NRSP_temp4: Facilitating Registration of Pest Management Technology for Specialty Crops and Specialty Uses

Status: Under Review

Duration	10/01/2020 to 09/30/2025
Admin Advisors:	[Douglas Buhler] [Bradley Hillman] [Sherry L. Larkin] [Marcel Holyoak]
NIFA Reps:	

Statement of Issues and Justification

Prerequisite Criteria

How is the NRSP consistent with the mission?

The mission of NRSP-4, or as it is better known as IR-4, is to facilitate regulatory approval of sustainable pest management technology for use in specialty crops as well as specialty uses in major crops to promote public well-being. Specialty crops are defined in law as “fruits and vegetables, tree nuts, dried fruits and horticulture and nursery crops, including floriculture.” IR-4 generates 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 State Agricultural Experiment Stations (SAES) as well as agrochemical industry partners with the principal objective to provide farmers/growers 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 also supports larger federally sponsored research efforts to manage invasive and emerging/re-emerging pests (Citrus Greening, Spotted Wing Drosophila, Brown Marmorated Stink Bug, Spotted Lanternfly, Cucumber Downy Mildew, Palmer Amaranth, etc.), protect pollinators from Varroa mites, and help remove barriers for important international markets for domestically produced specialty food crops.

More specifically, 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) in developing expertise in IPM with growers, pest control advisors and extension personnel on the ground.
    - Office of Pest Management Policy (OPMP) in supporting the development of sustainable agricultural practices and policies.
    - Agricultural Research Service National Program 304 and other programs in USDA research and extension that fall into field to fork pathways.
- US Environmental Protection Agency
    - Office of Pesticide Programs in submitting residue and performance data required for registration of new chemical and biological pesticides
    - Pesticide Program Dialogue Committee in advising 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 in supporting trade
    - Codex Committee on Pesticide Residues (CCPR) in supporting and expanding international regulatory harmonization
    - Transatlantic Trade and Investment Partnership (TTIP) Agreement Between the US and the European Union
- Commodity Producers/Food Processors/Retailers/Consumers
    - Farmers/growers have safe and effective products to manage pests and produce their crops
    - Food Processors have a consistent supply of raw materials to produce their product
    - Retailers have ample supply of high-quality product to meet consumer demand for specialty crops
    - Consumers have access to high-quality horticulture crops that are nutritious and enhance the environment

The NRSP-4 mission of research support and data generation to identify and provide farmers access to new sustainable pest management technologies is fully consistent with the mission of a National Research Support Project. It is an excellent example of how State Agricultural Experiment Stations (SAES) and 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 environmental horticulture crops that enhance the environment and quality of life. IR-4 has further assisted specialty crop producers and the public through initiatives to harmonize international pesticide standards to support global trade of specialty crops.

How does the NRSP pertain as a national issue?

Rationale

Priority Established by ESCOP/ESS

NRSP-4 activities and deliverables address five of the seven Grand Challenges identified in the recently updated Science Roadmap (http://escop.info/wp-content/uploads/2017/05/Scimap-2010.pdf). The five specific Grand Challenges that NRSP-4

addresses are:

Challenge: We must enhance the sustainability, competitiveness, and profitability of U.S. food and agricultural 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 or emerging/re-emerging, can reduce the quality and quantity of crops, resulting in lower revenue to the farmer/grower, 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 November 2017, 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"***. The authors note, *"…* the IR4 Project is estimated to contribute to 95,261 jobs with total labor income of $5.6 billion and contributes about $9.4 billion to annual gross domestic product…"

Additionally, U.S specialty crop growers want access to profitable international markets. Access to export markets is often limited by the lack of international standards regarding pesticide residues in crops. In an effort to minimize the problem, IR-4 is partnering with USDA-Foreign Agriculture Service to promote harmonization of maximum residue levels of pesticide residues and thereby reduce trade barriers 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 manufacturers, formulators and distributors of pesticide products 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: We must adapt to and mitigate the impacts of climate change on food, feed, fiber, and fuel systems in the United States.

Many scientists expect that climate change will 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.

Challenge: We must play a global leadership role to ensure a safe, secure, and abundant food supply for the United States and the world.

