Southern IPM Center

Southern Exposure

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In this issue:

1 Kentucky Apple OP Project

2 Henry Fadamiro Receives Honors

3 2011 IPM Enhancement Grants Awarded

4 Drosophila suzukii monitoring network

5 Role of IPM in meeting tomorrow's food challenges

7 School IPM and Community Support

Kentucky Growers Find New Ways to Take the Bite out of Apple Pests

Two years ago, Kentucky apple farmer Bill Jackson was worried about how he was going to control codling moth in his orchard. Like many apple growers, Jackson used one of only two remaining organophosphate insecticides to control two important apple pests—codling moth and Oriental fruit moth—and EPA had announced the cancellation of one of them. Now, after participating for one year in a two year study to compare traditional insecticides to newer reduced-risk chemicals, Jackson is ready to make the switch.

Codling moth

"I am extremely pleased with the new products," says Jackson, who has been farming for 46 years. "We're moving into using chemicals that are more environmentally friendly and break down in the environment much faster than the old chemicals."

Jackson is not alone. Three other Kentucky apple growers—all who participated in the same study—discovered that the new products did a better job at controlling the two moth species than did conventional insecticides, giving them more bushels of undamaged apples by harvest time. Two of the growers have already expressed a desire to start using the new products exclusively.

"I don't know how we're going to get comparison data for the next year," says Ric Bessin, principle investigator of the study, funded by a 2010 EPA Strategic Agricultural Initiative grant. "They want to stop using the OPs (organophosphates) and start using the new products because they did so well."

To control moths, apple growers have a choice of two insecticides: azinphos-methyl and phosmet, both of which are organophosphate insecticides. In 2008, EPA announced the cancellation of all azinphos-methyl, leaving only phosmet to control apple moth pests. However, phosmet uses are restricted, extending re-entry times after application to 7 days for hand thinning and summer pruning and 14 days for "pick-your-own" operations. Azinphos methyl is currently being phased out to a cancellation date of September 30, 2012.

Because of their toxicity to non-target organisms and insect predators, as well as strict requirements set by the 1996 Food Quality Protection Act, EPA has gradually reduced the number of available organophosphates. Although reduced-risk alternatives have been available for several years, growers have been reluctant to adopt them. According to a survey of growers from January 2010, about half of Kentucky apple growers expressed reluctance to use alternatives. Of those, 65 percent indicated that they were unfamiliar with the products, some of which require precise timing to be effective. About 17 percent indicated they felt the products were too expensive. Because codling moth is a key apple pest in Kentucky, every apple grower must have a management program for the pest.

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Apple Growers (continued from previous page)

Bessin chose the four growers based on their insect pest issues. Two growers had high levels of codling moth. One grower had problems with Oriental fruit moth, and one grower had relatively few insect problems. Each grower was using one of the two organophosphates to control both insects. Three out of four growers had annual damage from one of the moth species.

Growers divided their apple orchards into two blocks; in one, they continued to use their traditional insecticide. In the other, they used a combination of non-organophosphate products. Each grower used a different combination of products, in addition to using other integrated pest management methods such as degree day counts and pheromone traps that monitored the numbers of moths in the orchard to aid in the timing of sprays.

At the end of the season last year, three out of four of the growers had less damage from codling moth.


Oriental fruit moth larva

The fourth grower—who had been battling oriental fruit moth—had the same amount of damage in each block. However, pheromone trap captures in all orchards were lower in the reduced-risk blocks by the end of the season than they were in the traditional insecticide blocks. On average, growers spent about $20 more on the reduced-risk products than for the traditional insecticides but say the reduction in damage is worth the cost.

“I lost only 1 to 2 percent of my yield with the new products, whereas I lost 10 to 15 percent every year with the other chemicals,” Jackson says. “I realized last year that I needed to switch. Ric has really opened the eyes of an old man.”

