

In Memorium: Marion Miller Sears

It is with great sadness that we recognize the passing of a great woman who was a mentor and inspiration to many. Marion Miller Sears served as the Western Region IR-4 Program Director from 2002 – 2011.

According to Western Regional Field Coordinator, Becky Sisco, "Marion was dedicated and committed to the program and the people. She was an advocate for the Western Region and supported us admirably behind the scenes. She was a force to be reckoned with: smart, savvy, fun and kind. She appreciated us all and what we brought to the program. She will be greatly missed."

A memorial service was held April 11, 2011 on a beautiful afternoon on the UC Davis campus. IR-4 Executive Director, Jerry Baron attended the service and described it as a "celebration of the life and accomplishments of Marion."

The service was attended by over 200 of Marion's co-workers, students, friends and family.

Ron Tjeerdema, Marion's successor, hosted the service, which offered a delicate balance between the sadness of the great loss of Marion and the celebration of the positive impact Marion had on so many people. Marion's work with IR-4 was highlighted by UC-Davis Dean, Neal Van Alfen and Department Chair, Ron Tjeerdema.

Many had fond memories to share. Marion's children, Thomas and Sophie spoke. Thomas emotionally expressed his desire to make his Mom proud of him by dedicating his career to cancer research to help ensure that others would never have to go through what Marion battled. Sophie read a heartfelt poem on how her Mom will always be there.

This is a great loss and Marion is truly missed.



Marion Miller Sears
March 16, 1955 – February 25, 2011

A donation to the Marion Miller Memorial Student Scholarship Fund was made on behalf of the IR-4 Project. To learn more about the fund or to make a donation, visit <http://tinyurl.com/MarionMiller>



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Current Research and Distribution of Brown Marmorated Stink Bug

— by Cristi Palmer, IR-4 Ornamental Horticulture Manager &
Edith Lurvey, IR-4 Northeast Regional Field Coordinator

Brown marmorated stink bug (*Halyomorpha halys*, BMSB) populations have been slowly building over the last decade. This invasive pest was first discovered in Pennsylvania in 1998 and has since been found in 33 other states in all four IR-4 geographic regions (Figure 1). Until late in peach and apple production in 2009, BMSB had not been much of a problem on crops, although the suspicion was that it could become a major issue. However, that has changed; 2010 may become known as the year of the stink bug. Populations were unusually abundant and wreaked havoc on fruit, vegetable and ornamental horticulture crops in the middle Atlantic states. Many

fruit growers suffered heavy losses due to the damage caused by BMSB feeding. In ornamental horticulture crops, BMSBs feed on stems and it is unknown at this point whether this damage will cause significant economic loss. The BMSB feeds on more than 70 plant species; see the side bar lists for some of the susceptible food and ornamental horticulture crops.

Similar to native stink bugs, BMSBs overwinter as adults and seek harborage in cracks and crevices. These protected areas can be natural such as tree bark or human-made such as in and around buildings. Due to the large numbers of BMSB invading residential and commercial

buildings, many people now seek assistance in preventing or controlling these insects because of the foul odor they emit. There are university fact sheets that provide suggestions on what to do to prevent BMSB from entering buildings in early fall and how to handle them if they do emerge during the winter and spring into livable spaces. Check out the list of resources at the end of this article.

Research Highlights

Insect pheromones and trapping. Brown marmorated stink bug is attracted to the aggregation pheromone of the Asian brown-winged green bug, *Plautia stali*. This attraction hormone is being tested in the field with traps primarily as monitoring tools, but one type is currently available commercially from AgBio.

Biological Control. So far, US native beneficials have not significantly checked BMSB populations. USDA researchers have identified four parasitic wasps in the genus *Trissolcus* from China that lay their eggs in BMSB eggs. Over the next two years, these wasps will be evaluated for their effectiveness in quarantine facilities in Delaware (Hoelmar and Tatman).

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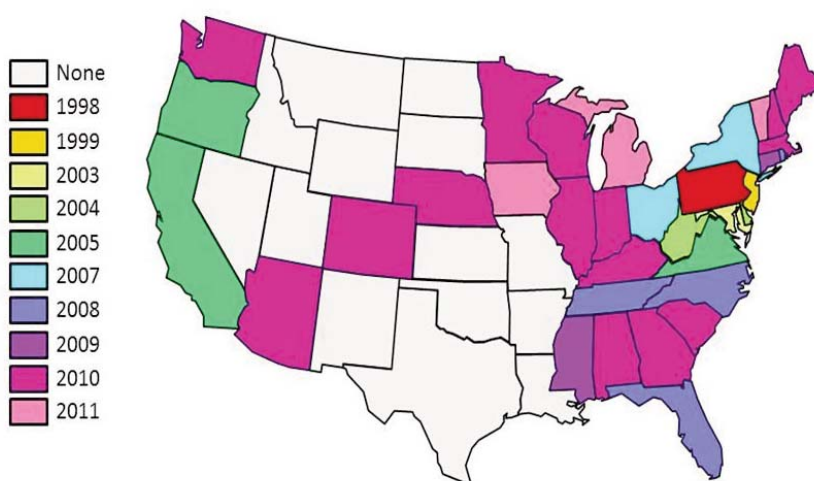


Figure 1. States where BMSB has been detected, although reproducing populations may not have yet established. Courtesy of George Hamilton, Rutgers University.

