February 5, 2020

Volume 3, Issue 1

Blacklands IPM Update

GENERAL:

Wheat across the regions looks good, and pest issues are currently minimal. Many producers in the region have utilized the recent drier weather to top dress and spray weeds. I have seen a few insects and diseases in fields across Hill County that we need to keep an eye on to make sure they do not get out of hand. I have not found leaf or stripe rust in wheat fields across Northern McLennan County and Hill County yet, but I have received reports of stripe in southern and western portions of McLennan County. The colder weather forecasted for next week will suppress the development of stripe rust across the area.,

DISEASE:

Disease issues are quite right now compared to the last couple of years. Currently I am picking up on low levels of powdery mildew around Abbott and Aquilla, and Septoria leaf blotch in wheat fields that are following wheat. I have received reports of strip rust being found in wheat around Temple and further south, and with the warmer temperatures this week I would suspect it will not be long before we start picking up locations in the Northern McLennan and Hill Counties area. As of right now there are not disease issues in any of the scouting program fields that require treatments, but we do need to continue to monitor disease progression in area wheat.

Powdery mildew is favored by mild temperature (59°-71°F), high relative humidity, and dense stands. Unlike our rust diseases powdery mildew does not need the leaf to be wet for an extended period for infection to occur but the dew in the canopy has driven canopy humidity up as the day progress. This disease affects yield by causing a reduction in the number of heads per acre, kernel size, and test weight. The earlier in the year powdery mildew infections occur the higher the potential there is to see an economic yield loss from the disease, which is why we need to keep an eye out and treat once the disease is becoming present throughout the field. Infections begin in the lower canopy where the humidity will be higher and the temperature lower than what weather stations are reading, and then move up the canopy if favorable growth conditions remain in place. Symptoms of powdery mildew is powdery white to gray fungal growth on leaves and stems (**Figure 1**). At first the fungal growth will have a white powdery appearance that will eventually change to a greyish brown color with time. On the opposite side of the leaf from the fungal growth the leaf tissue will appear yellow at first and then eventually turn to a tan to brown color as the fungus kills the cells in that region of the leaf. Management options for powdery mildew include planting varieties with resistance to powdery mildew, avoid excess Nitrogen being applied, and the use of fungicides. Texas A&M AgriLife Extension updates the varieties characteristics of common wheat varieties years and is published in the Texas Wheat Variety Trial Results (https://varietytesting.tamu.edu/files/wheat/2019/2019-Wheat-Publication-1030.pdf) and on the wheat resources page on the Hill County Texas A&M AgriLife Extension webpage (http://counties.agrilife.org/hill/files/2020/01/2020-TAMU-Wheat-Variety-Characteristics.pdf). Applying excess amounts of Nitrogen promotes tiller formation which leads to a dense canopy, and also increases the susceptibility of the crop to plant diseases. There are a number of fungicides on the market that will effectively manage powdery mildew, and their application should be made based on the presence and severity of powdery mildew in the field, if the variety is susceptible or resistant to powdery mildew, if the future weather conditions appear to be conducive for growth, and the market price should help in the fungicide selection.

Figure 1. Powdery mildew in wheat. Image on the left is of younger infections while the image on the right is from an older infection and has the black fruiting structures present.

Septoria leaf blotch is the other disease currently being found in the area. This disease in being found mainly in fields that are wheat behind wheat, where the disease survived the summer on infected wheat stubble. Symptoms start as small chlorotic spots, which can appear shortly after the plant emerges. As the disease progresses the lesions become a light tan, and will develop dark colored fruiting bodies inside the lesion. The shape of the lesion is typically long and narrow an constrained by leaf veins, but they can develop an irregular or elliptical shape. Diagnosing this disease in the the field is the dark colored fruiting bodies in the lesion. Favorable environmental conditions extended periods of leaf wetness, and temperatures between 50 and 68F. Management options include resistant varieties, cultural practices, and fungicides. There are wheat varieties with some level of resistance, however, of the common HRWW varieties planted in Texas there is only 4 with a published resistance rating. Cultural practices include rotation to a non-host crop an/or burying infected crop residue before plant the next crop. Fungicides can be utilized to manage Septoria leaf blotch, but should only be applied is the environmental conditions are favorable for disease progression and if the disease or complex of diseases is likely to cause an economic loss.

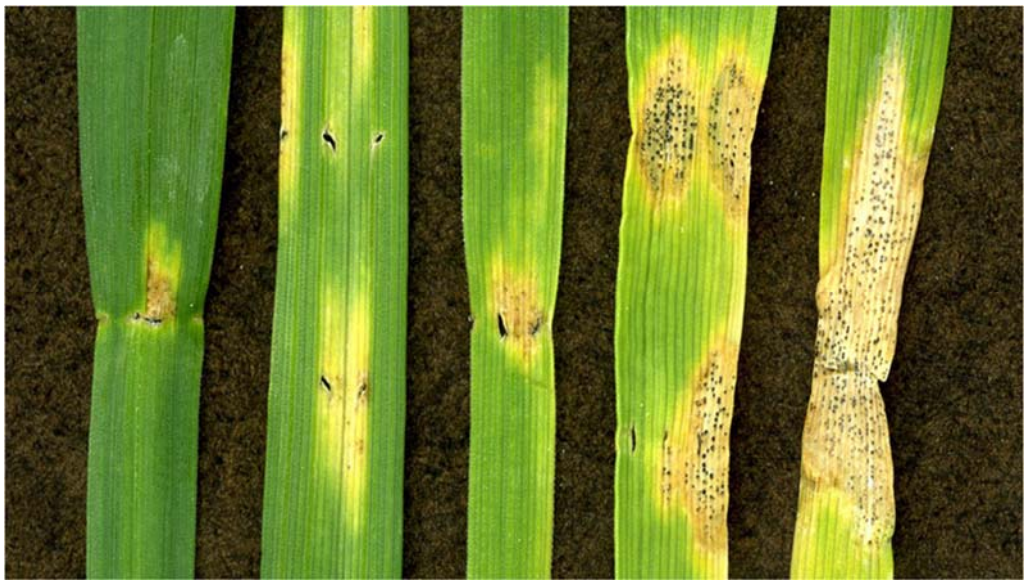

Figure 2. Septoria leaf blotch symptoms as lesions grow. Lesions on the left the start and progress as you move to the right with the development of the black fruiting bodies in the lesion. Photo credit: Ponomarenko et al. (2011).

INSECTS:

I have observed insect pest in all but three fields in the scouting program this week, but all are currently below what would justify treatment. Insect pest issues currently is less of an issue in wheat that is following corn or cotton, while the handful of fields we have that are wheat behind wheat are dealing with an insect pest issue that needs to be watched carefully. To date I have observed bird cherry oat aphids and winter grain mites infesting area wheat fields.

Bird cherry oat aphid numbers are present in a majority of the fields in the scouting program, but their population size is well below what would justify an insecticide application. This aphid can range in color from yellowish green, dark green, to black; and has a reddish orange area around the base of it's cornicles (**Figure 3**). This aphid is a known vector of the barley yellow dwarf virus, but I have not seen any symptoms that would suggest the virus has been transmitted. There is no established economic threshold for bird cherry oat aphid in Texas small grains, and it is recommended to follow the economic threshold from the University of Nebraska which is 20 aphids per tiller up to the boot stage, at which the economic threshold starts to decrease.

Figure 3. Bird cherry oat aphids in wheat. Photo credits: D. Tyler Mays (left) and Adam Sisson, Iowa State University, Bugwood.org

The greenbug has also been found in a couple of wheat fields along the county line between Abbott and West, and I have heard of reports of them in more fields. Currently they are at a level well below what would justify applying insecticides. The greenbug is pale green in color with a darker green streak down the back of the insect (**Figure 4**), and is only about 1/16 of an inch in size. This aphid species does inject a toxin into the plant while feeding, and this toxin causes the leaves to become yellow and later die, or plant to become infected with viruses like barely yellow dwarf virus. Population growth of the greenbug is favored by temperatures between 55F and 95F. The ability of this aphids to damage the plan with its toxin and acting as a vector for Barley Yellow Dwarf makes this insect a potential economic pest. There is an established economic threshold for greenbug in wheat and other small grains and is based on plant height and the number greenbug per linear foot (**Table 1**). Management options for greenbug include preserving beneficial insects, host plant resistance, and insecticide applications. Host plant resistance does exist, but most of the Hard Red Winter Wheat varieties commonly planted in Texas do no have a published resistance rating on the Texas A&M AgriLife Extension Wheat Variety Characteristics sheet. There are numerous insecticide options for greenbug management in wheat and include chlorpyrifos, premixes of chlorpyrifos and a pyrethroid, pyrethroids alone, dimethoate, and malathion.

Table 1. Texas A&M AgriLife Extension Service Greenbug Threshold

Plant Height (inches)	Number greenbugs per linear foot
3-6	100-300
4-8	200-400
6-16	300-800

Figure 4. Greenbug feeding on wheat leaf. Photo credit: Frank Peairs, Colorado State University, Bugwood.org

The winter grain mite is present in a handful of fields in the scouting program that are wheat following wheat or another small grain crop. This mite pest feeds on barley, oat, and wheat; and ranges in size from 1/32 to 1/16 of an inch. They have a black body with a single reddish orange spot on their back, while their legs and head are reddish-orange (**Figure 5**). They feed on the contents of leaf cells causing the leaf tips to turn brown, plant to become stunted and develop a silvery gray appearance. The winter grain mite tries to avoid light and will typically feed on the plant during the night and on overcast days, and hideout around the base of the plants during sunny days. They are easiest to spot in the field when they are walking on along the soil surface where the reddish orange legs and head stand out. Hot and dry weather reduces their activity. There is no established economic threshold for winter grain mite in Texas, but the presence of both the mite and visual feeding damage warrants treatment to avoid economic losses. There are not insecticide or miticides labeled for control of winter grain mite in wheat, but you can use insecticides under 2ee regulations, but the applicator assumes all liability with the application.

Figure 5. Winter grain mite on wheat leaf. Photo credit: University of Nebraska Department of Entomology.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

February 24, 2021

Volume 3, Issue 2

Blacklands IPM Update

GENERAL:

More normal temperatures have returned to the area after about 8 days of subfreezing weather. The artic blast dropped temperatures to as low as -2°F in some parts of Hill County, which has damaged some of the areas small grain crops. It is still too early to tell how severe the freeze damage is, but as I looked at wheat fields on Monday and Tuesday it appears the damage is more cosmetic. The low temperatures had little to no effect on the aphid populations but did halt disease development.

FREEZE DAMAGE:

Winter grain crops are cold hardy during their vegetative growth stages with wheat being the most tolerant and oat being the most sensitive. Wheat in the scouting program before the winter storm ranged from Feekes Growth Stage 4 (lengthening of leaf sheaths) to Feekes GS5 (leaf sheaths strongly erect), with the growing point still below the soil surface. Wheat is most sensitive to freezing temperatures during the reproductive growth stages (Feekes GS6-Feekes GS11.3). The extended period of subfreezing temperatures has caused some damage to the crop, but from the fields I have looked at this week it appears more severe than it may be. I have looked at a few fields in the scouting program so far this week and from the turn row fields appear rough, but once you get out in the field and start looking at the crown and slicing stems to look at the growing points there does not appear to be a lot of damage. It is still a little too soon to be assessing freeze damage, and only time will tell how bad the artic blast damaged our wheat crop.

Assessment of freeze damage to small grains should be delayed for about 7-10 days after the last freeze event so wheat has the chance to respond the warmer temperatures and try to grow. In wheat that has not jointed freeze damage can be fields having a blueish-green appearance, chlorotic leaves, and burnt leaf tips. Freeze damage to wheat during the tillering growth stages can have a slight to moderate affect on the crops yield potential. At the jointing stage (Feekes GS6) freeze damage shows up as yellowing or burning of leaves and leaf tips, lesion and splitting of the lower stems, and dead growing points. Freeze damage to wheat at the Feekes GS6 can have a moderate to severe impact on the crops yield. To assess freeze damage, collect a sample of plants from 4 or 5 different regions of the field and split stems and inspect the health of the plants growing point. A healthy growing point will be yellowish green to white in color, while a damaged growing point will be brown (**Figure 1**). To get an estimate on yield loss calculate the percent damaged growing points out of all the growing points inspected. Wheat does have the ability to compensate for freeze damage at this time by setting new tillers, and therefore assessing potential yield loss based on the percent of dead growing points can often overestimate the actual amount of yield loss.

There are a few things that helped our wheat survive this artic blast with minimal injury. The first is the crops growth stage. Our crop before this artic weather hit was at a growth stage where the growing point was below the soil and protected from adverse air temperatures. The second factor was that it snowed before we dropped to our lowest temperatures. The snow/ice cover acted as an insulator and helped keep the temperatures around the crown of the plant warmer than the actual measured air temperatures. The third factor that helped our crop make it through the Alaskan weather event was that our fields were adequately fertilized and was not moisture stressed. Plants that are healthy can withstand subfreezing temperatures better than plants that are poorly fertilized, or moisture stressed. The warm weather we are forecasted after this artic blast is also beneficial, as it is excellent for wheat growth, and even has some rain in the forecast.

Figure 1. Wheat growing point on Monday 22nd of February. The growing point on left is damaged, while the growing point on the right is healthy.

WHEAT PEST:

While the freezing weather may have damaged out wheat crop, it had a minimal impact o the bird cherry oat aphid population. The snow cover that helped to minimize the amount of freeze damage to the crop by acting as an insulator helped keep the micro-climate around the crown of the plant at a temperature that would not kill the aphids. Additionally, during cold weather these aphids can be found in the soil seeking warmth. The beneficial insect population we had in front of the winter storm were wiped out by the freezing temperatures. As the temperatures warm back up it should not take long for beneficial insects to return to area fields and help manage our pest. At this time aphid numbers are still below what would warrant an insecticide application, and we also need to see the extent of the damage caused the freezing weather before we invest money into the application of an insecticide.

Diseases in wheat were halted by the winter storm. However, the damage to the plant from the freeze will stress the plant and may make the crop more susceptible to some secondary diseases like crown rots and Alternaria leaf blight. At this time, I have not heard any reports of leaf rust or stripe rust near our area but looking at the weather forecast we could see stripe rust moving into the area in the next two weeks.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

March 5, 2021 Volume 3, Issue 3

Blacklands IPM Update

GENERAL:

A much need rain was received early this week, and halted corn planting operations but will help the area wheat crop rebound after suffering various levels of damage from winter storm Uri. As I scout wheat this week, all the wheat fields I have seen have greened up and recovered from the leaf burn caused by the frigid temperatures two weeks ago. The warmer temperatures and moisture have caused wheat pests like bird cherry oat aphids and stripe rust to become more active. Stripe rust is being found in wheat fields around Abbott and Bynum, but I have not seen a widespread dispersion of the disease yet. Bird cherry oat aphid numbers are increasing in the area with the lack of beneficial insects being absent since the winter storm.

