Southern IPM Center

Funded by the USDA National Institute of Food and Agriculture

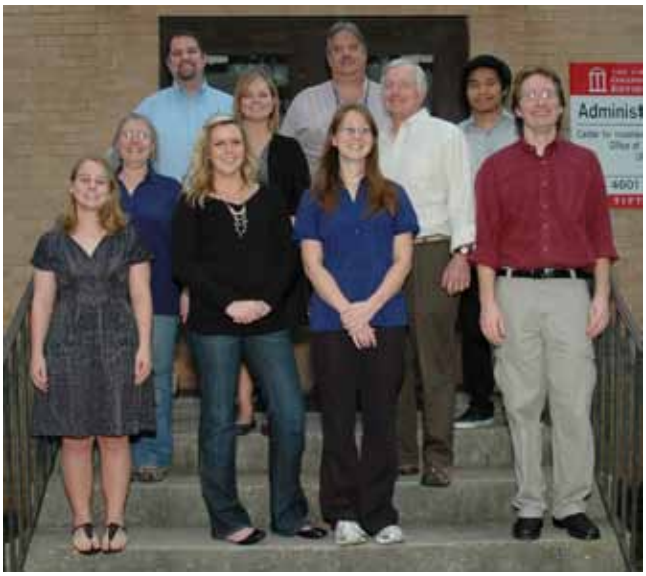
Southern IPM Center Annual Update

Prepared for the National IPM Committee Meeting, October 2012

Five Nominees Receive "Friends of IPM Awards"

Two teams and three individuals will be recognized this year with the Southern Region IPM Center's Friends of IPM Award. Winners were chosen by their peers in the region.

The Center for Invasive Species and Ecosystem Health, known to many in the region as the **Bugwood Network**, wins this year's Bright Idea award. Bugwood began in 1994 as a collection of a few hundred pictures of forest pests placed on the Internet to help county extension agents identify insects. As extension specialists and other university experts continued sending photos, Bugwood creators Drs. Keith Douce and David Morehead realized they had to make the database searchable.



Front: Michasia Harris, Lily Conner, Rebekah Wallace, Joe LaForest; **Middle**: Karan Rawlins, Salina McAlister, Keith Douce; **Rear**: Chuck Bargeron, David Moorhead, Rustico David

Now, over 15 years later, Bugwood contains well over 100,000 indexed photos, a diagnostician's cookbook, a Wikipedia, maps and hundreds of printable text resources.

The IPM Implementer award goes to **Dr. Blaine Viator**, a certified independent crop consultant in Louisiana. Dr. Viator is the current chair of the ipmPIPE steering committee and president-elect of the National Alliance of Independent Crop Consultants. In both roles, he has helped field crop growers both in Louisiana and nationally to understand and implement IPM.

Blaine Viator (L) and Jim VanKirk (R)

Since 2005, he provided monitoring data of soybean rust on kudzu and informed scientists about SBR activity in soybean. The SBR monitoring network has helped soybean pathologists to formulate appropriate SBR fungicide recommendations and has been instrumental to saving farmers money that might have been wasted on needless fungicide sprays.

IPM professionals in Tennessee know **Scott Stewart** as the state IPM Coordinator, but this year he is also winner of the IPM Educator award. According to nominator Owen Gwathmey, Dr. Stewart has led insect pest management programs for cotton, corn, soybean, sorghum, wheat and pasture since 2002. He regularly trains farmers and Extension agents in scouting schools, conducts pesticide and GM crop

L-R: Jim VanKirk, Scott Stewart and Norm Leppla

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Friends of IPM (continued)