Crops Susceptible to BMSB

Food

Apple
Apricot
Cherry
Citrus
Cucumber
Eggplant
Fig
Grape
Mulberry
Peach
Pear
Pecan
Pepper
Persimmon
Plum
Raspberry
Soybean
Sweet corn
Tomato

Ornamental Horticulture

Apple
Birch
Butterfly bush
Catalpa
Celosia
Chrysanthemum
Crabapple
Dahlia
Dogwood
Fig
Hackberry
Hibiscus
Honeysuckle
Lilac
Linden
Maple
Night-shade
Pittosporum
Princess tree
Redbud
Rose
Serviceberry
Snapdragon
Sunflower
Viburnum
Zelkova
Zinnia

Chemical Management. The efficacy research so far has focused on laboratory assays to assess BMSB mortality. Results from two different studies are presented in Table 1.

Dr. Tracey Leskey, et al. (USDA-ARS, Kearneysville, WV) treated glass surfaces using intermediate to high label rates, allowed them to dry for

18 hours, placed 30 BMSBs on treated surfaces and then followed their fate for 7 days. They assessed whether BMSBs were alive, moribund, or dead initially and then assessed longer term effects. This information was converted into a lethality index (0 to 100).

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Table 1. Comparison of BMSB Efficacy using Two Laboratory Bioassays.

Active Ingredient	Trade Name	Tracey Laskey, et al	Thomas Wuhr, et al	
		Lethality Index	% Mortality	% Moribund
Water	--	5.8		
Acephate	Acephate 97UP		100	100
	Orthene	87.5	58	70
Abamectin	Agri-Mek	16.3		
	Assail	18.8		
Acetamiprid	Assail 30SG		70	78
	Assail 70WP		86	100
Azinphos methyl	Guthion	71.3		
Beta-cyfluthrin	Baythroid	54.8	45	96
Bifenthrin	Brigade	91.5		
	Bifenture 2EC		100	100
	Bifenture 10DF		100	100
	Capture LFR		43	100
Bifenthrin + acetamiprid	Bifenture + Assail 30SG		100	100
Bifenthrin + imidacloprid	Brigadier		100	100
Carbaryl	Sevin	9.2	38	38
Chlorpyrifos	Lorsban	89.0		
Clothianidin	Clutch	55.6		
Cyazotoliprole	Cyazypyr	1.7		
Cypermethrin	Up-Cyde 2.5EC		100	100
Cyfluthrin	Tombstone	49.0		
Dimethoate	Cygon	93.3		
Dinotefuran	Safari	67.3		
	Scorpion 3.24		82	93
Endosulfan	Thionex		15	100
	Venom			
Endosulfan	Thionex	90.4	90	100
Esfenvalerate	Asana	43.3	24	31
Fenprothrin	Danitol	66.7		
Flonicamid	Beleaf	7.7		
Flubendiamide	Belt SC		23	23
Formetanate hydrochloride	Carzol SP	63.5		
Imidacloprid	Provado	40.0	17	33
Imidacloprid + cyfluthrin	Leverage 360		84	94
Indoxacarb	Avaunt	11.3		
Kaolin clay	Surround	23.1		
Kaolin clay + thiamethoxam	Surround + Actara	66.7		
Lambda-cy	Lambda-cy		74	78
	Warrior	52.9	57	93
Lambda-cyhalothrin + acetamiprid	Lambda-cy + Assail 30SG		93	100
Lambda-cyhalothrin + thiamethoxam	Endigo ZC		77	98
Malathion	Malathion	92.5		
Methidation	Supracide	90.4		
Methomyl	Lannate	90.1	78 - 90	78 - 92
Oxamyl	Vydate	34.2	10-82	18-82
Permethrin	Permethrin	77.1	50	95
Permethrin	Perm-up 3.2EC		98	98
Permethrin + acetamiprid	Perm-up 3.2EC + Assail 30SG		100	100
Phosmet	Imidan	20.0		
Pyrifluquinazon	Pyrifluquinazon	28.3		
Spirotetramat	Movento	9.8		
Thiacloprid	Calypso	18.3	15-29	18-46
Thiamethoxam	Actara	56.3	49	86
Tolfenpyrad	Tolfenpyrad	36.5		
Zeta-cypermethrin	Mustang Max	52.1		

Success! 2nd EPA Biopesticide Registration AF36 Achieved on Corn

Two farmer based organizations in Arizona and Texas worked together to achieve the second EPA Biopesticide registration with AF36. This registration of the aflatoxin control product AF36 for use on corn in Texas and Arizona represents a milestone in the development and commercialization of atoxigenic strain technology for the mitigation of aflatoxin in a variety of agricultural crops.

Dr. Peter Cotty, USDA ARS pioneered this technology and has been working on its development for more than fifteen years. The Arizona cotton industry leadership has been committed to this innovative technology. Their vision of sharing the results of this effort with other commodity groups such as the Texas Corn producers is becoming a reality.

Aflatoxin is a major problem in the desert Southwest and occasionally other parts of the US as well. Aflatoxin is a naturally occurring carcinogen found in cottonseed meal, corn, other grain crops and some specialty crops as well. Aflatoxin is produced by the organism *Aspergillus flavus* which is naturally occurring. Fortunately, there are some strains of *Aspergillus flavus* that do not produce the toxin.

Dr Cotty has been focusing on the use of these atoxigenic strains of *Aspergillus flavus*. He has developed a system where only very small quantities of the non-toxin producers are placed on the soil surface at a critical period of crop development to out-compete the toxin producers and the result is a reduction in aflatoxin in the harvested crop. The Arizona Cotton Research and Protection Council (ACRPC) is committed to working with Dr. Cotty and other scientists to test and make new atoxigenic strains available for commercial crop application.

While most growers are glad to have biological control options, the Arizona growers' interest and commitment to biological control runs much deeper. The biopesticide known as AF36 is not simply used by growers. The ACRPC is the organization recognized by EPA as the registrant, manufacturer and distributor of AF36. With the successful use of AF36 in cotton, growers using it in Texas became very interested in using it for managing aflatoxin in corn.

