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| **Project Title:** | Facilitating Registration of Pest Management Technology for Specialty Crops and Specialty Uses |
| **Duration**: | 1 October 2025 to 30 September 2030 |
| **Administrative Advisors:** | Doug Buhler (Michigan State University),<br>Moses Kairo (University of Maryland Eastern Shore),<br>John Davis (University of Florida,<br>Marcel Holyoak (University of California Davis) |
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# Statement of Issues and Justification

## Prerequisite Criteria

### A. How is the NRSP consistent with the mission?

NRSP-4 activities are a critical component of the national/international efforts of the IR-4 Project to facilitate regulatory approval of sustainable pest management technology for use in specialty crops[1] and specialty uses in major crops to promote public well-being. Specifically, NRSP-4 involvement contributes by enabling a coordinated national management of IR-4 research, research databases, and internal/external communication.

IR-4's primary objective is to perform research and develop data needed to support the registration of safe and effective chemical and bio-based crop protection products. Achieving deliverables is funded by the contributions of many partners[2] as they 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 is needed as the industry that owns and registers chemical and bio-based crop protection technology focuses its research and development efforts on large markets with major crops (e.g., corn, soybean, cotton, wheat/small grains, etc.) that provide adequate investment returns. Because specialty crop/specialty use markets are small, these are often deemed "orphan uses." IR-4 generates data that is submitted to the U.S. Environmental Protection Agency (EPA) to facilitate the registration of biopesticides (microbial and biochemical products), reduced-risk synthetic chemical pesticides, and the newest generation of emerging technologies (e.g., peptide chemicals, mRNA). The principal outcome of developing this data is to give farmers/growers legal access to essential pest management products that protect their high-value specialty crops from destructive pests. Crops would suffer significant yield and quality losses without safe and effective pest management products that regulatory authorities have approved.

[1] As defined by the Specialty Crop Competitiveness Act of 2004 as "Fruits and vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture).

[2] Includes State Agricultural Experiment Stations via NRSP-4 contributions and hosting IR-4 research and research administration, Congressional directed funding via USDA-National Institute of Food and Agriculture, U.S. Environmental Protection Agency waiver of fees, USDA-Agriculture Research Service provides scientists/technical assistance and testing facilities, Crop protection companies providing financial support, donation of testing materials and technical assistance, commodity groups and specialty crop farmers providing financial support and testing sites.

The Project funds research in 32 states (see table below). Because of the many partners in the research and the requirements to conduct the research following procedures closely regulated by the EPA, there is an absolute necessity for strong national coordination. National coordination includes managing multiple databases that capture unresolved pest management voids, which facilitate priority setting for research, track the status of research projects, and keep internal and external stakeholders informed of research and other activities. **NRSP-4 contributions are directly involved in supporting these critically necessary functions.**

**Table 1: State directly involved in IR-4 research and receiving IR-4 financial support**

| **Food Program** | **State Sites** | **ARS Sites** |
|---|---|---|
| Residue Field Sites | CA, CO, FL, HI, ID, MD, MI, NC, ND, NJ, NY, OH, OR, PR, SD, WA, WI | CA, GA, OH, SC, WA, |
| Processing Facilities | ID | |
| Analytical Laboratories | CA, FL | GA, WA |
| Product Performance | AR, AZ, CA, DE, FL, HI, ID, IN, MD, MI, MT, NC, NJ, NY, OH, OK, OR, PA, PR, SC, TX, WA, WI | |
| Integrated Solutions | AZ, CA, DE, FL, HI, ID, IN, KY, MD, MI, MS, NJ, NC, NY, OH, OR, SC, TN, VA, WA | |
| **Environmental Horticulture** | **State Sites** | **ARS Sites** |
| Product Performance | AL, CA, CO, CT, FL, HI, IN, KY, MD, MI, NC, NJ, NM, NY, OH, OR, PR, SC, TN, TX, VA, WA | OR |

The NRSP-4 contributions to the IR-4 effort are a successful and practical example of how State Agricultural Experiment Station (SAES) and USDA resources can be effectively leveraged for the public's benefit, including consumers, retailers, food processors, and specialty crop growers. NRSP-4 contributions continue to be a substantial element of Federal/State government and private sector efforts to protect specialty crop agriculture from damage from pests, reduce food waste, and facilitate public access to safe, wholesome, and affordable fruits and vegetables which are vital component of a healthy diet as well as ornamentals plants to enhance the environment. Efforts also support economic development in rural economies by providing opportunities for growers to profit from producing high-value specialty crops.

