

THE IR-4 PROJECT

HELPING
PEOPLE

PEST MANAGEMENT SOLUTIONS FOR SPECIALTY CROPS
AND SPECIALTY USES



YEAR END SUMMARY 2016

Dear Friends,

For the past 10 years, IR-4 has been publishing the IR-4 Year End Summary (YES document) to highlight the accomplishments of the past calendar year. This year's theme is "Helping People".

It is very clear how IR-4 helps the specialty crop community; IR-4 facilitates regulatory clearance and registrations of needed pest management technology for specialty crop farmers and growers to help them manage destructive pests. What is not fully evident is the other value-added activities and deliverables of IR-4 that help people. We hope, through reading the following stories, you will have a better understanding that IR-4 does more than register pesticides.

Let's start with the most identifiable IR-4 deliverable, new tolerances supporting new food crop registrations. In 2016, IR-4 data from over 50 residue studies were submitted to EPA. Based on EPA's approval, registrants can add 1000 new registrations to their products. This success ranked 2016 as one of the most productive years in IR-4 history. Future productivity looks promising as IR-4 submitted to EPA 30 new tolerance petitions.

IR-4's Ornamental Horticulture Program continues to develop data to support new uses that are important to the nursery/floriculture industries. Similarly, IR-4's Biopesticide & Organic Support Program supports new registrations of biopesticides for organic and conventional production systems. Examples of achievement from these programs include:

- EPA approved the registration of Orkestra™ Intrinsic® Fungicide (fluxapyroxad + pyraclostrobin) for greenhouse and nursery growers as well as landscape, forestry, interiorscape and other use sites. IR-4 started efficacy and crop safety studies in 2014, and our data contributed to 532 new crop uses.
- In addition to the approval of *Aspergillus flavus* (see pg 4), IR-4's efforts supported EPA approval of LifeGard™ by Certis USA containing *Bacillus mycooides* isolate J (BmJ) to manage *Cercospora* leaf spot of sugar beets, powdery mildew on cantaloupe and pecan scab

IR-4's Public Health Pesticide Program was part of a US effort to curb the spread of the Zika Virus by managing the mosquitoes that transmit the disease. Containing Zika remains an important objective within many countries. This effort highlighted the importance of biological and chemical pesticides in mosquito management.

IR-4's sustained success and expertise in its core mission has allowed the Project to serve in leadership roles in several areas that help others. Examples include IR-4's leadership with the domestic and international expansion and enhancement of crop groups. Crop grouping is an important tool in domestic and international harmonization of regulatory standards that allows for efficiencies in data development and data review. In 2016, EPA approved several modified crop groups. Additionally, the Codex Committee of Pesticide Registration moved an IR-4 developed proposal for reworking all vegetable types crop groups to the final stages of adopting crop groups in the approval process.

Additionally, IR-4 led a team of multi-discipline/multi-institution researchers who received approximately \$6.5 million from USDA's Specialty Crop Research Initiative, to address pollinator protection within the ornamental horticulture industry.

Finally, USDA-Foreign Agriculture Service supports IR-4's leadership of international harmonization of pesticide regulations/registrations to enhance exports and increase efficiencies. Activities include cooperative research with trading partners, capacity development activities in Asia, Africa and Latin America, and repurposing data through international submissions.

IR-4's work is designed with a single goal in mind: helping people. IR-4 helps growers have the pest management tools they need to produce high quality vegetables, fruits, nuts, herbs, nursery crops, flowers, and other horticulture crops. These tools enable them to provide quality food that is an important component of a healthy diet, and plants that enhance landscapes. It is IR-4's aspiration that the specialty crop industry be profitable, able to sustain farming and other components of the food chain, and provide consumers with affordable specialty crops throughout the year.

The budget challenges for IR-4's core activities continue to tighten. IR-4 has barely been able to maintain its ability to help people due to seven years of reduced funding, while expenses continue to escalate. This raises serious concerns that IR-4's ability to help farmers, growers and others may diminish. The productive and efficient IR-4 agriculture research infrastructure is being threatened by this fiscal neglect. IR-4's ability to respond rapidly to food security threats is compromised. It is hoped that through the collective efforts of the IR-4 Commodity Liaison Committee, Minor Crop Farmers Alliance and other stakeholders, that the new Congress and Administration will hear the message that IR-4 needs additional funds now.