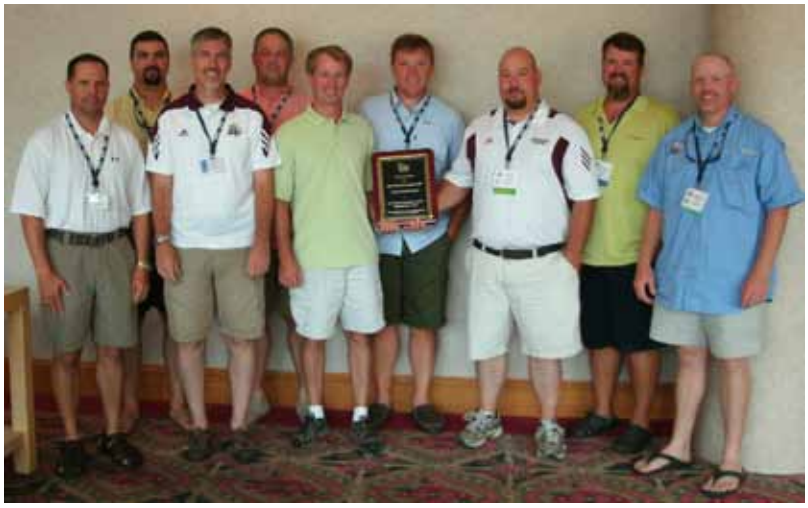
trials, evaluates sampling procedures and thresholds and communicates with farmers and Extension agents through a variety of methods.

Dr. Stewart developed an IPM program for the region's cotton farmers that minimized the amount of foliar insecticide applications needed to control the pest. "Through this IPM program, Dr. Stewart will most likely save growers millions of dollars in unneeded insecticide costs," says Jeffrey Gore, an assistant professor with Mississippi State University's Delta Research and Extension Center.

Future Leader award winner **Ayanava Majumdar** has already proven himself a current leader in IPM extension and impact evaluation. An Extension Entomologist with the Alabama Cooperative Extension System, Dr. Majumdar has successfully trained farmers in IPM, with IPM adoption rates of 53% and an increase in understanding of up to 62%. Dr. Majumdar is also one of the region's few IPM impact evaluation specialists. Last September, he led an evaluation workshop for the state IPM coordinators. He has also designed a logic model for IPM program evaluations in the southern region that researchers at Auburn are using to develop grant proposals.

L-R: Jim VanKirk, Ayanava Majumdar and Henry Fadamiro

The Pulling Together award goes to a group of Extension specialists in Mississippi who organized the **Mississippi Crop Situation Blog**. The blog team involves experts from Mississippi State University Extension Service and AgFax Media who are experts in crops, weeds, insects and soil. Located at http://www.mississippi-crops.com/, the blog provides information about crop and soil issues. Dr. K. Raja Reddy, who nominated the blog team, estimates that the blog saved Mississippi growers between 35 and 70 million dollars last year.



Mississippi Crop Situation Blog team

Virginia IPM Coordinator **Ames Herbert** received this year's Lifetime Achievement award. Dr. Herbert has been an Extension Specialist with the Tidewater Area Research and Extension Center for 24 years and IPM Coordinator for 15 years. In both positions, he conducts research and extension activities on peanuts, cotton, soybeans and small grain and is the only entomologist with responsibilities in those fields. Dr. Herbert has been principal investigator on several southern region projects, including two pocket guides (one on corn, soybean and wheat and the other on stink bugs), stink bug research and extension tools, a slug workshop and more.

L-R: Saied Mostaghimi, Jim VanKirk, Ames Herbert and Ed Jones

Small Farms Working Group Makes Plans to Train Public

The abundance of perfectly shaped produce at the chain grocery store paints a pretty but often inaccurate picture of the majority of American farms. Small-scale farms, which make up 87 percent of all farms, according to NASS statistics, often lack the resources to fight pests and diseases that can blemish a crop or destroy it completely. Of the total population of small-scale farmers in the U.S., only 4.5 percent report high earnings from sales. Most small-scale farmers either struggle to earn a living from their crop, or earn their main income from a non-farming source, leaving few financial resources for production decisions, including pest management.

To share the experiences and struggles of assisting small-scale farmers with pest management, university extension specialists and other stakeholders working with small-scale farmers met during a two-day meeting at Clemson University. Meeting participants discussed the challenges of teaching integrated pest management (IPM) to small-scale farmers and brainstormed ways to help these farmers understand and implement IPM on their farms.

The Small Farms Working Group is a new project initiated last fall by the Southern IPM Center. The working group brings together specialists from 1862 and 1890 land-grant universities in 15 southern states/territories, and a few private consultants who work specifically with farmers of small-acreage farms. SIPMC Director Jim VanKirk proposed the collaborative meeting to gather professionals who work with small-acreage farmers. The purpose of the workshop was to give participants the opportunity to share or request resources, ask questions and learn about what other programs are doing. Dr. Henry Fadamiro, a professor and IPM Coordinator at Auburn University and Associate Director of the Southern IPM Center, leads the group.