Alabama IPM Coordinator Henry Fadamiro Receives Honors

In April, Dr. Henry Fadamiro was awarded an Alumni Professorship by Auburn University. The five year professorship will be effective October 1st 2011. The Auburn Alumni Association funds the Alumni Professorship program because of its desire to support distinguished faculty. The program is designed to reward faculty members who have been recognized by their peers and colleagues as making outstanding and exceptional contributions to the University’s academic programs. He also received the Excellence in IPM Award from the Southeastern Branch of the Entomological Society in March.

New Crop Profiles, PMSPs and Elements

The following have been completed or revised since January 2011:

- Wine grapes (VA) elements (new)
- Apple (VA) crop profile (revised)

2011 Enhancement Grants Awarded

In 2011, the Southern Region IPM Center IPM Enhancement Grants Program was split into two parts. Part 1 included the Regulatory Information Network project, IPM documents (crop profiles, pest management strategic plans, IPM priorities and IPM elements), and IPM working group projects. Part 2 included seed and capstone projects.

Separate Requests for Applications (RFAs) for Parts 1 and 2 of the IPM Enhancement Grants Program were released on December 14, 2010 with a deadline of January 31, 2011 for submitting proposals to the Center. Eight proposals requesting $299,991 and 8 proposals requesting $193,965 were submitted for Parts 1 and 2, respectively.

Grant Review Panels for Parts 1 and 2 of the IPM Enhancement Grants Program reviewed the proposals and met separately on April 6 and April 5, 2010, respectively, to evaluate proposals and make recommendations for funding to Center staff. For Part 1, 6 proposals totaling $273,991 were approved for funding. Five proposals totaling $123,965 were approved for funding under Part 2. A list of projects (and project directors) selected for funding for 2011, totaling $397,956, is provided below.

PART 1:

Regulatory Information Network Project:

- Southern Region Specialty Crops at Risk Program – Regulatory Information Network (Mike Weaver, Fred Fishel, Mark Matocha, and Darrell Hensley)

IPM Documents Projects:

- Enhancing Nursery Crop Research and Extension with a Multi-State Working Group (Amy Fulcher, Juang-Horng Chong, Sarah White, Anthony LeBude, W.E. Klingeman, Matthew Chappell, Craig Adkins, and Kelly Ivors)
- Virginia Specialty Crops at Risk Program – IPM Documents Development Project (Michael Weaver)
- Creation of IPM Documents for Aquatic Plant Management in the Southern US (Robert Richardson, Steve Hoyle, John Madsen, and Ryan Wersal)

IPM Working Groups:

- Bugwood Center IPM Working Group (G. Keith Douce)
- Update of Priorities of the Southern Region School IPM Working Group, a New Beginning (Lawrence "Fudd" Graham)

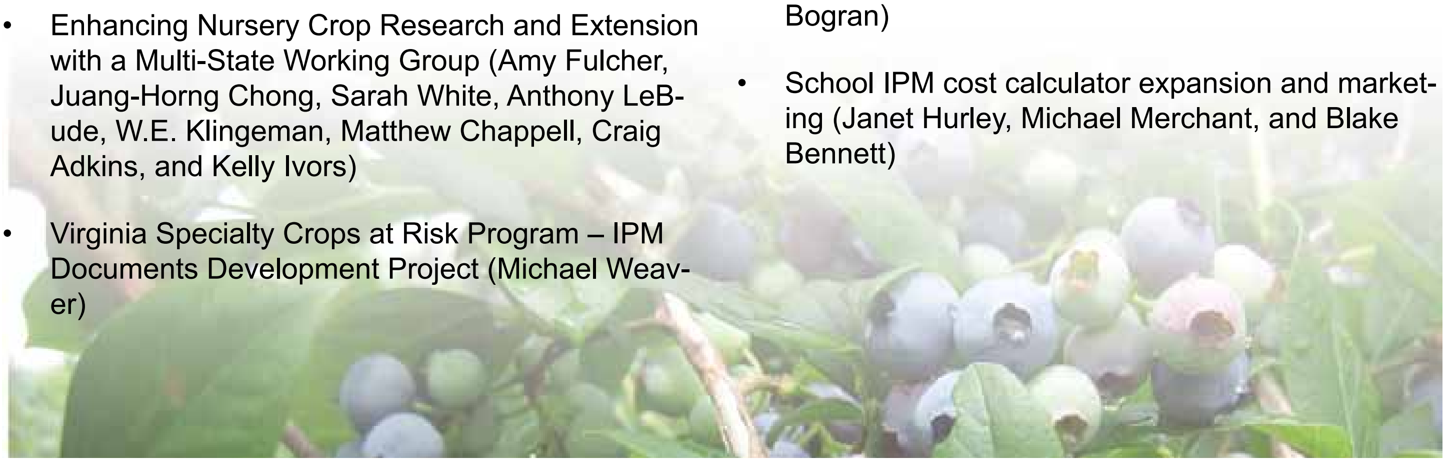
PART 2:

