

# NRSP\_TEMP004: Facilitating Registration of Pest Management Technology for Specialty Crops and Specialty Uses

Duration: October 2015 to September 30, 2020  
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## Statement of Issues and Justification

### Prerequisite Criteria

How is the NRSP consistent with the mission?

*NRSP-4 (IR-4 Project) fully meets the mission of a National Research Support Project and is an excellent example of how USDA resources can be effectively leveraged for the direct benefit of U.S. specialty crop growers, food processors and consumers. IR-4's efforts and deliverables help ensure that the public has a safe and adequate supply of fruits, nuts, vegetables, and herbs for a healthy diet and ornamental crops that enhance the environment. IR-4 has further assisted specialty crop producers and the public through initiatives to harmonize international pesticide standards to support trade of specialty crops. IR-4's efforts also support regulatory approval of technology to manage pests such as mosquitos, ticks and bed bugs that can transmit diseases to humans and animals. See Attachment 2 for a detailed IR-4 Project overview.*

IR-4 conducts research to generate data that are mainly used to facilitate registration of biopesticides (microbial and biochemical products) and synthetic chemical pesticides 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. IR-4's research and relevant data are part of larger federally sponsored efforts to manage invasive pests (Citrus Greening, Spotted Wing Drosophila, Brown Marmorated Stink Bug, etc.), protect pollinators from Varroa Mites, open lucrative international markets for domestically produced fruits, vegetables and nuts as well as to protect the public from arthropod vectors of diseases such as Malaria, Dengue Fever, West Nile Virus, Encephalitis, and Lyme Disease.

NRSP resources are used by IR-4 to provide support activities necessary in the multiyear lifecycle of each specific research study conducted by IR-4. Examples of these support activities include:

- **Stakeholder Engagement:** Encouraging input from stakeholders in the prioritization process for potential research projects through on-line and workshop participation.

- **Communicating the IR-4 Mission:** Providing outreach materials for the national IR-4 program through the website, technical reports, blogs, newsletters, special publications and social media.
- **Database Management:** Maintaining multiple databases to track research progress and to disseminate results to stakeholders.
- **Providing Data Access to Stakeholders:** Maintaining an online portal that allows specialty crop growers, commodity group representatives, SAES researchers, Cooperative Extension educators, USDA-Agriculture Research Service (ARS) scientists and the Integrated Pest Management (IPM) community to submit “Requests for Assistance” for crop protection solutions.
- **Research Planning:** Interacting with registrants of pest management technology and regulatory authorities to determine the type and amount of data needed to allow for regulatory approval. Developing protocols with researchers at appropriate research sites and analytical laboratories to ensure that data meet regulatory requirements.

IR-4 Project activities are fully aligned with the NRSP mission and are also used by other groups to accomplish their goals. IR-4 generates data that are utilized throughout the "information supply chain" from field to fork including:

- USDA
  - Regional Integrated Pest Management Centers (RIPM Centers) to develop expertise in IPM with growers, pest control advisors and extension personnel on the ground.
  - Office of Pest Management and Policy (OPMP) to support development of sustainable agricultural practices and policies.
  - National IPM Committee: To assist in achieving the future goals of the new Crop Protection Program.
- US Environmental Protection Agency:
  - Residue and performance data required for registration of new chemical and biological pesticides
  - Pesticide Program Dialogue Committee: Directing policy on sustainable agriculture and pest management
- International Work to Support Export of US Agricultural Goods:
  - North American Free Trade Agreement (NAFTA): Technical Working Group on Pesticides to support trade
  - Codex Committee on Pesticide Residues (CCPR): Support international regulatory harmonization
  - Transatlantic Trade and Investment Partnership (TTIP) Agreement Between the US and the European Union

Support from the State Agricultural Experiment Stations (SAES) is vitally important as NRSP-4 funds account for approximately 75% of salaries for the IR-4 Headquarters Management (Executive Director, Associate Director, and Assistant Directors). Their leadership is critical to ensure research goals and objectives are met and to coordinate efforts between SAES and USDA-ARS field and laboratory scientists throughout the United States. In addition to NRSP support, other public and private sector sources provide funding for salaries and research

activities. IR-4 has been very successful in leveraging the \$481,182 of NRSP funds with funds from four USDA units (NIFA, ARS, FAS, and APHIS), the crop protection industry and commodity organizations. In 2014, the IR-4 Project received approximately \$18.4 million dollars in direct funding and approximately \$17.0 million in in-kind contributions (see Attachment 3 for 2014 Budget Page).

The long term and continued support provided by Congress, USDA, the land grant university system through SAES, and industry strongly indicates their commitment and recognition of IR-4's unique and very effective partnerships with federal and state governments, the crop protection industry and producers of specialty crops. IR-4's research impacts every state, region and US territory to solve a problem of national importance.

How does this NRSP pertain as a national issue?

*The funds provided by NRSP enable scientists and regulatory officials to address a technical issue relevant in all 50 states/US Territories, as well as Canada, Mexico, and the rest of the world.*

The Minor Use Problem occurs when the cost for the crop protection industry to develop the required data to register pest management technology for specialty crops far exceeds the potential return on investment. 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.