The workshop, which took place June 26-27, brought specialists together who had never even met one another before. Many specialists discussed the challenges of pest management for small-acreage farms in their state, and each presented a different need.

After a morning of discussions, participants spent the afternoon touring two small farm sites. The first, Clemson's organic demonstration farm, was an impressive example of a "closed loop" sustainable farm. A closed drainage system caught rainwater in a huge tank and piped it to irrigation lines and a tilapia pond. A large automated compost system attracted flies that would give birth to larvae needed to feed the tilapia. Students sold produce grown on the farm as part of a Community Supported Agriculture project, and money from the sales was recycled back into the program.The second farm visited was an organic farm several miles away from the university.

During a brainstorming session on future directions and priorities for the group, specialists emphasized the importance of training for small-scale farmers. Several participants stated that time and transportation is often an issue for these farmers, so many farmers try to solve pest infestations on their own rather than losing a crucial day of work to attend a meeting

Small Farms Working Group (continued)

several miles away. Participants recommended building closed-loop demonstration farms, such as the one at Clemson, to make workshop attendance more attractive and give farmers tangible examples to support sustainable production.

Education and promotion targeted toward the general public was another of the top priorities. Specialists recommended producing handouts about IPM to leave at farmers' markets, hoping that increased consumer demand for IPM produce would encourage more farmers to learn about and practice IPM on their farms.

The group established a steering committee to review some of the priorities developed during the meeting and to discuss ways to manage implementation. The committee will develop some online communication methods until a second face-to-face meeting is planned next year.

Southern Region Impacts

Stories by Doris Sande, Impact Evaluation Specialist

VA Tech research saves Virginia and North Carolina peanut growers millions of dollars

Impact

Peanut farmers in Virginia and North Carolina saved $21.3 million in 2011, thanks to new genetically-modified peanut cultivars developed by researchers at Virginia Tech. The cultivars are resistant to Sclerotinia blight, a destructive peanut disease that can cause huge losses in yields.

The new cultivars could save farmers up to $261 per acre with the reduction of fungicide sprays alone. In 2012, North Carolina growers made on average about 39 cents for every dollar invested in their peanut crop. That return was even higher in 2010 because of lower seed costs: for every dollar spent, growers made 51 cents, more than half of what they invested. In research trials, growers who used the genetically-modified cultivars not only reduced fungicide sprays by 2-3 sprays per season, they also saw increased yield of up to 2200 lbs. per acre, resulting in increased yield values ranging from $72 to $297 per acre.

Background

Peanut growers typically face up to 75% crop loss from Sclerotinia blight, a stem rot disease that causes a cottony, white moldy growth near the base of peanut plants under moist conditions. The disease can kill entire plants and spreads rapidly under optimal conditions.

Farmers controlled S. blight mainly through fungicide applications, combined with other IPM methods such as cultivar selection, crop rotation, and sanitation. A single fungicide spray can cost about $87 per acre, and control for S. blight requires 2-3 sprays per season. Rotations must be selected carefully, since many cool-season vegetables, canola and common winter weeds can host the pathogen.

With a $120,000 USDA Southern Regional IPM grant, a team of Virginia Tech researchers led by Patrick Phipps developed and released a new line of peanuts modified with barley oxalate oxidase. Barley oxalate oxidase is a naturally-occurring enzyme that works by preventing the fungus from colonizing in the peanut plant cells. The research team used the enzyme to modify three peanut cultivars: NC 7, Wilson and Perry. In the field, the new cultivars had about 81% less disease than the original cultivars.

If peanut farmers throughout the Southeast used the new genetically-modified peanut cultivars, an initial USDA investment of $120,000 could potentially mean $312 million in savings per year, simply from reduced fungicide applications.

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Impact Stories (continued)

A Sustainable Solution for Peach Growers against Fungicide Resistance in Brown Rot Management

Impacts

Georgia and South Carolina both made $4 - 8 million in 2009 from making adjustments to their pre-harvest spray program for brown rot management in peach. Using the **'Profile' monitoring kit**, growers can find out in 3 days the resistance profile in their orchard. They are then rapidly able to adjust their fungicide applications based on the resistance in their orchard, before the disease causes crop loss. This in turn prevents unnecessary spraying of ineffective fungicides, improves brown rot control and minimizes risk of fungicide resistance, hence saving growers on fungicide costs. Scientists estimated that fungicide resistance would result in about 10-15% loss per State.

