

Integrated Pest Management Program

Monthly Newsletter

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SPECIALIST SPOTLIGHT

Get to know the specialists stationed throughout the state of Georgia that make up the IPM Program.

Dan Horton

Emeritus



Dan Horton received his bachelor's in zoology and his master's in entomology from Clemson University. He completed his doctorate in entomology at the University of Arkansas. Horton began his career at the University of Georgia in 1982, as a fruit and ornamental entomologist. He retired two years ago and now serves as a free-lance consultant for Georgia and South Carolina farmers.

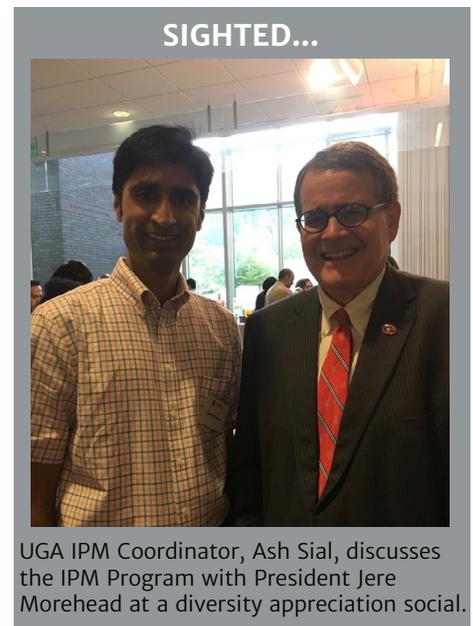
During his time with UGA, Horton was the main advocate for making the IPM Coordinator a permanent position. He was inspired by the federal appreciation that active IPM Coordinators in other IPM programs were receiving across the nation.

Horton feels the IPM program is one of the most interesting, least appreciated, and least understood programs in universities.

"Without IPM programs, there is no presence with the general public," he

said. "The program, with Extension agents, builds loyalty to UGA and provides important methods and research to the growers, preventing expensive effects, such as bad information or incorrect identifications."

In his spare time, Horton likes to stay active. He recently participated in the annual Plains, GA Peanut Festival 5K Road Race. He placed second in his age group and received a trophy, presented by Former President Jimmy Carter, pictured. ■



UGA IPM Coordinator, Ash Sial, discusses the IPM Program with President Jere Morehead at a diversity appreciation social.

UGA IPM INFORMATION

@UGAIPM



The submission deadline for the November newsletter is **October 29, 2018**. Please submit all articles prior to the deadline. If you would like an article written about an upcoming event or project, please email ipm@uga.edu.

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UPCOMING EVENTS

Oct 13 - [Apple Recipe Contest at Georgia Apple Festival](#) | 9:45AM | Elijay, GA

Oct 16 - [Growing Backyard Fruit Trees](#) | 6:00PM | Jeffersonville, GA

Oct 23 - [Area Beef Cattle Field Day in Butts County](#) | 3:00PM | Jackson, GA

For more events, please visit the [UGA Extension Calendar](#).

FEATURED CREATURE

Diamondback Moth

(*Lepidoptera, Plutellidae*)

Description:

Immature stages – Eggs are small, flat-oval (0.44 mm long), yellow, and usually laid singly on leaves. Larvae are light to dark green, tapering slightly at both ends with four pairs of prolegs, with slightly darker head and scattered hairs. Ranges in size from about 1.3 mm when hatching to a length of 8.6 mm in the fourth instar. Wriggles rapidly when disturbed and may drop from plant by a silken thread.

Adult stages – grayish-brown, with narrow forewings, fringed hind wings and pronounced antennae. Body length excluding antennae is about 6–9 mm with a wingspan of approximately double this when fully extended. When the wings come together as in resting position they tend to form line of contiguous pale diamonds down the middle of back, hence the name.

