BLACKLANDS IPM UPDATE

D. TYLER MAYS, EXTENSION AGENT-IPM, HILL AND MCLENNAN COUNTIES
ZACH T. DAVIS, CEA-AG/NR, HILL COUNTY

February 6, 2023 **Volume 5, Issue 1**

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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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.

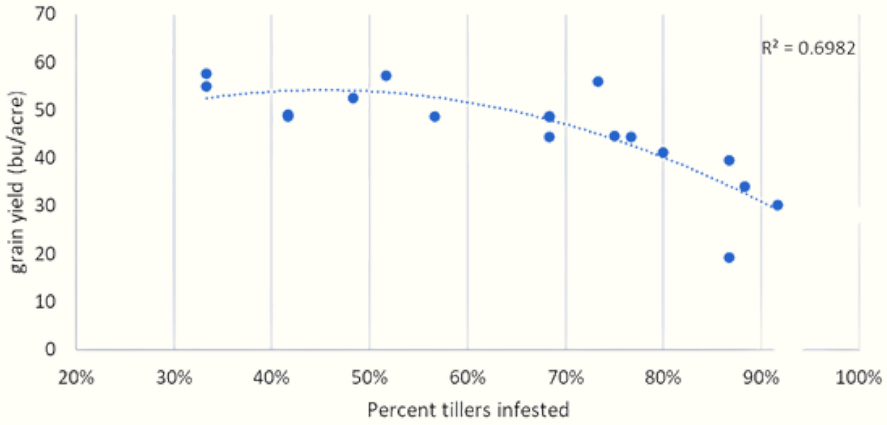

Figure 2. Relationship between percent of tillers infested at the end of the growing season and grain yield in Hill County, TX, 2022.

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 do to the eggs being small and hard to observe. In the past entomologist 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 emerge 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 convers 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/tiler	% 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%*		
Pr>F	*<0.0001*	*<0.0001*		

BLACKLANDS IPM UPDATE

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February 27, 2023 **Volume 5, Issue 2**

GENERAL:

Wheat across the area is greening up nicely thanks to the recent rains, and warmer temperatures. Current, pest issues in wheat remains low with the biggest issues currently being weeds. Aphids are present in area wheat fields, but are currently well below their respective economic threshold. I have not found or heard of leaf rust being north of Waco at this point, but I have found stripe rust in wheat north of Waco late last week. As we continue to stay on the mild to warm side of the thermometer rust, could soon be hitting wheat in Hill and surrounding counties.

Figure 1. Stripe rust pustules on a wheat leaf.

Figure 2. Leaf rust on wheat leaf. Photo credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

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LEAF RUST AND STRIPE RUST

Late last week I saw my first few pustules of stripe rust (**Figure 1**) in Hill County, and this is likely the start of rust infestations in area wheat fields for this area. The recent rains and current temperatures could lead to the infection of both leaf rust (**Figure 2**) and stripe rust. Leaf rust like the temperatures a little warmer with the optimum temperature being between 60-80°F, while stripe rust is favored by temperatures between 45-60°F. Both leaf and stripe rust require the leaf surface to be wet for an extended period to facilitate infection. Looking at the forecast it is just a matter of time before we start seeing leaf rust, and possibly stripe rust in our area wheat fields. Since most of the wheat in the area has not started jointing yet the yield loss from stripe rust can be severe, and it justifies watching fields closely and spraying in a timely manner.

Stripe rust infections that start at the jointing stage/first node visible yield loss can be between 25%-85% for a resistant and susceptible variety, respectively. Leaf rust is typically more of an issue later in the season as we reach the boot stage, and can also drastically reduce yields. Taking action now to manage leaf or stripe rust can preserve the yield potential of the field, but also help reduce the future inoculum load for your field and the fields around it. Currently, we have two ways to manage leaf rust and stripe rust in wheat including planting resistant varieties, and foliar fungicide treatments. Planting a rust resistant variety is a good management option but tit has two challenges. The first challenge is that most of the resistance genes in Hard Red Winter Wheat are adult plant resistance which does not kick in until after the plant has jointed, however, in our Soft Red Winter Wheat varieties these resistance genes typically are effective throughout the entire season. The second challenge is that the strain of the rust pathogens are changing constantly due to multiple factors like relying on a single or the same rust resistance genes in an environment. When we plant a variety or varieties that utilize the same resistance genes, we are selecting for the spores of the rust strains that are not susceptible to the resistance genes we utilize.

Fungicides are also a valuable tool in managing leaf rust and stripe rust in the season. However, not all fungicides are created equal some work better when applied before the infection and some are better at managing disease after the infection has taken place. Strobilurin based insecticides (i.e. azoxystrobin, pryaclostrobin) are better when applied before the infection occurs. Triazole fungicides (i.e. propiconazole, tebuconazole) are have both a preventative activity and can managing some diseases after the infection has started. Another key difference between the two common fungicide classes is length of residual activity. The Strobilurin fungicides can provide residual activity out to about 28 days after application, while the Triazole based fungicides only provide about 14 days of residual activity. However, weather conditions, coverage, and the exact active ingredient can impact the length of residual activity you can expect from either fungicide class.

Over the last two years we have evaluated four three fungicide programs for their ability to manage leaf rust and stripe rust, minimize yield loss from these rust pathogens, and which had the greatest net returns. Last year (2022) we evaluated the fungicide programs on a rust resistant variety and a rust susceptible variety, however, due to low yields due to Hessian fly in the rust resistant variety and low disease pressure these results are not shown. In 2021 we looked at the three fungicide programs on a wheat variety that was susceptible to stripe rust and moderately resistant to leaf rust, and saw a significant reduction in stripe rust severity in all fungicide programs (**Table 1**). However, when we look at the yield protection component of fungicides in rust management, there was no statistical difference between the propiconazole followed by tebuconazole, but statistical differences between the untreated Alto followed by Trivapro or Trivapro followed by Alto. This difference in yield also related to the difference in net return (value of grain-fungicide cost).

Table 1. Impact of different fungicide programs on stripe rust severity and yield loss in wheat, Hill County, TX 2021

Treatment[1]	Fungicide Cost[2]	Stripe Rust Severity	Yield	Test Weight	Gross Return[3]	Net Return[4]
Untreated Check	$0.00	83.3 a	45.26 b	53.4	271.53 b	271.53
Propiconazole @ 4 fl oz/acre, fb Tebuconazole @4 fl oz./acre	$3.56	24.3 b	55.35 ab	57.58	332.07 ab	328.51
Alto @ 3 fl. oz./acre, fb Trivapro @ 13.7 fl oz./acre	$19.89	7.3 b	60.28 a	57.98	366.65 a	341.76
Trivapro @ 9 fl. oz./acre, fb Alto @ 3 fl. oz./acre, fb	$14.34	2.4 b	62.82 a	57.7	376.89 a	362.55

[1] - Treatments were applied at Feekes 7 (two nodes visible) and Feekes 10.5 (head emergence)
[2] - Cost were averaged across three different chemical distributors in the area
[3] - Calculated based on wheat prices at $6.00 pe bushel and not dock for test weights
[4] - Calculated by subtracting the cost of fungicide from the gross return

APHIDS:

Aphid numbers remain light, but are starting to increase in some areas thanks to the warmer temperatures. At this time I have not found a field or are of a field that has a aphid population high enough to justify treatment, and thanks to beneficial insects these populations may take awhile to reach an economic damaging population. Most of the aphids I have found are the bird cherry-oat aphid (**Figure 3**), but there is the occasional greenbug (**Figure 4**) being found. There currently in not an economic threshold for bird cherry oat aphids in Texas Wheat, but it is recommended to use the economic threshold established by the University of Nebraska. This threshold is based on a rough growth stage of the field, and the number of aphids per tiller. Based on this threshold bird cherry-oat aphid population in wheat between the seedling stage and head emergence ranges between 20 and 30 aphids per tiller. Over the last few years, I have only had to call for bird cherry-oat aphids once, most of the time these populations will build and then rapidly decline due to natural enemies and reaching the population capacity for the aphid. If you do need to spray for aphids, we have historically used chlorpyrifos, but after February of 2022, all chlorpyrifos wheat labels and others had their labels revoked. Thankfully, there are a number of other effective insecticides that we can use to manage aphids in wheat, including pyrethroids, dimethoate, malathion, Sivanto, and Transform.

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

Figure 4. Greenbug, with the characteristic dark green stripe down its back. Photo credit: Rick Grantham, Oklahoma State University.

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.

BLACKLANDS IPM UPDATE

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March 10, 2023 **Volume 5, Issue 3**

GENERAL:

Thanks to our mild temperatures and recent moisture wheat across the area looks good and is starting to take off. There are fields in the area that have started jointing this week, while others are approaching the jointing stage. Pest activity in the area wheat, however, has also started to increase. Aphid numbers have started to increase in area fields, with some reaching the populations that justify treatment. True armyworm moths are starting to be common across the area, and winter grain mites are starting to be seen in a few area fields thanks to the damp and mild weather pattern we are currently in. Wheat disease activity is also starting to pick up, with stripe rust in powdery mildew being found in some area fields, and with the current weather pattern could become an issue.

Figure 1. wheat leaf colonized by bird cherry-oat aphids and english grain aphids.

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APHIDS:

Aphid numbers are starting to increase in area fields, and this issue seems to be a somewhat Blacklands wide problem as I have heard of reports of high aphid numbers south of Waco, and down into the Southern Blacklands around Taylor. Current aphids being found are the bird cherry oat aphid (**Figure 2**) and the English grain aphid (**Figure 3**). The predominant paid is the bird cherry oat aphid, with eh English grain aphid just starting to move into some are wheat fields. Currently, aphid populations are variable between fields, and very sporadic across most fields. However, there are a few fields that have enough aphids to justify insecticide applications. Most of these fields with high aphid populations have very dense canopies. Unfortunately, we currently do not have a published economic threshold for bird cherry oat aphids or English grain aphids in wheat, but it is recommended to follow the threshold established by the University of Nebraska (Table 1). There are several insecticides labeled for the management of these aphids in wheat, but probably the most utilized would be dimethoate which provide a quick knockdown but does not persist in the crop for very long and will also kill the beneficial insects currently in your field. Insecticides like Sivanto and Transform are labeled for these aphids in wheat, and will provide good control, have residual activity, and not disturb what beneficials insects are out in the field.

Figure 2. Picture of a bird cherry-oat aphid showing the reddish-orange coloration around its cornicles.

Figure 3. Picture of english grain aphids, showing their long black cornicles. Photo credit: J. P. Michaud, Kansas State University

WINTER GRAIN MITE:

The winter grain mite is mite species that is commonly found in wheat fields across the Blackland Prairie, that is favored by damp, mild weather conditions much like what we have experienced the last few weeks. The body of a winter grain mite has orange-colored legs, a body that is dark brown to black in color and has two spots on it back one that is a cream color and another that is orange in color (**Figure 4**). This mite rarely reaches levels or causes enough damage to justify treatment, and most of the insecticides that we use to treat aphids will either manage or suppress their population. Winter grain mites cause the leaves of the plant to develop a silver-grayish appearance and burned leaf tips, and this damage can stunt tillers. Treatment for winter grain mites is justified when the mites are present with visible symptoms of feeding damage on the plant. Currently the only product labeled for winter grain mite management is malathion at 1.5 pints/acre, but there are other insecticides that list just "mite spp" on the label that could possibly be used.

Figure 4. Picture of a winter grain mite on a leaf ,and showing the silverish to gray coloration of the leaf caused by their feed. Photo credit: University of Nebraska Department of Entomology.

STRIPE RUST AND POWDERY MILDEW:

Stripe rust is starting to show up in area wheat fields, and currently being seen in low levels in fields that were planted to a susceptible variety. Stripe rust produces pustules that can be found on both the leaf blade and leaf sheath. These pustules are elongated in shape and form stripes that follow the direction of the leaf veins, are yellowish orange to light orange in color (**Figure 5**). The current weather pattern we are in is highly conducive for the development of stripe rust, which is favored by extended periods of leaf wetness, high humidity, and temperatures between 45-70°F. This disease has the potential to greatly impact wheat yields, especially when infections start in late winter/early spring. Stripe rust can cause yield losses between 25% and 85% can be seen when infection starts at Feekes 6 (jointing, first node visible) in a resistant and susceptible variety, respectively. If the infection of the field first starts at the mid-flowering stage (Feekes 10.5.2) the potential yield loss is reduced drastically from 0% in a resistant variety and 12% in a susceptible variety. Fungicides are an effective management option for stripe rust when the potential for disease is high like our current weather conditions.