INSECTS:

The warmup from the artic blast two weeks ago has caused insect activity to increase. Bird cherry oat aphid (**Figure 1**) numbers were starting to increase with the lack of competition from beneficial insects. Over the course of this week, I have observed an increase in the beneficial insect population, and I even found a few mummified aphids which is a sign of parasitic wasp activity. The resurgence of lady beetles, lacewings, and parasitic wasp should help keep the bird cherry oat numbers below the economic threshold. There is no established economic threshold for bird cherry oat aphids in Texas wheat and we recommend utilizing the economic threshold developed by the University of Nebraska. This economic threshold (**Table 1**) is based on the number of aphids per tiller during certain key growth stages.

Figure 1. Bird cherry oat aphid, photo credit: D. Tyler Mays, Texas A&M AgriLife Extension

Table 1. Number of bird cherry oat aphids per till to justify treatment.

Seedling to Boot	Boot to Heading	Flowering	Milk Stage to Medium Dough
20	30	>5	10
Modified from University of Nebraska –Lincoln's Crop Watch, Identifying and Treating Aphids in Wheat.			

I also started finding some greenbugs in a field around the Hillsboro Municipal Airport this week, and right now their population is well below the economic threshold. Greenbugs are pale green and typically have a stripe of darker green on their back (**Figure 2**). This aphid injects a toxin into the plant while feeding that causes the leaf tissue to turn yellow and then eventually die and are also known vectors of the barley yellow dwarf virus. Their numbers can increase rapidly when temperatures range between 55F and 95F and cause economic losses. There is an established economic threshold for greenbug in Texas wheat and is based on the plant height and the number of greenbugs per foot of drill row (**Table 2**).

Figure 2. Greenbug, photo credit: Rick Grantham, Oklahoma State University

Table 2. Economic threshold for greenbugs in Texas small grains

Plant Height	Number greenbugs per linear foot
3-6 inches	100-300
4-8 inches	200-400
6-16 inches	300-800

DISEASE:

The weather conditions we are currently in are optimal for stripe rust (**Figure 3**) development. Early this week I picked up on one field in the Abbott, and upon talking with others scouting wheat in Hill and McLennan County the only other known occurrence of stripe rust is in the Bynum area. As our temperatures remain between 45F and 65F which is the favorable temperature range for stripe rust this disease will start spreading to more fields in the area. The pathogen also requires the leaf to be wet for around 6 hours for infection to occur. Planting varieties with resistance to stripe rust is a major management practice, but just because a variety is labeled as resistant does not mean it will not be infected. This is since there is different race of the fungus that may not be susceptible to the resistance genes present in the variety, and the type of resistance. In terms of wheat resistance there are two forms, seedling resistance and adult-plant resistance. Adult plant resistance does not start being active until the plant shifts to the reproductive development stages, jointing through grain maturation, and becomes stronger as the plants reach the flag leaf stage. Adult plant resistance is the most common type of rust resistance in our hard red winter wheat varieties. Seedling resistance is active throughout the growing season and is the most common in our soft red winter wheat varieties. This finding of stripe rust in Hill County indicates that conditions are favorable for stripe rust development and that we need to start monitoring fields for stripe rust infections.

Figure 3. Stripe rust on lower leaf of a wheat plant. Photo credit: D. Tyler Mays, Texas A&M AgriLife Extension

WHEAT FREEZE INJURY:

We are now two weeks past the winter storm, and the area wheat crop is responding well thanks to the rapid return to normal conditions and the recent rainfall. As of now it appears the wheat crop in Hill and Northern McLennan County will suffer minimal to no decrease in yield. There are however, a few fields that did have some tillers killed by the freezing weather, but these fields should still suffer a minimal impact on yield as the plants will be able to compensate for the death of these tillers.

AUDIO UPDATES:

The Extension IPM Program has started a regional audio update that will combine 3-4 IPM agents to discuss what is being seen in the field, and what we need to be ready for. These audio updates include South Texas, Texas Blacklands and Upper Gulf Coast, Rolling Plains and West Texas, as the High Plains/South Plains. This update will be posted weekly, and by going to the following link you can sign up to receive a text when an audio is posted, with a link to the recording.

Signup Blacklands Upper Gulf Coast - Extension Entomology, Texas A&M AgriLife Extension (texasinsects.org)

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Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

March 19, 2021 Volume 3, Issue 4

Blacklands IPM Update

GENERAL:

Wheat in the area has progressed nicely over the last two weeks and just about every field in the scouting program is at or past the jointing stage, with some fields having two nodes visible. Corn planting made good progress over the last 14 days with minimal rainfall, and I would say over 90 percent of the areas corn crop has been planted. Wheat pest activity has increased over the last 10 to 14 days with aphids needing to be treated, powdery mildew showing up in area fields, winter grain mites showing back up, and stripe rust present in some fields close to the Hill County and McLennan County border.

INSECTS:

Over the last two weeks insect and mite pest activity has picked up. Currently I am finding aphids in over 90% of the fields in the scouting program with some fields needing to be treated, but there are still a handful of fields with very low aphids' numbers. Most of the aphids I am finding are bird cherry oat aphids, but I have also come across some greenbugs and English grain aphids. Bird cherry oat aphids range in color from a light green to almost black, with an area of reddish orange around the base of their cornicles (**Figure 1A**). The bird cherry oat aphid is known to transmit the barley yellow dwarf virus which is also being found in some area fields. Greenbugs have a light green body with a darker green streak in the middle of their back (**Figure 1B**). The greenbug injects a toxin into the plant while feed that will eventually kill the leaf and is also a known vector for wheat viruses like barley yellow dwarf. English grain aphids range in color from a yellowish green to light green to even brown, and have long antennae, legs and cornicles which are black (**Figure 1C**). They do not inject a toxin into the plant, but can be vectors for the barley yellow dwarf virus.

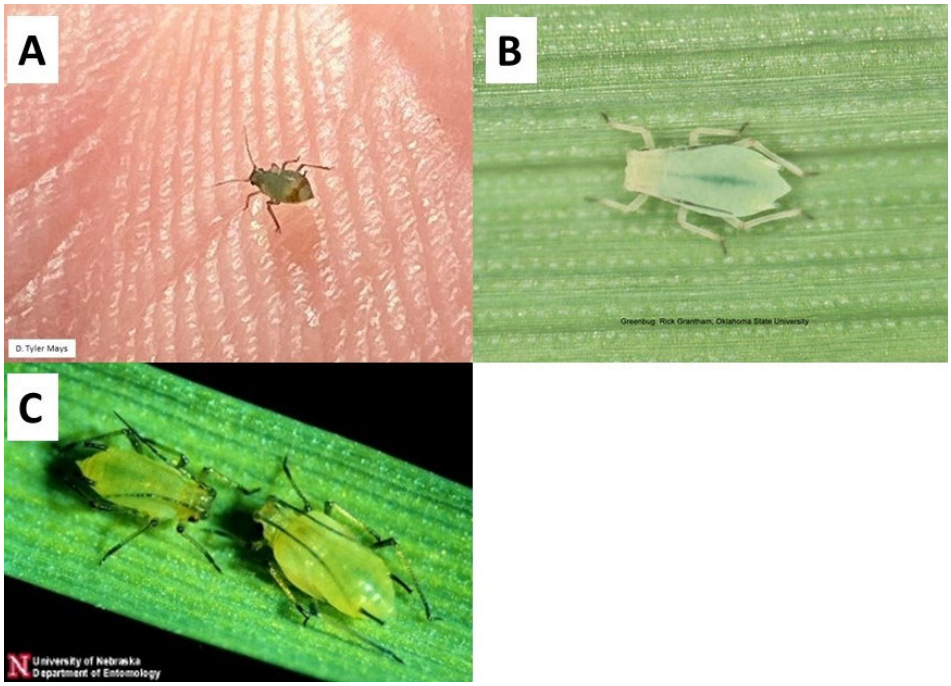

Figure 1. Aphids currently being found in wheat in Central Texas. A) bird cherry oat aphid, B) greebug, C) English grain aphid. Photo credits: B– Rick Grantham, Oklahoma State University,; C– University of Nebraska-Lincoln Department of Entomology

Each aphid species can have a detrimental impact on yields and should be treated at their respective economic thresholds. The greenbug threshold is based on plant height and the number of aphids per linear foot (**Table 1**), while the economic threshold for bird cherry oat aphids and the English grain aphid is based on the crop's growth stage and the number of aphids per tiller (**Table 2**). Beneficial insects have helped keep aphid numbers down since we defrosted from the artic blast last month, but there have been some fields where the beneficials are no longer keeping up the aphid population growth and these fields were treated. When deciding to treat for aphis we need to consider the aphid populations, the beneficial insect population, and if the beneficial insect population is keeping up with the aphid reproduction. If beneficials insects are abundant and there are parasitized aphids present, the field(s) should be rechecked in 3 to 5 days before deciding to spray.

Table 1. Economic threshold for greenbugs in Texas small grains

Plant Height	Number greenbugs per linear foot
3-6 inches	100-300
4-8 inches	200-400
6-16 inches	300-800

Table 2. Number of aphids per tiller that justifies treatment for bird cherry oat aphids and English grain aphids

Growth Stage	Bird Chery Oat Aphid	English Grain Aphid
Seedling & Pre-boot	20	30
Boot to heading	30	50
Flowering	5+	5
Milk to Medium Dough	10+	10+
Modified from: Identifying and treating aphids in wheat. 11 May 2007. cropwatch.unl.edu/identifying-and-treating-aphids-wheat		

Winter grain mite are once again being found in area wheat fields, and Mark Nemec has indicated that he is also finding them in Southwest and western McLennan Counties. The winter grain mite varies in color from dark brown to black, with a cream to white spot on their back. The legs and head of the winter grain mite are reddish orange in color (**Figure 2**). This mite damages the plant by piercing the leaf cells, causing the leaves to develop a stippling appearance much like spider mites in corn and cotton. Regions of the fields infested with winter grain mite may develop a sliver to gray hue, and the damaged plants can be stunted. There is not an established economic threshold for winter grain mite in Texas, but the Texas A&M AgriLife Extension Service Guide "Managing Insect and Mite Pest of Texas Small Grains" recommends treating when both the mite and damage are present. Malathion is the only insecticide with the winter grain mite on its label. For more information on winter grain mites feel free to visit any of the below links.

http://entoplp.okstate.edu/pddl/pddl/2009/PA8-31.pdf/
https://osuwheat.com/2015/01/06/winter-grain-mites-in-northcentral-ok/
https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/444/444-037/444-037_pdf.pdf

Figure 2. Winter grain mite on wheat leaf. Photo credit: University of Nebraska Department of Entomology

DISEASE:

Both powdery mildew and stripe rust is being observed in area wheat fields, and with the recent rain and high winds could soon be found in more fields. Currently, powdery mildew has been found in the Southern portions of Hill County near Abbott, Aquilla and Malone. Powdery mildew is a fungal disease that can infect leaves, stems, and heads of wheat, and symptoms include white fluffy masses of fungal growth (**Figure 3**). As these fungal masses age, they begin to turn gray in color and develop small black round fruiting bodies, and eventually turn a grayish brown. This disease is favored by high humidity with temperatures between 59F and 71F. Unlike our rust pathogens powder mildew does not require leaf wetness for infection. Agronomic factors that can influence the risk for powdery mildew include planting a susceptible variety, high seeding rates creating a dense canopy, high nitrogen fertilization, and having infected crop residue laying on the soil surface. Management options for powdery mildew include planting resistant varieties, avoiding dense canopies by avoiding excessive N fertilization or high seeding rates, and using fungicides to minimize disease severity. The decision to treat for powdery mildew in wheat should be based on the level of susceptibility of the variety, current disease incidence and severity, potential for crop loss, is the weather forecast favorable for disease development, and the market price.

Figure 3. Powdery mildew infecting a wheat leaf. Photo credit: D. Tyler Mays

Stripe rust was first found in the Abbott area a couple weeks about, but just now started to spread to new fields, and with the high winds and rain earlier this week could be found in more fields in the area soon. Stripe rust produces a yellow to orange pustule that form stripes on the leaf surface . Stripe rust infection and disease development is favored by extended leaf wetness and temperatures between 50F and 60F. Disease development usually starts slowing down once temperatures consistently exceed 72F and based on the weather forecast our environmental conditions are starting to be less conducive for stripe rust development.

AUDIO UPDATES:

The Extension IPM Program has started a regional audio update that will combine 3-4 IPM agents to discuss what is being seen in the field, and what we need to be ready for. These audio updates include South Texas, Texas Blacklands and Upper Gulf Coast, Rolling Plains and West Texas, as the High Plains/South Plains. This update will be posted weekly, and by going to the following link you can sign up to receive a text when an audio is posted, with a link to the recording. Signup Blacklands Upper Gulf Coast - Extension Entomology, Texas A&M AgriLife Extension (texasinsects.org)

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126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

April 1, 2021 Volume 3, Issue 5

Blacklands IPM Update

GENERAL:

Wheat across the region is growing nicely thanks to the rain received last week. Some wheat fields across the area are starting to have heads emerge from the boot, and currently pest issues in the Northern McLennan and Hill County area are low. Insects wise thee are sporadic populations of bird cherry oat aphids, English grain aphids, and greenbugs, with some fields having all three species. Current disease issues include powdery mildew in a handful of fields, Septoria leaf blotch in a few fields, and stripe rust in a handful of fields. I have also received reports of leaf rust activity starting to pick up in the McGregor area

INSECTS:

Aphids continue to hang around in area wheat fields not recently treated, but these fields have a good population of beneficials helping keep the aphid population below their respective economic thresholds. As our area crop reaches the boot and moves into the heading stage the economic thresholds for these aphids start to decrease (**Table 1 & 2**). Aphids currently being observed include bird cherry oat aphids (**Figure 1**), English grain aphids (**Figure 2**) and greenbugs (**Figure 3**). Bird cherry oat aphids range in color from yellowish green to a dark green and have an area of reddish-orange around the base of their cornicles. English grain aphids are a light green to brown with antennae, cornicles and legs that are long and black. The greenbug is a pale green with a darker green stripe down the middle of their back, and their cornicles are hard to see as they are short and the same color as their body.

Table 1. Economic threshold for bird cherry oat aphid and English grain aphid

Aphid Species	Seedling to Boot	Boot to Heading	Flowering	Milk Stage to Medium Dough
Bird Cherry Oat Aphid	20	30	>5	10
English Grain Aphid	30	50	5	≥10
Modified from University of Nebraska –Lincoln's Crop Watch, Identifying and Treating Aphids in Wheat.				