Biology:

Life Cycle – The moth mates in the evening hours and lays eggs singly or in loose groups attached to the foliage. Larvae hatch in 3–5 days and develop through 4 larval instars in about 11 days under warm temperature conditions as it feeds on the foliage. First instar larvae feed on just the underside of leaves causing a “window pane” effect – the upper epidermis still intact. Four instar larvae spin cocoons attached to lower leaf surfaces or the stem. Moths emerge from cocoons in about a week. The entire life cycle under warm conditions is approximately 3 weeks.

Seasonal Distribution – In Georgia there are multiple generations per year, with generation time slowing considerably in the winter months.

Traditionally numbers were very low in the winter, but in recent years, greater moth activity has been noted when temperatures are higher in than normal in December and January.

Damage to Crop:

Larvae feed on foliage with early instars causing window paining or small channels in the leaf surface and larger larvae causing perforations in the leaf. Low populations under 0.3 larvae/plant are not economically damaging early in the growing season, but should be controlled above this level. Cocoons are a source of insect contaminants late in the season and should be prevented 3 weeks before harvest.

Management:

Scout weekly to determine if 0.1–0.3 larvae/plant threshold has been reached. Allow a 1–2-month production break in mid-summer to avoid building up populations between spring and fall (note populations tend to be lower in the winter months in many years). Rotate insecticides as this insect can temporarily develop resistance to many pesticides with their excessive use. In Georgia, excessive, season-long use of a single insecticide ingredient has recently resulted in high levels of insecticide resistance (e.g., in 2002 in Mitchell county with the product spinosad). Encourage beneficial insects by avoiding chemicals toxic to parasitoids, e.g. the wasp parasitoid, *Diadegama insulare*, with effective alternatives like *Bacillus thuringiensis* sprays.

David Riley and Alton Sparks, Professors, University of Georgia, 2018 ■



Diamondback moth larva



Diamondback moth adult



Diamondback moth damage

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Integrated Pest Management Program

FROM THE FIELD

Articles and news stories pertaining to IPM field work written by IPM specialists.

Downy mildew resistance to QoI fungicides is rampant in Georgia vineyards

by Sarah Campbell and Phil Brannen, Plant Pathologists, University of Georgia – Athens Campus

Georgia's wine grape industry is relatively young and fragile.

Though vinifera and hybrid vineyards have been in production in Georgia for approximately 40 years, the industry has only shown significant growth in the last 10–15 years. Wine grapes are contributing significantly to the Georgia economy even though acreage pales in comparison to that of North Carolina and Virginia. Georgia vineyards are concentrated in the Valley and Ridge and Blue Ridge geographic regions of northern Georgia and the Piedmont of west Georgia. However, hybrid grapes are now being grown in the southern Coastal Plains, so wine grapes are actually becoming a statewide enterprise. Many grape species and hybrids share one significant issue in common – susceptibility to a disease called downy mildew. Arguably, downy mildew may be the most difficult to control disease in Georgia grapes, and this is true for most if not all of the Southeast.

Downy mildew is caused by the oomycete *Plasmopara viticola*. Though downy mildew is an important disease for grape growers worldwide, the southeastern environment is perfect

for disease development – generally humid and wet for much of the growing season. *P. viticola* infects and reproduces on berries (Fig. 1), pedicels, and the undersides of grape leaves (Fig. 2), reducing photosynthesis and rendering the fruit unusable. In severe cases, leaf drop (Fig. 2) will decrease the vine's overwintering potential because of nutrient deprivation, which leads to winter injury/kill. Downy mildew also lowers yield and has a substantively negative impact on the resulting wine quality due to both direct (infected fruits) or indirect (reduced photosynthates and poor grape quality) effects.

Downy mildew thrives on *V. vinifera*, hybrids and even some natives, which account for most of the cultivars grown in Georgia's wine industry. To minimize downy mildew and other diseases, grape growers spray fungicides throughout the season and even after harvest (to protect leaves). Due to the season-long infection potential of *P. viticola*, vineyard managers may employ as many as thirteen to seventeen downy mildew sprays in any given growing year. Because of the numerous applications of oomycete-active materials applied, resistance can



Figure 1. Downy mildew sporulation on young grape clusters (photo courtesy of C.F. Hong; University of Georgia Plant Pathology Department).