Since the ACRPC is a small grower supported state agency, it lacked the considerable funding necessary to pursue testing for commercial registration of

the product. That's where IR-4 got involved. The longstanding commitment of IR-4 and the assistance of IR-4 Biopesticide and Organic Support Manager, Dr. Michael Braverman made the AF36 registration on corn possible.

IR-4 was requested to assist and help secure an Experimental Use Permit on corn in Arizona and Texas. Since EPA recognizes aflatoxin as a public health issue they required efficacy data. Under an experimental use permit, Dr Cotty determined that AF36 reduced aflatoxin in corn. The threshold for aflatoxin in corn is only 20 ppb. Growers that have had many crops fail to meet that standard have been able to meet it with AF36.

IR-4 also helped format the information that Dr Cotty developed and submitted for a full Section 3 registration. Encouraged by the results, the Texas Corn Growers Association expressed their interest to EPA in seeing this registration move forward. EPA's Biopesticides and Pollution Prevention Division worked very hard to complete the registration and was able to complete registration ahead of schedule. The product continues to be registered by the

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BMSB

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Dr. Thomas Kuhar and colleagues (Virginia Tech, Blacksburg, VA) dipped paper and a single green bean pod in insecticide solutions based on label rates delivered in 100 gal per acre. The treatments were allowed to dry for about half an hour before BMSB adults or nymphs were exposed to them in petri dishes. Percent mortality and morbidity were assessed 72 hours later.

The products and active ingredients which gave a lethality index of greater than 85 or exhibited 85% mortality or higher are shaded in Table 1. These include acephate, acetamiprid, bifenthrin, chlorpyrifos, cypermethrin, dimethoate, endosulfan, malathion, methidathion, methomyl, permethrin, and combinations of pyrethroids and neonicotinoids. However, two neonicotinoids exhibited higher mortality in Dr. Kuhar's assessment than in Dr. Leskey's. Although Dr. Kuhar's methodology assessed impacts at 72 hours instead of through 1 week, BMSB were able to feed on a treated food source. Acetamiprid and dinotefuran may be good candidates to include in field efficacy experiments. Product formulation may be a factor in active ingredient efficacy.

IR-4 Research plans for 2011

IR-4 will be sponsoring several research projects in the Northeast and Southern Regions. Venom 70WG (dinote-

furon) and Trebon 280EC (etofenprox) will be tested alone and in combination with piperonyl butoxide on peppers, peaches, apples, and sweet corn grown in DE, MD or NJ. In addition to efficacy data, observations will be made on beneficial organisms and crop phytotoxicity. In another experiment, several products that have better profiles for conserving natural enemies (buprofezin, flonicamid, pyriproxifen, spinetoram, and spirotetramat) will be screened on peaches for efficacy and phytotoxicity. For ornamental horticulture crops, one experiment will be conducted in DE to screen A16901B, Aloft (clothianidin + bifenthrin), Flagship 25WG (thiamethoxam), Hachi-Hachi (tolfenpyrad), Orthene TTO (acephate), Scimitar (cypermethrin), Safari 20SG (dinotefuran), Talstar (bifenthrin), and TriStar 30SG (acetamiprid). 🌱

Mention of a specific product does not constitute a recommendation for use. As always, consult product labels prior to application and follow all label directions.

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Save the dates...

2011 Food Use Workshop
Sept 13-14, 2011
Raleigh, NC

Ornamental Horticulture Workshop
October 5-6, 2011
Sacramento, CA

2011 National Research Planning Meeting
October 25-26, 2011
IR-4 HQ, Princeton, NJ

IR-4 National Education Conference
Feb 29-Mar 1, 2012
San Antonio, TX

Canadian Growers Select 2012

Crop/Pest Priorities —by Randy Fletcher, Communication Officer Canada Pest Management Centre

Access to new and effective pest management tools and technologies is a major priority to Canadian horticultural producers, and Agriculture and Agri-Food Canada's Pest Management Centre (PMC), hosted the 9th Annual Canadian Minor Use Priority Setting Workshop in Ottawa, March 21-24, 2011.

Over 200 participants attended, including grower organization representatives, university and federal researchers, provincial Minor Use Coordinators and extension specialists, registrants, Pest Management Regulatory Agency (PMRA) representatives (Canada's 'EPA'), processing companies and other stakeholders. Delegates representing the IR-4 Project also participated, to seek opportunities for joint work.

The Minor Use Pesticide Program is modeled after the IR-4 Project. The PMC welcomes participation by IR-4 in the minor use priority setting process. Both organizations focus on grower-selected challenges, and continue to explore additional ways to work cooperatively for the benefit of specialty crop growers and stakeholders on both sides of the border.

The purpose of the meeting

was to review the current minor use priorities identified by growers in each of the Provinces for all crops, including ornamentals, specialty crops such as pulses as well as greenhouse crops, and to establish the top priority projects for the Pest Management Centre's (AAFC-PMC) 2012 field trials.

A total of 44 projects were selected, which includes priorities in each discipline (entomology, pathology and weed sciences) as well as 5 regional upgrades and 2 priorities for organic production. Some of the priorities, which reflect similar grower needs in the U.S., could become collaborative projects, and could lead to joint review submissions to both EPA and Health Canada's PMRA. After completion of the IR-4 Food Use Workshop in September, cooperative projects will be identified, and joint review possibilities will be examined.

The Canadian Workshop also identified the Spotted wing *Drosophila* (*Drosophila suzukii*) and the brown marmorated stink bug (*Halyomorpha halys*) as two emerging pests that can have a serious economic impact on growers on both sides of the border. These invasive species threaten Canadian and U.S. producers of cherries, apples,

blueberries, grapes, nectarines, pears, plums, pluots, peaches, raspberries, and strawberries.

