IR-4 Matters!

Annual Report 2014

The IR-4 Project
Pest Management Solutions for Specialty Crops and Minor Uses

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Dear Friends,

On behalf of the IR-4 Project Management Committee and the broad network of IR-4 research cooperators and personnel, attached, please find IR-4's 2014 Annual Report. In the pages of this Report you can read about the detailed activities and accomplishments we achieved during calendar year 2014.

IR-4 continues to facilitate tangible deliverables for its primary "customers" in all four program areas. Some highlights include:

Food Program

- EPA approved 51 new pesticide tolerances supporting 309 potential new use registrations.
- IR-4 scheduled 89 research studies, consisting of 467 field trials
- IR-4 submitted 43 petitions to EPA addressing 221 specific IR-4 requests for assistance. Additionally, IR-4 submitted one petition to EPA that proposed to add new crops to cucurbit vegetables crop group.
- In order to support labeling of new uses, 53 field trials were done for product performance and crop safety.

Ornamental Horticulture Program

- IR-4 data/submissions were used in 6 registrations and label amendments. This influenced the use of pesticides in about 1500 species on non-food crops.
- IR-4 conducted 685 research trials; of these 169 were efficacy trials designed to compare different products to manage pests.
- 22 new data summaries were compiled and submitted to industry. Data from 3,228 trials contributed to the writing of these reports.

Biopesticide and Organic Support Program

- EPA approved one new registration (Tobacco Mild Green Mosaic tobamovirus) and two registration expansions that support an additional 125 new uses of biopesticides.
- IR-4 submitted two registration packages to EPA, an amendment for Hops Beta acid to manage Varroa mites in honey bees and an expanded registration for the viral coat protein of papaya ringspot virus.
- IR-4 funded 3 Early Stage, 13 Advanced Stage and 7 Demonstration Stage grant proposals.
- In an effort to extend the open and transparent research priority selection process for biopesticide research, IR-4 held its first Biopesticide Workshop in September 2014. About 180 participants identified priorities for 2015 research.

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.

Public Health Pesticide Program

- IR-4 supported Experimental Use Permits for insecticides in autodissemination devices to control container breeding mosquitoes and sterile insect techniques involving differing strains of the endosymbiotic genus *Wolbachia*.
- IR-4 was engaged in supporting/modifying registrations for lethal ovitraps that target container-breeding mosquitoes, volatile materials which reduce biting pressure without needing skin-applied repellents, Attractive Toxic/Targeted Sugar Baits (ATSB), a new class of repellents and toxicants, including one new molecule with three times the repellency of DEET, and disseminating volatile repellents and that can be attached to the outside of clothing.
- IR-4 expanded and substantially revised the Public Health Pesticide database (http://ir4.rutgers.edu/PublicHealth/publichealthDB.cfm) that emphasizes the identification of underutilized chemicals with significant potential utility for organized vector control programs.

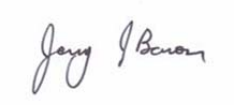
Another milestone in 2014 included IR-4 approving a new strategic plan that will serve as the roadmap the rest of this decade. The plan is called ***VISION 2020*** (see http://bit.ly/1zWpwI8). It is articulated in the plan that there are still significant pest management problems that challenge production of specialty crops. In many cases, IR-4 is the only option to facilitate approval of necessary pest management technology. The need for IR-4 is growing with new/invasive pests, pest resistance to pesticides, international harmonization of pesticides standards to support US exports and various regulatory decisions affecting products.

What IR-4 does matters to many; it has been documented that IR-4 efforts support over 104,000 jobs and add $7.2 billion to the gross domestic product[1]. These powerful economic drivers are only half the story. The other half involves food safety, food security and public wellbeing. IR-4 assists in the registration of the latest generation of reduced risk and lower risk pest management products. Many of these products are compatible with Integrated Pest Management systems, have little hazard or degrade rapidly after use. They allow farmers to maximize yields of quality fruits, vegetables and nuts; making products available to the public at an affordable price. With IR-4"s assistance, specialty crop growers provide the public a consistent supply of nutritious foods, essential to good health, as well as aid in the production of ornamentals that enhance the environment. Additionally, IR-4 helps provide tools to manage pests like mosquitoes, ticks and fleas that transmit diseases to humans. The bottom line, what IR-4 delivers to society is important and necessary.

Finally, let me acknowledge that I work and partner with some of the best qualified, committed and talented people. I thank my associates for their hard work and effort as well as thank all of IR-4's partners for their continued support! IR-4 is a very unique partnership organization that involves many working in cooperation to achieve important products that matters.

Please contact me at any time if you have questions about this document or need additional information about IR-4.

All the best,



[1] Miller, S and A. Leschewski. 2012. Economic Impact of the IR-4 Project and IR-4 Project Programs. Report by Michigan State University Center of Economic Analysis

ANNUAL REPORT OF THE IR-4 PROJECT (NRSP-4)
January 1, 2014 - December 31, 2014

*National Research Service Program No. 4 - Specialty Crop Pest Management

Background

The IR-4 Project was established by the Directors of the State Agricultural Experiment Stations (SAES) and the United States Department of Agriculture (USDA) in 1963 as a cooperative research program with the goal to support growers of fruits, vegetables, nuts herbs, and other small acreage specialty food crops by assisting with the registration of pesticides on these "minor crops". IR-4 conducts research to generate data that are mainly used to facilitate registration of synthetic chemical pesticides and biopesticides (microbial and biochemical products) and by the U.S. Environmental Protection Agency (EPA). IR-4's data are shared with federal/state agencies and institutions as well as industrial partners with the principal objective to provide farmers legal access to essential pest management products that protect specialty crops from destructive pests. Without safe and effective pest management products which have been approved by regulatory authorities, crops would suffer significant yield and quality losses.

The IR-4 Project was needed because the registrants of pesticides and biopesticides focus their product development efforts on large acreage crops (major crops such as corn, soybeans, wheat, etc.) where the potential sales are significant. Specialty crops are considered minor markets and the development of pest management technology for specialty crops are not usually the objective of the private sector. As a result, there are often many pest management voids in specialty crops and specialty use markets. This is called the "Minor Use Problem". IR-4 fills the void by developing the magnitude of the residue and/or product performance data needed by US Environmental Protection Agency (EPA), the crop protection industry and/or other regulatory authorities to allow registrations on the specialty crops.

The same minor use problem exists in other segments of agriculture. In 1977, IR-4 expanded its core objectives to include registration of pesticides for the protection of nursery/floral crops and Christmas trees. In 1982, IR-4's mission was enhanced to include support for lower risk microbial and biochemical pesticide products. In 2009, regulatory support for minor use pesticides that manage arthropod pests which transmit disease to humans was added as a fourth IR-4 Project objective. In all four IR-4 Project areas, national coordination, technical guidance and funding are provided to develop the appropriate data and/or support registrations. The Minor Use Problem is broad, affecting every state, every US territory and almost every country.

IR-4 has been successful; the research performed by the IR-4 Project has facilitated over 46,000 registrations of conventional pesticides and biopesticides for food and ornamental crops. Since most registrations of pest management products are national in scope, all states/territories benefit from the efforts of the IR-4 Project. Since 1995, IR-4 has given priority to facilitate registration of EPA defined "Reduced-Risk" chemicals and biopesticides to fill pest management voids. IR-4 also focuses its efforts on products that are compatible with Integrated Pest Management Systems (IPM).

IR-4 has achieved this success because it works in close cooperation with many groups and associations to accomplish its mission. Resources are leveraged to their fullest potential. Some of the major partners/cooperators include specialty crop growers/commodity organizations, the SAES, the crop protection industry, the USDA units (including Agriculture Research Service-ARS; Foreign Agriculture Service-FAS; National Institute of Food and Agriculture-NIFA; Animal and Plant Health Inspection Service-APHIS), EPA, the Department of Defense-Deployed Warfighter Protection Program (DWFP), California's Department of Pesticide Regulation (CA-DPR), Canada's Pest Management Regulatory Agency (PMRA) and the Pest Management Centre in Agriculture and Agri-Food Canada (CN-PMC). These and other Cooperating Agencies, principal leaders of the project, technical managers and IR-4 State and Federal Liaison Representatives are shown in Attachment 1.

Further details about the IR-4 Project can be found on the IR-4 Project's website: http://ir4.rutgers.edu.

Food Program

The IR-4 Project remains committed to its original objective to provide regulatory approval of safe and effective plant protection products to assist in the production of food crops and give specialty crop growers the tools they need to grow a healthy crop and be successful and competitive in local, regional, national and international markets.

Research Activities – Food Residue

Since 1963, IR-4 stakeholders have submitted 11,618 requests for assistance to the IR-4 Food Program. Of these, 371 are currently considered researchable projects that remain documented needs of specialty crop growers. The others have been addressed through previous research and regulatory submissions or cannot be registered at this time. In 2014, a total of 134 new project requests were submitted to IR-4 by various stakeholders. IR-4 staff added 84 requests to the IR-4 database to track the new crop group updates that will be bundled into future submissions to EPA. The total number of new requests added to the IR-4 tracking system during 2014 was 218 project requests.

IR-4's research priorities for 2014 were determined by IR-4 stakeholders during the September, 2013 IR-4 Food Use Workshop, in Albuquerque, NM. Based on the outcome of that workshop and other priority setting mechanisms, in 2014, IR-4 scheduled 65 new studies and 24 studies were carried over from the previous year for a total of 89 research projects. The research program consisted of 416 IR-4 (State/ARS) field trials and 51 trials from our Canadian (CN-PMC) partners for a grand total of 467 field trials. Canada also served as Sponsor and Study Director for 5 of these studies. The specific studies for 2014, including test chemical and crop, are shown in Attachment 2.

The majority of field trials are assigned to IR-4 or CN-PMC/Field Research Centers and sample analyses to the IR-4 Analytical Laboratories. When necessary, other cooperating facilities or contractors are utilized to ensure projects are completed in a timely manner. In most studies, the test chemical is applied in the field in a manner that simulates proposed grower use of the pesticide on the target crop. When the crop is at the appropriate stage, samples of the crop are collected and shipped to the analytical laboratory where the amount of test chemical remaining in or on the crop is determined. Field and laboratory data from this research are compiled in a regulatory package and submitted to the EPA to request a pesticide tolerance or maximum residue limit (MRL).

Research Activities - Efficacy and Crop Safety (E/CS)

The need for IR-4 to develop product performance and crop safety data to support labeling of new uses for specialty crop pest management tools continues to be an important priority in the IR-4 research plan, and in many cases the data is required by registrants prior to actively marketing the new uses. For 2014 IR-4 planned trials requiring $107,500 in funding to support E/CS trials in three research areas (for projects where these data are needed to support past residue research, but more E/CS data are needed before registration; supporting on-going residue research; and supporting projects to determine possible products to control pests where tools currently are not available [Pest Problem Without Solution, or "PPWS"]). This funding supported research to address needs for 18 projects, including 38 state university trials and an additional 10 trials by ARS. In addition, CN-PMC planned to conduct 5 E/CS trials (four on clomazone/cilantro, PR# 11092; and one on pyroxasulfone/edamame, PR# 11133). All these E/CS trials can be used to support new uses in the U.S. which will benefit specialty crop stakeholders (see Attachment 3 – "2014 Efficacy/Crop Safety (E/CS) Research Program" for full details).

Submissions and Success

In 2014, IR-4 submitted data to EPA or the cooperating registrant for 36 chemicals, in 43 different submissions addressing 221 specific IR-4 requests for assistance that were submitted by IR-4 stakeholders. Additionally, IR-4 submitted one petition to EPA that proposed to add new crops (cucurbit vegetables) to existing crop groups, as well as revise certain crop subgroups. Included in these pesticide submissions are packages that were submitted to cooperating registrants, where they submitted IR-4 data with their submissions or for label amendments, conditional registrations (data call-in), or to address registration review (re-registration) requirements to maintain the use of a product. This was a very productive year for IR-4 submissions, likely the highest on record. See Attachment 4 for a comprehensive listing of data submitted. It is expected that in the coming year the IR-4 accomplishments may reach new highs based on these submissions.

The IR-4 Food Use Program continues to work smarter and more efficiently to deliver new plant protection products for specialty crop growers. In 2014, IR-4 completed the transition to making all pesticide petition submissions to EPA electronically. This enables EPA to process and review the submissions more efficiently within EPA as well as with their review partners such as the PMRA in Canada. As well, nearly every submission includes an update to at least one of the new crop groups, to add even more uses to product labels and respond to new crop markets for growers.

IR-4 also submitted a large number of data packages to the Joint Meeting on Pesticide Residues (JMPR) in 2014 that will be used to establish Codex MRLs for US export commodities. These submissions included seven active ingredients with nearly 35 IR-4 data packages (commodities). These submissions can be viewed in Attachment 4A.

New uses resulting from IR-4 submissions were considerably lower in 2014, with only 309 new uses from 51 EPA established tolerances. However, these lower numbers are likely due to the normal ebb and flow of reviews at EPA, the five year average for IR-4 continues to remain over 700 uses per year. Other factors that may have played into these lower numbers was the government shutdown in October of 2013 and delays in receiving submission documents from the cooperating registrants for some submissions. The 309 new use registrations in 2014 bring the IR-4 51 year total of clearances to 16,187. A complete list of these new uses and new crop groups can be found in Attachment 5. In total, EPA reviewed 14 chemistries for IR-4 in 2014, which is also significantly lower than the number of reviews in 2013.

IR-4 continues to evaluate labels to determine if the new uses approved by EPA are indeed available to growers through labels registered in each state. In 2014, of the 309 possible new uses it has been determined that 185 uses now appear on product labels, nearly 60% of the total possible uses. IR-4 has contacted each of the registrants to encourage them to continue adding all possible uses to their marketing labels. It should be noted that some of the crops not counted were for new crop group conversions; therefore, some of the crops may be listed on product labels, just not the newly listed crops that were recently added to crop groups. It is expected that many of those uses will be added at a later date. IR-4 will continue to track these new uses with the registrants. IR-4 also re-reviewed the labeling success of 2013 approvals. It is reported that over 300 more uses now appear on product labels since IR-4's 2013 Annual Report, nearly 55% success rate of the 1032 possible uses from the 2013 tolerances. See Attachment 5 for details.

A listing of IR-4 projects in the queue for future submission to EPA that will address over 230 IR-4 project requests, are provided on Attachment 6 or can be viewed on the IR-4 website at: http://www.ir4.rutgers.edu/FoodUse/Food_UseSimple.cfm?simple=1. EPA posts their Multi-Year work plan that includes IR-4 pending submissions at: http://www.epa.gov/opprd001/workplan/newuse.htm. IR-4 submissions are generally reviewed by EPA and a tolerance established within a 15 month review timeline. IR-4 continues to support EPA's goal of encouraging the use of pesticides that pose less risk to human health and the environment compared to existing alternatives. Where possible, IR-4 continues to make requests of EPA that many of our submissions be classified as reduced risk.

Regulatory Compliance

Good Laboratory Practice Standards (GLP's as noted in Chapter 40, *Code of Federal Regulations*, Part 160) compliance is paramount to the success of the IR-4 Project's Food Program. Key components of compliance are the activities of the IR-4 Project's Quality Assurance Unit (QAU). The QAU continues to provide monitoring and support to cooperating scientists throughout the U.S. Audits of facilities and ongoing field and laboratory procedures provide assurance that IR-4's data is of the highest quality and will be accepted by the crop protection industry and EPA.

The Annual QA Planning Meeting was held in Atlanta, GA on Feb. 26-27, 2014. At this meeting, the audit plan for 2014 was created. For calendar year 2014, regular inspections included 20 facility, 161 field in-life, 82 analytical in-life, 82 analytical summary report/data audits and 495 field data book audits. During the 2014 calendar year, 63 final reports and amended reports were audited.

The US EPA conducted three inspections for GLP compliance and data integrity. A total of 143 EPA GLP facility inspections have occurred at IR-4 related sites since April 27, 1997. IR-4 facilities continue to maintain high standards and fully meet the GLP requirements.

IR-4 eQA reporting system has been in production since October 2013. In the last fiscal year over 1000 separate audit reports have been electronically generated and distributed to Testing Facility Management, Study Directors and other participants via this web based system. The system currently has 142 active users and 90 different locations identified.