The Minor Use Problem extends beyond specialty crops to specialty (minor) uses in major row crops such as corn, soybean, cotton, wheat. Certain pests can cause localized or sporadic pest damage on the major crops. The impact can be devastating. Registrants do not focus their research efforts on issues that are localized or sporadic as the costs can be greater than the return on investment.

Pesticides to manage mosquitoes, ticks and other arthropod pests that transmit disease and pose a threat to public health are also considered specialty uses, and the Minor Use Problem affects this sector. There is very limited private sector investment to support registration of necessary public health pesticides.

The Minor Use Problem is broad, affecting every state, every US territory and almost every country. Many pest management scientists within the SAES system and USDA-ARS are actively involved in trying to solve this problem. The SAES Directors in each state assist by appointing a scientist to serve as the IR-4 State Liaison Representative (SLR) to ensure that specialty crop/minor use pest management needs are addressed. In some states a second SLR representing the ornamental horticulture industry is assigned. SLRs are encouraged to meet with farmers/growers to discuss their pest control needs and to explain how IR-4 can help. Many other public sector scientists are actively engaged with IR-4 by identifying critical pest management voids, suggesting solutions and participating in priority setting. These scientists submit "Requests for Assistance" that start the IR-4 process.

For more than 50 years, the IR-4 Project has been extremely successful in developing the necessary data to ensure specialty crop/specialty use stakeholders have legal access to the most relevant technology to manage pests. The IR-4 Project has facilitated over 45,000 uses on edible and non-edible 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 research, especially for food crops, is a multiyear process from submission of the request to final approval. Attachment 4 illustrates a flow diagram of a typical IR-4 research project on a food crop; starting from identification of the problem, the submission of the request for assistance, the priority setting, research, regulatory submission, EPA review and finally the registration of the solution to allow use by the grower. This process takes three to five years from start to finish which includes approximately 1.5 years for EPA review and processing the registration. Research on the highest priority projects is expedited. Most IR-4 research on food crops is required to be conducted under Federal Good Laboratory Practice regulations.

Significant progress has been made in solving the Minor Use Problem. During the past five years, IR-4’s data have facilitated 4,370 new registrations on food crops. During the same period, IR-4 data have impacted pesticide use on 12,693 ornamental crops. However, there remain many emerging factors and challenges that drive the need for continued and expanded research by the IR-4 Project:

- **Legal Requirements for Pesticide Safety Evaluations:** The continuous reassessment by EPA of data associated with specific conventional chemical pesticides and biopesticides to ensure they meet current safety standards. Cancellations or use restrictions of important uses of conventional chemical pesticides and biopesticides are expected to continue to occur due to such factors as cumulative risk, aggregate risk, potential for endocrine disruption, and effects on endangered species or their habitats.
- **Pollinator Protection:** Increased concern regarding the potential impact of pesticides in the health and sustainability of pollinators. It is anticipated that some existing registrations will be cancelled or modified to reduce exposure.
- **Invasive Pests:** Occurrence of new, difficult to manage invasive pests such as Citrus Greening, Spotted Wing Drosophila, Brown Marmorated Stink Bug, and Boxwood Blight. New technologies are needed to manage these new and difficult problems.
- **Resistance Management:** Resistance to pesticides; pests continue to evolve, creating an environment where the effectiveness of a pesticide may be lost after continued use. This creates a need for new technologies to prevent or manage pest resistance to pesticides.
- **Pests of New Crops:** Pest management needs associated with introduction of new crops such as second generation biofuels (e.g. Miscanthus, Switchgrass, Agave), sweeteners (e.g. Stevia), and ethnic crops. The crop protection companies are not willing to invest significant resources in the development of pesticide registrations on new crops until expansion of the crop and the associated increase of potential sales reaches an appropriate level.

- **Expansion of Trade for US Agriculture:** Specialty crop growers are keen to export their goods, however, differences in allowable pesticide standards established in the U.S. and international trading partners can be different. IR-4's data and activities with international regulatory harmonization help to reduce barriers to trade.

IR-4 has recently modified its Biopesticide & Organic Support Program focusing research on biopesticides alone or in combination of reduced risk pesticides to address priority pest management voids. IR-4 has received over 80 new requests for assistance for the strategic use of biopesticides and reduced risk pesticides in a systems approach. This strategic integration provides management tools for pest resistance to pesticides, may result in lower pesticide residues at harvest, and further reduces the risk associated with pesticide use to humans and the environment. A sampling of these new requests for assistance include: Spotted-wing Drosophila control on fruit; Fire Blight management on organic apple; residue mitigation for export crops; Varroa mites and honeybees; and weed control in nurseries and transplant beds of ornamental horticulture crops.

Specialty crops have a farm gate value of nearly \$50 billion dollars and contribute to about 45% of the U.S. domestic crop value. With specialty crops/specialty uses being such a large driver of local and regional economies, damage to these crops can have devastating impacts to local, regional and/or national economies. All factors considered, it is safe to say that the need for a substantial IR-4 effort is predicted to continue for at least the next decade.

## **Rationale**

Priority Established by ESCOP/ESS

IR-4 activities and deliverables address and enhance support of five of the seven ESCOP Roadmap/Grand Challenges.