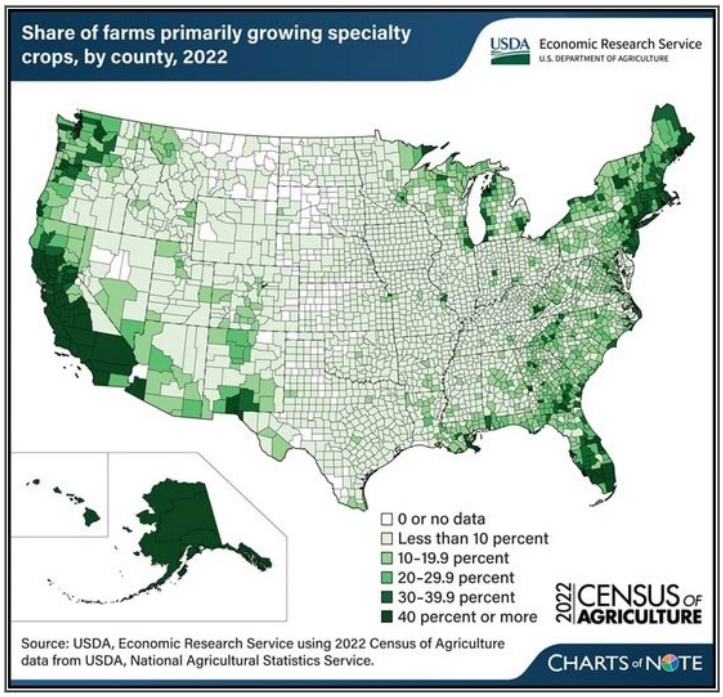
During the mid-term review of NRSP-4, it was indicated that NRSP-4 received a favorable review. Specifically, Dr. Mark McGuire, NRSP RC Chair, wrote in a letter to the NRSP-4 Administrative Advisors, "The midterm evaluation of NRSP4 was very positive. NRSP-RC commends NRSP4 for the extraordinary and tremendously impactful work being done."

### B. How does the NRSP pertain to a national issue?

Specialty crops play a significant role in the U.S. agricultural sector. Farm-level specialty crop production totals nearly $60 billion, representing about one-fourth of the value of all U.S. crop production[3]. When considering food and non-food specialty crops (ornamentals), it is safe to assume that **specialty crops**

[3] https://crsreports.congress.gov/product/pdf/r/r44719/5

**are sold and consumed in every county of every state, tribal lands, and territory of the United States**. According to the 2022 USDA Census of Agriculture, "Almost all (95%) of U.S. counties have farms, and every state has at least one farm primarily growing specialty crops" (see Image below). With specialty crops/specialty uses such a large driver of local and regional economies, damage to these crops can devastate local, regional, and/or national economies.




The crop protection industry's reluctance to perform the necessary research and invest in development to support the registration of vital crop protection products on specialty crops/specialty uses is called the **Minor Use Problem**. Like specialty crops, the Minor Use Problem is national in scope. NRSP-4/IR-4 directly and efficiently provides solutions to the Minor Use Problem. These solutions are relevant to every state, tribal lands, and U.S. territory.

The Minor Use Problem extends beyond specialty crops to specialty (minor) uses in major crops such as corn, soybean, cotton, and wheat. Certain pests can cause localized or sporadic pest damage on the major crops. When outbreaks occur, the impacts can be devastating. Registrants focus their research efforts on something other than localized or intermittent issues, as the costs can be greater than the return on investment. **The need to support the crop protection needs of specialty uses on major crops brings greater relevance to geographic areas where major crops are of utmost importance.** In addition to the minor uses on specialty crops, many emerging crops, including crops being grown for biofuels (e.g., canola), industrial oils (e.g., Carinata), and climate-smart crops (e.g., pennycress) depend on IR-4 for their arsenal of crop protection tools.

Many pest management scientists within the SAES system and ARS are actively involved in trying to solve the Minor Use 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/specialty use pest management

voids for crops grown in their state are articulated to IR-4 and efforts are made to classify the pest management void as a high priority and be addressed. A second SLR representing the ornamental horticulture industry is assigned in some states. 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 actively engage 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.

Since its inception in 1963, the IR-4 Project efforts have been the critical producer of registrations for specialty crops. It has been documented that over 23,000 registrations in the food crop program have been facilitated through the IR-4 Project. Approximately 160 product registrations on ornamental crops in the Environmental Horticulture Program have affected nearly 60,000 uses. **The overwhelming majority of IR-4's deliverables are not limited to one state or geographic region. They are available for use by any grower in states where crop protection products are available for sale.**

## Rationale

### A. Priority Established by agInnovation/ESCOP

NRSP-4 activities in the IR-4 Project and deliverables address most of the Grand Challenges identified in the updated Science Roadmap[4]. The six specific Grand Challenges addressed are:

***Grand 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 critically essential in enhancing 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 for the farmer/grower, potentially higher costs for the consumer, and a negative impact on economies.

In March 2022, the Michigan State University Center for Economic Analysis published a report[5] on ***the economic impact of the IR-4 Project and Programs. The report stated, "The IR-4 Project is estimated to contribute $8.97 billion to annual gross domestic product, including direct and secondary effects, which measures how dollars are re-spent throughout the economy."***

Additionally, U.S. specialty crop growers want access to profitable international markets. The lack of global standards regarding pesticide residues in crops often limits access to export markets. To minimize the problem, IR-4 is partnering with the 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. Congress formally recognized this partnership 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."*

[4] https://escop.info/wp-content/uploads/2017/05/Updated-Science-Roadmap-Report_FINAL20181220_optimized.pdf
[5] Miller, S.R. and J.T. Mann, ***The Economic Impact of the IR-4 Project and Program*** (2022). https://www.canr.msu.edu/resources/economic-impact-of-the-ir-4-project-and-programs-2022

Finally, the successful introduction of new specialty crops is often dependent on IR-4's activities to provide access to pest management technology. Pesticide manufacturers, formulators, and distributors are only willing to invest significant resources in developing pesticide registrations for a new crop once the potential sales of their products reach an appropriate level.

