The IR-4 Project

Pest Management Solutions for Specialty Crops and Minor Uses

Newsletter

Vol. 45 No. 1 Winter 2014

On Point with President Obama

It was on Friday evening, one week before the actual event, when IR-4's North Central Region (NCR) Administrative Adviser, Doug Buhler "got the call" that Michigan State University (MSU) would be hosting President Obama for a special event. The event, he learned a few days later, was the signing of the Farm Bill.

The Farm Bill is of particular importance to specialty crop growers and IR-4. The law contains language that reflects IR-4's current mission to support specialty crops and minor uses. The Farm Bill also authorizes IR-4 work in the international arena. This international work will help U.S. growers export their goods by removing trade barriers caused by residues of pesticides in specialty crops and minor agricultural uses.

MSU faculty members have had a good deal of input throughout the Farm Bill process. Senator Debbie Stabenow, is a graduate of the university and is currently Chairwoman of the Senate Committee on Agriculture, Nutrition and Forestry. This made good reason for MSU to host the signing of such a significant piece of legislation.

The day after "the call", an advance team of White House staffers arrived to discuss the visit with a planning team from MSU. Doug, who is the director of MSU's AgBio Research, became the research program point person for the President's visit. Doug showed the advance team the facilities and took them outside in the snow and explained how some of the farm equipment is used. They selected the equipment that would be on display in the staging area for the signing, and plans were well underway.

Then the Secret Service arrived and most of the plans were scrapped. "We learned quickly that you don't negotiate with the Secret Service," said Doug. "They're very

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Inside this issue...

Executive Director Notes

Dear Friends,

Greetings from the snowy East Coast U.S. where we have been hit hard by Old Man Winter forcing IR-4 Headquarters to close or truncate many work days. Regrettably, these shutdowns have impacted many aspects of normal IR-4 work flow.

Funding update

Congress approved and the President signed a funding law for the rest of federal fiscal year 2014 that restored IR-4 funding through USDA's National Institute of Food and Agriculture to the 2012 level of $11.916 million. This funding restoration and a similar one in USDA-ARS, while extremely helpful, does not fully address the current funding shortfalls associated with demand for IR-4 services. The funding restoration may not address the deep cuts that certain USDA-ARS sites experienced during sequestration.

We did get some good news through the signing of the 2014 Farm Bill, where the law contains language that reflects IR-4's current mission support specialty crops and minor uses. The Farm Bill also authorizes IR-4 to work in the international arena to help U.S. growers export their goods by removing trade barriers caused by residues of pesticides in specialty crops and minor agricultural uses. On behalf of the IR-4 Project I want to thank the members of the IR-4 Commodity Liaison Committee and Minor Crop Farmers Alliance for their support in the restoration of IR-4 funding and Farm Bill reauthorization.

Several of us at IR-4 Headquarters have been spending significant time going through all the thoughtful comments that were submitted in association with the IR-4 Strategic Planning survey. There were 550 individual responses with comments on multiple questions. We are progressing with our goal to release a draft strategic plan for review and comment in spring 2014 and finalization later this summer.

The new Strategic Plan is only one step of the process required to support the reauthorization of NRSP-4 (IR-4) by the State Agricultural Experimental Stations. IR-4 will be subject to a comprehensive project accomplishment/project direction review by USDA later this year. IR-4 will submit a future Project Statement outlining directions noted in the Strategic Plan. Needless to say, we are expecting several very busy months.

In closing, I want to thank and acknowledge Drs. Monte Johnson and Sally Schneider on their tremendous support and service to IR-4. Monte and Sally served as the National Program Leaders for IR-4 activities within USDA-NIFA and USDA-ARS, respectively. Monte retired from USDA-NIFA at the end of the year while Sally has received a promotion to Associate Administrator within USDA-ARS. Congratulations to both as they enter new phases of their lives.

All the best,
Jerry

New Assignment

— by IR-4 Executive Director, Jerry Baron

IR-4 has had an acute problem of overcapacity of facilities and staff to run residue field trials in EPA Data Region 2 for the last several years. We have too many high quality field research directors in the region and not enough work and associated funds to maintain all the sites at full capacity.

To solve this problem, IR-4 HQ, IR-4 Southern Region and North Carolina State University administration are partnering on a unique plan of "sharing" NC Field Research Director, Roger Batts, among the IR-4 units. Since December 2013, Roger has been working about 50% of his time for IR-4 Headquarters. He will be trained to become an off-site Study Director. Roger will also continue to lead the North Carolina's IR-4 Field Research Center as Director with a much reduced field trial workload (approx. 12 field trials for 2014). Roger will continue to be an employee of NC State University, managing field trials and studies out of his existing IR-4 office on the Raleigh campus.

We hope that the reduced field trials workload in NC will allow other Region 2 Field Research Centers to obtain enough resources to sustain operations. Furthermore, Roger's new responsibilities will partially backfill the anticipated gap in study directors capacity associated with the recent resignation announcement by Johannes Corley.

This new section of the IR-4 Newsletter called 'New Product Corner' was suggested by grower stakeholders as a way for IR-4 to help inform specialty crop growers about new pest management tools recently registered by EPA. This is for informational purposes only as IR-4 does not endorse a particular product or registrant.

TOLFENPYRAD (Insecticide – Nichino America, Inc.)

Introduction: Unconditional registration of the new active ingredient (AI) tolfenpyrad was granted by the EPA in November 2013 for its first uses on food crops. First non-food uses on ornamental horticulture plants grown in greenhouses (marketed under trade name Hachi-Hachi by SePRO Corp.) were registered in 2010. This new food use chemical registration provides growers with a new pest management tool for use against various insect and mite pests, as well as for fungicidal suppression activity against certain diseases. Tolfenpyrad is a broad-spectrum pyrazole classified in Group 21A by the Insecticide Resistance Action Committee (IRAC), and it acts by impairing energy metabolism in target pests.

