

# BLACKLANDS IPM UPDATE

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## GENERAL:

The current wheat crop is looking good, especially when we compare it to last year's crop. This crop has received some timely rains, some of which kept some producers from being able to plant some or all of their wheat acres. There have been some concerns over Hessian fly from area producers, and after their impact on the 2022 crop it is a valid concern. Through field visits in December and January, Hessian fly are present in area fields, but are currently not causing significant damage compared to last year. Through field scouting over the last few weeks, I have also picked up on some bird cherry oat aphids in a few area fields, but their populations are well below what would justify insecticide applications.



**Figure 1.** Wheat field in Hill County severely impacted by Hessian fly in 2022. Photo credit: Zach Davis, CEA-Ag/Nr, Hill County.

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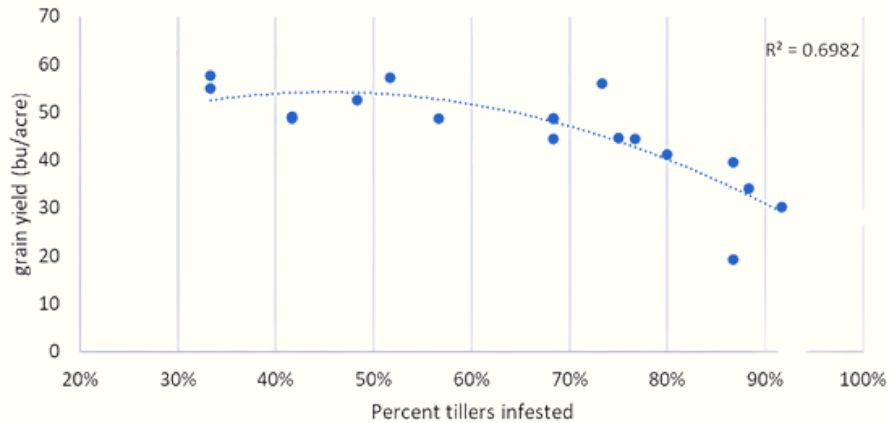
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## HESSIAN FLY AND THEIR IMPACT ON WHEAT:

After the severity of Hessian fly in the 2022 wheat crop, it was not a question of will they be an issue this year but a question of how bad they would be in this year's wheat crop. I have received numerous questions and concerns over the last couple of weeks about Hessian fly in wheat, and after their impact on the 2022 crop producer concerns are fully justifiable (Figure 1). It is not news that Hessian fly are once again present across the Texas Blacklands but compared to the 2022 wheat crop their severity is not as bad. There are a couple of explanations for why Hessian fly are not as bad as last year. The first explanation would be our moisture condition. Thankfully, when we closed out the month of November in 2022 our soil moisture conditions were better than when we closed out the month of November in 2021. This improved soil moisture has led to better tillering in area wheat fields compared to the drought in the fall of 2021 leading to poor tillering making it easier to find areas where Hessian fly killed tillers in the fall, winter and early spring. The temperatures can also explain why Hessian fly have not been as significant as they were for the 2022 wheat crop. Although we have experienced our fair share of unseasonably warm temperatures, we did thankfully get some periods of cooler weather which slowed the reproduction of Hessian fly. Third, most producers planted later than they did in the fall of 2021, although this was mostly driven by poor soil moisture conditions. The wheat planting in late October through November was able to miss at least one brood of Hessian fly. I would also assume some people utilized insecticide seed treatments and/or Hessian fly resistant varieties.

