UNIVERSITY OF GEORGIA
EXTENSION
Integrated Pest Management Program

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Monthly Newsletter | May 4, 2018 | Volume 4 | Issue 4

IN THIS ISSUE:

UGA IPM INFORMATION:

The submission deadline for the June newsletter is May 28, 2018. Please submit all articles prior to the deadline. If you would like an article written about an upcoming event or project, please email stinafig@uga.edu.

Have questions about the newsletter, website, or basic information? Send us an email at ipm@uga.edu!

Have comments on the newsletter redesign? Be sure to fill out our survey to let us know your thoughts!

SPECIALIST SPOTLIGHT

The IPM program consists of many specialists and faulty throughout the state of Georgia. This section is dedicated to bettering knowledge of your colleagues.

Mark Czarnota

Dr. Mark Czarnota is an Associate Professor in the Department of Horticulture at the University of Georgia. He is located at the Griffin Experiment Station in Griffin, Georgia. He has a 60% research appointment, 40% extension appointment, and covers all aspects of weed control in ornamentals, orchard floor management, small fruits, and Christmas trees. He received his BS degree from The University of Delaware, MS at Virginia Tech, and PhD at Cornell University. Dr. Czarnota began his weed science career in high school while having the opportunity to work under the direction of Robert Beatty. Robert was a good friend, founder of the Weed Science Society of America (WSSA). His research interests focus on applied weed management systems. He has authored or co-authored 26 refereed journal and book chapters, 50 extension publications, has made over 250 presentations at professional, extension, and master gardener meetings, and has generated over a million dollars in grant money. Dr. Czarnota is a native of Pennsylvania and has been married to his wife Robin for 21 years. They have 2 children, Zachary (16) and Zoe (12), and 9 dogs. His major hobbies include gardening, weight training, Taekwondo, woodworking, welding, and enjoying time with the family!

Dr. Czarnota's current projects include determining damage threshold values of dicamba, glyphosate, triclopyr, 2,4-D, and imazapyr in blueberries, peaches, and pecan. Evaluating herbicides for use in ornamentals, blueberries, and strawberries, Propagation of Fraser Fir by Somactic Embryogenesis.

One interesting fact I would like to share is that I grew up in Cochranville, PA (Southeast corner) – A small town with less than 400 people that had many different agricultural system (dairy, beef cattle, ornamentals, vegetables, fruit, lots of different row crops). Spent many of my summer days playing baseball (all day) and many winter evening playing ice hockey – Some fond memories of days before cell phones and computers that still bring a smile to my face!

Located at: CAES Griffin Campus | 1109 Experiment Street | Griffin, GA 30292

UPCOMING EVENTS:

May 11 – 2nd Annual Monroe County Hay Field Day | 9:00 AM | Forsyth, GA

May 14 – Lawn Care 101 | 6:00 PM | Jeffersonville, GA

May 23 – UGA Extension Gwinnett Category 24 Ornamental and Turf Pesticide Applicator Training | 8:00 AM | Morrow, GA

May 24 – UF/UGA Corn Silage and Forage Field Day | 8:00 AM | Lake Alfred, FL

SAVE THE DATE

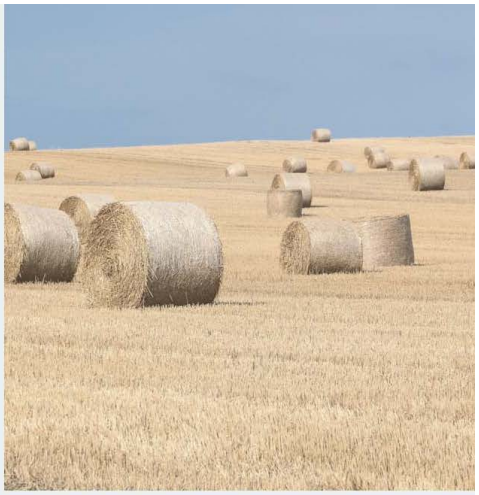
June 7 – Agronomic Crops Agent Training & Field Day | 8:00 AM | Tifton, GA

For more events, please visit the UGA Extension Calendar.

2ND ANNUAL MONROE CO EXTENSION

HAY FIELD DAY

MAY 11, 2018
9 AM TO 2 PM



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The University of Georgia College of Agricultural & Environmental Sciences (working cooperatively with Fort Valley State University, the U.S. Department of Agriculture, and the counties of Georgia) offers its educational programs, assistance, and materials to all people regardless of race, ethnicity, national origin, color, gender, sexual orientation, religion, age, disability, or veteran status and is an equal opportunity, affirmative action organization.

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Twiggs County

REGISTRATION REQUIRED
Call 478-945-3391 to register.

FEATURED CREATURE

This section will highlight a new insect or pest each month, including management practices.

Spotted wing drosophila identification, monitoring, and management in Georgia blueberries

By Ash Sial
Department of Entomology, University of Georgia, Athens GA, 30602

The spotted wing drosophila (SWD), *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae) is an invasive and economically important pest of many soft-skinned fruits such as blueberries, blackberries, raspberries, strawberries, cherries, and other. Since its first detection in California in 2008, SWD spread rapidly across the United States. It was first found in Georgia in 2010 and since then this small vinegar fly has impacted the $255 million Georgia blueberry industry with crop losses of up to 20% annually. SWD has been reportedly detected in many counties across the State. However, a statewide survey is underway to confirm reports and develop a SWD distribution map in the State of Georgia.

IDENTIFICATION AND LIFE CYCLE

The SWD flies have brownish-yellow thorax, black stripes across the abdomen, and distinct red eyes. Males have dark spots on the wingtips and black combs on the forelegs (Figure 1). Female SWD lack the spots and black combs, but have a very large serrated ovipositor (Figure 2). The adult female punctures the skin of intact fruit using its serrated ovipositor and deposit white eggs just under the fruit skin. Two spiracles (breathing tubes) which are attached to the egg extend out of the fruit through the hole, also known as a sting. Eggs hatch after 1-3 days and the larvae (maggots) continue to feed in the fruit. While in the fruit, the larvae develop through three instars. The respiratory ducts and mouth of the larvae develop with each instar. The third instar (Figure 3) has large hook-like mouthparts and branching anterior spiracles which protrude through its larval exterior. After 5-7 days, the third instar exits the fruit to pupate. The puparium (Figure 4) is initially bright white, but it browns as it ages. The fly remains in its puparium for 3-15 days until the adult emerges. Adult males may not develop the characteristic spot on the wingtips until 10 hours after eclosing, and reproductive maturity will typically be reached after 1-2 days. Mature females are extremely productive, laying 1-3 eggs per oviposition site, in 7-16 sites per day, for 10-59 days. One female can produces 300-600 eggs within a lifetime.

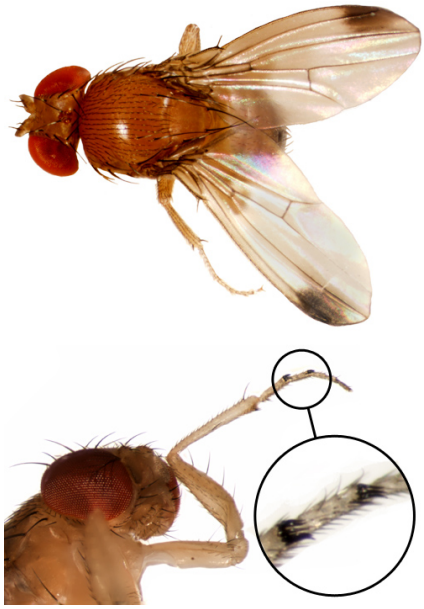


Figure 1. SWD male wing spots and sex combs.