Background

Brown rot in peach causes significant losses to peach growers due to the rapid spread of the disease especially in wet conditions. Entire fruit can be rotten in 48 hours after infection (Biggs et al. June 1998). This disease affects other stone fruits as well. The susceptible growth stages are during blossom, pre-harvest and harvest. The pre-harvest period is the most susceptible. Brown rot can be managed by cultural and chemical (fungicide) methods. There are only three known main groups of fungicides used against brown rot. Resistance to the first group of fungicides used for peach rot management developed in the 1980's. Control failures due to heavy reliance on the second group emerged in Georgia in 2006. Control now is dependent solely on the last known group, respiratory inhibitors, which unfortunately develop resistance very easily. Development of resistance to this group will leave peach growers with no solution.

In an effort to champion the sustainability of Southeastern peach production, a $115,000 S-RIPM grant allowed scientists from Clemson University and the University of Georgia to develop a technique, 'Profile' monitoring kit, for determining the resistance of the brown rot fungus to the three known fungicides by location. This is based on the premise that resistance will cause growers to apply different spray patterns that will work for their location, leading to location-specific resistance. The kit allows growers to make intelligent choices about the most suitable pre-harvest fungicide spray program for a given orchard.

Southeast Region Cotton Growers Now Better Equipped to Manage Stink Bugs

Impacts

Cotton growers, agents, scouts, and consultants now have a **Stink Bug Decision Aid** field card to enable them to determine when to spray for stink bugs. With the card, they apply a dynamic threshold (progressive spray) where the threshold changes by week of bloom. With the portable device, North Carolina cotton producers would have saved $65 million more in 2011 than they would with the usual 20% threshold boll damage technique. Similar adoption rates in the participating southeastern states of VA, SC, GA, and AL would have led to more than $150 million in savings in 2011.

Background

Ag-biotech crops promised sustainability to agriculture. The use of Bt cotton varieties resistant to bollworms and tobacco budworms (major pests of cotton) has been a major achievement in cotton farming, especially following the boll weevil menace. These varieties enabled growers to reduce insecticide sprays dramatically. Unfortunately, this low spray environ-

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Impact Stories (continued)

Stink Bug Decision Aid Card (continued)

ment has led to the emergence of new pests, some of which have become major pests, like the stink bug (green, southern green and brown). Damage from this bug is now three times the damage from bollworms, budworms and other caterpillar pests combined. The biggest challenge with the stink bug is the difficulty in assessing damage. Growers respond by spraying unnecessarily or fail to spray at the needed time.

A $25,000 IPM Enhancement Capstone grant to North Carolina State University provided access to a Stink Bug Decision Aid field card for producers, agents, cotton scouts and consultants in the southeast and midsouth regions. The card enables them to make straightforward management decisions about the right time to spray for stink bugs, during bloom (dynamic threshold). A regional grant by Cotton Inc. had earlier helped develop a treatment plan that addressed the vulnerability of cotton plants to stink bug boll damage during the week of bloom. The treatment entailed use of progressive sprays to determine a dynamic threshold, a 3-5 week bloom window when plants were most susceptible to stink bug damage. The card gives information on scouting procedures, thresholds by week of bloom, cutouts for selecting the correct boll size, and color images of internal boll damage. This enables growers to respond based on their specific situation. Initially, control was based on a generalized 20% internal boll damage threshold.

Sustainable Use of Bt Corn in the U.S. mid-south

Impacts

Texas, Mississippi, and Louisiana corn growers have hope for continued sustainable corn production, thanks to the discovery that sugarcane borer resistance to Bt corn can be completely overcome with a corn variety containing two Bt toxins. In addition, they will also be able to practice variety rotation due to the several Bt toxins that have been identified that can be used to establish better corn varieties.

