Control of this pest with conventional insecticides is limited to attempting to kill adult beetles. Many of the standard insecticides that are used in alfalfa will likely control this insect; however, timing will be the most critical issue. With the prolonged emergence period and lack of sexual reproduction, it will be difficult to anticipate when the peak in adult activity occurs. Rotation of leguminous crops into oats, wheat, corn or sorghum may be somewhat helpful but may require a long (up to five years) rotation period. Larvae do not prefer to feed on the fibrous root systems of the suggested rotation crops. This is likely going to be the best approach in managing this pest in Oklahoma. If sampling of adults can be conducted regularly throughout the late spring and summer months, then treatments may help in controlling adult populations and limiting egg laying activity.

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