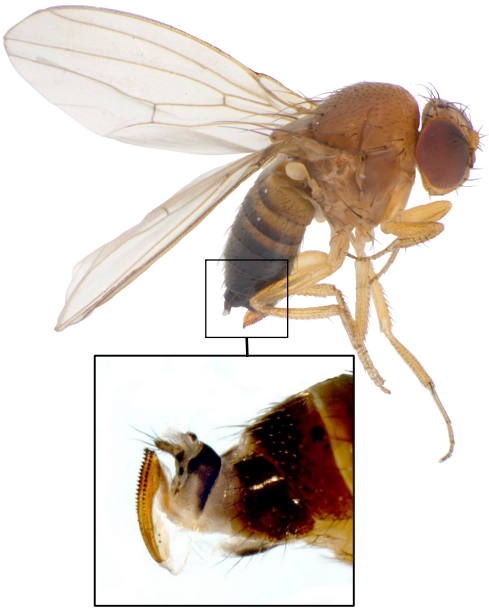


Figure 2. SWD Female and serrated ovipositor

Figure 3. SWD Larva

Figure 4. SWD Pupa (Puparium)

SWD DAMAGE

Blueberries are susceptible to SWD damage as soon as the maturing fruit begin to change color from green to purple up until they are harvested. Typical vinegar flies infest damaged, overripe or rotting fruit for egg-laying, but a female SWD can lay eggs into intact fruit using its serrated ovipositor. Although the fruit receives some damage during egg insertion which increases its vulnerability to fruit pathogens, the majority of the damage is caused by larval feeding. The SWD larvae eat the fruit pulp causing fruit to collapse often within days of egg-laying (Fig. 5). Because SWD attacks commercially-viable fruit, SWD poses a significant risk for blueberry growers. If SWD is not managed properly, fruit infested with SWD larvae may be harvested which will result in either downgrading or rejection of the entire shipment. It is therefore extremely important that Georgia blueberry growers implement effective monitoring and management strategies to minimize the impact of this devastating pest blueberry production.

Figure 5. Progression of SWD damage in a blueberry

MONITORING

The first and the most important step in the effective management of this pest is to determine whether SWD are present in your orchard and when they become active. To determine this, monitoring should be in place from early stages of fruit development until the end of harvest.

There are several trap designs available to detect the presence of SWD, though some are considered better than others. Studies have found that traps with a taller shape and greater bait surface area might attract more SWD. Holes in the traps should be wide enough that the flies can enter, but narrow enough to keep the bait from evaporating too quickly. If the holes are too wide this will also attract unwanted, larger insects.

Figure 6. SWD Monitoring Trap

A suggested trap design would consist of a 32-ounce deli cup with a corresponding lid (Fig. 6). To hang the trap use approximately 20" of 14-gauge, insulated copper wire, secured into two of the holes. The deli cup should have 10-12, 3/16-inch holes located just below the rim. The holes should encircle about 2/3 of the way around the cup, leaving an unpunctured section for pouring the bait. The trap should be baited with 150 mL of a yeast-sugar solution. Traps should be placed in shaded areas in or around the fruits, and the traps should be checked weekly. While checking the traps, determine if SWD is present, count the number of male and female SWD, and replace the trap with fresh bait. For detailed instructions on how to make these traps, please visit UGA Blueberry Blog at http://blog.caes.uga.edu/blueberry/. You can also access a video demonstration of how to make monitoring traps for SWD at http://www.youtube.com/watch?v=hVOn5SHqKgI.

SWD baits and lures include synthetic lures, yeast and sugar mixtures, and apple cider vinegar (ACV). Studies have shown that apple cider vinegar is not the most attractive bait, but it is often used because ACV is easy to find at the local stores and the traps are easy to service. The yeast and sugar solution, especially during warmer temperatures, is currently the best alternative. Traps baited with yeast and sugar trapped SWD earlier and in greater numbers than those with the ACV. Although these traps are messier to service, the yeast bait is less expensive than the ACV traps, and of course earlier detection is extremely important and allows for timely implementation of management strategies to protect fruit from infestation. In order to maximize the chances of trapping SWD, we recommend a minimum of one yeast and sugar-baited trap every 5-10 acres. If there is a woodland habitat surrounding the orchard, hang the traps in the orchard close to the woodland habitat. It might help with the earlier detection of the fly activity.

The traps for SWD should be hung in a shaded area of the bush canopy in the middle of the fruiting zone. Keep the trap clear of vegetation with the holes exposed so that SWD can easily fly in. Check the traps at least once a week and add fresh bait yeast-sugar bait each time traps are checked. Old bait should be poured into a bucket for disposal away from the orchard. The SWD captures should be recorded each week in a log book including number of male and female flies separately, date of the trap change, trap location and if possible GPS coordinates of the trap location.

For flies suspected of being SWD that are trapped in counties where this insect has not yet been reported, we encourage growers, scouts, and consultants to place flies into another container and then send them to your local County Agent for identification. The County Agents should report the first catch of SWD in their

respective Counties to us at ashsial@uga.edu to help with a survey currently underway to develop a map of SWD distribution in the State of Georgia.

Here are the recipes for the two most commonly used baits:

1. Apple cider vinegar
   Unscented soap (4 ml/gal)
   Use 150 ml of this solution per trap.

2. Yeast and sugar
   2 Tbsp yeast (ca. 8 g)
   8 Tbsp sugar (ca. 40 g)
   24 fl oz water
   0.76 ml unscented soap
   Use 150 ml of this solution per trap.
   This will make enough bait for just over 4 traps.

Supplies
Traps (see below)
Apple cider vinegar - 5% "real" ACV
Yeast - Red Star Dry Active Yeast (http://bit.ly/YqNPwq)
Sugar - White sugar, brand not important
Unscented soap - Seventh Generation (http://bit.ly/18Pta6p)

SAMPLING FRUIT FOR SWD LARVAE

If you suspect has been or may be infested by SWD, then you should sample fruit prior to harvest to determine the level of infestation by extracting larvae from the berries using one of three methods: sugar, salt, or boiling method. Each method require 2-4 cups (about 100) of blueberries.

The sugar method involves adding a cup of sugar solution (1/4 cup of sugar in 4 cups of water) to crushed berries in a seal-top gallon plastic bag. Reseal the bag and inspect the liquid for larvae floating on the surface on the sugar solution. For detailed instructions on how to use sugar solution to sample blueberries for SWD, please visit UGA Blueberry Blog at http://blog.caes.uga.edu/blueberry/. You can also access a video demonstration of how to use sugar solution to sample blueberries for SWD at http://www.youtube.com/watch?v=ZAb24LEFogg.

The salt method consists of combining a salt solution (1 tablespoon of salt and 1 cup of water) and berries in a seal-top gallon plastic bag. Without smashing the berries lightly mix the berries into the solution. Allow the berries and solution to sit in the bag for about 15 minutes. After that time, look for larvae that have emerged from the berries and are crawling on the berry surfaces. For detailed instructions on how to use salt solution to sample blueberries for SWD, please visit UGA Blueberry Blog at http://blog.caes.uga.edu/blueberry/. You can also access a video demonstration of how to use sugar solution to sample blueberries for SWD at http://www.youtube.com/watch?v=2u6OeoLVNeo.

The boiling method is most and provides the best estimate of the degree of SWD infestation. The sample of fruit should be placed in a heatproof pan and covered with water. Heat the water and boil the berries for one minute. Next pour the fruit mixture over a shallow, dark-colored pan covered with a mesh screen. Mash the fruit over the mesh screen with a spoon. Finally, lightly wash the berries with cold water to the rinse any remaining larvae into the pan. Inspect the pan for larvae floating on the liquid. The fruit processors most commonly use this method. For detailed instructions on how to use the boiling method to sample blueberries for SWD, please visit UGA Blueberry Blog at http://blog.caes.uga.edu/blueberry/. You can also access a video

demonstration of how to use the boiling method to sample blueberries for SWD at http://www.youtube.com/watch?v=ak0eMjjndpI.

