Pest e-alerts

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Wheat Disease Update – 2-Aug-2019
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Considerations to Make before Planting Wheat this Fall

Planting date: Much of the winter wheat sown in Oklahoma is used as a dual-purpose crop. In such a system, wheat is grazed by cattle from late fall through late winter/early spring and then harvested for grain in early summer. In a grain-only system, wheat is generally planted in October, but in a dual-purpose system wheat is planted in early to mid-September to maximize forage production. Planting wheat early significantly increases the likelihood that diseases and insect pests such as mite-transmitted viruses, the aphid/barley yellow dwarf complex, root and foot rots, and Hessian fly will be more prevalent and severe. For more detailed information on planting date and seed treatment considerations on wheat, see CR-7088 (Effect of Planting Date and Seed Treatment on Diseases and Insect Pests of Wheat) at:
http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-7836/CR-7088web2012.pdf

Mite-transmitted virus diseases. These virus diseases are transmitted by wheat curl mites (WCMs) (Figure 1), and include wheat streak mosaic (WSM), high plains disease (also called wheat mosaic), and Triticum mosaic (TrM). Of these, WSM is the most common. WCMs and these viruses survive in crops such as wheat, corn, and sorghum as well as many grassy weeds and volunteer wheat. In the fall and spring, WCMs spread to emerging seedling wheat, feed on that seedling wheat, and transmit virus to the young wheat plants.

Given this disease cycle, it is easy to see several factors that determine the incidence and severity of these diseases. First, controlling volunteer wheat and other grassy weeds that serve as alternative hosts for the mite and the viruses is imperative to help limit these diseases. Often an infected field of commercial wheat is growing immediately adjacent to a field left fallow during the fall and winter (Figure 2). The fallow field contained abundant volunteer wheat and grassy weeds from which WCMs carrying *Wheat streak mosaic virus* (WSMV) spread into the commercial field. Wheat infected in the fall will be severely damaged the next spring. Wheat infected in the spring also is damaged, but not as severely as wheat infected in the fall. Hence, it is

imperative to do yourself and your neighbors a favor by controlling volunteer wheat and grassy weeds in fields left fallow – especially, if they are adjacent to commercial wheat fields.

A second factor linked to the severity of these mite-transmitted virus diseases is planting date. Early planting dates associated with grazing provides for a much longer time period in the fall for mites to spread to and infect seedling wheat. Planting later in the fall (after October 1 in northern OK and after October 15 in southern OK) and controlling volunteer wheat are the two practices that can be employed to help manage these diseases. It is extremely critical that volunteer wheat is completely dead for at least two weeks prior to emergence of seedling wheat because WCMs have a life span of 7-10 days. Thus, completely killing or destroying volunteer wheat for a period of at least two weeks prior to emergence of seedling wheat will greatly reduce mite numbers in the fall.

The incidence and severity of these mite-transmitted virus diseases as affected by planting date can be illustrated by the number of samples that tested positive for WSMV and HPV during each of the last three years. In 2017, 103 wheat samples were tested by the Plant Disease and Insect Diagnostic Lab at OSU for presence of mite-transmitted viruses. Of these 103 samples, 69 (67%) tested positive for WSMV and 22 (21%) tested positive for HPV. In 2018, only 12 of 126 (10%) samples tested positive for one or both of these viruses. In 2019, only 21 samples were submitted for testing with 7 samples (33%) testing positive for WSMV (no positives for HPV). This lower number of samples submitted in 2019 and lower number of samples positive for WSM likely is due to an overall later planting date of wheat in Oklahoma in the fall of 2018 due to wet conditions. I believe this later planting date in conjunction with more awareness and action in limiting the green bridge helped to lower the incidence and severity of the mite-transmitted viruses in Oklahoma in 2019.

Finally, seed treatments and insecticides are not effective in controlling the mites or these mite-transmitted virus diseases. Regarding resistant varieties, there are several winter wheat varieties that have resistance to either WSM or the curl mites, but the adaptation of these varieties to Oklahoma is limited, and the resistance is not typically an absolute resistance to the disease. Hence, severe and continuous disease pressure especially at higher temperature (greater than about 75 F) can overcome the resistance. For more information on mite-transmitted virus diseases, see OSU Fact Sheet 7328 (Wheat Streak Mosaic, High Plains Disease and Triticum Mosaic: Three Virus Diseases of Wheat in Oklahoma) at: http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-8987/EPP-7328.pdf