Figure 2. Downy mildew sporulation on the underside of leaves (left) and subsequent defoliation (right).

readily develop to different chemical classes utilized to control downy mildew.

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long infection potential of *P. viticola*, vineyard managers may employ as many as thirteen to seventeen downy mildew sprays in any given growing year. Because of the numerous applications of oomycete-active materials applied, resistance can readily develop to different chemical classes utilized to control downy mildew.

Spraying fungicides with the same single-site mode-

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Downy mildew continued...

of-action active ingredient repeatedly selects for individuals who are less sensitive. These less sensitive individuals and their progeny remain in the vineyard and cause more damage – often as if no fungicide had been applied. Fungicide resistance in *P. viticola* is well studied for many classes of fungicides and a variety of geographic locations. The main classes of fungicides studied for resistance are the quinone outside inhibitors (QoI), carboxylic acid amides (CAA), phenylamides (PA), and cyano-acetamide oximes, all of which utilize a single mode of action to impede downy mildew (Gisi and Sierotzki 2008). These fungicide classes have been evaluated for grape growing regions in Europe, China, Japan, and the US. However, a study of fungicide resistance had not been conducted in Georgia.

In 2017, a survey of fungicide sensitivity was performed on downy mildew isolates from throughout the state. Leaves with downy mildew were collected from multiple commercial Georgia vineyards and tested for genetic mutations known to confer resistance and/or tested in bioassays to further confirm resistance. The main mutation known to cause QoI resistance is the G143A mutation, which is a point mutation in the cytochrome b gene that

changes the resulting amino acid from glycine to alanine (Baudoin et al. 2007). This mutation is known to confer total resistance to the entire QoI fungicide class. The known mutations for CAA resistance, point mutations in the PvCesA3 gene, also show cross resistance among the CAA fungicides (Nanni et al. 2016; Zhang et al. 2017). The presence of these mutations was evaluated using PCR for the samples collected in 2017 and on DNA isolated from Georgia downy mildew samples collected in previous years by Cheng-Fang Hong, a Ph.D. student at the University of Georgia.

To further confirm the molecular results for fungicide sensitivity, isolates were also tested against a discriminatory dose of a formulated commercial QoI and CAA fungicide in a leaf disc bioassay. The QoI active ingredient azoxystrobin (Abound) and the CAA active ingredient mandipropamid (Revus) were utilized. This bioassay was largely derived from the Fungicide Resistance Action Committee’s (FRAC) microtiter plate test for fungicide sensitivity (Sierotzki and Kraus 2003). A bioassay test was also conducted against a range of fungicide concentrations of the PA fungicide mefenoxam (Ridomil), to determine sensitivity of this class. Testing the PA

Table 1. Downy mildew resistance to QoI (Abound and Pristine; azoxystrobin and pyraclostrobin; FRAC 11), CAA (Revus and one component of Zampro; mandipropamid and dimethomorph; FRAC 40), and PA (Ridomil; mefenoxam; FRAC 4) fungicide classes in 2017 Georgia surveys.

County	N*	Bioassay			PCR	
		QoI	CAA	PA	QoI	CAA
Cobb	8 (1)	100	0	0	100	0
Colquitt	28 (1)	0	0	0	28.6	0
Fannin	8 (1)	100	0	0	100	0
Gilmer	9 (2)	100	0	0	100	0
Haralson	4 (1)	100	0	0	-	-
Rabun	8 (1)	100	0	0	100	0
White	13 (4)	100	0	0	100	0