MANAGEMENT

Measures to control Spotted Wing Drosophila are available, but methods are constantly being refined as new research and information becomes available, so keep informed through your local County Agents, and through our UGA Blueberry Blog. Currently there is no economic threshold for SWD, and the benefits of the treatment significantly outweigh the costs. We are therefore recommending a conservative approach, if SWD is detected at your or at your neighbor's farm, then control measures must be implemented. SWD control involves cultural control methods and/or chemical control methods.

CULTURAL CONTROL

Cultural control strategies should be part of the overall SWD management program and include sanitation, frequent harvest intervals, and exclusion netting. Sanitation, one of the most important cultural control methods, consists of removing over-ripe or fallen fruit from the field and disposing of them properly. Another sanitation method is the removal of wild plants that can be potential hosts for SWD including wild plants with berries such as grapes, beautyberry, elderberry, pokeweed, pokeberry, honey suckle, nightshade, dogwood, spicebush, and autumn olive, but the exact role of this approach in SWD control programs has yet to be investigated. Furthermore, frequent harvest intervals can keep susceptible fruit off of the bushes. During peak SWD season, harvest can be 1-2 times per week. Lastly, netting with mesh size less than .98mm can also protect the blueberry bushes from SWD. Small-scale growers or organic growers, due to their limited amount of control options, can utilize the mesh netting method to reduce SWD infestation.

If infested berries are found in the field or at the processor, they should be bagged inside plastic bags to prevent fly escape and placed in the sun to kill SWD before they complete development and emerge to continue infesting more fruit. If there is a large pile of fruit, it can be solarized by placing clear plastic sheet over the fruit in a sunny location and sealing well around the edge using soil. The infested fruit may be buried in the soil to prevent emergence, however, it will be effective only if burial depth is at least 30 cm or more otherwise flies can survive in the cool soil and emerge. Freezing berries is another way to kill SWD, and refrigerating them will stop further development of larvae, and may kill them after long periods of refrigeration. Keeping berries cool during the supply chain from processor to market to consumer will also minimize the chance that larvae will develop in berries.

CHEMICAL CONTROL

When implementing chemical control methods, choose from among the insecticides that have been shown to be effective against SWD. Fruits become susceptible to SWD once fruit coloration has started (when blueberries turn from green to purple). Treatment programs should begin as soon as the berries start to change color and continue through the end of harvest. Before administering pesticides growers should make sure their sprayers are calibrated and functioning properly. When administering pesticides, growers should ensure they are providing thorough coverage to the fruit and all areas of the bush. Table 1 includes a list of insecticides registered for use in blueberries that have shown high activity against SWD. Selection of insecticides for SWD control in blueberries, take into account the efficacy, chemical class, harvest date, pre-harvest interval, re-entry restrictions, and your target markets. The level of control achieved will depend on the SWD population, timeliness of application, coverage of fruit, and product effectiveness. If you are exporting fruit, also check carefully on the maximum residue limits (MRL) for the destination country. Make sure to rotate classes of insecticides to delay the development of insecticide resistance. Table 2 includes some suggested insecticide rotational programs to control SWD under different management strategies. This is particularly important for organic growers because there are only two classes of insecticides registered for use against SWD in organically produced blueberries.

When applying insecticides, growers/applicators must follow the label instructions for blueberries because **THE LABEL IS THE LAW**.

SWD CONTROL OPTIONS FOR ORGANIC BLUEBERRIES

Insecticides registered for organically produced blueberries are less effective against SWD than conventional insecticides and have shorter residual activity. However, SWD can be managed successfully through more intensive monitoring, timely application if flies are detected, and frequent application of the available insecticides. Cultural control strategies described in an earlier section of this update will also be important to help reduce the overall population levels and should be implemented if possible. There are only two organic insecticides effective against SWD which include Entrust and Pyganic. There are some restrictions on how much or how many times Entrust can be applied per season, so please read the label for details. Make sure to rotate Entrust with Pyganic to reduce the risk of resistance development in SWD.

SUMMARY

In summary, SWD is clearly one of the most devastating pests in the history of Georgia blueberry production. It is therefore extremely important for growers to implementing management strategies in a proactive manner in order to minimize the impact of this pest. Following are the key components of effective management of SWD:

1. Monitor fields with traps and check the traps weekly starting from the fruit-set until the end of harvest.

2. Make sure to check the trapped flies and correctly identify SWD to determine presence and number of male and female SWD.

3. Once SWD is detected in the traps while the berries are ripening or ripe, apply effective insecticides registered for blueberries weekly to protect the fruit. For detailed information about insecticides for SWD in blueberries (see Table 1 and Table 2, and also other resources available locally such as 2016 Southeast Regional Blueberry Pest Management Guide for conventional (http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2016/2016BlueberrySprayGuideFINAL.pdf) and organic blueberries (http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2015/BlueberrySprayGuide_organic_final.pdf)

4. While selecting insecticides for SWD control in blueberries, take into account the efficacy, chemical class, harvest date, pre-harvest interval, re-entry restrictions, and your target markets. If you are exporting fruit, also check carefully on the maximum residue limits (MRL) for the destination country.
5. Make insecticide application early in the morning or late in the evening to target peak SWD activity periods.

6. Calibrate your sprayer before making insecticide applications to ensure proper coverage of all parts of the blueberry bushes including fruit and foliage

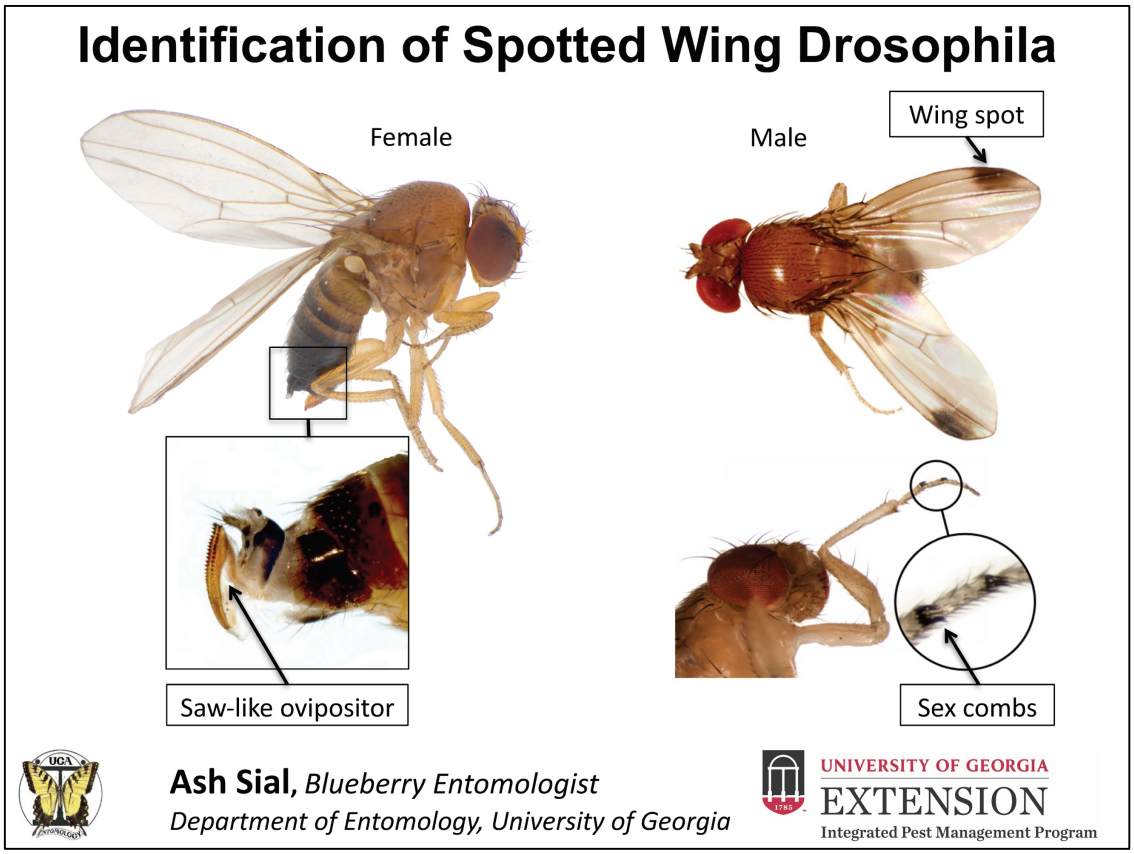
7. Make sure to rotate classes of insecticides to delay the development of insecticide resistance.