Table 2. Economic threshold for greenbugs in Texas small grains

Plant Height	Number greenbugs per linear foot
3-6 inches	100-300
4-8 inches	200-400
6-16 inches	300-800

Figure 1. Bird cherry oat aphid, photo credit: D. Tyler Mays, Texas A&M AgriLife Extension

Figure 2. English grain aphids. Photo credit: University of Nebraska Entomology Dept.

Figure 3. Greenbug, photo credit: Rick Grantham, Oklahoma State University

Armyworms typically show up around the heading and flowering stage, which are growth stages some of our wheat is at, and most will be there soon. The armyworm we deal with in this region is the true armyworm which can attack wheat in large numbers. Larvae reach a length of roughly 1-1/2 inches when fully grown and can be anywhere from green to brown with lighter stripes running the length of the body (**Figure 4**). Their head capsule is a tan to light brown with a pattern of narrow lines giving it a net like pattern and lack the prominent white inverted Y like the fall armyworm. They are favored by cool damp weather, and do not fare well once the daily high temperatures start getting to 88°F or higher. They will typically fist been seen in area where the canopy is tall and/or thick, as this provides them shade during the day. When scouting during the day you will need to check around the base of the plant, as true armyworms hide there during the day and move up the plant to feeding during the late afternoon and night. Much like our disease pests it is important to avoid extensive damage to the top two leaves from damage. Fields should be treated for true armyworms when there is four to five larvae per square foot, with evidence of defoliation in the lower canopy. Since they are an insect pest occurs this close to harvest when selecting an insecticide, it is important to read the label and understand the preharvest interval, as some products may carry a 30 day preharvest interval.

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

DISEASE:

Wheat disease issue have been lower this year compared to the previous two years, mostly due to the drier winter and early spring. There are a few diseases present and some we need to continue to watch for. Currently, I am picking up some powdery mildew, Septoria/Stagnospora leaf blotch, and stripe rust in a few fields around the area. Additionally, we need to continue to watch for stripe rust and leaf rust moving into more fields in the area.

Powdery mildew is present in some area wheat fields currently at levels that are not worth spraying yet. In fields with powdery mildew, it is being found in areas where the canopy is very thick, because this increases the canopy humidity which favors infection. Symptoms of powdery mildew include powdery fungal growth that ranges from white to gray in color, and can be found infecting the leaf, sheath, and stem. It is worth noting that some labels of both tebuconazole and propiconazole have taken powdery mildew off the labeled due to reduced efficacy in other wheat producing regions. For a list of fungicides for use in Texas wheat visit: http://varietytesting.tamu.edu/files/wheat/otherpublications/2019-Registered-Fungicides-Wheat.pdf.

Septroia leaf blotch and stagnospora leaf blotch are also being found in area wheat. I have seen this disease complex the last couple of years, and only observed levels worth treating twice, both of which were wheat fields planted behind wheat. This disease complex is more severe in wheat following wheat, but I have started picking up some lesions in the lower canopies of fields that were planted to corn or cotton last year. Septoria is favored by temperatures between 50-68°F while stagnospora is favored by temperatures between 68°F and 81°F, and both require wet and humid weather to spread and cause new infections. Septoria leaf blotch symptoms initially are small chlorotic flecks that will grow into irregularly shaped lesions that are brow to reddish brown in color (**Figure 5**). As the septroia lesion ages it will develop small dark brown to black speck in the lesion which are fruiting bodies of the fungus. Stagnospora lesions start as oval shaped with a dark brown color and is often bordered by a yellow halo. Lesions cause by stagnospora leaf blotch eventually enlarge into irregular shaped lesions with a dark brown center. Both stagnospora and Septoria lesions can grow together on a leaf, creating identification hard.

Figure 5. Progression of Septoria leaf blotch symptoms from left to right. Photo credit: Ponomarenko et al. 2011; APS images. https://www.apsnet.org/edcenter/disandpath/fungalasco/

Figure 6. Stagnospora leaf blotch symptoms. Photo credit: Heather Kelley, University of Tennessee https://guide.utcrops.com/wheat/wheat-disease-identification/diseases-affecting-leaves/stagonospora-nodorum-blotch/

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Rust diseases are starting to pick up following the rains last week (19-23 March). I started picking up some stripe rust in wheat in various fields throughout Northern McLennan and Hill Counties this week. Currently I am finding stripe rust on wheat varieties including WB Cedar, WB 4699, and WB 4515, stripe rust is also present in the uniform variety trials, but I did not take note of what varieties they were in. Fields with stripe rust are around Itasca, Hillsboro, Abbot, and Malone. I have yet to find any fields with leaf rust I am checking, but I have received reports that leaf rust activity has started to increase at the McGregor Research farm in breeder plots and the uniform variety trials. Leaf rust could soon be infecting area wheat fields, and this is my annual reminder to understand your varieties level of susceptibility to leaf rust. These rating can be found in the "2020 Texas Wheat Uniform Variety Trails" results book on page 9 found here: http://varietytesting.tamu.edu/files/wheat/2020/2020-Texas-Wheat-Variety-Trial-ResultsAug312020.pdf. Estimating potential losses due to stripe and/or leaf rust can be difficult because there are multiple factors that can affect the amount of yield lost. These factors include time of infection, severity of infection, variety susceptibility, and environmental conditions following initial infection. For stripe rust with most of our crop somewhere between Feekes GS 9 (flag leaf emerged) to 10.3 (mid heading) yield loss can be anywhere from 1% in older wheat that is resistant, up to 75% in younger wheat that is susceptible (Table 3). Leaf rust potential yield loss varies based on the area of the flag leaf covered by leaf rust at various growth stages (Table 4) Now is the most important time to scout wheat to avoid yield loss from diseases and insects that can be avoided.

Table 3. Potential percent yield loss caused by stripe rust based on variety susceptibility and time of infection

Growth Stage	Susceptible	Moderately susceptible	Moderately resistant	Resistant
Flag leaf (Feekes 9)	75	45	15	5
Mid-Boot (Feekes 10)	65	25	7	2
First Awns visible (Feekes 10.1)	50	10	3	1
Mid heading (Feekes 10.3)	40	5	2	0
Mid Flowering (Feekes 10.5.2)	12	2	1	0
Modified from Ron French, https://amarillo.tamu.edu/files/2016/11/Wheat-Fungicides-AmarilloFarm-Ranch-Show-2016.pdf.				

Table 4. Potential percent yield loss caused by leaf rust based on growth stage and percent flag leaf infected.

Growth Stage	10%	25%	40%	65%	100%
Flowering	10	15	20	30	35
Milk	2	5	8	14	20
Soft Dough	1	3	4	7	10
Hard Dough	1	1	1	3	5
Modified from Ron French, https://amarillo.tamu.edu/files/2016/11/Wheat-Fungicides-AmarilloFarm-Ranch-Show-2016.pdf.					

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

April 16, 2021 Volume 3, Issue 6

Blacklands IPM Update

GENERAL:

Wheat across the area is progressing nicely and ranges from just finishing pollination in some of the earliest planted fields to head emergence is some of our later planted field and/or later maturing varieties. Drought stress is starting to become apparent in fields west of I-35 where our soil texture is a little lighter. Rust is still active in the area despite the lack of rainfall, and currently most of the rust issues is still stripe rust but I did find a leaf rust pustule in the Malone area on the 9th of April. Aphids are also still being found in area wheat fields, but thanks to our beneficial I nsect populations are currently not a cause of concern. Corn is growing nicely despite the lack of rain, and much like our wheat crop areas west of I-35 and area with lighter rockier soils are starting to exhibit signs of drought stress. Cotton planting is complete except for some fields that were not planted in hopes of rain replenishing soil moisture at the seeding depth instead of dry planting. Some of the first planted cotton fields are starting to emerge, and now is the time to start assessing stand establishment and scouting for thrips.

WHEAT:

The area wheat crop needs a widespread rain event without the H-word but is still progressing nicely. In Hill and Northern McLennan Counties stripe rust **(Figure 1)** is still active in fields not recently treated with a fungicide, and untreated fields of both hard red and soft red winter wheat should be monitored closely. Leaf rust **(Figure 2)** is active in the Hill County UVT trials and with the strong winds we had last week (5-9 April) could have easily move leaf rust pustules into the area. I have also found a few pustules of leaf rust in other fields around the Malone area. The moisture that moved through late this week will help both leaf rust and stripe rust infections to grow and spread to new leaves in the same or nearby fields, , so fields not treated with a fungicide lately should be scouted for leaf and stripe rust.

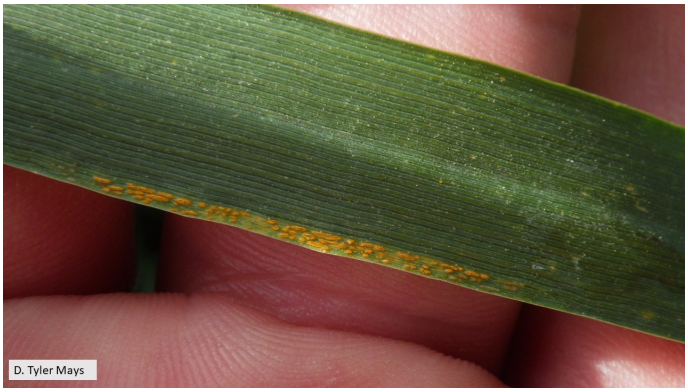

Figure 1. Stripe rust of wheat.

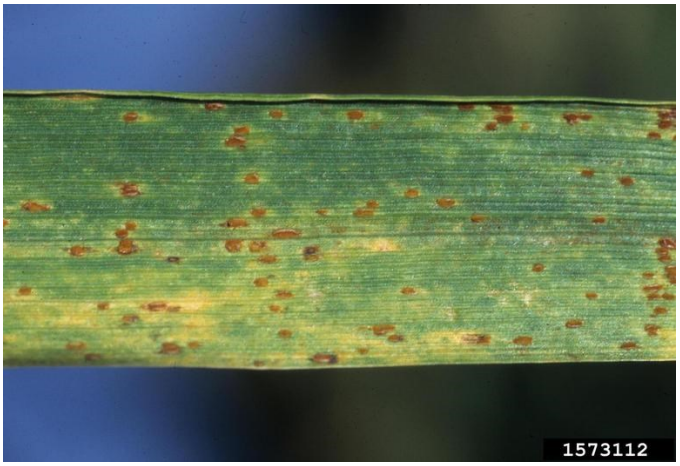

Figure 2. Wheat leaf rust.
Photo credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

Aphids are still being found in area wheat fields and consist mostly of English grain aphids. Fields with aphids present are still below the economic threshold, and thanks to a good beneficial insect population in these fields I expect they will not reach the economic threshold by the hard dough stage. If fields are treated for aphids we need to read the label closely and understand the products maximum use rate per acre per year as well as the products pre-harvest interval. Chlorpyrifos (Lorsban) is probably the most used insecticide for aphid control in wheat, and these insecticides have a maximum use rate of 2 pints per acre per year (1 lbs. chlorpyrifos per acre) and carries a 28-day pre-harvest interval. Dimethoate is also commonly used in wheat and has a maximum use rate of 1 pint per acre per year and carries a 35-day pre-harvest interval.

Now is the time we typically start dealing with armyworms in wheat, but currently I am not nor have I heard of reports of armyworms **(Figure 3)** in wheat fields in the area. The dry weather pattern may help to explain why we have not had armyworm issues this year, as armyworms are favored by coot damp weather. Fields should continue to be scouted for armyworms with the moisture that moved through the area this week as it may help armyworms get started.

Figure 3. True armyworm larvae. Photo credit: Roger Schmidt, University of Wisconsin-Madison, Bugwood.org

COTTON:

I would estimate that about 90% of the cotton crop in the area has been planted, and some of the first planted fields were starting to emerge earlier this week. As the crop starts to emerge now is the time to start evaluating stands and scouting for thrips. Insecticide seed treatments typically provide control of thrips for 2-3 weeks after planting, however, this dry weather pattern may affect their efficacy. These insecticide seed treatments need soil moisture to solubilize the insecticide in to the soil water solution for the plant to uptake the insecticide and control thrips, and the drying soil moisture profile may reduce the amount of these insecticide absorbed by the plant. Thrips are an important early season pest of cotton as damage can reduce leaf size, slow the rate of growth, delay maturity, and in the worst cases kill the plant. Fields should be treated for aphids when the field averages 1 thrips per true leaf, and during the cotyledon stage the threshold is 1 thrips per plant.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

April 30, 2021 Volume 3, Issue 7

Blacklands IPM Update

Texas IPM Partners With Nature

Texas A&M AgriLife Extension

GENERAL:

Wheat across the area is progressing nicely and some fields are starting to have the heads change colors as the grain filling process continues. Leaf and stripe rust spores are still floating around the area and causing new infections, but the crop's growth stage is at the point where a fungicide may not provide a return on its investment. Aphids remain in area wheat fields at populations below the economic threshold, and we still need to keep an eye out for armyworm issues in area wheat fields. Corn is growing nicely thanks to timely rains and cooler than normal temperatures. It appears the low temperatures and light frost we had on April 23rd had little to no impact on area crops. Cotton is up, but is emerging and growing slowly thanks to the cooler temperatures we have had over the last couple of weeks. Thrips, aphids, and spider mites are being found in area cotton fields, but for most of the fields I am looking at remain below their respective economic thresholds.

WHEAT:

The area wheat crop is progressing really good, and some fields are in the late grain filling stages and head are starting to turn color. Leaf rust and stripe rust infections are continuing to be found, but at the growth stage we are at, we are very limited on what fungicides we can use, and these fungicides may not provide a return on their investment based on the costs of these products. Both propiconazole and tebuconazole are labeled for applications though Feekes 10.5, and carry a 30 day pre-harvest interval, and every field I have seen is past Feekes GS 10.5 and within 30 days of harvest. This leaves only our three mode of action fungicides like Approach Prima, Miravis, and Trivapro which cost a little more but carry a 7 day preharvest interval. However, the cost of these products may not be returned from an application even with wheat prices near $7.00 per bushel.

English grain aphids (**Figure 1**)are still being found in area wheat fields at populations below the economic threshold. There is a good beneficial insect population in area wheat fields that are helping keep these aphids numbers down. At this point in the growing season the economic threshold for English grain aphids in wheat is 10 or more per plant.

Figure 1. English grain aphid. Photo credit. University of Nebraska Department of Entomology

I still have not seen or heard of reports of true armyworm issues in area wheat fields, but with this cooler weather and recent rains the environmental conditions are favorable for them to become an issue. Earlier this week I found one small true armyworm larvae in a dense area of a wheat field outside of Malone. The economic threshold for armyworms in wheat is 4 to 5 larvae per square foot with evidence of defoliation in the lower canopy.