IPM Seed Projects:

- Weed IT Mobile – a Weed Identification and Management Tool for Mobile Devices (Alexander Krings and Joseph Neal)
- Developing Management Practices to Address Invasive Plant Pests in Riparian Areas (Barbara Fair)

IPM Capstone Projects:

- Development of the "RiceScout" iPhone app to improve rice insect/arthropod, disease, weed and nutritional deficiency diagnostics in southern rice IPM programs (Natalie Hummel, Don Groth, Clayton Hollier, Dustin Harrell, John Saichuk, Eric Webster, and Richard Cartwright)
- Using GIS to develop pest management tools for wood boring beetles in southern nurseries (Carlos Bogran)
- School IPM cost calculator expansion and marketing (Janet Hurley, Michael Merchant, and Blake Bennett)



Using the tools at hand: Developing a monitoring network for spotted wing drosophila in the southeast by Hannah Burrack, North Carolina State University (2011 Friends of IPM Future Leader)

As potentially devastation invasive pest moved into the southeast in 2010, entomologists amassed a network of volunteers to detect and track its movement. This network has been responsible for detecting spotted wing drosophila (SWD, *Drosophila suzukii*) at 13 locations in North Carolina and South Carolina and will continue to track the fly in 2011.

Male (L) and Female *Drosophila suzukii.* Photo from Washington State University

SWD is an invasive pest of soft skinned fruit in North America which has rapidly spread throughout the country and poses a serious economic threat. SWD was first detected in California in late 2008 and spread throughout the west coast during 2009. Damage in California during 2009 was estimated at 20% across all host crops and was even higher on some, notably cherries, blackberries, and raspberries. In fall 2009, SWD was detected in Florida. Small fruit crops, especially strawberries, blackberries, raspberries, blueberries, and grapes, are an important part of the agricultural economy of the southeast and are at risk as SWD moves into the region. Because no coordinated monitoring programs were planned at the state level in North Carolina, South Carolina, and Virginia, a volunteer based monitoring network encompassing 23 locations was developed by entomologists at Clemson University Cooperative Extension (Powell Smith), Virginia Polytechnic Institute (Doug Pfieffer), and North Carolina State University (Hannah Burrack). The goal of this project was to detect spotted wing drosophila movement into North Carolina, South Carolina, and Virginia and to share the information gathered with stakeholders (growers, homeowners, and others). Funding for monitoring supplies and training were provided by the Southern Region Small Fruit Consortium (www.smallfruit.org), a multistate partnership which provides support to research and extension projects on small fruits.

The SWD monitoring network was coordinated by Dr. Burrack at NC State University and has been responsible for detecting SWD in 10 NC and 3 SC counties. In the three states covered by the volunteer monitoring network, fruit crops susceptible to SWD are grown on nearly 58,000 acres and are valued at over $212 million annually. Across the southern United States, these high value crops are grown on over 120,000 acres. Because of their high value per acre, these crops are often grown on small farms but have a much larger impact on the local food economy that acreage alone suggests.