Other global registrations: Japan, Dominican Republic, Taiwan, Thailand, UAE, Indonesia, Saudi Arabia, China, Malaysia, Jordan

US food use trade names/formulations: APTA™ and BEXAR™ Insecticides (both 1.31 lb AI/gal) and TORAC™ Insecticide (1.29 lb AI/gal)

US labeled crops*:
APTA™ and BEXAR™ Insecticides – citrus (crop group 10-10); stone fruit (crop group 12-12); tree nut (crop group 14-12); also on the BEXAR™ label - grapes (raisin, table, wine – only CA, OR, WA)

TORAC™ Insecticide – cotton (only in AZ, CA, NM); leafy vegetables (crop group 4); potato (only west of the Mississippi River)

Labeled food use pest spectrum: control or suppression of insects (thrips, psyllids, aphids, mealy bugs, soft seales, lepidoptera, Colorado potato beetle, flea beetles, cherry fruit fly, spotted wing drosophila, katydid), mites (Tetranychids, Eriophiids, Tarsonemids) and certain diseases (powdery, and downy mildews)

Ongoing IR-4 residue projects (PR#): 2010 – avocado (10427), blueberry (10380); 2011 – onion, crop group 3-07 (09657 and 09551), GH tomato (10634); 2012 – strawberry (10869); 2013 – GH cucumber (10842); 2014 - caneberry (11263)

Other researchable IR-4 database requests: succulent shelled bean (11299), coffee (10892), hops (10913)

SULFOXAFLOR (Insecticide - Dow AgroSciences LLC)

Introduction: Unconditional registrations of the new AI sulfoxaflor was granted by the EPA in May 2013. Regulatory scientists from EPA and counterpart agencies in Canada and Australia conducted a global joint review of the dossier. This new chemical registration provides growers with a new pest management tool for use against piercing/sucking/sap-feeding insects. Belonging to a novel class of chemistry (sulfoximines), sulfoxaflor was classified as a Group 4C insecticide by IRAC.

Other global registrations: Australia, Canada, China, Guatemala, Honduras, Indonesia, Israel, Panama, South Korea, Thailand, Vietnam; more country registrations are expected in the near future

US trade names/formulations: Closer® SC (2.0 lb AI/gal) and Transform® WG (50% AI)

US labeled crops*:
Closer® SC – Brassica leafy vegetables (crop group 5); citrus (crop group 10); cucurbit vegetables (crop group 9); fruiting vegetables (crop group 8) and okra; leafy vegetables (crop group 4) and watercress; leaves of root and tuber vegetables (crop group 2); pome fruit (crop group 11); small fruit vine-climbing except fuzzy kiwifruit (crop subgroup 13-07F); low growing berries (crop subgroup 13-07G); stone fruit (crop group 12); tree nut (crop group 14) and pistachio

Transform® WG – barley, triticale and wheat; canola (rapeseed), oilseed crop subgroup 20A; cotton; root and tuber vegetables (crop group 1); soybean; succulent, edible-podded and dry beans

Labeled pest spectrum: for control or suppression of aphids, fleahoppers, plant bugs, mealybugs, stink bugs, whiteflies, certain scales and certain psyllids

Ongoing IR-4 residue projects (PR#): 2013 – sunflower (11095, covering safflower [11269] and other crop subgroup 20B crops); 2014 - artichoke (10858), asparagus (11321), blueberry (11290), caneberry (11279)

Other researchable IR-4 database requests: hops (10912)

*See labels for specific use patterns and other general directions for use.

Congratulations Doug!

Doug Buhler, director of Michigan State University AgBioResearch and senior associate dean for research for the College of Agriculture and Natural Resources (CANR), received two awards on Dec. 11, 2013, during the Great Lakes Fruit, Vegetable and Farm Market EXPO annual banquet in Grand Rapids. The Michigan State Horticultural Society (MSHS) honored Dr. Buhler with the Distinguished Service Award, and the Michigan Vegetable Council (MVC) honored him with the Master Farmer Associate Award. Both organizations recognized his strong commitment to serve the needs and listen to the concerns of industry stakeholders. Doug has served in a number of leadership positions at MSU, among them chairperson of the Department of Crop and Soil Sciences, interim state leader for agriculture programs in MSU Extension, and most recently interim dean for CANR.

Master Farmer Associate Award – 2013
Doug Buhler, Michigan State University

He has been on the leadership team for MSU Project GREEEN (Generating Research and Extension to meet Economic and Environmental Needs) for many years. The awards credited him for helping develop this initiative into "an outstanding example of cooperation between industry stakeholders and the university."

Doug was also credited for recognizing the importance of key research and extension positions to industry, and working to hire new scientists during financially difficult times.

Since 1970, the MSHS Distinguished Service Award has recognized those giving dedicated service toward improvement of the Michigan fruit industry. The MVC gives the Master Farmer Associate Award to an individual who, while not directly involved with farming, has had a significant impact on the well-being of the vegetable industry in Michigan.

The expo organizers put together a YouTube video highlighting Doug's research and career. The video can be viewed online at http://bit.ly/awarddb.

On Point

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professional and very clear on how things will proceed while the President is on campus. We all knew our roles."

On Friday, February 7, 2014, the President, accompanied by Senator Stabenow, Agriculture Secretary Tom Vilsak and MSU President Lou Anna K. Simon, toured MSU's Biotechnology Institute (MBI). MBI was chosen because of its state of the art facilities where research to address real world problems is conducted. MBI is also the home of IR-4's North Central Region laboratory and office.

A short time later, President Obama signed the 2014 Farm Bill in front of 500 invited guests. IR-4 was represented by the NCR's analytical laboratory student helper, Chris LaMarche, who interned with Senator Stabenow in the summer of 2013 and was personally invited to the signing.

Though his time with the President was brief, Doug says he will never forget the moment he was eye to eye with President Obama and shook his hand and says he feels "honored to have been the point person for this momentous event."

Dont forget to follow us. www.facebook.com/IR4Project, www.facebook.com/IR4OrnHort and

@IR4_Project and @IR4Project.

Geraniums? Pelargoniums? What's the Difference?

Geraniums and pelargoniums are often confused with each other. It is very easy to do since the flower widely grown as a bedding plant and in containers is known as 'geranium', but its Latin genera name is *Pelargonium sp.* The genus *Geranium* contains 422 species of flowering annual, biennial and perennial plants and are found in temperate regions. Several species are cultivated for horticulture and pharmaceutical uses, but the vast majority of 'geraniums' sold in the U.S. are actually 'pelargoniums'.