***Grand 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 climate change to cause fundamental changes in cropping systems, with certain plants and pests having extended survival zones. Pests previously unable to overwinter in northern states may be able to survive as conditions change. The Project will be expected to provide practical solutions for these new challenges to producing specialty crops while removing some of the uncertainty in pest management.

In addition to the above, new "climate-friendly" crops are anticipated to be introduced as an economic option for growers. Services from IR-4 will be necessary to help these fledging crops manage the pests that will come as the climate friend crops adapt to an area. For example, the Project is currently working on the development of pest control technology for Field Pennycress.

***Grand Challenge - We must support energy security and the development of the bio-economy from renewable natural resources in the United States.***

IR-4 is often involved in the efforts to commercialize new crops with involvement in solving pest management. Crop protection products for new crops such as hemp, second-generation biofuels (e.g., Miscanthus, Switchgrass, Brassica cornea, canola, etc.), sweeteners (e.g., Stevia, Agave), and climate-smart crops (pennycress) have been secured through IR-4. These emerging crops often need foundational crop protection tools when entering the initial stages of introduction and commercialization. The Minor Use Problem impacts these crops in the initial ramp-up of production; the acreage is small, and the crop protection companies must invest in providing the essential crop protection tools. In many cases, crop production expansion is limited without crop protection tools.

***Grand 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 a recognized and highly respected entity in the international community as the model program to help specialty crop growers obtain legal access to safe and effective pest management technology. The IR-4 Project has been co-sponsor of four Global Minor Use Summits. IR-4 has consulted with the governments of Australia, Brazil, Canada, China, Costa Rica, New Zealand, South Korea, and Taiwan to find 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 Latin/South America. IR-4 is now working with the Minor Use Foundation to facilitate further global cooperation.

These activities aim to train others in the development of appropriate data and to collaborate on research projects of mutual interest. IR-4 expects the demand for its expertise to increase with the expansion of the global trade of specialty crops.

***Grand Challenge - We must improve the human health, nutrition, and wellness of the U.S. population.***

The medical community continues to recognize the broad health benefits of the consumption of fruits, vegetables, nuts, herbs, and spices. The public is informed to eat at least 15 servings a day. Furthermore, improved mental health and emotional well-being experienced when consumers are exposed to environments with greenery and landscaping have also been recognized.

IR-4's efforts in helping domestic growers produce high-quality specialty crops at an affordable price directly contribute to making these specialty crops available to the public at a reasonable price and year-round to promote public well-being.

***Grand Challenge - We must heighten environmental stewardship by developing sustainable management practices.***

In 2019, IR-4 introduced the Integrated Solutions Platform as part of its Food Program. This platform aimed to screen and incorporate conventional chemical and bio-based pesticides and emerging technologies such as peptide chemistry, mRNAi, and application technology into a system approach to managing pest management voids.
This effort offers growers effective pest management products with reduced risk profiles to humans and the environment. The strategic integration of biopesticides, reduced-risk pesticides, and other technologies addresses pest resistance to pesticides and may mitigate concerns with pesticide residues on commodities for domestic consumption and trade for international markets.

## B. Relevance to Stakeholders

The primary stakeholders for activities associated with IR-4/NRSP-4 activities are the growers of specialty crops. They provide the fruits, vegetables, nuts, herbs, spices, and ornamentals used by food processors/food service and retailers to give the public wholesome food and ornamental crops to the consumers. Four main groups articulate the interests of these primary stakeholders:

- Individual growers who directly interact with the program.
- IR-4 Commodity Liaison Committee (CLC) members. The CLC is a formal advisory group of 29 members representing growers, commodity groups, and food processors. The Chair of the CLC is a voting member of IR-4's Project Management Committee (aka Board of Directors)
- Minor Crop Farmers Alliance, a national organization representing farmers, processors, and others involved in producing 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 research priorities. It starts with the initial Request for Assistance (PR or Project Request). Any individual or

organization, except for representatives of crop protection companies, can submit a Project Request. Stakeholder participation continues during the priority setting of research. The Project solicits input on the importance of specific projects from regional focus meetings, web-based nominations of the highest priorities, input from EPA and the USDA-Regional Integrated Pest Management Centers, and in-person dialogue at national priority-setting workshops. Approximately 165 participants typically attend the annual Food Use Workshop, and approximately 75 participants usually attend the Environmental Horticulture Workshop.