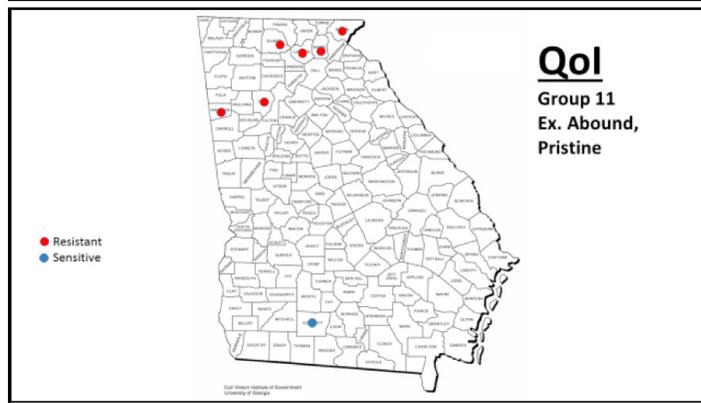


Figure 3. Survey results by county of *Plasmopara viticola* (downy mildew) resistance to QoI (FRAC 11) fungicides in Georgia (2017).

fungicides against a range of concentrations is necessary, as no molecular markers for resistance have been identified. Results indicated that QoI resistance is widespread among *P. viticola* populations throughout Georgia (Table 1 and Fig. 1). However, neither CAA nor PA resistance was observed at any vineyard in Georgia (Table 1). This is fortunate,

as CAA resistance has been found in Virginia and North Carolina within the last few years.

In addition to field surveys for downy mildew resistance, efficacy of eight different fungicides and two combinations (10 total treatments) were tested for downy mildew control at three locations (the University of Georgia Research

FROM THE FIELD

Articles and news stories pertaining to IPM field work written by IPM specialists.

Downy mildew continued...

and Education Center in Blairsville, GA and two commercial vineyards). Rates were calculated to correspond with a 50 gallon per acre spray volume, and applications were made at bloom, post-bloom, bunch closure, and second cover. Treatments included: (1) Abound, (2) Captan, (3) Pristine, (4) Prophyt, (5) Revus, (6) Revus Top, (7) Ranman, (8) Zampro, (9) Prophyt + Captan, and (10) Prophyt + Ranman.

In these trials, fungicides separated into three efficacy categories: (1) high efficacy – Revus, Zampro, Revus Top, Prophyt + Captan and Prophyt + Ranman; (2) good efficacy – Ranman, Captan, and Prophyt; and (3) no efficacy – Abound and Pristine (essentially the same as an untreated control) (Fig. 4). Downy mildew from these sites showed significant resistance to the QoI fungicides, as evidenced by the G143A mutation in the mitochondrial genome and bioassays. These trials further clearly document field resistance of downy mildew to the QoI fungicides azoxystrobin (Abound) and pyraclostrobin (Pristine) at these sites and confirm the total lack of activity by these fungicides in most sites in Georgia.

In conclusion, resistance to the strobilurin (quinone outside inhibitor [QoI]; Fungicide Resistance Action

Committee [FRAC] class 11) is widespread, and these fungicides (Abound, Pristine, Sovran, Flint), when utilized for control of other diseases, should always be mixed with mancozeb (early season) or Captan products at a minimum to increase or provide downy mildew control. Ridomil (mefenoxam) is still active, as is Revus and Zampro. Neither mancozeb nor Captan products are known to develop resistance, so maximum use of these products for downy mildew management should be encouraged. For the other classes with activity against downy mildew (Table 2), it is recommended that vineyard managers limit themselves to one application per season when possible – targeting periods with increased and sustained precipitation. Rotation among all active chemical classes will require producers to purchase multiple chemicals that will be utilized only once per season, but alternation of chemical classes is critical to maintaining these fungicides for years to come. We have already essentially lost the QoIs, and we simply can't afford to lose more classes if we are to manage this aggressive disease in the future.