Photo Pelargonium triste. Anonymous from cactusblog.net

Pelargoniums are one of the top annual ornamental horticulture crops in the U.S with over $134 million wholesale value annually (USDA NASS, Floriculture Crops 2012 Summary, April 2013). Pelargoniums readily germinate from seed and easily root from cuttings; both avenues of propagation are available with cutting production more common.

Pelargoniums were first cultivated before 1600 and *Pelargonium triste*, a native of South Africa, was probably brought to the botanical garden in Leiden, Netherlands on trading ships. John Tradescant purchased seeds in Paris and introduced them to England in 1631. Pelargoniums are native to south, east, and northeast Africa, Asia, St. Helena, Tristan da Cunha, Madagascar, Australia and New Zealand. There are 270 species worldwide with the highest diversity occurring in southern Africa with 219 species. Approximately 20 species are the progenitors of thousands of modern pelargonium cultivars.

Ivy-leaved pelargoniums are trailing cultivars with *P. peltatum* as the main contributing species. Regal pelargoniums are known as *P. x domesticum* and are primarily derived from *P. cucullatum* and *P. grandiflorum*. Zonal pelargoniums, known as P. *x hortorum* and bred primarily from *P. zonale* and *P. inquinans*, are highly sought after with over 500 cultivars. Scented leaf pelargoniums are derivatives of a number of species.

Disease and pest problems can plague pelargoniums. A few of the concerning pathogens include *Botrytis*, *Pythium*, and *Xanthomonas*. IR-4 has sponsored research on each of these diseases as well as on geranium rust. *Xanthomonas* leaf spot on pelargonium was a model system to study the impact of potential bactericides. Out of this research, copper based products consistently exhibited good efficacy, while there were a few other products with promise including Citrex, Firewall, and Insimmo.

Photo by Cristi Palmer

IR-4 has also sponsored research on geranium with plant growth regulators (PGRs) to enhance shelf life and crop safety to ensure little if any injury occurs with application. The PGR studies were designed to study whether PGRs may help overcome shipping stress, and enhance shelf quality and display life. Products containing 6-BA (Fascination, Maxcel, Exilis Plus) caused no to moderate injury which affected plant quality and shelf life of various cultivars. In general, ivy leaf cultivars like 'Tutti Frutti' were more sensitive than zonal cultivars like 'Tango'. The GA4 + 7 products (NovaGib and Provide) generally were not phytotoxic and had positive effects in some studies; however, they increased peduncle length at 100 ppm which may be unacceptable.

Pelargonium is a very popular plant and IR-4 has conducted many studies on pelargonium throughout the years. In addition to pest and pathogen studies on Pelargonium, crop safety studies have also been conducted on 11 fungicides, 8 herbicides, and 4 insecticides. As the need arises, IR-4 will continue conducting research on this popular plant.

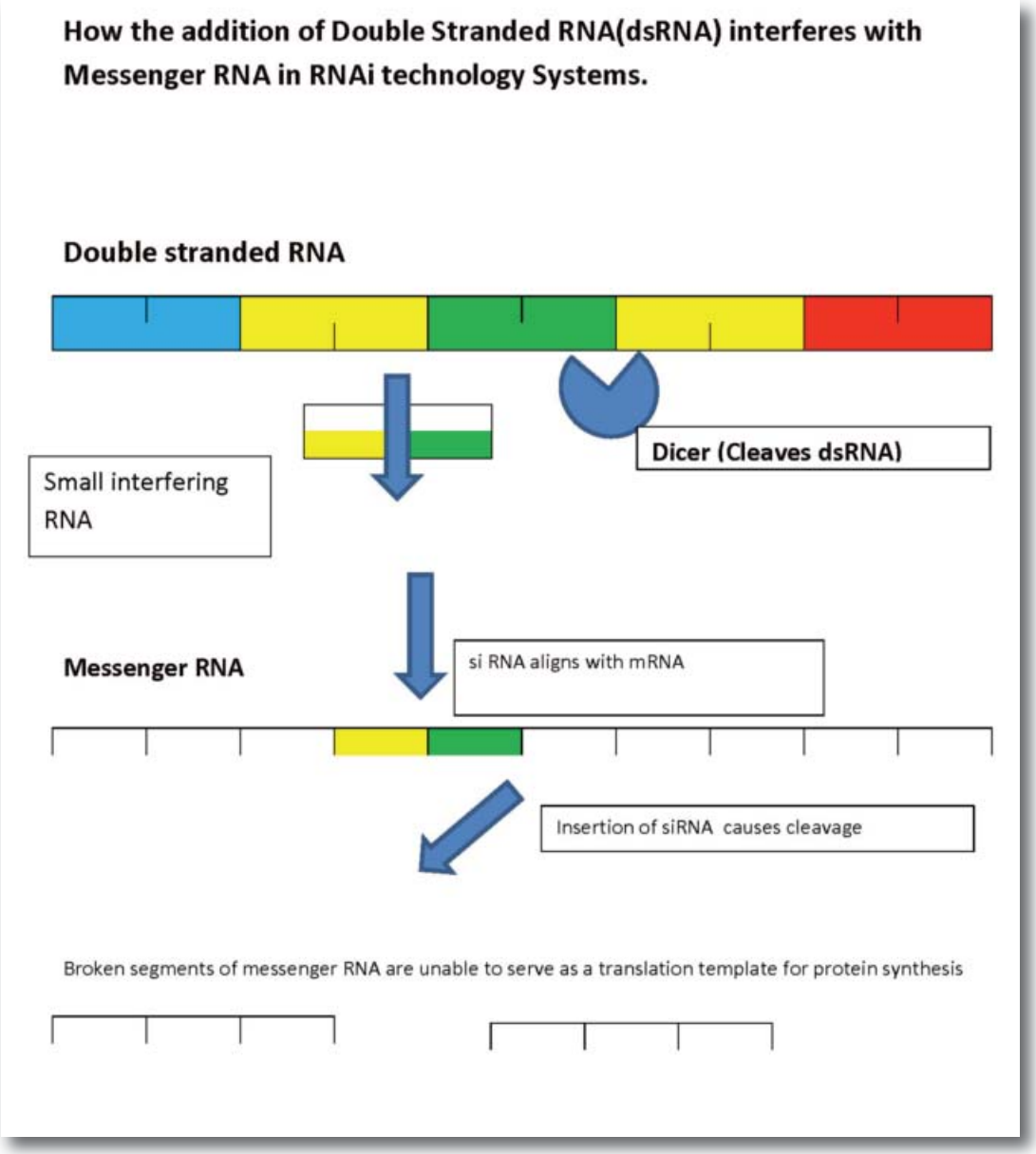
Biotechnoloy Update- RNAi as a New Technology for Pest Management