COTTON:

The area cotton crop is up and growing slowly thanks to the cool temperatures. There are some area fields with emergence issues due to dry planting, and crusting following the recent rains. Insect activity in area cotton fields is increasing with thrips, aphids, and spider mites being found in area fields. Thrips (**Figure 2**) are a big concern for cotton until the field starts squaring, and as area wheat fields begin to dry down they will start moving into area cotton fields. Thrips populations for the most part are well below the economic threshold, but I do have a few fields that are at the economic threshold. The fields that are at the threshold are surrounded by wheat fields on all sides. Cotton fields should continued to be monitored for thrips for the next couple of weeks, especially as our seed treatments will start loosing efficacy as we reach the 2nd true leaf stage. The economic threshold for thrips is cotton is 1 thrips per true leaf, and 1 thrips per plant on cotton in the cotyledon stage.

Figure 2. Adult thrips. Photo Credit: David Kerns, Texas A&M University

Aphids (**Figure 3**) and spider mites (**Figure 4**) are present in some area cotton fields, and their populations are still well below the economic thresholds. Currently there are not many beneficial insects in area cotton fields to keep aphid populations in check, so fields should also be monitored for potential aphid issues. The threshold for aphids in cotton is 40-70 aphids per leaf. Spider mite issues are present in a few fields and are well below the economic threshold of 40% of plants with visible damage and the population continuing to grow.

Figure 3. Aphid on cotton seedling. Photo Credit: Kate Crumley

Figure 4. Spider mites feeding on cotton leaf. Photo Credit: Kate Crumley

SORGHUM:

Sorghum acres should start being scouted for sugarcane aphids as they are present in Johnsongrass in both Hill County and Northern McLennan Counties. I have not seen or hear of reports of sugarcane aphids (**Figure 5**) in sorghum fields yet, but with them already in area johnsongrass we need to keep an eye on them so we can treat fields in a timely manner once the economic threshold is reached. The economic threshold for sugarcane aphids in pre-boot and booting sorghum is 20% of plants with 50 or more aphids.

Figure 5. Sugarcane aphids feeding on sorghum leaf. Photo credit: Rick Grantham

AUDIO UPDATES:

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

May 14, 2021 Volume 3, Issue 8

Blacklands IPM Update

GENERAL:

Wheat across the area is starting to dry down rapidly thanks to the more normal temperatures last week (May 3-7). Corn has loved the recent rains and cooler nighttime temperatures, and most fields have reached the rapid growth phase with no issues currently being observed. Cotton in the area is struggling to grow thanks to the cooler weather and high rainfall totals in some area. Cotton growth stages ranged from cotyledon stage to the two true leaf stage. Thrips populations are rapidly increasing in area cotton fields, with around 38% of the acres in the scouting program were needing to be sprayed for thrips in the last week. Aphids and spider mites are also being found in area cotton fields at populations well below their economic thresholds.

CORN:

Area corn ranges from the V8 to V10 growth stage, and issues are minimal and are mainly weed related. The recent rains and cool weather have favored growth of corn. There has been some people mentioning Northern corn leaf blight (NCLB) and rust in corn. In the corn fields I have walked through I have picked up some NCLB at low levels, and have not observed any common corn rust. The fields where I am finding NCLB Additionally, these diseases this early in the growing season has minimal impact on yields. Northern corn leaf blight (NCLB) is a fungal disease of corn that infects the foliar tissues. Symptoms start as long narrow lesion that are tan in color and run parallel to the leaf margins, and as the lesions grow, they develop the characteristic oblong, cigar shaped lesions. This disease is favored by temperature between 64F and 81F and wet humid weather and requires the leaf to be wet for a minimum of 6 hours. Although it has been common to find NCLB in Central Texas corn, or weather conditions are typically not favorable for disease development late in the season where it can reduce yields. Last year, Dr. Tom Isakeit, John Few, Zach Davis and I conducted a fungicide trials in corn to assess control of NCLB in Hill and Williamson Counties, and we failed to observe any yield response by applying fungicides. The full research report is attached to the newsletter.

Figure 1. Northern corn leaf blight of corn. Photo Credit: D. Tyler Mays, Texas A&M AgriLife

In corn there are two types of rust, common rust, and southern rust. Common rust can be found in area corn fields every year, and never develops to economic damaging levels. Common rust pustules are dark red and elongated in shape (Figure 2). Southern rust can be found occasionally in Central Texas corn fields late in the growing season and can easily reach levels that can cause an economic loss when the weather conditions are favorable. Pustules of southern rust are circular and orange in color (Figure 3). Southern rust is favored by temperatures between 54F and 97F and requires leaf wetness for infection. For more information on rust in corn, please visit the link below.
http://counties.agrilife.org/hill/files/2021/05/EPLP-049.pdf.

Figure 2. Common corn rust pustule. Photo credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

Figure 3. Southern rust of corn. Photo credit: Adam Sisson, Iowa State University, Bugwood.org

COTTON:

The area cotton crop ranges from the cotyledon stage to the two true leaf stage. Thrips numbers are increasing quickly as our area wheat crop is starting to dry down. As of the last Friday roughly 38% of my fields were at or above the economic threshold for thrips. Thrips feeding will cause the leaves to become distorted and curl up causing what is called opossum earing. I have seen this opossum earing in every fields in the scouting program, but not all fields had thrips populations near the economic threshold, this leaf deformation can also be caused by high winds blowing sands or when the temperatures are high. As you can see in **Figures 4 & 5**, thrips populations are increasing but it is hit or miss if a field is at the economic threshold. Some factors at play are 1) proximity to wheat fields, 2) the amount of wheat nearby, 3) the growth sage of nearby wheat, and 4) the growth stage of cotton. The cotton growth stage is important because our insecticide seed treatments are highly effective up until the 2 true leaf stage, and/or about 28 days after planting depending on environmental conditions. The economic threshold for thrips in cotton is 1 thrips per true leaf stage, example, a 2 true leaf cotton field that averages 2 thrips per plant is at the economic threshold. There are number of foliar insecticides that are highly effective at managing thrips in cotton and include the active ingredients acephate (Orthene and generics), dicrotophos (Bidrin), dimethoate, and spinetoram.

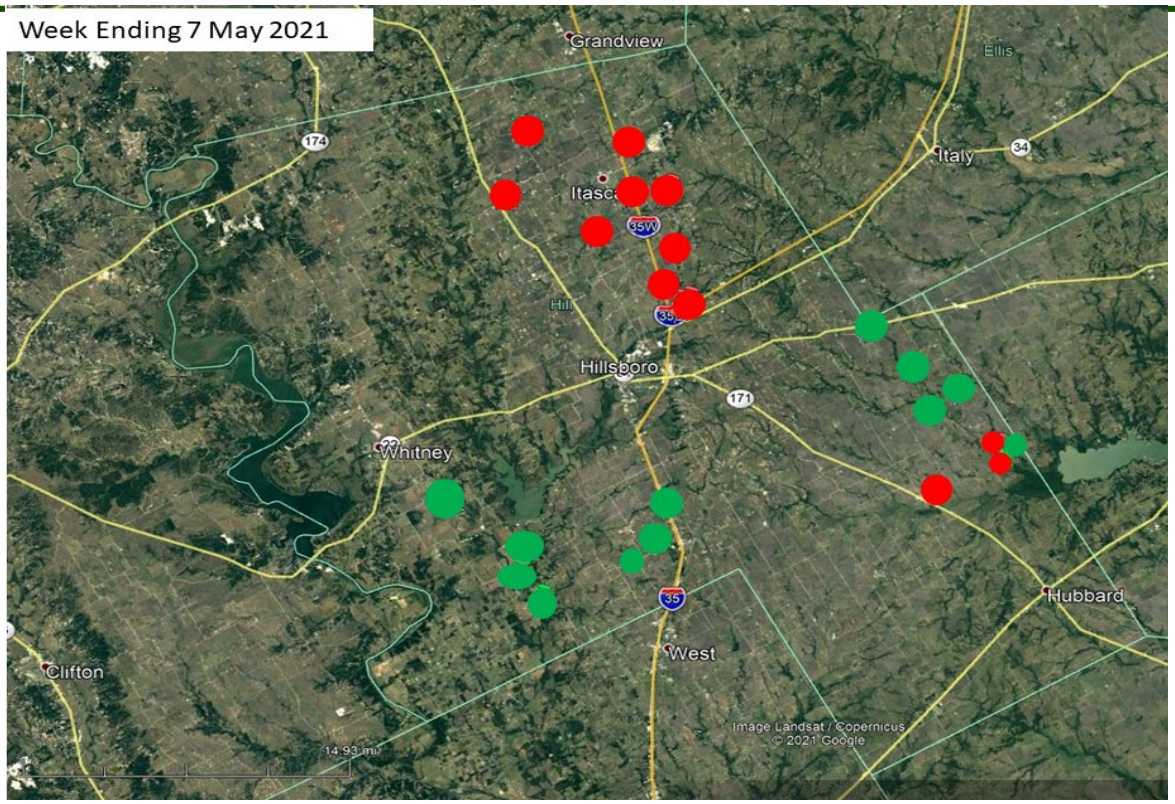

Figure 4. Fields at threshold for thrips in Hill County during the week ending 7 May 2021. Red dots indicate fields that are at the economic threshold, and green dots represent fields below the economic threshold

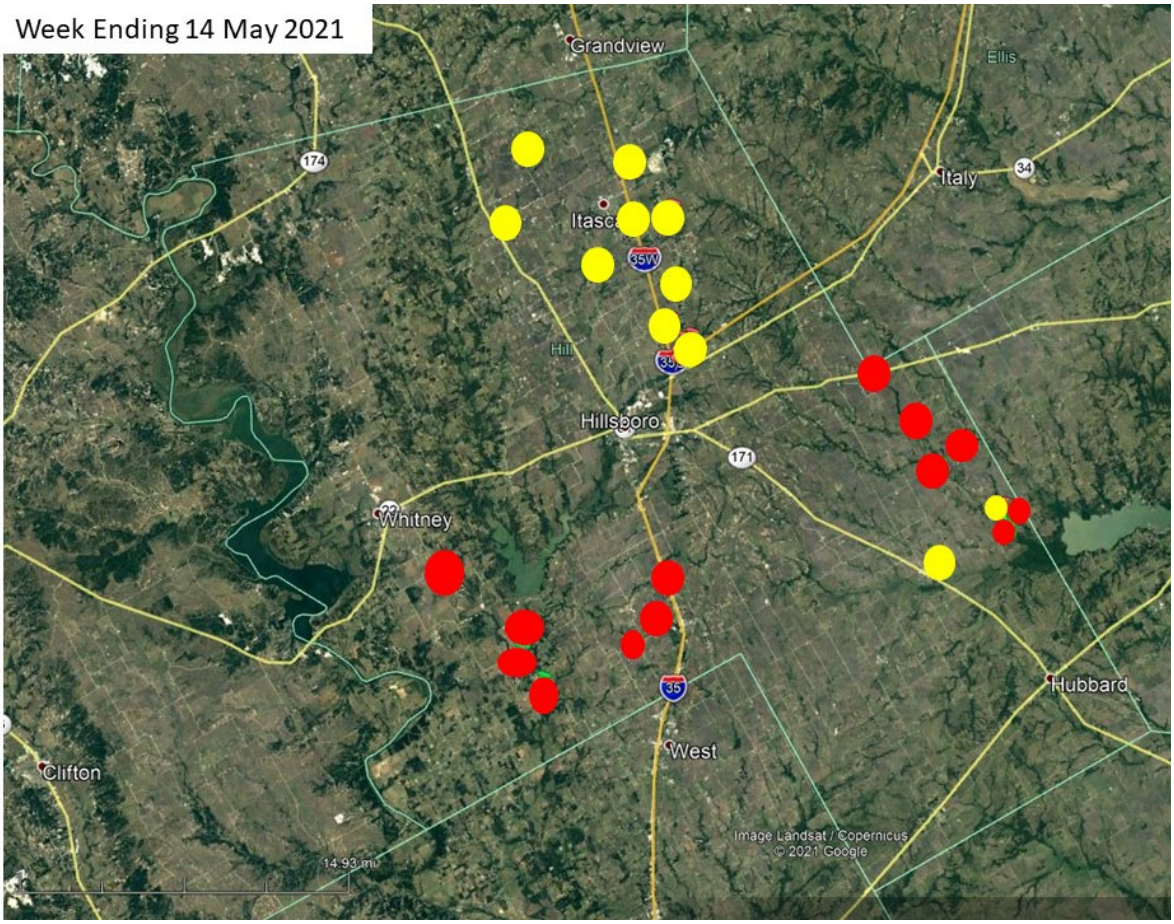

Figure 5. Fields at threshold for thrips in Hill County during the week ending 14 May 2021. Red dots indicate fields that are at the economic threshold, and yellow dots represent fields that were sprayed for thrips last week.

Aphids and spider mites are continually being found in area cotton fields at levels below the economic threshold. Both insect populations should continue to be monitored, as under favorable conditions their populations can quickly reach the economic threshold. In cotton with no open bolls aphids should be treated when they average 40-70 aphids per leaf. Spider mites in cotton should be treated when 40% or more of the plants are showing visible damage and the mite population is growing.

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Audio Updates from other regions of Texas: https://www.texasinsects.org/agriculture-audio-updates-home.html

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

May 21, 2021 Volume 3, Issue 9

Blacklands IPM Update

GENERAL:

Widespread rain has been the story for most of this past week, with areas receiving over 3" of rain. These recent rains and rains from a few weeks ago have led to ponding, flooding, and waterlogged soil conditions in some areas; and could potentially lead to some soil fertility issues. Currently all cotton in the area is susceptible to thrips injury and will remain that way until the field start setting squares. The area corn crop has benefited greatly from this moisture and cooler weather, but this may also lead to further development of northern corn leaf blight.

WATERLOGGED SOILS AND FERTILITY:

Waterlogged soil conditions can cause several issues with soil fertility and plant growth including roots. Soils that are waterlogged lack the oxygen need in the soil profile for the roots to transpire and absorb available nutrients. Additionally, when the soil is waterlogged root growth slows and can lead to a shallow root system which can make the crop more susceptible to drought and heat stress later in the growing season. Waterlogged soil conditions can also increase the plants susceptibility to diseases, as the lack of oxygen in the soil profile can lead to root decay.

Soil nutrients can also be lost during excessive rains and when soil become waterlogged. The most susceptible nutrient to loss during waterlogged conditions is Nitrogen (N), which can be lost through denitrification, leaching, and soil erosion. Leaching is the loss of N to lower portions of the soil profile as water moves through the soil profile and is not very common in soils with heavy clays like we have in this area. Denitrification is the conversion of nitrate and nitrite to gaseous nitrogen through a biochemical process carried out b anaerobic bacteria. The denitrification process can occur rapidly at when the soil is waterlogged and temperatures are between 77°F and 95°F and can be affected by the soil pH. The source of N applied recently may also affect the amount of N lost to denitrification, as both Ammonia and Ammonium are not susceptible to the denitrification process until they go through the nitrification process. Although the rain was greatly needed it could have depleted our soil N in some fields especially in terrace channels and other places that hold water and depending on the crop we may need to thank about applying additional N to ensure we can reach our yield potentials.