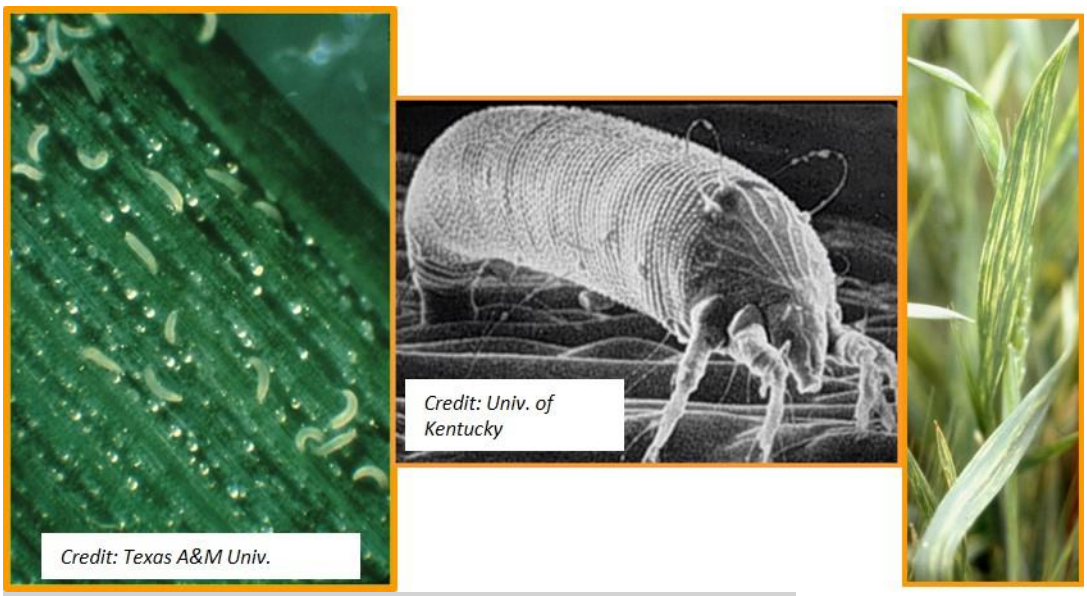

Figure 1. Wheat curl mites and symptoms of wheat streak mosaic.

Figure 2. A commercial wheat field (right) growing adjacent to a field (left) in which volunteer wheat and grassy weeds were not controlled until the spring. The commercial field begin to show WSM symptoms in late March and the disease became severe as the spring progressed.

Aphid/barley yellow dwarf (BYD) complex: Viruses that cause BYD are transmitted by many cereal-feeding aphids (Figure 3). BYD infections that occur in the fall are the most severe because virus has a longer time to damage plants as compared to infections that occur in the spring. Several steps can be taken to help manage BYD. First, a later planting date (after October 1 in northern Oklahoma and after October 15 in southern Oklahoma) helps reduce the opportunity for fall infection. Second, some wheat varieties (e.g., Duster, Billings, Gallagher, Iba, Bentley, Tatanka, and Winterhawk) tolerate BYD better than other varieties; however, be aware that no wheat variety has a high level of resistance to the aphid/BYD complex. Third, control aphids that transmit the viruses that cause BYD. This can be done by applying contact insecticides to kill aphids, or by treating seed before planting with a systemic insecticide. Unfortunately, by the time contact insecticides are applied, aphids frequently have already transmitted the viruses that cause BYD. Systemic seed-treatment insecticides containing imidacloprid or thiamethoxam can control aphids during the fall after planting. This may be particularly beneficial if wheat is planted early to obtain forage. Be sure to thoroughly read the label before applying any chemical.

Figure 3. Spot in field (left) of barley yellow dwarf (BYD) as would be seen in March or April. Many types of aphids (for example, greenbug; right) transmit the viruses that cause BYD.

Hessian fly: Hessian fly (Figure 4.) infestations can occur in the fall and spring. Fall infestations arise from over-summering pupae that emerge when climate conditions become favorable. In states north of Oklahoma, a "Hessian fly free" planting date often is used to help limit fall infestations by Hessian fly. However, such a planting date does not apply in Oklahoma because Hessian fly can emerge in Oklahoma as late as December (Figure 5.).

Delayed planting (after October 1 in northern Oklahoma, and after October 15 in southern Oklahoma) can help reduce the threat of Hessian fly, but a specific "fly free date" does not exist for most of Oklahoma as it does in Kansas and more northern wheat-growing states. This is because smaller, supplementary broods of adult flies emerge throughout the fall and winter. Some wheat varieties are either resistant (e.g. Duster, Gallagher, SY-Flint, and LCS Wizard) or partially resistant (e.g. Billings, Doublestop CL+, Everest, Iba, Ruby Lee, SY-Gold, and T-153) to Hessian fly infestations. Hessian fly infestations can be reduced somewhat by destroying volunteer wheat in and around the field at least two weeks prior to emergence of seedling wheat. Seed treatments that contain imidacloprid or thiamethoxam will also help reduce fall infestations of seedling wheat, especially if combined with delayed planting and volunteer destruction. For more information on Hessian fly, see OSU Fact Sheet: EPP-7086 (Hessian fly Management in Oklahoma Winter Wheat) at:
http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-6189/EPP-7086web2015.pdf