I want to again thank all the dedicated employees of IR-4 who have ensured that the work gets done properly and promptly. We also thank the many friends of IR-4 who support the Project and its mission of helping people.

All the best – Jerry

Helping Growers Get What They Need

As the Rolling Stones song goes, “you can’t always get what you want but (hopefully) if you try sometimes, well you might find, you get what you need”. IR-4 works hard to help fill the grower’s pest control toolbox and in 2016, IR-4 had another year with 1,000 new uses approved by EPA. Each successful new use is the culmination of over 5 years of work that relies on the efforts of many people, including the scientists and staff of the IR-4 network, the cooperating registrants, and partners at EPA and other regulatory agencies.

While this large number of new uses was based on only 50 IR-4 residue studies (on 19 products) it translates to a big boost in the grower toolbox. This multi-year process appears to start with the IR-4 Food Use Workshop; however, before the Workshop EPA provides “green light/red light” recommendations for IR-4’s workshop candidate projects. Since 2008, EPA has been providing these recommendations in an effort to target those compounds (projects) that are most likely to be successful at passing the required EPA risk assessment. The bottom line is that IR-4 and EPA do not want to spend precious resources on pest control solutions that may not be registerable, and therefore selection of the best projects allows both IR-4 and EPA to be more successful in helping growers with new tools.

Making submissions to EPA electronically is smart too! In 2015, IR-4 began making all submissions to EPA through their electronic portal. This change enables EPA to process and review IR-4 submissions more efficiently and supports smoother work with their review partners, such as the Pest Management Regulatory Agency in Canada.

Crop grouping also plays a major role in IR-4’s success. One example from 2016 is the first Tropical Crop sub group (24B) tolerance to be approved for any compound, which in this case was the insecticide SIVANTO® (flupyradifurone). IR-4 and Bayer carried out studies on pomegranate and avocado, respectively, which supported 40 additional crops such as mango and banana that can now be added to the SIVANTO label, helping the growers with another tool in their toolbox.

IR-4 also works closely with California Department of Pesticide Regulation (CAL DPR). For crops of interest to California growers, the residue submission package is provided to CAL DPR, and they review the package concurrently with EPA. This enables CA to review requests for state labels more expeditiously, as they have already reviewed the chemical-crop combination. In 2016, CAL DPR provided the review for the many new carfentrazone-ethyl (AIM) uses such as asparagus and artichoke as well as the many updates of crop groups to help growers.

“The dedicated individuals representing the IR-4 Project have delivered many tools that our industry needs in order to provide consumers safe, healthy and nutritious products, at an affordable price. A new administration will bring with it challenges, but also opportunities as we see new leaders at the EPA and USDA. Now more than ever, our stakeholders need the good work that the IR-4 Project does to continue to be the voice on behalf of all the specialty crop producers that feed the country and, in many cases, the world.”

—Mark Arney, CEO,
National Watermelon Promotion Board



*Fiesta grapes for dried-on-vine raisins
Selma, CA*

IR-4 provides new tools for the grower toolbox, and does this most effectively by forming strong partnerships with regulatory agencies for everything from guiding selection of our projects, to establishing tolerances and receiving labels. Of the 150+ new tolerances established in 2016, nearly 80 were crop group tolerances, efficiently supporting registrations on numerous crops with each IR-4 submission.

"I can think of two important problems where IR-4 has been involved recently, helping growers.

On avocados: Florida avocado growers are facing a very complicated exotic disease



named laurel wilt introduced from Asia. The laurel wilt affects many species of trees from the Lauraceae

*family including various forest trees like the red bay, various swamp bays, sassafras and avocados. The disease is produced by a fungus (*R. lauricola*) transmitted by ambrosia beetles. A tool that has been helping growers to keep our groves alive has been the use of fungicide injections. IR-4 has been helping us to manage the fungus by doing studies on the fungicide Tilt®.*

*On papayas: growers have observed mealybug (*P. marginatus*) insecticide resistance developing in this pest; IR-4 is helping papaya and avocado growers by conducting residue and efficacy studies in various locations*



including Mexico, Puerto Rico and Florida to register acetamiprid to help manage resistance on this pest."