The PMC is leading discussions with PMRA and the Canadian Food Inspection Agency on measures to manage these pests, including identifying potential products and technologies. Canadian and U.S. officials will work closely together in the pursuit of pest management options.

In its nine years of existence, the PMC's working relationship with the IR-4 Project has grown stronger. PMC fully appreciates the expertise, experience and guidance of those working at IR-4, recognized as our significant partner in the minor use world. Pests don't respect international boundaries, but through collaboration and shared resources growers on both sides of the border are benefiting from this partnership.

For a complete list of the priorities selected at the 2011 Canadian Minor Use Priority Setting Workshop please contact PMC's International and National Relations Officer Shirley Archambault at Shirley.Archambault@agr.gc.ca. For more information on AAFC-PMC, please consult our website www.agr.gc.ca. 

AF36

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growers for the growers. Scott Averhoff of the Texas Corn Producers Board stated, "As a Texas corn grower that destroyed 900 acres of corn due to aflatoxin levels in the 1500 ppb range and having endured years of participating in scientific symposiums seeking field deployable solutions for our growers, I cannot begin to describe how gratified I am in being able to use AF36 in our production management."

In 2010, corn from untreated farms were in the 400-500 ppb range for aflatoxin but on farms where AF36 was used, every load delivered was under 20 ppb aflatoxin, which yielded an \$0.85/bushel price premium over corn in the 20-100ppb range. This is an extreme example, but it is always good to be incorporating a practice that improves feed/food safety.

How is it that IR-4, which works on specialty crops, is involved? IR-4's mission is to provide the facilitation of registrations on specialty crops, but, IR-4 also works to facilitate registrations for minor uses on major crops such as cotton and corn and results can often benefit minor crop uses too.

Such is the case with pistachios. Pistachio is the third crop where IR-4 has become involved in helping register AF36. Most pistachios in the

US are grown in California and the export market to Europe is very important to pistachio growers. European standards have rejected many valuable pistachio loads. Dr. Cotty has been cooperating with Dr. Themis Michailides of the University of California to

satisfy the efficacy data requirements for EPA and the California Department of Pesticide Regulation (CDPR). The Section 3 registration for AF36 in pistachio has already been submitted to EPA and CDPR. In the near future, it is hoped pistachio producers will soon have full use of AF36.



Chalk up another success for growers through collaborative efforts. 🌱

Corn samples are prepared to determine the percent of AF36 and toxin producing strains on the grain

IR-4 Newsletter Vol. 42 No. 2 Spring 2011

The IR-4 Newsletter is published quarterly for distribution to cooperators in our partner State/Federal/Industry research units, State and Federal officials, commodity groups, and private citizens. Material from the IR-4 Newsletter may be reproduced with credit to the publication. Major funding for IR-4 is provided by USDA-NIFA and USDA-ARS in cooperation with the State Agricultural Experiment Stations. New Jersey Agricultural Experiment Station Publication No.P-27200-11-02, supported by state, US Hatch Act, and other USDA funds.

Editor: Sherrilynn Novack

IR-4 Public Relations and Communication Manager, 732.932.9575 x 4632, novack@aesop.rutgers.edu

Newsletter Committee:

Northeast Regional Field Coordinator, **Edith Lurvey**, 315.787.2308.

North Central Regional Director, **Bob Hollingworth**, 517.432.7718.

Western Regional Assistant Field Coordinator, **Stephen Flanagan**, 541.688.3155.

Southern Regional Field Coordinator, **Michelle Samuel-Foo**,

352-392-1978 ext 406

Southern Region Program Assistant/Quality Assurance Support **Robin Adkins**

352.392.1978 x 424.

Commodity Liaison Committee member, **Dave Trinka** of MBG Marketing, 269.434.6791.

Alabama State Liaison Representative, **Charles Gilliam**, 334-844-3045

IR-4 HQ, 732.932.9575.

Assistant Director, **Van Starner** x 4621

Ornamental Horticulture Manager, **Cristi Palmer** x 4629

Technical Coordinator/Entomology, **Ken Samoil** x 4614

Assistant Coordinator, Interdisciplinary Working Group **Kathryn Homa** x 4604

The IR-4 Project, building on its strong, more than 10-year relationship with Syngenta Crop Protection and working in concert with the Canadian Pest Management Centre (PMC), recently submitted its largest registration package in Project history. On March 28, 2011 The IR-4 Project submitted 5 administrative volumes for 5 active ingredients, 14 final reports, 21 end use product labels, and 78 tolerance requests to the US EPA.

IR-4 implemented this research based on priorities set by growers and grower groups at Food Use Workshops. Syngenta supported the work with product samples and technical support and following US EPA registration, will add the uses to the final printed labeling when approved. As the project wound down, IR-4 Plant Pathology Program Manager, David Thompson stated, "I've never submitted anything with this much complexity". This submission is a culmination of the collaborative efforts that go into attaining registrations of pest management solutions for specialty crop growers.

The main driver for this submission is the use of 3 compounds (azoxystrobin, fludioxonil, difenoconazole) on potato as a post-harvest treatment to control silver scurf and *Fusarium* dry rot of potatoes while they are in storage. Other postharvest uses include control of sour rot on citrus,

sour rot on tomatoes, *Penicillium* mold in citrus and stone fruit, *Penicillium* surface mold of pineapple, and uses that provide postharvest disease control tools for other tropical fruit. The use on pineapple is considered a Section 18 Emergency Use and is necessary to keep fruit from rotting in shipment. Growers had limited chemi-

It took a team of people from every group within IR-4 to put together the largest submission in IR-4 history. Team leader Dave Thompson pumps his fist in triumph. Members from the HQ team include (seated l to r) Debbie Carpenter, Dave Thompson, Jane Forder, Kathryn-Hacket Fields, (standing l to r) Johannes Corley, Bill Barney, Grace Lennon, Jerry Baron and Tammy Barkalow. Not pictured are Dan Kunkel, Kathryn Homa, Karen Sims and Juliet Thompson.

cals and needed additional chemistries for resistance management control of anthracnose on spinach and peppers. This submission also requests expansion of present tolerances to the newer crop groups and subgroups, which now contain many additional specialty crops that have never had any pest control tools available.