### **Challenge 1: Expand the sustainability, competitiveness, and profitability of U.S. food and agriculture systems**

The availability of crop protection technologies, including the latest generation of reduced risk chemical pesticides and biopesticides is a critically important component to enhance the sustainability, competitiveness and profitability of domestically produced fruits, vegetables, nuts, ornamentals and other specialty crops. New and emerging arthropods, plant diseases, and weeds, including those classified as invasive, can reduce the quality and quantity of the crops resulting in lower revenue to the farmer, potentially higher costs to the consumer and a negative impact on economies. For example, Citrus Greening has cost Florida over \$1 billion annually and the loss of 7,000 jobs over the last few years.

Impacts of IR-4's efforts are significant. In October 2012, Michigan State University's Center for Economic Analysis, issued an updated report titled "***Economic Impact of the IR-4 Project and IR-4 Project Programs***" (Attachment 5). The authors, Steven Miller and Andrea Leschewski noted, "*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 \$7.2 billion. The findings support public investment in the IR-4 Program*".

Additionally, U.S specialty crop growers want access to profitable international markets. Access to export markets is often limited by the lack of standards involving pesticide residues in crops. In an effort to minimize the problem, IR-4 is partnering with USDA-FAS to eliminate pesticide residues as a trade barrier for U.S. grown specialty crops. This partnership was formally recognized by Congress in the 2014 Farm Bill where IR-4 authorization was modified to include *"assist in removing trade barriers caused by residues of pesticides registered for minor agricultural use and for use on domestically grown specialty crops."*

Finally, the successful introduction of new specialty crops is often dependent on the activities of IR-4 to provide access to pest management technology. The crop protection companies are not willing to invest significant resources in the development of pesticide registrations on a new crop until the potential sales of their products reach an appropriate level.

### **Challenge 2: Mitigate the impacts of climate change on food, feed, fiber, and fuel systems in the U.S.**

Many scientists expect that climate change could cause fundamental changes in cropping systems with certain plants and pests having extended optimum and survival zones. Pests previously unable to overwinter in northern states may be able to survive as conditions change. IR-4 will be expected to provide practical solutions for these new challenges to the production of specialty crops.

Though not directly attributed to climate change, the recent drought in the Western States is another significant challenge and includes the potential shift of specialty crop production to those states with adequate water resources. Such a shift will have a profound impact on pest management needs for specialty crops and expected services for IR-4.

### **Challenge 4: Global leadership role to ensure a safe, secure and abundant food supply**

IR-4 is recognized by the international community as the model program to help specialty crop growers obtain legal access to safe and effective pest management technology. IR-4 personnel, in association with UN's Food and Agriculture Organization (FAO) have sponsored the first and second Global Minor Use Summits. IR-4 has consulted with the governments of Australia, Brazil, Canada, China, Costa Rica, New Zealand, South Korea, and Taiwan in finding solutions for the Minor Use Problem. Additionally IR-4 has been the principal educator in World Bank funded capacity building projects in the ASEAN region, Sub-Saharan Africa and in Latin/South America. The goal of these activities is to train others in the development of appropriate data and to collaborate on research projects of mutual interest. IR-4 expects that the demand for its expertise will increase in the future with the expansion of global trade of specialty crops.

### **Challenge 5: Improve human health, nutrition and wellness of the U.S. population**

In 2008, IR-4 entered into a five-year Cooperative Agreement with USDA-ARS (NP 104-Veterinary, Medical and Urban Entomology) to help provide regulatory support in the development of new pest management technology to control arthropod pests that transmit diseases to humans and animals. IR-4's efforts are part of a much larger agreement between ARS and the Department of Defense that emphasizes pest management technology to protect U.S. deployed military forces from mosquitoes, sand flies, ticks, and other pests, and to prevent

outbreaks of vector-transmitted diseases. This agreement has been renewed for a second five-year term.

IR-4's efforts have had a positive impact on the protection of deployed military forces and the general public with the registration of new products/new devices to manage these public health pests. The need for IR-4's involvement in registering new products for control of mosquitoes, ticks, bed bugs, etc. is expected to increase as insect resistance to insecticides expands and a rapidly increasing number of vector borne diseases (e.g. Malaria, Dengue Fever, West Nile Virus, and Chikungunya Virus) becomes established/reestablished in the U.S.

Also relevant is the expanding recognition by the medical community of health benefits from eating fruits and vegetables. The improved mental health and emotional wellbeing experienced when consumers are exposed to environments with greenery and landscaping has also been recognized. IR-4 efforts directly assist in making these specialty crops affordable and available year round to promote public well-being.

**Challenge 6: Improve environmental stewardship** IR-4 currently focuses its research on pesticides that are often classified by EPA as Reduced Risk for one or more of that product's uses. Availability of Reduced Risk alternatives helps growers transition away from pesticides with concerns to the safety of applicators, consumers, and the environment.

Recently, IR-4 expanded its efforts with the strategic integration of biopesticides and reduced risk chemical pesticides as a rational pest management system. The goal of this effort is to offer growers an effective pest management system that offers products with less human toxicology and/or environmental concerns. The strategic integration of biopesticides and reduced risk chemical products also helps address pest resistance to pesticides and may mitigate pesticide residues on commodities in trade.