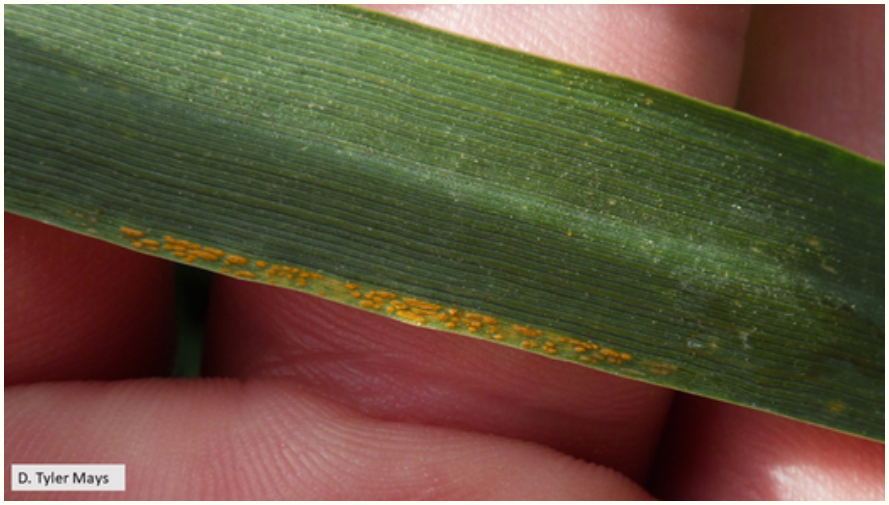

Figure 5. Stripe rust of wheat, showing the light orange, elongated pustules

Powdery mildew is another disease that is being found in some wheat fields across the region, in varying levels of severity. Currently, powdery mildew is not widespread across the Texas Blacklands nor is it widespread across the fields they are currently being found in. The fields and the areas of fields where I am currently finding powdery mildew have very dense canopies where the seed drill overlapped, or where nitrogen fertilizer applications overlapped. Symptoms of powdery mildew infection include fluffy white fungal growth on the leaf blade or leaf sheath (**Figure 6**). As the infection ages the fungal mass changes from white to a grayish brown, and develops small black dots within the fungal masses which are alternative fruiting bodies called cleistothecia. Wheat fields are most susceptible o infection during periods of rapid growth, such as Feekes 5-Feekes 10.5 (stem elongation -head emergence), which is the growth stage range for most of out wheat. Favorable environmental conditions for the disease include temperatures between 59-71°F and high humidity. Unlike other foliar fungal diseases of wheat, powdery mildew does not require extended periods of leaf wetness to aid in the infection process. Fields that are planted using high seeding rates or have received high rates of nitrogen fertilizer have a higher risk of seeing powdery mildew than fields that are planted at optimum seeding rates and receive the lower adequate N fertility. Management options for powdery mildew include avoiding excessive Nitrogen fertilization rates, avoiding high seeding rates, host plant resistance, and fungicide applications. There are some varieties that are known to have some degree of resistance to the powdery mildew pathogen, but due to the low frequency of powdery mildew in our wheat, and the ability to economically and effectively control the disease with fungicides it is not recommended to select a variety to plant solely based on it level of resistance to powdery mildew. There are several fungicides labeled for use in wheat that can control powdery mildew.

If your field(s) need to be sprayed for powdery mildew, it is important to take into consideration that other foliar disease are likely to develop, and depending on the crops growth stage it maybe beneficials to apply a fungicide that contains both a strobilurin active ingredient and a triazole active ingredient. Strobilurin based fungicides inhibit the fungi's ability to produce energy to grow, and work best when applied before the disease infection takes place. Triazole based fungicides on the other hand manage the disease by inhibiting sterol production in the fungi, and will manage infections that have already happened. If the current weather conditions persist into the next few weeks, we could easily see more wheat fields become infected with powdery mildew, and the incidence and severity of powdery mildew to increase in fields already infected

Figure 6. Photos of powdery mildew of wheat. Left- up close picture of powdery mildew on a wheat leaf, right- photo of what powdery mildew looks like when you pull open the canopy.

BLACKLANDS IPM UPDATE

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March 28, 2023 **Volume 5, Issue 4**

GENERAL:

The area's wheat crop is progressing nicely and most of the wheat I have looked at will be headed our or in the boot stage by the end of this week. The recent weather conditions have been great for both our wheat and corn crops, but also for the development of some common wheat pests. Both leaf rust and stripe rust are starting to show up in some area fields, and powdery mildew is continuing to be found in area fields. True armyworm moths are still floating around the area, but last week was probably the peak flight for those that would impact wheat, and I still have not found or heard of armyworm issues in the immediate area. Bird cherry oat aphids are still present in some area fields that were not sprayed, and thankfully these numbers are starting to decline. It also appears at this time that most of the Blacklands avoided significant crops damaged from the frost and freezing temperatures on the 19th and 20th of this month.

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WHEAT DISEASE:

Leaf rust, stripe rust, and powdery mildew are all present in the area, and fields should be checked for their occurrence to avoid significant crop loss. All three diseases can greatly impact yields, and they can be easily managed with fungicide applications. Fungicide applications can be economical when they are applied to prevent disease infections on the top three leaves, as these are the leaves that produce over 95% of the energy the plant needs to fill out the developing kernels.

Leaf rust produces pustules that are round to oval in shape, and reddish orange in color (**Figure 1**), and stripe rust pustules are oblong and yellowish orange in color (**Figure 2**). Both of these diseases can be managed with resistance genes, and fungicides. Planting resistant varieties is an very economical way of managing leaf rust or stripe rust, however there are very few commercial varieties that have a high degree of resistance to both leaf rust and stripe rust. Due to the lack of varieties with good resistance to both pathogens, fungicides are commonly needed around the time the head emerges to avoid the top three leaves becoming infected with either disease

Figure 1. Wheat leaf rust. Photo credit: Donald Groth, Louisiana State University AgCenter, Bugwood.org

Figure 2. Stripe rust of wheat.

Powdery mildew (**Figure 3**) is a common wheat disease, but typically does not affect widespread acreage of wheat in our area, and nor does it usually progress to the point where it is possibly reducing wheat yields. This disease is caused by high humidity and temperatures between 59-71°F, and growth of the fungus slows as temperatures exceed 77°F. Much like leaf rust and stripe rust, there are some varieties that are more resistant to powdery mildew than others, and your seed representative should be able to provide that information if you ask. Other management options for powdery mildew include avoiding dense canopies, applying proper rates of Nitrogen fertilizer, and fungicide applications. Fungicides can be used to manage powdery mildew, but the cheaper products like propiconazole or tebuconazole are not as effective as some of the other fungicides like cyproconazole (Alto) and those with multiple modes of action

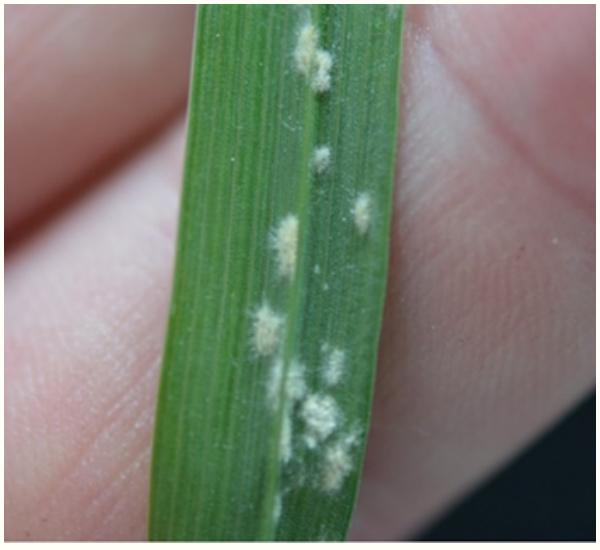

Figure 3. Up close photo of the white mycelial mass produced by the powdery mildew pathogen.

ARMYWORMS

It is not news that moth activity has increased over the last couple of weeks as we have moved into spring. Some of these moths were True armyworm moths which can be a devastating pest of wheat. I have not found an armyworm in area wheat fields yet but have heard reports of them hitting wheat hard in East Texas and Louisiana over the last couple of weeks.

The armyworm larvae are green to brown in color with lighter stripes running the length of the body, and can reach lengths up to 1-1/2 inches when fully grown (**Figure 4**). This pest tends to be higher in areas of the fields with dense canopies, as they try and avoid the sunlight. During the day the larvae will hide around the base of the plants, and under debris that remains on the soil surface. It is important to treat armyworms in a timely manner, and before they get too big, as small worms are easier to control and the armyworm consumes more plant matter as it grows. The recommended economic threshold for true armyworm in wheat and other small grain in Texas is four to five per 1 square foot. There are several insecticides that are labeled for control of true armyworm in small grains including multiple pyrethroids and malathion, both of which are reasonably priced for a wheat crop, but product with the active ingredient of chlorantraniliprole are also labeled for true armyworm management.

Figure 4. True armyworm larva. Photo credit: Roger Schmidt, University of Wisconsin-Madison, Bugwood.org

BLACKLANDS IPM UPDATE

D. TYLER MAYS, EXTENSION AGENT-IPM, HILL AND MCLENNAN COUNTIES
ZACH T. DAVIS, CEA-AG/NR, HILL COUNTY

April 14, 2023 **Volume 5, Issue 5**

GENERAL:

Some much needed rain was received across the Blackland Prairie with totals ranging from ½" to as much as 3 inches in the Southern portion. Corn and sorghum planting operations are wrapping up, and cotton planters are starting to roll with favorable soil moisture and forecasted temperatures becoming more favorable for cotton growth. Pest activity in wheat is starting to pick up with leaf rust, true armyworms, and stinkbugs being found in area wheat fields. Thanks to the rain and the full moon last week we are seeing a heavy run of true armyworm larvae in some area wheat fields, and populations are heavy across much of the Texas Blacklands. The recent rains should help finish the wheat crop off and get cotton emerged, but soils are drying out quickly was poor subsoil moisture levels and could use another rain soon. The armyworm and stinkbug issues could also impact area corn and sorghum fields. Overall, the area's wheat crop look good, except for the handful of fields that were planted early, or planted to a Hessian fly susceptible wheat variety. Leaf rust activity is starting to pick up in the area fields that have not received a fungicide application. True armyworms are starting to move into area fields in high numbers, and stinkbugs are starting to move in and out of area wheat fields that are finished or wrapping up pollination.

BLACKLANDS IPM UPDATE IS A PUBLICATION OF TEXAS A&M AGRILIFE EXTENSION IPM PROGRAM IN HILL & MCLENNAN COUNTIES.

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WHEAT DISEASE:

Leaf rust (**Figure 1**) pressure in wheat had been low up until the rains last week, and has started to increase over the last 7-10 days in fields that have not been treated with a fungicide. Currently, most of these pustules are being found on untreated wheat fields and are present in the lower canopy. This sign of new active leaf rust pustules is a sign that a fungicide application may be warranted to minimize the impact leaf rust has on wheat yields. Thankfully, most of the wheat around Hill and McLennan Counties has reached or passed the flowering stage, and we may only need about 3 weeks of protection to get us past the hard dough stage. Once the crop reaches the hard dough stage, the impact leaf rust can have on yields is reduced dramatically and given that it we are only a few weeks away from many of the fields reaching this stage we can get away with a cheaper fungicide application like propiconazole or tebuconazole.

Powdery mildew is still present in area wheat fields, and fields should be monitored closely. Thankfully, it looks like we should be getting some warmer weather in the area next week that should slow down the activity of powdery mildew. I have seen a few fields that are having powdery mildew infection move up into the middle canopy, but most of the infections I am seeing are not new and active. When looking at powdery mildew, new infections will be white, while older infections will have a more grayish to brown color with black dots (**Figures 2 & 3**). This disease should be monitored closely, and it too can have a significant impact on wheat yield, and fields should be treated if the crop has not reached the hard dough stage and the disease risk infecting the top two leaves of the plant.