With these new uses, growers can produce and market higher quality potatoes, citrus fruits, stone fruits, pineapple and tropical fruits. Pepper and spinach growers will be able to

Bales of Effort Yield

The paperwork was immense. It weighed 100 pounds and when it was stacked, it measured 11' 2.5" tall.



manage anthracnose leaf spot on their crops. Growers will also gain tools to assist in resistance management, where currently a limited number of tools prevents good chemistry rotation. Specialty crop growers will also gain tools where they previously had few or none.

Collaboration is Key

Bundling the studies into one EPA submission package became a catalyst for collaboration. IR-4 Executive Director, Jerry Baron discussed the need for submission bundling. He said, "Bundling as many

s Bountiful Harvests



The analysis of propiconazole and triazole metabolites in stone fruit and citrus studies became a bottleneck to completing the submission. Further, the study with azoxystrobin, fludioxonil and difenoconazole was going to be difficult and could have delayed the submission. With the deadline looming and complicated lab analysis becoming more chal-

lenging, IR-4

soon realized it could not complete this submission on time with-

out help. Syngenta offered to help by com-

pleting the lab analysis. IR-4 wrote the Field and

Processing Reports and transferred the study to Syngenta.

Syngenta added the analytical

portion and together, they finished the study.

Helping growers further, there was a need for growers to be able to market their commodities without trade barriers. Coordination with Canada via the PMC and Syngenta Canada was crucial in minimizing trade issues. John Abbott, Syngenta Team leader for fungicides,

noted, "This has been a great example of excellent coordination with IR-4, Syngenta Canada and the PMC." The PMC worked with IR-4 and conducted trials in Canada on some of the studies (potato, spinach, pepper, ginseng) to obtain these uses and plans to submit the package to the PMRA in Canada as soon as possible after the US EPA submission.

The Result

In total, the submission package paperwork weighed 100 lbs and, when stacked end on end, measured 11 feet and 2.5 inches tall. This collaborative effort of IR-4, Canadian PMC, Syngenta, and thousands of people-hours fills the void and brings new tools to growers, which can help them provide cleaner, more appealing, fruits and vegetables to consumers.

This is a great example of working together in leveraging resources with external partners (IR-4 and PMC), collaborating across North America, delivering stakeholder priorities, avoiding trade irritants and establishing common MRLs with Canada. Together, IR-4, Syngenta, and other industry collaborators are continually looking for ways to enhance and increase efficiency as we broaden product uses and address gaps in crop protection tools for specialty crop growers. 🌱



The Syngenta Greensboro, NC based team Starting back row l to r : Eileen Kennedy, David Lowe, Eric Tedford, Janis McFarland; next row l to r: Aaron Weber, Jeff Perline, Tom Willard, Arpad Szarka, Mark Grunenwald; next row l to r: Walt Anderson, Sharon Waynick, Carol Hayworth, Tim Joseph, Michelle Hampton, Dirk Drost; next row l to r: Betty Brame, Stephanie Rutledge, Faye Wilhite, Bunnie Konat, Pat Dinnen, Teresa Cox; front row l to r: Sharlyne Pyles, Ruhi Rezaaiyan, and Barbara North. In all, at least 52 people from Syngenta participated in the submission.

actions on a compound as possible benefits the US EPA. This allows them efficiencies in reviewing chemicals less frequently and allows them to review submission within their timeframe." Working with companies and EPA in meeting their timelines is crucial and this large submission brought many challenges in reaching deadlines.

Western Region Spring Kick Off Meeting

—by Mika Tolson, Western Region Assistant Coordinator

Spring 1. Winter 2. Cold pouring rain was no deterrent to the group attending the Western Region State Liaison Representatives meeting at the University of California, Davis. The meeting was an opportunity for state representatives and commodity liaison representatives to discuss pest management needs, tour local agriculture and ornamental sites, get updates on IR-4, and learn about invasive pest concerns.

Becky Sisco, Regional Field Coordinator for the Western Region, began the meeting with a tribute to faculty director Marion Miller, who lost her courageous battle with pancreatic cancer in February.

Ron Tjeerdema was introduced as the new IR-4 faculty director. Dr. Tjeerdema chairs the Environmental Toxicology Department at UC Davis and conducts pesticide environmental fate research.

The remainder of the morning held discussion of research priorities for 2012 and an update from headquarters on new pesticide uses, crop group revisions and the proposed change to commodity-based prioritization for the Food Use Workshop.

Then it was tour time. First stop: Michael Parrella's UC Davis greenhouses to see natural predators in action for biocontrol in ornamentals.

Back on the bus, sandwiches were served en route to Greene and Hemly's pear orchard in the Sacramento River Delta. The group met with Matt Hemly, orchard manager, Pat Weddle and Randy Hansen, pioneers of biologically intensive integrated pest management to talk about how the pear industry transformed from one of the heaviest users of pesticides to a low pesticide input crop.

Next, the bus headed east to Ann Chase's horticultural research facility in Mt. Aukum. Dashing between greenhouses to avoid the downpour, Chase explained how she conducts trials to determine the best product for controlling a plant disease and whether a grower's crop can be salvaged. She generously provided the group with publications including a fungicide options wheel and a handheld plant disease guide.