Relevance to stakeholders

IR-4 recognizes the farmers, growers and processors of domestically produced specialty crops/specialty uses as the primary stakeholders of IR-4 Project research and regulatory activities. The interests of these primary stakeholders are articulated by four main groups:

1. Individual growers who directly interact with the IR-4 Project;
2. IR-4 Commodity Liaison Committee (CLC), a formal advisory group consisting of growers, commodity groups, and food processors.
3. Minor Crop Farmers Alliance, a national organization representing farmers, processors and others involved in the production of various horticultural crops from across the U.S.
4. State and federal research scientists and extension specialists who directly represent the interests of specialty crop growers.

The primary stakeholders and other partners have significant involvement in directing IR-4's research activities. It starts with the initial Request for Assistance. Any individual or organization is allowed to submit a Request for Assistance. The only group prohibited from submitting Requests for Assistance are representatives from pesticide companies. Broad involvement continues during priority setting of research. IR-4 solicits input on the importance

of a specific projects utilizing a variety of methods including regional focused meetings, web based nominations of the highest priorities, input from EPA and the USDA-Regional Pest Management Centers, and face to face dialogue at the IR-4 national priority setting workshops. Approximately 175 participants attended the annual IR-4 Food Use Workshop in 2014. Every other year, about 100 participants attend the Ornamental Horticulture workshop. In 2014, IR-4 held its first Biopesticide Workshop where 180 stakeholders participated in priority setting. Specific IR-4 research projects are based on the priorities set at these workshops.

To ensure that all stakeholders and their projects are heard, IR-4 maintains a "Safety Net" where a stakeholder can propose an upgrade in priority for a specific study via submission of a detailed proposal articulating the critical pest management void.

Stakeholders are actively involved in this prioritization process because the end products of IR-4 efforts are tangible registrations of pest management technology that growers use to sustain their farming operations. Miller and Leschewski's report (Attachment 5) noted *"growers benefit in higher yields with higher quality output, consumers benefit with new varieties and lower costs to food and ornamental crops"*. EPA has documented that over the last 18 years, IR-4 supported Emergency Exemptions have help growers avoid \$22.7 billion dollars in losses from the target pests. Dr. Rich Bonanno, Chair of the IR-4 Commodity Liaison Committee, in written testimony to Congress, *"We believe the IR-4 Project has become one of the most efficient, indispensable and reliable government programs ever developed. Simply put, specialty crops cannot economically survive without the IR-4 Project."*

IR-4 anticipates that stakeholder involvement within IR-4 will increase as pest management issues escalate. IR-4 leadership continues to receive numerous invitations to formally address stakeholders at regional, national and international conferences, meetings and workshops to discuss the program and its ability to provide service.

In addition to these primary stakeholders, IR-4 solicits involvement and input from other partners, agencies and organizations to address specialty crop issues including:

- **USDA-NIFA** who oversees the \$11.9 million Congressional appropriated funding for Minor Crop Pest Management (IR-4). This grant is the largest single source of funding for IR-4. The funding is awarded through a competitive grant process. This funding supports the development of the required data IR-4 uses to provide deliverables to stakeholders. A representative of NIFA regularly attends and participates in the IR-4 Project Management Committee (PMC) meetings to provide direction and input;
- **State Agricultural Experiment Stations** – In addition to the NRSP-4 funds, each Experiment Station that hosts an IR-4 field research center, laboratory, or office contributes significant in-kind support. It is estimated that the SAES annually provides over \$5 million of in-kind support. The SAES Directors' interests are represented through the four IR-4 Regional Administrative Advisors who regularly attend and participate in IR-4 PMC meetings;
- **USDA-ARS** works in full coordination with IR-4. ARS provides personnel and research funds for IR-4 research at six field research centers and two analytical laboratories. An



ARS Senior Scientist and an ARS National Program Leader attend the IR-4 PMC meetings. The Senior Scientist participates as a voting member of the IR-4 PMC;

- **The Crop Protection Industry** – This group provides IR-4 access to their conventional chemical pesticides, biopesticides and plant incorporated protectants. This cooperation and access to their products allow IR-4 to help specialty crop/specialty use stakeholders. IR-4 meets with most companies at least once a year to develop cooperative strategies and timelines;
- **Agriculture and Agri-Food Canada Pest Management Centre (CN-PMC)** cooperates with IR-4 and conducts research of mutual interest to U.S. and Canadian specialty crop growers. CN-PMC conducts 50-60 field trials each year as part as many as 20 IR-4 studies. The resulting data are simultaneously submitted to both EPA and Canadian regulatory agencies. This cooperative effort saves U.S. tax payers approximately \$1.0 million annually and often assists in giving U.S. growers greater access to Canadian markets;
- **USDA-FAS** collaborates with IR-4 in the development of strategies to break down barriers of trade associated with pesticide residues in exported crops. FAS provides direct funding for many of IR-4's international initiatives;
- **USDA-APHIS** collaborates with IR-4 and funds research to develop pest management strategies for numerous invasive pests that attack specialty crops; and
- **Department of Defense-Armed Forces Pest Management Board (AFPMB)** works with IR-4 to develop technology to manage arthropod pests that vector diseases; including mosquitoes, sand flies and ticks. Efforts are concentrated on products to protect deployed U.S. military forces. The AFPMB is also interested in products that have civilian applications.