Figure 1. Wheat leaf rust. Photo credit: Donald Groth, Louisiana State University AgCenter, Bugwood.org

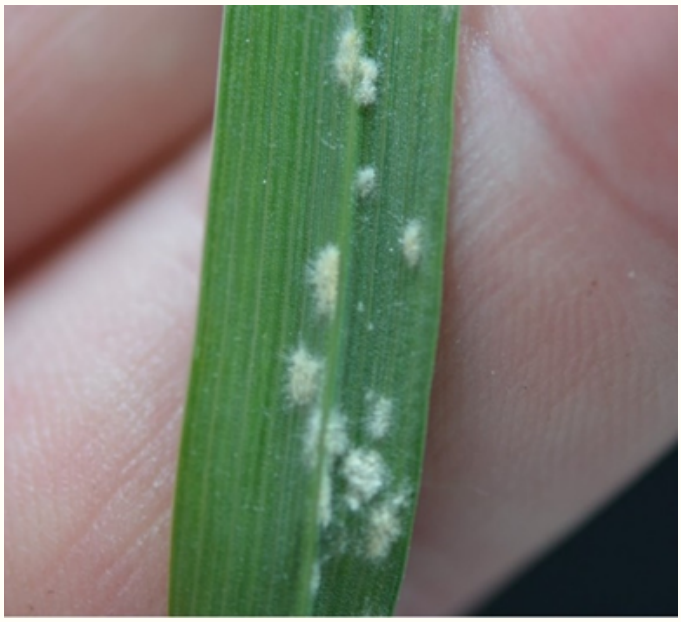

Figure 2. Up close photo of the white mycelial mass produced by the powdery mildew pathogen.

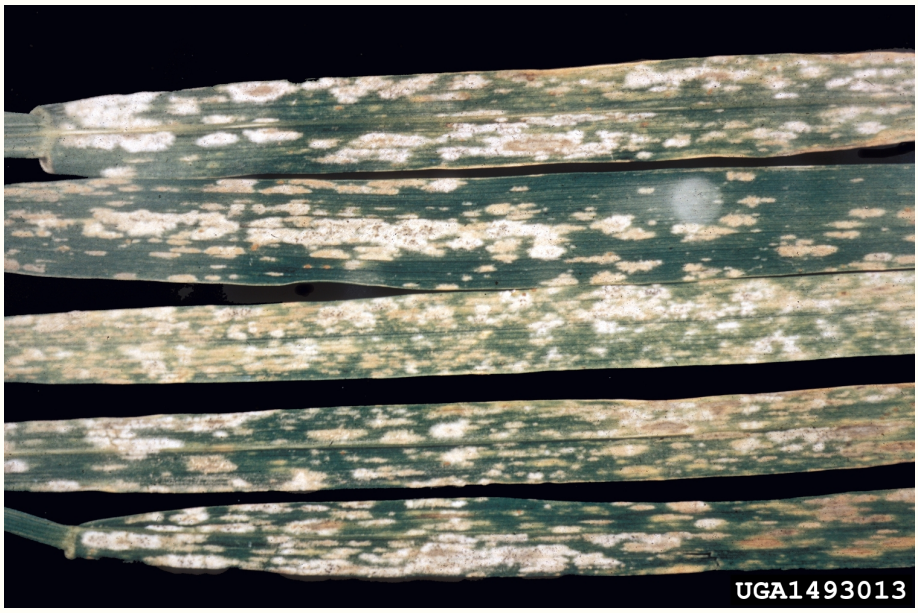

Figure 3. Older powdery mildew infection, note the darker color of the powdery mildew growth. Photo credit: University of Georgia Plant Pathology, Univeristy of Georgia, Bugwood.org

WHEAT INSECTS

Currently our biggest issue in area wheat is the true armyworm. Thanks to cooler temperatures, recent rains, and the full moon last week much of the Blacklands is experiencing a heavy run of true armyworms. True armyworms can be green to brown in color with light stripes running the length of the body and have a tan head capsule (**Figure 4**). The head capsule of a true armyworm lacks the white inverted Y that is present on fall armyworms and have a pattern of narrow lines that looks like a net. This pes prefers dense canopies as the adults lay their eggs in shaded parts of fields, and the larva tend to hide in places where sunlight does not reach. Currently very high numbers have been reported in Falls, Hill, and Milam Counties, and I would suspect surrounding counties will also have issues with true armyworms. When checking fields for true armyworms it is best to look early in the morning or near sunset, as the larvae will hide out on the soil or near the base of the plants during the day. Also, when looking it is important to look under any organic matter that is sitting on top of the soil as they will tend to hide under these to get away from the light. Damage from true armyworm starts as windowpanes on the leaf as the small larvae do not have the mouthparts capable of chewing entire leaves, but as the caterpillar grows it will start to consume entire portions of the leaf. Additionally, the true armyworm consumes about 70% percent of it diet during the last two instars. The current economic threshold for true armyworms in wheat is 4 to 5 armyworms per 1 square foot, however, this threshold was established on cheaper wheat prices and with current wheat prices at or above $7.00/bushel this threshold is like lower and closer to 2 or 3 per square foot. There are a few management options available for true armyworms in small grains including chlorantraniliprole based products (Vantacor and generics; Besiege), pyrethroids, Spinosad, Bt sprays, and malathion. The most economical treatment will likely be one of the pyrethroid based products and should provide good control. Given the crop stage and how close we are to reaching harvestable kernels, I do not see where we would need to utilize a product that will provide a long residual activity.

Figure 4. True armyworm larva. Photo credit: Roger Schmidt, University of Wisconsin-Madison, Bugwood.org

Stinkbugs are starting to show up in some area wheat fields, but currently I have not seen a population that would warrant much concern. There are multiple species of stinkbug that can be found infesting wheat fields including the rice stinkbug, conchuela stinkbug, southern green stinkbug, and multiple species of brown stinkbug (**Figure 5**). Stinkbugs can be found infesting wheat fields from the time the head emerges until the crop reaches the hard kernel stage. They use their piercing sucking mouthpart to feed on the developing kernels, cause light weight kernels and aborted kernels. Kernels that are fed on and not aborted tend to have reduced germination and reduced baking quality. It takes a lot of stinkbugs to justify treatment for them, and the economic threshold depends on the maturity of the kernel ranging from 1-3 stinkbugs per 10 heads (**Table 1**). Stinkbug populations in wheat, much like in row crops tend to be more congregated near field margins with populations typically reducing as you move further into the field. They tend to be transitory in wheat, such that you can see them in high numbers one day, and then a few days later hard to find. Products currently labeled for stinkbug management in small grains are pyrethroids and should provide good control if needed.

Table 1. Economic threshold for stinkbugs in wheat

Growth Stage	Threshold	Is spraying worth it
Flowering to soft dough	1 per 10 head	Yes
Hard dough	3 per 10 heads	Yes
Hard kernel	>3 per 10 heads	Not Likely

Figure 5. Common stinkbugs infesting wheat: rice stinkbug (top left), conchuela stinkbug (top right), southern green stinkbug (bottom left), and brown stinkbug (bottom right). Photo credits: Pat Porter, Apurba Barman, Lesley Ingram, Bugwood.org, and Russ Otten, University of Georgia, Bugwood.org

BLACKLANDS IPM UPDATE

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ZACH T. DAVIS, CEA-AG/NR, HILL COUNTY

May 5, 2023 **Volume 5, Issue 6**

GENERAL:

Most of the area has received some good rainfall totals over the last two weeks, however some areas received heavy crop damage from some severe thunderstorms. Wheat is maturing nicely, and the recent moisture should finish the crop. Currently it looks like wheat harvest could starting in 10-14 for some areas. I am starting to find some leaf rust and stripe rust, but thanks to where we are in the season, they are not a major concern. The areas corn crop where not severely damaged from hail is progressing nicely thanking to the cooler temperatures and recent rains. The recent severe thunderstorms, however, have caused some damage to area fields that need to be assessed. Sorghum is progressing as planned with no current insect issues be found in area fields, but weeds are starting to emerge and weed control is going to be the number one management option to do in sorghum over the next week or so. Cotton is up and still emerging in some areas, and unfortunately this cooler temperature spell has made it a poor time for cotton to be in the ground and trying to emerge and grow. Not much is happening in our cotton crop currently, but we need to continue to evaluate stands and replant decisions and watch for thrips as I have started picking up on adults moving into area cotton fields.

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WHEAT:

The recent rains should allow the crop to finish out and help keep bushel weight up. I have been getting reports of and seeing both leaf rust (**Figure 1**) and stripe rust (**Figure 2**) starting to move up the plant following the recent rains. There have been a few producers calling me concerned about if there is something they should do for the leaf and stripe rust in their fields. Thankfully, where 98% of the area wheat crop is at in the maturation of the grain, we can expect little yield loss from leaf rust starting to infect the flag leaf. At this point in the growing season there are two reasons why there are not many management options for rust or even some insect pests. The first is pesticide pre-harvest intervals, or the time days that must pass after an application before you can harvest the crop. Most pesticides labeled for wheat have a 30-day PHI with some products carrying only a 14 day PHI. The second reason there is not much we can do for the rust currently increasing in area wheat fields is label restrictions, and the fungicide labels I am familiar with do not allow applications to be made in wheat after pollination (Feekes 10.5.1).

Figure 1. Wheat leaf rust. Photo credit: Donald Groth, Louisiana State University AgCenter, Bugwood.org

Figure 2. Stripe rust of wheat. Photo credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

CORN:

Overall, the areas corn crop is in good conditions and in the whorl stage, with the fields I have walked in ranging from V6 to V9. At this point in the growing season the growing point is now above the soil surface, and kernel rows and kernels per row are now being determined. The biggest issue with corn production in the Texas Blacklands, especially those acres in and around Hill and McLennan Counties is hail damage from the recent severe thunderstorms last week. I have seen some pictures of fields that have been significantly damaged from the hail these storms produced (**Figure 3**), but most of the corn acres I have seen appear to have either missed the hail or been minimally damaged. We are roughly one week past these hailstorms and now is the time to evaluate the severity of hail damage, so you can make better decision about putting additional inputs on the field(s).

Figure 3. Corn damaged by hailstorm. Photo credt: Daren Muller, Iowa State Univeristy, Bugwood.org.

Assessing potential yield loss in corn from hail damage can be confusing, and the ultimate decision to keep or abandon the crop should be based on an assessment from your insurance adjuster. The following is 6just ways to assess the severity of the hail damage, and provided to give insight if you should contact your adjuster to get an assessment. The first step in assessing hail damage in corn is to identify the crops growth stage. There are two methods to identify corn growth stages. The first and most widely utilized method is the visible leaf collar method that commonly denoted with Vn, where "n" is the number of leaf collars visible (V6= 6 leaf collars visible). The second method is the droopy leaf method which is used by insurance adjusters for assessing potential yield losses from hail. Using the droopy leaf method, once a leaf tip comes out of the whorl and the leaf tip starts to drop toward the soil it is considered a leaf. To convert between the two growth stages, one corn reaches between 12 to 18 inches and the leaf collar stage is roughly 2 leaves behind the droopy leaf (V8 corn = ~10 leaf corn). The next step in assessing hail damage impacts on yield is to determine the percentage of the leaf area lost. This can be tricky to assess the earlier you go into a field after the hailstorm, but if you give the crop a few days to try and grow the leaves will start to untangle and a better assessment of leaf area remaining can be made. Based on data published by the National Crop Insurance Service when corn is in the 12-leaf stage (~V10) it takes roughly 55% of the leaf area to be lost to cause a 10% yield loss. The third step in assessing hail damage is to evaluate stalk integrity. In this step we want to look at both the strength of the stalk and the severity of hail damage to the stalk. To test stalk strength, stand next to the plant and grab a hold of the stalk and then extend your arm, if the stalk does not snap back to where it was before extending your arm the strength of the stalk has been compromised and may lodge with late season heavy winds. To determine if the stalk has been damaged internally by hail you need to pull the plant up and determine if the hail stone was big enough or hit the stalk hard enough to bruise through all the leaf sheaths. The best way to assess this is to remove the leaf sheaths from around the stalk and look for wounding on the actual stalk. If wounding is apparent on the stalk, we then need to slice the stalks from the crown of the plant up and assess if there was any internal damage to the pith or vascular tissue, tassel, and ear shoots. If you see a significant percent leaf area lost, poor stalk strength, or excessive damage to the stalk it is recommended to reach out to an insurance adjust for them to come and give them an assessment. Something else we need to watch out for as we move further into the year is hail damage to the lower stalk can provide an easier route of entry for our stalk rot pathogens, and these hail damage fields may need to be harvest sooner to avoid lodging.