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 three 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 Trade Organization funded capacity building projects in the ASEAN region, Sub-Sahara 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: We must improve human health, nutrition, and wellness of the U.S. population.

The medical community is increasingly recognizing the health benefits from eating fruits and vegetables. The improved mental health and emotional well-being experienced when consumers are exposed to environments with greenery and landscaping has also been recognized. IR-4 efforts directly contribute to making these specialty crops affordable and available year-round to promote public well-being.

Challenge: We must heighten environmental stewardship through the development of sustainable management practices.

IR-4 focuses efforts on chemical 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 higher risk profiles to the safety of applicators, consumers, and the environment. IR-4 is also leading in the advancement of biopesticide registration and subsequent adoption by growers as useful options for managing pests in their pest management programs.

Recently, IR-4 introduced an Integrated Solutions initiative as part of IR-4's Food Program. The goal of this initiative is to screen conventional chemical pesticides and biopesticides to identify best management practices to existing pest management voids. This effort will offer growers effective pest management products with reduced risk profiles to humans

and/or the environment. The strategic integration of biopesticides and reduced risk chemical technologies addresses pest resistance to pesticides, and may mitigate concerns with pesticide residues on commodities in trade for international markets.

Relevance to Stakeholders

NRSP-4 primary stakeholders are the farmers/growers and processors of domestic specialty crops. The interests of these primary stakeholders are articulated by four main groups:

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

The primary stakeholders and other partners have significant involvement in identifying IR-4 priorities. It starts with the initial Request for Assistance to IR-4. Any individual or organization can submit a Request for Assistance with the exception of representatives from crop protection companies. Broad involvement continues during priority setting of research. IR-4 solicits input on the importance of specific projects utilizing a variety of methods, including regional focus meetings, web-based nominations of the highest priorities, input from EPA and the USDA-Regional Pest Management Centers, and face to face dialogue at national priority setting workshops. Approximately 175 participants typically attend the annual Food Use workshop, and approximately 100 participants typically attend the Environmental Horticulture and the previously held Biopesticide workshops every other year.

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

IR-4 anticipates that stakeholder involvement will increase as pest management issues evolve. 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-National Institute of Food and Agriculture (NIFA) 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 host IR-4 field research centers, laboratories, or offices and contribute 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 NRSP-4 Regional Administrative Advisors who regularly attend and participate in PMC meetings.
- USDA-ARS works in full coordination with IR-4. ARS provides personnel and funds for IR-4 activities 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 PMC.
- Crop Protection Industry provides IR-4 access to their conventional chemical pesticides, biopesticides and plant incorporated protectants. This cooperation and access to their products allows 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.
- US Environmental Protection Agency reviews IR-4 submissions and assesses the safety of the potential uses. EPA assists IR-4 by providing IR-4 with an analysis of potential research projects prior to initiation to eliminate any product with anticipated regulatory concerns. This allows IR-4 to effectively utilize its resources on products with high potential for regulatory success. EPA also waives fees for service charges associated with IR-4 submissions.
- Agriculture and Agri-Food Canada's 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 approximately 30 field trials and manages an average of 4 studies each year. The resulting data are simultaneous submitted to both EPA and Canadian regulatory agencies. This cooperative effort saves U.S. taxpayers approximately $0.5 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-Animal and Plant Health Inspection Service (APHIS) collaborates with IR-4 and funds programs to develop pest management strategies for numerous invasive and emerging/re-emergent pests that attack specialty crops.

Implementation

Objectives

1. To obtain regulatory approvals for the newest generation and most effective pest management solutions for high-value specialty food crops, and for minor uses

on a major food crops.
Comments: Comments: Emphasis is placed on using reduced risk products or low exposure applications and encourages uses that are compatible with IPM and resistance management programs. Components within this objective include: • Magnitude of residue studies to determine the amount of pesticide residue remaining in or on a specialty crop after being exposed to applications of a pesticide. • Product performance studies to develop efficacy and crop safety data that are required by a state (e.g. California) or company to “prove” that the proposed use is safe and effective when proposed use directions are followed. • Integrated Solutions to focus on the development of “systems” to mitigate, or lower, the level of chemical pesticide in fruits and vegetables at harvest. This is critically important to ensure domestic growers have adequate pest management tools for both the domestic and international markets. Integrated Solutions will also develop options to manage or prevent resistance by pests to pesticides. • Crop grouping to establish extrapolation models for residue data for certain representative crops used to establish pesticide tolerances for those a group of crops that are botanically or taxonomically related.