Crop Grouping Initiative

IR-4 continues to expand and enhance crop groups and sub-groups. The revised Cucurbit Vegetable Crop Group and subgroups were submitted to the EPA over the past year and the Cereal Grains will be submitted in 2015. It is expected that as EPA completes their reviews of pending crop group updates, additional final rules will be published in 2015 for: Leafy Vegetables (except Brassica) and Brassica Vegetables and the new crop groups for Stalk, Stem, and Leaf Petiole; Tropical and Sub-tropical fruit, edible peel and Tropical and Sub-tropical fruit inedible peel. The effort to update crop groups continues with the Codex Committee of Pesticide Residues as well and the Vegetable types are expected to be completed during the 2015 Codex Committee of Pesticide Residues meeting.

International Activities:

IR-4 remains committed to assisting US specialty crop growers and their desire to capture lucrative international markets through harmonizing pesticide residues standards in specialty crops and remove pesticide residues a technical phytosanitary trade barrier.

In North America, IR-4 cooperates with CN-PMC who contributed 51 field trials to the joint program in 2014. Three new studies and 2 carry over studies were managed by CN-PMC, with them serving as Study Director and Sponsor, and they utilized a number of IR-4 field research centers to complete the NAFTA data requirements. In addition, the CN-PMC program continues to provide significant contributions to IR-4 efficacy and crop safety research and shares ornamental efficacy and crop safety with IR-4. There also continues to be a good exchange of personnel, with CN-PMC participating in various IR-4 meetings and vice versa. In total the research benefit of working with CN-PMC is estimated to exceed $500,000 per year.

The joint review process by EPA and Canada's Pest Management Regulatory Agency also benefits IR-4 stakeholders by saving resources on both sides of the border; only one agency is responsible for reviewing the residue data. More importantly, both agencies are establishing maximum residue levels (MRLs) at the same level, at the same time. This prevents trade irritants before they happen. EPA and PMRA completed two joint reviews on IR-4/CN-PMC submissions in 2014 for the active ingredient metrafenone, with nearly 50 new uses associated with it.

IR-4 has also been working with EPA and Canadian authorities to implement the pesticide related areas in President Obama's initiative with Canada's Prime Minister Harper, known as the Regulatory Cooperation Council (RCC). IR-4 has partnered with CN-PMC to further develop and harmonize data generation and submission processes that will allow the US and Canadian regulatory authorities to better share resources to review data to further eliminate trade barriers between the two countries.

IR-4 also made a number of data submissions to the Joint Meeting of Pesticide Residues (JMPR) and Codex Committee on Pesticide Residue (CCPR) that should support additional Codex MRLs in the future. These submissions included Acetamiprid, Tebuconazole, Cyazofamid, and Bifenthrin (see Attachment 4) and cover over 15 commodities. In addition, IR-4 worked with several manufacturers to support the submissions of Cyazofamid, Flonicamid, Flupyradifurone, and Chlorothalonil to support another 18 minor uses.

At the request of EPA, IR-4 personnel continue to be included as part of the US delegations to both the CCPR and Organization for Economic Co-operation and Development (OECD) as well as the Working Group on Pesticides and the NAFTA Technical Working Group on Pesticides. IR-4 plays a key role on the OECD Expert Group on Minor Uses, where a number of guidance documents have been prepared and released over the past few years with regard to minor use issues. IR-4 also assists other countries, both developed and developing, as they begin to establish minor use programs, especially with New Zealand, Brazil and Costa Rica. The knowledge and expertise of IR-4 is often

sought and is highly valuable to these countries as their minor use programs evolve. IR-4 initiated its first joint study (Fluazifop-p-butyl/Papaya) with Costa Rica in 2014, where they are contributing three field trials. It is anticipated that this cooperation will result in a joint submission in 2016 for registration in the respective countries and a submission to Codex that would follow.

Global Capacity Development, Residue Data Generation Project. Coordinated by USDA-FAS, this project's objective is to enhance capacity of participating nations in Asia, Africa and Latin America to meet pesticide-related requirements based on international (Codex) standards. This goal is being achieved by collaborative residue data generation projects that incorporate all technical aspects of these studies and is expected to provide broader national residue monitoring as well. The focus of IR-4's involvement has been on developing the expertise to conduct field and laboratory pesticide residue studies under Good Laboratory Practices and to eventually provide data to local authorities and Codex for product registration. All three of the regions participating in this project have received Standards Trade Development Facility (STDF) and USDA Foreign Agriculture Service funding, which also provides support for IR-4's contributions to the project. Work in the three regions is progressing and is in various stages, with a commitment to start making submissions to JMPR in 2016. Please see IR-4 newsletter article on the subject at: http://issuu.com/snovack/docs/vol45no1qxp. It is IR-4's vision, that at the end of this work, there will be a global network of capable minor use programs that can partner, when appropriate, with IR-4 to addressing domestic and international grower needs.

Ornamental Horticulture Program

The Ornamental Horticulture Program continues to support an industry valued at nearly $12 billion in annual sales (Horticulture Census, 2009, NASS). This industry is quite complex because growers cover many diverse markets including flowers, bulbs, houseplants, perennials, trees, shrubs and more. These plants are grown and maintained in greenhouses, nurseries, commercial/residential landscapes, interiorscapes, Christmas tree farms and sod farms.

Research Activities

In 2014, IR-4 conducted 685 ornamental horticulture research trials to support registrations in the greenhouse, nursery, landscape, Christmas tree and forestry industries. Of these 169 were efficacy trials designed to compare different products to manage damaging insects, plant diseases and weeds and to measure the impact of growth regulators; the remaining trials were conducted to determine the level of phytotoxicity to crops with herbicides used to manage common weeds in and around nurseries. Please see Table 1 for a summary of research activities and Attachment 7 for a complete listing of 2014 field cooperators and Attachment 8 for research activities listed by project.

Table 1. Summary of IR-4's 2014 and Revised 2013 Ornamental Horticulture Program Research Activities.

Category	2014			Revised 2013		
	Efficacy	Crop Safety	Total	Efficacy	Crop Safety	Total
Number of Studies (PR Numbers) with Planned Trials	131	272	403	183	352	535
Number of Trials	204	481	685	244	556	800

Submissions and Successes

During 2014, 22 data summaries were compiled based upon research reports submitted by researchers. See Attachment 9 for Abstracts from the individual reports. The summary reports include Acetic Acid Crop Safety, Ammonium Nonanoate Crop Safety, Beetle Borer Weevil & White Grub Efficacy, Botryis Efficacy, Cyflufenamid Crop Safety, d-Limonene Crop Safety, Dimethenamid-p, Crop Safety, Dithiopyr Crop Safety, Indaziflam Crop Safety, Metconazole Crop Safety, Oregano Oil Crop Safety, Pelargonic Acid Crop Safety, Pyridalyl Crop Safety, Pyrifluquinazon Crop Safety, Spirotetramat Crop Safety, Sulfentrazone + Prodiamine Crop Safety, Sulfosulfuron Crop Safety, Tebuconazole Crop Safety, Thrips Efficacy, Tolfenpyrad Crop Safety, Triticonazole Crop Safety, and Whitefly Efficacy. Data from 3,228 trials contributed to the writing of these reports. Table 2 lists the number of trials by IR-4 Region that were used in the data summaries.

Table 2. 2014 Ornamental Horticulture Program Research Summaries.

Region	Number of Trials
North Central	491
North East	375
Southern	883
Western	525
USDA-ARS	856
Total	3,228

During 2014, US EPA approved 6 new labels based partially on the efficacy or crop safety IR-4 generated: A16901B (cyantraniliprole + thiamethoxam), DPX-HGW86 (cyantraniliprole), Mainspring 200SC (cyantraniliprole), Mika WG (azoxystrobin), Rycar (pyrifluquinazon), and Xxpire 40WG (spinetoram + sulfoxaflor). Marengo G (indaziflam) was registered in CA; and internationally Canada registered Regalia Maxx (Extract of *Reynoutria sachalinensis*). Two numbered formulations were dropped from further development. After the 2013 annual report was finalized, it was discovered that the EPA registrations of Hachi-Hachi SC and Sulfentrazone 4F and the CA registration of Orvego also occurred. See Table 3 for 2014 and revised 2013 information.

Table 3. Ornamental Horticulture Program Contributions to 2014 and Revised 2013 Registrations.

Category	2014			Revised 2013		
	Efficacy	Crop Safety	Total	Efficacy	Crop Safety	Total
New US EPA Product Registrations [a]	6	0 [f]	6	5	1 [f]	4
US EPA Label Amendments [b]	0	0	0	1	0	0
State Registrations [c]	0	1	1	2	0	1
International	1	0	1	0	0	0
Number of Trials Contributing to Registrations [d]	68	170	238	102	269	372
North Central	17	21	38	16	69	87
North East	2	17	19	21	13	33
Southern	26	24	50	29	62	91
Western	22	11	33	31	25	56
USDA-ARS	1	97	98	5	100	105
Number of Impacted Crops [e]	4,548	73	4,621	2,052	38	1,535

[a] New products for the ornamental horticulture industry based on data collected through IR-4 and submitted to manufacturers in previous years.

[b] Label updates on existing products for the ornamental horticulture industry based on data collected through IR-4 and submitted to manufacturers in previous years.

[c] State registrations and special local needs registrations on federally registered products for the ornamental horticulture industry based on data collected through IR-4 and submitted to manufacturers in previous years.

[d] The total number of trials where data was utilized for registrations.

[e] The number of impacted crops is an estimate of the total plant species grown commercially for ornamental uses impacted by the IR-4 data.

[f] For some registrations, IR-4 contributed both efficacy and crop safety data.

2013 Workshop

The Ornamental Horticulture Workshop was held in Coconut Grove, FL in October 2013 to establish priorities for the 2014 to 2015 biennial research cycle. As in past workshops, during the first morning of the workshop, registrant representatives presented new active ingredients and highlighted opportunities for existing products. Then the results of the Grower & Extension Survey were presented, and we discussed the pro and cons for conducting efficacy or crop safety research on 36 current and potential new projects across entomology, pathology and weed science. To have these discussions flow smoothly, IR-4 staff created new handouts: Project Sheets summarizing the need, research and registrations to date, and 15 Product Lists outlining the key features of tools currently available for certain diseases and pests. The 31 project sheets were created to cover recently studied projects and potential new

projects based on the annual Grower & Extension Survey and newly received project requests. Also, new projects for each discipline were raised as potential research avenues during the workshop. After the relative merits of each project were captured on poster-size paper and fastened to the walls, a Sticker Caucus was held so that workshop attendees could vote for the research projects IR-4 should undertake during 2014 – 2015. During the second morning of the workshop, the outcomes for each discipline were projected, and the research priorities were finalized after further conversations.

Priorities from the 2013 Workshop include:
Entomology Projects: Thrips Efficacy, Armored Scale Efficacy, New Product Crop Safety.
Pathology Projects: Botrytis Efficacy, Leaf Spot & Anthracnose Efficacy, New Product Crop Safety.
Weed Science: Pre-Emergent Liquid Herbicide Crop Safety will be focused on Tower EC and Dimension 2EW, while the Ornamental Grass herbicide Crop Safety will screen Dimension 2EW, Gallery, and Pendulum 2G.

Invasive Species Research Activities

During 2014, the IR-4 Ornamental Horticulture Program continued to facilitate research activities for several invasive species impacting the Ornamental Horticulture Industry: Management of Invasive Arthropods during Shipping, Gladiolus Rust Biology and Management, Chrysanthemum White Rust Biology and Management, Boxwood Blight Biology and Management, and Impatiens Downy Mildew Biology and Management. Each project was funded under USDA-APHIS Farm Bill Section 10201 and encompassed key objectives to manage exotic invasive species by studying aspects of pathogen or pest biology and management tools (conventional or biopesticide as appropriate to the target organism) on plants to enable growers to better implement mitigation strategies. Key elements of each project are listed in Table 4 below.

Table 4. Invasive Species Projects during 2014

Project Topic	Collaborating Researchers	Research Objectives	Duration
Management of Invasive Arthropods	Lance Osborne, University of Florida Cindy McKenzie, USDA-ARS, Fort Pierce Jim Bethke, University of California Arnold Hara, University of Hawai'i	*Duponchelia fovealis* biology and management tools (conventional, biopesticide, predators) Prevention of arthropod development during shipping with applications of biopesticides and biorational materials immediately before shipping	2010-2015
Gladiolus Rust	James Buck, University of Georgia Alberto Valencia-Botin, University of Guadalajara Doug Luster, USDA-ARS Fort Detrick Mo Bonde, USDA-ARS Fort Detrick Steve Jeffers, Clemson University	Fungicide screening and rotational programs Screening for gladiolus cultivar resistance Overwintering/oversummering of *Uromyces transversalis* Development of serological and genetic assays	2009 - 2014
Chrysanthemum White Rust	Doug Luster, USDA-ARS Fort Detrick Mo Bonde, USDA-ARS Fort Detrick Oney Smith, Hood College, Kurt Heungens, ILVO, Belgium Bas Brandwagt, Royal van Zanten, The Netherlands JoAnne Crouch, USDA-ARS, Beltsville	Overwintering of *Puccinia horiana* Fungicide impact on sporulation Fungicide screening on whole plants Development of serological and genetic diagnostic tools Biology and development of *P. horiana* in chrysanthemum	2010-2015
Boxwood Blight	Sharon Douglas, Connecticut Agriculture Experiment Station (CAES) Robert Marra, CAES Jim LaMondia, CAES Margery Daughtrey, Cornell University Nina Shishkoff, USDA-ARS- Fort Detrick JoAnne Crouch, USDA-ARS, Beltsville Mike Benson, NC State University Marc Cubeta, NC State University Kelly Ivors, NC State University Chuan Hong, Virgina Tech Anton Baudoin, Virginia Tech Norm Dart, Virgina Department of Ag.	Fungicide screening and mitigation strategies Cultural control potentials Effect of sanitizers on conidia and mycelia Impact of fungicides on microsclerotium development Screening of potential biopesticides for microslerotium inactivation Development of isothermic LAMP detection assay Boxwood species and cultivar screen for resistance *Calonectria pseudonaviculata* host range (*Pachysandra* and *Sarcoccoca*) Development of infections under field conditions *Calonectria pseudonaviculata* population genetics Development of epidemiology model based on U.S. temperature and moisture conditions	2011 – 2015

	& Consumer Services Len Coop, Oregon State University Anne Gould, Rutgers University Brad Hillman, Rutgers University		
Impatiens Downy Mildew	Margery Daughtrey, Cornell University Mary Hasubeck, Michigan State University Aaron Palmateer, University of Florida JoAnne Crouch, USDA-ARS, Beltsville Nina Shishkoff, USDA-ARS, Fort Detrick Lena Quesada, NC State University Ann Gould, Rutgers University	Overwintering of *Plasmopora obducens* oospores Fungicide screening and rotational strategies Sporangia and oospore development and epidemiology *Plasmopora obducens* population genetics Development of genetic tools for downy mildews including Impatiens Downy Mildew, Cucurbit Downy Mildew, Hops Downy Mildew, Basil Downy Mildew	2012 - 2015

Biopesticide and Organic Support Program

The IR-4 Biopesticide and Organic Support Program has the goal of facilitating the registration of crop protection products classified by EPA as Biopesticides. IR-4 has four major functions in the biopesticide arena including: (1) an "Early Stage" grants program to fund research proposals for products whose core data have not yet been submitted to EPA; (2) an "Advanced Stage" grants program to fund research proposals for products that have been registered by EPA or are in the registration process and additional data is needed to assist with expansion of the registration to new crops or to new pests; (3) a "Demonstration" grants program to fund large-scale demonstration plots to gather information and provide outreach indicating that biopesticides can be a useful tool in pest management systems; and (4) a registration assistance program to provide university and USDA researchers as well as small biopesticide companies with regulatory advice and petition preparation assistance.

Research Activities

The Biopesticide Research Program has provided competitive grant funding of projects, amounting to over $7.1 million in grants to researchers since its inception. In 2014, the biopesticide grant program funded 3 Early Stage, 13 Advanced Stage and 7 Demonstration Stage projects (see Attachment 10). These were conducted by different universities on fruits and vegetables, tropical crops, honeybees, turf and ornamentals. The demonstration stage grants were co-reviewed by EPA and IR-4. Among the high profile invasive pests, the biopesticide program has supported projects involving spotted wing drosophila and brown marmorated stinkbug as well as fireblight on apples.

In an effort to transition IR-4's Biopesticide research from a grant based system to a more responsive directed research program, IR-4 held its first Biopesticide Workshop in September 2014 in association with the Food Use Workshop in Atlanta, GA. Rather than operate as a grant-based program that provides funding for Early, Advanced and Demonstration stage research, a priority setting workshop was held to actively engage stakeholders and encourage submission of known pest management voids that can potentially be answered by biopesticide technology

Submissions and Successes

In 2014, IR-4 submitted amended registration packages for Hops Beta acid, and a new registration for the viral coat protein of papaya ringspot virus to EPA to expand use into Florida.