## Implementation

### Objectives

1. **Food Program:** Obtain regulatory approval of safe and effective pesticides for fruits, vegetables, nuts and other specialty food crops and minor uses on major food crops with an emphasis on low hazard or reduced risk products and uses that are compatible with Integrated Pest Management (IPM) programs. Annually, IR-4 will initiate about 100 multiyear residue studies consisting of 600 field trials and 50 efficacy/crop safety trials to facilitate pesticide tolerances and registrations. IR-4 will also assist specialty crops through the establishment of international Maximum Residue Levels to remove pesticide residues as a barrier to trade which allows producers better access to lucrative export markets. The need for IR-4's services will increase with introduction of new/invasive pests, with pests becoming resistant to available pesticides, with increased need for product performance data, with increased complexity of regulatory data requirements, with internationalization of data requirements, and with emerging regulatory issues (e.g. pollinator protection).
2. **Biopesticide/Organic Support Program:** Research to enhance the development and registration of biochemical pesticides, microbial pesticides, plant incorporated protectants and other technology to manage pests for use in conventional and organic production systems. IR-4 will also assist public sector associates and small biopesticide companies

by providing guidance on how to successfully navigate through EPA's biopesticide registration process. IR-4 will also provide regulatory support for USDA deregulation of genetically modified organisms associated with plant incorporated protectants. IR-4's intends to conduct 20 studies to determine which biopesticide(s) exhibit potential to manage critical pests and provide regulatory support for at least two project, annually. The need for IR-4's Biopesticide Program services will increase given growing demand for a more natural approach to pest management, including organics, for the continued challenge of new pests or pests becoming resistant to available pesticides, and for emerging regulatory issues (e.g. pollinator protection) with conventional pesticides. There is also anticipation that there will be emerging biopesticides (e.g. RNAi) that will require IR-4's assistance.

3. **Ornamental Horticulture Program:** Develop efficacy and/or plant safety data with biopesticides and conventional pesticides that expands the number of nursery, floral, and other ornamental crops or pests, including invasive pests registered. Emphasis will be placed on using products that are compatible with IPM and resistance management programs. Annually, IR-4 will initiate at least six research projects consisting of at least 200 field trials. The need for services in the ornamental area will increase given the introduction of new/invasive pest, pests becoming resistant to available pesticides, increased complexity of regulatory requirements, and emerging regulatory issues (e.g. pollinator protection).
4. **Public Health Pesticides:** Provide assistance in the development/registration of pesticides and for use in controlling arthropod pests that transmit diseases to humans and minor animal species. IR-4's activities target mosquitoes, ticks, sand flies, etc. that impact human health through vectoring diseases (e.g. West Nile virus, Lyme disease, malaria, dengue). IR-4 works with Department of Defense (DoD) and ARS to get the products registered through EPA. Specifically IR-4 will identify and assist in the evaluation of underutilized pesticides with vector control relevance, will evaluate novel products and technology developed for registration feasibility and regulatory data needs, will provide regulatory consulting services for public sector collaborators leading towards EPA registrations and will collaborate with international to facilitate global development of new technology.

## Projected Outcomes

1. **Food Program:** Annually, IR-4 submits about 100 data packages to EPA to facilitate establishment of pesticide tolerances that support approx. 700 new uses. In the past four years IR-4 has supported establishment of 955 permanent tolerances and 4,370 registrations on food crops. Through these efforts, IR-4 continues to assist in ensuring that there is a consistent supply of high quality, specialty crops essential to good health. The impact of IR-4 outcomes in the Food Program have been estimated to generate economic activity sufficient to support 87,792 U.S. jobs with labor income exceeding \$3.5 billion. The IR-4 Food Crop Program is estimated to add nearly \$6.1 billion to annual GDP.
2. **Biopesticide/Organic Support Program:** Efficacy data developed in an IR-4's Biopesticide research project is sent to industry to expand registrations of new products, adding new crops or new pests to existing products, or providing additional information

to allow them to better steward their products. Over the past four years IR-4's research projects have expanded biopesticide product registrations to include 55 new crop uses and one "all crops" registration. In the same four year period, there have been 7 registrations of new products facilitated through IR-4 regulatory assistance efforts. The impact of IR-4's deliverables in the Biopesticide and Organic Support Program were estimated to generate 2,358 jobs with annual earnings of \$87 million. The program is also estimated to add just over \$155 million to annual GDP. IR-4 made some significant changes in its sponsored biopesticide research in 2014. Rather than operate as a grant-based program, 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. This change is based on the need for more complete research projects to fill gaps for growers, the desire to be more inclusive, by allowing input from stakeholders.