It is important to note that stakeholder involvement and interest in services provided by IR-4 is increasing due to emerging pest management issues and challenges. These emerging crop protection/pest management challenges include:

- Climate change involves unpredictable high temperatures, heavy rainfall in some areas, and drought in others. This is making established pest management programs subject to failure. Climate change is expanding the places where pests can overwinter and become a significant problem. New pest management strategies are needed to help assist existing crops in resiliency to climate change.
- Due to multiple court decisions involving the Endangered Species Act, the U.S. Environmental Protection Agency (EPA) is making serious efforts to implement mitigations that impact new and existing pesticide uses. EPA has established mitigation strategies that significantly modify what and how crop protection products (including chemical and bio-based) can be used.
- U.S. EPA continues to reassess pesticides for hazards. Registration Review measures adverse factors, including effects on pollinators, endocrine disruption, PFAS, other human health concerns, offsite movement into ground or surface waters, etc.
- The European Union (EU) assesses pesticides differently than the EPA and other competent regulatory authorities. Assessment in the EU is based on hazard assessment. The EPA uses a highly scientific risk assessment-based approach. The hazard assessment approach in the EU is resulting in the cancellation of many cornerstone crop protection products. The EU is also pursuing the elimination/reduction of maximum residue levels allowed in imported crops. This has become a significant trade barrier to U.S. growers as they can legally use pesticides and sell crops in domestic markets but are limited in exporting treated crops to the EU. As it is difficult to segregate crops for domestic and international markets, the EU standards have become de facto US standards for when the crop can be exported.
- Similar to the EU, the State of California is performing additional assessments of pesticides. The State has adopted a Sustainable Pest Management plan. California intends to remove all pesticides that the State government classifies as “High Risk” by 2050.
- Invasive pests (e.g., Citrus Greening, Spotted-Wing Drosophila, Boxwood Blight, Spotted Lanternfly, basil downy mildew, cucumber downy mildew, Palmer Amaranth, etc.) are becoming more common, impacting crop production and the environment. These pests often have no natural enemies, and little is known about their biology, with little to no effective crop protection product registrations.
- Certain crop protection products are losing their ability to manage pests. They are no longer effective because the pests have evolved and developed resistance to the technology.
- The United States Supreme Court recently ruled that the Chevron Deference gave regulatory authorities, such as EPA, the ability to develop regulations to implement laws. While it is uncertain

how this Supreme Court ruling will impact the availability of pesticides, there is great concern that this will result in the loss of additional critically essential uses.

Because of these challenges, IR-4 receives numerous invitations to formally address stakeholders at regional, national, and international conferences, meetings, and workshops to discuss the Project and its ability to alleviate some of the challenges.

In addition to stakeholder input on research priorities, stakeholders contribute to various assessments of IR-4/NRSP-4 activities and provide process improvement suggestions. In 2021, an ad hoc Path Forward 2.0 review panel was established to perform an in-depth analysis of IR-4 operations, specifically identifying opportunities for improving ways of working[6].

The final report of the Path Forward 2.0 panel was introduced with a comment, ***"IR-4 is an incredibly well-run program with excellent and dedicated staff. It is a model program driven by stakeholder engagement and delivers meaningful and tangible results through excellent collaboration among multiple public and private partners". It is noteworthy that these results have been delivered during an extended period of flat budgets and therefore diminished funding"***. The analysis led to recommendations that included more significant support for information technology, internal and external communications, training needs, and specific attention to potential analytical laboratory backlog solutions.

In addition, the Environment Horticulture Program stakeholders are conducting a targeted assessment of this research program area. Co-chaired by Amy Upton of the Michigan Nursery and Landscape Association, three listening sessions and a survey will provide input on this program area. The report of their findings is anticipated to be presented to the IR-4 Project Management Committee in late October 2024.

## Implementation

### A. Objectives

NRSP-4 contributions are a critical component of the overall object of the IR-4 Project to develop data to support the registration by industry, EPA, and other regulatory authorities of new uses of bio-based and chemical pesticides on fruits, vegetables, nuts, herbs, ornamentals, and other specialty food crops as well as minor uses of on major food crops. Priority is given to products or uses considered lower risk and compatible with integrated pest management systems. Components within this objective include:

- EPA requires "Magnitude of Residue" studies to determine the amount of a pesticide and its metabolites remaining on a specialty food crop/use after exposure to pesticide applications shown to control target pest(s). These studies must be performed under EPA-required Good Laboratory Practice regulations[7].
- Product performance field trials to develop efficacy and crop safety data required by certain States (e.g., California) or companies to assess that the proposed use of food and non-food crops is safe and effective.

[6] Panelist include Rob Hedberg, former National Program Leader in the USDA-NIFA, Barbara Madden, former Minor Use Team Leader, US EPA, Janis McFarland, former Head of Regulatory Syngenta Crop Protection, Ray Ratto, co-owner of Ratto Brothers, a family owned vegetable farm in Modesto, CA, and Chaired by Dan Rossi, former Executive Director, Northeastern Regional Association of State Agricultural Experiment Station Directors.