### IMPACT ON WHEAT:

The 2022 wheat crop reminded many of us just how devastating the Hessian fly can be on wheat. Hessian fly infestations impact wheat in two ways, both of which were observed in the 2022 crop. The first way yields are impacted by Hessian fly by killing tillers and/or the entire plant, which under severe infestations can kill entire fields. This is common when infestations are heavy in the fall and early winter months before the crop starts to joint. Hessian fly kill tillers by feeding in the crown of the plant and infesting young tillers. Their feeding on these young tillers starves the tiller from the nutrients and water it needs to continue to grow. The second way the Hessian fly damages a crop is by inhibiting the flow of water and nutrients to the developing head. This reduces flow of water and nutrients throughout the plant and to the developing head leads to shorter tillers, weaker stalks, reduced kernels per head, and reduced kernel weight. One of the questions I have been receiving is how bad will Hessian fly impact yield this year. The answer is not cut and dry, because it depends on variety, planting date, level of fall infestation, and the level of spring infestations. Past research indicated that yields can be significantly impacted when 10% of tillers are infested in the fall, and about 20% of tillers are infested in the spring. Last year we collected data from the Hill County Hard Red Winter Wheat Uniform Variety Trial on the number of Hessian fly per tiller, percent of tillers infested with Hessian fly, and yield. Based on the data collected significant yield loss started once 50% of tillers were infested throughout the entire growing season (Figure 2). This data shows the average of 3 plots for each variety for percent tillers infested and yield, and you can see that once the percentage of tillers infested reached 50% yields drop rapidly.



**Figure 2.** Relationship between percent of tillers infested at the end of the growing season and grain yield in Hill County, TX, 2022.

## ***MANAGING HESSIAN FLY:***

A bulk of the questions I have received from producers the last couple of weeks is what can we do to manage Hessian fly. Sadly, at this point in the growing season there is no recommended management options. In fact, there are very few management options we have for Hessian fly, including crop rotation, tillage, variety selection, and insecticide seed treatments. Some have asked about using foliar insecticides to manage Hessian fly infestations, and currently this is not a recommended practice for a few reasons. First, the maggot has established a feeding site between the leaf sheath and stem and they are protected from foliar insecticides. There are a few insecticides that have Hessian fly on their label, but these products are contact insecticides, and do not move systemically throughout the plant. Any labeled insecticide is labeled to target the adult or maggot shortly after it emerges from the egg. Timing this application is difficult due to the eggs being small and hard to observe. In the past entomologists from other states in the Southern United States have looked into using foliar insecticides to manage Hessian fly infestations, and would receive varied results due to how adult flies emerge, and the difficulty with timing the application. Crop rotation can reduce the impact of Hessian fly in wheat, but depending on what your neighbors planted on their fields and can negate the ability of crop rotation to reduce Hessian fly infestations. I have seen a few fields already this year where Hessian fly are heavy on one side of a field, and come to find out, the field across the road was planted in wheat last year. These flies are able to fly, but long distance movement relies on wind currents. So if wheat is planted near fields that were planted to wheat the previous season it can still be heavily infested. Tillage can be used to reduce the emergence of adults, but requires that all infested crop residue is buried beneath the soil surface a couple of inches, and with most producers cognizant of soil conservation and practicing minimal tillage it is not as effective anymore.

The best management option for Hessian fly is variety selection by choosing a variety that has some level of resistance to Hessian fly. Resistance in wheat to Hessian fly does not mean you will not see some infesting your field, due to the different Hessian fly biotypes that can be present in an environment that is not susceptible to certain resistance genes. In wheat Hessian fly resistance is achieved through two methods, including tillering capability that converts tolerance, and actual resistance genes. Tillering rate of a variety can impact how well it can take Hessian fly infestations, since a variety that tillers more can compensate for early tiller loss in the late winter and early spring by putting on new tillers. The best method of choosing a resistant/tolerant variety is to choose one that has a resistance gene. Currently there have been 37 different resistance genes discovered for Hessian fly, that can control different biotypes. Through sampling last year, it is apparent that our predominant Hessian fly biotype in Texas is now biotype L, which is susceptible to the resistance genes, H13, H20, Hdic and other. Sadly, seed companies are not as transparent about what resistance genes are present in the different varieties so you will have to contact your sales representative to find out this information. Thankfully, during the outbreak of Hessian fly in 2022 myself and other scientists working in wheat across the Texas Blacklands screened numerous varieties for their level of susceptibility to Hessian fly. Through this we identified a handful of Hard Red Winter Wheat varieties that have good resistance to Hessian fly based on number per tiller and grain yield (Table 1). These varieties included Gallagher, Bob Dole, AP Roadrunner, WB 4418, WB 4523, and two Texas A&M breeding lines TX15M8024 and TX16M9216. Currently neither have been commercially released, but TX16M9216 should be released in the next year or two and currently do not know what name it will be commercialized under. Insecticide seed treatments can also help in mitigating the impact Hessian fly have on wheat, but these products are short lived in the plant, lasting only about 30 days. The effectiveness of this management practice can be varied depending on planting date, with earlier planted wheat seeing a high benefit from including an insecticide seed treatment and later planted wheat having less of a benefit.