IR-4 efforts in the Biopesticide and Organic Support Program yielded 125 new registrations in 2014. Data from IR-4 funded efficacy research supported seven additions of crops to biopesticide labels (see Attachment 10). EPA also approved the registration of an IR-4 submission for Tobacco Mild Green Mosaic Tobamovirus that covered 118 new uses on grass and non-grass animal feeds. In addition, 24C labels have been developed for 9,10 Anthraquinone including Avipel Liquid for Corn (10 states), and Avipel Dry formulation for Corn (13 states). In addition, Section 18s were supported forAV-1011 for rice in Louisiana and Arkansas and the Avipel Liquid in Sunflower in South Dakota.

The Public Health Pesticides Program

The IR-4 Public Health Pesticide (PHP) Program assists in the development and registration of pesticide products that protect the public from vector-borne diseases (e.g. West Nile virus, Lyme disease, malaria, or dengue fever) and from the nuisance and economic costs caused by mosquitoes, ticks, and similar public health pests. These vector

control uses of pesticides are statutorily recognized as “minor uses”, and it has been determined that public support for their development is in the public interest. In addition to regulatory support for new materials and products, the PHP Program maintains a unique database of vector control materials and an inventory of potential PHP’s, and collaborates with industry, the user community, and regulators on developing strategies to retain products in the vector control toolbox in the face of new regulatory requirements.

Primary funding for the IR-4 PHP Program is provided by U.S. Department of Defense (DoD) and USDA-ARS through the Deployed Warfighter Protection Program (DWFP), a research consortium and product development program focusing on the development of improved vector management methods and materials. IR-4 serves as a regulatory consultant and representative for many of the new materials and methods developed by DWFP-funded researchers. In addition, the DoD and ARS have engaged IR-4 to help expand the vector control toolbox by identifying new or underutilized vector control tools; providing regulatory support for new active ingredients and PHP products developed outside the DWFP; and supporting the continued registration of older useful products.

Since its start in 2008, the IR-4 PHP has become a key player linking researchers, the vector control user community, commercial partners, and regulators in the development of a wide range of new chemical tools for vector control, including toxicants, repellents, attractant-baited traps, and pesticide-treated fabrics. This collaborative approach has also been fruitful in efforts to retain existing tools facing new data requirements, and in the search for underutilized chemicals from other realms which might be repurposed for vector control.

During 2014, the IR-4 Public Health Pesticides Program continued a research program on the incidental deposition of mosquitocides on crops with completion of the field and lab work for ground applications of the mosquito adulticide etofenprox on multiple crops. This complements our earlier work with aerial applications, which resulted in an all-crop tolerance for this new vector control product. Phase II of the studies will help define both the range of residues seen with different application methods, and also the cumulative load that can result after multiple applications in the same area over the course of a season, and the impacts of wind and other weather on per-application residues. These models, methods, and data are also helping develop methods for estimating incidental drift and deposition onto water, which may be critical information for some environmental risk assessments during registration reviews.

IR-4 was engaged in several other activities in 2014 which support new uses for existing pesticide materials, including assistance in development of efficacy protocols for lethal ovitraps that target container-breeding mosquitoes. A label has been issued for this product, which was originally developed by the U.S. Army and which is now commercially licensed, but the label recommends a high density of traps, and operational success will likely require more evidence of effectiveness at low trap densities, as well as greater specification and characterization of the oviposition attractants. We are also working with several researchers on volatile materials which reduce biting pressure without needing skin-applied repellents; while mosquito coils have been around for many years, only recently has there been concerted work on how these work and on the feasibility of registering such products for indoor uses. Finally, clothing treated with permethrin helps protect from insect bites but faces limitations, including resistance and durability, and we are working with the military, USDA researchers, the CDC, and registrants to evaluate alternative treatments, to assess the feasibility for retreating pre-treated garments, to assess bednets treated with mixtures of pesticides, and reviewing non-destructive methods to estimate or measure residual pyrethroid on clothing after wear and washing.

IR-4 also supported several new materials and products for vector control this year, including three truly novel approaches. We are the primary regulatory consultants for Attractive Toxic/Targeted Sugar Baits (ATSB), a novel approach to the control of mosquitoes, sand flies, and possibly other vector species. With IR-4 assistance, commercial ATSB products were introduced to the U.S. market, and we helped secure major new development funding from the Gates Foundation and the Innovative Vector Control Consortium. IR-4 also represented an ARS lab in preliminary regulatory negotiations for an entire new class of repellents and toxicants, including one new molecule with three times the repellency of DEET and minimal apparent toxic risk; and we developed GLP methods for efficacy testing for an IGR-autodissemination system under development by the Rutgers Center for Vector Biology and a commercial partner. We helped characterized a class of natural molecules which repel bees and possibly other pollinators, and which may be a valuable tool to minimize vector control and other pesticide impacts on these beneficial insects. IR-4 supported ARS developers on development and possible registration in the U.S. and globally for novel products that disseminate volatile repellents and that can be attached to the outside of clothing.

Finally, we are working to obtain expanded Experimental Use Permits (EUP's) for phase II work with sterile insect techniques for mosquitoes based on reproductive incompatibility between mosquitoes infected with differing strains of the endosymbiotic genus *Wolbachia*.

Given the great diversity of actual and potential vector control tools, a major focus of the IR-4 PHP program has been the development and maintenance of a database of public health pesticides, and we particularly emphasize the identification of underutilized chemicals with significant potential utility for organized vector control programs. During 2014 the IR-4 PHP database (http://ir4.rutgers.edu/PublicHealth/publichealthDB.cfm) was substantially revised and expanded, and a second edition of the IR-4 Inventory of Public Health Pesticides, based on the database, was prepared. In particular, in 2014 we developed database modules on technical and end-use products (n = 1250), on the biological activity of vector control products, and on vector control research and development projects. One specific use for these documents is tracking new regulatory requirements for existing materials; another is to help focus the PHP testing and evaluation programs of the military and the USDA.

Impact

Specialty crop growers and other minor use stakeholders are often at a disadvantage relative to major crops (corn, soybean, cotton and other program crops) in having legal access to effective pesticides and biopesticides. Without an adequate arsenal of pest management tools, the cost of production and the amount of pest damage on the crops are likely to increase, while supply of quality produce is likely to decrease. Because of this, the IR-4 Project is an important entity in providing the US population a plentiful supply of reasonably priced vegetables, fruits, herbs, and ornamental crops throughout the year.

Specific IR-4 Project deliverables to stakeholders are documented in the respective Program sections (Food Use Program, Ornamental Horticulture Program, the Biopesticide and Organic Support Program and the Public Health Program). It is safe to say that without the existence of the IR-4 Project; only a limited number of safe and effective crop protection chemicals and biological alternatives would be available for use on food and ornamental specialty crops and minor uses. IR-4's activities protect these high value crops which are valued at $65 billion at the farm gate.

In an effort to capture a solid assessment of program value, Michigan State University's Center of Economic Analysis conducted a study on the economic impact of IR-4 Project's activities in the Food, Ornamental Horticulture and Biopesticide and Organic Support programs. This report was updated in October 2012. When well-established methods of measuring direct and secondary economic impacts are used to gauge the contributions of the IR-4 Project and its three primary programs, including the Food Crops, Ornamental, and Biological and Organic Support programs in terms of sales, employment and gross domestic product is significant. Each program posits real economic benefits to growers and the economy as a whole. Specifically, growers benefit in higher yields with higher quality output, consumers benefit by more varieties and lower costs of food and ornamental crops, and the industry benefits through better global competitiveness of US output. Including all secondary impacts, the IR-4 Project is anticipated to support research and industry sales sufficient to support 104,650 U.S. jobs and bumps annual gross domestic product by as much as $7.2 billion. It is safe to assume that the economic impact of IR-4's activity in 2013 is equal or better than the values reported in 2012.

These powerful economic drivers are only half the story. The other half involves food safety, food security and public wellbeing. IR-4 assists in the registration of the latest generation of reduced risk and lower risk pest management products. Many of these products are compatible with Integrated Pest Management systems, have little hazard or degrade rapidly after use. They allow farmers to maximize yields of quality fruits, vegetables and nuts; making products available to the public at an affordable price. With IR-4"s assistance, specialty crop growers provide the public a consistent supply of nutritious foods, essential to good health, as well as aid in the production of ornamentals that enhance the environment. Additionally, IR-4 helps provide tools to manage pests like mosquitoes, ticks and fleas that transmit diseases to humans. The bottom line, what IR-4 delivers to society is extremely important and necessary.

2014 Appropriations and other funding

The IR-4 Project is funded by USDA in partnership with the SAES and others. Total direct funding for the IR-4 Project during calendar year 2014 was $17.83 million.

The majority of USDA funding for the IR-4 Project comes through NIFA. This included the Congressional appropriation through NIFA amounting to $11.916 million. This level restored IR-4 back to FY 2012 funding levels. Funding in FY 2013 was reduced to by $910,000 from the FY 2012 appropriation of $11.916 million from the Budget Control Act of 2012 or "Sequestration".

The Congressional appropriated funds managed through USDA-NIFA provide resources for IR-4 Project core operations within the Food, Ornamental Horticulture and Biopesticide and Organic Support programs. In FY 2014, approximately $8.04 million was distributed to the four IR-4 Regional offices and Headquarters for personnel, supplies, equipment, laboratory analysis and other core expenses. Over $2.03 million was allocated for field trials that produce the necessary residue samples. An additional $112,500 was directed to efficacy/crop safety testing of pesticides on food crops; $518,000 for ornamental trials; $373,643 for biopesticide/organic support grants and the remaining $833,910 was mandatory NIFA holdback.

The SAES directly contributes $481,182 through Multi-State Research Funds (NRSP-4 grant). The NRSP-4 funds are a critical component of the total funding the IR-4 Project receives, and augments funds from USDA and other sources. NRSP-4 funds directly pay salaries for IR-4 HQ management who provide overall leadership and coordination of the IR-4 Project's on-going research efforts. Additionally, the Directors of the State Agricultural Experiment Stations provide IR-4 a significant amount of in-kind contributions by hosting IR-4 field research centers, analytical laboratories and management offices throughout the United States.

USDA-ARS provides funds supporting their personnel who work on cooperative projects that align with priorities and studies managed by IR-4. These participating ARS scientists are given specific research assignments that fully complement and do not duplicate the on-going research at the SAES. The amount allocated to the USDA-ARS Minor Use Program has dropped to $3.17 million. Current funding has been reduced by approximately $800,000 over the last several years. This has resulted in reductions in contributions from this important component of the IR-4 research network.

The USDA-ARS (NP-104)/DoD $250,000 funding is provided exclusively for the Public Health Pesticide Registration Support Program and pays for personnel costs, travel and subcontracts to research groups who conduct priority research projects.

USDA-FAS and other global partners (mostly World Bank funds through Standards Trade and Development faculty grant) provided IR-4 with approximately $350,000 to work on international activities to support specialty crop exports and global pesticide regulatory harmonization. This includes funds for reformatting existing IR-4 data to allow its use to support international maximum residue levels and capacity building training programs in Asia, Africa and Latin America. IR-4 is participating in pilot projects to teach developing countries how to develop required data to support Maximum Residue Levels on specially crops.

USDA-APHIS has funded IR-4 approximately $461,996 to do work on selected invasive species both within the US within quarantine facilities as well as internationally where the invasive pest is native. Activities include efficacy testing of pest management products to studies to better understand the biology of the pest.

The crop protection industry and some grower groups/commodity associations also contributes direct financial resources as well as significant in-kind resources. In 2014 they provided approximately $1.52 million in unrestricted grants. IR-4 used these resources to supplement USDA funds; $199,366 for additional research activities, $362,775 for office rent, $760,044 to support additional HQ operations and $164,124 for priority setting/research planning workshops, EPA training tour, and related meetings.

IR-4 also receives a significant amount of in-kind contributions from multiple sources. The direct funding of nearly $18 million does not include the substantial in-kind contributions provided by SAES/land grant universities, EPA, the CN-PMC and the crop protection industry The in-kind contributions are conservatively estimated to be a 1:1 match. In Fiscal Year 2014, EPA provided an in-kind contribution of approximately $7.6 million in fee exemptions because EPA is prohibited by the Pesticide Registration Improvement Act from charging IR-4 fees. The SAES receives no indirect costs from USDA-NIFA funds. It is estimated that SAES host institutions contribute over $5

million annually through their coverage of the indirect costs. In addition, SAES host institutions provide employee benefits to IR-4 employees. The registrants of pesticides and biopesticides and government of Canada also make significant in-kind contribution.

The IR-4 Project remains prudent with the use of resources while it continues to search for opportunities to gain efficiencies in all aspects of its research and regulatory affairs. Over the last several years, there have been substantial process improvements which allow IR-4 to get the most out of the funding.

Future Directions

Annually, IR-4 hosts a Food Use Workshop to prioritize future research projects. These open workshops are designed to gain stakeholder input and feedback to determine what the most important research pest management needs are and where resources should be spent. The 2014 Food Use Workshop was held September 9 & 10 in Atlanta, Georgia. One-hundred and eighty stakeholders attended the Workshop. Based on priorities established at the IR-4 Food Use Workshop and other processes, for IR-4 plans to conduct 559 field trials of which: 96 are residue and efficacy/crop safety studies; 75 will be conducted by USDA-ARS; 39 will be conducted by Canadian partners (CN-PMC) and the remainder are being completed by the IR-4 research network at the land-grant university system.

The Ornamental Horticulture program hosts a biennial workshop to set two year research priorities. In 2013, the Ornamental Horticulture Workshop was held October 16 & 17 near Miami, FL. The projects selected include: thrips efficacy, armored scale efficacy, botrytis efficacy, leaf spot/Anthracnose efficacy and new product crop safety.

IR-4 takes great pride in selecting food and ornamental research priorities in open and transparent workshops involving many stakeholders. In an effort to extend this culture to biopesticide research, IR-4 held its first Biopesticide Workshop in September 2014 in association with the Food Use Workshop in Atlanta, GA. Rather than operate as a grant-based program that provides funding for Early, Advanced and Demonstration stage research, a priority setting workshop was held to actively engage stakeholders and encourage submission of known pest management voids that can potentially be answered by biopesticide technology.

Prior to the Biopesticide Workshop, IR-4 established a web page where stakeholders could complete and submit a ***IR-4 Minor Use Biopesticide Priority Needs Form*** that would articulate the need of a biopesticide product to control a pest. This page also includes the current IR-4 Biopesticide Priority Needs List, a comprehensive index of requests received to manage pests with biopesticides. All Requests for Assistance where screened by HQ for validity and duplication and consolidated into 135 potential projects for 2015 research.

The inaugural priority setting workshop enabled the 180 participants (stakeholders, researchers, extension specialists, commodity representatives and growers) to meet, review projects and select priority biopesticide and organic efficacy project needs for the following research cycle. Electronic voting systems were employed at the workshop to identify top priority categories and identify crop and pest issues for each category. The nine highest priority projects were selected for further activity.

Following the workshop, experts associated with the research priorities were identified. The research experts suggest potential products to evaluate and protocols are then developed from their suggestions. The next step involves identifying qualified researchers who are able to conduct the research trials. These researchers will be selected based on the target pest and specialty crop of interest and the researcher's expertise and then the research will follow.

IR-4 takes pride in these accomplishments; providing over 46,000 registrations for food and non-food crops over the 51 year history of the Project. However, there are many issues that remain unresolved. Specialty crop growers/minor use stakeholders still face challenges in managing critical pests that consume their crops and profits. It is often difficult to export certain specialty crops because standards of allowable pesticide residues vary across nations. IR-4's international involvement plays a major role in harmonizing maximum residue levels for allowable pesticide residues in specialty crops. Newly emerging invasive pests, such as Brown Marmorated Stink Bug, Spotted Winged Drosophia, Boxwood Blight, resistant weeds and other pests threaten agriculture and the environment. Recent

outbreaks of West Nile Virus and Dengue Fever in the continental US, highlight the need for solutions to manage public heath pests as well.