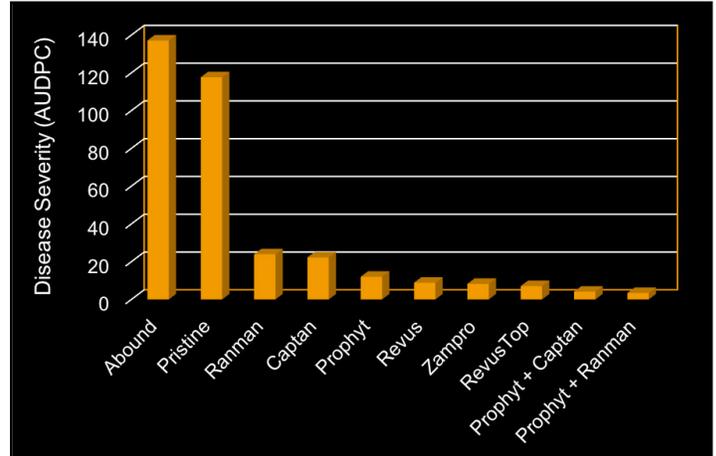


Figure 4. Efficacy (disease severity response as measured by the area under the disease progress curve [AUDPC]) of downy mildew active materials averaged across three trial sites in 2017. The QoI-containing products Abound and Pristine did not provide downy mildew control, and all three sites experienced a “field failure” where these materials were applied. Ranman, Captan, and Prophyt provided good control, but it is advisable that these materials be utilized in tank mixes such as Prophyt + Captan or Prophyt + Ranman for optimal efficacy and resistance management.

Fungicides	FRAC Code	Efficacy
Ametocradin + dimethomorph (Zampro)	40 + 45	++++ Systemic
Azoxystrobin (Abound)	11	??? Systemic (Resistance prevalent; always mix with mancozeb or Captan)
Boscalid + Pyraclostrobin (Pristine)	7 + 11	??? Systemic (Resistance prevalent; always mix with mancozeb or Captan)
Captan	M4	+++ Contact protectant; combine with Phosphonates
Cyazofamid (Ranman)	21	+++ Locally systemic; combine with Phosphonates
Famoxadone + Cymoxanil (Tanos)	11 + 27	+++ Use with Captan or mancozeb (required)
Mancozeb	M3	+++ Contact protectant
Mandipropamid (Revus)	40	++++ Translaminar protectant
Mandipropamid + Difenoconazole (Revus Top)	3 + 40	++++ Translaminar protectant
Mefanoxam + Mancozeb (Ridomil Gold MZ)	4 + M3	++++ Systemic + contact protectant
Phosphonates (Prophyt, etc.)	33	+++ Systemic (combine with Captan)
Ziram	M3	+++ Contact protectant
Zoxamide + Mancozeb (Gavel)	22 + M3	+++ Contact protectant fungicides

Table 2. List of downy mildew active materials, Fungicide Resistance Action Committee (FRAC) codes, and efficacy ratings with notes.

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AGENT ADVOCATE

Structural Pest Management Program series to aid Extension Agents

Need help generating a little extra revenue for your local Georgia County Extension Office? We have discovered it! The Center for Urban Agriculture (The Center) offers four opportunities for Georgia County Extension offices to generate revenue. In the next four issues of the IPM Program Monthly Newsletter, we will reveal the details for all four opportunities.

The Getting the Best of Pests (GTBOP) is a live webinar series that reaches out to the Georgia Green Industry offering CEU Category Credits from the privacy and luxury of a home or office environment. This GTBOP Green series saves companies time, travel and expenses and provides extension agents user-friendly, useful information and an opportunity to generate a little revenue right from their county office.

The GTBOP Green Webinars are offered on the 3rd Wednesday of every ODD-numbered month. (January, March, May, July, September and November.) These live webinars are accessed online, utilizing the web-based software, Go-To-Webinar, and are aired from 8:15 am to 10:45 am. For more information on the GTBOP Green Webinar Series or other programs that The Center offers, contact the Bodie Pennisi at bpennisi@uga.edu.

For more information on the workshops and other programs from the Structural Pest Management Program, please visit <http://www.gabugs.uga.edu>. ■

REVENUE GENERATING OPPORTUNITIES

HOW TO USE GTBOP.COM FOR YOUR COUNTY

PART 4 OF 4 - SPREAD THE WORD

County extension offices receive funds from advertising the GTBOP.com webinar series to others in their county.

PROMOTE



Promote and share the live webinar information to help raise awareness and increase participation from your county.

REGISTRATION

Someone from your country registers for a live webinar online via Eventbrite.



