



PLANT DISEASE AND INSECT ADVISORY

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Wheat Disease Update – Fusarium Head Blight

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Producers in north central Oklahoma most likely heard about Fusarium head blight (also known as “scab” or “head scab”) over the last month or so. Fusarium head blight (FHB) is a major disease of wheat and barley in states north and east of Oklahoma, but only rarely has FHB been reported in central or western OK. However, Dr. Jeff Edwards (Extension Wheat Agronomist) and Roger Gribble (Area Extension Agronomist) found a field in north-central OK in May that was infected with FHB at a 30-40% incidence. This is the greatest incidence of FHB that I have heard of in Oklahoma, especially for a location not in eastern/northeastern OK. FHB also has been found from low to high incidences in south central Kansas during the past month.

Cause & problems associate with FHB: FHB is caused by the fungus *Fusarium* (Figure 1), whose spores (Figure 2) infect wheat heads and developing kernels primarily during and after flowering. Infection of wheat heads (Figure 3) occurs when there are long periods (48-72 hours) of high humidity and temperatures ranging from 75-85°F. Infections can also occur at lower temperatures, but longer periods of high humidity are then required. Infection at flowering can result in sterility but often the end result is white, chalky-appearing shriveled seed (Figure 4). Entire or partial heads can be infected. This same fungus also can infect and kill seedling wheat in the fall (Figure 5) and causes Fusarium root rot (dryland root rot) observed in the spring (Figure 6).



Fig 1. The fungus *Fusarium* growing from infected wheat stems (note reddish color often associated with *Fusarium*).



Fig 2. Spores of the fungus *Fusarium*.



Fig 3. Wheat heads infected with *Fusarium* (head on left is partially infected; head on right is totally infected).



Fig 4. Wheat seed infected with *Fusarium* (healthy seed on top and bottom; note reddish color often indicative of presence of *Fusarium*).



Fig 5. Wheat seedlings in the fall with rotted roots due to *Fusarium* (note healthy seedling on right).



Fig 6. Wheat tillers infected with *Fusarium* and showing symptoms of Fusarium (dryland) root rot (note healthy stem on bottom).

The other major problem associated with FHB is the production of compounds called mycotoxins, among which DON (deoxynivalenol – also called “vomitoxin”) is the most common. Presence of *Fusarium* in wheat grain does not automatically mean that DON is present in wheat, so wheat infected with *Fusarium* frequently is tested for the presence and level of DON. DON is toxic to animals, with advisory levels set by the Food and Drug Administration as follows:

- 1 part per million (PPM) for finished grain products for human consumption.
- No standard for raw grain going into milling process.
- Cattle, over 4 months old: 10 ppm (providing grain at that level doesn’t exceed 50 percent of diet).
- Poultry: 10 ppm (providing grain at that level doesn’t exceed 50 percent of diet).
- Swine: 5 ppm (not to exceed 20 percent of ration).
- All other animals: 5 ppm (providing grains don’t exceed 40 percent of diet).

The Oklahoma Animal Disease Diagnostic Laboratory (OADDL) at Oklahoma State University does not directly test grain for the presence of DON because there has not been a need for this test in Oklahoma. However, OADDL will accept samples for such testing and send them to

qualified labs that they know of in other states. If there is a need for such testing, OADDL can be contacted at 405-744-6623 for further information.

Use of wheat harvested from an FHB-infected field for seed: Grain harvested from a field with a high incidence of FHB can be used as seed but taking a number of precautions should be considered. First, adjusting the combine at harvest to remove light-weight FHB-infected seed is helpful. If this was not done, cleaning seed after harvest is a possibility. These steps will serve to remove the lighter and shriveled FHB-infected seed, but not all FHB-infected seed will be removed because some infections occur later in grain development and the kernels are close to full weight. If you know or suspect that you are planting seed infected with *Fusarium*, be sure the seed has a good test weight (at least 56 pounds) and a >85% germination rate. Treating seed with a chemical should also be considered as a number of seed treatments are labeled to suppress or partially control early season *Fusarium* seed and seedling rots. This should increase seedling survival and facilitate stand establishment. These seed treatments include:

1. Gaucho XT @ 3.4 fluid oz per cwt (early season control).
2. Raxil MD @5-6.5 fluid oz per cwt (early season control or suppression).
3. Raxil MD EXTRA @ 5 fluid oz per cwt (early season control or suppression).
4. Raxil MD-W @ 5 fluid oz per cwt (early season control or suppression).
5. Dividend XL @ 2 fluid oz per cwt. (label states can be used from 1 – 2 fluid oz/cwt, but partial control of *Fusarium* is listed only at 1 oz/cwt).
6. Dividend XL RTA @ 10 fluid oz per cwt (label states can be used from 2.5 – 10.0 fluid oz/cwt, but partial control of *Fusarium* is listed only at 10 oz/cwt.).
7. Dividend Extreme @ 4 fluid oz per cwt (label states can be used from 1-4 fluid oz/cwt, but early season control of *Fusarium* is listed only at 4 oz/cwt).
8. Charter @3.1 fluid oz per cwt (controls seeding blights and suppresses early season infections caused by *Fusarium* crown rot and root rot.)
9. Charter PB @ 5.5 fluid oz per cwt (reduces seed and soil-borne seedling blights (*Fusarium* spp.).

Be sure to read the label with these or any seed treatment as there are restrictions related to times between planting and use of wheat for grazing. Also please note that with many of these seed treatments only the higher rates are listed as offering partial control of *Fusarium* or that control is indicated as “early season control.” Also keep in mind that all of these seed treatments also target other fungal diseases including bunts and smuts, etc.

Other steps to control FHB: Planting wheat seed from a FHB-infected field can affect germination and stand establishment in the fall because the same fungus that causes FHB also causes *Fusarium* seedling and root rot. However, it is important to remember that FHB in the spring results from infections that occur during flowering. Thus, prolonged humid conditions with warm temperatures in the spring favor FHB incidence and severity. The other factor that can greatly impact FHB incidence in the spring is residue in which wheat is planted. Corn, where *Fusarium* causes corn stalk rot, is highly susceptible to *Fusarium*. Thus, wheat planted into corn residue infected *Fusarium* is more likely to show FHB than wheat planted into other types of residue such as soybean. The following quote from a North Dakota State Fact Sheet (“Dealing with Scabby Grain, Vomitoxin,” M. McMullen, et al., September, 1994) indicates this:

“Studies in Ontario, Canada showed that the number of wheat heads infected with scab when corn was the previous crop was five to 10 times higher than when wheat was the previous crop. The number of wheat heads infected with scab when wheat was the previous crop was about 1.5 times higher than if the previous crop was soybeans.”

Keep in mind however, that wheat planted into residue from soybean or even into clean-tilled fields can still show significant levels of scab if favorable weather conditions exist in the spring as spores can move from other fields and *Fusarium* can survive to some extent on many crop and weed residues. Although resistance to FHB exists in wheat, the reaction of the hard red winter wheat varieties planted in Oklahoma to FHB is mostly unknown because we have not had to deal with FHB in the past.

FHB has not been a significant problem in Oklahoma, but with an increased incidence this past spring and with the potential of wheat-corn rotations increasing, producers should become familiar with this disease and take steps to avoid situations that greatly favor FHB. More information on FHB from states where this disease is significant can be found at:

1. <http://www.oznet.ksu.edu/path-ext/factSheets/Wheat/Wheat%20Scab.asp>
2. <http://www.wheatcab.psu.edu/>
3. <http://ohioline.osu.edu/ac-fact/0004.html>
4. <http://www.ag.ndsu.edu/pubs/plantsci/pests/pp1302w.htm>
5. <http://www.ag.ndsu.edu/pubs/plantsci/smgrains/pp1095w.htm>

Interesting Results from this Year's Pecan Nut Casebearer Trials

Phil Mulder, Extension Entomologist

This has been the type of year where many producers chose to ignore treatment recommendations for pecan nut casebearer (PNC). This decision is often made to allow the insect population to do some crop load thinning and it sounds like a reasonable means of avoiding shaking many trees later in the summer. Unfortunately, this gets to be a little tricky, particularly if the grower chooses to ignore casebearer for the remainder of the summer. An early 10% loss can quickly escalate into a 30% loss or more if second generation is not controlled. Growers who elect to try this approach should monitor for adult PNC activity throughout the summer and monitor the crop carefully for extensive damage.