8. Continue monitoring to evaluate your management program, and respond in a timely manner if needed.

9. If possible, harvest as frequently as possible and remove leftover fruit from the orchard to reduce fly feeding and breeding resources.

10. If infested berries are found, they should be bagged inside plastic bags to prevent fly escape and placed in the sun to kill SWD before they complete development and emerge to continue infesting more fruit.

Keep yourself updated about this pest to informed decisions to manage it. Find the latest information at our UGA Blueberry Blog (http://blog.caes.uga.edu/blueberry/) and sign up to receive updates instantly.


Identification of Spotted Wing Drosophila
Female
Male
Wing spot
Saw-like ovipositor
Sex combs
Ash Sial, Blueberry Entomologist
Department of Entomology, University of Georgia
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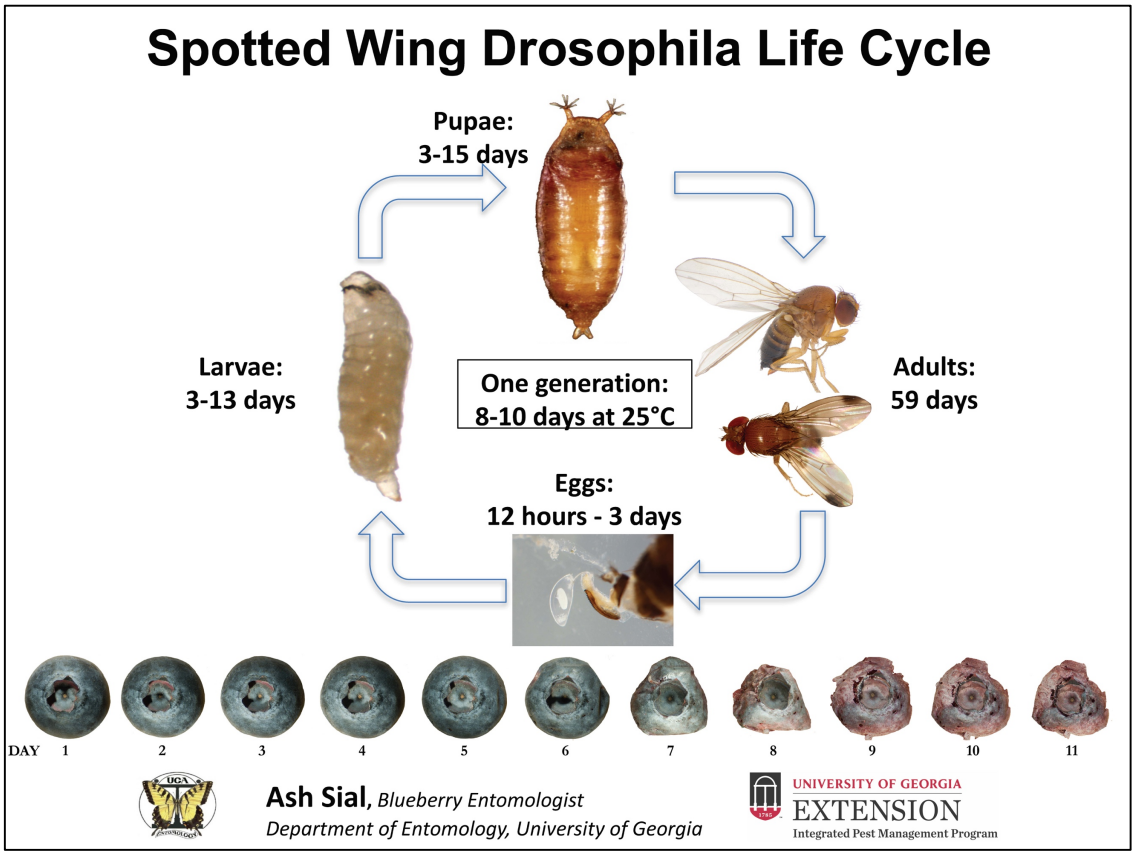
Spotted Wing Drosophila Life Cycle
Pupae:
3-15 days
Larvae:
3-13 days
One generation:
8-10 days at 25°C
Adults:
59 days
Eggs:
12 hours - 3 days
DAY 1 2 3 4 5 6 7 8 9 10 11
Ash Sial, Blueberry Entomologist
Department of Entomology, University of Georgia
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Monitoring Spotted Wing Drosophila Using Traps

YEAST AND SUGAR BAIT RECIPE:

2 Tbsp yeast (ca 8g)
8 Tbsp sugar (ca 40g)
24 fl oz water
0.76 ml unscented soap
Use 150ml of solution per trap, this will fill just over 4 traps.

INSTRUCTIONS:

Make the traps using 32oz deli cup as shown in picture. Mix desired amount of bait in appropriate sized container, use funnel if container opening is too small. Shake contents for 30 sec. and pour into traps until filled to pre-marked line. Deploy in shaded fruiting zone of bush where entry holes are not blocked by vegetation. Check traps weekly by straining sample out of the bait, removing old bait in a bucket, and redeploying traps with fresh yeast sugar-water bait.

Ash Sial, *Blueberry Entomologist*
Department of Entomology, University of Georgia

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Management of Spotted Wing Drosophila in Blueberries

SWD is the key pest of blueberries in Georgia. It is therefore extremely important for growers to implement management strategies in a proactive manner in order to minimize the impact of this pest. Here are the key components of effective management of SWD:

1) Monitor fields with traps and check the traps weekly starting from the fruit-set until the end of harvest.
2) Make sure to check the trapped flies and correctly identify SWD to determine presence and number of male and female SWD.
3) Once SWD is detected in the traps while the berries are ripening or ripe, apply effective insecticides registered for blueberries weekly to protect the fruit.
4) While selecting insecticides for SWD control in blueberries, take into account the efficacy, chemical class, harvest date, pre-harvest interval, re-entry restrictions, and your target markets. If you are exporting fruit, also check carefully on the maximum residue limits (MRL) for the destination country.
5) Make insecticide application early in the morning or late in the evening to target peak SWD activity periods.
6) Calibrate your sprayer before making insecticide applications to ensure proper coverage of all parts of the blueberry bushes including fruit and foliage
7) Make sure to rotate classes of insecticides to delay the development of insecticide resistance.
8) Continue monitoring to evaluate your management program, and respond in a timely manner if needed.
9) If possible, harvest frequently and remove leftover fruit from the orchard to reduce fly feeding and breeding resources.
10) If infested berries are found, they should be bagged inside plastic bags to prevent fly escape and placed in the sun to kill SWD before they complete development and emerge to continue infesting more fruit.

