OSU OKLAHOMA COOPERATIVE EXTENSION SERVICE

WHEAT PRODUCTION NEWSLETTER

Vol. 2, No. 2 Website: http://www.wheat.okstate.edu Sep. 06, 2005

Keep a Close Watch for Fall Armyworms in Seedling Wheat

Dr. Tom A. Royer, Extension Entomologist

We have received reports of fall armyworm buildups in sorghum and other crops in north eastern Texas and south central Oklahoma. In addition, I have seen some very severe fall armyworm infestations in numerous sorghum fields in Oklahoma over the past 3-4 weeks. For the most part, these fall armyworms have just about completed their lifecycle, but such large and noticeable numbers increase the potential that we will see another generation that could cause some serious problems for seedling wheat.

Fall armyworms can kill seedling wheat, so newly planted wheat fields need to be watched carefully for several weeks after emergence. To scout for fall armyworms, examine plants in several locations within the field. Fall armyworms are most active in the morning or late afternoon. Look for leaves that seem to have had all of their green tissue removed which gives the leaf a "window pane" appearance. Examine some plants showing evidence of injury, and look in for small caterpillars in the whorl of the wheat seedling. When scouting, examine plants along the field margin as well as in the interior, because they often move in from road ditches and weedy areas. The suggested treatment threshold is 2 to3 larvae per linear foot of row.

Fall armyworms are most easily controlled when they are small (less than ½ inches). Several insecticides are registered for control of fall armyworm in wheat, including chlorpyrifos (Lorsban 4E) at 1 pint/acre, gamma cyhalothrin (Proaxis) at 2.56-3.84 fl oz/acre, lambda cyhalothrin (Warrior) at 2.56-3.84 fl oz/acre, methomyl (Lannate LV) at 0.75-1.5 pint/acre, methyl parathion 4E at 1.5 pint/acre, spinosad (Tracer) at 1.5 -3 fl oz/acre and zeta cypermethrin (Mustang MAX) at 3.2 -4 oz/acre. Remember to follow all label restrictions.

Q & A Regarding Fall Armyworm in Wheat and Pasture

Dr. Tom A. Royer, Extension Entomologist
Dr. Gene Krenzer, Extension Agronomist (Ret.)

Q. "A couple of years ago, fall armyworms seemed to destroy my pasture "overnight", where do they come from?"

A. Fall armyworm is a tropical insect and overwinters only in the warmest areas of the US. As populations build throughout the summer, they move northward on weather fronts, often arriving in Oklahoma in late summer. Because several generations develop during the summer, the generations overlap and effectively create a continuous supply of moths (and eggs). Any fall-planted wheat field that is emerging out of the ground could become infested.

Fall armyworm infestations often go unnoticed for a while because they don't cause obvious damage until they get bigger. The caterpillars shed their skin five times before they quit feeding. To indicate the stage of growth that a caterpillar is in, we refer to them as instars. The first instar is the caterpillar just after it hatches. A second instar is the caterpillar after it has shed its skin for the first time. A sixth instar has shed its skin five times and will feed, bury itself in the soil, and pupate.

If you were to ration out a supply of food to feed each instar, you would need to reserve 70% of the total supply just to feed a sixth instar caterpillar. It is similar to trying to feed a hungry teenager. Like a teenager, a sixth instar fall armyworm can eat lots of food in a relatively short period of time, and leave little leftover for anyone else.

Q. Is my wheat susceptible to fall armyworm?

A. YES. Producers should be monitoring any emerged wheat for signs of fall armyworm feeding.

Q. "How can I recognize a fall armyworm infestation before it causes major injury?

A. During the first three instars, the caterpillar does not remove much plant tissue. It will scrape off the epidermis of the leaf, leaving a clear, papery membrane that you can see through. This type of feeding is called "windowpaning" or skeletonizing. As the caterpillar gets larger, it chews through the leaf and begins eating along the margin of the leaf blade. Fourth through sixth instars chew along leaf margins and eat the entire leaf blade, as well as stems. The key is to look for the "windowpaning" as an early sign that you have an infestation.