**Table 1.** Hessian infestation levels in various Hard Red Winter Wheat Varieties in 2022 from Hill County, TX.

Variety	Hessian Fly/tiller	% infested tillers	Yield (bu/acre)	Resistance Rating
CP1200045#142	9.78	91.67%	30.30	S
TAM 205	6.17	86.67%	19.22	S
TX14A001035	4.37	86.67%	39.60	MS
TAM W-101	4.33	88.33%	34.00	MS
TAM 304	3.93	75.00%	44.70	MS
Big Country	3.72	56.67%	48.70	MS
WB4699	3.30	76.67%	44.50	MS
TX14M7061	3.22	68.33%	44.50	MR
TX14A001249	2.90	80.00%	41.10	MR
Bob Dole	2.68	73.33%	55.90	MR
WB 4515	2.65	68.33%	48.75	MR
TX14V70214	2.52	68.33%	48.60	MR
Gallagher	1.50	48.33%	52.47	R
TX15M8024	1.40	41.67%	49.00	R
WB 4418	1.15	51.67%	57.10	R
TX16M9216	1.13	33.33%	57.50	R
AP Roadrunner	1.00	41.67%	48.60	R
WB4523	0.77	33.33%	55.00	R
LSD(p=0.05)	2.17	16.50%		
P>F	<0.0001	<0.0001		



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## BIRD-CHERRY OAT APHID:

The bird-cherry oat aphid is a very common wheat pest in our area, and is a dark green aphids with a orange to reddish brown spot near its back around the based of it cornicles (Figure 3). While they are a common every year in wheat fields around the Blacklands, they typically do not reach population levels that would justify treatment. However, they are known vectors of wheat diseases like Barley Yellow Dwarf Virus (BYDV). Due to their potential for transmitting BYDV (Figure 4) it is important to monitor fields for the population of bird-cherry oat aphids and the development of BYDV symptoms. In Texas we do not have a published economic threshold for bird-cherry oat aphid in wheat, but we recommend following the economic threshold published by the University of Nebraska. This threshold is based on the crop's growth stage and the number of aphids per tiller/stem. When wheat is in the seedling stage, so from emergence up to the boot stage, the economic threshold for bird-cherry oat aphid is 20 per tiller. If, for some reason, fields need to be treated for bird-cherry oat aphid or any other insect pest insecticide selection may not be as easy as it has been in the past. As many of you may know the EPA made a ruling on chlorpyrifos last winter that revoked all applications to crops applied in crops we grow. Thankfully, last year they gave a grace period of applications through the end of February, but now any application to wheat or other small grains would be illegal. Thankfully, there is other insecticide that can be used, including pyrethroids (lambda-cyhalothrin and others), dimethoate, and Sivanto to name a few.



**Figure 3.** Bird-cherry oat aphids showing the reddish brown spot around the base of the cornicles.



**Figure 4.** Wheat plants expressing symptoms of Barley Yellow Dwarf Virus (BYDV). Photo credit: Nar Ranabhat, Kansas State University, Buwood.org.