2. To assist public sector scientists, government programs and small biopesticide companies by providing regulatory support and guidance to effectively complete the steps required in the registration process managed by EPA’s Biopesticide and Pollution Prevention and Registration Divisions, respectively.
Comments: In addition, regulatory support, involving the deregulation and findings of substantial equivalence of genetically modified organisms, RNAi, and gene edited organisms, will be provided for the registration and/or approval of plant incorporated protectants (PIPs). Regulatory support will also be provided to assist certified organic growers by obtaining EPA registrations of products deemed capable of approval by one of the certifying bodies as approved for use in organic production.
3. To develop product performance (efficacy and/or plant safety) data that will establish or expand the number of environmental horticulture crops or pests of those crops on pesticide labels (including biopesticides) and enable growers to most effectively utilize these tools.
Comments: Emphasis will be placed on using lower/reduced risk chemicals and encouraging uses compatible with IPM and resistance management programs. In addition, through support provided by the USDA’s Specialty Crop Research Initiative, threats to pollinators will be addressed by (1) identifying pollinator attractiveness of top selling ornamental crops, (2) filling specific regulatory data gaps for pollinator risk assessment of systemic insecticide residues within ornamental horticulture crops, (3) comparing current pest management practices with alternative strategies, (4) providing guidance to growers and landscape managers with updated Best Management Practices, and (5) developing outreach tools for multiple stakeholder audiences.
4. To work in cooperation with USDA-FAS, Agriculture and Ag-Food Canada, European Union Minor Use Coordination Facility and other international organizations on global harmonization of pesticide registration standards.
Comments: This objective is important because U.S. specialty crop farmers/growers will benefit from and need access to important international markets. However, export markets are often limited by the lack of harmonized standards involving pesticide residues in specialty crops.

Projected Outcomes

- • IR-4 annually submits an average of approximately 100 data packages to EPA to facilitate establishment of pesticide tolerances that support approximately 700 new uses in specialty food crops. The USDA estimates that specialty food crops sales in the U.S. totaled $41.7 billion in 2016 (USDA NASS, Crop Values: 2016 Summary. 2017). Since the inception of the program, over 20,000 new uses in food crops have been supported. 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. It is estimated that food crop productivity enhancements supported by IR-4 generate economic activity sufficient to support 70,868 domestic jobs with $4.2 billion annual contributions to labor income and $7.1 billion contributions to gross domestic product.
- • Historically there have been two dimensions of the IR-4 program to support the development and registration of biopesticides for use in conventional and organic food, and in non-food pest management programs – research support and regulatory support. The biopesticide research support program is being migrated into the new integrated solutions program. The regulatory support will continue to provide guidance on how effectively follow and complete the EPA biopesticide registration process. The regulatory support program typically facilitates an average of two registrations of new products per year. Prior to the change in the program, it was estimated that the program adds 17,340 jobs with labor income of $963 million and annual contributions of $1.6 million to gross domestic product.
- • Efficacy and/or crop safety data developed by IR-4 are compiled into project summaries and submitted to the crop protection product industry to support registrations of new products or in adding new crops or new pests to existing product registrations for the environmental horticulture industry, an industry valued at nearly $19.2 billion in the U.S. (Horticultural Census, 2014, USDA NASS). IR-4's goal is to compile at least 15 project summaries annually which in turn will contribute to at least 6 registrations impacting environmental horticulture crop uses. It is estimated that this program generates about 6,470 jobs, with labor income totaling $386 million. It also expands annual gross domestic product by just about $597 million.
- • In aggregate, it is estimated the IR-4 program contributes to 95,261 jobs with total labor income of $5.6 billion and contributes about $9.4 billion to annual gross domestic product.
- • IR-4 data plays a key role in efforts to harmonize pesticide residue standards for specialty crops and to reduce the use of maximum residue limits (MRLs) as a technical phytosanitary trade barrier. As a result, US specialty crop growers will be better able to expand their markets by exporting fruits and vegetables to international destinations. At the same time these efforts also expand the availability of fresh products to consumers year-round. By working cooperatively, contributions from other countries can be leveraged to reduce costs in the United States. For example, it is estimated that working cooperatively with the Canadian Pest Management Centre in Agriculture and Agri-Food Canada yields savings of $500,000 per year to the IR-4 Project.