— Armando Monterroso
R&D Director at Brooks Tropicals, LLC

IR-4 and Bayer carried out studies on pomegranate and avocado, which supported additional crops such as mango and banana.



Helping People Solve a Toxic Problem with *Aspergillus flavus*

Once more the Biopesticide and Organic Support Program continues to help people by ensuring that aflatoxin, a known human carcinogen, is reduced or eliminated on commonly consumed crops. IR-4 research has supported the evaluation and registration of beneficial strains of *Aspergillus flavus* that displace toxic aflatoxin producing fungi in crop fields.



Ground rig prepared to distribute fungi to fight aflatoxin on corn. IR-4 has been involved in funding research and expanding registrations in corn and other crops. Aflatoxin is a potent liver carcinogen, so its management helps protect consumer health and increases profitability to farmers.

Beginning in 1997, the IR-4 Project funded Peter Cotty of USDA-ARS for a project that eventually resulted in the registration, by IR-4, of *Aspergillus flavus* AF36 on cotton and corn. Research continued in 2004, with Themis Michailides of the University of California's Kearny Field Station. His work contributed to the IR-4 registration of *Aspergillus flavus* AF36 on pistachio. IR-4 later (2013) obtained an Experimental Use Permit for *Aspergillus flavus* AF36 for use on commercial almond orchards. In 2016, Peter Cotty was again aided by IR-4 in the registration of *Aspergillus flavus* AF36 on figs and almonds under the trade name Prevail, and EPA granted a time-limited exemption from the tolerance for residues of the *Aspergillus flavus* AF36 in or on dried figs and almonds.

In 2016, IR-4 aided David Gibson, Executive Director of the Texas Corn Producers Board, by preparing the registration package, which resulted in an Experimental Use Permit on corn for the *Aspergillus flavus* strains TC16F, TC35C, TC38B, TC46G, under the trade name FourSure™. When applied to corn from the 5-leaf stage until start of tasseling, the *Aspergillus flavus* strains in FourSure compete with strains of *Aspergillus flavus* that produce large amounts of aflatoxin and, in doing so, considerably reduces the amount of these highly toxic aflatoxin producers that become associated with the crop.

The use and advancement of this technology continues to benefit the whole of society, and is helping people by promoting food safety and security.

Helping Growers Obtain Access to Global Markets

Helping growers means responding to the ever-changing data requirements for registration. With the continued opening of global markets, additional data requirements must be met. While IR-4 has always used the US guidelines for regulatory studies, several years ago it became evident that to meet data requirements typically required by EU, Codex or Canada, etc., IR-4 would need to increase the number of data sites. In some cases, IR-4 needs to provide different types of data such as processing studies, more decline studies, or additional metabolite analysis. In other cases, IR-4 needs to generate data solely for exporting commodities. For example, in 2016, IR-4 generated data on potassium phosphite and provided it to the tree nut growers, for the sole purpose of submitting the data to the EU to support US exports. While the product is exempt from the requirement of a tolerance in the US, there are maximum residue standards in the EU.

Fortunately, in 2016 IR-4 received a Technical Assistance for Specialty Crops (TASC) grant from the USDA-Foreign Agriculture Service to help pay for this additional work. While the primary work on each study will still be funded through USDA-NIFA, adding these additional sites, up front will preclude the need to go back later and generate additional data when export concerns arise. IR-4 is anticipating that the grant will support as many as 30 additional field trials in 2017, along with the analytical work associated with those trials. Crop studies such as caneberrries, pomegranate, and peas require additional field trials to meet international guidelines. IR-4 is using its expertise to meet these new requirements in order to help people export their crops and expand their markets.

Cooperation with Brazil



Since 2012, IR-4 and the Canadian Pest Management Centre (PMC) have had a Memorandum of Understanding with Brazil as a means to cooperate on projects of mutual interest. However, due to certain legislative issues, Brazil has not been able to participate in cooperative research projects with IR-4. This past November (2016) the IV Brazilian Workshop of Minor Crops was held where representatives from IR-4, PMC and the new EU Minor Use Coordinator shared perspectives on minor use programs and possible areas of cooperation. The need for legal pest control on specialty crops is great in Brazil. As outcomes from the workshop, it is anticipated that the new government there will provide stronger support for Minor Uses. This is another example of IR-4 helping people gain access to pest control solutions.