— by Michael Braverman, Biopesticide and Organic Support Program Manager

Most people have heard of genetically modified crops and the use of biotechnology for crop pest management. The most common of these technologies is the use of genetic material from *Bacillus thuringiensis* (*Bt*) to code for the production of a protein in plants which controls certain insects. Because of the history of biotechnology coming through the microorganism *Bt*, these products are considered to be biopesticides. These are commonly referred to as Plant Incorporated Protectants (PIPs) and are regulated in EPA's Biopesticide and Pollution Prevention Division[1]. A newer form of biotechnology based biopesticides is RNAi technology.

How can this technology be used?

The term RNAi stands for RNA interference because it interferes or silences processes such as protein synthesis. Without certain proteins, pests may not develop, certain processes cannot continue and so the process or the organism fails to



function or reproduce. There are many potential applications of this technology such as controlling insects, diseases and nematodes, insect transmitted diseases and reversing pesticide resistance. Just like one's genetic makeup, this technology is highly specific. One of the newer approaches to RNAi based technology has been delivery of dsRNA through feeding insects. IR-4 first met with EPA about RNAi technology in 2008 with a company called Beeologics which developed the dsRNA of Israeli Acute Paralysis Virus of honeybees. This technology was more closely aligned with the FDA regulatory framework and was partnered with IR-4's sister program IR-7.

How does it work?

RNAi is the name of the process but it is double stranded RNA that does the work. All plants and animals contain RNA which is part of the genetic system which serves several functions depending on the life stage. RNA is normally single stranded, not double stranded. One of the main functions of RNA is in protein synthesis which involves several steps. A single strand of messenger RNA (mRNA) is made off of the template provided by DNA. The mRNA then causes amino acids to form chains in the exact order to produce a certain protein. RNAi interferes between these two processes by interfering with or cutting up the target mRNA (see graphic for further details). The result is that the proteins are not formed and unmodified genes are only interfered with or silenced.

While most current biotechnological traits involve incorporating specific genetic material into the plants genome, some RNAi based technology can be incorporated into plants or sprayed onto plants and it does not modify the plant genome itself. RNAi is also referred to as double stranded RNA (dsRNA) technology since the interference is actually initiated due to the presence of dsRNA and it is the dsRNA that is applied or functions. This is achieved through the application of double stranded RNA. Although the technology is new, humans consume RNA every time they eat a plant.

Other biotechnology efforts.

IR-4's biopesticide program has already successfully assisted in the registration of HoneySweet Plum, a USDA discovery which utilized a viral coat protein for resistance to plum pox virus. For several years Hawaii has been growing papayas which are resistant to papaya ringspot virus. The University of Florida has developed a similar technology incorporating resistance into papaya varieties suited to growing in Florida. In both of these cases there are simply no pesticides available that can be sprayed on plants to control viruses.

Actually, IR4's history of involvement of biotechnology goes back to 1999 with some initial development of biotechnology based weed management in vegetables. Some of the newer areas of biotechnology projects very recently initiated involve disease management in tree nuts and ornamentals. Most biotechnology traits have been delivered through transformation via Agrobacterium, selection of transformed cells and regeneration through tissue culture. A newer technology being assisted by IR-4 involves the delivery of traits through the priming of seeds. The current focus is for management of Fusarium crown rot on tomato in cooperation with Morflora's TraitUP technology[2].

How is RNAi technology regulated by EPA?

EPA's Biopesticide and Pollution Prevention Division has a long history of regulating transgenic crops that are Plant Incorporated Protectants. EPA does not have an existing set of regulations for RNAi technology, but they are in the process of being formed. EPA recently held a Science Advisory Meeting to discuss the formation of regulations for RNAi technology. The regulations are likely to be similar to those currently used for Plant Incorporated Protectants (Genetically Modified Crops). There may be greater emphasis on environmental fate since some are sprayed onto plants or may be mobile within insects or other organisms although data indicates that RNA is rapidly degraded. RNAi technology regulation may be based on the way in which they are delivered and their intended activity and specificity. Overall human health impacts from insect or plant disease organism-targeted dsRNA is of less concern in humans due to RNA specificity and enzymes in our blood and stomach which rapidly degrade RNA.

[1]EPA history of regulation for genetically modified crops. www.epa.gov/pesticides/biopesticides/pips/index.htm