A total of 20 volunteers were recruited, and included cooperative extension agents, university faculty & extension specialists, state department of agriculture personnel, research station personnel, and others. Volunteers were trained via webinars, and data were collected using freely available online tools (Google Documents). This allowed for real time data sharing via Dr. Burrack's blog (www.ncsmallfruitsipm.blogspot.com). Volunteers established 23 locations in NC, SC, and VA in May 2010. Each location had at least 1 potential SWD host present, and a total of 6 traps were placed at each site. SWD was detected in Saluda County, SC on 2 July 2010, and was detected in Randolph County, NC on 14 July 2010. SWD has now been confirmed from 10 NC and 3 SC counties. Because southeastern SWD detections began in mid to late summer, susceptible fruit were not present at monitoring sites, and no fruit infestations were observed until 24 September 2010 when a large larval infestation, approaching 100%, was discovered at the North Carolina State University (NCSU) Upper Mountain Research Station (UMRS) near Laurel Springs. A replicated caneberry variety trial that included several primocane fruiting varieties and a day neutral straw-

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Using the Tools at Hand (continued from previous page)

berry trial at UMRS were both heavily infested. Following this detection, SWD were also found infesting fruit at the Mountain Horticultural Crops Research Station, Mills River, NC and in primocane fruiting raspberries and blackberries at two grower locations. None of the fruit at either of the grower locations was being harvested or sold, so no commercial product was comprised due to SWD in the southeast during 2010. Interestingly, although adult SWD continue to be captured in Florida, as of yet, larvae have not been found in the field.

Drosophila suzukii on raspberry. Photo credit: Hannah Burrack

The SWD volunteer monitoring network had impact beyond providing early detection of a potentially devastating pests, it also empowered the volunteers who participated. In follow up surveys at the end of the 2010 monitoring period, volunteers indicated that the greatest benefit of participation was “getting to be a part of something that I think is important to… growers” and “having the opportunity to be the first to detect a new pest”. This positive experience has led almost all of the volunteers to return in 2011.

SWD monitoring will continue in 2011 and expand to Georgia, Louisiana, and more locations in NC and VA. Dr. Burrack plans to translate the success of the SWD volunteer monitoring network into other participatory pest detection programs. First on the list is a statewide monitoring program for grape root borer, which will empower North Carolina grape growers to detect and trap these important pests. Much like with SWD, data on grape root borer will be shared in real time so participants can share their observations with the public.

The Critical Role of IPM in Meeting Tomorrow’s Food Challenges

an essay by Thomas F. Peeper, Okanola Project, Oklahoma State University (the Okanola Project received the 2011 Friends of IPM Bright Idea Award)

To the credit of the world’s news media, news stories are beginning, once again, to focus on the looming population and food crisis. We all know that, with money as the medium of exchange, a balance is continuously achieved between quantity of food produced and quantity available to a given consumer. The wealthier always eat better; the poor always starve. Our challenge as agricultural scientists is simply to reduce the number of people worldwide who live day after day without adequate nutrition. Fortunately we live in a society that, for the most part, agrees that the poor should be fed, regardless of where in our world they live.

I would suggest that most agricultural scientists selected their career because they like people and respect nature. And, nature loves diversity. Nowhere does human diversity appear more evident than in the agricultural colleges and universities of our nation. Our agricultural scientists spend countless hours, days, and years cooperating with this diversity of people to discover new ways to improve genetics, maximize resource utilization efficiency, manage pests, improve nutritional value of food, and on and on. But scientists are never satisfied until they see their discoveries in action. And, because they like people, agricultural scientists are typically compelled

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The Critical Role of IPM (continued from previous page)

to be educators, not only in the classroom but also in the field and in fields around the world. These traits and skills will be essential in our efforts to double food production in the next 40 years.