Helping Build Capacity with Global Agencies

Projects completed and reports submitted (by the Manufacturer [MFG]) to FAO/WHO Joint Meeting on Pesticide Review for 2017 review:

- Azoxystrobin + Difenconazole/dragon fruit with samples from Indonesia and Vietnam
- Spinetoram on lychee and mango from Thailand
- Spinetoram on avocado from Columbia

Projects completed and reports that will be submitted (by the MFG) to JMPR for 2018 review:

- Pyriproxyfen on Papaya from the Philippines, Malaysia and Brunei
- Pyriproxyfen on Mango from Malaysia and Singapore
- Pyriproxyfen on Pineapple from Panama
- Pyriproxyfen on Banana from Costa Rica and Guatemala

In total 7 projects were completed through the Standards and Trade Development Facility (STDF) capacity building project.

Several African countries began a sulfoxafor project on mango in 2016 and it should be completed by the end of 2017.



“The North American greenhouse vegetable industry has greatly developed in the last 25 years. The IR-4 Project is a shining example of an agency helping growers to meet the ever changing pest challenges in agriculture. Our industry is getting the tools it needs to meet these challenges, thanks to the IR-4 Project.”

—Michael E. Bledsoe, Ph.D.
Village Farms International
VP Food Safety and Regulatory Affairs

Helping Growers Produce High Quality Crops

IR-4 builds collaborations to research specific problems impacting US growers' ability to produce high quality plants economically so customers have a plentiful and varied supply of flowers, shrubs and trees for their landscapes. This collaborative network of ornamental horticulture researchers studies how to manage different diseases, insects, or weeds. Most of these researchers work on many different problems



Photo by Cristi Palmer

within their respective disciplines. IR-4 pools together these research results and provides this information as summaries to companies to create new labels and update current labels. This helps growers obtain new and varied tools to manage pests, weeds and diseases in their crops. This successful network has fostered the registration of numerous products for the green industry. One recent example is the 2016 EPA registration of Orkestra Intrinsic Fungicide (fluxapyroxad + pyraclostrobin) which manages many diseases including downy mildew, leaf spots, powdery mildew and rusts. Because this product contains two active ingredients from different Fungicide Resistance Action Committee (FRAC) groups, it can be used to prevent the onset of resistance development within a rotation program, ultimately preserving multiple tools for growers.

Helping Growers with Invasive Species

If you have been unlucky enough to have a tree care company take down a dying ash tree infested with Emerald Ash Borer or have a swarm of state investigators searching your property for Giant African Land Snail, invasive species have affected your life. Invasive species are organisms (insects, microbes, plants, animals, etc.) from other places in the world that can survive in a new environment and displace native species. In Florida alone, it is estimated that 2 new exotic species become established every month. Not all exotic species cause economic or ecosystem harm. However, many do. Since 2009, IR-4 has built research teams to study invasive insects and diseases and how growers can deal with them during plant production. These teams have researchers with varying expertise, from product screening and recommending what products can be used in the short term to genomics that look at population dynamics and answer questions about where these new organisms arose. We facilitated the following projects: mitigating pests during shipping, chrysanthemum white rust, boxwood blight, impatiens and other downy mildews. All of these projects screened tools to manage pests and diseases and developed basic biological information to best deploy those products during the crop cycle.

"The IR-4 staff has done a great job preparing research summaries for the conducted ornamental trials. I use those summaries in my extension program as they are a great source of information on nursery crop tolerance to herbicides."