[2]MorFlora Agro www.morflora.com//userfiles/file/Morflora-Wins-Agrow-Awards.pdf

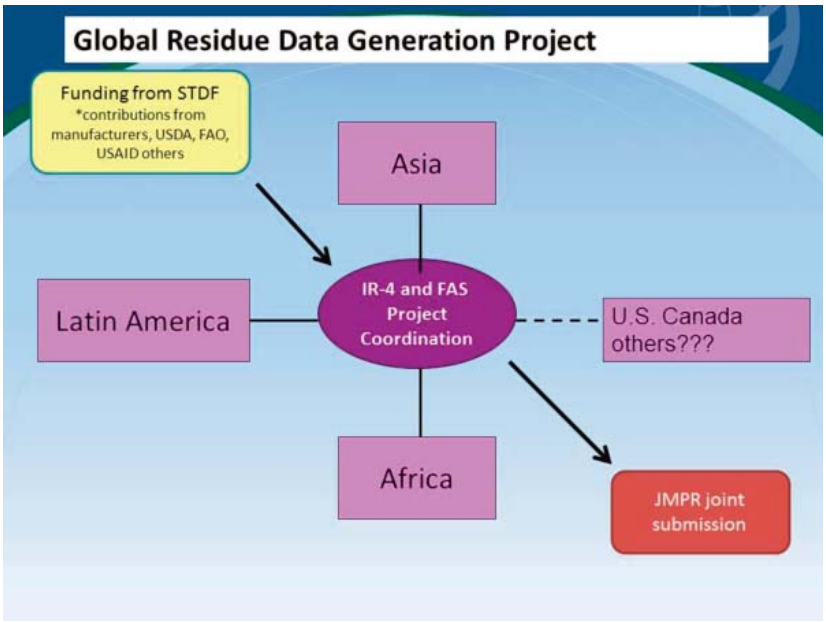
Global Capacity Development, F

—by Dan Kunkel, Michael Braverman, Edith

IR-4 involvement in international harmonization of pesticide residues continues to expand as these needs are consistently communicated by our stakeholders. The 2014 Farm Bill states that IR-4 should "assist in removing trade barriers caused by residues of pesticides registered for minor agricultural use and for use on domestically grown specialty crops". This recommendation was also noted by several stakeholders in the recent IR-4 strategic plan survey. The needs of U.S. specialty crop growers are better served with resolving international MRL trade barriers as well as our traditional task of establishing U.S. tolerences.

There are great opportunities for partnerships by working with other publically funded global minor use programs. Working cooperatively, IR-4 can leverage other countries' contributions of research data to better harmonize pesticide standards, thus providing more opportunity for U.S. specialty crop growers to export their produce. For example, IR-4 has been working in cooperation with Canada for 15 years on a number of projects that have led to tolerances for both countries. The cooperation saves IR-4 an estimated $500,000 per year, which allows funding for other U.S. grower priorities. IR-4 has also initiated formal partnerships with New Zealand, Brazil and Costa Rica. These cooperative research programs will benefit US growers in a similar way as the partnership with Canada. Specialty crops are also very important to Asia, Africa and Latin America. IR-4 is working with these countries and hope this collaboration will provide valuable partnerships in contributing data to solve minor use issues.

A key action item identified at the first Global Minor Use Summit in 2007, was to support greater capacity development in areas of need. This included the promotion of lower risk pesticides, along with increased coordination and cooperation to assist developing countries in generating pesticide residue data. Over the course of the five years that followed the first summit, the USDA took the lead and provided resources for a number of meetings and workshops to increase communication and coordination within the three regions of Asia, Africa and Latin America. The second Minor Use Summit further endorsed this work and at approximately the same time (March 2012), specific grants were secured to initiate further training modules and residue studies in these regions. The residue projects chosen focused specifically on newer reduced risk products (azoxystrobin, spinetoram, and pyriproxyfen) on tropical fruits as a crop group, especially the inedible peel CODEX subgroup 6B.



These products are also important to the United States because IR-4 had helped secure access to these products on tropical fruits, largely by using extrapolation from existing data on other crops such as pome, stone and citrus fruits that precluded data to support Codex Maximum Residue Limits (MRLs).

The final expectation for these global projects would be to help generate data that could be submitted to the Joint Meeting on Pesticide Residues (JMPR) and ultimately establish Codex MRLs.

The objective of these projects is to enhance the capacity of participating nations in Asia, Africa and Latin America to meet pesticide-related requirements. Based on international (Codex) standards, this cooperation will also increase opportunities for international trade of U.S. grown specialty crop exports.

All three of the regions

The Standards Development (STDF) is a gl partnership th developing co building their implement int sanitary and p (SPS) standard guidelines and recommendat means to impr human, anima health status a gain or mainta markets.

Residue Data Generation Project

Lurvey, IR-4, and Jason Sandahl, USDA-FAS

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participating in this project have now received funding from Standards Trade Development Facility (STDF) and USDA Foreign Agriculture Service (USDA-FAS), which also provides support for IR-4's contributions to each of the projects. This objective is being achieved by collaborative residue data generation that incorporates all technical aspects of these studies. This work will further develop expertise in these nations to conduct field and laboratory pesticide residue studies under Good Laboratory Practices and support their ability to provide data to local authorities and Codex for product registrations, particularly on lower risk products. Work in the three regions is progressing and is in various stages, with the commitment to start making submissions to JMPR in 2015.

Regional updates.

Each region has received funding to support three years of work. The first year covers training for conducting GLP field trials, establishing committees to provide administrative and technical support, as well as the responsibility for making project selections. The second year encompasses the initiation of the studies with actual GLP field trials and analytical work. In the final year, data would be collated into reports. At the end of the three year grant period, submissions would be made to the JMPR and local regulatory authorities. Thus far, training has involved nearly 200 field scientists and nearly 100 chemists.

The first region to start work was the Association of South East Asian Nations (ASEAN). Training workshops were held in a number of different countries in the preceding years and in May 2012, the first field treatments were made in Malaysia involving pyriproxyfen on mango. This study was performed in cooperation with Singapore who conducted the laboratory analysis. By January 2013, the second study was initiated in Thailand for spinetoram on mango. Other studies will start soon and include pyriproxyfen on papaya in the Philippines and a pre-mix of azoxystrobin and difenconazole on dragon fruit. An additional study in Thailand will involve spinetoram on longan or lychee. In addition to field training, laboratory workshops on GLP method validation have been conducted in Malaysia, Singapore, and Thailand. For those studies in progress, some samples are already being analyzed for residues, and it is anticipated that by December of 2015, several reports will be ready for submission to JMPR.