[7] *Chapter 40, Code of Federal Regulations, Part 160*

- Integrated Solutions platform intended for the development of "systems" using biopesticides, biostimulants, chemical pesticides, new emerging technologies (e.g., peptide chemistry, mRNAi) resistant varieties, and application technology to identify options to control pests, mitigate residues on harvested crops, or develop strategies to prevent or manage pest resistance to pesticides.
- The organic platform to support/obtain registrations of pesticides that can be used in certified organic systems.
- Regulatory support and consulting services to assist in registering new technology discovered or developed by public-sector scientists.
- Global harmonization of pesticide registration standards to help facilitate the removal of non-technical trade barriers that limit the export of U.S.-grown specialty crops.

NRSP resources are significant to the IR-4 Project's ability to successfully leverage other government and non-government funds necessary to meet all sub-objectives listed above. NRSP-4 resources are utilized to coordinate national management of IR-4 research, research databases, and internal/external communication.

## Outcomes and impact (current and projected)

The IR-4 Project's deliverables can be measured using various components or "Quantifiable Achievements." Table 2 below provides the average number of quantifiable achievements per calendar year 2020-2023. The average annual achievements attributed to NRSP-4 contributions during the current period and projected during the renewal period are also provided. The outcomes are calculated utilizing the ratio of NRSP-4 funds to total funds. Please note that the projected achievements during the renewal period reflect the 15% reduction in NRSP-4 funding.

**TABLE 2-Average Annual Quantifiable Achievements for IR-4 including an estimate of achievements realized from NRSP-4 contributions; current and projected**

| Quantifiable Achievements | Average annual achievements, 2020-2023[8] | Average annual achievements via NRSP-4 contributions Current period[9] | Project average annual achievements via NRSP-4 contributions [10] |
|---|---|---|---|
| New food pesticide tolerances | 282 | 8.24 | 6.81 |
| New food pesticide registrations | 894 | 26.15 | 21.61 |
| New food tolerance petition submissions | 18 | 0.52 | 0.43 |
| Product performance reports | 105 | 3.06 | 2.53 |
| Integrated Solution reports | 45 | 1.52 | 1.09 |
| New residue field trials | 3728 | 10.88 | 8.99 |
| Product Performance field trials | 101 | 2.95 | 2.43 |
| Integrated Solutions field trials | 53 | 1.54 | 1.27 |
| New registrations of ornamental crops | 1 | 0.03 | 0.02 |
| Impacted of ornamental crops | 669 | 19.57 | 16.17 |
| EH Program research summaries | 22 | 0.63 | 0.52 |
| EH Program field trials | 633 | 18.51 | 15.29 |

[8] Details at https://www.ir4project.org/about-ir4/annual_report/

[9] As NRSP-4 funds account for approximately 2.925% of the total funding for IR-4, it is extrapolated that 2.925% of the deliverables are attributed to the NRSP contributions

[10] Assuming IR-4 funding remains at FY 2024 levels and NRSP-4 contribution drops to $409,004 annually, NRSP-4 funds account for 2.417% of the total funding and it is extrapolated that 2.417% of the deliverable can be attributed to NRSP-4 contributions

Regarding impacts, in March 2022, Drs. Steven Miller and John Mann of Michigan State University Center for Economic Analysis published a report on ***The Economic Impact of the IR-4 Project and Programs*** https://www.ir4project.org/wp-content/uploads/2022/06/2022-Economic-Impact-Summary.pdf. In this report, they stated, "We apply well-established approaches to measuring economic contributions and estimate that the IR-4 Project supports over 111 thousand domestic jobs with a total annual payroll of $5.34 billion in 2021 dollars. When accounting for all sources of national income, the IR-4 Project is estimated to contribute $8.97 billion to the annual gross domestic product, including direct and secondary effects, which measures how dollars are re-spent throughout the economy. Several channels of economic contribution go into these measures, including direct expenditures of the IR-4 Project, anticipated crop losses mitigated under each of the two IR-4 Programs through Biopesticide Regulatory Support, and gaining EPA exemptions for pesticide use when few or no other options for pest management exists. Recognizing that benefits realized today come from over 50 years of IR-4 Project efforts, we show that we can attribute about seven jobs today for every $1,000 in annual public investment in the IR-4 Project."

Using the same extrapolation ratio outlined in Table 2, NRSP-4 contributions to the IR-4 Project yield 3,247 domestic jobs. When accounting for all sources of national income, the NRSP-4 contributions are estimated to contribute $216,805,000 to the annual gross domestic product. **This means that each dollar invested in NRSP funds yields over $530. This is a substantial return on investment.**

**B. Management, Budget, and Business Plan for NRSP-4**

Since 1963, the State Agriculture Experimental Station (SAES) Directors have diverted a small amount of their "off-the-top" Hatch or multi-state research funds from Congressional appropriations to support the IR-4 Project. These off-the-top funds were the first funds allocated when IR-4 was established over 60 years ago.

This SAES Directors' contribution to NRSP-4 reached the high mark of $514,000 in 1997. Since FY 1998, funding has remained at approx. $481,182 annually, except FY 1999 at $501,000 and FY 2023 at $444,444. During these 27 years, the cost of operations has increased substantially. For example, the $481,182 provided in 1997 is worth nearly $940,000 in 2024[11].