Management, Budget and Business Plan

Long-term policy, coordination, and integration of NRSP-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 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 for three-year terms. 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 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.

IR-4 including participating ARS scientists, currently employs approximately 125 full-time equivalent staff. All personnel and infrastructure are associated with the State Agricultural Experiment Station (SAES) System or USDA Agricultural Research Service (ARS). IR-4 Headquarters (HQ) is located at the New Jersey Agricultural Experiment Station at Rutgers University and employs approximately 26 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 Headquarters staff consists of: Executive Director, Senior Associate Director, Assistant Directors, Program Managers and Research Coordinators who oversee the Food, Environmental Horticulture, and Biopesticide/Organic Support programs.

The four IR-4 regional offices are currently located at State Agricultural Experiments Stations in New Jersey at Rutgers

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 in the regional offices includes the Regional Field Coordinators. In addition, Regional Laboratory Coordinators, Regional Quality Assurance Coordinators, additional analytical chemists, technicians and support staff are supported in the analytical laboratories located in the North Central, Southern and Western regions.

The ARS Director of the Office of Minor Use Pesticides, located in Charleston, South Carolina, manages a program similar to that of the IR-4 Regions. ARS sponsored field research is conducted at research sites in California, South Carolina, Georgia, Ohio, Oregon and Washington State. ARS maintains two analytical laboratories in Georgia and Washington State.

In order to assure that the overall IR-4 organization structure was appropriate, an outside panel of experts was employed in 2016 to conduct an organizational assessment. Members of the panel include Chair Steven Slack, Professor Emeritus and Associate Vice President for Agriculture at the Ohio State University; Kathryn Burkgren, Senior Director for Organizational and Workforce Development at Cornell University; James Cranney, California Citrus Quality Council; John Abbott, Syngenta Crop Protections; and Brian Scully, Laboratory Director, US Horticulture Research Laboratory.

The panel was tasked with critically evaluating IR-4's infrastructure including the number and locations of the state and ARS coordination offices, field research centers and analytical laboratories. They were also asked to explore operational efficiencies and/or possible savings that could be achieved through reorganization of the IR-4 units. The panel concluded that the current structure meets the existing and future needs of specialty crop producers, processors and consumers and made no recommendations for organizational restructuring. It noted that the major limiting factor in serving the needs of its constituents is not the structure of the organization, but a projected shortfall in financial resources. The panel recommended that IR-4 continue to support and invest in entrepreneurial efforts such as extramural grants and collaborative relationships to grow relevant programs and resources to support them. It further recommended that IR-4 continue to identify cost savings through increased efficiency.

Based on the recommendations of the panel, IR-4 implemented a number of changes in field and analytical laboratory operations to increase coordination and integration and thus improve efficiencies. IR-4 was also successful in securing additional funding from other sources including the USDA Foreign Agricultural Service to assist in data development of further harmonization of standards involving pesticide residues in specialty crops in the U.S. and its international trading partners, Additionally, the State of California has funded IR-4 studies to support registration of alternatives pesticides in specialty crops.

The NRSP-4 funds are a critical component of the total funding that IR-4 receives, and augments funds from USDA and other sources. NRSP-4 funds directly pay salaries for IR-4 Headquarters management who provide overall leadership and coordination of IR-4's on-going research support efforts. 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. They support activities necessary in the multiyear lifecycle of each study conducted by IR-4 including:

- 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-ARS scientists and the 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 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. IR-4 receives approximately $17 million dollars in total annual direct funding, thus leveraging the NRSP funding roughly 33 to 1. In addition, IR-4 receives in-kind contributions of estimated at approximately $17 million annually.