COTTON:

Cotton in Hill County and other portions of Central Texas is having a hard time developing a respectable stand. This is mainly due to the heavy rains and cooler than expected weather over the last 7-10 days. For those fields that have developed a respectable stand, they are growing slowly due to some excess soil moisture and the cooler temperatures. All the fields I checked this week are still in the cotyledon stage, and some are just now starting to have the first true leaf increase in size. During these times of cool and wet weather leading to slower cotton growth the plant can become very susceptible to damage from thrips and seedling diseases. I have started picking up on adult thrips moving into some area fields, but thankfully I have not found any immature thrips (**Figure 4**). Based on these observations it appears that our insecticide seed treatments are still holding. However, as we continue to grow, we need to keep a close eye on thrips populations as our insecticide seed treatments will start breaking down as we reach the second true leaf stage. If you planted the new ThryvOn technology cotton sold by DeltaPine, thrips management will not be an issue for those fields. This Bt technology does not kill the thrips but does repel them so you may still see thrips in the field and some minor feeding damage, but an insecticide application will not be warranted in fields with this technology.

Figure 4. Adult flower thrips, note the black coloration of the wings on the top of the body. Photo credit: David Kerns, Texas A&M AgriLife

Right now, it is important to get out and assess the stand in your fields. Replant decision can be difficult to make because it is either kill the plant that are up and replant the entire field or try and patch in areas with poor stands which can often time cause more damage to the existing crop. When I am assessing the stand for replant decision, I am looking for the uniformity of the stand more so than the number of plants per acre. There is data from previous years that show plant populations can go down to less than 20k plants per acre before seeing a yield loss. For me I am looking for how big are the gaps between plants, and how common are there gaps bigger than 3 feet. Another thing to keep in mind when assessing cotton stands is your row spacing. The narrower the row spacing the more uniform spacing between plants you can have and not see plant develop a bushy growth pattern.

As our wheat crop continues to dry down and we continue to cut hay meadows, thrips will start moving in the environment and looking for young tender tissue. Thrips pressure could be significant again this year, and it is important to spray fields in a timely manner once the economic threshold is reached to avoid a delay in maturity and yield loss. The current economic threshold for thrips in cotton is 1 thrips per a true leaf (cotyledon stage is 1 true leaf). However, if we get into a pattern of warmer weather and the crop is growing fast we could potentially bump that threshold up to 1.5 to 2 thrips per true leaf. There are a number of products labeled for thrips management in cotton, but the most common ones used in our area include acephate and Bidrin. Last year we conducted 2 thrips efficacy trials in the area looking at different products on thrips. The first trial saw a severe infestation of thrips with thrips population exceeding 50 thrips per true leaf at the 3rd true leaf stage (**Figure 5**). Based on this data the products Acephate, Bidrin, dimethoate, Radiant or Intrepid Edge, and Renestra can all provide good control of thrips populations. For our area, though acephate at 4 oz will likely be the most cost-effective insecticide.

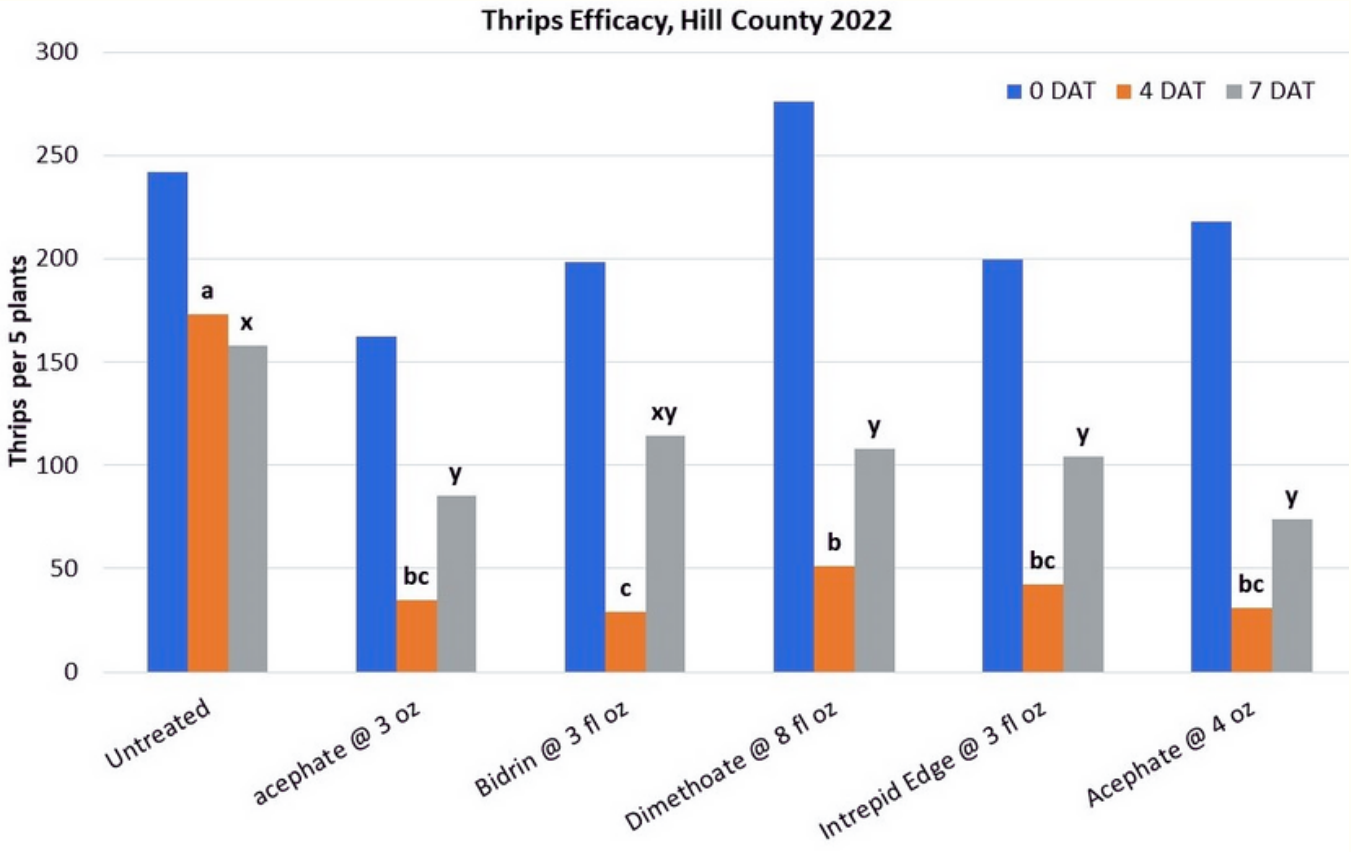

Figure 5. Thrips per 5 plants from the e fficacy trial conducted in Hill County , TX last year. 0DAT= 3rd true leaf, 4DAT= 4th true leaf, and 7 DAT=5th true leaf.

BLACKLANDS IPM UPDATE

D. TYLER MAYS, EXTENSION AGENT-IPM, HILL AND MCLENNAN COUNTIES
ZACH T. DAVIS, CEA-AG/NR, HILL COUNTY

May 19, 2023 **Volume 5, Issue 7**

GENERAL:

More rain over the last 7-10 days has led to excessive soil moisture, field flooding, and washouts within area fields. This wetter and cooler weather continues to have negative impacts on area fields, especially those that are planted with cotton. Corn and sorghum in areas that drain well are loving the recent and current weather pattern, however, these weather conditions have been favorable for leaf blight in sorghum, Northern Corn Leaf Blight in corn, and Southern rust in corn. Low lying fields and areas of the fields that tend to hold water like terrace channels have turned chlorotic and growth stunted due to prolonged periods of over saturated soils. Cotton growth remains slow across the area, and most fields are behind where they should be in plant development based on planting date. The cooler wetter weather has caused unfavorable growing conditions for cotton, and we could use a 1–2-week dry period with sunshine are warmer temperatures to dry fields out and get our cotton to grow better. When we get prolonged periods of wet and cool weather plants become very susceptible to thrips damage and seedling disease, both of which are currently impacting area cotton fields. Other downsides to the excess rain are issues with weed control as our preemergent herbicides have now played out, and delayed wheat harvest which can increase the risk of seeing wheat sprouting in the head.

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SORGHUM:

The sorghum that I have checked looks good, except for low lying areas of fields and terrace channels which are stunted and turning chlorotic due to waterlogged soil conditions. Insect pests in sorghum remain quiet, but I have found some leaf feeding damage from either corn earworm or fall armyworm that is very minimal across both the fields and area. Sorghum aphids (formerly sugarcane aphid) have not been found in the fields I am regularly checking (**Figure 1**). I have also inspected Johnsongrass across the county and have not found sorghum aphid infesting johnsongrass in the roadside ditches. Their populations are starting to increase in portions of South Texas, so it is one insect we will need to keep an eye on as we progress through the season.

Figure 1. Sugarcane aphids on a sorghum leaf, with a winged adult. Photo credit: Xandra Morris.

This week while walking sorghum, I did pickup on some leaf blight in area fields (**Figure 2**). Leaf blight in sorghum causes lesions that are elongated with a gray center that is bordered by tan and reddish colors. This disease is caused by the same fungus as northern corn leaf blight and is favored by the same weather conditions including prolonged periods of moisture either from rain or dew, and temperatures between 65-80F. At this time the level of leaf blight I am seeing in area fields is extremely low, and we are still a little early in the season where a fungicide treatment would be of any benefit, if at all. This disease rarely reaches economic damaging levels in the Texas Blacklands, but if our weather pattern does not change soon, it is something we should keep on our radar.

Figure 2. Leaf blight of grain sorghum. Photo credit: Pioneer Hybrid, https://www.pioneer.com/us/agronomy/diseases.html#LeafDisease_3

CORN:

For the most part corn across the regions looks very good thanks to the mild temperatures and consistent rainfall not allowing fields to become stressed by drought or high temperatures. With the current weather pattern though some disease risks have increased, mainly around northern corn leaf blight (NCLB) and southern rust. Nutrient deficiency is also a concern for some area fields, especially around Nitrogen which is highly mobile within soil water.

Northern corn leaf blight is not a new disease of corn for the Texas Blacklands. The most recent widespread occurrence of the disease was back in 2020, when we had growing conditions very similar to what we are in currently. The NCLB is characterized by elongated lesions that can resemble a cigar and can be tan to grayish in color. Eventually the fungus will start to produce spores within the lesion that can range from olive-green to black and can give the lesion a dirty appearance (**Figure 3**). This pathogen is favored by wet humid weather with mild temperatures, and the fungus does not do well once our temperatures start increasing above 80F. Historically, this disease has not been an economically important disease for corn thanks to our typical weather pattern getting drier and warmer during the key growth stage of tassel emergence through soft dough. Lesions from the disease will start in the lower canopy where humidity is usually the highest, and as weather conditions remain favorable will move up the plant. Much like with wheat where we want to protect the top few leaves, in corn we want to minimize the amount of disease on the ear leaf and the leaves above the ear, as they provide most of the energy the plant needs to fill out the kernels. Management options for NCLB include hybrid selection, crop rotation, and plowing under residue. Fungicide applications may be needed with a susceptible hybrid and favorable weather conditions. Hybrid selection is probably the most effective management option, as there are commercially available hybrids with varying levels of resistance to the pathogen. This pathogen will survive to the following year on infected crop residue, therefore management options like crop rotation and residue management can reduce the risk for NCLB. Rotating away from corn for one season should provide a good reduction in the inoculum load. Additionally, tillage that buries or speeds up the decomposition of infected crop residue can reduce the risk of a field becoming severely infected with NCLB. Fungicides can be used in corn to manage NCLB, but recent research by Dr. Tom Isakeit and myself did not see a benefit from a fungicide application in this area. This is due to our weather typically warming up and drying out causing an unfavorable environment for NCLB development. However, if our weather conditions remain mild and wet, we could see some fields that may benefit from a fungicide application, especially those fields that were planted with a hybrid that is very susceptible.