Keep yourself updated about this pest to make informed decisions to manage it. Find the latest information at our UGA Blueberry Blog (http://blog.caes.uga.edu/blueberry/) and sign up to receive instant updates.

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Ideas at Work

Expanding Pollinator Habitats Through a Statewide Initiative

Abstract

Due to changing federal and state policy as well as increased community concerns about pollinators, assisting clients interested in pollinator health is taking more Extension agent time and resources. In addition, many gardeners tend to be beginners in need of support to recognize best management practices related to pollinating and beneficial insects. In Georgia, the Pollinator Spaces Project provides tools gardeners can use to create pollinator habitats, learn about pollinating and beneficial insects, and be recognized for their efforts. As a low-cost, agent-friendly program, it is a model that can be easily replicated in other states.

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Kris Braman
Department Head and Professor
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Athens, Georgia
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Introduction

On March 21, 2017, the rusty patched bumble bee was listed as endangered under the Endangered Species Act (U.S. Fish and Wildlife Service, 2017). Also in 2017, the U.S. Environmental Protection Agency advised each state to create a managed pollinator protection plan (U.S. Environmental Protection Agency, 2017). These federal-level actions regarding pollinators have stimulated action at the state level. Georgia answered the call to create a state-level plan with Protecting Georgia's Pollinators. Locally, the policies delineated in Protecting Georgia's Pollinators have increased public awareness of pollinator issues, with many citizens showing interest in creating pollinator habitat and understanding the role of beneficial insects in their gardens.

Background

With the increased interest in pollinators, local Extension personnel are called on more often for assistance with pollinator gardening issues. It is not uncommon to find gardeners spraying broad spectrum insecticides throughout the growing season, thereby killing needed pollinators, or misidentifying pollinating insects as pests. Many pollinator gardens are overseen by teachers or community members with little to no gardening experience. With the increasing number of pollinator gardens, there are opportunities to educate and support novice gardeners on pollinator health and the role of all beneficial insects. Our experience has shown that many gardeners express enthusiasm for pollinator health and indicate a willingness to learn more.

Research has shown that creating a habitat to assist pollinators also assists other beneficial insects, such as pest predators and parasitoids (Wratten, Gillespie, Decourtye, Mader, & Desneux, 2012). By assisting in the creation

of strong pollinator habitats, we in Extension help local gardeners grow insect populations needed to support strong garden ecosystems. In addition to addressing community needs, a pollinator habitat program aligns with national and state ecological and education standards. As a response to all of these issues, we created the Pollinator Spaces Project in Georgia.

Project Development

We determined that the key to a successful pollinator project was a user-friendly program that could be implemented easily by the state's 158 agriculture and natural resources Extension agents. The Pollinator Spaces Project comprises research-based training materials housed on a website (https://ugaurbanag.com/pollinators) and augmented with social media pieces, handouts, and seed packages. It is easily adaptable to individual county needs.

The first step in creating our statewide initiative was to develop the website and populate it with research-based information on pollinator plants specific to Georgia ecosystems (Harris, Braman, & Pennisi, 2016). The website content includes information on native Georgia plants to encourage sustainability (Hostetler & Main, 2010). The website also contains links to lesson plans for teachers, plans for habitat enhancement projects, and emphasis on best management practices. Additionally, we used social media platforms, such as a Facebook page and YouTube videos, to provide easily deliverable educational pieces.

Hard-copy materials we created include educational pamphlets and colorful plant lists that can be handed out in offices, at conference booths, or at farmers' markets. We also secured a grant to create project-specific seed packets. The appealing packet covers were designed by a local artist and include the URL for the project website and the Extension logo. As a result of the grant, we were able to make 4,000 packs of cosmos seeds available to agents for giveaways.

Statewide Program Use

After completing the development of all materials, we began conducting workshops on pollinator health. Many agents adopted the pollinator project in their plans of work and centered workshops and booth themes around the project, using the developed materials. At the local level, agents worked with their county partners on the project. For example, one agent worked with local growers to offer discounts to gardeners purchasing plants from the pollinator list. Another worked with local officials to add habitat to the county's green space. An agent in southern Georgia worked with a collaborator on an existing trail system to enhance the area by adding pollinator plants.

We found that school gardeners were especially interested in the program as it aligns with objectives in the Georgia school system's STEAM (science, technology, engineering, art, and math) certification. In addition to environmental science, the topic of pollinator health can be applied to many academic disciplines. Teachers have used the project in their classrooms and in afterschool clubs.

Results

During the first year of the program, 22 workshops were conducted with 621 attendees. Sixty pollinator gardens were created in 20 Georgia counties. Over 9,000 face-to-face contacts were recorded. The Pollinator Spaces Project proved to be a statewide program with local impact. The agents appreciated having resources at little to no cost that they could readily incorporate in their existing work. The initiative also gave agents an easy way to be a visible part of the growing movement for pollinator health.

Recognition of efforts was an important aspect of the project. As new habitats were created, gardeners were asked to share their progress with us so that we could demonstrate behavior change. The gardeners sent in photos and details about their new habitats. In return, each received an artistically designed personalized certificate of participation via email. These certificates appear in community garden kiosks and on classroom walls across the state. They have been publically presented at garden open houses and school meetings, suggesting that gardeners want to show that their work has been recognized by a state organization.

Photos of the gardens were featured on the project Facebook page (https://facebook.com/UGAcommunityandschoolgardens) and in the "collection of gardens" section of the website. Teachers have indicated that they are grateful for this public feature of the project because it shows others outside their schools what they are doing with their gardens. Also, students like to see their photos on a public forum.

Conclusion

The low-cost, agent-friendly Georgia Pollinator Spaces Project serves as a model approach to supporting communities in improving their pollinator habitats and can be adapted by Extension professionals for use in other states. It is our hope that the program will result in an increase in pollinators as well as other beneficial insects. More research is needed to measure the benefits of the program for pollinator health; however, we expect that the new habitats and the use of best management practices will increase overall garden health.

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Updates from UGA's Veterinary Entomology Lab

By: Nancy Hinkle

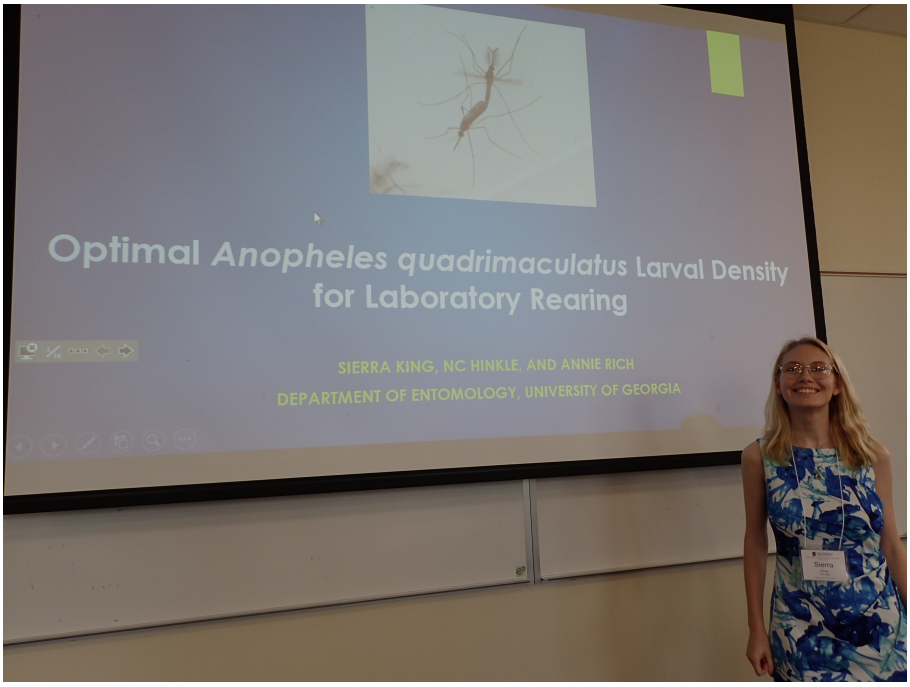
Entomology Professor, UGA-Athens Campus

Annie Rich, a master's student in UGA's Veterinary Entomology program, was awarded the Association of Zoos and Aquariums Terrestrial Invertebrate Taxon Advisory Group's Steve Prchal Scholarship, funding her attendance at the 2017 Invertebrates in Education and Conservation Conference (IECC) in Tucson, AZ.