NRSP-4's contribution to total IR-4 funding in 1997 was slightly less than 6%. In FY 2024, the contribution dropped to less than 3%. With the recommendation by the NRSP Review Committee to reduce NRSP-4's funding by 15% during the next grant period, FY 2026-2030, the contribution will drop to less than 2.5%.

IR-4 is fortunate; it has been able to bring in funds from many sources, including USDA grants (NIFA, ARS, and FAS) and private sector contributions, and continue leveraging NRSP funds to support specialty crop agriculture with their critical pest management needs. Leveraged **direct** funds include:

- IR-4 receives an annual Congressional appropriation through USDA-NIFA of $15.0 million. These funds 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; and 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

[11] https://www.in2013dollars.com/us/inflation/1997?amount=481182

specific research assignments that fully complement and do not duplicate the ongoing research at the SAES.

- IR-4 receives funds from USDA-FAS to manage the global harmonization of pesticide registration and international capacity building. FAS funds are provided through annual grants that vary in amount based on funding availability and priority.
- Grower groups, commodity associations, and the crop protection industry contribute unrestricted amounts. IR-4 receives approximately $1.25 million annually, and these resources support additional research, IR-4 headquarters operations, priority setting/research planning workshops, EPA training tours, and related meetings.

Additionally, it is estimated that IR-4 receives approx. $15 million of in-kind contributions from the SAES/Land-grant Universities (LGU) by absorbing expenses associated with hosting IR-4 field centers, analytical laboratories, and management offices, from EPA via accepting waivers of Pesticide Registration Improvement Act fees, from the crop protection industry and growers by providing test and reference products that are used in research as well as land to test the pesticides on target crops.

The IR-4 Project's management structure consists of a Board of Directors and a Chief Executive Officer. The Project Management Committee (PMC) serves as the board of directors for the IR-4 Project. 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 meets three times a year to develop policies and procedures, set operational budgets within funding limitations, review the status of ongoing programs, and ensure the program's overall goals are being met. The PMC continues to support allocating the NRSP-4 resources to IR-4 Headquarters. The PMC believes that the resources provided by SAES Directors via the NRSP-4 allocation to North Carolina State University for use in the IR-4 Project operations are a critical component of the nationwide effort of the IR-4 Project to facilitate regulatory approval of safe and effective pest management technology for specialty crops and specialty uses for major crops.

IR-4 Chief Executive Officer is the Project's Executive Director, who is located at the National Headquarters office on the campus of North Carolina State University. The Executive Director is responsible for "Performing the duties of Principal Investigator and administrating funds provided by USDA, the State Agriculture Experimental Station Directors (Multiple-region research funds), and others." Assisting the Executive Director in this responsibility are the Associate Director for Regulatory Sciences, National Chief of Staff, Environmental Horticulture Program Manager, Biopesticide Regulatory Support Manager, Quality Assurance Manager, Biology Team Leader, Data Applications Manager, and National Information and Communication Officer.

The contributions of this leadership enabled a coordinated national management of IR-4 research, research databases, and internal/external communication. Specifically, they support activities necessary in the multiyear lifecycle of IR-4 research prioritization and research execution, including:

- Stakeholder Engagement: Encouraging input from stakeholders in the prioritization process for potential research projects through online 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 pest management technology registrants and regulatory authorities to determine the type and amount of data needed for regulatory approval. Developing protocols with researchers at appropriate research sites and analytical laboratories to ensure that data meet regulatory requirements.

NRSP-4 resources historically are used to cover a proportional salary and fringe for these IR-4 Project leaders at IR-4 Project Headquarters. It is proposed that this allocation continue, and during the proposed renewal period, 100% of the NRSP-4 contributions will be assigned to the IR-4 Headquarters' leadership salary and fringe. While 100% of the NRSP-4 contributions are utilized for the wage/fringe of the leadership during every year of the Project, it is anticipated that 42%the total salary/fringe costs of these leaders will be covered by NRSP-4 contributions in year one. Based on the expected increase in salary/fringe costs (modeled at 4% per annum), by the end of the project, the percentage of total salary/fringe covered by NRSP-4 contributions for these leaders will drop to 35%. A more significant contribution from other sources will offset the static funding from NRSP.

IR-4 believes that 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.

The documented return on investment from the NRSP-4 contribution to IR-4 is significant, approx. $530 for every dollar invested. NRSP-4 is one of the longest-running and most successful NRSPs. Its continued relevancy and considerable leveraging of funds have justified its multiple renewals. NRSP funds are a critical component of IR-4's success. A clear case is made that renewal of **NRSP-4 funds at the level recommended in 2023 by the NRSP Review Committee, $400,005, is warranted.**

Most believe that the Congress of the United States needs to address the funding shortfalls for agriculture research, including the need for significantly more funds for the IR-4 Project. In 2022 and 2023, IR-4 was fortunately to obtain a $3.1 million increase. This was the first increase in over 12 years.