FIgure 3. Northern corn leaf blight in corn. Photo credit: Daren Mueller, Iowa State University, Bugwood.org

Another disease we need to be on the lookout for is southern rust, which is being found in South Texas and the Lower Rio Grande Valley. This disease can cause economic loss to susceptible corn in the Texas Blacklands if not treated. The action threshold for spraying is when about 50% of plants in fields reach roughly 5% leaf area covered with rust, between the silking and grain fill growth stages. Southern rust should not be confused with common leaf rust which occurs in the Blacklands just about every year, but never develops to economical levels. Southern rust pustules are orange in color and circular and tend to be more densely located on leaf tissue (**Figure 4**). Common leaf rust tends to be a darker red color with elongated pustules that are spread out across the leaf surface. Depending on when the southern rust infection occurs during the growth of the crop, a fungicide application could be beneficial to both yield and economic return. Southern rust Southern rust infections start in the lower canopy and move upwards when weather conditions remain favorable for disease development. The two management options for southern rust in corn include hybrid selection and fungicide applications. Southern rust resistance ratings for hybrids can be obtained by looking on the seed company's website or reaching out to your seed representative. Fungicides are highly effective against southern rust, but timing can be critical. If fungicides are applied too early (prior to silking), there may need to be a second application. (**Table 1**).

Figure 4. Southern rust (left) and common leaf rust of corn (right). Photo credit: Tom Isakeit

TABLE 1. POSSIBILITIES OF BENEFITS OF SPRAYING FOR SOUTHERN RUST DEPENDING ON THE CROP STAGE WHEN IT IS FIRST DETECTED.		
CROP STAGE	POSSIBLE BENEFIT FROM SPRAYING	COMMENT
Vegetative	None	
VT (tasseling)	Maybe, with a late-planted and very susceptible hybrid	May need a second spray
R1 (silking)	Yes	May need a second spray
R2 (blister)	Yes	Less likely to need a second spray
R3 (milk)	Yes	No second spray needed
R4 (dough)	Maybe, with severe disease pressure	No second spray needed
R5 (dent)	Less likely	No second spray needed
R6 (black layer)	None	

FUNGICIDE TIMING & SELECTION:

Fungicide timing is critical in managing the disease and minimizing yield loss by the target disease(s). For both NCLB and southern rust depending on the severity of the disease fungicides applied around the time of tassel or silk emergence will typically provide the highest efficacy and economic return. Product selection can also determine how well your fungicide will protect the plant from either disease. Most fungicides used in corn production belong to one of three fungicide classes including triazole, strobilurin, and SDHI; all have different modes of action against fungi. The triazole class of fungicides inhibits ergosterol synthesis which inhibits the ability of the fungal cell to be produced. The triazole class of fungicides mainly controls diseases that are already actively infecting the plant, which is why this class is commonly called a curative fungicide. This refers to microscopic, invisible infections; visible pustules will not be killed and can still produce spores. The one downside to the triazole class of fungicides is their length of residual activity, which is roughly 14 days. The strobilurin class of fungicides inhibit spore germination as the fungus is trying to infect the plant and is why they are commonly referred to as preventative fungicides. The benefit of using a strobilurin class fungicide is their length of residual activity, which can be about 4 weeks after application. The last fungicide mode of action class commonly used in row crops is the SDHI class. Fungicides in the SDHI class control fungi by inhibiting electron transfer that is important for energy production. The benefit of the SDHI and Strobilurin class of fungicides is their length of residual activity, and that if applied prior to infection can stop the disease from infecting the plant which is why they are commonly classed as preventative fungicides. When dealing with both NCBL and Southern rust, depending on application timing it may be more cost effective to apply a fungicide that contains a triazole fungicide and at least a strobilurin based fungicide as this would provide control of the fungi already infecting the plant, and control any new spores trying to infect the plant.

COTTON:

Cotton across the areas is still suffering from cooler temperatures and excess soil moisture. Due to this current weather pattern, we are seeing cotton growing much slower than we would like and have made thrips a very big issue over the last 14 days. Currently thrips populations are low compared to last year ranging from 0.6 per true leaf to 2 thrips per true leaf in some areas, but compared to last year their damage is much more severe. Some fields were sprayed last week, but the bulk of the fields were sprayed this week. Those fields that were sprayed last week with 4 oz of acephate are starting to see adult and immature thrips moving back into the field and risking the fields needing to be sprayed again. It is not uncommon to see multiple insecticide applications for trips when we get weather patterns like we have been in for the last 3-4 weeks. The economic threshold for thrips is recommended at 1 thrips per true leaf but when we get into to periods of very slow growth it may be necessary to bump the economic threshold down to 0.5 to 0.75 thrips per true leaf to avoid anymore delay in maturity and avoid economic loss. Insecticide options for trips that are highly effective include acephate, dimethoate, Bidrin, Intrepid Edge and Radiant.

Another insect pest being found in area cotton fields is aphids. It is not uncommon for aphids to be present in seedling cotton in the Texas Blacklands, especially when the weather is cool and wet, stressing the plant. Currently, the aphid numbers are so low that I am not making pesticide recommendations to control thrips and try to suppress aphid populations. I am finding them mainly in the terminal and the newest leaf that is starting to unfurl. Other places we can see aphids feed include the underside of leaves, the leaf petiole and stem. Signs on the plants that there is a heavy infestation including honeydew on leaves below the aphid colony, and infested leaves starting to cup downward. Feeding from aphids removes carbohydrate from the plant that it would have otherwise used to set fruit or growth new nodes and stress the plant. As we progress through the growing season, we need to keep an eye out for aphids, and make pesticide selection for fleahoppers and may a second thrips shot based on the occurrence and population size of aphids in the field(s), so we can avoid the plant being stressed another factor especially one that we can control.

BLACKLANDS IPM UPDATE

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ZACH T. DAVIS, CEA-AG/NR, HILL COUNTY

June 3, 2023 **Volume 5, Issue 8**

GENERAL:

Warmer drier weather over the last 10 or so days has allowed for wheat harvest operations to take off, and cotton to finally kick into gear and start growing. Wheat yield reports have been very good this year, where Hessian fly were not a major issue with reports ranging between 65 bushel/acre to as high as 92 bushels/acre. Corn continues to progress nicely, and the warmer temperatures have reduced the risk for Northern Corn Leaf Blight, but Southern rust in corn remains a potential issue. Cotton is finally growing good, and most of the cotton is no longer susceptible to thrips injury. Some fields are close to setting squares and reaching the stage where fleahoppers will be moving into area fields.

BLACKLANDS IPM UPDATE IS A PUBLICATION OF TEXAS A&M AGRILIFE EXTENSION IPM PROGRAM IN HILL & MCLENNAN COUNTIES.

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CORN:

The wet May and late April has provided great soil moisture in the area, except for low lying areas, and along with the mild temperatures has created excellent conditions for growth and development. This is honestly some of the tallest and best-looking corn I have seen in a long time. Our temperatures have started to warm up, which has reduced the risk for severe Northern Corn Leaf Blight issues. Southern rust and spider mites are two pests of corn we need to continue to watch for, as they could potentially become an issue in are corn fields.

The risk for Southern rust (**Figure 1**) in corn remains, especially if we receive the rain they are call for over the next few days. This disease is favored by warmer temperatures, but still needs periods of leaf wetness for infection to take place. Southern rust pustules are circular in shape and are a light orange in color. These pustules will be densely located on the leaf surface. Of the two rust pathogens in corn, this is the one that can reach levels that can cause economic loss, and a fungicide application is recommended when 50% of the plants have 5% of the leaf area infected. Once the crop reaches the dent stage, it is no longer susceptible to economic loss, and fungicides will not provide an economic benefit at or beyond the R4 growth stage. Selecting a fungicide when treating corn for Southern rust should be based on the crops growth stage, and how long it is expected to take for the crop to reach the dent stage. If the crop is still early in the reproductive growth stage (VT-R2) a longer residual activity fungicide is preferred as it could provide sufficient control and you would avoid needing to make a second fungicide application.

Figure 1. Southern rust (left) and common leaf rust of corn (right). Photo credit: Tom Isakeit

Spider mites in corn is common during periods of hot and dry conditions. The recent weather pattern has not been very conducive for spider mites in Hill and McLennan Counties, but I have received multiple reports of spider mite populations increasing in portions of Williamson County. The good growth in our ditches has allowed plenty of vegetation that can harbor our spider mites, and as we shred our ditches and cut adjoining hay meadow spider mites could soon be infesting area corn fields. Especially, if we hit a period of warm and dry weather. This pest can do significant damage to corn by feeding on the leaves and causes infested leaves to develop white to yellowish spots giving the leaf a stippling appearance (**Figure 2**). When looking at infested leaves from above the leaf can also develop of silverish cast, and on the underside of leaves webbing can be observed when spider mite populations are reproducing rapidly (**Figure 3**). Treatment for spider mites is justified when 21-30 percent of the leaf area of the plant is damaged (**Table 1**). Management options include the application of miticides like Zeal, Portal, Oberon, and Onager. Other products like dimethoate and bifenthrin are also labeled for spider mite management in corn, but these products tend to provide some control before the spider mites come back with vengeance. These miticides like Zeal, Onager, Portal, etc. do not provide quick control of the spider mite populations, and it may take up to 10 days before you start seeing these products working. Therefore, application of these products should be made before the mite populations exceed the economic threshold.

Figure 2. White and yellow stippling of corn leaf caused by spider mite infestation. Photo Credit: Daren Mueller, Iowa State Univeristy, Bugwood.org

Figure 3. Webbing on the underside of corn leaves caused by a spider mite infestation. Photo credit: David Kerns, Texas A&M University

COTTON:

Cotton is finally turning around and starting to grow rapidly. Most of he acres in the Central Blacklands are past thrips issues, but replanted fields can still be damaged. This replanted cotton will be protected by the insecticide seed treatments up until the 2nd true leaf starts to come out, or roughly 28 days after planting. Looking at the weather forecast, thrips may not be an issue in these fields, but we should still use a threshold around 1 to 1.5 thrips per true leaf depending on how rapidly the plant are growing once they emerge.

Now that cotton is finally getting to the point where it will set squares, cotton fleahopper could soon become an issue (**Figure 4 & 5**). The damage from fleahopper could be worse this year than in recent years because our crop is roughly 1 month behind where it should be. The fleahoppers feeding on the small developing squares causes the damaged square to be shed from the plant, which can delay the onset of blooming, which can further delay the crop reaching harvest readiness. The economic threshold for fleahoppers in the Blacklands is 10-15 fleahoppers per 100 plants, and with how late our crop is at starting to set squares the first application is likely justified at about 10 fleahoppers. For the second and potentially third fleahopper applications we can adjust the threshold in the 10-15 per 100 range based on the crops square set. Fields with exceptional square set, say 90% or higher can withstand a little more feeding than fields with poor square sets. Therefore, if we have fields with square sets at 90% or higher, we could get away with using a threshold closer to 15 per 100 plants. However, in fields with poor square set such as 75% or less, we do not have much room for additional square loss and the threshold for additional fleahopper treatments should be closer to the 10 fleahoppers per 100 terminals. There are many options for the management of fleahoppers in cotton and including products like Centric, Bidrin, PQZ, Sivanto, Sefina, and acephate at 4 oz plus a max rated of imidacloprid (2-3 fl oz., depending on formulation). Looking at fleahopper trials over the last few years, the acephate plus imidacloprid treatment is a very cost-effective option for fleahopper management, but will likely only provide control for about 7-10 days depending on the fleahopper pressure (**Figure 6**). Centric is another great product which has a labeled application rate for fleahopper that range from 1.25-2.0 oz, with this product application rate should be adjusted based on the level of fleahopper infestation, using higher rates when the fleahopper population is higher. The other neonicotinoid products like PQZ, Sefina, Transform and Sivanto can provide great control and a little longer residual, but are slower at control the fleahopper populations. The benefit to using products like these is they also can provide control of aphids present in the field. Products like Centric and imidacloprid are not as strong on aphids in cotton but can provide some level of aphid population suppression which is one reason imidacloprid is typically tank mixed with acephate for fleahopper management.