There seems to be little doubt among most agricultural scientists that annual worldwide food production can meet the needs of today's 7 billion inhabitants and that it can be increased to feed 2 billion more over the next 40 years. The real challenge that we face is not whether it can be done, but whether it will be done. The challenges ahead will certainly include the technical issues, but the bigger challenges may be political and social. Politically, modern history continues to demonstrate that we can expect a continuation of wars, larger and smaller, and local or regional famine always follows war. We will have to accept such inevitability and move on with our work.

Socially, our nation will have to learn patience. We live in a world of instant, and almost continuous, communication. We expect quick, easy answers to all problems.

As agricultural scientists, we must do our best today to help our nation and the world prepare to drastically increase agricultural production. This will require action on many fronts, and, as we well know, most of the gains will result from patient, persistent efforts, not from sudden dramatic leaps.

Major advances in pest control strategies are clearly needed to combat the ever-increasing diversity of pests and pest biotypes. It has been obvious to agricultural scientists for decades that total dependence on pesticides for pest management is folly. Yet, farmers must look at their bottom line every year to make pest management decisions along with decisions on every other input, and potential long term problems just do not fit on an annual balance sheet. Therein lies the necessity of increasing efforts to develop better IPM practices that are easier to understand and easier to use, so that an aging population of farmers can adopt appropriate strategies and then find them cost effective each year.

We might ask ourselves, "What needs to change if we indeed are going to be able to feed 9 billion people?" I would suggest the following as worthy of consideration, while recognizing this list as incomplete.

The paucity of federal funding for pest management research has always been a major restraint to development of IPM practices. This seems appalling as we become more familiar with the realization that worldwide food shortages can quickly destabilize nations and even civilization itself. Perhaps agricultural scientists need to become much more vocal in our efforts to educate decision makers of the consequences of delayed and underfunded research and educational efforts. The nation must recognize that we have to start paying for tomorrow's food today by increasing funding for agricultural research and outreach efforts.

Our ancestors realized 150 years ago that food and technology were critical to our nation. Thus the Land Grant Agricultural Colleges came into existence. All agricultural scientists should make every effort today to educate our higher administrations of the looming food crisis and the role each university must play in efforts to increase food production.

On the state level, we find another major threat to increased food production. The harvested acreage of wheat in Oklahoma has decreased almost 50% over the past 30 years, from 6.9 million acres in 1982 to an average of 3.5 million acres over the past 4 years. Unfortunately, this loss of acreage is not attributable to adoption of other crops. Corn, grain sorghum and soybeans have increased a little but total only about a million acres. Winter canola and sesame production are growing, yet none of these—including land lost to the Conservation Reserve Program (CRP) —can account for even half of the dramatic decline in harvested wheat acreage. Compounding this problem is the failure of wheat yields to increase over time. Statewide average yields during the decade of the 2000s were only 0.2 bushels per acre higher than average yields for the decade of the 1980s, in spite of the shift of the poorest land into the CRP. Clearly this loss of capability coupled with failure of yields to increase over time may be the major threat to efforts to double food production over the next 40 years.

Factors that may contribute to this loss of cropland include urban sprawl, the transition of wheat farms to

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The Critical Role of IPM (continued from previous page)

small lifestyle farms and abandonment of once productive cropland to weeds, particularly annual (Italian) ryegrass. In Oklahoma, the scenario has gone like this: first a wheat farmer finds ryegrass in his field. For a few years, he applies herbicides to control it. Then, a consultant explains to him that the ryegrass has developed herbicide resistance. So he stops producing crops and uses the land only for seasonal grazing. In a few years he retires and divides the land for sale to non-wheat producing lifestyle farmers.

Current research and educational efforts at the university level, such as the Okanola Project, are focused on reversing these trends. University specialists show farmers that integrated approaches to weed management can be successful, and that changes in their cropping systems—such as greater emphasis on crop rotation for pest management and the adoption of no-till—can result in greater sustainability for their entire farming operation.