Annie Rich was selected by the 9th International IPM Symposium Award Committee as the Masters Student 2018 recipient of the International IPM Award of Excellence. Pi Chi Omega presented her their scholarship, as well.

Annie Rich received the Entomological Society of America's MUVE travel grant to attend the 2017 ESA meeting in Denver, CO, at which she received 2nd place for her poster presentation, "Eprinomectin as Mosquito Control and Treated Cattle as Tools in the War Against Malaria."

Annie Rich received the America Mosquito Control Association's Kelly Labell Travel Award to attend the 2018 AMCA meeting in Kansas City. There her presentation, "Death by Cattle: Zooprophylaxis and Endectocide Efficacy in the Control of Anopheles Mosquitoes," received Honorable Mention.



Sierra King, an undergraduate student in UGA's Veterinary Entomology program, was awarded the College of Agricultural and Environmental Sciences' Undergraduate Research Initiative Award funding to study "Optimal Anopheles quadrimaculatus Larval Density for Laboratory Rearing."

She reported the results of her study at the CAES Undergraduate Research Symposium and was awarded 5th place in the oral presentation competition.

Update on pepper weevil control in Georgia

By: David Riley[1] and Stormy Sparks[2]
[1]Entomology Professor, UGA-Tifton Campus
[2]Entomology Professor, UGA-Tifton Campus

The pepper weevil, *Anthonomus eugenii* (Fig. 1), is one of the most severe pest of sweet and hot peppers worldwide (Riley 1992). It causes severe bloom and fruit drop in infested fields, often with nearly 100% yield loss (Fig. 2). In recent years, it has also caused significant damage to eggplant, reproducing mainly in the flowers in that crop. Since the grubs are inside of the buds or fruit, they are protected from contact insecticides, making them particularly difficult to control with insecticide sprays. Thus, preventative control of the adults before they lay eggs into the flowers and fruit is recommended. The pepper weevil appeared in damaging levels again in commercial pepper and eggplant during the fall 2017 season. Pest populations were extremely high in many fields.

Figure 1. Pepper weevil adult on pepper flower bud.

To make matters worse, we have collected pepper weevil adults overwintering in spite of commercial efforts to destroy the old pepper plants. Last fall we compared insecticides which we thought should provide significant levels of control of this pest in bioassays against field collected adults. Again, the susceptibility of the adults to insecticides is the most critical measure of potential control of this pest, so we specifically bioassayed the adults. To do so, we collected fallen pods in a highly infested pepper field in southern Georgia and held the pods for adult weevil emergence (~2 days). Organically grown pepper pods were sliced and dipped into the high rate of insecticide in the equivalent dilution of 100 gallons spray volume per acre. Five adults were placed onto the treated pepper slices and mortality was taken at 24, 48, and 72 hours. The results below (Table 1) showed that Vydate and Actara were the strongest insecticides for weevil control, Exirel weakens the weevil (moribund), and, unfortunately, the pyrethroid Karate, and an experimental, provided no control at all.

Figure 2. Pepper weevil grub in a fallen bell pepper pod.

We have since recorded the same lack of control with another pyrethroid insecticide. The lack of efficacy with the pyrethoids is extremely troubling as the pyrethroids are historically the insecticides most frequently used for management of this pest because of efficacy and cost. This lack of control also explains the high populations observed in commercial fields in 2017, as growers were relying in pyrethroids for control. It was clear from these tests that pepper weevil adult control options are currently very limited in Georgia and that early detection and preventative sprays will be critical.

Insecticide treatment	24 h dead	24 h moribund	24 h live	72 h dead	72 h moribund	72 h live
Vydate	4.00a	1.17c	0.00c	5.17a	0.00b	0.00b
Actara	3.00b	2.00b	0.00c	5.00a	0.00b	0.00b
Exirel	0.17c	4.44a	0.50b	1.17b	3.33a	0.50b
VST-experimental	0.00c	0.00d	5.00a	0.00c	0.00b	5.00a
Karate/Warrior	0.17c	0.00d	4.83a	0.17c	0.17b	4.67a
Water check	0.00c	0.17d	4.83a	0.33c	0.17b	4.50a

Management of Sugarcane Aphid on Georgia Sorghum in 2018

By: David Buntin
Grain Crop Entomologist, UGA-Griffin Campus

In late August 2014, a new aphid was found attacking grain sorghum in Georgia. This aphid is the sugarcane aphid (*Melanaphis sacchari*). Sugarcane aphid (SCA) has been will be a serious pest of sorghum in each year since then with most fields being treated one or more times.

Background: SCA has occurred feeding on sugarcane in Florida since 1977 and Louisiana since 1989. SCA on sorghum was first found near Beaumont, TX in 2013, and is now widespread across the southern U.S. The aphid infests all types of sorghums including grain, silage, and forage sorghums, sorghum x sudangrass mixes, sudangrass, and Johnsongrass, *Sorghum halepense*. Indeed, Johnsongrass supports populations in areas were grain sorghum is absent. The aphid must overwinter on green sorghum plants in areas where volunteer sorghum and Johnsongrass do not go completely dormant.

Xinzhi Ni, USDA-ARS, Tifton, GA

Pat Porter, Texas A&M AgriLife Extension

Identification: It is important to scout sorghum fields in your area for its presence. It is fairly easy to identify. Wingless forms are a uniform pale cream to yellow with black feet and black cornicles (the small tubes present on the end of the abdomen).

Damage: SCA typically is present at very high numbers of several hundred to thousand aphids per sorghum plant. Large populations of fluid sucking aphids cause serious injury to the plants including death of leaves and sometimes plants. Feeding injury causes reddish lesions on the stems and leaves. Greatest yield losses occurred during seedling, pre-boot, boot stages before panicle emergence stages with yield losses of 52 – 100%. Pre-boot infestations at this time can prevent heading and infestations during boot and early panicle emergence can cause sterile heads. Infestations during soft dough also reduced yield by about 20%. The aphid can remain present in large numbers in the field until harvest. It produces large quantities of honeydew, a sticky sugary substance that adheres to the plants, which may interfere with harvest and could damage combine harvest equipment.

Management Practices for SCA Aphid

1) Plant a tolerant Variety. Some hybrids have been shown to have tolerance and partial resistance to the aphid. This table lists tolerant and moderately tolerant hybrids that we have evaluated in Georgia. Tolerance is a combination of tolerance of the plant to damage and a direct reduction in aphid growth. But all tolerant variety may still have aphid infestations and need to be monitored and treated if infestations exceed

treatment threshold listed below. A complete list of tolerant varieties for the U.S. from the Sorghum Checkoff web site is at http://www.sorghumcheckoff.com/farmer-resources/grain-production/hybrid-selection.