RECEIVE MONEY



- Half of the proceeds collected from a GTBOP webinar from someone in your county is sent to your office.
- County agents do not receive time for GA Counts

For more information on this series, please contact
Tami Boyle: 770-233-6107, tadams@uga.edu

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MEDIA MENTIONS

Articles and news stories pertaining to IPM field work written by outside sources.

Turkestan cockroach now resident of Georgia, UGA scientist says

by Sharon Dowdy

A new cockroach species from Turkey has been recorded for the first time in Georgia, according to University of Georgia College of Agricultural and Environmental Sciences entomologist Dan Suiter.

Suiter, a UGA Cooperative Extension specialist on the UGA campus in Griffin, Georgia, was alerted to the new cockroach by Howard Carter of Countryside Pest Control. Carter collected the cockroach in a trap while inspecting a site in Spalding County, Georgia, for pests.

“About a year ago, Howard brought me a sticky card with a bunch of different cockroaches on it and wanted to know what this one was,” said Suiter, who specializes in home and structural pests. “I wasn’t sure, and neither was Orkin’s national technical director, who was on hand when Howard brought the sample in.”

The experts thought that the cockroach was the native woods cockroach, the ones that typically are attracted to lights, Suiter said. “It looked like those, but then it didn’t,” he said. “We finally determined that it was the Turkestan cockroach, *Blatta lateralis*.”

The male of this species is gold-colored and about an inch and a quarter in length. The female is wingless and cherry-colored with two white streaks where the wings would otherwise be.

In 2017, Suiter sent a specimen of the cockroach to the UGA Museum of Natural History where Richard Hoebeke, an associate curator for arthropods at the museum, confirmed and documented the species.

“The significance of finding this cockroach in Georgia is that it’s known to primarily be in the Southwestern United



Turkestan cockroach, Blatta lateralis, a cockroach species from Turkey has been recorded for the first time in Georgia, according to University of Georgia College of Agricultural and Environmental Sciences entomologist Dan Suiter. Photo by Lisa Ames, UGA Cooperative Extension.

States,” Suiter said. “It’s invasive and it’s been found in the U.S., but it’s never been documented in Georgia until now.”

The Turkestan cockroach may be new to Georgians, but across the Southwest U.S., it is well established. “People in the Southwest view this species of cockroach the way Southerners view the Palmetto bug,” he said. “They hate it.”

This year, Suiter equipped Carter with 10 cockroach traps to determine whether the Turkestan cockroach was still in the area.

Carter and his 11-year-old grandson, Bryce Sammons, set the traps and waited.

“I think he’s a future entomologist.

He really enjoyed setting the traps, and he’s been taking bugs he finds to Dan for a few years,” Carter said.

Two days after placing the traps, Carter returned to Suiter with 50 Turkestan cockroaches. Suiter sent 20 specimens to the UGA museum, where they will be cataloged and entered into the museum’s collection.

“By now they are probably in other locations and they just haven’t been reported,” he said. “And, to an untrained eye, they just look like any other cockroach.”

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FUNDING OPPORTUNITIES

IPM Enhancement Grant Program – Request for Applications (RFA)

The submission deadline is November 16, 2018

The IPM Enhancement Grants Program (IPMEP) is a foundational mechanism used by SIPMC to address important issues affecting the region that has produced many significant outputs and favorable outcomes addressing Global Food Security challenges including invasive species, endangered species, pest resistance, and impacts resulting from regulatory actions. We use a competitive process each year to solicit and select projects for funding.

Any IPM setting is applicable to the IPM Enhancement Grant program, including agriculture, urban and school, forestry and recreation. The funding covers a one-year project, so please keep that in mind when considering your proposal. See below for project types that this grant funds. We have adopted an outcome-based approach for our funded projects, and you will notice that when you read through the RFA. Each component of the proposal is explained in detail; please take the time to read through the RFA carefully.

If you are familiar with this grant program from previous years, this year's RFA does NOT cover proposals for IPM Documents. IPM Documents is now included in a separate RFA.