Figure 4. Adult cotton fleahopper. Photo credit: Pat Porter, Texas A&M AgriLife Extension

Figure 5. Cotton fleahopper nymph. Photo credit: Pat Porter, Texas A&M AgriLife Extension

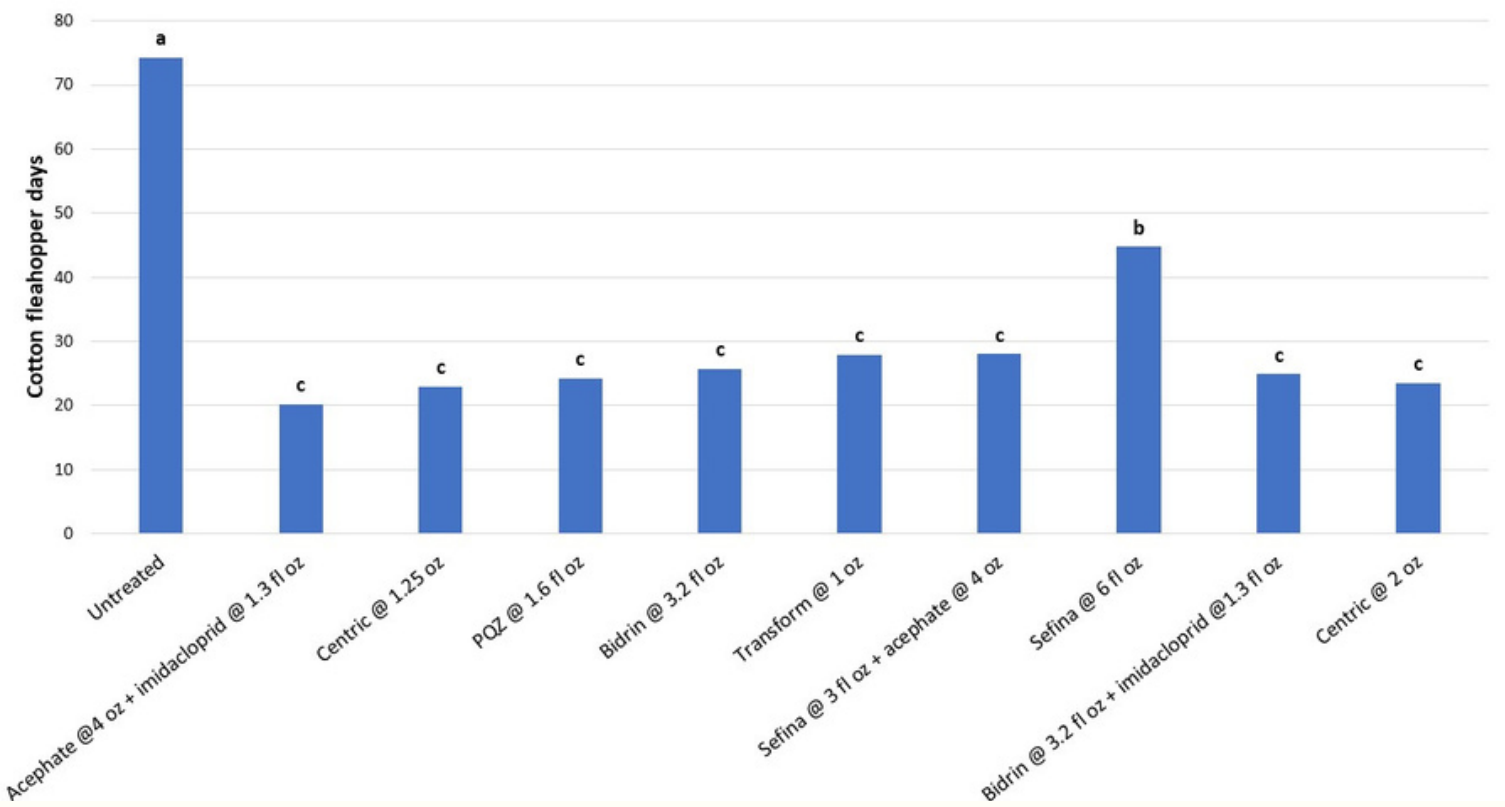

Figure 6. Cumulative pressure of cotton fleahoppers in various insecticide treatments in the 2022 Cotton Fleahopper Efficacy Trial in Hill County.

I am finding aphids in area fields, but currently in low numbers, and they are patchy across the field. Currently, these populations are not a major concern, but as we move into fleahopper season they are something we need to keep in mind when making insecticide selections. Aphids can be found feeding on the underside of leaves, the terminal, stems, and petioles. Sings on aphids infested plants include honey dew on upper leaf surface and the soil around the plant, and cotton leaves that are starting to cup downward. Their feeding can stress the plant, and impact yield and treatment is justified when aphids populations are between 40-70 per leaf. Since our crop was stress earlier this year by the rain and cool weather, which led to our delayed maturity we need to be cognizant of aphid populations and treat them in a timely manner to avoid additional stress to the plant. Due to how delayed our crop is, I would lean toward treating for aphids when they reach the lower end of the threshold. Products such as PQZ, Sefina, Sivanto, Transform, and Intruder all work well at controlling aphids in cotton, while Centric and imidacloprid are not as effective but can suppress the population.

BLACKLANDS IPM UPDATE

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June 16, 2023 **Volume 5, Issue 9**

GENERAL:

Our first wave of triple digit temperatures arrived late the week, but thankfully most of the area received a fair amount of moisture to help the plants survive this heat wave. Corn is growing nicely, but these triple digit temperatures could lead to kernel abortion or poor kernel fill. Spider mites could become a major issue in corn with the high temperatures and is the main pest for corn between now and harvest. I have started to find some stinkbugs in corn, but currently nothing to the level that would be concerning. Sorghum has progressed nicely so far this season without pest issues. Midge could be a concern for the later planted sorghum fields, and sorghum aphids could soon become an issue in area fields with this warmer and dryer weather pattern. Early this week I started to pickup on stink bug moving into area sorghum, but numbers are currently below the economic threshold. Cotton has turned the corner and is growing nicely with most fields finishing up their second week of squaring. Fleahopper numbers remain very high as they continue to move from wild host to feed on the tender flower buds of cotton. Aphids remain present, but the heavy rains last weekend has reduced their populations a little bit but are something we need to keep in mind as we are treating for fleahopper. Cotton should continue to be monitored for fleahopper populations, and with the high temperature spider mites should also be on our radar going forward.

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CORN:

Spider mites (**Figures 1 & 2**) were being found in corn fields across the Blacklands last week prior to the heavy rain last weekend. Thankfully, looking at corn earlier this week the rain was strong enough to wash the spider mites off the leaves. However, during periods of hot and dry weather spider mite populations thrive and can significantly impact corn yields. Previous research ahs show that yield losses from spider mites can reach as high and 45% grain production and 40% dry matter in a silage system. Yield can be impacted all the way up to black layer, and can lead to premature plant death, poor kernel weight and size. The need to treat will be dependent on the growth stage of the crop, amount of plant damage, the size of the colony, and how the crop will be harvested. Miticides that can be used in corn include Portal, Comite, Onager, Oberon, and dimethoate. These miticides are slow acting, so if treatment is needed it is better to apply it before the colonies become too large.

Figure 1. White and yellow stippling of corn leaf caused by spider mite infestation. Photo Credit: Daren Mueller, Iowa State Univeristy, Bugwood.org

Figure 2. Webbing on the underside of corn leaves caused by a spider mite infestation. Photo credit: David Kerns, Texas A&M University

SORGHUM:

Up until now there was not many concerns for area sorghum fields, but now that fields are at or beyond the boot stage and the warmer weather, pest activity is starting to pick up. The sorghum that pollinated this past week missed heavy midge pressure, but fields and head that emerge or start flowering after this weekend should be watched closely for sorghum midge. Historically, June 20th is the last day of blooming that can avoid significant midge damage. The economic threshold for midge depends on the yield potential, cost of production, and the value of the crop per 100 pounds. Pyrethroid based insecticides remain effective on midge but could cause concerns with sorghum aphids and spider mites. Spinosad could also be used if you are concerned with flaring other pest and wanting to product you beneficial insects, but this product does also come with a little higher cost.

The sorghum aphid (**Figure 3**) could soon become a major issue in the area, especially if the hot and dry weather patterns hangs around for a while. This pest has the potential to cause significant damage, and their populations can increase rapidly under hot and dry conditions. Treatment for sorghum aphid is justified when the field reaches 20% plants infested up to the boot stage or 30% infested plants between head emerge and hard kernel. Once the field has reaches maturity, applications for sorghum aphids are only justified if the pest threats to complicate harvest operations due to their honeydew. Currently I am not finding them in area sorghum fields, but they are present in the environment feeding on johnsongrass. As our ditches get gut or start drying out, they could soon move to area sorghum fields. Insecticide options for sorghum aphids include Sivanto, Transform, and Sefina. If you happen to treat fields for sorghum midge and/or spider mites, the pesticides used for them do tend to wipe out all insects active in the field which can lead to sorghum aphid population blowing up. If fields are treated for a pest using a broad-spectrum insecticide/miticide it is highly recommended to monitor sorghum aphid populations closely as our weather conditions are becoming favorable for them to reproduce rapidly.

Figure 3. Sorghum aphid. Photo credit: John Grantham, Oklahoma State Univeristy.

Stink bugs are starting to move into area fields with both rice stinkbug (**Figure 4**) and the conchuela stink bug (**Figure 5**) being found in sorghum in the Central Blacklands. Stink bugs will feed on the developing kernels which can negatively impact yield through reduced kernel size and weight, and the number of kernels per head. We can also see various species of both green and brown stinkbugs infested sorghum as well. Stink bugs tend to be very mobile in the environment and can move into fields very quickly. Their populations tend to be higher along field margins which is why it is important to avoid sampling heads only near the field edge. An easy way to scout for stink bugs and other head feeding pest is by taking a 1-gallon milk jug, cutting the bottom off, and beating the heads inside the jug. Pyrethroid can be very effective on our stink bugs, but with rice stink bug there is known pyrethroid resistance in Texas. The rice stink bug pyrethroid resistant populations are mainly along the Gulf Coast of Texas, and currently there is no indication of pyrethroid resistant rice stink bugs in the Texas Blacklands. Chemical options for stink bug management in cotton include pyrethroid, but if you are concerned about potential resistant rice stink bugs, dimethoate can be used. Treatment for stink bugs in wheat is justified with there are about 0.5 per head.

Figure 4. Rice stink bug adult. Photo credit: Winfield Sterling, TAMU retired.

Figure 5. Conchuela stink bug adults feeding on sorghum grain.

COTTON:

Cotton across the area is progressing nicely, and most fields in Hill and Northern McLennan Counties are in the second week of squaring. The biggest issue in area cotton fields is fleahoppers which have increased in pressure. Other issues in area cotton include hail damage, weeds, and plant growth management.

Cotton fleahopper (**Figure 6 & 7**) numbers this week are running extremely high with fields averaging between 15% and 50% infested, with most fields averaging above 30% infested. Currently, there are a lot of fleahoppers in the environment that is supporting a constant migration of adult fleahoppers into fields. This high fleahopper pressure was supported by our spring rains that allowed weedy plants like silver leaf night shade, parthenium ragweed, wooly croton, and others to grow very well and host fleahoppers. Last week treatments were going out which included acephate plus imidacloprid and Sivanto, but due to the higher fleahopper pressure these years these treatments only provided about 4-5 days of control before fields were reaching the economic threshold again. These treatments are working as our square sets this week are still in the mid-80s and or higher, which is very good for our part of the state. They will remain a threat until fields start blooming, but the overall pressure of fleahoppers should start slowing down as we approach first bloom.