In Africa and Latin America, extensive GLP training has taken place and the appropriate committees have been established. They have also selected projects and are in the process of initiating studies with field trial applications planned in the coming months. It is expected that the Latin American project will have the first applications of pyriproxyfen scheduled for bananas in Costa Rica late this winter, pineapples in Panama this spring and avocados in

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List of IR-4 and other US participants

ASEAN
Michael Braverman, IR-4
Elizabeth Culbert, IR-4
WA State Lab.
Wayne Jiang, IR-4 MSU lab.
Jason Sandahl, USDA-FAS
David Grist, USDA-FAS
Elizabeth Johnson, USDA-FAS
Miguel Gonzalez, USDA-FAS
Caitrin Martin, USDA-FAS

AFRICA
Michael Braverman, IR-4
Joe Defrancesco, IR-4
field training
Dan Kunkel, IR-4
Debra Edwards, consultant
coordination of
administrative and
technical committees
Jason Sandahl, USDA-FAS
David Grist, USDA-FAS
Elizabeth Johnson, USDA-FA

Latin America
Edith Lurvey, IR-4
Dan Kunkel, IR-4
Debra Edwards, consultant
coordination of
administrative and
technical committees
Amy Wang, consultant - field
Milena Ramirez,
consultant - Lab
Jason Sandahl, USDA-FAS
David Grist, USDA-FAS
Elizabeth Johnson, USDA-FAS

Attractive Toxic Sugar Baits for Vector Control

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

What do mosquitoes eat? If you've been bitten recently by a mosquito, the answer seems obvious – they feed on us! But when we realize that only female mosquitoes take blood meals, and only a few times during their lives, it looks like the answer must be wider. In fact, feeding behavior by mosquitoes is relatively complex, and recent work on this topic is beginning to point toward a range of potentially useful new mosquito control strategies. In particular, the concept of mixing feeding attractants with sugar and a pesticide is reaching maturity, and attractive toxic sugar bait (ATSB) products are now beginning to enter the vector control market, both in the U.S. and globally. IR-4 is working closely with inventors, product developers, and regulators to help bring these new tools to households and organized vector control programs.

Culex mosquitoes feeding on flower nectar

ATSB works by exploiting the "sweet tooth" of adult mosquitoes, which feed often on plant sugars to satisfy their energy needs. Very soon after emerging from their pupal cases, both male and female mosquitoes seek sugar, and they continue to feed frequently on plant nectars and other sugar sources for the rest of their lives (see Foster & Hancock 1994 ncbi.nlm.nih.gov/pubmed/8965081). This observation led to several novel experimental approaches to mosquito surveillance and control, including sugar baits used to distribute biopesticides (*Bacillus sphaericus*) to oviposition sites, and sugar-baited traps. The most productive results were from Yosef Schlein, Rue-De Xue, and Gunter Muller, who sprayed mixtures of sugar and food dye, both with and without a gut toxin (boric acid), on flowering plants and then counted the local mosquitoes. The dyes were visible in the guts of mosquitoes exposed to both toxic and non-toxic sugar solutions, but the really exciting observation was a rapid and prolonged crash in populations where boric acid was included with the sugar.

While it was encouraging that mosquitoes could be killed with toxic sugar baits, it was impractical to rely on flowering plants for attracting the mosquitoes, as flowers may not occur when and where mosquito control is needed. Therefore, these researchers began to look for the cues that bring sugar-seeking mosquitoes to plants, with the hope that effective and stable attractants could be added to the sugar and toxicant, resulting in effective attract-and-kill products. Flowers were the first targets, as mosquitoes had been seen eating floral nectars, but it soon became clear that some tropical fruits, wine, brown sugar, and mixtures of these were all effective, and potentially much more effective mosquito attractants than flowers.

While many of the most effective fruit-based attractants spoiled rapidly, this team eventually discovered and patented a shelf-stable attractant, and the stage was set for product development. In the last three years, a use patent for the concept has been issued in the U.S. and other countries, an ATSB station was registered with EPA, and a 25(b) foliar spray product based on microencapsulated garlic oil has been launched for both the house-

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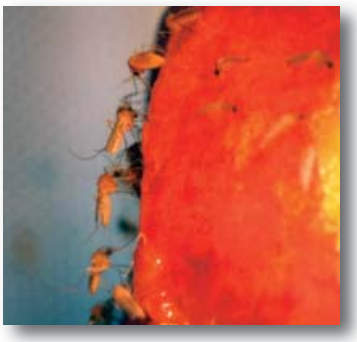

Over-ripe nectarine attracts sugar-seeking Culex mosquito

Attractive toxic sugar bait sprayed on vegetation, with male Anopheles (malaria mosquito)

Mosquitoes after eating dyed sugar bait

AmericanHort Formally Launched January 1

National Trade Association to Serve Horticulture Industry

AmericanHort, the horticulture industry's new trade association, formally began with the consolidation on December 31, 2013 of the Nursery & Landscape Association and OFA – The Association of Horticulture Professionals. The more than two-year effort to bring the groups together was initiated by the volunteer leadership of the legacy organizations in order to better meet the needs of the industry and the respective memberships.

The mission of AmericanHort is to unite, promote, and advance the industry through advocacy, collaboration, connectivity, education, market development and research. The vision developed by the new board of directors is to be a leading and unifying organization for the horticulture industry in order to cultivate successful businesses, and for the industry to enhance lives through the benefits of plants.

The new organization will represent the whole of the plant industry, including breeders, greenhouse and nursery growers, garden center retailers, distributors, interior and exterior landscapers, florists, students, educators, researchers, manufacturers, and all of those who are part of the industry supply chain. AmericanHort will have its primary office in Columbus, Ohio, and an office in Washington, DC to facilitate government relations and research activities, including the management of the Horticultural Research Institute. AmericanHort will also continue to manage America in Bloom, the industry's community beautification initiative.

AmericanHort's Regulatory & Legislative Affairs Director, Joe Bischoff will represent the organization as a new member on the IR-4 Commodity Liaison Committee. He stated, "For over 35 years, IR-4 has been a trusted partner serving the American horticulture industry by bringing needed treatments to nursery and floriculture growers who would otherwise not have access to them. With the formation of AmericanHort we look forward to broadening our collaboration with IR-4 and, together, finding new and more efficient ways to address our industry's plant pest and disease concerns."

IR-4 welcomes Joe and wishes AmericanHort all the best in its new venture.

Welcome New CLC Members

IR-4 welcomes new Commodity Liaison Committee Members

Joe Bischoff
AmericanHort

Maximillian Merrill and
Dennis Nuxoll
Western Growers Association

Terry Humfeld
Cranberry Institute

Paul Schlegel
American Farm Bureau

The IR-4 Newsletter Vol 45 No. 1

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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 Federline** 352.392.1978 x 424.
Commodity Liaison Committee member, **Mike Bledsoe,** 407-493-3933 of Village Farms.