Q. How many fall armyworms are too many, and how do I control them?

A. In fall seeded wheat, treat if you find two to three armyworms per foot of row. In pasture, no established treatment threshold has been determined, however a general guideline for fall armyworm control in the southeastern US suggests that if you find two or three large larvae per square foot in grass pasture, consider treating.

Several insecticides are registered for control of fall armyworm in wheat, including Lorsban SG, methomyl (Lannate), Warrior T, and parathion (methyl or ethyl). Remember to follow all label restrictions.

In pasture, Sevin , malathion, Lannate (for bermuda pasture only), Confirm2F, and methyl parathion are labeled for control of fall armyworm.

Q. "Once this brood of armyworms is gone, can we quit worrying about them?

A. The short answer is no. Fall armyworms are likely to be with us until we have a killing frost. However, we are getting late enough in the year that this will probably be the last generation that we see. The bottom line is that producers should remain vigilant.

Q. If I treat for fall armyworm, when can I put my cattle back out to graze?

A. **Grazing restrictions are as follows for wheat:**

Sevin	7 days
Karate (RUP)	30 days
Lannate (RUP)	10 days
malathion	7 days
methyl parathion (RUP)	15 days
ethyl parathion (RUP)	15 days
Lorsban 4E-SG	14 days
	28 days for harvest

Grazing restrictions for pasture

carbaryl, (Sevin and other names - check label for specific recommendations)	0-14 days
Confirm	0 days
malathion	0 days
methomyl (Lannate) bermuda only	7 days
parathion (methyl)	15 days

Q. If I have a wheat field that has been chewed to the ground, will it come back if I control the worms, or should I consider replanting?

A. The answer to this question involves several considerations. First, the armyworms are not controlled, they will continue to feed and keep the leaves from getting above ground. At some point, the plants will simply "wear out" and die. If the wheat was very small seedling stage and under stress the plants may not have enough energy reserve to recover. However, if the wheat had some time to develop top growth before the armyworms chewed them down to the base and you have adequate soil moisture, you may see a nice recovery of the stand.

Before you decide on whether to spray or replant, answer the following questions:

- *Was your stand marginal to begin with?* If the answer is yes, you might want to consider replanting.

- *How much will it cost to replant versus spraying?* You should consider the economics of controlling the current infestation with the costs of a replant. If you replant, you might want to delay planting for several days to make sure the armyworms have either pupated or "marched" out of the field.

Q. "My lawn is infested, what should I do?"

A. There are products available for control, but for bermuda turf, you might consider not doing anything. It is late in the year, and fall armyworm will not likely cause serious damage. If you decide that control is required, several products are registered, including *Bacillus thuringiensis* (Javalin), diazinon, Orthene or Sevin. You may still find Dursban in stores, but it will no longer be sold to homeowners after 12/31/01, so you should probably consider other products.

A couple of new pyrethroid insecticides are available for homeowners as well. One line is the Bayer Advanced Lawn and Garden Multi-Insect Killer which contains cyfluthrin. Another line is the Ortho Home Defense Indoor and Outdoor Insect Killer, which contains bifenthrin. Both are very effective at very low dosages. Remember to follow all label directions before applying any pesticide.

Can we cut costs without cutting yield?

Dr. Jeff Edwards, Extension Small Grains

Rising input costs and low commodity prices have farmers looking for more and more ways to decrease input costs. This is an excellent opportunity to look for new ways to increase operational efficiency and make more out of every dollar invested, but the rush to trim costs, if not done wisely, can just as easily lead to decreased efficiency and decreased profitability. So, let's take a brief look at some ways to cut costs and increase efficiency without sacrificing yield.

1. **Keep the basics covered.**
   There is nothing wrong with thinking outside the box or looking at ways to increase yields and profitability, but always remember that a sound building must have a solid foundation. In wheat production that firm foundation consists of up-to-date soil tests, proper fertility, quality seed planted at a consistent depth, and good recordkeeping. Without this solid foundation, increased operational efficiency and profit from new technologies will be difficult.