In 2013, IR-4 started the process of developing its next strategic plan. The plan, ***VISION 2020*** was completed and approved by the IR-4 Project Management Committee in July 2014. This plan details the IR-4 Project background, vision, mission, values, culture, objectives and funding needs and identifies strategic benchmarks and the goals in each program are outlined here:

Food Program

- Host an annual prioritization workshop that enables stakeholders to participate in the process of selecting research priorities.
- Conduct up to six studies with conventional chemical pesticides, biopesticides, and combinations to identify the most promising product(s) to manage a critical pest management void.
- Conduct approximately 100 Magnitude of the Residue studies annually. When appropriate, conduct residue trials at critical sites to meet international standards.
- Conduct 50 to 60 field trials annually to collect efficacy and/or crop safety data.
- Complete the development of the remaining crop grouping expansion proposals and submit them to EPA.

Ornamental Horticulture Program

- Host a workshop once every two years to gain input on the most important pest management voids and establish research priorities.
- Conduct at least six research projects to screen options for the management of critical pests and to determine whether solutions impact plant quality.
- Disseminate results through the IR-4 website, presentations at scientific and trade meetings, and communications via social media.

Biopesticide and Organic Support Program

- Encourage submission of "Request for Assistance" forms identifying pest management voids that can potentially be answered by biopesticide technology.
- Enable stakeholders to provide input on the most important projects and establish research priorities.
- Conduct up to 20 studies at multiple locations with biopesticides, conventional chemical pesticides and combinations in a strategic manner to determine which program(s) exhibit potential to manage critical pests and pesticide resistance management strategies while potentially lowering chemical residues at harvest.
- Assist public sector scientists and small businesses on an as-needed basis by providing guidance on the regulatory approval process.
- Collaborate with Extension to conduct approximately five on-farm Biopesticide Demonstration projects to help specialty crop farmers.

Additionally, IR-4 would like to fund: IR-4 State Liaison Representatives to conduct local workshops targeting Cooperative Extension and growers who work to identify newly emerging pest management voids, replace outdated field and analytical equipment at research farms and analytical laboratories, and encourage the U.S. Congress to allow 10% indirect cost charge on IR-4 grants to host institutions.

The most noteworthy changes under this plan include increased emphasis in helping harmonize global standards for pesticide residues in specialty crops to give domestic producers expedited access to lucrative international markets. Congress authorized this activity in the 2014 Farm Bill. Another ongoing change includes increased emphasis on supporting the strategic use of biopesticides not only to control key pests but to assist in the management of pest resistance to pesticides and reduction of chemical residues in food.

Adequate funding remains the most critical current and future challenge for IR-4. In spite of the restoration of funds lost previously in sequester cuts, there remains a significant shortfall. It should also be noted that many of IR-4's partners are also experiencing fiscal challenges and some partners have to reduce or eliminate IR-4 involvement due to these challenges. For example, in July 2014, the IR-4 PMC was informed that Cornell University administration did not intend to submit a grant application to USDA-NIFA to support IR-4's FY 2015 Northeast Region operations. This is mainly due to the Federal restriction not allowing Cornell to collect indirect costs on the IR-4 grant. IR-4 is in the process of relocating its Northeast Region operations to Rutgers University and University of Maryland. IR-4's new strategic plan, ***Vision 2020,*** articulates justification for significant funding needs for an increase for IR-4.

PUBLICATIONS/PRESENTATIONS

Arsenovic, M, D. Kunkel, J. Baron, and D. Carpenter: The IR-4 Project: Update on Weed Control Projects (Food Uses). 68th Annual Meeting of the Northeastern Weed Science Society, Philadelphia, PA, January 6-8, 2014.

Arsenovic, M, D. Kunkel, J. Baron, and D. Carpenter: The IR-4 Project: Update on Weed Control Projects. Annual Meeting of the WSSA and Canadian Weed Science Society, Vancouver, BC, Canada, February 3-6, 2014.

Baron, J.J., M. Braverman, and D. L. Kunkel. 2014. The Use of Global Residue Data Sets to Facilitate the Establishment of Harmonized Maximum Residue Levels. IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 575

Baron, J.J., D. L. Kunkel and M. Braverman,. 2014. MRL harmonization for specialty crops: A global vision. IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 282

Bonde, M.R., C. L. Palmer, D. G. Luster, S. E. Nester, J. M. Revell, and D. K. Berner. 2014. Viability of *Puccinia horiana* Teliospores Under Various Environmental Conditions. Plant Health Progress doi:10.1094/PHP-RS-13-0117.

Bonde, M.R., Murphy, C.A., Bauchan, G.R., Luster, D.G., Palmer, C.L., Nester, S.E., Revell, J.M. and Berner, D.K. 2014. Evidence for systemic infection by *Puccinia horiana*, causal agent of chrysanthemum white rust, in chrysanthemum. Phytopathology "First Look" paper. htpp://dx.doi.org/10.1094/PHYTO-09-13-0266-R. posted 08/14/2014.

Bonde, M.R., S. E. Nester, C. L. Palmer, J. M. Revell. Longevity of *Uromyces transversalis* Urediniospores under Various Environmental Conditions. Abstract. American Phytopathology Socitey Annual Meeting. Phytopathology. Phytopathology 104:S3.2

Braverman, M. P., D. Kunkel, J. Baron, and J. Sandahl. 2014. Challenges of considering harmonization of GAP and trade in protocol development for magnitude of residue studies in ASEAN and African countries. IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 581

Braverman, M. P., D. Kunkel, and J. Baron. 2014. Utilizing good science to bridge the gap between research and registration of RNAi and other biotechnology based tools. IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 719.

Braverman, M. P., J. Baron, D. Kunkel, and M. Arsenovic. 2014. Regulatory Update of the IR-4 Project Biopesticide and Organic Support Program. Weed Science Society of America Abstracts # 281.

Braverman, M.P., D. Kunkel, and J. Baron. Biopesticide Registration Successes of the IR-4 Project and Changes in Regulatory Requirements, in *Biopesticides: State of the Art and Future Opportunities* Chapter 17, pp 259–265 *ACS Symposium Series*, Vol. 1172.

Braverman, M.P., D. Kunkel and J. Baron. Registration and Integration of Biopesticides into Pest Management Systems Facilitated Through the IR-4 Project. SCI Biorationals Conference. UK.

Holm, R, D.L. Kunkel, and J. Eggleston, 2014. A Quantum Leap, Progress in the discovery of New Crop Protection, Crop Protection Handbook, MeisterPro

Homa, K., Barney, W. P., Ward, D. L., Wyenandt, C. A., and Simon, J. E. 2014. Evaluation of fungicides for the control of *Peronospora belbahrii* on sweet basil in New Jersey. Plant Disease. 98(11):1561-1566.

Kunkel, Daniel L. and Kimberly Berry. 2014. Codex Maximum Residue Limits: Who uses these Standards? IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 576

Kunkel, D.L., M. Braverman, J. Baron. 2014. Global Minor Use Summits: Outcomes, Progress, and Continuing Activities. IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 577

Kunkel, D.L., W. Barney, J. Baron. 2014. Crop Classification and Grouping, Successes and Challenges. IUPAC International Congress of Pesticide Chemistry, San Francisco, California, August 2014, Abstract # 580

McKenzie, C.L., Kumar, V., Palmer, C.L., Oetting, R.D., and Osborne, L.S. 2014. Chemical class rotations for control of *Bemisia tabaci* (Hemiptera: Aleyrodidae) on poinsettia and their effect on cryptic species population composition. Pesticide Management Science. Available online: http://onlinelibrary.wiley.com/doi/10.1002/ps.3736/pdf

Novack, S. IR-4 Newsletter, Vol. 45 Number 1-Winter 2014. New Jersey Agricultural Experiment Station Publication No. P-27200-14-01.

Novack, S. IR-4 Newsletter, Volume 45 Number 2-Spring 2014. New Jersey Agricultural Experiment Station Publication No. P-27200-14-02.

Novack, S. IR-4 Newsletter, Summer Volume 45 Number 3- Summer/Fall 2014. New Jersey Agricultural Experiment Station Publication No. P-27200-14-03.

Palmer, C. and Daughtrey, M. 2014. Impatiens: Is there life after downy mildew? AmericanHort CONNECT, 2014(2), p. 3, 8-9.

Palmer, C.L. 2014. Insect and Mite Needs for U.S. Production Ornamentals. Invited Presentation April 23, 2014. BASF Innovations Meeting.

Palmer, C.L. 2014. IR-4: 2014 Research Priorities & Adventures in Biopesticides. Presentation for SAF Pest & Production Management Conference, February, 2014.

Palmer, C.L. 2014. Boxwood Blight. NJ Nursery & Landscape Association NJ Plants Annual Trade Show. January 2014.

Palmer, C.L. 2014. Impatiens Downy Mildew: Description of a Devastating Disease & Hope for the Future. NJ Nursery & Landscape Association NJ Plants Annual Trade Show. January 2014.

Palmer, C.L., and N. Shishkoff. 2014. Boxwood Blight: A New Scourge, a New Paradigm for Collaborative Research. Outlooks on Pest Management 25(3):230-236.

Palmer, C. L., S. E. Nester, J. M. Revell, M. R. Bonde. 2014. Fungicide impact on *in vitro* germination of *Puccinia horiana*, the causal agent of Chrysanthemum White Rust. Abstract. American Phytopathological Society Annual Meeting. Phytopathology 104:S3.89.

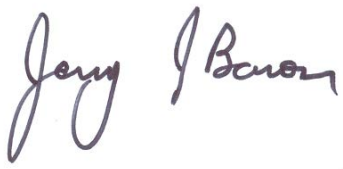
Starner, V.R., J.J. Baron and D.L. Kunkel. 2014. Invited lecture "The IR-4 Project at Rutgers" 3/10/14 in Rutgers Entomology course "Agricultural Entomology and Pest Management" taught by Dr. George Hamilton, New Brunswick, NJ.

Starner, V.R., K. Homa, J.J. Baron and D.L. Kunkel. 2014. Invited lectures "The IR-4 Project and IPM" and "The IR-4 Project – an Overview" 4/4/14 in Delaware Valley College IPM class, Doylestown, PA.

Starner, V. and S. Novack, 2014. "Another Day on the DelMarVa", IR-4/EPA/USDA Field Tour June 11, 2014 tour book. New Jersey Agricultural Experiment Station Publication No. P-27200-22-14, 16 pp.

Starner, V, K. Dorschner, D. Kunkel. 2014. "IR-4 Project Regulatory Research Update", 12/3/14 presentation at the Brown Marmorated Stink Bug IPM Working Group Meeting, Winchester, VA.

Approved by:



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Rutgers, The State University of New Jersey

D. Soderlund, Chair,
IR-4 Project Management Committee
Cornell University

Mary Duryea, Chair, IR-4 Administrative Advisers
University of Florida

ATTACHMENT 1

Participants in the Process

Stakeholder Representatives

These are the primary customers for IR-4 Project services. A concerted effort is always made to seek input from growers/commodity group representatives for establishing research priority setting policies. The **IR-4 Commodity Liaison Committee (CLC)** provides input to the IR-4 Project Management Committee on overall operations and program direction. They are often effective communicators to Congress on the importance of the IR-4 Project and its deliverables to specialty crop agriculture in the United States. Members include:

Dr. Michael Aerts, Florida Fruit and Vegetable Association
Mr. Mark Arney, Nat'l Watermelon Promotion Board
Mr. Kirk Baumann, Ginseng Board of Wisconsin
Dr. Lori Berger, Ag Business Resources
Dr. Joe Bischoff, AmericanHort
Dr. Michael Bledsoe, Village Farms, L.P.
Dr. A. Richard Bonanno, Pleasant Valley Farms and CLC Chair
Mr. Bruce Buurma, Buurma Farms Inc.
Mr. James R. Cranney, California Citrus Quality Council
Dr. Brian R. Flood, Del Monte USA
Ms. Ann E. George, Washington Hop Commission
Mr. Hank Giclas, Western Growers Association
Mr. Terry Humfeld, Cranberry Institute
Mr. John Keeling, National Potato Council
Mr. Phil Korson, Cherry Marketing Institute
Mr. Eric Maurer, Engage Agro
Mr. Maximilian Merrill, Western Growers Association
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Mr. Dennis Nuxoll, Western Growers Association
Ms. Laura Phelps, American Mushroom Institute
Mr. Ray Prewett, Texas Vegetable Association
Mr. Ray Ratto, Ratto Brothers
Mr. Paul Schlegel, American Farm Bureau Federation
Mr. Steven Salisbury, Mint Industry Research Council
Ms. Lin Schmale, Society of American Florists
Mr. Todd Scholz, USA Dry Pea & Lentil Council
Dr. Alan Schreiber, Agriculture Development Group, Inc.
Mr. Berry Tanner, National Watermelon Association (alternative)
Mr. Dave Trinka, MBG Marketing
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Cooperating Government Departments and Agencies

Agriculture and Agri Food Canada (CN-PMC)
American Public and Land Grant University Association (APLU)
Health Canada
State Agricultural Experiment Stations/Land Grant Universities (SAES)
State of California Department of Pesticide Regulation (DPR)
U.S. Department of Agriculture, National Institute of Food and Agriculture (NIFA)
U.S. Department of Agriculture, Agricultural Research Service (ARS)
U.S. Department of Agriculture, Foreign Agriculture Service (FAS)
U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS)
U.S. Department of Defense, Deployed Warfighter Protection Program (DWFP)
U.S. Environmental Protection Agency (EPA)

ATTACHMENT 1 Continued

Crop Protection Industry

AgBio Development Inc.
AgraQuest Inc.
Agrimar
AgroSource Inc.
Albaugh, Inc.
Amvac Chemical Corporation
Arkion Life Sciences
Arysta LifeScience North America Corp.
BASF Corporation
Bayer CropScience USA
Bayer Environmental Science
BetaTec
BioBest
Bio HumaNetics
BioProdex
BioSafe Systems
Bioworks
CAI Limited
Certis USA
Cheminova
Chemtura AgroSolutions
Dow AgroSciences
DuPont Agricultural Products
Engage Agro
FMC Corporation
Gowan CompanyIsagro, USA
ISK Biosciences
Janssen Pharmaceutica
K-I Chemical USA Inc.
MGK
Landis International
Lonza Inc.
Makhteshim-Agan N.A. Inc.
Marrone BioInnovations, Inc.
Monsanto Company
Natural Industries
Neudorff
Nichino America, Inc.
Nisso America, Inc.
Novozymes, Inc.
Nufarm Americas, Inc.
OHP
Sankyo Agro Co., Ltd.
SePro Corporation
Sipcam Advan
Summerdale, Inc.
Syngenta Crop Protection Inc.
Syngenta Flowers
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ATTACHMENT 1 Continued

IR-4 Project Headquarters (HQ)

IR-4 Headquarters is located at the 500 College Road East, Suite 201W, Princeton, NJ 08540; (732) 932-9575

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ATTACHMENT 1 Continued

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Dr. R. Hartzler	IA
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Dr. V. Krischik	MN
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ATTACHMENT 1 Continued

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ATTACHMENT 1 Continued

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R. Saldana	TX
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R. Splichal	TX
D. Studstill	FL
S. Yates	FL

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D. Anderson	OR
M. Bari	CA
B. Boutwell	CA
J. Coughlin	HI
M. Craig	NM
J. DeFrancesco	OR
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D. Groenendale	WA
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J. Kam	HI
M. Kawate	HI
G. Koskela	OR
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C. Mallory-Smith	OR
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M. Miller	CA
T. Miller	WA
M. Mitchell	CA
D. Morishita	ID
C. Oman	CO
J. Schroeder	NM
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R. Smith	CA
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ARS

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H. Peill	NS
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D. Ulrich	SK
M. Weber-Henricks	ON
G. Whittington	SK
R. Wismer	ON