IR-4 receives an annual Congressional appropriation through USDA-NIFA of $11.9 million. These funds are used to provide resources for IR-4 core operations in the four IR-4 regional offices and IR-4 Headquarters including personnel, supplies, equipment, and laboratory analysis; field trials that produce the necessary residue samples; efficacy/crop safety testing of pesticides on food crops; ornamental trials.

USDA-ARS allocated $3.1 million that is used by ARS scientists, 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.

IR-4 receives funds from USDA-FAS 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 funding availability and priority.

Unrestricted contributions from grower groups, commodity associations and the crop protection industry are also received. IR-4 receives approx. $1.25 million annually and uses these resources to support additional projects, IR-4 Headquarter operations, priority setting/research planning workshops, EPA training tours and related meetings.

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

- SAES/Land-grant Universities (LGU) by hosting IR-4 field centers, analytical laboratories and management offices throughout the United States
- EPA Pesticide Registration Improvement Act fee waivers
- Growers and crop protection industry
- Canadian Pest Management Centre in Agriculture and Agri-Food Canada

The long term and continued support provided by Congress, USDA, the land grant university system, through SAES, and industry strongly indicates the commitment of these organizations 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 efforts impact every state, region and US territory to solve a problem of national importance.

IR-4 remains the longest running and one of the most successful NRSPs. 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 IR-4. 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.

Integration

IR-4 has been highly successful in meeting the needs of its stakeholders due in large part to the extensive partnerships it has cultivated over the years. These partnerships involve a number of public sector organizations and agencies including:

- **SAES/LGU**– A significant amount of IR-4's activities are driven by personnel within the SAES/LGU community including teachers, researchers, and extension agents/specialists. In many states the SAES personnel work with individual farmers/growers or commodity associations and when a new pest problem surfaces, the SAES personnel perform preliminary screening research to identify the most promising pest management product(s) to manage the target pest. In certain circumstances, IR-4 will work with the SAES researchers and manage the screening research to identify the most promising pest management product for use in IR-4 sponsored residue studies. Once the registration is approved, SAES/LGU personnel share the news of success and of the availability of the new management tool with their stakeholders. This involvement of SAES/LGU personnel makes IR-4 a true grassroots organization.

  IR-4 scientists contribute to 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 also 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 personnel routinely participate in educational conferences and workshops that are organized by Cooperative Extension that target grower education on pest management and the safe use of pest management products. Many of IR-4 presentations provide participants with the opportunity to earn State Pesticide Applicator Recertification credits.

  IR-4 personnel also participate in the operations of University 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 on a number of projects. 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 personnel participate in all four of the RIPM Center Advisory Committees. IR-4 personnel also participate 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 developing pest management strategies for specialty crops was highlighted in other sections of this document.

  The integration of activities between IR-4 and FAS has expanded significantly over the recent past. IR-4 personnel work 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 personnel provide scientific expertise and leadership in technical harmonization issues.

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

- **Office of Pest Management Policy (OPMP)**– IR-4 continues to work closely with OPMP on projects of mutual interest. IR-4 and OPMP have explored options

for pollinator protection, including the potential registration of new products to manage Varroa mites.

- **EPA**– EPA and IR-4 personnel meet at least twice each 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 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.

Outreach, Communications and Assessment

IR-4 prepared a comprehensive strategic communications and outreach plan in 2017 which is currently being further refined. The goals of the 2017 plan were:

- Generate greater visibility for IR-4 through a comprehensive communication and education plan that keeps stakeholders informed and elevates the understanding of the value of IR-4 and its activities to Congress and the general public.
- Promote stakeholder involvement through networking and collaboration to increase engagement and information exchange.

The target audiences of these efforts include farmers/growers, commodity associations, food processors, internal IR-4 personnel (State Liaison Representatives, staff at the IR-4 regional offices and analytical laboratories, and cooperating ARS scientists), state and federal government agencies, international partners, registrants of pesticides and biopesticides, and interested members of the public.

The IR-4 website (https://www.ir4project.org) was completely redesigned in 2018. It contains the most current news and information about IR-4 activities, with extensive information specific for the Food, Environmental Horticulture, and Biopesticide/Organic Support programs. Stakeholders can submit a Project Request for food residue, performance, and integrated solutions. Project Requests and/or Grower Surveys can also be made for environmental horticulture through the website, and to check the status of IR-4 research on specific crops and pests. Users can also access other relevant information through multiple searchable databases as well as view Food Crop Success Stories and Environmental Horticulture Research Summaries and Crop Vignettes. 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.