Background

Like other transgenic crops, Bt maize was developed to protect against insect damage, specifically the European corn borer (ECB). Unfortunately, another related pest, the sugarcane corn borer (SCB) has become a major target pest of transgenic corn in the U.S. mid-south regions, more so where corn is close to sugarcane, the main host for SCB. Conventional sprays are not effective against corn borer since they burrow into the stem where they are protected from the spray. Sugarcane borer has become a high priority pest due to three main reasons. First, the sugarcane borer has developed resistance to the Bt toxin in transgenic corn, a major threat to the sustainable use of Bt corn. Second, most of the Bt corn varieties planted do not express a sufficiently high Bt dose against SCB. This second problem of Bt dosage is much easier to fix than the one of resistance. Third, the high risk for development of resistance is due to widespread use of one type of Bt corn variety.

Researchers therefore needed to address the sustainability of Bt corn by addressing the resistance problem in sugarcane borer. This was made possible with a $133,900 S-RIPM grant to scientists at Louisiana State University in 2008. From their research, they determined that the resistance can be completely overcome with a Bt corn variety containing two different Bt toxins. They also identified several Bt toxins that are able to overcome the SCB resistance. This information is being used to develop better resistance management strategies and to establish better Bt corn varieties for managing corn borers.

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Impact Stories (continued)

Promising Remedy for Cruciferous Organic Vegetable Growers in the Southern U.S.

Impacts and potential impacts

PyGanic® has been the insecticide commonly used by organic growers. Since the new insecticide Entrust® outperforms PyGanic®, there is good news for organic growers who have had problems with the yellowmargined beetle. Even better news is the fact that Entrust® can be used alternately with PyGanic® (greatly improving its efficacy to that of Entrust®), and with NOFLY®. This helps alleviate problems of beetle resistance to either insecticide when used alone. Considering that this pest causes total economic loss to the crop, the use of these products has positive impacts. These products will increase the potential for more growers to transition into organic farming.

Background

Growing organic vegetables in the Southeast U.S. is a challenge due to high pest pressure, mostly due to the mild winters that are typical for this region of the country. Conventional vegetable growers usually use foliar insecticides to deal with pest problems, but organic growers do not have that option. Organic growers practicing integrated pest management are intent on cutting down on pesticide usage and cannot use synthetic insecticides. This therefore limits their control options.

One of the major pests that organic growers of cruciferous vegetable crops deal with is the yellowmargined leaf beetle. The damage from this pest is so severe that heavy infestation will defoliate the host plant, resulting in total economic loss. This usually happens during the spring when both larvae and adults feed in groups on foliage and leaf margins, making holes. Cruciferous vegetable crops damaged by this pest include broccoli, cabbage, cauliflower, collards, mustard, radish, turnip, arugula, watercress, Japanese leafy vegetables including mizuna, mibuna and napa cabbage. Mustard, watercress, and the Japanese vegetables are high value crops grown mostly organically. Part of the problem to managing yellowmargined leaf beetle is that it is an exotic pest and therefore has no known predators in the U.S. It was introduced to the U.S. from South America.

The lack of a control option for organic crucifer vegetable growers was the motivation behind the study carried out by scientists from Auburn University, Alabama. With 2007 funding from an IPM Enhancement Capstone grant, they sought to develop and identify low-input management practices approved by the Organic Materials Review Institute (OMRI) for yellowmargined leaf beetle. Using OMRI approved formulations that are effective against other pests in the same group as the beetle, they established the efficacy of these formulations against this beetle. Ultimately, the goal was to identify organically acceptable treatments effective against the beetle for recommendation to organic vegetable growers in the Southern U.S.

Using stand-alone treatments applied weekly over four growing seasons from 2007-2010, Entrust® was found to be the most effective in consistently suppressing the beetle adults, larvae, and crop damage. PyGanic® ranked second in effectiveness. Other formulations showed some control but not sufficient enough. Weekly applications of Entrust® in alternation with PyGanic®, and NOFLY® had similar results to Entrust®, applied alone.

New Name, New Faces: the 2012 Southern IPM Center

Since the Center for IPM began administering the IPM Center grant for the southern region, we have contrasted with the other three IPM Centers in two ways: we have directed the Center without a partner, and we have added the word “Region” to the title of the Center.

With the commencement of the 2012 IPM Center project, neither will be true anymore.

The 2012 Southern IPM Center will partner with two other institutions: Auburn University and the University of Georgia. Staff from each university will assist Director Jim VanKirk and Associate Director Steve Toth in carrying out the new vision for the Center.