Corn requires about 1.2 lbs N/acre for every 1 bushel/acre, and by the VT/R1 growth stage roughly 75% of the total N has been absorbed by the plant. So, for example, a field with a yield potential of 120 bu./acre will require roughly 100 lbs N/acre, and by the VT growth stage will have taken up roughly 75 lbs N/acre, with the need of 25 more lbs N/acre to reach the 120 bu./acre yield goal. With most of the fields in the area still not at the VT growth stage, but quickly approach tasseling, I do not suspect there will be a need for additional N being applied. Cotton on the other hand has not reached the peak demand for N and could possibly benefit from an additional application of N once we start drying out. Cotton requires about 50 lbs N/acre to produce a 1 bale/acre cotton crop, and N demand does not really pick up until the plants start squaring and peaks during peak boll fill. For cotton there is still a lot of time in the growing season where we could correct any soil N deficits and reach our yield goal. It is highly recommended to take soil samples to at least 12 inches, but preferred to a depth of at least 18 inches, and submit them for nutrient analysis. The best response to N applications will occur when they are completed by early squaring, additionally, knifing in N should stop once plans reach the pin head square stage to avoid root clipping. Side dressing N with Y-drops can also benefit the crop by providing additional N to the soil. There are foliar N products out there, but in the long run they may be more costly than knifing or Y-dropping additional N, because of potential for leaf burn and the need for multiple foliar N applications.

CORN:

The corn crop in the area is quickly approaching the VT (tassel emergence) growth stage, and getting close to peak water demand, so these recent rains will be very beneficial to our corn crop. As of right now there are very few issues being observed in the corn fields I have walked through, with just a few fields with low levels of northern corn leaf blight (NCLB). The incidence and severity of NCLB (**Figure 1**) currently varies on the hybrid's susceptibility, previous crop on the field, and tillage practice. Prior to the rains this week, I have not seen any corn fields near the incidence or severity that would warrant a fungicide treatment. These recent rains and temperatures however could help lead to new infections in these fields as well as others in the area. In corn it is important to keep the ear leaf and the leaves above the ear as free of disease as possible to maximize yields, as these leaves are responsible for producing most of the energy the plant needs to fill out the ear. With the recent rains and the forecasted temperatures out to next Friday (May 28) it is highly recommended to keep monitoring your most susceptible hybrids, fields following corn, or with residue on the surface, for the development of northern corn leaf blight. This disease rarely reaches levels that justify treatment, and during 2020 a fungicide trial did not see any yield benefit from the application of fungicides. There may be some fields that are corn behind corn, and with high residue that may need to be sprayed, but fields will need to be monitored to decide if a fungicide is warranted. Below in **Table 1** is a decision aid from Dr. Tom Isakeit, to be used for deciding if a field should be treated with a fungicide. If your field(s) do have levels of NCLB that justify treatment, at the growth stage most of our corn getting close to tasseling, nonionic surfactants (NIS) should not be used as they can cause arrested ear syndrome.

Table 1. Northern corn leaf blight decision aid to determine if fungicide application is warranted in Central Texas.

1) Is the hybrid susceptible to NCLB? E.g. on a scale of 1-10, where 10 is very susceptible, it ranks 8 or higher.
YES—Go to 2
No—No need to spray
2) Was the previous crop corn, and is there residue?
YES—Go to 3
NO—No need to spray
3) Are there lesions on at least 50% of plants
YES—Go to 4
NO—Don't spray be keep checking field
4) Is corn approaching or at tasseling?
YES—Go to 5
NO—Don't spray but check forecast for wet weather
5) Is there rain in forecast?
YES—A preventative fungicide application would be warranted between VT and R1 (flowering)
NO—Don't spray yet, but once crop is past R1, there would be no benefit from fungicide application

Figure 1. Northern corn leaf blight lesion observed in corn on May 13, 2021.

COTTON:

The area cotton crop is between the 2 true leaf and 4 true leaf stage, and most field will soon be out of the window for thrips damage and susceptible to fleahopper injury. Fields once starting to square, typically around the 5th true leaf stage are typically no longer susceptible to thrips damage. Thrips should be treated for when they are averaging 1 thrips per true leaf, for example a field at the 3 true leaf stage averaging 3 thrips per plant should be treated. Fleahoppers will soon be the most important issue to scout for and are pale to grayish green in color (**Figure 2**). The cotton fleahopper feed on young squares, and this feeding cause the bracts of the square to flare out before it is eventually kicked off the plant. The first three weeks of squaring is the most important time to protect the crop from fleahopper damage. The economic threshold for cotton fleahoppers in the Texas Blacklands is 10-15 fleahoppers per 100 terminals.

Figure 2. Adult cotton fleahopper. Photo credit: James Smith, Mississippi State University, Bugwood.org

Blacklands IPM Update is a publication of Texas A&M AgriLife Extension IPM Program in Hill & McLennan Counties.

Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

May 28, 2021 Volume 3, Issue 10

Blacklands IPM Update

GENERAL:

Cool and wet weather remains in the forecast for the next 10 days. This rainy spell has delayed harvest, caused disease concerns in corn, and slowed down cotton growth and development. There were some wheat harvest operations going on Thursday, but I have not hear how the test weight and grain quality has held up on these fields. Wheat producers are concerned with reduced test weights and sprouting in the head after the recent rains. Cotton growth has been slow for the last 10 to 14 days as the cloudy skies, cooler temperatures, and excessive soil moisture has been unfavorable for cotton growth. Corn in the area is starting to pollinate in some fields, with other still a week or two out from tasseling, and the recent cool and wet weather has been a cause of concern for some corn producers with northern corn leaf blight.

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WHEAT:

Wheat harvest has been delayed, but late this week there has been a few fields harvested in the area. I have not heard how the grain quality of these fields have held up with the cool rainy weather over the last 14 days. There recent rains have brought concerns of lower test weights, and pre-harvest sprouting. Texas weight of grain crops especially wheat and other small grains can be reduced by repeated wetting and drying of the grain. To understand how this happens when wheat is at physiological maturity the grain it about 37% moisture and the kernels are too soft for harvest operations. Rainfall and/or heavy dews between physiological maturity and harvest causes the kernels to swell, and as they redry they do not return to their original size and shape. This swelling of the kernels causes the grain to not pack in to the given volume as well which is why our test weight drops. This reduction in test weight can lead to an increase in the number of bushels produced on the field, but the weight of the bushel will be lower.

Pre-harvest sprouting is a phenomenon where kernels sprout in the head before the field can be harvested, and with the recent rains is something some area producers are concerned about. Pre-harvest sprouting is caused by pro-longed periods of rain and/or high humidity before the crop can be harvested. Environment conditions during grain fill, mainly temperature can increase he susceptibility of the crop to pre-harvest sprouting. When the grain is produced during cool temperatures it typically has a higher level of dormancy, and are more resistant to pre-harvest sprouting, while high temperatures during grain maturation tends to increase the possibility of pre-harvest sprouting. The t emperatures we experienced during grain maturation were cool, and most fields should have so decent dormancy. The risk of seeing pre-harvest sprouting is increased by repeated wetting and drying cycle. Additionally, there also appears to be varying degrees of susceptibility between varieties. As of now I have checked a handful of fields throughout the county and have not found any signs of pre-harvest sprouting, but talking to a local grain elevator that had some wheat brought in said they had seen a low amount of pre-harvest sprouting in wheat. Digging through the internet, the last time we had conditions favored for pre-harvest sprouting was in 2015, and I found an article written by Clark Neely. This article can be found on the Texas Row Crop Newsletter Blog and can be found at https://agrilife.org/texasrowcrops/2015/06/02/pre-harvest-sprouting-threatening-2015-texas-wheat-crop/.

CORN:

The area corn crop is growing nicely, but much like our wheat and cotton crops it too could use a break from the rain. Corn in the area ranges from currently pollinating to about 10-14 days from tassel emergence. I have picked up some fall armyworm feeding in some non-Bt corn, and have seen an increase in corn earworm moth activity over the last 7 to 10 days. Northern corn leaf blight (NCLB) remains and concern for some area corn producers as more rain and cool temperatures remain in the weather forecast for the next 10 days. For those that are still on the fence about spraying or not spraying for NCLB, there are three factors that will decide if your field(s) are at risk for needing a fungicide application. These factors include 1) degree of susceptibility of the hybrid to NCLB, 2) how long has corn been grown on the field as corn on corn cropping practices increases susceptibility, and 3) is there any corn residue on the soil surface. The continuation of rain changed in the forecast and daily high temperatures not predicted to exceed 80°F for the next 10 days, is creating an environment favorable for disease development. Tom Isakeit and myself put together a Blog post covering NCLB for the Texas Row Crop Newsletter, which included a decision aid (**Table 1**), and can be found at https://agrilife.org/texasrowcrops/2021/05/21/northern-corn-leaf-blight/. Additionally, there is more information on NCLB in previous newsletters that can be found on the Hill County AgriLife Extension Service webpage at https://hill.agrilife.org/newsletters/ipm-newsletter/.

Table 1. Northern corn leaf blight decision aid to determine if fungicide application is warranted in Central Texas.

1) Is the hybrid susceptible to NCLB? E.g. on a scale of 1-10, where 10 is very susceptible, it ranks 8 or higher.
YES—Go to 2
No—No need to spray
2) Was the previous crop corn, and is there residue?
YES—Go to 3
NO—No need to spray
3) Are there lesions on at least 50% of plants
YES—Go to 4
NO—Don't spray be keep checking field
4) Is corn approaching or at tasseling?
YES—Go to 5
NO—Don't spray but check forecast for wet weather
5) Is there rain in forecast?
YES—A preventative fungicide application would be warranted between VT and R1 (flowering)
NO—Don't spray yet, but once crop is past R1, there would be no benefit from fungicide application

COTTON:

Cotton in the area is still growing slowly, and there are three explanations, 1) our cooler temperatures have led to almost 90 GDD60s less than the 5-year average GDD60s accumulation (**Figure 1**), 2) the prolonged period of rain has led to excessive soil moisture which is not conducive for cotton growth, and 3) prolonged cloudy days has reduced the photosynthetic rate of plants slowing down energy production by the plant. Area cotton ranges from 3 true leaves to 7 true leaves with some fields starting to set squares. There are still a lot of thrips out in the area, and cotton that has not yet started setting squares is still susceptible to thrips damage. Fleahoppers are in the environment, with most of them being found in roadside ditches, but I have found a few fleahoppers in some fields. It is important to protect cotton from avoidable square loss like from fleahopper damage, for the first three weeks of squaring. The economic threshold for fleahoppers in cotton in the Texas Blacklands is 10-15 fleahoppers per 100 plants.

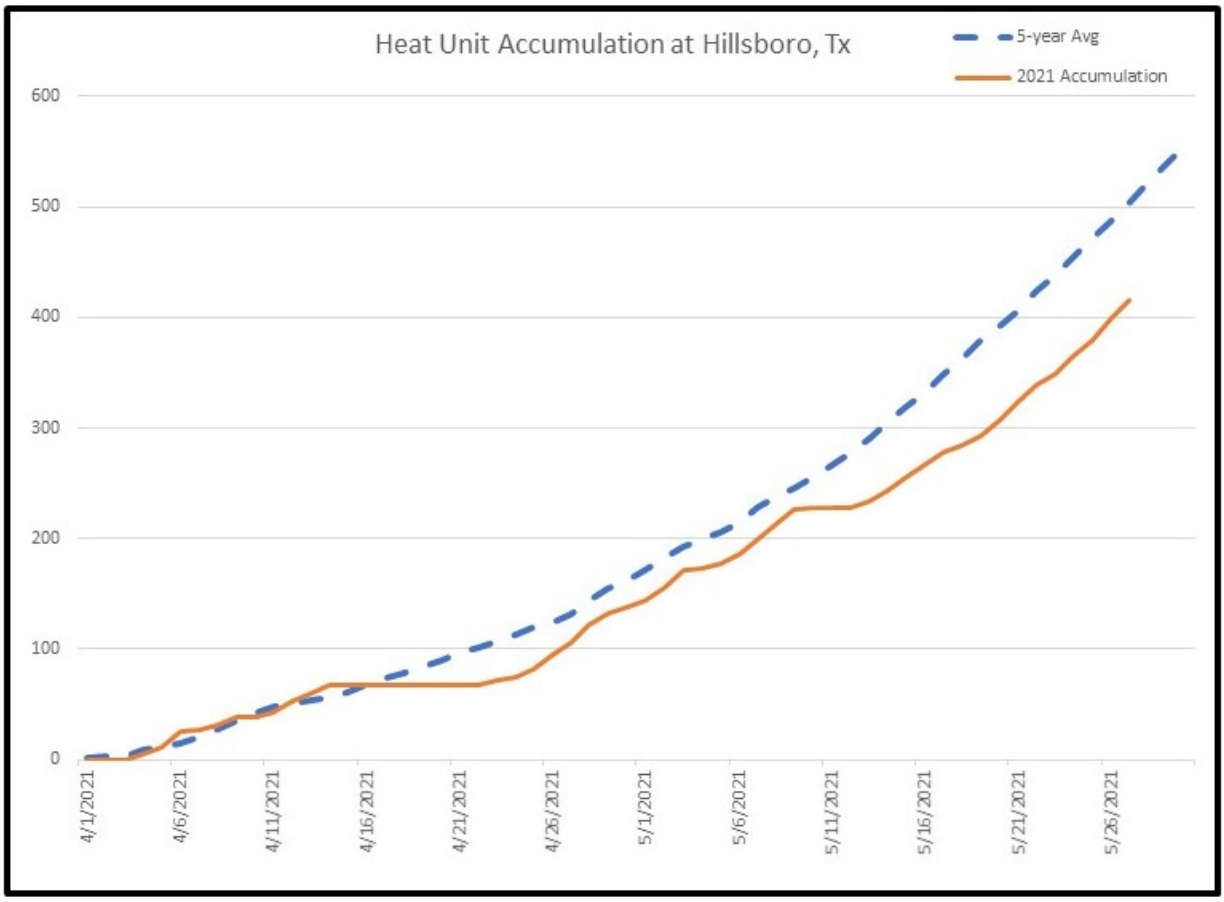

Figure 1. GDD60s accumulated from April 1, 2021 through May 27, 2021 (Solid line) at Hillsboro, TX compared to the 5 year average (Dashed line).