Figure 6. Adult cotton fleahopper. Photo credit: Pat Porter, Texas A&M AgriLife Extension

Figure 7. Cotton fleahopper nymph. Photo credit: Pat Porter, Texas A&M AgriLife Extension

Thunderstorms last weekend brought much needed moisture to most of the area, also came with some hail that damaged cotton along with corn and sorghum (**Figure 8**). Cotton can withstand hail damage a little better than our other crops like corn and sorghum because of it indeterminant growth. I have seen a few areas field where the hail broke off the terminal (apical meristem) which is the main growing point for the plant. Despite the loss of apical dominance, the plant will continue to grow and mature bolls, by putting on vegetative branches at the different places around the stem. Determining how much yield was lost from the hailstorm is hard to determine because how the plant responds and how good the field can yield is affected by the current and future weather conditions. These will have a delayed maturity and will require a favorable weather pattern in August and September to maximize yield and fiber quality.

Figure 8. Hail damaged cotton, after storms on June 3rd.

BLACKLANDS IPM UPDATE

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June 30, 2023 **Volume 5, Issue 10**

GENERAL:

Our first round of triple digit temperatures came this past week, and you can tell that is taking a toll on the crops throughout the area. Corn leaves are starting to curl in the afternoon and cotton leaves are starting to droop during the heat of the day. This is a response of these plants to reduce moisture loss, and thankfully most fields I have seen have their leaves back to "normal" first thing in the morning. If leaves do not return to "normal" overnight it is a sign of drought stress, but if they just temporarily curl or droop it is just the plant trying to conserve the moisture it has. Corn silage harvest is in full swing, and some yield reports have been very good for our area. Fleahoppers are finally down, and cotton is finally starting to bloom indicating that we will soon be out of the window for fleahopper damage in the area. However, in cotton other insects are starting to pick up including aphids, stink bugs, spider mites, and bollworms. With the depleting soil moisture profile and fruit load, cotton fields are starting to express symptoms of Potassium deficiency. Sorghum looks good across the area, but insects remain active. Stink bugs and head worms remain an issue in our later planted or later maturing sorghum hybrids, and the sorghum aphid is finally starting to infest area fields.

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SORGHUM:

Sorghum throughout the area is variable in growth stage, with some fields starting to reach the hard dough stage, and other fields or portions of fields just now starting to head out. Fields that are just now starting to head out, or areas of fields that are just now coming into pollination are at great risk for heavy sorghum midge infestations. Looking at some late emerging heads this week I was finding some midge and was average about 0.25 midge per head, which is close to the economic threshold for 4,000 lbs/acre milo. Insecticide including pyrethroids, Spinosad, and methomyl can be used to control sorghum midge, and if a pyrethroid or methomyl is used other pest like sorghum aphid and spider mites should be watched closely after application as these products will kill the beneficial insects in the field.

Stink bugs have reached the economic threshold in multiple fields across the area, with a mixed species of mostly greens, conchuela, and rice stink bug, with a few brown stink bugs (**Figure 1**). I am finding fields that are ranging from 0.5 to 1.5 stink bugs per head, which is just below to just above the economic threshold for stink bugs in milo with a 4,000-pound yield potential. Pyrethroids can provide great control of stink bugs in sorghum, but there is known resistance to pyrethroids in rice stink bug populations along the Texas Gulf Coast, so if your field is primarily infested with rice stink bug another insecticide options is dimethoate. Dimethoate may be a more viable option for stink bug management this year as there are spider mites present in some area fields lower in the canopy, and dimethoate can provide suppression of spider mites, where a pyrethroid would cause their populations to blow up following application. If your field is at threshold for stink bugs, and headworks are near the threshold however, an application of Besiege would be the better option as the chlorantraniliprole plus lambda-cyhalothrin in Besiege would provide good control of both pests.

Figure 1. Rice stink bug (left) and Conchuela stink bug (right) are two common stink bug pest of sorghum. Rice stink bug picture provided by Pat Porter, Texas A&M AgriLife Extension Service

Head worms are present in area fields and should be monitored closely. Their populations this year are variable across the area and within fields. The economic threshold for head worms in sorghum with a 4,000-pound yield potential ranges from 0.3-1.5 large (>1/2") worms per head. Pyrethroids can be effective for heartworm control when populations are predominantly sorghum webworm, but if your head worms are mostly corn earworm, it is not recommended to use a pyrethroid based insecticide for their control as we have documented pyrethroid resistance in corn earworm populations in Texas. For head worm populations that are mostly corn earworm or fall armyworm, the best product to use would be something with the chlorantraniliprole active ingredient like Vantacor, Shenzi, or Besiege.

Sorghum aphid is starting to be found in area sorghum fields (**Figure 2**), and thankfully their populations are currently below the economic threshold. This pest could soon reach the economic threshold, with our hot and dry weather pattern, and field should be monitored closely. If your field is infested with sorghum aphids it is highly recommended to check the field at least every three days so you can get an insecticide application on the field in a timely manner once their population reaches the economic threshold. Fields that are in the latter stages of grain maturation are less susceptible to economic loss than those fields that are currently heading out or flowering. Fields should continue to be monitored for sorghum aphid up until harvest, to avoid excess honeydew creating harvest issues. The economic threshold for sorghum during the flowering and grain maturation process is 30% of plants infested with 50 or more aphids, and once the crop is approaching black layer an application is warranted with there is excess honeydew with active colonies. Sivanto applied at 4 oz remains the best insecticide option for sorghum aphid, but transform could be used as well but it does not provide the length of residual as Sivanto. If you are making an application at or near harvest to avoid sticky sorghum malathion could be a cheaper option to provide a quick knockdown with a short preharvest interval.

Figure 2. Sorghum aphids found in a Hill County sorghum field.

COTTON:

Cotton across the area is progressing nicely given the current weather pattern, and fields are finally starting to bloom across the area. Fleahopper populations have subsided, and most of the acres in the area are no longer at risk of economic fleahopper damage. Insect pests remain active in area cotton including aphids, spider mites, and bollworms. Another issue starting to show up in some area fields is Potassium deficiency (**Figure 3**), and the only way to really manage this problem in crops is to alleviate moisture stress through rainfall or irrigation if available. The overnight temperatures staying mostly in the mid 70S could lead to some pollination issues, as high nighttime temperatures can lead to pollen sterility.

Figure 3. Potassium deficiency symptoms in cotton.

Aphids are present in some area cotton fields (**Figure 4**), and currently are not widespread across the area or within fields. The current aphid populations I am seeing are well below the economic threshold of 40-70 aphids per leaf. They can be found feeding on various parts of the plant including underside of leaves, stem, bract or square, on the actual square, and even in the terminal of the plant. Their feeding can cause leaves to cup downward and/or droop, and square and small bolls to be shed from the plant. Chemical options for aphids in cotton include Sivanto, acetamiprid (Intruder Maxx), Bidrin 8EC, and Carbine 50WG. Centric and imidacloprid are two neonicotinoid products like Sivanto and Intruder, but at best will only provide some suppression of the aphid populations. When spraying for cotton aphid application volume can significantly impact the performance of the insecticide, as aphids can at time be in the mid to lower canopies, when cotton get a dense canopy, it is hard to get good coverage of the middle and lower canopy with less than 10 Gallons per acre.

Figure 4. Aphids feeding on the underside of a leaf and the terminal of a cotton plant.

Spider mites are present in field margins in some area fields, and with the hot and dry weather could soon blow up and start moving deeper into fields. Signs of spider mite infestations include reddening of the upper leaf surface (**Figure 5**), and discoloration and webbing on the lower leaf surface (**Figure 6**). Fields should be treated when roughly 40% of the plants are infested with active spider mite colonies. Field margin treatment could potentially be used to reduce the amount of product needed, and to keep the spider mites from moving deeper into the field. Thankfully, in cotton we can use abamectin based products which can provide great control.

Figure 5. Redding of the upper surface of a cotton leaf caused by spider mite colony.

Figure 6. Discoloration of the lower leaf surface and webbing caused by spider mite infestation.

Bollworms could soon become a major issue in our area, if what is happening in Brazos Bottoms is an indication of what is going to happen here. If you have listened to our IPM Audio Update, you know that David Kerns, Extension Entomologist, and others are finding worm damage in not only non-Bt cotton, but also in 2-gene cotton such as the Bollgard II and TwinLink trait packages. I have a trial where I am monitoring the efficacy of Cotton Bt trait packages and checking the test on Friday (30 June) I was finding live worms up to 3-days old and damage in only the non-Bt plot. Eggs were abundant in all trait packages and moths were still active in the field. Our next full moon is this coming Monday July 3rd and we could see a fairly heavy moth flight that night. Going forward we need to keep a close eye on our cotton for bollworm damage and populations. This includes checking terminals for worms and damage, as well as bolls and squares throughout the plant canopy. Also take the time and check underneath and in bloom tags, as bollworms will get trapped in blooms and feed on bloom before moving on to feed on bolls (**Figure 7**). For fields planted with a variety that is only two gene (Bollgard II and TwinLink) it may be beneficial to spray based on egg lay, especially if there are 20% or more plants with a bollworm egg. When counting eggs, count all the eggs you see and divide by the total number of plants inspected, infestation can be more than 100%. In our three gene cotton or in two-gene cotton that was not sprayed on egg lay, the economic threshold is 6% fruit damage (square and bolls). The best treatment for bollworms is the chlorantraniliprole active ingredient found in Vantacor, Shenzi, Besiege and others. If the only issue in the field is cotton bollworm, then either Vantacor or Shenzi are the best options as they contain only chlorantraniliprole and will preserve our beneficial insects. However, if stink bugs are also close to the economic threshold and application of either Besiege or Elevest would be a better fit as they contain the chlorantraniliprole active ingredient as well as either lambda-cyhalothrin (Besiege) or bifenthrin (Elevest) which can provide good control of our bollworm and stinkbug populations.

Figure 7. Cotton bollworm feeding within a dessicating bloom.

BLACKLANDS IPM UPDATE

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ZACH T. DAVIS, CEA-AG/NR, HILL COUNTY

July 7, 2023 **Volume 5, Issue 11**

GENERAL:

Cotton is holding nicely with the bulk of the acres in the peak bloom stage, while our later cotton is just now starting to set squares. Spider mites are starting to be found in area fields, and with our hot and dry weather pattern predicted to continue for the next week or so, they could increase to populations that would justify treatment. There are a good number of fields in the area with active spider mite colonies, that currently are not at the economic threshold. Stinkbugs have been abundant this year in other crops including sorghum and corn, as well as being highly populated in wild host plants. This could be an indication of stink bug issues in our area cotton crop this year. I have started to find some stink bugs floating around area cotton fields but have not seen many bolls damaged yet. Late planted cotton fields should be monitored closely for cotton fleahopper as they start to set squares, as their numbers have started to increase in the late planted cotton field I am scouting. Bollworms could soon be an issue for area cotton fields, especially those planted with a 2-gene Bt trait package (Bollgard 2, TwinkLink).

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SPIDER MITES:

Spider mites are a common pest of corn, cotton, and sorghum during periods of hot and dry weather. Last week I noticed a few leaves, but this week I started picking them up in more fields. They are currently concentrated in the field margins near corn, or grassy areas that were recently mown. In cotton spider mites can infest and damage the leaf tissue enough to defoliate entire plants if left untreated. Spider mite feeding causes the upper leaf surface to develop a red to maroon discoloration (**Figure 1**) and can cause a silverish to brown discoloration on the lower leaf surface (**Figure 2**). The reddening of the upper leaf surface tends to start near the base of the leaf, or along leaf veins and grows as the mite continues to feed on the leaf. Early signs of spider mite damage can be difficult to see at first, cause a slight mottling of the upper surface, with light green to yellow spots. Treatment for spider mites is warranted when about 40% of the plants are infested with active mite colonies. Miticides available for use in cotton include abamectin (Agri-Mek SC, ABBA Ultra), Oberon 4SC, Zeal 72WSP, Portal, and Fanfare (bifenthrin). These miticides do take time to control the pest, and treatments would perform better when applied before the population gets out of hand. Spot treating infested areas or treating end rows as they are moving into the field can reduce the applications cost, and hopefully prevent the need of treating the entire field.