—Jeffrey Derr
Professor of Weed Science, Virginia Tech

Helping People Protect Pollinators

Honeybee and bumblebee protection has gathered much attention in recent years. To explore ways the ornamental horticulture community can aid in providing suitable habitat for these and other bee pollinators, IR-4 developed a multi-disciplinary team to study how best to protect pollinators while growing healthy ornamental horticulture plants for enjoyment by the public. Two key questions include "are popular ornamental horticulture plants food sources for pollinators?" and "what are the risks to pollinators if systemic insecticides are used during production to deal with insect pests?" Our research team will answer these questions by screening the most popular annuals and perennials for their attractiveness to bees and determining the residues of systemic insecticides in model ornamental horticulture plants. We will also compare alternative pest management strategies, study how people select plants that may be beneficial to bees, and develop best management practices for growers and landscape managers to grow and maintain healthy plants, while fostering habitat for bees. The team members include academic and government researchers, research associates and students. Our team is unique because it combines researchers who focus on how to manage pests with researchers who study bee health and brings in research on consumer behavior (how and why people purchase plants) and grower adoption of new pest management strategies.



Photo by
Cristi Palmer

"The Ornamental Horticulture Program at IR-4 has been key in helping growers by ensuring safe and effective pest management tools for the green industry. IR-4's work contributes tremendously to the success of the greenhouse, nursery production, and landscape management industry!"

—Jill Calabro, Ph.D.
Science & Research Programs Director
AmericanHort/Horticultural Research Institute

Helping People Find Solutions for Arthropods that Transmit Disease

The spread of Zika virus brought wide attention in 2016 to vector-borne diseases and the arthropods that transmit them, and provided a dramatic reminder of how the IR-4 Public Health Pesticides (PHP) Program helps people. During the year IR-4 focused on keeping existing mosquito control tools in the toolbox in the face of new data requirements, providing information and decision support to researchers and vector control professionals, supporting development and registration of new vector control interventions, and developing a comparative efficacy trial for chemical tools to control *Aedes* mosquitoes.

Despite the clear need this year for vector control tools in the US and elsewhere, pesticides registered for mosquito control faced unprecedented challenges, with new risk assessments and data requirements challenging much of the chemical control toolbox. Cancellations moved ahead for temephos (larvicide), and resmethrin and allethrin (adulticides) at least partly in response to unaffordable data requirements, but IR-4 did help negotiate some extensions and still is working with registrants to possibly return temephos and allethrin to registration. New risk assessments for human health and endangered species put the organophosphate mosquitocides at risk as well, and IR-4 led efforts to refine data on droplet size and clarified drift and deposition models for these materials.

IR-4 has long maintained an on-line database for vector control materials and products, and this year saw a major expansion of this tool as an aide to decision makers. We identified larvicide options for drinking water in Hawaii and Puerto Rico and initiated EPA consultations to clarify needed labels. The IR-4 PHP Program also located mosquito control tools compatible with organic farms, initiated registration actions for aircraft disinsection with a foreign-registered product, defined options for indoor residual spraying vs. *Aedes aegypti*, and assisted USDA with tick control options in cattle transportation. In addition, IR-4 expanded collaboration with the US military to ensure that product data is easily available to military personnel, and began a joint effort to track product development efforts.

Support for new products is a primary mission for the PHP Program, and this year was active with work on lethal ovitraps and attractive toxic sugar baits (ATSB) leading to a major expansion of these products in the market, major field tests for efficacy, and formal review by the World Health Organization (WHO). Experimental work on *Wolbachia* bacteria as an endosymbiotic biocontrol agent was assisted by Experimental Use Permits that IR-4 helped develop. Finally, IR-4 staff helped WHO train vector control scientists from China, India, Malaysia, and Iran in Good Laboratory Practices (GLP) efforts as part of a global expansion of GLP facilities for vector control.

"Through their singular efforts, IR-4 continues to ensure that public health professionals will have the tools that they need to enhance the quality of life and protect the health of citizens."

—Stanton E. Cope, Ph.D.
Captain (Retired), United States Navy
President, American Mosquito Control Association



Western Region Researcher, Keri Skiles & IR-4 Public Health Pesticide Manager, Karl Malamud-Roam, set up a droplet sampler for measuring incidental deposition on crops from mosquito control sprays.

With the large public attention on Zika virus this year, IR-4 initiated planning for comparative efficacy trials. We have identified collaborators and developed protocols to evaluate the utility and possible synergy of existing and novel approaches to *Aedes* control.

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"IR-4 is an extremely important resource for the mushroom industry. The expertise of the staff helps to guide our growers toward effective pest control solutions. They provide a much needed link between growers, researchers, chemical registrants and EPA."

— Laura Phelps
Consultant, American Mushroom Institute