2. **Focus on strategies that increase efficiency**
   The cost of an agricultural input is the same whether it is applied in an efficient manner or not. Efficiency of an input can be increased through a variety of methods such as better assessment of plant needs, better product delivery method, or better timing of an input. Let's take a look at a specific example of each of these.

   - **Better assessment of plant needs**
     I know of no better example of this topic than the sensor-based nitrogen recommendation system (a.k.a. Greenseeker). Through the use of nitrogen-rich strips and hand-held sensors, this system allows for accurate assessment of plant nitrogen needs. Through better assessment of plant needs, there is the potential to double nitrogen use efficiency. In my book, doubling the efficiency with which nitrogen is used is equivalent to cutting nitrogen costs in half. Visit www.nue.okstate.edu or visit your local extension agent for more information on sensor-based nitrogen recommendations.

   - **Better product delivery**
     A good example of better product delivery is banding of phosphorous (P) fertilizer. Phosphorous can easily be "tied up" by aluminum present in the soil solution, especially at soil pH of 5.5 or below. By banding P fertilizer, we reduce the amount that is immobilized by Al and increase plant availability.

     Another example of better product delivery is upgrading to air-induction or low-drift potential spray nozzles and properly calibrating sprayers. Wind-free days are a rarity in Oklahoma, so using low-drift nozzles and reducing spray pressure will increase the amount of chemical reaching the soil surface and increase efficiency.

   - **Better timing**
     This idea ties in with our first point, because if you can make a better assessment of plant needs, you can more properly time inputs. Examples would include delaying the bulk of N applications until spring, spraying weeds while they are still small, or spraying fungicides early enough to prevent disease.

3. **Let nature work for you**
   Incorporate an integrated pest management program into your farming operation to reduce

the number of pesticide applications that are required. This can be accomplished by planting improved varieties with better disease resistance or by doing a better job of scouting for pests and predators. If you are new to integrated pest management, I suggest starting by giving the glance-and-go greenbug scouting system a try this fall (see the August 12 newsletter posted at www.wheat.okstate.edu for more info).

4. **Be cautious of miracle products**
Unfortunately, the hard economic times have many producers looking for magic bullets to increase their yield and profits. I suggest the following checklist for evaluating new products that might come your way.

- **Is there research to substantiate product claims?**
Naturally, I have a preference for university-based research results, but there are many reputable private firms out there that evaluate new products as well. The main considerations here, though, are have the data been thoroughly reviewed by a disinterested party and what comparisons were made. A new fertilizer treatment, for example, would need to be compared not only to an untreated check but to a standard fertilizer treatment such as DAP (18-46-0) in-furrow. While there may be an advantage over no in-furrow fertilizer, the treatment may only be equivalent to DAP in furrow, in which case the choice could be made based upon price and not performance.

- **Do the claims sound too good to be true?**
Consider the following statement: Synthetic oil has superior lubricating properties as compared to conventional motor oil. I think most of us would agree that this statement is correct, even if we don't use synthetic motor oil. Many of us would agree that we could go longer between oil changes and increase engine efficiency by using synthetic oil. I doubt if any of us, however, would allow a mechanic to convince us that, due to its superior lubricating ability, one quart of synthetic motor oil in our car can take the place of 6 quarts of conventional motor oil. A prime example of this principle in agriculture is pelletized lime. Chemically, one molecule of $CaCO_3$ will neutralize two H^+ ions which are the cause of soil acidity. There is no shortcut around this reaction! (See you extension agent for revised OSU Fact Sheet #2240 for more information on correcting soil pH)

- **Is the research project complete?**
The fact that a university is "looking" at a new product or variety ***does not in any fashion constitute a recommendation*** for that particular product. In fact, the base assumption or hypothesis is likely that the product does not work and the data will have to show otherwise to change this assumption. For this reason, it is important to wait until research results are published to draw conclusions about what the data imply. If a new product or variety is evaluated in university tests and is clearly superior to all other available alternatives, it will be publicized. Trust me, we live for this stuff!

Wheat Disease Update

Dr. Bob Hunger, Extension Wheat 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

Figure 1. Loose smut

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.