Dr. Henry Fadamiro of Auburn University is a new Associate Director. Henry led the first gathering of the Small Farms Working Group (SFWG) initiative for the 2011 project (see story on page 4) and will continue facilitating the ideas and communication that began at the first meeting in June. He will also assist with the Friends of Southern IPM awards program. Henry is Alumni Professor of Entomology & Pest Management at Auburn University and Alabama’s Extension IPM Coordinator. His specific expertise in recent years is in IPM of fruit and vegetable crops and organic pest management. He has served the southern region IPM community in many capacities including Secretary (2007) and Chair (2008) of the Southern Region IPM Coordinators (SERA003) working group (2007-2008), and Member (2005-2008) and Chair (2008) of the Advisory Council of the Southern Region IPM Center.

Joseph LaForest at the University of Georgia will be the new Assistant Director. Joe will provide day-to-day leadership of our electronic networking and issues-support initiative (FITT). Joe is the IPM Program Coordinator at the Center for Invasive Species and Ecosystem Health, commonly referred to as “the Bugwood Network” or “Bugwood.” He has a B.S. in Urban Forestry and graduated from the Ohio State University with two Masters degrees (Entomology and Plant Pathology). For the past 6 years, Joe has managed the Bugwood Image Database and the image recruitment projects to better illustrate organisms of concern to agriculture. He provides oversight and training for the BugwoodWiki. He continues work on improvements to the functionality of all Bugwood systems to serve the needs of specific audiences and develop web services to extend the assets contained in the Bugwood systems to other programs.

Also from the Bugwood Network, Co-PD Charles “Chuck” Bargeron will be the administrative liaison between University of Georgia collaborators and other project leaders at NCSU and Auburn University. He and Joe LaForest will work closely together. He is the Information Technology Director and public service faculty member in the Entomology Department. For the past 15 years Chuck has led the development of all Bugwood Information Systems and managed the execution of developing projects. He has been actively involved in Southern Region efforts focused on invasive species including past service as president of the Southeast Exotic Pest Plant Council and serving as the President of the National Association of Exotic Pest Plant Councils. He has been recognized as Advocate of the Year by the Florida Exotic Pest Plant Council in 2008 and received the Genius Award from the Mid-Atlantic Exotic Pest Plant Council in 2009.

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The New Southern IPM Center (continued)

In addition to the name and staff changes, we will be focusing our attention on some new initiatives and tweaking some of our old projects:

- The Facilitation of Innovation Through Technology (FITT) is a new venture, led by Joe LaForest and Chuck Bargaron. This initiative involves technological support for working groups and other issue-focused projects in the region. Joe has already started this by introducing a communication and content management site called Basecamp to the Small Farms Working Group and to the staff at the IPM Center.
- Small Farms Working Group began with the 2011 project and culminated its first year with a meeting in Clemson, South Carolina, in late June. With a steering committee in place, we're hoping that this group fleshes out some of the priorities identified at the June meeting and produces some of the products envisioned during the brainstorming session.
- IPM Enhancement Grants will resurface after a one-year hiatus because of funding cuts; however, it will have a slightly different focus. In addition to funding crop profiles and pest management strategic plans, this year we plan to send out a survey to Extension staff throughout the region that asks for the major regional Extension priorities. Responses from this survey will guide the RFA for Part 2 (special projects).
- The Regulatory Information Network will continue to be funded under a special subcontract to four states (Virginia, Tennessee, Texas and Florida) that will cover the entire region. Under the leadership of the Mike Weaver at Virginia Tech, the Network has organized monthly conference calls that include staff from EPA and USDA OPMP, in addition to some of the former State Contacts. The Network will continue updating the crop profiles and is discussing efficient ways to organize responses to regulatory questions.
- Friends of Southern IPM awards will continue but will add a new award for a graduate student.
- Fruits of the Impact Evaluation initiative should be evident in this publication and will continue in the new project.

This Year's Southern Regional IPM Awards Include Vegetable Disease App, Resistance Research

This year Southern Regional IPM grants funded 6 out of 40 proposals for a total of 767,993. Of the funded proposals, three were for combination research-extension projects, two were for research projects and one was for an extension project.