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
Research Analyst, **Kathryn Homa** x 4604

Global Studies

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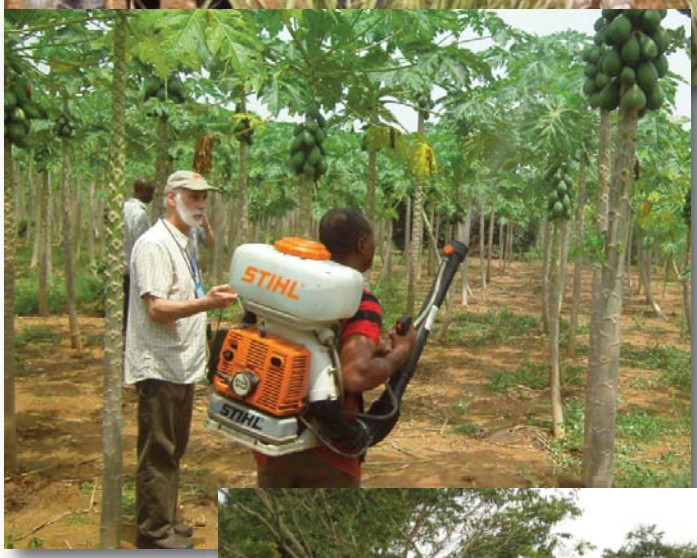
Peru will start in May. Additional field and lab training will be associated with each of these events, and should allow the lab analysis to follow shortly after samples are harvested from these studies. The other Latin American countries conducting studies are Colombia, Guatemala and Bolivia. Studies expected in Africa will include work primarily with bananas, papaya, pineapple, passion fruit, guava, date and palm. Countries include Ghana, Senegal, Kenya, Tanzania and Uganda. These studies should begin later in 2014. Other studies will be initiated in Morocco, and Egypt, but are not part of the STDF grants.

It is also important to note that some of the regions are conducting similar studiessuch as spinetoram on bananas in Uganda, and Bolivia. Hopefully when these studies are complete it will further support IR-4's work to collate global data sets to help ease regional data requirements, while still providing a robust regulatory data package.

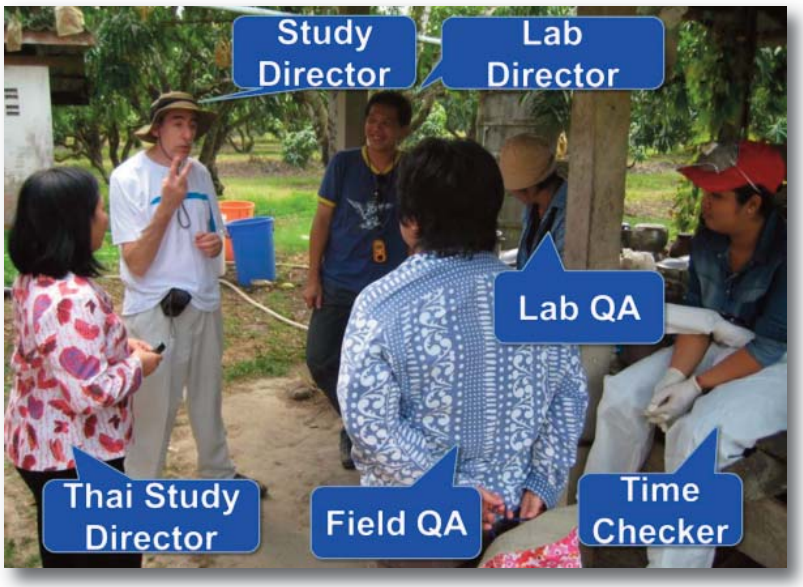
It is IR-4's vision, that at the end of these capacity building projects, there will be a global network of capable minor use programs that can partner, when appropriate, with IR-4 to address domestic and international grower needs.

Setting up pineapple trials in Ghana, Michael Braverman explains plot layout.



Joe Defrancesco providing training during a workshop in Ghana, 2014.

Harvesting pineapples in Panama.



Michael Braverman providing some final tips before the mango trial started in Thailand

Multi-country group live GLP training, Thailand & 9 other ASEAN countries, January of 2013

Baits

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hold and organized vector control market.

The potential for this "new paradigm" in vector control seems very promising. Not only has data been presented on efficacy vs. all major genera of disease vector and nuisance mosquitoes in the U.S., but field trials in Mali have shown promise against the major malaria vector mosquitoes, and preliminary work shows potential vs. sand flies. Since the mosquitoes come to the ATSB and eat the product, proponents expect minimal impact to non-target species, as most respond to different attractants. In particular, recent data has shown that honey bees and other pollinators ingest very little of the sugar bait, apparently because of their reliance on visual rather than olfactory cues for finding food.

Wall-hung ATSB station in Mali

The IR-4 Public Health Pesticides Program has worked over the last year with ATSB developers to help ensure that their U.S. activities meet regulatory requirements. We are also exploring with them some additional ways to turn mosquitoes' taste for sugar into effective vector control tools.

FDA to Revise Parts of Food Safety Act

—by Lee Dean, Editorial Director Vegetable Grower News

Reprinted with permission February 2014, Volume 48 Number 2

FDA will draft what it calls "significant" revisions to part of the Food Safety Modernization Act (FSMA), and launch an additional comment period for those revisions next summer. Michael Taylor, FDA deputy commissioner for foods and veterinary medicine, said Dec. 19 that the agency was reacting to comments from the produce industry during meetings across the country and as part of the official comment period for two of the FSMA rules first published in January 2013, covering fresh produce safety and preventive controls for eliminating pathogens.

"Based on our discussions with farmers, the research community and other input we have received, we have learned a great deal, and our thinking has evolved. Everyone shares the goal of ensuring produce safety, but, as we said at the beginning of the process, the new safety standards must be flexible enough to accommodate reasonably the great diversity of the produce sector, and they must be practical to implement," Taylor said.

FDA will go back to the drawing board and make what it calls "significant changes" in these areas:

- Water quality standards and testing
- Standards for using raw manure and compost
- Provisions affecting mixed-use facilities
- Procedures for withdrawing the qualified exemption for certain farms

"We have heard the concern that these provisions, as proposed, would not fully achieve our goal of implementing the law in a way that improves public health protections while minimizing undue burdens on farmers and other food producers," Taylor said.