ATTACHMENT 2
2014 Food Use Research Projects - Residue Trials

Chemical	Crop	PR #
Acequinocyl	Guava	8600
Acequinocyl	Lychee	8602
Acifluorfen	Bean (Lima) (Succulent & Dried Shelled)	A6300
Acifluorfen	Edamame (vegetable soybean)	10958
Bifenthrin	Apple	11016
Bifenthrin	Clover (Seed Crop)	11297
Bifenthrin	Cranberry	11000
Bifenthrin	Orange	11166
Bifenthrin	Peach	11017
Bifenthrin	Pomegranate	11249
Bromoxynil	Grasses (Seed Crop)	11329
Buprofezin	Fig	11342
Buprofezin	Pepper (Bell) (GH)	8162
Chloroathlonil	Sugar Apple	A3721
Clethodim	Grape	10582
Clethodim	Pecan	11094
Clomazone	Cilantro	11092*
Clomazone	Cucurbit Vegetables	11063*
Clopyralid	Strawberry	11256
Cyflumetofen	Cucumber (GH)	11452
Dinotefuran	Apple	11302
Dinotefuran	Cherry	11305*
Dinotefuran	Peach	11304
Dinotefuran	Plum	11199*
Diquat	Avocado	10816
Diquat	Lychee	10815
Ethaboxam (V-10208) + Fluopicolide	Potato	A11113*
Etoxazole	Beet (sugar)	11233
Famoxadone + Cymoxanil	Hops	A7796
Famoxadone + Cymoxanil	Radish	8757
Fenpyroximate	Celery	11100
Fenpyroximate	Watermelon	11182
Flonicamid	Alfalfa, Clover	A9943
Flonicamid	Sunflower	11383
Florasulam + Fluroxypyr	Grasses (Seed Crop)	11317
Fluazifop-p-butyl	Chives (Rep Crop 19A)	A2087
Fluazifop-p-butyl	Greens (Mustard)	A2076*
Fluazifop-p-butyl	Papaya	11265
Fluazinam	Pea (Edible Podded, Succulent & Dried Shelled)	11231
Fluensulfone	Beet (sugar)	10908*
Fluopicolide	Orange	11021
Flupyradifurone (BYI 02960)	Caneberry	10860*
FTH 545	Cantaloupe	11158

FTH 545	Cucumber	11156
Halosulfuron	Cucumber	10891
Imidacloprid	Corn (Seed Crop)	11270
Indaziflam	Caneberry	10909
Ipconazole	Onion (Seed TRT)	11111*
Isoxaben	Blueberry	10247
Linuron	Sweet Potato	11118
Linuron + Diuron	Sesame	11396
Mandipropamid	Grapefruit	11140
Mandipropamid	Lemon	11139
Mandipropamid	Orange	11138
Nitrapyrin	Cabbage	A2022
Nitrapyrin	Celery	A2024
Nitrapyrin	Grapefruit	11316
Nitrapyrin	Lemon	11314
Nitrapyrin	Lettuce (Head & Leaf)	A2659
Nitrapyrin	Onion (Seed TRT)	11309
Nitrapyrin	Orange	11315
Nitrapyrin	Spinach	A2658
Oxytetracycline	Cherry	11311
Pendimethalin	Celery	10746*
Permethrin	Grape	1953
Propiconazole	Avocado	11053
Pymetrozine	Cucumber (GH)	7968*
Pymetrozine	Tomato (GH)	7969*
Pyraflufen-Ethyl	Hops	8708
Pyrethrins + PBO	Mushroom (White Button)	5954
Pyroxasulfone	Edamame (vegetable soybean)	11133*
Saflufenacil	Caneberry	11079*
Sethoxydim	Caneberry	9934
S-Metolachlor/Metolachlor	Dill	11325
S-Metolachlor/Metolachlor	Rosemary	10819
S-Metolachlor/Metolachlor	Stevia	9872
Spinotoram	Blueberry	11284
Spinosad	Onion (Dry Bulb)	10988
Sulfoxaflor	Artichoke (Globe)	10858*
Sulfoxaflor	Asparagus	11321*
Sulfoxaflor	Blueberry (High Bush)	11296*
Sulfoxaflor	Caneberry	11279*
Thiabendazole	Clover (Seed Crop)	11310
Tolfenpyrad	Caneberry	11263
Trifloxystrobin	Onion	7049*
Trifloxystrobin	Onion	A7049*
Zeta-Cypermethrin	Basil	8397
* *indicates joint studies with Canada PMC.		

ATTACHMENT 3
2014 Efficacty/Crop Safety (E/CS) Research Program

Research to complete E/CS needs for pre-2014 projects/residue studies:

Chemical	Crop	PR#	Comments	ARS trials	State university trials
Sulfentrazone	edamame	10750	not a residue study - need E/CS data to add crop to label	OH, WA	--
DPX-QGU42	crop subgroup 05B	11125	2013 residue study	GA	--
Fomesafen	lima bean	6202	2013 residue study	OH	CA, ID, WI
Indaziflam	high bush blueberry	10882	2013 residue study; multi-year CS trials	GA	OR, NC, MI
Clomazone	dill	11091	2013 residue study	WA	CA, MD
Clomazone	cilantro	11092	2013 residue study		
S-metolachlor	rosemary	10819	2013 residue study	--	FL, MI, NM, NY
Quizalofop	grape	10031	Mfg requires E/CS data before providing submission docs	--	CA, NC
			Totals	6	14

Research to complete E/CS needs for new 2014 residue studies:

Chemical	Crop	PR#	Comments	ARS trials	State university trials
Fomesafen	sweet potato	11115	2014 residue study	GA	AR, NC, WI
Linuron	sweet potato	11118	2014 residue study	GA	AR, NC, WI
Fluazifop	chives	2087	2014 residue study	--	AR, CA, FL
Pendimethalin	celery	10746	2014 residue study	--	CA, FL
Acifluorfen	edamame	10958	2014 residue study	OH	AR, MI, NY
Pyroxasulfone	edamame	11133	2014 residue study	WA	AR, MI, NY, WA
Acifluorfen	lima bean	6300	2014 residue study	--	CA, DE
Saflufenacil	caneberry	11079	2014 residue study	--	OH, WA
			Totals	4	22

Research in 2014 for PPWS (Pest Problem Without Solution) studies:

Chemical	Crop	PR#	Comments	ARS trials	State university trials
Fungicides	parsley	10709	leaf spots	--	FL
Fungicides	dragon fruit	10611	bipolaris fruit rot	--	FL
			Totals	0	2

ATTACHMENT 4
2014 Submissions to EPA, Registrants, Codex, and State Departments of Agriculture

Pest Control Agent / Type*		Commodity or Crop Group	PR#	Date
Streptomycin	B/F	Tomato	1602	Jan 07 2014
		Grapefruit	10043	
		Fruit, pome, group 11-10	11189	
Sethoxydim	H	Bushberry subgroup 13-07B	9933	Jan 15 2014
		Caneberry subgroup 13-07A	10933	
		Berry, low growing, subgroup 13-07G	10934	
		Berry, low growing, except strawberry, subgroup 13-07H	10935	
		Fescue, forage and hay	A4873	
		Fruit, citrus, group 10-10	10936	
		Fruit, pome, group 11-10	10937	
		Fruit, small, vine climbing, subgroup 13-07F, except fuzzy kiwifruit	10938	
		Rapeseed subgroup 20A	10939	
		Sunflower subgroup 20B, except safflower, seed		
		Cottonseed subgroup 20C		
		Vegetable, bulb, group 3-07	10940	
		Vegetable, fruiting, group 8-10	10941	
Novaluron	I	Avocado	9246	
		Carrot	9522	
		Bean	9780	
		Cucumber (Greenhouse)	10237	
		Vegetable, fruiting, group 8-10	11025	
		Fruit, pome, group 11-10	11026	
		Cherry subgroup 12-12A	11414	
		Peach subgroup 12-12B	11415	
		Plum subgroup 12-12C	11416	
Metconazole	F	Pea and bean, dried shelled, except soybean, subgroup 6C	10388	Jan 30 2014
			10389	
			11403	
			11404	
		Sunflower subgroup 20B	10390	
			11405	
		Rapeseed subgroup 20A	11373	
		Fruit, stone, group 12-12	11374	
		Nut, tree, group 14-12	11375	
S-metolachlor	H	Berry, low growing, subgroup 13-07G, except cranberry	1676	Feb 07 2014
		Lettuce	8982	
			10218	
			10099	
		Vegetable, cucurbit, group 9	9406	
			6656	
			3659	
		Vegetable, fruiting, group 8-10, except tabasco pepper and okra	11280	

Pest Control Agent / Type*		Commodity or Crop Group	PR#	Date
S-metolachlor	H	Sunflower subgroup 20B	11281	Feb 07 2014
Pyrethrins + PBO**	I	Tomato (greenhouse)	10850	2013
		Lettuce (head) and Spinach	10846	(not previously reported)
		Caneberry	10720	
		Citrus fruit (post-harvest)	10724	
		Strawberry	10719	
Diflubenzuron**	I	Peanut	A9891	Feb 11 2014
Captan	F	Ginseng	7997	Mar 04 2014
Prohexadione Calcium	P	Strawberry	7773	Mar 21 2014
		Watercress	10151	
Clothianidin	I	Fruit, stone, group 12-12	10376	Mar 24 2014
			10377	
			11391	
		Rice, wild	11243	
		Tomato subgroup 8-10A	11392	
		Pepper/Eggplant subgroup 8-10B	11436	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11390	
		Nut, tree, group 14-12	11388	
Clothianidin**	I	Grapefruit	A10168	Mar 03 2014
Chlorothalonil***	F	Cranberry	10801	Mar 12 2014
Potassium phosphite***	F	Citrus	10687	Mar 13 2014
Pyrethrins + PBO**	I	Mustard greens and Cabbage	10847	Mar 14 2014
Fludioxonil	F	Carrot (post-harvest)	11181	Apr 24 2014
		Fruit, stone, group 12-12	11449	
Difenoconazole	F	Ginseng	10446	Apr 24 2014
		Artichoke, globe	10387	
		Cucumber (greenhouse)	10665	
		Fruit, stone, group 12-12	11438	
		Nut, tree, group 14-12	11439	
Cyprodinil	F	Artichoke, globe	10387	Apr 24 2014
		Cucumber (greenhouse)	10665	
		Fruit, stone, group 12-12	11443	
		Guava	7127	
		Pomegranate	10613	
		Tomato (small)	A8124	
Ethofumesate	H	Small grains	9882	May 01 2014
Fludioxonil	F	Carrot (post-harvest)	11181	May 06 2014
		Fruit, stone, group 12-12	11449	
Pendimethalin	H	Caneberry subgroup 13-07A	9840	May 27 2014
		Bushberry subgroup 13-07B	10181	
		Nut, tree, group 14-12	11454	
Methoxyfenozide*	I	Orange	B9367	May 29 2014
Saflufenacil*	H	Pomegranate	10786	May 30 2014
Esfenvalerate	I	Oilseed group 20 (additional data to support earlier submission)	5150	Jun 23 2014
Pyrimethanil	F	Cucumber (greenhouse)	10284	Jul 16 2014

Pest Control Agent / Type*		Commodity or Crop Group	PR#	Date
Pyrimethanil	F	Fruit, pome, group 11-10	11425	Jul 16 2014
		Orange subgroup 10-10A	11424	
		Lemon subgroup 10-10B	11497	
		Grapefruit subgroup 10-10C	11498	
		Fruit, stone, group 12-12	11426	
		Tomato subgroup 8-10A	11427	
Methoxyfenozide	I	Chives	7240	Jul 16 2014
		Herb subgroup 19A, except chive, fresh, leaves		
		Onion, green, subgroup 3-07B, except chive		
		Nut, tree, group 14-12	11471	
		Fruit, stone, group 12-12, except plum, prune, fresh	11472	
Halosulfuron-methyl	H	Fruit, pome, group 11-10	A9722	Jul 17 2014
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F (for regional registration east of the Rocky Mountains)	A7768	
Pronamide**	H	Lettuce (leaf)	8709 9149 11278	Jul 21 2014
Diflubenzuron	I	Carrot	8643	Aug 06 2014
		Alfalfa	8678 B8678	
		Peach subgroup 12-12B	8664	
		Plum subgroup 12-12C		
		Nut, tree, group 14-12	11420	
		Cottonseed subgroup 20C	11421	
		Pepper/Eggplant subgroup 8-10B	5526 8910	
Acetamiprid	I	Clover	A9600 B9600	Aug 21 2014
Saflufenacil**	H	Pomegranate	10786	Aug 07 2014
Abamectin	I	Vegetable, fruiting, group 10	11058 5076	Sep 02 2014
		Fruit, citrus, group 10-10	11057	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11059	
		Berry, low growing, subgroup 13-07G	11186	
		Fruit, stone, group 12-12	11184	
		Fruit, pome, group 11-10	11242	
		Nut, tree, group 14-12	11185	
		Papaya	4078	
		Star apple	7825	
		Black Sapote	7826	
		Sapodilla	7827	
		Canistel	7828	
		Mamey sapote	7829	
		Guava	6435	
		Feijoa	11578	
		Jaboticaba	7832	

Pest Control Agent / Type*		Commodity or Crop Group	PR#	Date
Abamectin	I	Wax jambu	7833	Sep 02 2014
		Starfruit (carambola)	7819	
		Passion fruit	7835	
		Acerola	7836	
		Lychee	7831	
		Longan	11574	
		Spanish lime	11575	
		Ramutan	11576	
		Pulasan	11577	
		Pineapple	8439	
		Bean	5478 7271	
		Onion, green, subgroup 3-07B	A4068	
NAA	P	Pomegranate	A5389	Sep 03 2014
Clofentezine	I	Avocado	9321	Sep 04 2014
		Papaya	9322	
		Fruit, pome, group 11-10	11531	
		Cherry subgroup 12-12A	11532	
		Peach subgroup 12-12B	11533	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11534	
Flubendiamide	I	Bushberry subgroup 13-07B	9981	Sep 09 2014
		Fruit, pome, group 11-10	11581	
		Fruit, stone, group 12-12	11582	
		Nut, tree, group 14-12	11583	
		Vegetable, fruiting, group 8-10	11580	
		Sunflower subgroup 20B	11584	
Azoxystrobin	F	Ti palm	10994	Sep 23 2014
		Fruit, stone, group 12-12	11430	
		Nut, tree, group 14-12	11431	
Propiconazole	F	Dill	6589	Oct 01 2014
		Brassica, leafy greens, subgroup 5B	6236 6235 6509	
		Radish	6385	
		Ti palm	10995	
		Watercress	9937	
		Fruit, stone, group 12-12	11597	
		Nut, tree, group 14-12	11598	
Spirodiclofen**	I	Date	10482	Oct 22 2014
Fluazifop-p-butyl	H	Lettuce (head and leaf)	2072 2772 3399	Nov 05 2014
		Rhubarb	A2404	
		Onion, green	3405	
		Onion, bulb, subgroup 3-07A	11362	
		Vegetable, tuberous and corm, except potato, subgroup 1D	11361 2402 2403	

Pest Control Agent / Type*		Commodity or Crop Group	PR#	Date
Fluazifop-p-butyl	H	Vegetable, tuberous and corm, except potato, subgroup 1D	3029	Nov 05 2014
		Caneberry subgroup 13-07A	3947 2681	
		Bushberry subgroup 13-07B	2083	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11365	
		Strawberry, perennial	A2085	
		Fine fescue grasses (for seed), to support regional registration in the Pacific Northwest	9825	
Penoxsulam	H	Fruit, pome, group 11-10	10944	Nov 11 2014
		Fruit, stone, group 12-12	10899	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11609	
		Nut, tree, group 14-12	11610	
		Olive	10866	
		Pomegranate	10867	
Acetamiprid**	I	Cranberry	10943	Nov 18 2014
Clethodim	H	Onion, bulb, subgroup 3-07A	10545	Dec 01 2014
		Vegetable, fruiting, group 8-10	10543	
		Fruit, pome, group 10-10	6873 6874	
		Fruit, stone, group 12-12	6877 6948 6875	
		Berry, low growing, subgroup 13-07G, except cranberry	10546	
		Rapeseed subgroup 20A, except flax	10544	
		Sunflower subgroup 20B	11612	
		Cottonseed subgroup 20C	11613	
		Stevia	11205	
Zoxamide	F	Ginseng	9708	Dec 05 2014
		Tomato subgroup 8-10A	11615	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11616	
		Vegetable, tuberous and corm, subgroup 1C	11617	
Carfentrazone-ethyl	H	Artichoke, globe	10721	Dec 08 2014
		Asparagus	10278	
		Peppermint	9427	
		Spearmint		
		Teff	10196	
		Vegetable, bulb, group 3-07	11486	
		Vegetable, fruiting, group 8-10	11487	
		Fruit, citrus, group 10-10	11488	
		Fruit, pome, group 11-10	11489	
		Fruit, stone, group 12-12	11490	
		Caneberry subgroup 13-07A	11491	
		Bushberry subgroup 13-07B	11492	
		Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F	11493	

Pest Control Agent / Type*		Commodity or Crop Group	PR#	Date
Carfentrazone-ethyl	H	Berry, low growing, subgroup 13-07G	11494	Dec 08 2014
		Nut, tree, group 14-12	11495	
		Oilseed group 20	11496	
			11145	

*B=bactericide, F=fungicide, H=herbicide, I=insecticide/acaricide, M=molluscide, P=plant growth regulator