Figure 4. Adult Hessian fly (left) and larvae and pupae of the Hessian fly (right)

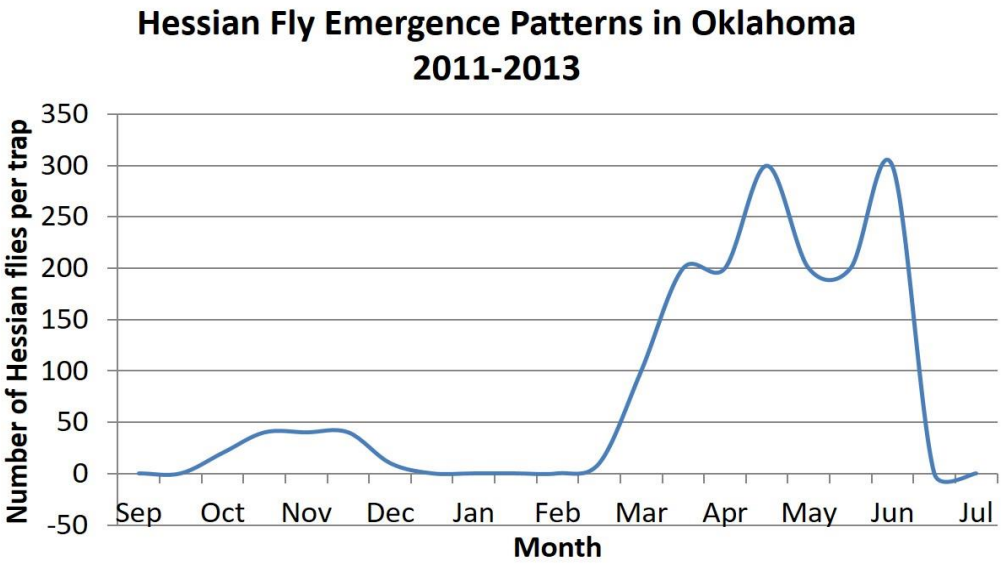

Figure 5. Emergence of Hessian fly in Oklahoma by month from 2011-2013.

Root and foot rots: These are caused by fungi and include several diseases such as dryland (Fusarium) root rot, Rhizoctonia root rot (sharp eyespot), common root rot, take-all, and eyespot (strawbreaker). Every year samples are received in the lab that are diagnosed with root rot. Typically these samples are submitted in the fall when wheat is in the seedling stage or in later May and early June as plants are maturing. Germinating seeds and seedlings have small root systems that if infected impacts seed germination and seedling emergence (Figure 6). Later in the season (late May/early June), root rots again become apparent as maturing plants are unable to obtain sufficient moisture to finish grain development especially if drought conditions are present. In mature plants, white heads often indicates the presence of root rot (Figure 7).

In 2017-2018, the incidence and severity of root rots across Oklahoma dramatically increased compared to the 2016-2017 season. This increase likely resulted from weather conditions that favored the root rots along with heat and drought in May/June of 2018 that promoted white heads to develop. Dryland (Fusarium) root rot was the most common root rot observed in 2018, and caused significant damage to wheat in southwestern, western, northwestern OK as well as the panhandle. In 2018-2019, dryland (Fusarium) root rot again became prevalent across much of Oklahoma, but was not as damaging as the previous year likely because ample moisture and cool temperatures meant that water stress on plants was much less than in 2017-2018.

Controlling root and foot rots is difficult. There are no resistant varieties, and fungicide seed treatments with activity toward the root and foot rots are effective in protecting germinating seed and emerging seedlings, their activity usually involves early-season control or suppression rather than control at a consistently high level throughout the season. Often, there also are different "levels" of activity related to different treatment rates, so again, CAREFULLY read the label of any seed treatment to be sure activity against the diseases and/or insects of concern are indicated, and be certain that the seed treatment(s) is being used at the rate indicated on the label for activity against those diseases and/or insects. Later planting (after October 1 in northern Oklahoma and after October 15 in southern Oklahoma) also can help reduce the incidence and severity of root rots, but planting later will not entirely eliminate the presence or effects of root rots. If you have a field with a history of severe root rot, consider planting that field as late as possible or plan to use it in a "graze-out" fashion if that is consistent with your overall plan. For some root rots, there are specific factors that contribute to disease incidence and severity. For example, a high soil pH (>6.5) greatly favors disease development of the root rot called take-all. OSU soil test recommendations factor in this phenomenon by reducing lime recommendations when continuous wheat is the intended crop. Another practice that can help limit take-all and some of the other root rots is the elimination of residue. However, elimination of residue by tillage or burning does not seem to affect the incidence or severity of eyespot (strawbreaker).