The tour concluded at Cooper Vineyards near Plymouth for a talk by grower Dick Cooper and an evening reception.

Wednesday's program opened

with a presentation from Barbara Madden on the EPA pesticide regulatory process and proposed changes to IR-4's fee waiver. She encouraged everyone to send concerns to Steven Bradbury, EPA Director Office of Pesticide Programs.

Field Program Assistant Mika Tolson provided an update on the Western Region Ornamental Program, and the meeting wrapped up with a series of invasive pest presentations.

As a testament to the importance of Spotted Wing Drosophila, Doug Walsh of Washington State University has given 26 presentations in the last 14 months. All western states have the pest, and it's moving up the US eastern seaboard. Dr. Walsh is part of a \$5.8 million grant from the USDA-Specialty Crops Research Initiative to manage the fruit fly.

Mike Kawate of the University of Hawaii spoke about the significance of the Coffee Berry Borer as a new invasive pest. A quarantine is in place for the entire west coast of the big island where Kona coffee is grown. Chemical control has not proven effective against the Berry Borer. Researchers are investigating biological control, changes in cultural practices,

Controlling Adult Mosquitoes with Pesticides Part III — Risk Assessment & Risk Mitigation

— by Karl Malamud-Roam, IR-4 Public Health Pesticide Manager

Control of adult mosquitoes with pesticides is an important public health practice (see Parts I & II of this series), but it does entail some risks, both to human health and to the environment. This article explores how direct toxicant risks are assessed and how they are mitigated or managed to ensure that they are acceptable. The benefits and risks of mosquito repellents, barrier sprays, and attractants for traps are explored in the next article in this series.

Killing adult mosquitoes with pesticides requires that the pesticides move into and through the environment. Inevitably, this means that some non-target organisms, potentially including humans,

are exposed to mosquitocides when they are applied. The risks associated with this exposure are primarily evaluated with the standard EPA process for assessing outdoor uses of pesticides. Some distinct features of mosquito adulticide risk assessment are discussed here.

EPA's formal pesticide risk assessments follow four basic steps – hazard identification, dose-response assessment, exposure assessment, and risk characterization – that take into account the potential toxic consequences (hazards) of the material, the amounts needed to cause these effects, and the likelihood of being exposed to these hazardous doses (www.epa.gov/pesticides/about/



Mosquito Adulticide Drift into a Florida Forest (Courtesy City of Gainesville, FL)

[overview_risk_assess.htm](#)). Substantial safety factors are built into the process where data on either toxicology or exposure is incomplete.

The active ingredients in most modern mosquito adulticides are either pyrethins (which are botanical extracts) and pyrethroids (synthetic pyrethrin analogues), or organophosphates (OPs), and all of these have gone through the four-step risk assessment process in the last few years. Starting in 2010, all pesticides will be reevaluated at least every 15 years through the registration review process (www.epa.gov/oppsrrd1/reevaluation/pyrethroids-pyrethrins.html) and will include risk assessment and risk mitigation measures to ensure that identified risks are reasonable.

Pyrethrins, pyrethroids, and OPs all impact mosquitoes through disruption of the insect nervous system, and the primary hazard or potential effect

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WSR Kick-off *continued from previous pg*

and natural products to synchronize flower and fruit development.

The Brown Marmorated Stink Bug (BMSB) is a major agricultural pest in the eastern US that has been moving west. UC Davis entomologist Frank Zalom told the group BMSB was confirmed in Davis on March 1st. Zalom presented

that researchers have seen control in lab tests with mixes of pyrethroids and neonicotinoids, but more research is needed in the field and on life-cycle, detection, and non-chemical alternatives.

Becky Sisco thanked everyone and asked for a host for the 2012 meeting — bring your parkas, Idaho here we come!

Risk

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of these materials on humans or non-target organisms, if exposures are sufficiently high, is neuro-toxicity. What makes these materials acceptable as public health pesticides is the high degree of selectivity toward insects, especially when synergized (with PBO), and the



Mosquito control technician in FL (courtesy City of Jacksonville)

consequent high safety factor that exists for mammals and most other nontarget organisms relative to the very small doses that are neurotoxic for mosquitoes (www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2005-0284-0033). A particular concern of assessors is ensuring the safety of workers using these materials.

Other potential hazards that have been reviewed, including chronic toxicity, cancer risk, developmental and reproductive impacts, etc., also demonstrate the need to integrate dose and exposure data to fully assess potentially toxic hazards. As with neuro-toxicity, some of these materials demonstrate potential impacts at high doses but insignificant risks at real-world exposure frequencies and application rates (Peterson et al

2006). For example, resmethrin is classified as "Likely to be Carcinogenic to Humans" by EPA's Cancer Assessment Review Committee (CARC) based on the results of very high exposures in lab studies; however, EPA concluded that "the resmethrin risk assessment estimates that an adult could be exposed to resmethrin when applied as an aerial ULV mosquito adulticide spray up to 365 times a year for 70 years before the Agency's cancer risk level of concern is exceeded." (Resmethrin RED, 2006, p32) In other words, the qualitative hazard can only be interpreted in a meaningful way when dose and exposure are included.

Risk assessments for mosquito adulticides as well as other pesticides include evaluation of constituents other than the active ingredients, and a particular concern with adulticides is the potential impact of the synergists. This is not a particular concern with organophosphates, but most types of animals have mechanisms for detoxifying pyrethrins and pyrethroids, and synergists such as piperonyl butoxide (PBO) are commonly used to preclude rapid detoxification by insect enzymes. While PBO and other such synergists have very low direct toxicity to people or other non-target organisms (www.epa.gov/fedrgstr/EPA-PEST/2006/July/Day-26/p11717.htm), a recent focus of research has been the potential impacts of these molecules in settings

where they might unintentionally synergize persistent pyrethroid residues (www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm).