** Submitted to MFG for Submission to EPA, support a label expansion or in response to a DCI

*** Submitted to MFG for international markets

ATTACHMENT 4A
2014 Submissions to Joint Meeting on Pesticide Residues (JMPR)

Pest Control Agent / Type*		Commodities	Date
Acetamiprid	I	Asparagus, Mustard Greens, Sweet Corn	Dec-14
Tebuconazole	F	Asparagus, Bulb Onion, Green Onion	Dec-14
Cyazofamid	F	Hops Basil**, Succulent bean**, succulent shelled bean**, Lettuce**, spinach**	Dec-14
Flonicamid	F	Canola**; mint**; strawberry**	Dec-14
Flupyradifurone	F	blueberry **; prickly pear cactus **	Dec-14
Chlorothalonil	F	Ginseng** Mango**, Peppers**, Mushrooms**, Pistachio**, Horseradish**, Rhubarb** cherry**	Dec-14
Bifenthrin	I	Head Lettuce, Spinach, Celery, Pea, Snap bean, Lima Bean, Blueberry, Grape	Dec-14
*F=fungicide, H=herbicide, I=insecticide/acaricide, M=molluscide, P=plant growth regulator, R=rodenticide			
**IR-4 data submitted by manufacturer			

ATTACHMENT 5
2014 Tolerance Successes - Permanent Tolerances
Published in the *Federal Register*

Pest Control Agent / Type*		Date	Commodity or Crop Group	PR#	No. of Uses	No. of Tolerances
Cyantraniliprole	I	Feb 05 2014	Vegetable, bulb, subgroup 3-07A**	10107	26	1
			Vegetable, bulb, subgroup 3-07B**			
			Vegetable, fruiting, group 8-10**	10104	21	1
				10122		
Chlorantraniliprole	I	Feb 07 2014	Onion, green, subgroup 3-07B**	A10204	15	1
			Papaya**	B10204	1	1
			Passionfruit**	B10204	1	1
			Spice subgroup 19B**	A10204	30	1
			Fruit, stone, group 12-12, except cherry, Chickasaw plum, and damson plum[1**]	11200	11	1
Linuron	H	Feb 12 2014	Cilantro/Coriander**	1625	1	3
			Dill**	1432	1	4
			Horseradish**	3609	1	1
			Parsley**	3035	1	2
			Pea, dry**	9651	2	1
Triflumizole	F	Mar 05 2014	Tomato (greenhouse only)	9299	2	1
			Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F[2]	11048	5	1
			Berry, low growing, subgroup 13-07G, except cranberry[2]	11049	7	1
			Fruit, pome, group 11-10[2]	11050	10	5
Clomazone	H	Apr 02 2014	Brassica, head and stem, subgroup 5A	A3569	9	1
			(Replaces Cabbage tolerance)			
			Pea, southern Cowpea, forage and hay	8934	1	4
			Rhubarb	8724	1	1
Fenoxaprop-ethyl	H	May 07 2014	Grass hay	6220	1	1
Bifenazate	I	Aug 06 2014	Herb subgroup 19A, except chervil and chive	8846	38	1
			Fruit, pome, group 11-10[1]	11060	5	1
			Vegetable, fruiting, group 8-10[1]	11061	12	1
			Timothy, forage and hay	9037	1	2
Kasugamycin	F	Aug 29 2014	Fruit, pome, group 11-10[1**]	9773	5	1
				9619		
Saflufenacil	H	Sep 03 2014	Olive**	10787	1	1
Sulfentrazone	H	Sep 12 2014	Apple	7770	1	1

Pest Control Agent / Type*		Date	Commodity or Crop Group	PR#	No. of Uses	No. of Tolerances
Fluensulfone	N	Sep 24 2014	Vegetable, fruiting, group 8-10**	10462	21	1
				10463		
			Vegetable, cucurbit, group 9**	10459	14	1
				10461		
				10599		
				10460		
Metrafenone	F	Oct 22 2014	Peach subgroup 12-12B**	10369	2	1
			Apricot**	11252	1	1
			Cherry subgroup 12-12A**	10370	5	1
			Vegetable, cucurbit, group 9**	10477	14	1
				10478		
			Hops**	10466	1	1
			Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F[2]	11253	5	1
			Vegetable, fruiting, group 8-10	10479	21	1
Paraquat	H	Oct 29 2014	Vegetable, tuberous and corm, subgroup 1C[2]	10583	15	1
				Totals	309	51
[1] Update of established tolerance on old crop group or subgroup						

[2] Conversion of established tolerance(s) on representative commodities to a crop group or subgroup tolerance

** These uses have been found on an approved market labels per www.cdms.net or on company website.

IR-4 Project Tolerance Successes from 2013, where uses are now listed on product labels

Pest Control Agent / Type*		Date	Commodity or Crop Group	PR#	No. of Uses	No. of Tolerances
Imidacloprid	I	Jun 05 2013	Fish**	10553	1	2
			Fish-shellfish, mollusk**			
Ethalfluralin	H	Jul 03 2013	Rapeseed subgroup 20A[2]**	10550	27	2
			Sunflower subgroup 20B[2]**			
Hexythiazox	I	Jul 17 2013	Pepper/Eggplant subgroup 8-10B**	9134	10	1
			Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F[2]**	10963	6	1
Imazosulfuron	H	Jul 24 2013	Vegetable, tuberous and corm, subgroup 1C**	9645	17	1
			Melon subgroup 9A**	9819	3	1
Trifluralin	H	Jul 31 2013	Oilseed group 20[2]**	10749	29	1
Pyraclostrobin	F	Aug 28 2013	Artichoke, globe**	9689	1	1

Pest Control Agent / Type*		Date	Commodity or Crop Group	PR#	No. of Uses	No. of Tolerances
Prometryn	H	Sep 11 2013	Bean, snap, succulent**	8978	1	1
			Dill (replaces tolerance with regional restrictions)**	A3040	1	3
Quinoxyfen	F	Sep 18 2013	Berry, low growing, subgroup 13-07G[2**]	11065	8	1
			Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F[2**]	11064	5	1
			Vegetable, fruiting, group 8-10[3**]	9289	19	1
Methoxyfenozide	I	Oct 02 2013	Herb subgroup 19A, except chives**	7241	39	1
			Date**	10154	1	1
			Caneberry subgroup 13-07A**	10470	5	1
			Sorghum, sweet and grain	7525	2	8
			Grain, aspirated fractions**			
			Pea and bean, dried shelled, except soybean, subgroup 6C, except Pea, blackeyed, seed and Pea, southern, seed[4**]	11149	0	1
			Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F[2**]	11150	5	1
			Berry, low growing,	11151	8	1
			subgroup 13-07G[2**]			
			Fruit, pome, group 11-10[1**]	11152	5	1
			Vegetable, fruiting, group 8-10[3**]	11153	10	1
			Rapeseed subgroup 20A[6**]	11154	0	1
			Sunflower subgroup 20B[6**]	11155	0	1
			Atemoya[5**]	7065	1	1
			Sugar apple[5**]	7066	1	1
			Cherimoya[5**]	11173	1	1
			Custard apple[5**]	11174	1	1
			Ilama[5**]	11175	1	1
			Soursop[5**]	11176	1	1
			Biriba[5**]	11177	1	1
Fomesafen[7]	H	Nov 01 2013	Pea, succulent**	8083	7	1
			Pumpkin**	9115	1	1
			Soybean, vegetable, succulent**	10287	1	1
			Squash, summer**	9538	11	1
			Squash, winter**			
			Watermelon**	8945	1	1
Boscalid	F	Nov 08 2013	Artichoke, globe**	9689	1	1
Etofenprox	I	Nov 27 2013	All food commodities[6 **]	---	0	1
Flonicamid	I	Dec 11 2013	Alfalfa**	9943	3	3
			Vegetable, fruiting, group 8-10[1 **]	11196	11	1
			Fruit, pome, group 11-10[1**]	11197	5	1
			Fruit, stone, group 12-12[1**]	11198	11	1
			Mint**	9358	2	2

Pest Control Agent / Type*		Date	Commodity or Crop Group	PR#	No. of Uses	No. of Tolerances
Mandipropamid	F	Dec 20 2013	Basil **	10124	1	2
			Bean, snap**	10324	1	1
			Ginseng**	10061	1	1
			Fruit, small, vine climbing, except fuzzy kiwifruit, subgroup 13-07F[2]**	11192	5	1
			Onion, bulb, subgroup 3-07A[2**]	11193	3	1
			Onion, green, subgroup 3-07B[2**]	11194	6	1
			Vegetable, fruiting, group 8-10[1**]	10485	11	1
Totals					302	65

[1] Update of established tolerance on old crop group or subgroup

[2] Conversion of established tolerance(s) on representative commodities to a crop group or subgroup tolerance

** These uses have been found on an approved market labels per www.cdms.net or on company website.

ATTACHMENT 6
Pending Food Program Submissions to EPA

PR #	Chemical	Commodity (Full name)
7732	2,4-D	STRAWBERRY (ANNUAL)
275	2,4-DB	GUAR
8992	2,4-DB	LENTIL
9218	ACEQUINOCYL	AVOCADO
11052	ALL PESTICIDES	LEAVES OF ROOT/TUBER VEGETABLES
967	ANTHRAQUINONE	RICE
3735	ATRAZINE	SORGHUM (SWEET)
8052	AVG	CHERRY
11055	AZOXYSTROBIN	BLUEBERRY
9026	BETA-CYFLUTHRIN	FLAX
10002	BIFENAZATE	BANANA
11462	BIFENAZATE	CHERRY SUBGROUP
11463	BIFENAZATE	PEACH SUBGROUP
11464	BIFENAZATE	PLUM SUBGROUP
11465	BIFENAZATE	TREE NUT GROUP
9338	BROMOXYNIL	MILLET
11201	CHLORANTRANILIPROLE	TREE NUT GROUP
10087	CHLORFENAPYR	BASIL & CHIVES (GH)
11062	CHLORFENAPYR	FRUITING VEGETABLES GROUP
10367	CHLOROTHALONIL	ALMOND
10859	CHLOROTHALONIL	CHERRY (SOUR)
10164	CHLOROTHALONIL	GRAPEFRUIT
5423	CHLOROTHALONIL	GREENS (MUSTARD)
10100	CHLOROTHALONIL	GUAVA
10165	CHLOROTHALONIL	LEMON
147	CHLOROTHALONIL	LETTUCE (HEAD & LEAF)
6420	CHLOROTHALONIL	LYCHEE
10163	CHLOROTHALONIL	ORANGE
148	CHLOROTHALONIL	RADISH
397	CHLOROTHALONIL	SPINACH
3624	CLOPYRALID	PEAR
11046	CYANTRANILIPROLE (HGW86)	CANEBERRY
10874	CYANTRANILIPROLE (HGW86)	COFFEE
10327	CYANTRANILIPROLE (HGW86)	LETTUCE (GH)
10328	CYANTRANILIPROLE (HGW86)	STRAWBERRY
10265	CYAZOFAMID	CHIVES (REP CROP 19A)
10656	CYAZOFAMID	TOMATO (GH)
1548	DCPA	ASPARAGUS
11433	DCPA	BULB VEGETABLE GROUP
8332	DCPA	CARROT
11435	DCPA	LOW GROWING BERRY SUBGROUP
11258	DIFENOCONAZOLE + CYPRODINIL	WATERCRESS
10818	DIQUAT	BANANA
10766	DIQUAT	ONION (DRY BULB)
10669	DIQUAT	PEPPER (BELL & NONBELL)

10688	DIQUAT	TOMATO
9737	DIQUAT	WATERCRESS
2399	DIURON	CHERRY
3071	DIURON	PLUM
10623	DPX-QGU42	ASPARAGUS
7137	EMAMECTIN BENZOATE	BASIL
10685	EMAMECTIN BENZOATE	CHERRY
10115	ETHEPHON	FIG
8814	ETHEPHON	SWEET POTATO
9918	ETHOFUMESATE	CARROT
10049	ETHOPROP	MINT
4124	ETHYLENE	PINEAPPLE
11254	ETOFENPROX	GRASSES
11254	ETOFENPROX	LETTUCE, LEAF
11254	ETOFENPROX	ORANGE
10577	ETOFENPROX + PIPERONYL BUTOXIDE	MUSHROOM (WHITE BUTTON)
11099	ETOXAZOLE	CORN (SWEET)
7262	FAMOXADONE + CYMOXANIL	BEAN, LIMA (SUCCULENT & DRIED SHELLED)
8875	FAMOXADONE + CYMOXANIL	CARROT
8759	FAMOXADONE + CYMOXANIL	GREENS (MUSTARD)
10677	FAMOXADONE + CYMOXANIL	MANGO
10507	FENHEXAMID	BUSHBERRY SUBGROUP
10506	FENHEXAMID	CANEBERRY SUBGROUP
9741	FENHEXAMID	KIWIFRUIT (PREHARVEST)
10510	FENHEXAMID	LOW GROWING BERRY SUBGROUP
7149	FENHEXAMID	ONION
8243	FENHEXAMID	ONION (GH TRANSPLANT)
10509	FENHEXAMID	SMALL FRUIT VINE CLIMBING SUBGROUP, EXCEPT FUZZY KIWIFRUIT
10508	FENHEXAMID	SMALL FRUIT VINE CLIMBING SUBGROUP, EXCEPT GRAPE
11333	FENPROPATHRIN	CHERRY SUBGROUP
9266	FENPROPATHRIN	GREENS (MUSTARD)
11334	FENPROPATHRIN	PEACH SUBGROUP
11335	FENPROPATHRIN	PLUM SUBGROUP
7946	FENPROPATHRIN	SWEET POTATO
11332	FENPROPATHRIN	TREE NUT GROUP
9517	FENPROPATHRIN	TURNIP (ROOTS)
8097	FENPYROXIMATE	CANEBERRY
11246	FENPYROXIMATE	TREE NUTS
10475	FLONICAMID	BEAN (DRIED SHELLED)
10999	FLONICAMID	PEPPER (GH)
11363	FLUAZIFOP-P-BUTYL	CITRUS FRUIT GROUP
11364	FLUAZIFOP-P-BUTYL	STONE FRUIT GROUP
7093	FLUAZINAM	CABBAGE
9238	FLUAZINAM	CUCUMBER
6796	FLUAZINAM	MAYHAW
8916	FLUAZINAM	SQUASH
11618	FLUAZINAM	TUBEROUS AND CORM VEGETABLES SUBGROUP

10374	FLUDIOXONIL	CELERY
10907	FLUENSULFONE	CARROT
10224	FLUMIOXAZIN	BROCCOLI
9700	FLUMIOXAZIN	CANEBERRY (BLACKBERRY)
10249	FLUMIOXAZIN	CANEBERRY (BLACKBERRY)
10229	FLUMIOXAZIN	CANEBERRY (RASPBERRY)
10605	FLUMIOXAZIN	CLOVER (SEED CROP)
11371	FLUMIOXAZIN	FRUITING VEGETABLES GROUP
10764	FLUMIOXAZIN	GRAPEFRUIT
10686	FLUMIOXAZIN	GUAYULE
10763	FLUMIOXAZIN	LEMON
11370	FLUMIOXAZIN	LOW GROWING BERRY SUBGROUP
11369	FLUMIOXAZIN	ONION, BULB SUBGROUP
10799	FLUMIOXAZIN	ORANGE
11366	FLUMIOXAZIN	POME FRUIT GROUP
11368	FLUMIOXAZIN	SMALL FRUIT VINE CLIMBING SUBGROUP, EXCEPT FUZZY KIWIFRUIT
11367	FLUMIOXAZIN	STONE FRUIT GROUP
11608	FLUMIOXAZIN	TREE NUTS
10121	FLUOPICOLIDE	BASIL
10323	FLUOPICOLIDE	BEAN (SNAP)
11191	FLUOPICOLIDE	FRUITING VEGETABLES GROUP
10916	FLUOPICOLIDE	HOPS
11190	FLUOPICOLIDE	SMALL FRUIT VINE CLIMBING SUBGROUP, EXCEPT FUZZY KIWIFRUIT
10785	FLUPYRADIFURONE (BYI 02960)	CUCUMBER (GH)
10770	FLUPYRADIFURONE (BYI 02960)	POMEGRANATE
11188	FLUPYRADIFURONE (BYI 02960)	PRICKLY PEAR CACTUS
10784	FLUPYRADIFURONE (BYI 02960)	TOMATO (GH)
10807	FLUROXYPYR + FLORASULAM + PYROXSULAM	TEFF
9710	FLUTOLANIL	CARROT
9392	FLUTOLANIL	GINSENG
10393	FLUTOLANIL	GREENS (MUSTARD) (SEED TRT)
9711	FLUTOLANIL	RADISH
10476	FOMESAFEN	PEA (DRY)
10282	FOMESAFEN	STRAWBERRY
10439	FOMESAFEN	STRAWBERRY (PERENNIAL)
11156	FTH 545	CUCUMBER
11157	FTH 545	SQUASH (SUMMER)
8056	GLYPHOSATE	ONION (DRY BULB)
6312	GLYPHOSATE	STRAWBERRY
9494	IMAZALIL	MUSHROOM (WHITE BUTTON)
7669	IMIDACLOPRID	BLUEBERRY (HIGH BUSH)
10882	INDAZIFLAM	BLUEBERRY (HIGH BUSH)
10654	INDAZIFLAM	COFFEE
11071	INDAZIFLAM	HOPS
9521	INDOXACARB	GRASSES (SEED CROP)