Common bunt (also called 'stinking smut'): 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

Figure 2. Common bunt (a.k.a. stinking smut)

are broken and the spores are released to spread to the coat of healthy wheat 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.

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 all of these diseases, see http://www.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.

Hessian Fly Control Considerations in Winter Wheat

Dr. Tom A. Royer, Extension Entomologist

Oklahoma growers experienced some Hessian fly infestations last year, so it has become a topic of concern as this planting season approaches. It is critical to make those decisions, because there are very few control options available to growers.

There are 2 main generations that occur, a fall infestation and a spring infestation. Hessian fly injury is caused by larval feeding on stem tissue at the crown of young plants or just above the nodes of jointed wheat. The larva is a shiny, white headless and legless maggot that measures up to 3/16 of an inch. When mature, a larva forms a 1/8 inch long puparium that is commonly referred to as a "flaxseed". A flaxseed is dark brown and looks like a grain of rice.

During a fall infestation, young infested plants become dark-green to bluish green in color and are stunted with thickened leaves. Often, secondary

tillers fail to develop or simply die. To confirm an infestation, the plant and roots should be removed from the soil and inspected for maggots or flaxseeds by gently pulling the leaf sheath away from the stem and examining the crown area (as shown in the picture above). Pay particular attention to any secondary tillers for flaxseed.

In a spring infestation, the stem is often injured, and will lodge at the point of feeding. A heavily infested field looks like it has suffered hail damage. In such fields, the lodged plants will nearly always contain "flaxseeds" that are inserted at the first joint of the stem, just under the leaf sheath. You can estimate damage by counting fallen tillers per foot of row in several locations, and dividing that by the number of heads in a foot of row. There is no effective insecticide control for spring infestations.

Control: As stated earlier, Hessian fly infestations are rare in Oklahoma, probably due to the drier environment that exists in most of the wheat belt. Even so, it can be a problem in some years. There are just a few control options that are effective.

- The Fly Free Planting Date: If fields are planted later, say in October, the risk of a fall infestation will be reduced. The so-called "fly-free planting date" is not very effective, with the exception of the northern tier of counties in Oklahoma, including the panhandle. Why, because we have such varying warm periods during the wheat growing season, so Hessian fly adults can emerge at any time during the winter in most of the state.

- Burying stubble. Infested stubble should be buried at least two to four inches below the surface. Volunteer wheat should be destroyed as soon as possible if summer rains stimulate germination in the field. This is not an option for those growers practicing conservation tillage.

- Resistant varieties are available for spring wheat, but there is much less information on biotype resistance that is incorporated into hard red winter wheat. I sampled several infested fields in north central Oklahoma which showed that biotypes A, B, C, and D comprised 90+% of the biotypes collected. Thus, any variety that has resistance to those biotypes will be of value in areas where Hessian fly has been a more consistent problem.

- Seed Treatments: Seed can be treated with Gaucho or Cruiser insecticide to control fall infestations. This should be a strong consideration for growers that use no-till or conservation tillage, and are growing continuous wheat. Dr. Gerald Wilde, a research entomologist at Kansas State, has conducted some studies that evaluated control of Hessian fly with seed treatments. His work showed that Gaucho and Cruiser both reduced Hessian fly compared to untreated seed by about 90%. These seed treatments do not reduce spring infestations; however they also provide protection from cereal aphids such as the greenbug and bird cherry-oat aphid.

Growers that have experienced more consistent infestations of Hessian fly should consider using a seed treatment, especially if they are growing continuous wheat in a no-till or conservation till system and are planting in September.

Check out the new web site!

We are currently working on a new web site for all things wheat at Oklahoma State University. It can be found at www.wheat.okstate.edu Look for new information and new features to be added periodically. We also welcome any suggestions or comments.

Subscription information

The *Wheat Production Newsletter* is published in electronic format on an as needed basis throughout the year. To receive an electronic copy in pdf format, send an email with **subscribe** as the subject line to jeff.edwards@okstate.edu

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert Whitson, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at no cost to the taxpayer.