Most of the growers that made applications of insecticides on a timely basis experienced excellent control. Trapping for adults and monitoring for oviposition or moth activity helped many producers carefully time those treatments. Attached below are results of trials conducted

near Perkins, Oklahoma at the Cimmaron Valley Research Station. The newer material under the name of “Endigo” does have a label on pecan and the two active ingredients (Thiamethoxam and lambda-Cyhalothrin) are the same ones found in Centric and Warrior, respectively. I would suggest being cautious about using this material for early-season insect control, due to potential harm to beneficial organisms; however, this material may have some promise for pecan weevil (particularly early control – July or August) but is yet untested for such use in Oklahoma. The nice attribute about this combination product is associated with these two different active ingredients. The Centric component is quite effective on aphids, while the Warrior component is effective on a wide range of pests and in particular pecan weevil. Therefore, flaring of aphid populations with use of pyrethroids may not be a problem; however, this is strictly an assumption at this point.

Three insecticides were evaluated for control of PNC on a trial conducted in a ten year old pecan orchard (cv. Kansa) at the Cimmaron Valley Research Station in Perkins, OK (Payne County). The test was designed as a randomized complete block with four, multiple-tree



replicates (9-12 trees) of each treatment and an untreated check. Pretreatment PNC infestation levels were checked on 26 May, eight days after first moth capture. Infestation on that date revealed 0 damaged clusters and no eggs per 310 clusters examined. On 31 May, three white eggs per 310 clusters were identified. The infestation levels on 31 May warranted treatment; therefore, applications were made on 6 June. Pretreatment samples were also taken on 6 June revealing one white egg and three nut entries per 100 clusters. Treatments were applied on 6 June using a Savage

PTO-driven, air-blast sprayer calibrated to deliver 124.9 gpa. Only one application was made. Damage was evaluated on 26 June by inspecting 200 nut clusters/treatment within each block for casebearer larval entries.

Pecan nut casebearer infestation levels exceeded economic thresholds when the final pretreatment counts were made. Twenty days after treatment, the number of PNC damaged clusters on trees increased in the Lorsban, Intrepid and Untreated trees. Damage from PNC ranged from a high of 9.3% in trees left untreated to a low of .0012% in trees treated with Endigo. Analysis revealed that Intrepid and Endigo treated trees had significantly lower infestation levels than untreated trees.

The interesting thing about this year’s test was that Intrepid did not perform as well as the Endigo. Normally, Intrepid or Confirm would have 1% or less damage. The explanation for this is related to the advice we commonly give to growers using these materials. Apply them on time (we waited until damage began because of high winds) and add a spreader-sticker to enhance residual activity. We intentionally did not add a surfactant based on recommendations from Syngenta, the makers of Endigo. Their label specifically states that no spreader-sticker should be added to this chemical for maximum performance. Apparently, they were correct for their product but perhaps not as accurate for the Intrepid.

Treatment/formulation	Rate lb (AI/acre)	Pretreatment Counts						Post Treatment Counts
		% white eggs		% pink eggs		% nut entry		Mean % Fruit clusters damaged
		31 May	6 June	31 May	6 June	31 May	6 June	26 June
Endigo ZC	0.09							0.0012 a
Lorsban 4E	1.0							6.6 bc
Intrepid/2F	0.12							2.8 b
Untreated	---	1.0	1.0	0.0	0.0	0.0	3.0	9.3 c

Means, within columns, followed by the same letter are not significantly different ($P > 0.05$; ANOVA). Data were transformed using an arcsine square root transformation before analysis, for ease of reporting only percentages are reported.

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