To get to the RFA and required forms, please go to our [introduction page](#). ■

Georgia Agricultural Commodity Commission for Peaches

The proposal deadline is November 16, 2018

The Georgia Agricultural Commodity Commission for Peaches has issued their call for proposals to be considered for FY19 funding. The Commission seeks to provide funding for research focused on all aspects of the Georgia peach industry. Please contact the Grants and Contracts office (agcg@uga.edu) if you plan to submit a proposal. Notifying the Office does not commit you to following through with an actual application, but alerts them to the possibility. For more contact information, please visit their [website](#). ■

Friends of Southern IPM Graduate Student Award

The nomination deadline is December 7, 2018

There are 6 categories of awards: Bright Idea (research-oriented or new idea), IPM Implementer (someone who practices IPM in the real world), IPM Educator (extension or teacher), Pulling Together (group), Future Leader (young professional), and Lifetime Achievement (seasoned professional). The award is open to anyone in the region demonstrating excellence in the

field of IPM. In fact, we welcome the opportunity to recognize those outside of the university setting, such as growers, school IPM coordinators, teachers, etc.

Award winners will be publicly recognized at an event of their choice. The Call for Nominations for the professional awards is at <https://bit.ly/2pVhJMg>. ■

Friends of Southern IPM Graduate Student Award

The nomination deadline is December 7, 2018

The Friends of Southern IPM graduate student award will go to two graduate students: one Masters student and one Ph.D. student.

Each department can nominate UP TO 3 Masters students and UP TO 3 Ph.D. students. Each department can submit up to six nominations, and universities can submit from more than one department (i.e., entomology, plant pathology, weed science, horticulture, etc. Departments can submit from the same university).

The Call for Nominations for the graduate student awards is at <https://bit.ly/2NHjs1l>. ■

Southern Region IPM Center – Critical Needs and Emerging Issues

The submission deadline is December 31, 2018

This Request for Applications will fund projects that address a critical or emerging IPM issue of regional or national significance. The Center has a small amount of funding to help facilitate timely responses to critical issues, as an early regional response can lead to more timely and effective solutions. Our purpose is to provide a small source of funds that can be used to start work on new and critical issues, and to support projects that offer new and innovative solutions to emerging IPM challenges. For more information, please visit their [website](#). ■

Southern Region IPM Center – IPM Documents

The submission deadline is December 31, 2018

This Request for Applications will fund projects that address the need for documents that accurately reflect the current state of Integrated pest management on a regional or national basis. IPM Documents may address crops or other (non-crop) settings for a single state or combination of states. Funding provided by the center are intended to help facilitate authoring of these documents including travel, meeting, and survey expenses associated with information gathering. Currently, 3 types of documents are recognized: Crop profiles (CP), Pest Management Strategic Plans (PMSP), and IPM Priorities. For more information, please visit their [website](#). ■

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MEDIA MENTIONS

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So, what's the difference between the Turkestan cockroach and other cockroaches Georgians are accustomed to seeing scurry across the kitchen floor? Not much, Suiter said.

"They have a similar biology as an American or smokybrown cockroach. American cockroaches, *Periplaneta americana*, are from Africa and the smokybrown cockroach, *Periplaneta fuliginosa*, is from Japan," he said. "None of these cockroach pests are native to the U.S., including the German cockroach, *Blattella germanica* (the one found in kitchens), which is from Southeast Asia."

Having been in the pest control business since 1986, Carter says the key to controlling pests is to have a watchful eye and keep your home or office clutter-free.

"You should really pay attention to what you see in your home," he said. "Don't create problems. If you have clutter, you are going to have problems with insects and rodents; it's a given."

When it comes to controlling cockroaches, no matter what their country of origin, Suiter refers people to UGA Extension Bulletin 1412, "Management of Pest Insects in and Around the Home." This publication can be found at extension.uga.edu/publications. For a more extensive pest control manual, Suiter recommends UGA Extension Special Bulletin 48, the home and garden edition of the Georgia Pest Management Handbook.

Visit the UGA Structural Pest Management program website for more information. ■

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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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