3. **Ornamental Horticulture Program:** Efficacy and/or crop safety data developed by IR-4 are compiled into project summaries and submitted to industry to support registrations of new products or adding new crops or new pests to existing product registrations. IR-4's goal is to compile at least 15 project summaries annually. Data from IR-4 project summaries will contribute to at least six registrations impacting at least 1,500 ornamental horticulture crop uses annually. In the past 4 years IR-4 has assisted in the approval of 32 registrations impacting 12,695 uses on ornamental crops. IR-4 continues to assist in ensuring that there a consistent supply of quality ornamental crops that enhance the landscape. The Ornamental Horticulture Program impact is measured to generate a total of 14,501 jobs with wages of \$582 million and it estimated to contribute \$1.0 billion to the annual GDP.
4. **Public Health Pesticides:** Milestones include:
  1. Publish 2nd edition of Identification and Status of Underutilized or Potential Useful Materials and Current Public Health Pesticide
  2. assist ARS scientists with U.S. registration of pesticides for attachment to the outside of clothing
  3. assist in testing the efficacy of insect growth regulators used in auto dissemination stations to eliminate the need of area wide spraying in urban environments
  4. developed residue data showing the potential for pesticide/metabolites to accumulate in crops after an area wide application of an insecticide to manage adult mosquitoes. EPA has approved registration
  5. support the field retreatment registration of military uniforms with insecticides
  6. conduct feasibility study for retention of U.S. temephos registration.

### **Management, Budget, and Business Plan**

Long-term policy, coordination, and integration of IR-4 are provided by the IR-4 Project Management Committee (PMC). The PMC consists of seven voting members and six non-voting members. The voting members are the IR-4 Project Executive Director, the Directors of the four IR-4 Regional Offices, the ARS Director of the Office of Minor Use Pesticides, and the Chair of the IR-4 Commodity Liaison Committee. Non-voting members include four Administrative Advisors (each one representing their respective regional associations of the SAES Directors), an ARS National Program Leader for Plant

Health and NIFA's Minor Crop Pest Management (IR-4) National Program Leader. The PMC Chair is elected by the voting members. The PMC meets three times a year to review the status of ongoing programs, develop policy and procedures, set operational budgets, develop strategies and ensure that the program's overall goals are being met. IR-4 Project Headquarters, the four IR-4 Regional Offices, and the USDA-ARS Office of Minor Use Pesticides are responsible for day-to-day management, coordination, and operation of the national program.

The IR-4 Project, including participating ARS scientists, currently employs approximately 125 full-time equivalent staff. All research personnel and infrastructure are associated with the SAES or USDA-ARS. IR-4 HQ is located at the New Jersey Agricultural Experiment Station at Rutgers University and currently employs 28 full-time scientists and support staff. Many of the IR-4 HQ scientists have advanced degrees in pest management sciences, analytical chemistry or horticulture. IR-4 HQ staff consists of: Executive Director, Associate Director, Assistant Directors, Program Managers and Research Coordinators who oversee the Food, Ornamental Horticulture, Biopesticide and Organic Support, and Public Health Pesticide Programs.

The four IR-4 Regional Offices are currently located at SAES in New York at Cornell University (Northeast); Florida at University of Florida (Southern); Michigan at Michigan State University (North Central) and California at University of California/Davis (Western). These offices are each led by a Regional Director responsible for staff, program and budget in their respective region. Staff includes the Regional Field Coordinators (RFC), Regional Laboratory Coordinators (RLC), Regional Quality Assurance Coordinators (RQAC), additional analytical chemists, technicians and support staff. The Northeast Region no longer maintains an analytical laboratory, RLC or analytical chemists. The Northeast Region office will be relocating from Cornell to Rutgers University in December 2015.

The ARS Director of the Office of Minor Use Pesticides, located in Beltsville, MD, manages a program similar to that of the IR-4 Regions. ARS sponsored field research is conducted at research sites in CA, SC, GA, OH, OR and WA. ARS maintains two analytical laboratories in GA and WA.

A complete organization chart is found in Attachment 12.

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 (see Attachment 3). 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. Since 1976, IR-4 HQ has been successful in using the NRSP-4 funds as a base to obtain additional resources from federal and private sector sources to operate the IR-4 Project. **During the last five years the \$481,182 from SAES has been leveraged at more than 30:1.**

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.

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 USDA-ARS (NP-104)/DoD 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.

IR-4 receives funds from USDA-FAS, World Bank and USDA-APHIS to manage international, capacity building and invasive species management activities, respectively. Funds from these two USDA sources are through annual grants that vary in amount based on funds availability and priority.

IR-4 also receives a significant amount of in-kind contributions from multiple sources. 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 contributions.

The IR-4 Project recently updated its strategic plan, *Vision 2020*: (Attachment 7). This plan details the IR-4 Project background, vision, mission, values, culture, objectives and funding needs and identifies strategic benchmarks. It is IR-4's plan 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.
- Encourage the U.S. Congress to allow 10% indirect cost charge on IR-4 grants to host institutions.
- 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.

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.

***Vision 2020*** articulates justification for a significant funding increase for IR-4. Stakeholders intend to focus on funding increases with the NIFA (Minor Crop Pest Management (IR-4) line) and ARS (Office of Minor Uses) sections. There will also be an

effort to increase industry contributions, including more emphasis on food processors and other food chain participants. See Table 1 for details.

IR-4 remains the longest running and successful NRSP. The continued relevancy and significant leveraging of funds have justified the multiple renewals of NRSP-4. NRSP funds are a critical component of the success of the IR-4 Project. Recognizing the fiscal realities, this proposal requests to maintain NRSP-4 funding at the current level of \$481,182 while targeting other sources for increased funds to achieve strategic benchmarks.