The current funding from the Congressional Appropriated "Minor Crop Pest Management (IR4) line in the NIFA section is $15 million. The specialty crop stakeholders[12] have advocated to Congress that they increase annual funding for IR-4 to $25 million annually. The stakeholders have been unsuccessful in achieving their recommendation in FY 2024. The likelihood for increase funds is currently bleak.

[12] Friends of IR-4, see https://ir4friends.org

Significant aspects influencing the availability and usefulness of new and existing pest management technology for specialty crops and uses have been altered since the decision by the NRSP Review Committee to reduce the NRSP-4 contribution to IR-4 was made in June 2023. During this short time frame, we have witnessed:

- Intensified climate change is rapidly expanding the areas where new pests become a significant problem.
- Numerous new policies and procedures by the U.S. EPA involving pesticide use mitigations to achieve compliance with the Endangered Species Act.
- Significant activities with EPA reassessment of pesticides regarding human health and environmental hazards targeting products with fundamental use in specialty crops
- More and more difficult provisions by the European Union on pesticide residues in imported food crops
- The release of the State of California's plan to phase out essential pesticide products currently utilized on specialty crops
- The unknown impact of the United States Supreme Court ruling on the Chevron Deference and its effect on pesticide availability

The above challenges call for more efforts by IR-4 to bring the latest generation of bio-based and reduced-risk chemical pesticides to market.

It is unknown if the NRSP Review Panel had complete and accurate information when deciding on a 15% reduction in off-the-top funding. The letter from Dr. McGuire to the NRSP-4 Administrative Advisors stated that there was a "recent infusion of $4 million into IR4 via NIFA". The actual funding increase was only $3.1 million. We also are unsure if the NRSP Review Committee knew before 2022 that IR-4's authorizing language did not allow for payment of indirect costs. The authorizing language was modified to allow a modest 10% indirect cost associated with the funding increase. This means that approx. 50% of the new funds received were used to offset the change to allow indirect costs.

IR-4 comprehends the NRSP Review Committee's objective to redirect funds traditionally allocated to NRSP-4 into new NRSPs. However, the need for IR-4 remains extremely high and alternative funds to keep research capacity intact are currently limited.

IR-4 continues to evolve and redirect efforts from its traditional work with chemical pesticides and engages more with bio-based products. While the reduction in NRSP-4 funds will not stop the transition, it will slow movement into this area. For example, IR-4 has maintained approx. 1.33 FTE involved in biopesticide regulatory support and consultation for public sector technology. In anticipation of reducing the NRSP-4 funding, IR-4 is deferring hiring a replacement position involved in this critical area. The impact of deferring this rehiring is that some technology developed by land-grant institutions, USDA-ARS, or other public institutions may not make it to market, or the entry cost may be much higher as private sector consultants must be retained

IR-4 respectfully requests that the **NRSP Review Committee reconsider the proposed funding reduction for NRSP-4 and provide previous total funding ($481,182) each year for the next five-year funding cycle.** This restoration of the $72,177 reduction will help allow IR-4 to reestablish a Biopesticide Regulatory support platform to help pest management technology discovered/developed by public

sector scientists make it into the domestic market and give the specialty crop producers another valuable tool.

**C. Integration**

IR-4 has been highly successful in meeting the needs of its stakeholders due in large part to the extensive partnerships it continues to value and engage. These partnerships involve:

- State Agricultural Experiment Stations (SAES) host IR-4 field research centers, laboratories, or offices and contribute significant in-kind support ($5 million annually). In many states, SAES personnel work with individual farmers/growers or commodity associations. When a new pest problem surfaces, they perform preliminary screening research to identify the most promising pest management product(s) to manage the target pest. Once the registration is approved, SAES personnel will share the news of the success and availability of the new technology with their stakeholders.

  IR-4 personnel also participate in the operations of University departments and colleges. This involves training the next generation of scientists. IR-4 scientists also mentor students as members of Graduate Advisory Committees. Additionally, IR-4 often hires undergraduate and graduate student interns.
- USDA-NIFA oversees the Congressional-appropriated funding for Minor Crop Pest Management (IR4). This grant is the largest single source of financing for IR-4. This funding directly supports research and the development of the required data IR-4 uses to provide deliverables to stakeholders. A representative of NIFA (currently Dr. Rubella Goswami) regularly attends and participates in the IR-4 Project Management Committee (PMC) meetings to provide direction and input.
- USDA – ARS – 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. ARS National Program 304 scientists directly participate in IR-4 research priority setting. In the biopesticide area, IR-4 helps get ARS crop protection technology through the regulatory process.
- Regional Pest Management Centers (RIPM) — IR-4 and the RIPM Centers collaborate; IR-4 solicits input from the RIPM Centers on the predicted impact of pesticide use on new and existing IPM systems. IR-4 personnel participate in all four of the RIPM Center Advisory Committees. IR-4 personnel also participate in task forces or teams associated with high-profile pest management issues, including the Citrus Greening research teams.
- USDA-FAS collaborates on developing strategies to overcome trade barriers associated with pesticide residues in exported crops. FAS provides direct funding to harmonize pesticide registrations between the United States and trading partners. This helps domestic specialty crop growers export quality fruits and vegetables to lucrative international markets.
- The US Environmental Protection Agency (EPA) reviews data submissions and assesses the safety of the potential uses. EPA assists by providing a “Stop Light” analysis (Red=Stop; Yellow=Caution; Green =Go) of possible research projects before initiation to eliminate any product with anticipated regulatory concerns. This allows the efficient utilization of resources on products with high potential for regulatory success. EPA also waives “fees for service” charges associated with IR-4 submissions.