Another research question is the extent to which the cumulative effects of mosquitocides and other pesticides may cause toxic impacts beyond those estimated by single-molecule risk assessments. Pesticide cumulative risk assessments were mandated by the Food Quality Protection Act (FQPA) in 1996, and have been completed for organophosphates and some other pesticide classes, but not yet for the pyrethrins and pyrethroids (www.epa.gov/pesticides/cumulative/). EPA's FIFRA Scientific Advisory Panel (SAP) has reviewed this topic for the pyrethrins and pyrethroids in 2009 and 2010, and proposed that the majority of these chemicals share two common modes of action. When the final SAP report is issued, there may be new restrictions imposed, possibly in the area of allowable residues on foods or animal feed. Few adulticides have explicit residue tolerances established at this point, and IR-4 is helping determine appropriate protocols for establishing these for mosquitocides.

While risk assessments for mosquitocides generally follows the standards for other pesticides, control of adult mosquitoes has some unique attributes, which

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Blooms & Greenery

—by Cristi Palmer, IR-4 Ornamental Horticulture Manager

Mothers' Day. Writing a note in a card, taking her to dinner, giving her a present are all ways to honor our mothers on this holiday. Another common way to show mom appreciation is to give her a bouquet of flowers or a live plant, whether a house plant or a flowering bush or bulb that she can transplant later into the garden. In this Spotlight, we are



Photo by aboutflowers.com

focusing on cut flowers and foliage that create beautiful arrangements expressing our thoughts and emotions during holidays and other events.

The United States domestic cut flower and foliage production is \$487 million in flowers and greenery annually (2009 Census of Horticulture, NASS 2010). The 2,700 domestic growers represent 63% of the flowers placed into arrangements, remaining a key component of US floriculture production. In addition to gerbera, rose and tulip, US producers grow lilies, iris, carnations, asters, lisianthus, asparagus fern, baby's breath and many other common

and/or exotic flowers to bring interesting colors and shapes to floral arrangements.

Each cut flower and greenery has an almost unique set of challenges to produce quality blooms or stems, but there are some common pest and disease issues for many crops. Aphids, thrips, whiteflies and mites feed on many crops. Disease issues include bacterial diseases, root and bulb rots and foliar diseases such as powdery mildew, gray mold, and viruses.

Over the past few years, IR-4 has tackled some of the diseases and pests affecting cut flower and foliage production. For thrips management, several products have been newly registered or updated: Hachi-Hachi (tolfenpyrad), Kontos (spirotetramat), Overture (pyridalyl), and Pylon (chlorfenapyr). IR-4 has also helped develop data for root rots caused by *Phytophthora* species, and some of the products registered for this use include Adorn (fluopicolide), Segway (cyazofamid), Stature SC (dimethomorph), and Subdue MAXX (mefenoxam). The research so far for bacterial diseases points toward the copper-based products providing the best efficacy, although there are some new active ingredients being tested further this year. Screening new active ingredients for gray mold or



Photo by aboutflowers.com

other *Botrytis* diseases is a new research project starting this year. And another new research project for 2011 is testing whether PGRs can enhance branching for hydrangea grown either as a pot crop or for the production of cut stems – and hydrangea is an up-and-coming flower in floral design.

To read the IR-4 summary reports on these and other projects, visit ir4.rutgers.edu/ornamentals.

Happy Mothers' Day! 🌱

Mention of a specific product does not constitute a recommendation for use. As always, consult product labels prior to application and follow all label directions.



Photo by Terry Davis, Michigan State University

Highlights of Joint NCR/SOR Field Training

— by Michelle Samuel-Foo and Robin Adkins

You can see the logic. Offer sunshine starved folks an opportunity to get in a game of putt-putt golf, bask in Florida sunshine and enjoyed authentic Southern-style BBQ. This, plus more, was what attendees enjoyed at the joint IR-4 Southern (SOR) and North Central (NCR) Region GLP Field and Residue training workshop.

On February 22-23, 52 participants, including IR-4 field research directors (FRD), technicians and their assistants, HQ personnel, regional field coordinators (RFC) quality assurance (QA) coordinators, and private consultants all converged in Gainesville, FL for the workshop. The SOR RFC Michelle Samuel-Foo moderated the first day's sessions with the assistance of the training committee that consisted of David Studstill and Darrell Thomas (FRD and assistant at the UF Citra Field research center); Debbie Carpenter and Van Starner (IR-4 Asst Director of Registrations and Asst Director of Res Planning & Outreach); Satoru Miyazaki and Michael Chen (NCR RFC and QA coordinator), Kathleen Knight, Robin Adkins and Amanda Hogle (SOR QA coordinator, QA Assistant and Program Assistant). They put

together a jam-packed 2 day session tackling everything from greenhouse trials to receiving samples in the analytical lab.

Marty Marshall, SOR IR-4 Director welcomed the group followed by Satoru Miyazaki's presentation on the importance, generation and use of standard operating procedures (SOPs). A hands-on demonstration of making spaghetti, led by Debbie Carpenter, illustrated the importance of having a standardized methodology for conducting routine operations. Debbie also led sessions on: 1) GLP Test Substances, (Receipt and Storage -what to look for, Formulations, COA, Expiration dates, Re-certifications and what to do when in doubt) and 2) Timelines, Bundling and Preparation of data summaries. She explained the critical role field sites play as the initiator of the GLP residue trials and how submitting Field Data Books (FDB) promptly contributes to the wider success of the IR-4 program. With the challenges to the National program to reduce the timelines for the organization, Debbie's seminar was timely and well received.