The failure of yields to increase is perplexing but is probably related more to pest management issues than to genetics, suggesting a need for major increases in IPM efforts. Regression analysis of the harvested wheat acreage in Oklahoma between 1980 to 2009 predicts that by the year 2056, wheat production in Oklahoma will reach zero. Clearly, if we are going to double food production by 2050, we must halt the ongoing loss of productive cropland.

The Southern Region IPM Center welcomes editorial opinions from specialists in the region as well as responses.

School IPM: Good Community Support Means Fewer Pest Problems

A little support can go a long way towards using integrated pest management (IPM) to fight pests in schools. According to a school IPM coordinator in Monroe, North Carolina, school administrator support for IPM is key to a successful and maturing school IPM program.

Chris Mills and Patty Alder

North Carolina is one of only 15 states that require schools to adopt IPM (Owens, 2010). However, even with the law, statewide implementation of school IPM has been slow. When North Carolina's law was passed in 2002, the Union County school administration hired a school IPM coordinator. Chris Mills, who took the position and has been the coordinator since then, said that the support he had from the administration helped him make changes, even when changing behaviors was a challenge.

"The most important part about getting started is getting staff support," he says. "Our school system didn't wait around. They made the IPM Coordinator position available, and then I've made the position what it is today."

In April, Mills received an award for leading a "Coalition Project," with funding from the Environmental Protection Agency Pesticide Registration Improvement Renewal Act (PRIA2). Mills was one of two school IPM coordinators in the southern region who received an award.

"These programs rely heavily on the support from upper administration, the school board, and the parents and teachers/staff," says Patty Alder, School IPM Program Leader at NC State University. "The programs that have been most successful have done so because of the commitment by the system as a whole."

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School IPM (continued from previous page)

For the coalition project, Mills gathered staff from neighboring county schools, the Department of Health and pest management professionals. For two days, school IPM specialists from Texas and Alabama presented ways to implement school IPM programs in their school, along with the benefits that would follow.

Since Mills began implementing IPM in the Union County school district, he has reaped some of those benefits, both in long-term cost savings and in a reduction of complaints about pests. Although the IPM program required some extra costs initially, the savings have outweighed the costs. In fact, they have saved $18,000 on fire ant treatments alone. Teachers and staff have noticed that fewer pests are in the building, and several have asked Mills to teach the children about how to keep the pests out.

"One teacher had been teaching her students about cockroaches, and a staff person called me to ask if I could add some information," Mills says. "I wound up talking to five classes, and a few days later, I got a handmade card from the kids I had talked to. Those kids will take that information home with them and tell their parents."

In North Carolina, all schools must have an IPM policy in place by October of this year. With the October deadline approaching, staff in many school districts are scrambling to create an IPM policy. Maintenance staff from one county presented a policy to their school board after Mills spoke to them. Others are still unsure about what to do, or even what IPM is.

"School administrators have numerous challenges in meeting the needs of their student population, and sometimes IPM cannot be the highest priority," Alder says. "Administration often perceives cost as an impediment to implementing IPM. However, as the successful schools have clearly demonstrated, once the programs are enacted, their costs actually drop, as does the unnecessary use of pesticides."

While pest control costs drop, staff satisfaction in schools with effective IPM program seems to rise. According to Mike Merchant, urban entomologist at Texas AgriLife Extension Service, staff in Texas schools are equally pleased with the results of integrated pest management. In a 2005 Texas AgriLife Extension survey of over 500 IPM Coordinators, 53% felt that the IPM requirements had actually reduced long-term costs of pest management and schools were 75% more likely to be satisfied with their pest control program compared to 1993, before the state school IPM law went into effect.

Yet beyond the cost savings and fewer pests and complaints, Mills says that his satisfaction comes with knowing that the school is safer for the children.

"Ultimately the goal of IPM is to make sure that school is safe for the students," he says. "I have to treat every child in the school like they were my own. So you have to keep going back to people and be relentless about teaching them what to do."

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