> "It is critical that FDA gets these FSMA rules right, and we believe this is a step in the right direction."
> — David Gombas, United Fresh Produce Association

FDA said it plans to publish the revised proposed rule changes in "early summer" 2014. The agency will seek additional comments only on the portions of the proposed rules that have been revised, citing the court order that requires FSMA to be finalized by 2015.

"There may be other revisions to the proposed rules; the scope of the revised proposals, on which we will seek further comment, will be determined after we complete our initial review of written comments. We believe that this additional step to seek further input on revised sections of the proposed rules that need significant adjustment is critical to fulfilling our continuing commitment to getting these rules right," Taylor said.

Produce organizations hailed FDA's decision to redraft some of the FSMA provisions.

"PMA is commending FDA for listening to and acknowledging significant concerns raised by produce stakeholders about the proposals issued in January 2013," said Meg Miller, director of public relations for the Produce Marketing Association. "FDA is taking steps to provide stakeholders with a new opportunity to review and provide comment on revised proposed produce and preventive control rule provisions that raised significant concern in the produce community."

David Gombas, senior vice president of food safety and technology for the United Fresh Produce Association, also praised the FDA action.

"We are encouraged that FDA took seriously the extensive input they received from produce farmers and others in the agricultural sector with respect to the proposed Produce Safety and Preventive Controls rules," Gombas said. "We appreciate FDA's willingness to rethink these provisions and propose requirements that are more science- and risk- based. It is critical that FDA gets these FSMA rules right, and we believe this is a step in the right direction."

IR-4 Successes Nov. 2013 - Jan. 2014

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: Nov 1, 2013
Fomesafen
Trade Name: Reflex
Crops: Lima bean (succulent), Cantaloupe, Cucumber, Pea (succulent), Pumpkin, Soybean (succulent), Squash (summer and winter), Watermelon
PR#: 06202, 09536, 09537, 08083, 09115, 10287, 09538, 08945, 09689

Federal Register: Nov 8, 2013
Boscalid
Trade Name: Endura, Pristine
Crops: Globe artichoke, Low growing berry except cranberry subgroup 13-07G, Bushberry subgroup 13-07B, Caneberry subgroup 13-07A, Belgian endive, Bulb vegetable subgroup 3-07, Citrus fruit group 10-10, Pome fruit group 11-10, Small vine-climbing fruit except fuzzy kiwifruit subgroup 13-07F, Fruiting vegetable group 8-10, Oilseed group 20, Persimmon, Turnip greens
PR#: 09689, 10565, 10563, 10562, A8662, 10560, 10566, 10567, 10564, 10561, 10568, 09093, 09423

Federal Register: Nov 15, 2013
Tebuconazole
Trade Name: Folicur
Crops: Barley, Cucurbit vegetable group 9, Fruiting vegetable group 10
PR#: A6513, A5091, 10960

Federal Register: Nov 20, 2013
Fenpropathrin
Trade Name: Danitol
Crops: Barley, Low growing berry subgroup 13-07G, Bushberry subgroup 13-07B, Citrus fruit group 10-10, Pome fruit group 11-10, Small vine-climbing fruit except fuzzy kiwifruit subgroup 13-07F, Fruiting vegetable group 8-10
PR#: 07667, 11035, 11033, 11031, 11032, 11034, 11030

Federal Register: Nov 27, 2013
Etofenprox
Trade Name: Not applicable—public health uses
Crops: All food and feed commodities (indirect or inadvertent residues from non-agricultural applications)
PR#: B10315

Federal Register: Nov 27, 2013
Metaldehyde
Trade Name: Deadline
Crops: Grass (grown for seed), Leaf petioles subgroup 4B, Mint, Taro (wetland), Corn (field and sweet), Soybean (regional registration only), Caneberry subgroup 13-07A, Bushberry subgroup 13-07B, Low growing berry subgroup 13-07G
PR#: 06267, 09421, 09611, 07574, 09655, A9821, 10778, 10779, 10780

Federal Register: Dec 11, 2013
Flonicamid
Trade Name: Beleaf
Crops: Alfalfa, Fruiting vegetable group 8-10, Pome fruit group 11-10, Stone fruit group 12-12, Mint
PR#: 09943, 11196, 11197, 11198, 09358

Federal Register: Dec 20, 2013
Mandipropamid
Trade Name: Revus
Crops: Basil, Snap bean, Ginseng, Small vine-climbing fruit except fuzzy kiwifruit subgroup 13-07F, Bulb onion subgroup 3-07A, Green onion subgroup 3-07B, Fruiting vegetable group 8-10
PR#: 10124, 10324, 10061, 11192, 11193, 11194, 10485

Federal Register: Dec 27, 2013
Indoxacarb
Trade Name: Avaunt, Steward
Crops: Bean (dry and succulent), Cowpea (forage and hay), Low growing berry except strawberry subgroup 13-07H, Small vine-climbing fruit except fuzzy kiwifruit subgroup 13-07F
PR#: 09969, 08574, 10340, 10339

No new tolerances from IR-4 submissions were established in January.

Retirement

IR-4 wishes to thank Monte Johnson and wish him much success in his retirement from USDA-NIFA this past December.

Monte provided national leadership for state and federal activities aimed at developing a greater understanding of the toxicological consequences of human exposure to pesticides and the effects of pesticide residues in foods and the environment. He provided administrative oversight and national leadership for IR-4 since 2005.

Events

Save the Dates

Boxwood Blight Summit
ARS Building 3
May 13
Beltsville, MD
Contact: Cristi Palmer
palmer@aesop.rutgers.edu

American Boxwood Society Symposium
May 13-16
College Park, MD
Contact: Cristi Palmer
palmer@aesop.rutgers.edu

IUPAC Conference
August 10-14, 2014
San Francisco, CA

2014 Food Use & Biopesticide Workshops
September 9-10, 2014
The JW Marriott
Atlanta Buckhead, 3300 Lenox Road NE,
Atlanta, GA 30326-1333
Contact: Van Starner
starner@aesop.rutgers,edu

8th International IPM Symposium
March 23–26, 2015
Salt Lake City Utah

XXV International Congress of Entomology
September 25-30, 2016
Orlando, Florida

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

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