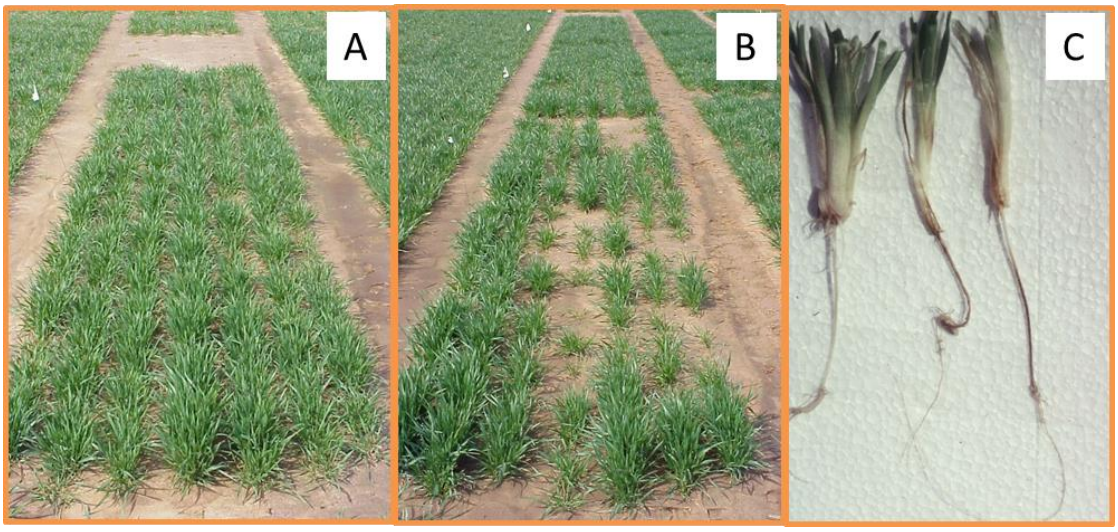

Figure 6. (A) A healthy plot of wheat in the fall as a result of using a seed treatment; (B) a poor stand of wheat in the fall in a non-treated plot; (C) a healthy seedling (left) compared to two seedlings (center and right) showing symptoms of common root rot. Notice the darkened sub-crown internode on the seedlings in the center and on the right as well as the reduced top growth compared to the healthy seedling on the left.

Figure 7. White heads indicative of root rot (left); darkened roots indicative of take all root rot (center); wheat killed by dryland root rot split open to show the pinkish growth of the causal fungus, *Fusarium* (right).

Seed treatments: There are several excellent reasons to plant seed wheat treated with an insecticide/fungicide seed treatment. These include:

1. Control of bunts and smuts, including common bunt (also called stinking smut) and loose smut. The similarity of these names can be confusing. All affect the grain of wheat, but whereas common bunt and flag smut spores carryover on seed or in the soil, loose smut carries over in the seed. Seed treatments are highly effective in controlling all the bunts/smuts. If common bunt (stinking smut) was observed in a field and that field is to be planted again with wheat, then planting certified wheat seed treated with a fungicide effective against common bunt is strongly recommended. If either common bunt or loose smut was observed in a field, grain harvested from that field should not be used as seed the next year. However, if grain harvested from such a field must be used as seed wheat, treatment of that seed at a high rate of a systemic or a systemic + contact seed treatment effective against common bunt and loose smut is strongly recommended. For more information on common bunt & loose smut, see: http://www.entoplp.okstate.edu/ddd/hosts/wheat.htm and consult the "2019 OSU Extension Agents' Handbook of Insect, Plant Disease, and Weed Control (OCES publication E-832)," and/or contact your County Extension Educator.
2. Enhance seedling emergence, stand establishment and forage production by suppressing root, crown and foot rots. This was discussed above under "Root and Foot Rots."
3. Early season control of the aphid/BYDV complex. This can be achieved by using a seed treatment containing an insecticide. Be sure that the treatment includes an insecticide labeled for control of aphids.

4. Control fall foliar diseases including leaf rust and powdery mildew. Seed treatments are effective in controlling foliar diseases (especially leaf rust and powdery mildew) in the fall, which may reduce the inoculum level of these diseases in the spring. However, this control should be viewed as an added benefit and not necessarily as a sole reason to use a seed treatment.
5. Suppression of early emerged Hessian fly. Research suggests that some suppression can be achieved, but an insecticide seed treatment has little residual activity past the seedling stage and Hessian fly often infests wheat after the seedling stage.

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