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

Texas IPM Partners With Nature

Blacklands IPM Update

Texas A&M AgriLife Extension

GENERAL:

Dry and warmer weather is finally moved into the area during the middle of this past week and has allowed for wheat harvest to ramp up and cotton growth. As wheat harvest is finally in full swing, I am seeing some preharvest sprouting in some area wheat fields, both hard and soft wheat are affected and from the fields I have looked at average less than 5 % sprouts. Preharvest sprouting has caused some to be concerned about saving seed to plant again in the fall. As our corn and cotton fields start drying out, we will eventually see the extent of how much Nitrogen was loss through denitrification and leaching. Insect pest populations have increased over the last two weeks, with cotton fleahopper population reaching threshold in some fields, and aphid populations starting to increase rapidly. Most of the corn is past pollination and starting to develop kernels. Northern corn leaf blight is become less of an issue in area corn fields because of the crop's growth stage and the weather pattern we are getting into is not conducive for further development of the disease. At this point what we need to keep an eye out for is southern rust and spider mites if we start getting too dry and warm.

COTTON:

Area cotton ranges from 6 true leaf stage up to the 12 true leaf stage with match head squares. I have noticed that just about every cotton variety has set squares higher on the plant than they normally do, an this can be explained by the cool, cloudy, and waterlogged stresses that caused the plant to use its resources to survive rather than to set fruit. As we are drying out, I highly recommend taking a soil sample to test for the nutrient availability of your fields, and determine what additional fertilizer need to be applied to reach your desired yield goal. A shot of foliar N may help the plant sustain itself for a few day and give it a jump start, but it will not replace the need to soil applied N if the soil is deficient. Due to where we are in the growing season applying formulations of rapidly available nutrients is going to give the best return on investment. This will include side dressing with either a coulter rig or Y-drops, and application of dry formulations may not be converted to the plant available form in time for the plant to benefit from the application. Additionally, we want to make sure not to over fertilize as this can attract some pest, and lead to management difficulties such as excessive growth and difficulty with defoliation later in the year.

Cotton fleahopper populations have exploded in some areas of Hill County, with some fields running around 24 fleahoppers per 100 plants, while some fields have no fleahoppers. Most of the fields at threshold for fleahoppers are in the western and northern portions of Hill County. The adult cotton fleahopper is a grayish to pale green, and about 1/8th of an inch long (**Figure 1**), while the nymph is much smaller and a lighter green with red eyes (**Figure 2**). They are a major pest during the square phase of cotton up until early bloom because they feed on the young developing square by piercing the square and feeding on the plant juices. This feeding causes the squares to eventually be shed from the plant, reducing the number of fruiting positions. The squares produced during the first three weeks of flowering will go on to produced the biggest most valuable bolls, and this is why it is important to protect the plant from fleahopper and other plant bug damage. The economic threshold for cotton fleahopper in the Texas Blacklands is 10-15 fleahoppers per 100 terminals. There is a number of insecticide and tank mixes available for fleahopper management and the most common products can be found in the table below.

Figure 1. Adult cotton fleahopper. Photo credit: James Smith, Mississippi State University, Bugwood.org

Figure 2. Cotton fleahopper nymph. Photo credit: Xandra Morris

Table 2. Suggested Insecticides and Rates for Managing Cotton Fleahoppers in Cotton

Insecticide (trade name)	Lb active ingredient per acre	Amount of formulated product per acre	Acres treated per gal or lb of formulated product	Mode of action group (*IRAC)
Acephate[1] (Orthene 97, Acephate 90, generics)	0.24	4 oz	4	1B
Acetamiprid[1] (Intruder Max 70WP/ Strafer Max, generics)	0.026–0.048	0.6–1.1 oz	26.67–14.55	4A
Dicrotophos[1] (Bidrin 8EC, generics)	0.25–0.5	4–8 fl oz	32–16	1B
Flonicamid (Carbine 50WG)	0.054–0.089	1.7–2.8 oz	9.41–5.71	29
Imidacloprid[1] (Alias 4F, Admire Pro, generics)	0.031–0.063	1–2 fl oz	128–64	4A
Oxamyl (Vydate C-LV 3.77)	0.125–0.5	8–32 fl oz	16–4	1A
Thiamethoxam (Centric 40WG)	0.031–0.063	1.25–2.5 oz	12.8–6.4	4A

[1] Rates vary depending on product and formulation.
*IRAC = Insecticide Resistance Action Committee (1A = Carbamates, 1B = Organophosphates, 4A = Neonicotinoids, 29 = Flonicamid)

Cotton aphid numbers have started rising, especially in fields that have been sprayed with acephate for thrips. Currently I have not found a field that were at threshold for cotton aphids, but I have recommended including imidacloprid to be mixed with fleahopper shots in hopes of suppressing the population enough to keep them from reaching the economic threshold. Reports from the Brazos bottoms around College Station the aphid number there are averaging well over the economic threshold in some fields, with some local fields average over 150 aphids per leaf. Cotton aphids damage the plant by feeding on the underside of cotton leaves, stems, and terminals. This feeding reduces yields by reducing the carbohydrate production of the plant that would be used to produce bolls. When aphid populations get extremely heavy the infested leaves will begin to curl downward. Another issue with cotton aphids is the potential transmission of the Cotton Leaf Roll Dwarf Virus, which has been found in other portions of Central Texas in previous years. The threshold for aphids in cotton is based on if there are any open bolls on the plant, and with our cotton no where near having open bolls the current economic threshold is 40-70 aphids per leaf. Currently there are some plants with over 70 aphids per plant in fields, but when sampling over 100 plants the aphid numbers drop well below the 40-70 aphids per leaf. There are several insecticides labeled for aphid management in cotton and can be found in the Table below.

Table 2. Suggested Insecticides and Rates for Managing Aphids in Cotton

Insecticide (trade name)	Amount of formulated product (fl oz or oz per acre)	Lb of active ingredient per acre	Acres treated per gal or lb of formulated product	Mode of action group (*IRAC)
Flupyradifurone (Sivanto 200SL)	7.0–10.5	0.0913–0.137	18.29–12.19	4D
Flonicamid (Carbine 50WG)	1.4–2.8	0.044–0.089	11.43–5.71	29
Acetamiprid[1] (Intruder Max 70WP/Strafer Max)	0.6–1.1	0.025–0.05	26.67–14.55	4A
Dicrotophos[1], [@](Bidrin 8EC)	4.0–8.0	0.25–0.5	32–16	1B

[1]Rates will vary depending on product formulation.
[@]Suppression only
*IRAC = Insecticide Resistance Action Committee (1B = Organophosphates, 4A = Neonicotinoids, 4D = Butenolides, 29 = Flonicamid)

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

June 18, 2021 Volume 3, Issue 12

Blacklands IPM Update

GENERAL:

Wheat harvest is finally wrapping up for most area producers and I have et to hear a lot of yield averages, just that yields were lower than expected. Corn continues to progress nicely, and most of the crop is past any major yield loss from turning off hot and dry. Southern rust is being found in McLennan County, and we need to keep an eye out for this disease in some of our younger corn fields. Cotton aphids and fleahoppers continue to be found in area cotton fields, that were not treated last week. Sorghum across the area is starting to head out with some locations starting to bloom and should be scouted for sugarcane aphids and midge.

COTTON:

Most of the cotton is the area is finally starting to set squares and growing nicely thanks to the rains in May, or soils drying out a little bit, and warmer temperatures. There are some fields around the area that need a plant growth regulator application to slow growth and avoid excessive plant height that may cause harvest issues down the road. Plant growth regulators will not stop the plant from growing, but it affects the rate at which cells can expand leading to shorter internode lengths and shorter statured plants. They will not help the plant set more squares, but may help the plant retain squares, and often there is no yield benefit but can make harvest operations easier. For the few cents per ounce for mepiquat chloride a 4-8 oz/acre shot during squaring when growing conditions are highly favorable it can shorten the plants a bit and make harvest operations easier. Currently I and only recommending applications of 4-6 fl oz/acre based on the variety's growth habit, and additionally if we continue to stay warm and dry the PGR application at 8 fl oz/acre may be enough to stress the plant enough where it hurt the fields yield potential. If we catch more rains soon and environmental conditions remain favorable for crop growth additional applications of a PGR may be warranted and/or needed.

Cotton insect pest activity is still highly active and has increased over the last week. Fleahoppers are being found in most wheat fields above the economic threshold of 10-15 per 100 terminals, especially in fields that are squaring and have not been treated for fleahoppers during the last 7-10 days. Last week I had some fields treated with 4 oz./acre of acephate (Orthene) plus 2 fl. oz/ acre of imidacloprid, and some fields treated with 2 oz/acre of centric. Both mixtures appear to be working very nicely, and I have also heard of reports from the Brazos River bottoms of Bidrin plus imidacloprid working really good on cotton fleahoppers. Based on what our numbers are now and the population numbers I am hearing from the southern Blacklands and Brazos river bottom we could very easily need a second application, and on fields that have received the acephate plus imidacloprid shot the first time around I am think an application of centric on the second fleahopper shot may provide enough knockdown and residual to carry us through the window of susceptibility to fleahopper damage.

Cotton aphid populations are still increase in a few fields in the scouting program but are nowhere near the economic threshold. The economic threshold for aphids in cotton at this point in the growing season is 40-70 aphids per leaf, and I am currently finding some leaves with over 100 aphids but when I average these with the other leaves sampled across a field I am finding the fields averaging below the economic threshold. When treating for fleahoppers we need to be aware of if aphids are present in a field or not, especially if we are treating with acephate as this can flare aphid populations. Last week I had some fields that needed to be treated for fleahoppers, and had aphids in the field as well and elected to go out with the acephate plus imidacloprid treatment, and although imidacloprid is weak on aphids I am seeing some reduction in population and it will probably suppress the population enough for either weather to knock them out or our beneficials to move into the field and help keep their numbers below the economic threshold.

CORN:

Corn is progressing nicely thanks to the warm weather drying out our soils from a waterlogged state making it possible for the plant to uptake the water and nutrients needed for development. Our weather conditions are no longer favorable for northern corn leaf blight development, but there is another disease we need to keep an eye on in corn. Over the course of this week, I have seen southern rust in the Taylor area, and received report of sightings in both Hill and McLennan Counties. In corn we can see two different rust the first being common rust and the second being southern rust. Common rust is typically around early in the season because it is favored by cooler weather, while southern rust typically is found later in the year around the pollination and grain fill growth stage due to it being favored by slightly warmer temperatures. Common rust is not a disease we are concerned about in Texas, as it rarely if ever has reached levels that could cause economic loss. Pustules of common rust are elongated in shape and brick red in color and will be found sporadically across the leaf surface. Southern rust pustules are an orange color and circular in shape and will be found in dense clumps of pustules on the leaf surface (Figure 1). If treatment is need will depend on multiple different factors that can affect the disease severity and potential for yield loss, these being hybrid susceptibility, growth stage, and incidence and severity of infection if present. Fungicides sprayed before the blister to dent stage to target northern corn leaf blight or southern rust will not provide long enough residual activity to protect the plant from economic yield loss if the environment remains favorable for disease. Additionally, fungicides are rarely justified past the hard dough to dent stage for southern rust as the potential for yield loss drops dramatically once the crop reaches the dent stage. Fungicides should be applied when 3-5% of the leaf area on the lower leaves of at least 50% of the plants are infected with southern rust. Fungicide selection is not a major issue, and even some of our cheaper products can provide good enough control of southern rust to prevent a large loss in yield. Tom Isakeit, Extension Plant Pathologist out of College Station has put together an excellent factsheet on southern rust covering identification, determining when to treat, and what fungicide can be used in Texas corn, and can be found at http://counties.agrilife.org/hill/files/2021/05/EPLP-049.pdf.

Figure 1. Visual comparison of southern rust pustules (left) and common rust pustules (right) in corn. Photo credit: Tom Isakeit, Texas A&M AgriLife Extension.

SORGHUM:

Sorghum fields in the area are starting to head out with some higher elevations in fields starting to pollinate. With pollination going on now or quickly approaching area fields we need to keep an eye out for sorghum midge. The best time to scout for sorghum midge is in the morning up until about 10:00am, by beating flowering heads into a bucket and then counting the number of midge present. I currently have not seen or heard of any midge being found in Hill and Northern McLennan Counties, but they were high in the Brazos bottoms over the last two weeks.

The economic threshold for midge in sorghum is based on the cost of control, grain value, and number of flowering head per acre (Figure 2). Sugarcane aphids are also present in some area sorghum fields but remain below the economic threshold currently. The economic threshold for sugarcane aphids is based on the percent of plant infested with 50 or more aphids per leaf at different growth stages (Figure 3). If we are needing to treat for midge, we need to be cognizant of sugarcane aphid populations, as pyrethroids are usually used to manage midge in sorghum, and they can cause the sugarcane aphid populations to explode. If a midge treatment is needed and sugarcane aphid populations are approaching the economic threshold it would be beneficial to go ahead and include an insecticide for sugarcane aphid management to avoid need to treat for aphids a few days later. Sivanto is probably the best insecticide labeled for sugarcane aphids, but another product that can be used but not as effective as Sivanto is Transform.

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Table 17. Estimated economic injury levels for sorghum midge for a range of factors. (This table is only a guide. Use the equation in the text to estimate the economic injury level in your field.)

Control cost, $/A	Crop value, $100 lb	Economic injury level—mean number of midges/flowering head		
		Flowering heads = 18,000/A	Flowering heads = 45,000/A	Flowering heads = 67,500/A
5	6	1.6	0.6	0.4
5	7	1.3	0.5	0.34
5	8	1.2	0.5	0.3
6	6	1.9	0.8	0.5
6	7	1.6	0.7	0.4
6	8	1.4	0.6	0.35
7	6	2.2	0.85	0.6
7	7	1.9	0.75	0.5
7	8	1.6	0.65	0.45

Figure 2. Economic injury level table used to determine when to treat sorghum for midge.

Table 11. Action thresholds based on sorghum growth stages (Source: revised from thresholds created by Louisiana State University)

Growth stage	Action threshold
Preboot	20% of plants infested with 50 or more aphids
Boot	20% of plants infested with 50 or more aphids
Flowering–milk	30% of plants infested with 50 or more aphids
Soft dough	30% of plants infested with established aphid colonies and localized areas1 with heavy honeydew
Dough	30% of plants infested with established aphid colonies and localized areas[1] with heavy honeydew
Black layer	Heavy honeydew and established aphid colonies. Treat only to prevent harvest problems. Observe preharvest intervals for insecticides.