Company	Variety	Maturity	SCA Tolerance	Comment
Alta Seeds	AG1201	Med-Early	Good	
Alta Seeds	AG1203	Med-Early	Good	
DeKalb	DKS 3707	Medium	Good	
DeKalb	DKS 4707	Medium	Good	
DeKalb	DKS 2907	Early	Fair-Good	Cream colored seed
Dyna-Gro	M74GB17	Med-Full	Good	
Dyna-Gro	M73GR55	Med-Full	Good	
Pioneer	83P17	Med-Full	Fair-Good	
Sorghum Partners	SP73B12	Med-Full	Good	
Sorghum Partners	SP78M30	Med-Full	Good	
Sorghum Partners	SP7715	Med-Full	Good	
Warner	W-7051	Full	Good	Tall

2) Plant early – Because the aphid migrates northward in the spring, early plantings may avoid may avoid very large infestations. Late planted double-crop plantings are at greater risk of severe infestations.

3) Use an insecticide seed treatment. My trials show that an insecticide seed treatment limits seedling infestations for 30 – 40 days after planting. All registered neonicotinoid insecticides are effective including thiamethoxam (Cruiser), clothianidin (Poncho, NIpsIt Inside) and imidacloprid (Gaucho, others). Most grain sorghum seed was treated with one of these seed treatments.

4) Scout early and often. Fields can quickly be inspected for the presence of aphids by looking are on the underside of leaves. Once aphids are detected, scout at least once, preferably 2 times per week, because aphid numbers build very quickly. Shinny lower leaves with honeydew are a sign of infestation.

5) Beneficial insects do not control infestations before damage has occurred. SCA and their honeydew attract large number of beneficial insect predators such as lady beetles, syrphid fly larvae and lacewings. A parasitic wasp is present in and caused infested aphids to turn a dark blue-gray color. Generally, the rapid rate of increase in aphid populations overwhelms the beneficial insects and severe plant damage usually occurs.

6) Treat when aphids reach threshold levels. The current threshold is **50 or more aphids per leaf on 25% pf plants** preboot stage through dough stage. Once threshold is reach do not delay application because infestations can very quickly go from the threshold level to hundreds of aphids per leaf in less than a week.

7) Use an effective insecticide. PYRETHROID INSECTICIDES ARE NOT EFFECTIVE and may flare infestations by killing all the aphid predators. Regardless of the insecticide, rapidly expanding populations may be difficult to control. Foliar insecticide options for SCA in Georgia are:

- **Sivanto Prime** (Bayer Crop Protection). Sivanto prime has a full section 3 label and a supplemental 2ee label for lower rates on sorghum and other grain crops. The 2ee rates are 4 – 7 fl. oz. per acre. Sivanto was very effective in my trials at rates of 4 to 7 fl. oz. per acre with control usually lasting 21 days or more. At the 4 oz. rate, it can be applied up to 7 times during the season but has a 21 day PHI.
- **Transform WG** (Dow AgroSciences). Transform WG does not have a full federal label for use on sorghum. But Transform WG has an approved Section 18 emergency exception for use on sorghum in Georgia in 2018. The label allows for 2 applications per season and not more than 3 oz. per acre per crop and has a 14 day PHI. **Transform cannot be used during bloom** to protect pollinators. In my

trails, rates of 1.0 and 1.5 oz. per acre were effective. Use the 1.5 oz. rate if aphid populations are increasing rapidly.

- **Chlopyrifos** (Lorsban Advanced, Nufos, other). Lorsban is labeled at 1 to 2 pints per acre. The 2 pint rate has a 60 day harvest interval. The 1 pint has a 30 day harvest interval, but is usually not effective. The 2 pint rate was 60-90% control for about 7-10 days. At the 2 pint rate, it cannot be used after the boot stage due the 60 day PHI. DO NOT USE CHLORPYRIFOS ON SWEET SORGHUM.
- Dimethoate (Dimethoate, Cygon). Not recommended. In my trials dimethoate is variable in control and usually not effective.

8) Good coverage is important for effective control. Use tips and GPA for maximum coverage especially lower in the canopy. A minimum of 10 gpa by ground and 5 gpa by air is highly recommended.

9) Avoid pyrethroid insecticides for other sorghum pests. For sorghum midge try to avoid routine pyrethroid sprays for sorghum midge. Instead scout and treat at 1 adult per panicle. Use Blackhawk or Chlorpyrifos (1 pint per are) for low to moderate infestations. If pyrethroids are used, they can be tank mixed with Sivanto prime (Do not use Transform during bloom). Early plantings often avoid serious midge infestations. For fall armyworm in the whorl, the threshold is 50% infested whorls and for headworms, corn earworms fall armyworm, sorghum webworm, the threshold is 1 worm per head. Use Prevathon, Beseige or Lannate for both situations.

10) Check fields 2-3 weeks before harvest for infestations. A treatment may be needed if large numbers are in the head to prevent interference with harvest and damage to combines. Transform WG can be applied up to 14 days before harvest.

11) Silage/forage sorghum control. Currently we are using similar recommendations for silage and forage sorghum as for grain sorghum. Work is on-going to refine management practices for silage/forage sorghum. Only a small number of forage/silage types have some tolerance to SCA as summarized by Dr. Dennis Hancock (UGA forage agronomist): http://caes2.caes.uga.edu/commodities/fieldcrops/forages/species/sorghums.html Both Sivanto prime and Transform can be used on silage and forage type sorghums. Grazing / hay interval is 7 days for both products. In forage/hay types, the later cutting were damaged last year. Spray coverage is difficult when plants get tall. If aphids are present but below threshold consider a spray application as late as possible before the crop gets too tall.

12) **Sweet sorghum.** Transform WG and chlorpyrifos **cannot** be used on sweet sorghum. A Section 18 label was approved for use of Sivanto prime on sweet sorghum in Georgia in 2017 and the request is pending for 2018.

Please contact me, David Buntin (gbuntin@uga.edu) if you have questions insect pest management in sorghum.

MEDIA MENTIONS

This section includes articles and news stories pertaining to IPM field work written by outside sources.

UGA agriculture climatologist says expect dry planting conditions this spring
By Julie Jernigan
Published 4/16/18 by CAES MEDIA NEWSWIRE


The weather determines when growers schedule operations like spraying, cattle grazing and irrigation.

Georgia farmers should expect dry weather when they plant their crops this spring, but Pam Knox, University of Georgia College of Agricultural and Environmental Sciences agricultural climatologist, anticipates an active tropical storm season in the Atlantic Ocean this summer.

Growers watch the weather closely because it determines when growers schedule operations like spraying, cattle grazing and irrigation.

"Coming out of the moderate La Nina event that we had this winter, neutral conditions are expected by late spring," Knox said. "When this happens, there seem to be drier conditions that are not good for planting."

Once crops are planted, growers rely on rainfall or irrigation to supply water to the crops. If there is a lack of precipitation, farmers must increase the operation of their irrigation pivots.

Precipitation in Georgia was low in January and February, which caused an increase in drought conditions. But cooler weather and increased rainfall in March alleviated some of those dry conditions, Knox said.

Because it is an El Nino-Southern Oscillation (ENSO)-neutral year, the interaction between the atmosphere and the ocean produces a slight periodic variation between below-normal and above-normal sea surface temperatures. This means that, during hurricane season, from June 1 through Nov. 30, there will likely be more named storms.

Last year, Hurricane Irma damaged crops across the southwestern part of Georgia. The Gulf of Mexico is very warm again this spring, which could lead to the rapid intensification of storms over that region, according to Knox.

"I suggest closely monitoring the weather forecast to see if you are in the path of a storm," Knox said.

To deliver updated news to growers, Knox uses observations and satellites to track weather predictions.

"I look at all of these models to simulate what we might expect, but weather is always changing," Knox said. "You always have to be prepared."

Knox writes a daily blog, where she details weather outlooks for the week and other crop news. For more information, visit the Climate and Agriculture in the South East blog at site.extension.uga.edu/climate/author/pknox/.