The following list includes all of the 2012 Southern Region IPM awards:

- Integrated Strategies for Sustainable Herbicide Resistance Mitigation and Management in Barnyardgrass in Midsouth Rice (University of Arkansas: Jason Norsworthy, $133,890)
- Predicting in-season infection risk of cucurbit downy mildew and validation of a downy mildew forecasting system (NC State University: Peter Ojiambo, $185,566)
- Economic analysis to optimize management decisions for Verticillium wilt of cotton (Texas AgriLife Research: Terry Wheeler, $127,240)
- Integration of inter-row living ground cover and plant growth promoting formulations to reduce losses by insect-borne plant viruses (University of Florida: John Francis Murphy, $139,810)
- Integration of peanut genotypes with high levels of field resistance to Tomato spotted wilt virus with other spotted wilt management tactics (University of Georgia: Rajagopalbabu Srinivasan, $128,500)
- Veg Dr Development Of Smart Phone Applications For Identification And Management Of Vegetable Diseases (University of Georgia: Charles Bargaron, $27,987)

Researchers at NC State and VA Tech find ways to make cereal leaf beetle management a safer bet

Cereal leaf beetle has plagued wheat and other small grain farmers since the early 1960s. As with most nonnative insects, the beetle's biology and ecology are an enigma, and it thrives in the absence of aggressive predators. Although timed spraying controls the beetle if populations are low, it does little to control high beetle populations or prevent the losses sustained from the larvae's incessant feeding. To make cereal leaf beetle control less of a gamble, researchers at N.C. State University and Virginia Polytechnic Institute and State University have discovered a way to help growers use scouting and thresholds more effectively.

cereal leaf beetle

Native to Europe and Asia, cereal leaf beetle was first discovered in southern Michigan in the early 1960s and has become one of the primary pests of small grains. The most destructive life stage of the beetle is the larvae, which skeletonize the leaf, decreasing the plant's ability to photosynthesize and giving the field a frosted appearance. Losses can reach 40%.

Federal agencies, researchers and growers have tried numerous efforts to control the pest. After the beetle's arrival, Michigan and Indiana were placed under quarantine, and small grains in other states had to be treated before transport. When those efforts failed, large-scale spray programs began, but they failed to stop the spread of the beetle as well. By 1970, all quarantine and eradication efforts had ended, and cereal leaf beetle was well established in the U.S.

Researchers turned to IPM tactics such as host plant resistance and biological control, but these tactics gained little traction with wheat growers. Resistant wheat plants did not produce the yield of the more

"Frosted" appearance of wheat field from cereal leaf beetle damage

susceptible varieties, and imported parasitoids worked well in some areas but did not thrive in others. In addition, continued use of regular calendar sprays further reduced the predator population.

Growers had good reasons for a prophylactic spray program; many would mix insecticide with a nitrogen application or a fungicide that they were using anyway. To many growers, the tank mixes made sense economically, and many argued that they didn't suffer a yield loss from cereal leaf beetle because they had protected their field. In addition, growers who wanted to scout had to do so between March and June, an extraordinarily long scouting season, and many of them scouted the fields on their tractor, flattening the wheat tillers and reducing yield. Even though growers insisted that the timed sprays saved them money, researchers say that the prophylactic sprays are risky depending on the beetle population in the field.

"Calendar spraying works well when you have a low number of insects," says Dominic Reisig, extension entomologist at the Vernon James Research & Extension Center at NC State University. "However, when you have a high number of cereal leaf beetle, spraying doesn't manage them at all and you wind up with a huge yield loss anyway. It's a much riskier strategy than following IPM practices."