1: A single plant or group of adjacent plants with sugarcane aphid colonies

Figure 3. Economic threshold for sugarcane aphids in grain sorghum based on growth stage and percent

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

July 2, 2021 Volume 3, Issue 13

Blacklands IPM Update

GENERAL:

Cotton fields are progressing nicely, and have a good square set especially for being in waterlogged soils for almost the entire month of May. I did start picking up blooms in some fields around Abbott and Aquilla last week (June 21-25), but these were mostly in higher elevated or well drained fields or areas of fields. Pest activity in cotton is still highly active as last week I was finding fields at or above the economic threshold, and I have also started picking up on bollworm eggs throughout the county and lygus bugs in some area fields. Corn is rounding the corner to grain harvest, and silage harvest operations are currently underway. All the corn fields I have looked at are at the dent stage and still has some kernel weight to be added, and there are a few pests we need to remain on our radar. Grasshoppers are highly abundant, and I found some significant grasshopper damage in corn driving on a county road near Abbott. Most of the sorghum in the area is starting to bloom, and we need to keep an eye out for midge as the wet weather during the month of May delayed crop development and we are now past the last bloom date that would potentially avoid midge damage. In sorghum we also need to keep a watch on head worms and sugarcane aphids.

COTTON:

Cotton in the area ranges from just starting to set square to peak bloom in some of our earliest planted cotton on the western portions of the county. The recent rains will be timely as due to the wet weather during the month of May, cotton plants did not have much need to set a deep root system to scavenge moisture from the soil profile, and some fields in peak bloom were starting to show the early symptoms of Potassium deficiency. Insect pest activity remains high across area cotton fields, with fleahoppers still a threat to cotton that has not started to bloom, bollworm eggs being found in area cotton fields, and some fields with very low populations of lygus bugs.

Fleahoppers remain an issue for area cotton fields, especially those that have not started blooming. The overall number of fleahoppers are lower than what they were two even three weeks ago, but I still am finding fields with treatable populations of cotton fleahoppers around Hill County. For fields that still have a way to go to reach the early bloom stage, it is highly recommended to continue scouting for cotton fleahopper as they can reduce the crops yield potential rather quickly if left untreated. In fields that have reached the early bloom stage it is highly likely that those fields are not longer at risk of economic loss from cotton fleahopper. Over the course of the last three weeks I have used Acephate at 4 oz/acre plus 2 oz/acre imidacloprid, Centric at 2 oz/acre, and Bidrin at 4 oz/acre plus 2 oz/acre for fleahopper control, and have seen good results out of all three prescriptions. They are holding fleahopper back for 7 to 10 days after applications, with Centric providing the longest residual activity against fleahoppers.

Grasshoppers are causing defoliation in some are corn fields, and as we get closer and closer to corn harvest, we could see them moving into nearby cotton fields. Much like in corn, grasshoppers are an occasional pest of cotton and rarely reach level or cause enough damage that would justify spraying an insecticide. Over the last 7-10 day I have picked up on some grasshopper damage and grasshoppers in cotton fields, but their number and amount of damage cause has not been a cause of alarm for me. Treatment for grasshoppers in cotton is not justified until they have caused a lot of defoliation (30% or more), which typically occurs along field margins first. If field margins are being defoliated by grasshoppers, they can commonly be managed by spraying fields edges especially those that border where the grasshoppers are coming from. Grasshopper damage in cotton is usually worse in fields that are bordered by native range lands, pastures, and even hay fields and these fields and field edges should be scouted first. Insecticide such as Bidrin, Prevathon and multiple types of pyrethroids are labeled for grasshopper management in cotton. However, if you do have to treat for grasshopper the best insecticide to apply is Prevathon which provide good control and does not kill all the beneficial insect in the field that are helping keep secondary pest like aphids and spider mites below the economic threshold.

The full moon last week (June 21-25) has led to some bollworm eggs being laid in area cotton fields, but egg number remain quite low. As we move further into the growing season, we need to keep a close watch on bollworm eggs and bollworm number in area cotton fields so we can treat prior to them getting too big to control or moving into bolls or deep into the canopy where it will be hard to get good coverage with an insecticide application. In cotton with the Bollgard 2 and TwinLink Bt technologies, we need to keep a very close eye out for bollworm issues as I am already hearing reports of bollworms making it through these technologies in the gulf coast region of Texas. I suspect we will see another flight here in about 7 to 10 days that will be a big one, as most of the earworms in corn just cut out of the ear to pupate into adults. In Texas we have two economic thresholds for bollworms, one is based on egg lay and the other is based on the amount of damage fruit and the presence of live worms. The egg threshold was developed for use in out two gene cotton (Bollgard 2 and TwinLink) in areas where Bt resistance has been a major issue and is 20% egg lay or 20 percent of the plants inspected with at least one egg. This region of Texas has not seen many Bt resistance issues in cotton in a while, and it is not likely that our dual gene cotton will benefit from an insecticide being sprayed based on egg lay. The threshold for bollworms I recommend for this area of Texas is 6% damage fruit (squares and bolls) with live worms present. There are several insecticides labeled for bollworm control in cotton, but it is highly advised to avoid using pyrethroid based insecticides as there is data show our bollworm populations have a good level of resistance to pyrethroids, and it will likely cause aphids and even spider mite number to increase rapidly. Prevathon is still the best insecticide choice for bollworms, and the company selling the product is eventually switching from Prevathon to a new product called Vantacor which is just a higher concentration of Prevathon with lower uses rates between 0.7-2.5 fl oz/acre versus the use rates of 8-29 fl oz/acre for Prevathon.

Lygus bugs have also been found in a few cotton fields around Aquilla and Hillsboro, and this insect over the last couple of years as not been an issue but still warrants a close eye as they can damage both squares and small bolls. In the Blacklands of Texas we mostly see the tarnished plant bug (**Figure 1**), which can vary in color from pale yellow with some black markings to reddish brown and even black with some yellow markings. The nymph (immature) lygus bug is a yellowish green, and as they mature will develop 5 black dots on their back. There are two ways to scout for Lygus in cotton which include a sweep net or a drop cloth/beat sheet. The sweep net works best for cotton that has not reached peak bloom yest and the drop cloth works best as plants get taller and starting to bloom. The economic threshold for Lygus in cotton is dependent on the growth stage and sampling method, and ranges from 2-3 per 6 row feet using a drop cloth to as many as 15 per 100 sweeps using a sweep net. There are several insecticides labeled for controlling Lygus, or plant bugs in cotton and include Transform, Intruder, acephate, Centric, Bidrin, along with others.

Figure 1. Adult tarnished plant bug, which is often referred to as a Lygus Bug.
Photo credit: Ronald Smith, Auburn University, Bugwood.org

CORN:

The area corn crop has progressed nicely this year despite being dry early on, then getting extremely wet and then soils eventually drying out after a wet May. It was not until last week (June 21-25) that I started picking up on some fields showing signs of heat and/or moisture stress. The rains over this past weekend and earlier this week, and those in the forecast for this weekend have and will be very beneficial for corn yields, especially bushel weight. Since most of the area corn crop is at the dent stage, it is out of the window for yield loss from diseases that can be managed. Grasshopper numbers are increasing in the area and has defoliated some plants in a field of corn around Abbott (**Figure 2**). Grasshoppers are an occasional pest of corn, and rarely cause economic damage. Their damage can typically be found along field margins first and seeing them on field edges with extensive defoliation can justify an insecticide application. It is recommended to treat corn when there are 10 or more grasshopper per 9 square feet (1 square yard). There are several insecticides labeled for grasshopper control in corn, but if you do elect to spray for them you need to pay attention to the insecticide's pre-harvest interval, as some of these products carry PHIs of 30 days. Being this late in the season it is hard to say how much yield could be lost if grasshoppers are not treated, as this would depend on several factors like growth stage or how long until the crop reaches black layer, grasshopper populations and the amount of defoliation caused by grasshoppers. Ideally, you want to treat before too much of the ear leaf and leaves above the ear are defoliated as these are the leaves most responsible for filling the kernels on the ear.

Figure 2. Defoliated corn on field margin caused by a grasshopper infestation.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

July 16, 2021 Volume 3, Issue 14

Blacklands IPM Update

GENERAL:

Cotton across the area have developed nicely over the last two weeks with all the fields I am checking in the bloom stage. The recent rains over the July 4th weekend this past weekend have been very beneficial to the crop except for it has held some producers out of the field from being able to spray weeds and plant growth regulators. Insect activity in cotton is still high, but currently there are not any major widespread issues in the cotton crop. Grasshoppers remain active in the environment and have been found in some area cotton fields. Grasshopper number have not yet reached a level or caused enough damage in these fields to justify treatment. Bollworm moths remain active in the area, but larvae numbers and damage are not severe enough yet to justify treatment on cotton. Thanks to the timely rains our crop has a good fruit load, and Potassium (K) deficiencies symptoms are starting to be found in area fields. Corn and sorghum acres continue to progress closer and closer to harvest, with sugarcane aphid number increasing in area around Waco and further south which could cause an issue at harvest if they are left untreated.

COTTON:

The area cotton crop looks good right now thanks to the timely rains. Honestly, earlier this year I would not have suspected our crop to turn around and look as good as it does, because of the cool temperatures and excessive moisture received during the month of May. There are not any major insect issues in area cotton right now, but there are a few pests we need to continue scouting for including bollworms and grasshoppers. Potassium deficiency symptoms are also still being found in area fields, but thanks to the rains last weekend it does not appear to be getting worse.

Bollworm moths are still being found flying around area fields and eggs are easy to find, but the current egg lay is still light. As of now our Bt trait packages are holding up against the current bollworm pressure, and I am not finding any significant damage is our two-gene (Bollgard 2 and TwinLink) technology or our 3 gene technologies. I have a bollworm sentinel plot that includes all available Bt trait packages and a non-Bt variety outside of Abbott and have only found about 8% damage in the non-Bt variety and no damage in any of the Bt varieties. As we continue to progress in the season, we need to keep an eye out for bollworms and their damage and treat when the economic threshold is reached. The new threshold for bollworms in cotton is 6% damage fruit (squares and bolls) with live worms present. Insecticide options for bollworm management include Prevathon at 14-21 FL oz/acre and Besiege at 7-12 fl oz/acre. Bollworms will remain an issue for area cotton fields, until they accumulate about 350 growing degree days (heat units) past cutout (5 nodes above white flower).

Grasshoppers are still active in the area, and I have started to pick up some moving into area the edges of area cotton fields. As of now I have not seen enough grasshoppers or their damage in any cotton field that would justify treatment, however as our grain crops continue to be harvested and our pastures and road ditches get cut and/or start drying down they will be moving to cotton to feed. Fields should be treated for grasshoppers when there is significant defoliation (30% or more) and treating field edges can usually prevent damage from moving further into the field. There is various insecticide labeled for grasshopper management in cotton, but the best product we could use is Prevathon (now called Vantacor) at 10 FL oz/acre (Vantacor rate = 0.90 FL oz/acre). By using Prevathon we preserve our beneficial insect that are in the field helping keep aphids, spider mites and bollworm numbers below the economic threshold.

SORGHUM:

Sugarcane aphid populations have remained low for most of the state of Texas, until about seven days ago. Recently I have received reports of sugarcane aphid number increasing in the Southern portions of the state, and earlier this week I was called to a field between Riesel and Marlin, where sugarcane aphid numbers are increasing to levels close to the economic threshold. Even though most of the sorghum in the area is past seeing economic yield loss from sugarcane aphids, we do need to keep watching their numbers so we can avoid harvest issues that arise from the honeydew they produce. When managing aphids this late in the season we are less worried about length of residual the insecticide will provide and more worried about our pre harvest interval. Products that can be used include Transform at 1.5 oz/acre which carries a 14-day PHI, Sivanto at 4 fl oz./acre and carries a 14-day PHI, and Sefina at 6 fl oz/acre which also carries a 14-day PHI.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

July 30, 2021 Volume 3, Issue 15

Blacklands IPM Update

GENERAL:

Cotton in the area is still blooming and setting fruit, but some area cotton fields are quickly approaching cutout. Aphids have returned to some area fields, but currently populations are remaining well below the current economic threshold. Stink bugs are also present in area cotton fields and causing damage, with some fields requiring treatment. Currently, our bollworm numbers are low, and there is minimal damage in out Bollgard 2 and TwinkLink cotton trait packages. As our cotton continues to bloom and set more fruit the demand for water and nutrients is high, and the drying soil moisture is starting to limit the amount of nutrients absorbed by the plant, and this has led to some physiological fruit shed. Sorghum acres are starting to be treated with a kill shot for harvest preparation, and in these fields and those not yet sprayed we need to keep an eye out for sugarcane aphids as they are present in some area sorghum fields. Thanks to the recent dry spell, a lot of corn acres have dried down to 15% moisture and harvest operations have started.

COTTON:

Our bollworm pressure over the last 3 to 4 weeks have been low, and all the Bt trait packages have held up against our current bollworm pressure. I have a variety trial outside of Abbott that includes and non-Bt, TwinLink, TwinLink Plus, Bollgard 2, Bollgard 3, and Widestrike 3 varieties, and for the last four weeks I have been checking 100 bolls and 100 squares for worm damage once a week. During the first four weeks of this project I have only found minimal damage in the TwinLink and Bollgard 2 varieties (**Table 1**). Damage in the non-Bt has been lower than what would be expected with 9% damage the week of July 23rd and 13% damage the week of July 30th. Last weekend we had a full moon, and I had suspected to see a decent moth flight this week, but the trap numbers have indicated that the moth flight was lighter than expected. As our season moves along we need to be vigilant of bollworms in our Bollgard 2 and TwinLink varieties until the crop has accumulated 350 heat units past cutout. The economic threshold for bollworms in cotton is 6% damage fruit with worms present. Recommended insecticides include Prevathon at 14-21 fl. oz./acre, Vantacor (reformulation of Prevathon) at 1.2-1.9 fl oz/acre, and Besiege between 6.5 and 12.5 fl oz/acre, using the higher rate ranges for larger worm and/or longer residual activity. The downside of using Besiege is that it also include lambda-cyhalothrin which will kill the beneficial insect population and potentially flare aphid and spider mite populations.