Proper peanut rotations can have positive impact on yields

By Julie Jernigan

Published 4/25/18 by CAES MEDIA NEWSWIRE

Automated data collection and analysis pipelines are changing the Farmers may have more success growing peanuts if they don't continuously plant peanuts in the same field, according to Scott Tubbs, University of Georgia Tifton campus's research cropping system agronomist for peanuts.

"Rotating other crops with peanuts prevents peanut root-knot nematodes simply because it alternates the host," according to Scott Tubbs, University of Georgia Tifton campus's research cropping system agronomist for peanuts.

Tubbs has studied the impact of peanut rotation since 2008. Instead of growing peanuts in a field for consecutive years, called "continuous peanut rotation," he believes that Georgia growers should plant a rotation of crops in each field, allowing time to avoid the buildup of diseases, nematodes and other pest problems.

In research conducted at UGA-Tifton, Tubbs recorded a decrease in yields by as much as 2,000 pounds per acre during continuous peanut rotation. In this specific trial, the decline in yields was caused by the buildup of root-knot nematodes.

The peanut root-knot nematode affects the roots of peanut plants, where the nematodes lay eggs. This causes the plant to swell and results in yield loss. If peanuts are rotated with another row crop like cotton or corn, instances of root-knot nematode decline and peanut yields increase. The longer the crop rotations are sustained, the more effective the peanut crop will be.

"Our numbers for peanut root-knot nematode decreased when going from a one-year (or continuous) rotation to a two-year rotation, where we put one crop in between peanut crops," Tubbs said. "We reduced the number of peanut root-knot nematodes by half. If you take it out to a three-year rotation, where you grow two crops in between peanut crops, we actually reduced peanut root-knot nematodes by 90 percent."

A four-year rotation by Tubbs, where three crops were planted between peanuts crops and peanuts were grown once every four years, reduced peanut root-knot nematodes by 97 to 99 percent.

"Rotating other crops with peanuts prevents peanut root-knot nematodes simply because it alternates the host," Tubbs said.

Georgia peanut farmers are planning their 2018 crop now. The planting window ranges from late April to late May.

There have been extreme fluctuations in peanut acreage in recent years, from a 90-year low of 430,000 acres in 2013 to last year's 840,000 acres, a 25-year high, according to the "UGA Peanut Production Quick Reference Guide."

"Acreage has been more consistent in the last three years, but consistently high," Tubbs said. "This has put a strain on maintaining recommended crop rotations for peanuts."

For more information on crop rotation, visit the UGA Extension publications website at extension.uga.edu/publications.html.

FUNDING OPPORTUNITIES

This section provides IPM grant information.

NIFA Crop Protection and Pest Management Program

The purpose of the Crop Protection and Pest Management program is to address high priority issues related to pests and their management using IPM approaches at the state, regional and national levels. The CPPM program supports projects that will ensure food security and respond effectively to other major societal pest management challenges with comprehensive IPM approaches that are economically viable, ecologically prudent, and safe for human health. The CPPM program addresses IPM challenges for emerging issues and existing priority pest concerns that can be addressed more effectively with new and emerging technologies. The outcomes of the CPPM program are effective, affordable, and environmentally sound IPM practices and strategies needed to maintain agricultural productivity and healthy communities. The closing date for the grant application is **May 8, 2018**. For more information, please visit their website.

Agriculture and Food Research Initiative Foundational – Exploratory Research

This program area encourages continuous development of innovative ideas that will position U.S. Agriculture at the global forefront. These ideas will lead to quantum leaps in our knowledge and capabilities in agriculture and food production. They will address the challenges that have never been addressed before or challenges that have been addressed, but where new and risky ideas could promise high potential impact. This program area supports research projects that need to develop proof of concept for untested ideas that will lead to creative and positive disruption of the agricultural norm. The closing date for the grant application is **May 22, 2018**. For more information, please visit their website.

Higher Education Multicultural Scholars Program (MSP)

The purpose of this competitive undergraduate scholarship grant program is to increase the multicultural diversity of the food and agricultural scientific and professional workforce, and advance the educational achievement of all Americans by providing competitive grants to colleges and universities. The closing date for the grant application is **June 20, 2018**. For more information, please visit their website.

Agriculture and Food Research Initiative - Sustainable Agricultural Systems

Applications to the FY 2018 Agriculture and Food Research Initiative - Sustainable Agricultural Systems (SAS) Request for Applications (RFA) must focus on approaches that promote transformational changes in the U.S. food and agriculture system within the next 25 years. NIFA seeks creative and visionary applications that take a systems approach, and that will significantly improve the supply of abundant, affordable, safe, nutritious, and accessible food, while providing sustainable opportunities for expansion of the bioeconomy through novel animal, crop, and forest products and supporting technologies. These approaches must demonstrate current and future social, behavioral, economic, health, and environmental impacts. Additionally, the outcomes of the work being proposed must result in societal benefits, including promotion of rural prosperity and enhancement of quality of life for those involved in food and agricultural value chains from production to utilization and consumption. See AFRI SAS RFA for details. A letter of intent for the grant application is due **June 27, 2018**. For more information, please visit their website.

Food and Agriculture Education Information System (FAEIS)

NIFA requests applications for the Food and Agriculture Education Information System (FAEIS) for fiscal year (FY) 2018 to maintain a national food and agricultural education information system that contains information on enrollment, degrees awarded, faculty, employment placement, and other similar information in the food and agricultural sciences.

The Food and Agriculture Education Information System (FAEIS) is a comprehensive database that gathers information, on a voluntary basis, from degree granting institutions of higher education on student enrollment in Food, Agriculture, Natural Resources, and Human Sciences (FANH) sciences, degrees awarded, and graduate placement at all degree levels and by gender, race, and other relevant categories. In addition, data is collected on faculty salaries by rank and discipline. The closing date for the grant application is **June 28, 2018.** For more information, please visit their website.

Citrus Disease Research and Extension (CDRE)

The Specialty Crop Research Initiative (SCRI) Citrus Disease Research and Extension Program (CDRE) is authorized in the Agricultural Act of 2014 (H.R. 2642) to award grants to eligible entities to conduct research and extension activities, technical assistance and development activities to: (a) combat citrus diseases and pests, both domestic and invasive and including huanglongbing and the Asian citrus psyllid, which pose imminent harm to United States citrus production and threaten the future viability of the citrus industry; and (b) provide support for the dissemination and commercialization of relevant information, techniques, and technologies discovered pursuant to research and extension activities funded through SCRI/CDRE and other research and extension projects targeting problems caused by citrus production diseases and invasive pests. The closing date for the grant application is **June 29, 2018.** For more information, please visit their website.

Agriculture and Food Research Initiative – Foundational Program

The AFRI Foundational Program supports grants in the six AFRI priority areas to continue building a foundation of knowledge critical for solving current and future societal challenges. The six priority areas are: Plant Health and Production and Plant Products; Animal Health and Production and Animal Products; Food Safety, Nutrition, and Health; Bioenergy, Natural Resources, and Environment; Agriculture Systems and Technology; and Agriculture Economics and Rural Communities. Single-function Research Projects, multi-function Integrated Projects, and Food and Agricultural Science Enhancement (FASE) Grants are expected to address one of the Program Area Priorities (see Foundational Program RFA for details). The closing date for the grant application is **September 30, 2018**. For more information, please visit their website.

The UGA Integrated Pest Management Newsletter is a monthly journal for researchers, extension agents, extension specialists, and others interested in pest management. It provides the most updated information on legislation, regulations, and other issues concerning pest management in Georgia.

Do not regard the information in this newsletter as pest management recommendations. Consult the Georgia Pest Management Handbook, extension publications or appropriate specialists for additional information.

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