7603	ISOXABEN	APPLE
10230	KASUGAMYCIN	CHERRY
8742	LAMBDA-CYHALOTHRIN	ASPARAGUS (FERN)
10255	LAMBDA-CYHALOTHRIN	BROCCOLI RAAB
10343	LAMBDA-CYHALOTHRIN	BULB VEGETABLES SUBGROUP
9390	LAMBDA-CYHALOTHRIN	CARROT
9926	LAMBDA-CYHALOTHRIN	GREENS (MUSTARD)
9430	LAMBDA-CYHALOTHRIN	MILLET, PEARL
9842	LAMBDA-CYHALOTHRIN	OKRA
9381	LAMBDA-CYHALOTHRIN	RADISH
8850	LAMBDA-CYHALOTHRIN	RICE, WILD
9380	LAMBDA-CYHALOTHRIN	RUTABAGA
10344	LAMBDA-CYHALOTHRIN	TEA
9379	LAMBDA-CYHALOTHRIN	TURNIP (ROOTS)
10540	LAMBDA-CYHALOTHRIN + THIAMETHOXAM	AVOCADO
6684	LAMBDA-CYHALOTHRIN + THIAMETHOXAM	GUAVA
10221	LINURON	BASIL
8912	MANCOZEB	BLUEBERRY
1703	MEFENOXAM	CUCUMBER (GH)
11376	MESOTRIONE	BERRY & SMALL FRUIT GROUP
10338	METALDEHYDE	BEET (GARDEN)
11038	METALDEHYDE	HOPS
10335	METALDEHYDE	WHEAT
6388	METRIBUZIN	PEA (EDIBLE PODDED & SUCCULENT SHELLED)
3524	NAA	ALMOND
3523	NAA	PLUM
3525	NAA	WALNUT
3616	OXYFLUORFEN	CANEBERRY (RASPBERRY)
9822	OXYFLUORFEN	COFFEE
6318	OXYFLUORFEN	KENAF
3574	OXYFLUORFEN	ONION (GREEN)
3573	OXYFLUORFEN	SHALLOT
9352	OXYFLUORFEN	STRAWBERRY (TRANSPLANTS)
7377	OXYFLUORFEN	TI PALM
4132	OXYFLUORFEN	TOMATO
11255	PENDIMETHALIN	SAFFLOWER
10865	PENFLUFEN	ONION
10022	PENTHIOPYRAD	CILANTRO
11444	PENTHIOPYRAD	LETTUCE (GH)
10840	PERMETHRIN	TEA
11445	PYMETROZINE	LETTUCE (GH)
10855	PYRETHRINS + PBO	HERBS & SPICES GROUP
10852	PYRETHRINS + PBO	STONE FRUIT GROUP
8036	PYRIDABEN	CUCUMBER (GH)
10793	PYRIFLUQUINAZON	CUCUMBER (GH)
8295	QUINCLORAC	ASPARAGUS
10435	QUINCLORAC	BLUEBERRY
10436	QUINCLORAC	CANEBERRY

10031	QUIZALOFOP	GRAPE
11379	RIMSULFURON	CITRUS FRUIT GROUP
7888	RIMSULFURON	CRANBERRY
10657	RIMSULFURON	GRASSES (SEED CROP)
11380	RIMSULFURON	POME FRUIT GROUP
11378	RIMSULFURON	SMALL FRUIT VINE CLIMBING SUBGROUP, EXCEPT FUZZY KIWIFRUIT
11381	RIMSULFURON	STONE FRUIT GROUP
11382	RIMSULFURON	TREE NUT GROUP
11377	RIMSULFURON	TUBEROUS/CORM VEGETABLES
8345	SETHOXYDIM	VERNONIA
10039	SPIRODICLOFEN	BANANA
10482	SPIRODICLOFEN	DATE
9330	SPIRODICLOFEN	SUGAR APPLE
9971	SPIROMESIFEN	CANTALOUPE
9970	SPIROMESIFEN	CUCUMBER
10800	SPIROMESIFEN	FRUIT VEGETABLES
9842	SPIROMESIFEN	GRASSES
9290	SPIROMESIFEN	OKRA
9972	SPIROMESIFEN	SQUASH (SUMMER)
10551	SPIROMESIFEN	WATERCRESS
10788	SPIROTETRAMAT	CARROT
11455	SPIROTETRAMAT	STONE FRUITS
11456	SPIROTETRAMAT	TREE NUTS
10114	SULFUR DIOXIDE	FIG
10134	TEBUCONAZOLE	TOMATO (GH)
6481	TEBUCONAZOLE	WATERCRESS
11235	TERBACIL	OREGANO
9017	TERBACIL	PEACH
8959	TERBACIL	STRAWBERRY (ANNUAL)
10880	THIABENDAZOLE	MUSHROOM (WHITE BUTTON)
10246	THIAMETHOXAM	CANEBERRY
9709	THIOPHANATE METHYL	BEAN (SNAP)
8614	THIOPHANATE METHYL	PEPPER (FIELD & GH)
10427	TOLFENPYRAD	AVOCADO
10380	TOLFENPYRAD	BLUEBERRY
9657	TOLFENPYRAD	ONION
10869	TOLFENPYRAD	STRAWBERRY
10634	TOLFENPYRAD	TOMATO (GH)
10820	TRIFLURALIN	ROSEMARY
10652	V-10208	CANTALOUPE
10651	V-10208	CUCUMBER (FIELD & GH)
10682	V-10208	GINSENG
10650	V-10208	PEPPER (BELL & NONBELL)
10649	V-10208	SQUASH (SUMMER)
9736	ZINC PHOSPHIDE	GRASSES (SEED CROP)

ATTACHMENT 7 – 2014 ORNAMENTAL HORTICULTURE PROGRAM

FIELD COOPERATORS

NORTHCENTRAL REGION

Dr. Raymond Cloyd	IL
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Dr. David Williams	IL

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WESTERN REGION

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USDA-ARS

Dr. Rick Boydston	WA
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Mr. Tom Freiberger	NJ
Dr. Nik Grunwald	OR
Mr. John Harvey	WA
Dr. Mike Reding	OH
Mr. Paul Wade	SC

ATTACHMENT 8 – 2014 ORNAMENTAL HORTICULTURE PROGRAM

RESEARCH ACTIVITIES

Discipline	Project	Researchers	Crops	Products	Trials
Entomology	Borer & Beetle Efficacy *	3	3	7	18
	Pyrfluquinazon Crop Safety*	8	16	1	24
	Pyridalyl Crop Safety*	1	2	1	2
	Sawfly Efficacy	1	1	5	6
	Scale Efficacy*	4	5	5	9
	Spirotetramat Crop Safety*	8	10	1	15
	Thrips Efficacy*	3	2	8	15
	Tolfenpyrad Crop Safety*	9	13	2	36
	Whitefly Efficacy (Bemisia Q and B, Trialeurodes)*	2	2	9	14
Pathology	Acibenzolar Crop Safety*	2	3	1	7
	Amectotradin + Dimethomorph Crop Safety*	6	6	1	13
	Azoxystrobin Crop Safety*	1	1	1	3
	Benzovindiflupyr + Azoxystrobin (A18126B) Crop Safety*	11	16	1	25
	Botrytis Efficacy	3	4	19	37
	Chlorthalonil + Propiconazole Crop Safety*	1	1	1	3
	Cyflufenamid Crop Safety*	9	14	1	24
	Difenconazaole + Azoxystrobin (A13703G) Crop Safety*	1	2	1	3
	Fludioxonil Crop Safety*	1	1	1	3
	Fluensulfone Crop Safety*	1	3	1	3
	Fusarium Efficacy*	3	3	10	21
	Metconazole Crop Safety*	10	10	1	24
	Pythium Efficacy*	4	2	13	32
	Tebuconazole Crop Safety*	8	11	1	22
	Triticonazole Crop Safety*	11	15	1	29
Weed Science	Acetic Acid Crop Safety*	2	11	1	13
	Ammonium Nonanoate Crop Safety*	3	5	2	6
	Dimethenamid-p Crop Safety*	17	39	1	62
	Dithiopyr Crop Safety*	1	3	1	4
	D-limonene Crop Safety*	3	5	1	6
	F6875 Crop Safety*	15	31	1	45
	Flumioxazin + Pyroxasulfone Crop Safety*	3	16	1	18
	Flumioxazin Crop Safety*	2	12	1	15
	Indaziflam Crop Safety*	5	9	1	10
	Isoxaben Crop Safety*	7	10	1	14
	Liverwort Efficacy*	1	1	3	3
	Oregano Oil Crop Safety*	2	5	1	5
	Oxyfluorfen + Prodiamine Crop Safety*	10	17	1	21
	Pelargonic Acid (Scythe) Crop Safety*	1	2	1	2
	Pendimethalin + Dimethenamid-p Crop Safety*	12	18	1	26
	Prodiamine Crop Safety*	1	3	1	4
Plant Growth Regulators	Herbaceous Branching	1	1	3	3

* High Priority Projects

For a detailed list of research activities visit ir4.rutgers.edu.

ATTACHMENT 9 – SUMMARIES OF 2014 ORNAMENTAL HORTICULTURE RESEARCH

Acetic Acid Crop Safety

From 2010 to 2013, IR-4 completed 38 trials on WeedPharm (acetic acid). The data contained in this report was generated to register uses of active ingredient on and around ornamental horticulture plants with broadcast applications, including over the top of established plants. The WeedPharm rates in this testing program were at 5 and 10 % active ingredient as the 1X and 2X rates. It had been applied to 18 plant genera or species. Results showed WeedPharm causing no injury when applied to these crops in the dormant stage of growth. Of these genera and species, none exhibited no or minimal transient injury after the second application at both rates. Eight (8) crops showed significant injury after the second application. Of the ten (10) crops that still need additional information, there are three (3) genera or species in which one or two trials did not show significant injury at 1X and 2X rates, and three (3) genera/species showing variable response at the 1X rate.

Ammonium Nonnanoate Crop Safety

From 2010 to 2013, IR-4 completed 24 trials on Racer (Ammonium nonanoate). The data contained in this report was generated to register uses of active ingredient on and around ornamental horticulture plants with broadcast applications, including over the top of established plants. The Racer rates in this testing program were at 3 and 6 % v/v as the 1X and 2X rates. It had been applied to 16 plant genera or species. Results showed Racer causing no injury when applied to these crops in the dormant stage of growth. Of these genera and species, none exhibited no or minimal transient injury after the second application at both rates. Four (4) crops showed significant injury after the second application. Of the twelve (12) crops that still need additional information, there are six (6) genera or species in which one or two trials did not show significant injury at 1X and 2X rates.

Borer, Beetle, White Grubs & Weevil Efficacy

Collectively, managing coleopteran insects can be challenging because the adult and larval stages may both cause damage and sometimes occur on different hosts or on different plant parts. While organophosphates, pyrethroids, and neonicotinoids can provide good to excellent control of coleopteran insects, not all products work equally well in all situations. Treatments for borers are very different than treatments targeting white grubs. Developing newer classes of chemistry are important to reduce the environmental consequences and to minimize the development of resistance. Starting with the 2004 Annual Workshop, screening a number of products to manage coleopteran insects became one of the high priority projects for entomology. From 2005 through 2013, 57 products representing 37 different active ingredients were tested for management of adult and larval stages of coleopteran insects. In addition, 10 products representing 10 active ingredients were evaluated for lepidopteran clearwing borers in 2008 and 2009. These products represented both biological and chemical tools. Some products were already registered but more data were needed or they were considered standards to measure the level of efficacy achieved with other materials. Other products were in development but have not yet been registered with the EPA. While a number of coleopteran and lepidopteran species were tested, only enough experiments were able to be completed on the coleopteran species black vine weevil, Japanese beetle, oriental beetle and viburnum leaf beetles to recommend actions to register or amend labels for these pests.

Botrytis Efficacy

At the IR-4 Ornamental Horticulture Program Workshop in 2011, Botrytis Efficacy was selected as a high priority project to expand the knowledge and list of fungicides available to growers for these diseases. In addition to research collected through the IR-4 program, this summary includes a review of experiments conducted from 1998 to 2014 on ornamental horticulture crops. During this time period, numerous products representing 38 active ingredients were tested as foliar applications against several *Botrytis* species causing blight and gray mold on ornamentals. Most products are registered and commercially used. Almost all trials were conducted on *Botrytis cinerea*; other species tested were *B. elliptica* and *B. paeoniae* and *B. tulipae.* Although there were insufficient data for definitive conclusions, three new products that are included in the Botrytis efficacy project, BAS 703 and V-10135, looked promising, while Proud 3 and SP2770 looked ineffective. Limited data on other relatively new products (F9110, S2200, SP2773, Regalia, Torque, Tourney, Trinity) were inconclusive. Of the registered products, Daconil, Decree, Heritage, Insignia, Pageant and Palladium generally provided excellent efficacy; Chipco 26019 and Veranda O provided good efficacy and Disarm provided mediocre efficacy. ZeroTol, and the copper products (Camelot, Phyton 27, STBX-304) generally performed poorly.

ATTACHMENT 9 – Continued

Cyflufenamid Crop Safety
Cyflufenamid is an active ingredient for managing foliar diseases including powdery mildew and botrytis. It is not yet registered by EPA for the ornamental horticulture industry. During 2012 and 2013, the IR-4 Project completed 29 trials on 15 ornamental plant genera or species. In these trials, 3 species or genera exhibited minimal or no injury after foliar applications. For the remaining 12 crops, not sufficient information has been generated. However, to date the tested crops are not sensitive to foliar applications up to 4X the proposed high label rate.

d-Limonene Crop Safety
From 2012 to 2013, IR-4 completed 19 trials on Avenger Ag (d-limonene). The data contained in this report was generated to register uses of active ingredient on and around ornamental horticulture plants with broadcast applications, including over the top of established plants. The Avenger Ag rates in this testing program were at 14 and 28 % v/v as the 1X and 2X rates. It had been applied to 11 plant genera or species. Results showed Avenger Ag causing no injury when applied to these crops in the dormant stage of growth. Of these genera and species, none exhibited no or minimal transient injury after the second application at both rates. Six (6) crops showed significant injury after the second application. Of the six (6) crops that still need additional information, there is one (1) species in which one trial did not show significant injury at 1X and 2X rates.

Dimethenamid-p Crop Safety
From 2007 to 2013, IR-4 completed 401 trials on Tower EC (dimethenamid-p). The data contained in this report was generated to register uses of dimethenamid-p on and around ornamental horticulture plants with over-the-top applications. The dimethenamid-p rates in the testing program were 0.97, 1.94 and 3.88 pounds active ingredient per acre (lb ai per A) as the 1X, 2X and 4X rates. Tower EC had been applied to 126 plant genera or species. Of these, 58 plant species exhibited no or minimal transient injury after application at all three rates. Nine crops exhibited no phytotoxicity at 0.97 and 1.94 lb ai per acre but did have some injury at 3.88 lb ai per acre. Six crops – *Cladrastis, Echinacea, Epilobium canum, Muhlenbergia dubia, Teucrium chamaedrys* and *Viburnum opulus* – exhibited significant phytotoxicity at even the lowest rate.

Dithiopyr Crop Safety
Dimension was initially registered in 1992 for ornamental horticulture uses. This initial label contained an extensive list of ornamental horticulture plants in landscapes where Dimension could be used without causing phytotoxicity. In 2006, the new Dimension 2EW label contained registered uses for field container and in ground nursery production, the first dithiopyr product to have these use sites. Starting in 1992, IR-4 examined 67 crops to expand this label to other crops, including several different fern species grown in field containers. Of the researched crops and Dimension formulations, only one crop (*Rosa sp.*) can be added at this time based on the data provided here. It is recommended the trials conducted using emulsifiable concentrate formulations be repeated with Dimension 2EW.