Table 1. Percent bollworm damage in various Bt technologies in Hill County, TX on 30 July 2021

Trait Package	% damaged squares	% damaged bolls	% damage square and bolls
Non-Bt	18%	8%	13%
TwinLink	4%	2%	3%
TwinLink Plus	1%	0%	0.5%
Bollgard 2	1%	0%	0.5%
Bollgard 3	0%	0%	0%
Widestrike 3	0%	0%	0%

Stinkbugs are present in some area cotton fields, and some fields have reached the economic threshold. Most of the fields I have found at the economic threshold are in Western and Northern Hill County. Fields around Abbott east to Malone and south to Waco are currently running damage levels well below the economic threshold. Most of the stinkbug I am finding in area cotton fields are brown stinkbugs, but there are occasionally some green stinkbugs showing up in the cotton as well. Stinkbugs damage cotton by piercing small and medium sized cotton bolls to feed on the developing seeds. This feeding damage stains the lint as the oils from the developing seeds ooze out into the developing fibers, and also opens the bolls up for potential infection by the various bollworm pathogens. Stinkbug damage can also lead to hard lock issues, where when the boll opens the lint does not fluff out like it typically does. Signs of a boll being fed on by a stink bug includes wart like growths on the carpel wall (**Figure 1**), and/or stained lint. To scout for stink bugs the most reliable way is to collect 100 bolls from four different regions of the field, and opening bolls to check for internal feeding damage. The economic threshold for stinkbugs in cotton depends on the week of bloom, and for most of the areas cotton the current economic threshold is between 10 and 20 percent damaged bolls. There are a number of insecticides labeled for stinkbug management in cotton, but most pyrethroids are not very effective at controlling brown stinkbug. Recommended insecticides for stinkbug management include bifenthrin at 6 fl oz/acre and Bidrin at 8 fl. oz./acre, and Acephate at 1lb of active ingredient per acre (various rates depending formulation). If a field needs to be sprayed for stinkbugs and have aphids present, including a couple of ounces of imidacloprid can provide some suppression of the current aphid population, but complete control of the aphid population should not be expected.

Figure 1. Warts on internal carpel wall of boll, which is a sign of stinkbug feeding. Photo credit: Kate Crumley, Texas A&M AgriLife Extension Service

Figure 2. Brown stinkbug adult. Photo credit: Russ Ottens, University of Georgia, Bugwood.org

Figure 3. Adult green stink bug adult. Photo credit: Russ Ottens, University of Georgia, Bugwood.org

Aphids are being found in some fields in the area, but their populations are currently well below the economic threshold, but if we are having to treat fields for stinkbugs we need to keep a very close eye on their numbers as they can increase rapidly. Aphids can be found feeding on just about any part of the cotton plant, and feed by sucking the sap the plant would otherwise use to fill out the fruit and/or grow. Excessive aphid feeding can cause the leaves to cup downward, and could potentially cause some squares to be shed from the plant. Thankfully right now we do not have any open cotton boll, and unless the aphids populations explode will not be a major issue. Our current economic threshold is 40-70 aphids per leaf, but once bolls start to open that threshold drops to 10 aphids per leaf. Aphids can be managed with various insecticides, but there have been reduced efficacy with some neonicotinoids like imidacloprid and Centric. The best available insecticides for aphids include, Transform, Intruder, and Sefina.

SORGUM:

Most sorghum acres are past the point where yield loss from any pest will happen, but we need to continue watching sugarcane aphid populations. Currently sugarcane aphid populations are low, and over the last week or so there has been a reduction in sugarcane aphid numbers thanks to increased beneficial activity. As our weather stays hot and dry, we need to keep an eye on their numbers so we can treat fields before they produce a lot of honey dew on the leave and in the head that can cause harvest issues. If you do need to treat sorghum for sugarcane aphids to avoid harvest issues the best insecticides include Transform, Sivanto and Sefina, all of which carry a 14-day pre harvest interval for grain harvest.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

August 13, 2021 Volume 3, Issue 16

Blacklands IPM Update

GENERAL:

Finally, our temperatures are more normal and conducive for cotton boll development, and some area cotton fields could use a rain to help retain some late blooming fruit. There is a lot of physiological fruit shed occurring right now as the plant is adjusting to the fruit load and its available resources. Insect issues ae low right now, but I am starting to find aphids in some area fields as well as stinkbugs both of which are well below the economic thresholds. Some fields in the western portions of Hill County are starting to open and the warm temperatures will cause bolls in area fields to open quickly. Corn harvest is full steam ahead, and yield reports are all over the board ranging from as low as 60 bushels/acre to as high as almost 200 bushels/acre. Test weights in these fields have been good thanks to late season rains and cooler than average temperatures during the grain fill process, I have heard of test weight as high as 61 lbs/bushel.

COTTON:

The cotton crop is progressing nicely, and doing some boll counts during the week it is looking like we are going to have another good cotton crop thanks to timely summer rains and the mild temperatures. Cotton fields are starting to shed fruit, which is a common occurrence at this point in the growing season. The fruit is caused by the plant adjusting to the current boll load and the available water and nutrients it has so it can fill out all the bolls it keeps on the plant. If we could catch a rain this weekend like it is forecasted, we could see some of these late season bolls stay on the plant but waiting on these bolls to fill may cause harvest issues with fall rains.

Our cotton is at the point in the growing season where insects are not a major issue. Most cotton fields have accumulated enough heat units past cutout where they are no longer susceptible to economical bollworm damage. I am starting to find stinkbugs in area cotton fields again, but they will likely no need to be treated because of two reasons. The first reason is the economic threshold for stinkbugs a this point in the growing season is high at 50% damage bolls, and the second reason is we are so late in the season that there are very few bolls tender enough for stinkbugs to feed on. Aphids (**Figure 1**) are also being found in area cotton fields but are well below the economic threshold. Currently in fields where I am finding aphids there is a decent beneficial insect population that is keep the aphid numbers from exploding. As our cotton starts to open, we need to keep a close eye on these fields with aphids, as they can cause sticky cotton from the honey dew the aphids produce. Because of the issues that evolve around aphids and sticky cotton, once bolls start opening the economic threshold for aphids drop to only 10 aphids per leaf. If for some reason aphid numbers reach the economic threshold there are a few insecticides that are recommended for aphid management in cotton, including, Sivanto (flupyradifurone), Intruder Max (acetamiprid), and Bidrin (dicrotophos). Neonicotinoids like imidacloprid and Centric have labels for aphid management in cotton, but there are known issues with the efficacy of these insecticides on cotton aphids**.**

Figure 1. Cotton aphids found in a Cotton field in Hill County, TX. Photo credit: D. Tyler Mays.

SORGHUM:

I have not seen many sugarcane aphids in the few unharvested sorghum field I am seeing, but we need to keep an eye on these as we progress closer to harvest. If we do run into sugarcane aphids when killing sorghum for harvest preparation to avoid gumming the combine from the honeydew produced by the aphids. Mixing your kill shot with an insecticide like Sivanto or Transform will control the aphids and keep them from moving into the head and producing honeydew that would cause harvest issues. These insecticide however carry a preharvest interval of 14 days.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu

August 20, 2021 Volume 3, Issue 17

Blacklands IPM Update

GENERAL:

A much-needed rain for cotton came this past weekend and the first part of this last week and should provide enough moisture to finish out the cotton crop. The downside of the rain is prior to its arrival plants were shedding fruit due to depleting soil moisture and heat stress, but this recent round of rain will lead to the plant holding on to some of these late pollinated bolls which will bring some late season management options to ponder about as we approach harvest. Foliar cotton diseases and premature defoliation are also an arising issue in some area cotton fields. The premature defoliation is a function of either foliar disease, Potassium deficiency, or the combination of the two. There are no cotton insect pest issues observed this week in fields in the scouting program. We also need to start thinking about wheat planting, especially if you caught seed during harvest to plant this fall thanks to all the rain received once the crop was ready for harvest. The biggest issue we will likely see with caught wheat seed from this spring is reduced germination due to pre harvest sprouting.

WHEAT:

I know we all want to forget the nightmare of 2021 wheat harvest, but the excess rain and pre-harvest sprouting could have negative impacts on wheat stand establishment this fall if seed is being saved for planting. The pre-harvest sprouting, we saw earlier this spring will likely reduce the germination percentage and vigor of seeds planted. The pre-harvest sprouting was caused by the continuous rains on harvest ready wheat, causing the seeds to break dormancy and start converting the starch to sugar leading the radicle and shoot starting to form. When the starch is started to be converted to glucose and then redried the seed loses potential energy it will need to germinate and be a vigorous growing plant. It is highly recommended to conduct a germination test on saved seed that is going to be planted later this fall. I would also recommend calculating the number of seeds per pound, so you can properly adjust your seeding rates to obtain your desired plant stand. Another test that is commonly conducted to test grain quality is a Falling Number Test, which is a measure of the number of seconds it takes a plunger to fall through a slurry of grain and water. Industry usually prefers this number to be around 300, and number below 275-250 is a cause for concern if wanting to plant this seed. The Falling Number Test can only be conducted in a laboratory setting. This test does not need to be conducted to get an idea of if your caught seed is good to plant since germination percentage and vigor test can tell you how much of the seed will germinate and how vigorous the seeds will grow. There are seed testing laboratories in every state in the United States, but the two most common seed labs I hear about are the Texas Department of Agriculture's Giddings Seed Lab, and the Kansas Crop Improvement Association Seed Lab in Manhattan, Kansas. The addresses to these two labs can be found below.

Texas Department of Agriculture Giddings
Seed Lab
P.O. Box 629
1010 CR 226
Giddings, TX 78942

Kansas Crop Improvement Association Seed Lab
2000 Kimball Ave.
Manhattan, KS 66502
https://www.kscrop.org/seed-lab.html.

COTTON:

The area cotton crop received a much-needed rain to help finish out what appears to be a great crop for Central Texas. Insect issues are non-existent at this point as the aphids I were seeing the last couple of weeks are no longer being found. The recent rains will lead to some late blooms to stay on the plant, and this may lead to some producers wanting to hold on and wait for these bolls to mature, but this may not be the best agronomic decision for multiple reasons. Some area cotton fields are starting to experience premature defoliation caused by foliar diseases like Target Spot and Stemphylium leaf spot, as well as Potassium deficiency.

There comes a point in the cotton growing season where you must no longer worry about setting and maturing more bolls on the top of the plant. During a "normal" growing season, but the delayed growth due to the excess moisture during the month of May is making the decision a little harder. In Central Texas we are not stressed to set bolls by a certain date to beat the annual first frost date like areas of west Texas, but we are stressed to get the crop out before the rainy season arrives. The recent rains will help the plant to hold some of these recently bloomed bolls but waiting for them to mature could hurt your crop's lint quality and loan rate. It takes roughly 850 heat units for a cotton boll to go from white flower to open boll. If we accumulate 20 heat units per a day which is normal for this time of the year it would take roughly 34 days for the boll to mature. If a boll was pollinated on Monday (8/16) would not be ready for harvest until around September 19th, add another 10 to 14 days for the defoliation process and the field will not be harvest ready until between Sept. 29th and Oct. 3rd. Additionally, the bolls that are set this high on the plant are typically smaller and do not contribute much to yield, and the micronaire and other fiber qualities can also be low due to the interaction between the plant and environment and the environment alone with risk of late season rains staining cotton lint.

I am seeing areas of some fields across the area to be prematurely defoliated due to three different factors, 1) cotton root rot, 2) foliar disease, and 3) Potassium deficiency setting in. At this point in the growing season the premature defoliation will have little impact on the yield but may have some implications on the fiber quality as some of the younger bolls may not fully mature due to lack of photosynthetic area on the plant. Foliar fungicides are rarely justified in Texas cotton, even in the Rio Grande Valley and Gulf Coast. Symptoms of target spot are irregularly shaped lesions with concentric rings (**Figure 1**). Target spot lesions can be found on multiple parts of the cotton plant including the leaf, bracts, and stems. A second disease I am observing in some are cotton fields is Stemphylium leaf spot (**Figure 2**). This disease produces smaller lesions that are dark brown to black in color and do not have concentric rings. The center of Stemphylium leaf spot lesion also can fall out giving the leaf a shot hole appearance where target spot lesions stay intact. Stemphylium leaf spot is typically associated with Potassium deficiency, where as target spot can infect healthy plants. Another distinguishing factor between target spot and Stemphylium leaf spot is where the infection starts, target spot will first be observed in the lower canopy and move up the plant and conditions remain favorable, and Stemphylium leaf spot infections can start in any portions of the crop canopy.

Figure 1. Target spot lesion on cotton leaf, with he concentric rings. Photo credit: Tom Allen, Mississippi State University

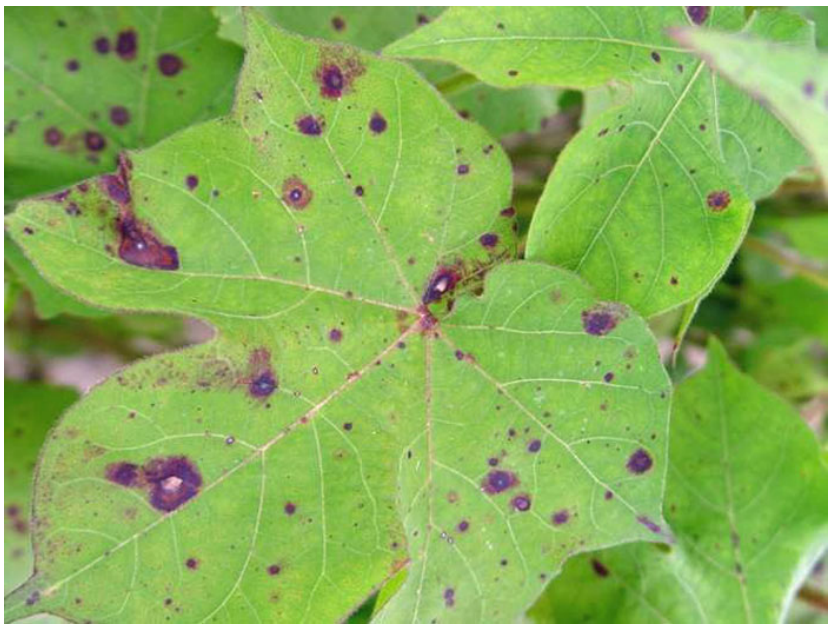

Figure 2. Stemphylium leaf spot on cotton with various aged lesion on the leaf.
Photo credit: Thomas County Ag, University of Georgia and Michael Mulvaney, University of Florida.

Another explanation for the premature defoliation of cotton plans is the onset of Potassium deficiency due to reduced uptake of Potassium from the soil causing the plant to move the Potassium stored in the leaves to the developing bolls. The deficiency and movement of Potassium from the leaf to the boll causes the leaves to develop a interveinal chlorosis that eventually progress to a gold and red color before the leaf falls off the plant. Since Potassium is mobile in the plant the deficiency symptoms typically start in the lower canopy and moves up the plant as the deficiency increases. This late in the season the premature defoliation from Potassium deficiency will not have a major impact on yield but may cause some issues with lint quality. The premature defoliation could be looked at somewhat of a good thing as it can be an indication of a good boll load, and the premature defoliation could make harvest preparation easier with less leaf tissue needing to be defoliated.

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Authors:
Tyler Mays, Extension Agent-IPM Hill & McLennan Counties
Zach Davis, County Extension Agent-AG/NR

126 South Covington Street
P.O. Box 318
Hillsboro, Texas 76645
Phone: 254-582-4022
Fax: 254-582-4021
Mobile: 979-482-0111
Email:Tyler.mays@ag.tamu.edu