If funding requests outlined in Table 1, including the NRSP-4 contribution, are reduced or not provided it will be necessary to scale back benchmarks. IR-4's Project Management Committee will make the necessary decisions to balance programs and costs while maintaining its ability to provide solutions to stakeholders. Value added programs such as funding IR-4 State Liaison Representatives to conduct local workshops will be vulnerable. Longstanding issues to replace outdated equipment and solving the indirect cost issues will be again deferred. There may have to be reductions in research in the food, ornamental horticulture and biopesticide program as well as staff. If funding cuts are severe, IR-4 would be forced to eliminate certain infrastructure, including field research centers, analytical laboratories and coordinating offices to maintain some degree of critical operational efficiencies.

Table 1. Resources needed to achieve strategic benchmarks associated with IR-4's Plant Health Objectives (From Attachment 7 - *Vision 2020*)

(x \$1,000)

Purpose	NIFA	ARS	NRSP-4	DoD	Industry	Total
<b>Existing Food, Ornamental &amp; Biopesticide Program Funding</b>	<b>\$11,916</b>	<b>\$3,171</b>	<b>\$481</b>	<b>\$250</b>	<b>\$1,265</b>	<b>\$17,083</b>
<b>Additional Funding Needed for Core Programs</b>						
Restore Program Capacity	\$900	\$1,000			\$1,250	\$3,150
Expanded Efficacy/Crop Safety Testing	\$1,500	\$400				\$1,900
Enhanced State-Based Priority Setting	\$100					\$100
Funds for Indirect Costs	\$1,442					\$1,442
<b>TOTAL (Existing and New)</b>	<b>\$15,858</b>	<b>\$4,571</b>	<b>\$481</b>		<b>\$2,515</b>	<b>\$23,425</b>

*Vision 2020* contains a section involving additional research and service opportunities within IR-4. The Sponsored Programs objectives extend the scope and capabilities of the IR-4 Project to benefit the public and are often funded by grants and cooperative agreements specific to a particular issue or problem. It is important to note that sponsored programs are a way for specialty crop farmers/producers and other specialty use stakeholders to gain access to the knowledge base and capabilities of IR-4 when

regulatory research/regulatory assistance is not available from others and the data needs are beyond the capabilities of the core IR-4 budget. Examples include:

- **Grower-Funded Research** - Individual farmers, commodity associations and others can volunteer supplemental funding to have their priority projects added to IR-4's research program.
- **Invasive Species Management** - IR-4 will provide leadership in the development of data and other relevant information with pesticides and biopesticides to manage invasive species.
- **International (Global) Capacity Building** - IR-4 will conduct educational programs and outreach activities to train research and regulatory personnel in the processes used for the development of regulatory data, and to support the establishment of Maximum Residue Levels.
- **Import Tolerances** - IR-4 will assist U.S. based food processors that rely on imported specialty crops as their raw materials through assistance in the establishment of import pesticide tolerances.
- **Pollinator Protection** - IR-4 will provide regulatory support and assistance with the registration of biopesticides, conventional chemical pesticides and other pest management technology to manage Varroa mites and other pests of managed honeybees and other pollinators.
- **Other Studies** - IR-4 will conduct and/or manage other studies required by EPA to support the registration of a priority use for a biopesticide, a conventional chemical pesticide or other pest management technology.

### **Integration**

The IR-4 partnership extends beyond growers, food processors, commodity organizations, the pest management industry, and includes many other public sector organizations and agencies.

**SAES/Land-grant universities (LGU)** – A significant amount of IR-4's activities are driven by personnel within the SAES/LGUs including teaching, research, and extension agents/specialists. In many states the SAES personnel work with individual farmers or commodity associations and when a new pest problem surfaces, the SAES personnel are contacted to identify the pest and offer solutions. If a solution is not available, research is conducted to identify options and request IR-4's assistance. Once the registration is approved, SAES/LGU personnel share the news of success and the new management tool with their stakeholders. This involvement of SAES/LGU personnel makes IR-4 a true grassroots organization.

IR-4 scientists contribute in the LGU system through the education and training of the next generation of scientists. IR-4 scientists are often asked to share their unique knowledge of pest management, analytical chemistry, regulatory science and other expertise through guest lectures in the classroom. IR-4 scientists mentor students as members of Graduate Advisory Committees. Additionally, IR-4 often



hires undergraduate and graduate student interns. Many of these interns have progressed and completed advance degrees in agricultural, chemical and life sciences.

IR-4 routinely participates in educational conferences and workshop that are organized by Cooperative Extension that target grower education on pest management and the safer use of pest management products. Many of these IR-4 presentations provide participants with State Pesticide Applicator Recertification credits.

IR-4 personnel participate in the operations of departments and colleges. This includes maintenance of teaching laboratories, service on department committees and in some cases participation in college leadership positions.

**NIFA Pest Management Programs** – IR-4 and the Regional Integrated Pest Management (RIPM) Centers collaborate. IR-4 solicits input from the RIPM Centers on the predicted impact of pesticide use on new and existing IPM systems. This input is used by participants at IR-4 Workshops in setting research priorities.

IR-4 participates in all four of the RIPM Center Advisory Committees. IR-4 also participates on task forces or teams associated with high profile pest management issues, including the Brown Marmorated Stink Bug and the Citrus Greening research teams.