Indaziflam Crop Safety
From 2011 through 2014 IR-4 has completed 101 trials evaluating indaziflam granular formulations for crop safety. The data contained in this report was generated to register the use of indaziflam on and around ornamental horticulture plants with over-the-top applications. The rates tested were 0.045, 0.089 and 0.178 pounds active ingredient per acre (lb ai per A) as the 1X, 2X and 4X rates. The indaziflam 0.03%G formulation was applied to 16 plant genera or species, the Marengo G formulation was applied to 28 crops. Of these crops, 7 exhibited no or minimal transient injury after application at all three rates including *Berberis sp., Liriope sp., Ophiopogon japonicus, Rhododendron sp., Rosa sp., Taxus media* and certain *Viburnum* species. The remaining crops evaluated have only been screened in 1 or two trials or exhibited minimal to significant injury. Further testing is required on many species before a conclusion can be made confirming crop safety.

Metconazole Crop Safety
Metconazole was registered as Tourney 50WDG in the United States in 2007 as a turf fungicide. In 2010, uses for ornamental horticulture plants in greenhouse, nurseries, and landscapes were added. The commercial label contains a list of 49 woody ornamental plants exhibiting no or minimal injury. However, because metconazole is in the triazole class it could cause symptoms similar to plant growth regulators and additional testing is warranted on additional herbaceous and woody ornamental species. Between 2010 and 2013, the IR-4 Project completed 124 trials on 35

ornamental plant species examining phytotoxicity related to foliar applications of Tourney. In these trials, 18 species or genera exhibited minimal or no injury after foliar applications. Of these, 11 are already on the Tourney label; *Antirrhinum majus, Buxus sp., Hemerocallis sp., Hydrangea sp., Lantana sp., Liriope sp. and Verbena sp.* are the seven crops not yet listed. Based on this information, it is recommended that these be added to the list of tolerant plants on the Tourney 50WDG label. Four crops exhibited stunting: Begonia, Impatiens, Pansy and Zinnia.

Oregano Oil Crop Safety

From 2010 to 2013, IR-4 completed 28 trials on Bryophyter (Oregano oil). The data contained in this report was generated to register uses of active ingredient on and around ornamental horticulture plants with broadcast applications, including over the top of established plants. The Bryophyter rates in this testing program were at 1 and 2 % active ingredient as the 1X and 2X rates. It had been applied to 21 plant genera or species. Results showed Bryophyter causing no injury when applied to these crops in the dormant stage of growth. Of these genera and species, none exhibited no or minimal transient injury after the second application at both rates. Seven (7) crops showed significant injury after the second application. Of the fourteen (14) crops that still need additional information, there are eight (8) genera or species in which one trial did not show significant injury at 1X and 2X rates, and two (2) genera/species showing variable response at the 1X rate.

Perlargonic Acid Crop Safety

From 2010 to 2013, IR-4 completed 14 trials on Scythe (pelargonic acid). The data contained in this report was generated to register uses of active ingredient on and around ornamental horticulture plants with broadcast applications, including over the top of established plants. The Scythe rates in this testing program were at 3 and 6 % v/v as the 1X and 2X rates. It had been applied to 12 plant genera or species. Results showed Scythe causing no injury when applied to these crops in the dormant stage of growth. Of these genera and species, none exhibited no or minimal transient injury after the second application at both rates. Four (4) crops showed significant injury after the second application. Of the eight (8) crops that still need additional information, there are two (2) genera or species in which one or two trials do not show significant injury at 1X and 2X rates, and one (1) genera/species showing variable response at the 1X rate.

Pyridalyl Crop Safety

Pyridalyl was registered as Overture for use on ornamental horticulture plants in greenhouses with foliar applications in the United States in 2008. The label recommends use on ornamental horticulture plants with testing by the grower. From 2010 to 2013, the IR-4 Project conducted 46 trials on 13 ornamental plant species examining phytotoxicity related to Overture applications. In these trials, no injury was noted.

Pyrifluquinazone Crop Safety

Pyrifluquinazon was registered for use on ornamentals applied foliar or drench in the United States in 2013. The label recommends use on ornamental horticulture plants except a few species or genera specified in the label. From 2010 to 2013, the IR-4 Project conducted 74 trials on 17 ornamental plant species examining phytotoxicity related to pyrifluquinazon applications. No tested crops exhibited significant injury or growth reduction during these experiments.

Spirotetramat Crop Safety

Spirotetramat was registered as Kontos for use on ornamentals applied foliar or drench in the United States in 2008. The label recommends use on ornamental horticulture plants except a few species or genera specified in the label. From 2007 to 2013, the IR-4 Project conducted 218 trials on 43 ornamental plant species examining phytotoxicity related to Kontos applications. In these trials, only 6 crops (*Begonia* sp, *Coleus x hybridus, Petunia* sp., *Pelargonium* sp., *Vinca* sp., and *Viola* sp.) exhibited noticeable, significant injury and that was a slight height reduction, leaf curling, bleaching of flowers or plant death at the 2X and 4X rates applied as drench. One species (*Verbena hybrida)* exhibited significant flower discoloration at all rates applied as drench in one trial. Based on this information, it is recommended that the label prohibits drench application on *Begonia* sp., *Coleus x hybridus, Petunia* sp., *Pelargonium* sp., *Verbena hybrida, Vinca* sp., and *Viola* sp. The current label does not recommend use of Kontos on *Pelargonium* spp. Foliar application on these species may be recommended with the precautionary statements in the CROP TOLERANCE section of the current Kontos label.

ATTACHMENT 9 – Continued

Sulfentrazone + Prodiamine Crop Safety

Since 2007 IR-4 has completed 342 trials with products containing sulfentrazone + prodiamine (F6875 0.3G and F6875 4SC) on 88 crops. The data contained in this report was generated to register uses of sulfentrazone + prodiamine formulation on and around ornamental horticulture plants with over-the-top applications. The rates tested were 0.375, 0.75 and 1.5 pounds active ingredient per acre (lb ai per A) as the 1X, 2X and 4X rates. The F6875 0.3G formulation was applied to 75 plant genera or species. Of these crops, 22 exhibited no or minimal transient injury after application at all three rates. Nine crops (*Buddleia davidii, Echinacea sp., Hemerocallis sp., Hosta sp., Iris sp., Lobularia maritima, Ophiopogon sp., Phlox paniculata, Phlox subulata*) exhibited phytotoxicity at even the lowest rate. F6875 4SC was tested on 55 genera or species of which 11 species exhibited little to no injury at all three rates. Eleven species (*Buddleia davidii, Chasmanthium latifolium, Dryopteris sp., Echinacea purpurea, Hemerocallis, Heuchera sanguinea, Hibiscus sp., Hosta sp., Hydrangea sp., Phlox paniculata, and Rudbeckia sp.)* demonstrated significant injury even at the lowest rate.

Sulfosulfuron Crop Safety

Since 2005 IR-4 has completed 192 trials with sulfosulfuron (Certainty 75WDG) on 79 plant genera or species. The data contained in this report was generated to register uses of sulfosulfuron on and around ornamental horticulture plants with over-the-top applications. The sulfosulfuron rates in the testing programs were 1.25, 2.5 and 5 oz product per acre (0.0586, 0.117, and 0.188 lb ai per acre) as the 1X, 2X and 4X rates. Two plant genera or species exhibited no or minimal transient injury after application at all three rates in 3 trials including *Gleditsia sp.* and *Hibiscus*; however with the latter there may be a cultivar or species sensitivity. Five crops (*Acer rubrum, Armeria maritima, Gazania sp., Lavandula angustifolia and Muhlenbergia capillaris*) exhibited minimal or transient injury at the lowest rate but there was commercially unacceptable injury at the higher rates. For 26 crops, there was significant injury even mortality. For the remaining crops, more trials are needed to determine response.

Tebuconazole Crop Safety

Tebuconazole was first registered in 1994 for peanut diseases. Since then its food use label has expanded to several other food crops. The first noncrop registration of Torque 3.6SC (tebuconazole) occurred in 2010 for ornamental horticulture growers, professional landscape managers and for golf course turf. Tebuconazole manages foliar ornamental horticulture diseases including powdery mildew and rusts. However, given that triazoles have a tendency to also exhibit impacts similar to growth regulators, the crop safety profile for Torque 3.6SC is not well known. During 2012 and 2013, the IR-4 Project completed 25 trials on 13 ornamental plant genera or species. In these trials, 2 species or genera exhibited minimal or no injury after foliar applications. Torque caused stunting in Pansy and Zinnia at the higher application rates. In one trial, Narcissus exhibited moderate injury after the third application; additional trials are warranted to determine whether number of applications or the crop cultivar might be the contributing factor for injury. For the remaining 8 crops, not sufficient information has been generated.

Thrips Efficacy Summary

For the last 8 years, the IR-4 Ornamental Horticulture Workshop has ranked developing efficacy data on new products to manage thrips as a High Priority Project. Thrips remain an important threat for several reasons: 1) the damage thrips cause to ornamental horticulture plants, decreasing the value of the infested crops; 2) the tospoviruses (tomato spotted wilt, impatiens necrotic ringspot) they can vector; 3) the newly arrived invasive species which impact at least 250 different ornamental horticulture species; and 4) growers lack the ability to rotate among 3 to 4 different modes of actions to effectively manage resistance development in the thrips populations they must control to maintain economic viability. From 2005 through 2013, 68 products representing 53 different active ingredients were tested for thrips management. These products represented both biological and chemical tools. Some products were already registered but more data were needed particularly with the newly invasive thrips species or they were considered standards to measure the level of efficacy achieved with other materials. Other products were in development but have not yet been registered with the EPA. The five thrips species tested in the IR-4 program were Chilli Thrips (*Scirtothrips dorsalis*), Gladiolus Thrips (*Thrips simplex*), Privet Thrips (*Dendothrips ornatus*), Weeping Fig Thrips (*Gynaikothrips uzeli*), and Western Flower Thrips (*Frankliniella occidentalis*).

Tolfenpyrad was registered as Hachi-Hachi 15 EC in the United States on July 28, 2010 for the control of aphids, leafhoppers, scales, thrips, whiteflies, and early instar lepidopteran larvae on ornamental horticulture crops grown in greenhouses. An expansion of this label for outdoor uses is planned. In this report, ten species or genera exhibited minimal or no injury after foliar treatments of Hachi-Hachi 15EC (tolfenpyrad) at 21, 48 and 84 fl oz per 100 gal. All can be added to the label as crops tested for tolerance: (*Begonia sp., Petunia sp,. Tagetes sp., Verbena sp., Viola sp.* and *Zinnia sp.*). For Tolfenpyrad SC, nine crops can be listed on the label as crops tested for tolerance (*Alyssum sp.*, *Angelonia sp*., *Antirhinnum sp*., *Begonia sp., Gerbera sp., Petunia sp., Tagetes sp., Viola sp.* and *Zinnia sp.*), and two crops should be included in listing of crops where treatments are not recommended: *Impatiens* sp. and *Impatiens,* New Guinea Hybrids.

Triticonazole Crop Safety

Triticonazole was registered as Trinity 2SC in the United States in 2007 as a turf fungicide. Since that time it has been under development to expand to ornamental horticulture diseases. Because triticonazole is in the triazole class, it could cause symptoms similar to plant growth regulators and testing is warranted on additional herbaceous and woody ornamental species Between 2010 and 2013, the IR-4 Project completed 148 trials on 36 ornamental plant species examining phytotoxicity related to foliar applications of Trinity 2SC. In these trials, 22 species or genera exhibited minimal or no injury after foliar applications. Of these, five are not yet listed on the label: *Alyssum sp, Buxus sp., Cornus sp., Lantana sp.,* and *Osteospermum sp*.

Whitefly Efficacy

Whiteflies are significant pests of ornamental horticulture crops. Three whiteflies species and biotypes contribute to crop production losses in the United States: greenhouse whitefly (*Trialeurodes vaporariorum*), silverleaf whitefly B biotype (*Bemisia tabaci* B Biotype), and silverleaf whitefly Q biotype (*Bemisia tabaci* Q Biotype). From 2002 through 2013, 87 products or rotational/tank mix treatments comprised of 49 different active ingredients were tested through this screening program. In addition to research collected through the IR-4 program, this summary includes a review of experiments conducted from 2004 to 2013 on ornamental horticulture crops. The best products for Q biotype eradication, and those that should be reserved for critical situations, were Judo and Safari. However, Avid, Sanmite, and TriStar also demonstrated effective control and should be utilized routinely as part of the overall management program for Bemisia whiteflies. Mycoinsecticides under these testing conditions did not perform as well as anticipated for Q biotype whitefly management. Several new products that are included in the IR-4 Whitefly efficacy project looked promising based on their efficacy relative to standards. These include A20520A, GF-2626, GF-2860 and NNI-0101. Further research is needed to obtain additional efficacy data to recommend actions to register or amend labels for these pests. Studies on resistance development indicated potential for Q biotype resistance under intense insecticide pressure.

ATTACHMENT 10- Biopesticide and Organic Support Program

2014 Grant Awards

Grant Stage—Early

- Efficacy of biofungicide product at the early stage of development for downy mildew in cucumber
- A natural treatment for fire blight: pilot test in apple orchards
- Evaluation of VBC-90017, a biorational nematicide for the management of nematode pests of potato

Grant Stage—Advanced

- Developing a reduced risk early season management program for BMSB in peach
- Biopesticide management of armored scales in ornamental palms
- Integration of biopesticides into blueberry IPM programs for spotted wing drosophila as a resistance and residue management strategy
- Effectiveness of the entomopathogenic fungus Metarhizium anisopliae against the southern chinch bug (Hemiptera: Blissidae)
- Spotted Wing Drosophila Control in Organic Berries
- Use of the novel biopesticide AgriTrap for control of two spotted spider mite and whitefly in greenhouse ornamentals
- Evaluation of Biopesticide, Veratran D for Control of Spotted Wing Drosophila and Thrips in Berry Crops
- Determine the efficacy of biofungicides for control of downy mildew in basil
- Organic Management of Basil Downy Mildew at the Advanced Stage
- Evaluation of biologically based alternatives for management of downy mildew and Alternaria leaf spot of basil
- US Efficacy Trials for the Turf Bioherbicide Sarritor
- Managing Potato Late Blight and Pink Rot using MBI-110 and other Biopesticides
- Incorporating a biopesticide for integrated bed bug management

Grant Stage—Demonstration

- Efficacy of Phyllom BeetleGONE!TM for Oriental beetle control in blueberries
- Biocontrol of grape powdery mildew: Evaluating strategies and novel combinations for effective use of Regalia in Integrated Pest Management (IPM) systems
- Incorporation of biofungicides into hop powdery mildew IPM programs
- Strategies for the use of Botector in eastern winegrape vineyards
- Alternatives for chilli thrips management in rose production
- Second-Year Effect of Ground Application of SPLAT GM Gypsy Moth Mating Disruptant
- Integrating Biopesticides into Soilborne Disease Control for 2-year old Ginseng

ATTACHMENT 10 – Continued

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ATTACHMENT 10 – Continued

Biopesticide Regulatory Support Package Approved in 2014

Product	Crop	PR Number	TYPE	Registration Type	Uses
Tobacco Mild Green	Animal Grass Feeds	0364B	Herbicide	New Active Ingredient	109
Mosaic Tobamovirus	Non-Grass Feeds	0364B	Herbicide	New Active Ingredient	9

New Uses Supported by the Biopesticide Efficacy Grant Program

Active Ingredient	Crop	PR Number	Uses
Chromobacterium subtsugae	Broccoli	755B	1
	Peach	932B	1
	Blueberry	964B	1
	Blackberry	964B	1
Metarhizium anisopliae Strain F52	Turf	559B, 1005B	1
	Onion	580B	1
	Pepper	772B	1

TOTAL NEW USES – 125

24C labels Supported

- **Avipel** (9,10-Anthraquinone)**Liquid for Corn** Louisiana, Michigan, Minnesota, Mississippi, South Dakota, Texas, Wisconsin, Florida, Vermont, Virginia
- **Avipel Dry for Corn** Louisiana, Michigan, Minnesota, Mississippi, North Dakota, South Dakota, Texas, Wisconsin, Maine, Utah, Delaware, Virginia

FIFRA Section 18 -Seed Treatment Labels

- **AV-1011 for Rice** Louisiana, Florida
- **Avipel liquid for Sunflower-** South Dakota
- **HopGuard (Potassium salts of Hop Beta Acids) Beehives –** 37 states

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