Figure 1. Redding of the upper surface of a cotton leaf caused by spider mite colony.

Figure 2. Discoloration of the lower leaf surface and webbing caused by spider mite infestation.

STINK BUGS:

Stink bug numbers have been high this year in wheat, corn, and sorghum; and now threaten to cause economic damage to area cotton fields. Stink bugs pierce small developing bolls to feed on the seed, which can cause stained lint, introduce boll rot pathogens, prevent lint from fluffing out when the boll opens (hardlock), and in some cases can cause small bolls to be shed from the plant. The greatest impact stinkbugs have on cotton is reduced lint quality, leading to lower loan values. Bolls that are fed on by stinkbugs develop wart like growths on the internal carpel wall of the boll (**Figure 3**). Stink bugs should be treated when they have damaged 10% of bolls during the 3rd through 5th week of bloom, 20% of bolls during the 2nd and 6th week of bloom, and 30% of bolls during week 7 of bloom and beyond. Treatment options for stinkbugs include pyrethroids, acephate, and Bidrin. If the predominant stink bug species present is brown stink bugs a pyrethroid may not be effective, however, bifenthrin (Fanfare) does appear to be stronger on brown stink bugs than the other pyrethroids. The insecticide options available for stink bug management will wipe out our beneficial insect population, leading to secondary insects like spider mites and aphids to increase. IF you need to be treating fields for stink bugs, and spider mites are present you could include abamectin in the tank, or even use bifenthrin which can provide control of the stink bug population and spider mites (rate:3.84-6.4 fl oz). Sadly there is not a good option to keep aphids suppressed when treating for stink bugs.

Figure 3. Three different types of stink bug injury to cotton. Photo credit: Philip Roberts, University of Georgia

BLACKLANDS IPM UPDATE

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July 22, 2023 **Volume 5, Issue 12**

GENERAL:

Corn harvest has started, and early yield reports have been very good. Most of the sorghum in the area is ready for harvest or close to being ready. Even though we are approaching harvest we do need to keep an eye on sorghum aphid populations to avoid excess honeydew causing harvest issues. Sorghum aphid numbers have started to increase in area fields that have not been treated, but we do have some beneficials around these colonies. Cotton is looking good for not receiving meaningful rains fall for the last 6-weeks and high temperatures. Fruit has stared to shed due to depleted soil moisture, and will continue until we defoliate the crop, received meaningful precipitation, or the plant dies from drought stress. Aphids are still present in area cotton fields, but numbers are low across the field, with localized areas with heavy aphid populations. Stinkbugs are still controlled from our recent applications, but we need to continue checking for them for the next two to three weeks while we still have bolls that are susceptible to damage. I have started to pick up on whitefly nymphs in some area cotton fields, but thankfully their numbers currently are low.

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SORGHUM:

Sorghum is closing in on the finish line, but even though we are close to harvest we need to continue to scout for sorghum aphid. At this point in the growing season, we will not see yield loss from the sorghum aphid, but because they are prolific honeydew producers (**Figure 1**), they can cause harvest complications. If aphids are not controlled in time for the honeydew to dry before harvest, it can gum up the combine to the point where harvest must stop, and the machine has to be cleaned out with a pressure washer. To avoid harvest issues from the honeydew fields should be treated for sorghum aphid when there is heavy honeydew and established aphid colonies. When selecting an insecticide, it is important to review the pre-harvest interval for the products, aa we do not want to use a product that is going to delay us from being able to harvest the crop. Products like Sivanto, Transform, Sefina, and alpha-cypermethrin all have a PHI of 14 days. Depending on how far you are from being able to harvest the crop should also be considered when choosing and insecticide. If you will be getting into the field shortly after the PHI is up you could get away with an alpha-cypermethrin shot, however, this product does not have very good residual activity. Transform, Sefina, and Sivanto all provide residual activity, but the residual activity of Sivanto has been better than Transform or Sefina.

Figure 1. Sorghum covered in honeydew caused by a severe infestation of sorghum aphids. Photo credit: Pat Porter, Texas A&M AgriLife Extension.

COTTON:

Given what the area's cotton crop has been through over the last 6-8 weeks, the crop looks good. As anticipated plants started really kicking square and small bolls off the plant over the last 7-10 days. This is due to the plant adjusting its fruit load to what resources it has available. As our soil moisture continues to deplete, we will see plants continue to show signs of drought and heat stress, but also nutrient deficiencies as the plant starts moving nutrients from leaf tissue into the developing bolls. Another possible explanation for the small bolls being shed is the possibility of pollen sterility due to the recent sting of high temperatures.

Spider mites are present in area fields, but thankfully currently their populations are low and not widespread. Since stinkbugs were an issue the last couple of weeks, and fields were sprayed we need to watch the spider mite populations closely. Some producers were proactive when they treated for stinkbugs and included 2 fl oz of abamectin across the whole field or along end rows. Thankfully, at this time there are thrips feeding on spider mite eggs in area fields which are helping keep the spider mite population suppressed. If you use acephate or Bidrin for stinkbug management previously your risk for spider mites is high, because these products also killed the thrips populations and have no activity on spider mites. If bifenthrin was used to treat your stinkbugs, your risk for spider mite issues is reduced, because these products also have some activity against spider mites. Fields should be treated when 40% of the plants have noticeable leaf damage (speckling and/or reddening) with active spider mite colonies. Abamectin is likely the most economical miticide for cotton, but you can also use Portal, Zeal and Oberon in cotton.

Figure 2. Redding of the upper surface of a cotton leaf caused by spider mite colony.

Figure 3. Discoloration of the lower leaf surface and webbing caused by spider mite infestation.

Aphid populations remain low, but they are one pest we need to keep an eye on as we approach bolls starting to open. Currently there are fields that have pockets of heavy aphids, but when you look at the field the aphid population is rather small. Currently our threshold is around 60 aphids per leaf, but once bolls start opening that threshold drops to just 10 aphids per leaf. At this point in the growing season aphids will greatly impact bot yield and fiber quality by feeding on the plants resources it would otherwise be used to filling out bolls. Another issue with aphids in cotton is that they are heavy honeydew producers, and when bolls are open the honeydew can get on the lint and cause sticky cotton. Aphid treatments tend to be pricey to obtain good control, products like Centric and imidacloprid are labeled for cotton aphid, but depending on population and canopy size may only provide suppression at best. Products like acetamiprid (Intruder), Transform, Sivanto, and Sefina can provide excellent control of aphid populations. Carrier volume can also impact the effectiveness of insecticide applications. At a minimum application should be made at 10 gallons per acre, but if the canopy is dense you may need to increase the volume closer to 15 gallons per acre to get good coverage of the canopy.

Figure 4. Cotton leaves cupping downward due to cotton aphids. Photo credit: Clemson University - USDA Cooperative Extension Slide Series , Bugwood.org

I have started to pick up on some banded wing whitefly in some area fields. Currently their populations are light, and well below the economic threshold. Banded wing whitefly are small fly like insects that have a yellow body, and white wings with grayish bands (**Figure 5**). This insect feeds on the plat sap using the piercing sucking mouthparts of the nymphs. The nymphs or immature stage are scale insect that can be found on the lower leaf surface, typically near one of the leaf veins. Banded wing whitefly nymphs are flat and oval in shape, with a fringe of hairs along the margins (**Figure 6**). This insect can be a major issue in cotton by feeding on plant resources that would otherwise be used to fill out bolls, and by causing sticky cotton due to honeydew production. For banded wing whitefly the economic threshold before bolls open is 50 nymphs per 5th mainstem leaf below the terminal, however, once bolls are open the economic threshold is only 25 nymphs per leaf. There are several insecticide options if they do increase to economically damaging populations in area fields. These products include acetamiprid (Intruder), Centric, Sivanto, imidacloprid (Admire Pro), acephate, Oberon, and pyriproxyfen (Knack). The acephate, Oberon, and pyriproxyfen products will kill the beneficial insect and could lead to issues with aphids and spider mites.

Figure 5. Banded wing whitefly adults. Photo credit: Ronald Smith, Auburn University, Bugwood.org

Figure 6. Banded wing whitefly adult and nymphs. Photo credit: David Kerns, Texas A&M AgriLife Extension.

BLACKLANDS IPM UPDATE

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Corn and sorghum harvest has wrapped up for the most part, with a few fields of both still to be harvested. The dry and hot weather pattern we have been in since the middle of June has finally taken its toll on our area's cotton crop, and fields are ready or close to being ready for defoliation. I know most of us are tired of the year, and ready to get this cotton crop out of the field sooner rather than later, but I think there are some fields where we may be rushing to defoliate a little too soon. To maximize both yield and fiber quality, defoliation applications are typically justified when 60% of the bolls are open, or there are 4 nodes between the uppermost cracked boll and the upper most harvestable boll (NACB). However, given the hot and dry weather we experienced during bloom, and the fact that we set a lot of the bolls in a short period of time the NACB method will likely not be an effective way to determine harvest aid timing this year. This year to determine harvest aid timing we will need to look a the percent of bolls open, and also cut a cross section of the upper bolls on the plant to determine if they are mature enough for ethephon to open the bolls. A boll is deemed mature and susceptible to ethephon applications once the seed coat starts changing color, and the cotyledons are fully formed and do not have any jelly.

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Choosing defoliation chemical can be tricky, because their performance can be impacted by multiple factors like weather, variety, and even the health of the plant. Defoliation of cotton typically is not that difficult when temperatures are around 80F or higher, however, drought stress can increase the difficulty of defoliation. When the plant gets severely drought stressed like last year and this year some defoliation chemicals may not work as good, especially those that are hormone based because the plant is not actively growing to process the products. Another issue with defoliation when in conditions like this year is getting the product into the plant because the leaves have hardened off and turned leathery. Over the last couple of years, I have been including a half rate of a Non-Ionic Surfactant in defoliation shots and it appears to help the products stick to the leaf and be absorbed by the leaf tissue. With temperatures predicted to remain in the high 90s to topping the century mark, application volume could also impact the performance of defoliation products and application volumes should be adjusted higher to insure adequate coverage of the crop canopy. Common defoliation products used in the Texas Blacklands include Ginstar and generics, thiadiazuron, Finish 6, or ethephon. In some years producers may even use a PPO-inhibitor like Aim or Sharpen to defoliate and kill the plant in a single application. Ginstar, thiadiazuron, Finish 6 and ethephon are all hormone-based products that help the plant create abscission layers at the based of leaf petioles and at the sutures between lock on the bolls. Herbicides like Aim and Sharpen can be used to defoliate the plant when applied at the correct rates, but these products have a higher tendency of sticking leaves. When cotton gets drought stressed like it is this year, hormonal based products may not work as good as when the plants are healthy. This is also a current issue in the Corpus Christi area where thiadiazuron is not working as expected and many producers down there have switched to Folex and are seeing great results. A lot of the fields in the area are already defoliation on their own, especially where Potassium deficiency was bad, and as long as we get good coverage of the crop canopy, we should get good results with our typical defolations mixtures of 2 fl oz Ginstar plus 2 fl oz Dropp (or generic), or 2 fl oz Ginstar plus 12-12 fl oz of Finish 6.

Kill shots this year will probably be mostly paraquat (Gramoxone) due to the market price and the crops yield potential. A few years ago the EPA mandated all users of paraquat based products taken an only training. This training is good for 3 years and can be found at: https://npsec.us/paraquat. When using sharpen or Aim for your second shot, some important reminders are to include a Methylated Seed Oil and spray grade Ammonium Sulfate to ensure adequate performance. Much like with our defoliation shots, application volume can impact their performance, due to the low humidity and high temperatures, and application volumes lower than ~10 gallons/acre may not provide good enough coverage for these products to work. This is because both Aim and Sharpen are contact herbicides and do not move within the plant and only kills what the spray droplets come into contact with.