IR-4 also uses social media and communication tools such as Constant Contact to "push" information to its stakeholders. Constant Contact subscribers receive monthly updates about IR-4 activities and other breaking news related to the program. Through this tool, IR-4 regularly delivers this same information via Facebook (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. IR-4 Directors also routinely attend USDA and SAES meetings to update them on IR-4 activities and progress in achieving new pest management products for specialty crop stakeholders.

IR-4 communication and outreach activities include input from many within IR-4, 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. Additional feedback and suggestions for improvements are also sought from stakeholders. A comprehensive list of publications and presentations from 2014 to 2018 is attached.

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 analysis to better serve those who are already using the information and to recruit new users. This analysis is also used to modify communication strategies and increase awareness of IR-4.

Literature Cited

Miller, S.R. and J. T. Mann, *The Economic Impact of the IR-4 Project and Programs.*2017, Michigan State University Product Center Food-Ag-Bio Center for Economic Analysis. Report can be found at: https://www.ir4project.org/wp-content/uploads/2018/12/IR4-2017-Impact-Final.pdf

USDA NASS, *Crop Values: 2016 Summary*. 2017

USDA NASS, *Horticultural Census.* 2014

Outreach Plan

IR-4 prepared a comprehensive strategic communications and outreach plan in 2017 which is currently being further refined. The goals of the 2017 plan were:

- Generate greater visibility for IR-4 through a comprehensive communication and education plan that keeps stakeholders informed and elevates the understanding of the value of IR-4 and its activities to Congress and the general public.
- Promote stakeholder involvement through networking and collaboration to increase engagement and information exchange.

The target audiences of these efforts include farmers/growers, commodity associations, food processors, internal IR-4 personnel (State Liaison Representatives, staff at the IR-4 regional offices and analytical laboratories, and cooperating ARS scientists), state and federal government agencies, international partners, registrants of pesticides and biopesticides, and interested members of the public.

The IR-4 website (https://www.ir4project.org) was completely redesigned in 2018. It contains the most current news and information about IR-4 activities, with extensive information specific for the Food, Environmental Horticulture, and Biopesticide/Organic Support programs. Stakeholders can submit a Project Request for food residue, performance, and integrated solutions. Project Requests and/or Grower Surveys can also be made for environmental horticulture through the website, and to check the status of IR-4 research on specific crops and pests. Users can also access other relevant information through multiple searchable databases as well as view Food Crop Success Stories and Environmental Horticulture Research Summaries and Crop Vignettes. 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.

IR-4 also uses social media and communication tools such as Constant Contact to "push" information to its stakeholders. Constant Contact subscribers receive monthly updates about IR-4 activities and other breaking news related to the program. Through this tool, IR-4 regularly delivers this same information via Facebook (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. IR-4 Directors also routinely attend USDA and SAES meetings to update them on IR-4 activities and progress in achieving new pest management products for specialty crop stakeholders.

IR-4 communication and outreach activities include input from many within IR-4, 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. Additional feedback and suggestions for improvements are also sought from stakeholders. A comprehensive list of publications and presentations from 2014 to 2018 is attached.

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 analysis to better serve those who are already using the information and to recruit new users. This analysis is also used to modify communication strategies and increase awareness of IR-4.

Organization/Governance

Literature Cited

Miller, S.R. and J. T. Mann, *The Economic Impact of the IR-4 Project and Programs.*2017, Michigan State University Product Center Food-Ag-Bio Center for Economic Analysis. Report can be found at: https://www.ir4project.org/wp-content/uploads/2018/12/IR4-2017-Impact-Final.pdf

USDA NASS, *Crop Values: 2016 Summary*. 2017

USDA NASS, *Horticultural Census.* 2014

Land Grant Participating States/Institutions

MI,WA,PR,NC,MN,ID

Non Land Grant Participating States/Institutions

Participation

Participant	Is Head	Station	Objective	Research						Extension	
				KA	SOI	FOS	SY	PY	TY	FTE	KA