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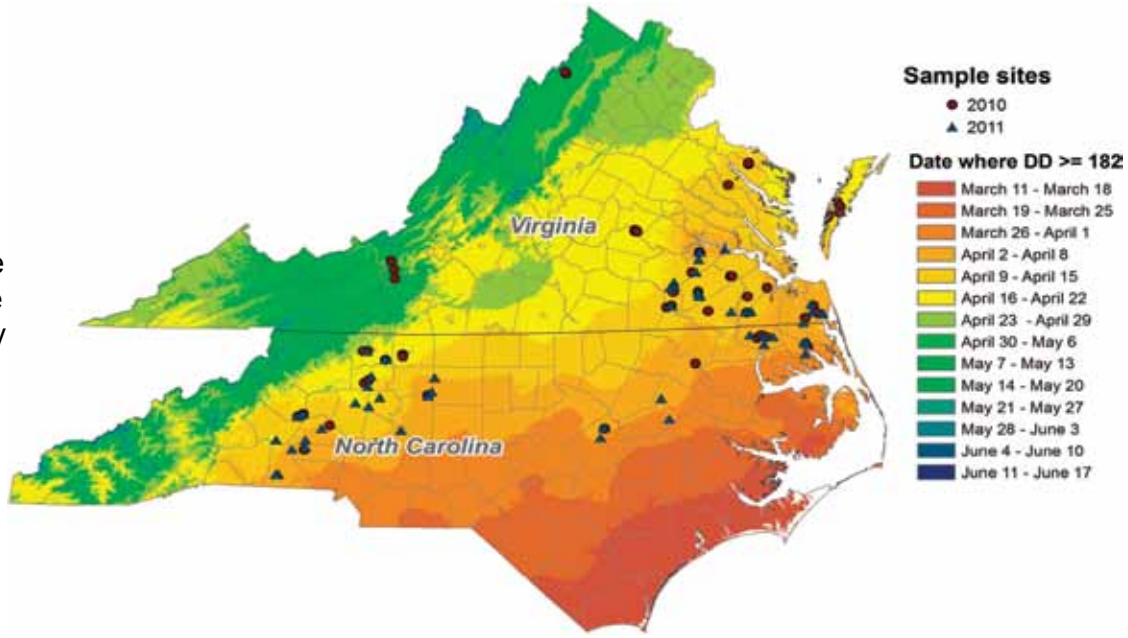
Cereal Leaf Beetle (continued)

To convince growers to use thresholds that had been developed several years ago by NC State researchers, Reisig and other entomologists from NC State and Virginia Tech knew they had to find two things: a way to shorten the scouting season and make scouting more efficient, and proof that using the thresholds would be more profitable or economically sensible than their calendar spray program.

To shorten the scouting season, researchers turned to degree-days. Degree-days begin with a biofix of either the first trap catch or a specified date and then count the number of degree days based on the number of degrees the ambient temperature is above the insect's optimum temperature. Counting degree-days helps the grower know when to begin and stop scouting. Because scouting often begins before threshold, if insect populations reach threshold, the grower is less likely to miss the chance to spray before populations increase to a number that will make the spray ineffective.

With funding from a 2010 IPM Enhancement Grant, researchers discovered that the optimal degree-day model used 182 degree days, with a development threshold between 8 and 25 degrees Celsius. Using that model for eastern Virginia and eastern North Carolina, researchers found that cereal leaf beetle egg-laying peaked between April 6 and 12, with the average date of April 8, and larvae, whose population peaked about 17.5 days after egg peak, usually peaked between April 19 and 29. In 2011, egg peaks started earlier but larval peaks began later in the season, but they were not too far from the dates of the previous year.

Using the degree-day model, growers would begin scouting their fields one week prior to the predicted time of peak egg lay. When larval counts reached the threshold of 25 larvae per tiller, growers would spray their fields. If population counts never reached threshold before the end of the scouting season, growers could save their insecticide for the next season, saving money on insecticide and conserving predators.



Map of degree day data

Once the degree-day model was established, scientists used it to create a prediction map of the state to forecast periods for egg peaks for counties in North Carolina and Virginia. Reisig plans to use the map next year to create an alert system for growers to signal the beginning and ending of the scouting season, depending on where they live. Reisig said that as they tested the map this past spring, the dates that they had estimated in each region accurately predicted egg peak and larva peak.

Reisig and other researchers are still trying to understand the beetle's biology, since understanding why beetle populations are high in some areas and not in others will further alert growers to whether or not they may need to apply an insecticide. But Reisig says that even without understanding why the beetle prefers certain areas over others, using the thresholds to time insecticide sprays is much less risky than spraying on a calendar schedule.

"If you use our degree-day model to help you know when to scout, and you use thresholds, you're going to be able to manage the beetle before it reduces yield," Reisig says. "If you spray prophylactically, you're taking a chance that there will be a lot of beetles and you won't be able to control them, or the beetle isn't around at all and you're just reducing your predators."