**ARS/FAS/APHIS** – The integrated partnership between IR-4 and ARS scientists involved in pest management research for specialty crops and arthropods that transmit disease to humans and animals was highlighted in other sections of this document.

The integration of activities between IR-4 and FAS has expanded significantly over the past five years. IR-4 works closely with FAS's Science and Capacity Building Divisions to harmonize pesticide registrations and allowable Maximum Residue Levels as global standards. In many cases IR-4 provides scientific expertise and leadership in technical harmonization issues.

APHIS also utilizes IR-4's unique expertise. Utilizing APHIS funds, IR-4 has managed research to develop a better understanding of invasive pests and how best to manage them. Projects managed include Chrysanthemum White Rust, Boxwood Blight, and Impatiens Downy Mildew.

**OPMP** – IR-4 continues to work closely with OPMP on projects of mutual interest. IR-4 and OPMP are currently exploring options for pollinator protection, including the potential registration of new products to manage Varroa mites.

**EPA** – EPA and IR-4 meet at least twice a year to discuss new regulatory approaches that enhance and improve regulatory efficiencies, data requirements, and research collaboration. IR-4 assists EPA by conducting agriculture field tours for new EPA employees to provide opportunities for them to better understand crop production systems and agriculture. EPA regularly asks IR-4 to join in their international delegations to NAFTA, OECD, and Codex.

In the coming years, IR-4 will execute the provisions of **Vision 2020**. Under this plan, IR-4 will focus on enhancing the participation and contributions of the IR-4 State Liaison Representatives (SLR). Our goal is to actively reach out to farmers, specialty crop commodity associations, food processors, and other stakeholders to solicit input on local pest management issues and how IR-4 can help to solve problems. This enhanced public outreach and providing solutions to important problems should have a positive impact on IR-4 and LGU.

### **Outreach, Communications and Assessment**

IR-4 Project Headquarters serves as the focal point in outreach by providing communication with a host of stakeholders including: farmers, commodity associations, food processors, internal IR-4 personnel (State Liaison Representatives, staff at the IR-4 regional offices and analytical laboratories, cooperating ARS scientists), state and federal government agencies, international partners, the registrants of pesticides and biopesticides and interested members of the public. IR-4 employs a mix of communication tools and media, including traditional printed materials such as brochures, flyers, posters, news releases, quarterly newsletters (distributed to about 3,200 domestic and 250 international subscribers), and annual reports as well as internet-based tools. IR-4 launched an online version of its newsletter with the Summer/Fall 2014 issue.

The IR-4 website ([ir4.rutgers.edu](http://ir4.rutgers.edu)) contains a vast amount of information, and has over 5500 "hits" monthly from domestic and international visitors from 82 countries. The IR-4 website contains the most current news and information about IR-4 activities, with extensive information specific for the Food, Ornamental Horticulture, Biopesticide/Organic Support and Public Health Pesticide programs. Stakeholders can submit a "Request for Assistance" form through the website and most importantly, check the status of IR-4 research on specific crops and pests. Users can also access other relevant information through multiple searchable databases. IR-4 also maintains the Global Minor Use Information Portal that provides a key source of information in support of international harmonization of pesticide registrations and maximum residues levels. To better serve the needs of website visitors, IR-4 is currently redesigning their IR-4 website to better organize the available information and simplify searches.

IR-4 also uses social media and Constant Contact to "push" information to its stakeholders. Constant Contact subscribers (over 2000) receive monthly updates about IR-4 research and other breaking news related to the program. Through this

tool, IR-4 regularly delivers this same information on IR-4's three Facebook pages (Food Use, Ornamental Horticulture, Public Health) at facebook.com/IR4Project, and its Twitter account (twitter.com/IR4\_Project).

IR-4 personnel regularly attend scientific, association, and trade meetings in order to contribute presentations about IR-4 accomplishments and provide information to growers. IR-4 personnel frequently submit articles for industry trade magazines and peer reviewed journals.

Additionally, IR-4 Directors routinely attend USDA and SAES meetings to update them on IR-4 activities and progress in solving the "Minor Use Problem". Agencies are also provided Annual Reports and Year End Summaries to help demonstrate progress.

IR-4 Communication and Outreach activities are managed by the IR-4 Communication Manager with input from many within the IR-4 Project including a Communication Committee with representatives from IR-4 Headquarters, the four IR-4 regions, the Project Management Committee, State Liaisons, and the Commodity Liaison Committee. The Communication Manager routinely seeks additional feedback and suggestions for improvements from stakeholders. A comprehensive list of Publications and Presentations from 2009 to 2013 is listed in Attachment 8.

IR-4 utilizes programs like Google Analytics and applications within Constant Contact to determine who is using IR-4 electronic communication information. The goal is to use this information to better serve those who are already using the site and to recruit new users. This information is also used to modify communication strategies and increase awareness of IR-4.

During the development of the recent IR-4 strategic plan, *Vision 2020*, stakeholders were asked to rate IR-4 communication and outreach. Over 550 responses were received and 80% agreed that "*IR-4 is communicating effectively using its website, social media, newsletter and monthly reports*" Only 2% disagreed/strongly disagreed with this statement. Several good suggestions for improvement were made with actions being initiated such as the redesign of the IR-4 website.

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