Van Starner took participants through changes to the 2011 protocols and FDB. This

proved to be a 'high energy session' as new requirements in protocol language for distinguishing between multiple trials at a single location was hotly debated. QA Coordinators, Michael Chen and Kathleen Knight, presented a session on the role of QA in GLP studies and FRD top 10 findings to QA.

Tuesday's classroom sessions were punctuated by "How well do you know IR-4" trivia style questions that were written by Van Starner, Roger Batts and Michelle Samuel-Foo. Categories included "How well do you know IR-4 Acronyms" and "How well do you know IR-4 Field Data Books." Dan Heider and Michelle tested the shipping prowess of the group while providing some afternoon entertainment, by quizzing folks on the do's and don'ts of shipping IR-4 samples. Dan used his own set of QA findings to get folks to gauge what to do or not do when shipping samples.

FRDs, presented "Tricks of the Trade" where they shared tools or other items that they have customized to make their IR-4 jobs easier. Lori Gregg discussed using colored flagging tape to easily identify items, Bernie Zandstra, Rodney Tocco and Sylvia Morse try to "keep things simple and standard" by making use of repetition for their trials. David Studstill highlighted his "creative calculations" for application records, and Reed

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IR-4 Successes Jan. - Mar. 2011

The trade names listed below are provided as a means to identify the chemical for which a tolerance has been established. A trade name listed here may not be the name of the product on which the new food use(s) will be registered. Only labeled products may be used on a food crop. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical.

Federal Register: January 19, 2011 **Fluazinam** Trade Name: Omega
Crops: Carrot, Apple **PR#:** 07094, 06797

Federal Register: January 26, 2011 **Mefenoxam** Trade Name: Ridomil Gold
Crops: Snap bean, Spinach, Caneberry subgroup 13-07A, Bushberry subgroup 13-07B (delete Lingonberry tolerance), Bulb onion subgroup 3-07A, Green onion subgroup 3-07B
PR#: 08371, 08430, 08431, 01169

Federal Register: February 2, 2011 **Sulfentrazone** Trade Name: Spartan
Crops: Tuberous and corm vegetable subgroup 1C (delete Potato tolerance), Head and stem Brassica subgroup 5A (delete Cabbage tolerance), Brassica leafy greens subgroup 5B, Fruiting vegetable group 8-10, Melon subgroup 9A, Succulent pea, Strawberry, Flax
PR#: 07723, 07724, 08064, 08065, 07581, 07912, 07914, 09355, 07957, 08048, 09025, 07911, 07917, 08049, 08445, 06520, 07044, 07584

Federal Register: March 23, 2011 **Aspergillus flavus** AF36
Crops: Corn (exemption from tolerance) **PR#:** 378B

Olszack shared his "confessions of a reluctant FRD" or how he overcame his initial hesitation, accepted that he had a huge learning curve to undertake and ultimately how he has come to embrace and "enjoy" IR-4 FDB completion.

The UF Plant Research and Education Center was the site of the second day's activities. David Studstill and Buck Nelson led participants on a tour of the experiment station and the IR-4 facilities. Afterward, David and Darrell Thomas led a backpack sprayer calibration demonstration. Darrell simulated walking 3 mph with the use of a metronome while carrying a

backpack sprayer and holding the spray wand at a consistent 18-20 inches across a plot of chives. To demonstrate that this is not always such an easy task, volunteers from the audience were asked to mimic the spray application. All in all, this was a simple, but engaging activity that achieved a dual purpose of demonstrating good technique and record keeping while providing a light moment of entertainment.

Roger Batts, Field Research Director at the NC State IR-4 Field Research Center, drove his customized and well-outfitted truck and sampling trailer to the UF Citra experiment station. Both are impressively organized with the tools and

equipment that he needs for conducting his trials. Most of Roger's GLP residue studies are performed at remote sites so it is necessary for him to have all needed equipment and supplies organized and "ready to roll." There is also space dedicated for coolers that are held securely in the trailer, for transporting samples back to his freezers.

David and John Wise (FRD at MSU) demonstrated spray deposition patterns using an air blast sprayer versus a straight boom attached to a high boy tractor (both set at 30 GPA). This exercise was conducted in a highbush blueberry field

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Risk

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led EPA to issue Pesticide Registration Notice 2005-1. The most significant elements of this PR Notice are: the recognition that drift is necessary for adult mosquito control, rather than an adverse source of impacts; that applications over water are acceptable if the anticipated drift moves the pesticide cloud to and through areas of mosquito habitat; and that careful control of pesticide droplet size and frequency of application are the keys to mitigating potential pesticide impacts. 🌱

2011 MRL Workshop

International trade, pest management, evolving regulations and global harmonization will be the focus of the 2011 MRL Workshop. Growers, pest control advisors, commodity groups, packer-shipper organizations, registrants and regulatory personnel are encouraged to participate! June 1 & 2, 2011. The workshop will be held at the Holiday Inn San Francisco Fisherman's Wharf. To learn more visit the California Specialty Crops Council website at www.specialtycrops.org. 🌱

NCR/SOR

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where water sensitive paper was placed at low, medium and high heights in various locations throughout the plot. This illustrated the penetrative power and distance that spray droplets could travel. John gave a brief lecture to the group about how important it is to select the proper equipment for a specific trial, while being consistent with commercial practices as this could ultimately influence the outcome of a residue analysis. The workshop was a successful event that provided a refresher to experienced GLP personnel and laid a solid foundation for newer field researchers. 🌱



IR-4 Headquarters,
Rutgers, The State University
of New Jersey
500 College Road East
Suite 201 W
Princeton, NJ 08540



United States Department of Agriculture
National Institute of Food and Agriculture



Major funding for IR-4 is provided by Special Research Grants and Hatch Act Funds from USDA-NIFA, in cooperation with the State Agricultural Experiment Stations, and USDA-ARS.

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