Participant	Is Head	Station	Objective	Research						Extension	
				KA	SOI	FOS	SY	PY	TY	FTE	KA
Batts, Roger		North Carolina - North Carolina State University		711 711 711 711 711 711 711 711 711 711 711 711 711	1199 1199 1199 1199 1199 1219 1219 1219 1219 1499 1499 1499 1499	1120 1130 1140 1150 1160 1120 1130 1140 1150 1160 1120 1130 1140 1150 1160	1.00	0.00	0.00	0	0
Erhardt, Susan		Michigan - Michigan State University	1	902	1499	1140	0.10	0.00	0.00	0	0
Hirnyck, Ronda	Yes	Idaho - University of Idaho	1	211 212 213 214	7410 7410 7410 7410	1130 1160 1140 1060	0.20	1.00	0.00	0.2	216 0
Hutchison, William	Yes	Minnesota - University of Minnesota	3	216	3110	1130	0.10	0.00	0.00	0	0
Robles, Wilfredo	Yes	Puerto Rico - University of Puerto Rico	1,3	211 212 213	1099 1459 2499	1130 1160 1140	0.25	0.00	0.00	0	0
Walsh, Douglas B.	Yes	Washington - Washington State University	1,3	216	2410	1130	0.10	0.00	0.50	0	0
Wise, John	Yes	Michigan - Michigan State University	2,3	902	5220	1150	0.10	0.00	0.00	0	0

Combined Participation

Combination of KA, SOI and FOS	Total SY	Total PY	Total TY
902-5220-1150	0.1	0	0
902-1499-1140	0.1	0	0
216-2410-1130	0.1	0	0.5
211-1099-1130	0.08	0	0
212-1459-1160	0.08	0	0
213-2499-1140	0.08	0	0
711-1199-1120	0.07	0	0
711-1199-1130	0.07	0	0
711-1199-1140	0.07	0	0
711-1199-1150	0.07	0	0
711-1199-1160	0.07	0	0
711-1219-1120	0.07	0	0
711-1219-1130	0.07	0	0
711-1219-1140	0.07	0	0
711-1219-1150	0.07	0	0
Grand Total:	**1.85**	**1.00**	**0.50**

Combination of KA, SOI and FOS	Total SY	Total PY	Total TY
711-1219-1160	0.07	0	0
711-1499-1120	0.07	0	0
711-1499-1130	0.07	0	0
711-1499-1140	0.07	0	0
711-1499-1150	0.07	0	0
711-1499-1160	0.07	0	0
216-3110-1130	0.1	0	0
211-7410-1130	0.05	1	0
212-7410-1160	0.05	1	0
213-7410-1140	0.05	1	0
214-7410-1060	0.05	1	0
Grand Total:	**1.85**	**1.00**	**0.50**

Program/KA	Total FTE
0	0
0	0
0	0
0	0
0	0
0	0
216	0.07
0	0.07
Grand FTE Total:	**0.2**

Budgets

MRF Funding 2020

Description	Dollars	FTE
Salaries	361792.00	2.66
Fringe Benefits	119390.00	0.00
Wages	0.00	0.00
Travel	0.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	0.00	0.00
Totals	**481182**	**2.66**

Comments

MRF Funding 2021

Description	Dollars	FTE
Salaries	361792.00	2.61
Fringe Benefits	119390.00	0.00
Wages	0.00	0.00
Travel	0.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	0.00	0.00
Totals	**481182**	**2.61**

Comments

MRF Funding 2022

Description	Dollars	FTE
Salaries	361792.00	2.57
Fringe Benefits	119390.00	0.00
Wages	0.00	0.00
Travel	0.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	0.00	0.00
Totals	**481182**	**2.57**

Comments

MRF Funding 2023

Description	Dollars	FTE
Salaries	361792.00	2.53
Fringe Benefits	119390.00	0.00
Wages	0.00	0.00
Travel	0.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	0.00	0.00
Totals	**481182**	**2.53**

Comments

MRF Funding 2024

Description	Dollars	FTE
Salaries	361792.00	2.49
Fringe Benefits	119390.00	0.00
Wages	0.00	0.00
Travel	0.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	0.00	0.00
Totals	**481182**	**2.49**

Comments