EPA and IR-4 regularly meet to discuss new regulatory approaches that enhance and improve regulatory efficiencies, data requirements, and research collaboration. IR-4 has a standing seat in EPA's Pesticide Program Dialogue Committee, United States/Mexico/Canada Free Trade Agreement (USMCA) Technical Working Group on Pesticides and Codex Committee on Pesticide Residues (CCPR). Participation provides an opportunity to advise others on specialty crop pest management issues.

- The Crop Protection Industry –Industry provides access to conventional chemical pesticides, biopesticides, and emerging technologies, which IR-4 helps specialty crop/specialty use stakeholders. Representing this industry is CropLife America (CLA), a network of companies that produces pesticides in the United States. The Bio-Product Industry Association (BPIA) is an association of companies registering bio-based pesticides and biostimulants in the United States once approved by the EPA and state regulatory authorities.
- Agriculture and Agri-Food Canada's Pest Management Centre (CN-PMC) cooperates and conducts research of mutual interest to U.S. and Canadian specialty crop growers. CN-PMC conducts approximately 20 field trials in cooperation with U.S. efforts. The resulting data are simultaneously submitted to both EPA and Canadian regulatory agencies. This cooperative effort saves U.S. taxpayers approximately $0.5 million annually and often gives U.S. growers greater access to Canadian markets.

### D. Outreach, Communications, and Assessment

Since relocating the IR-4 Project Headquarters to NC State starting in 2020, a concerted effort has been made to upgrade strategic communications and outreach. Accomplishments include:

- A fully redesigned website
- Develop and implement a comprehensive Visual Strategy
- Establish a broad presence on social media, including LinkedIn, X (Twitter), Facebook, Instagram, and YouTube.
- An expanded use of videos to communicate to stakeholders. Videos include:
    - 60 Years of IR-4 (2023)[13]
    - IR-4: 60 Years and Beyond (2024)[14]
    - Video tutorials in the priority-setting process, including[15]
        - Submitting a Project Clearance Request
        - Nominating Projects for the Food Use Workshop
        - The Food Use Workshop Process
        - Priority Upgrade Proposals
- Approx. Monthly news articles highlighting deliverables to commodity groups, significant events, and the people of IR-4.
- Development of short (on-pagers) highlight the four regions and the Environmental Horticulture Program

There are three plans for the upcoming project period.

[13] https://www.youtube.com/watch?v=9P42Gc5dHws&t=2s
[14] https://www.youtube.com/watch?v=5OlEyflwkrM
[15] https://www.ir4project.org/industry-resources/

1. The first aspect is to continue the process of modernizing and upgrading the communications that are used to engage external partners. This means additional modifications to the IR-4 website to increase user experience satisfaction and more video use for outreach activities. The ultimate objective is to generate greater visibility that keeps stakeholders informed and elevates the understanding of the value of IR-4 and activities to the general public. 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.
2. IR-4 personnel regularly attend scientific, association, and trade meetings to contribute presentations about IR-4/NRSP-4 accomplishments and inform growers. Efforts will be made to go beyond the traditional stakeholders and involve new groups. In 2023, a Network Enhancement Project Taskforce (NET) was established to explain the available services to underserved populations better. The NET targeted crop protection researchers at 1890 and 1964 Land Grant Universities. The other goal of the NET was to engage Cooperative Extension through the County Agricultural Agents. Some accomplishments include:
    - Delivered a talk and set up an IR4 booth at the 1890 Association of Research Directors (ARD) Conference in April 2024.
    - Invitation to present at the Annual 1890 ARD Business Meeting on September 23rd at the Sheraton in Raleigh. This opportunity aims to foster connections with Historically Black Colleges and Universities (HBCUs) stakeholders and enhance our community network.
    - The IR4 website has posted a new video about the “Food Use Workshop Process” to introduce newcomers to the Food Use Priority setting Workshop.
    - Establish ties with the Association of Black Entomologists

In 2024, IR-4 established the first Magnitude Residue study in response to a request from a Tribal Nation to obtain a pesticide tolerance

The third prong of enhanced communication focuses on internal stakeholders. Work has started on the development of an intranet site. The plan is to move all the “nuts and bolts” research performance information off the publically-facing website and move it to a limited-access intranet site. This will simplify the public-facing website and make it friendlier for casual/uninformed users to find appropriate information. The other positive aspect will help the researchers involved in IR-4 to have a portal or one place to go to interact electronically. A WordPress development site has been established through NC State’s Office of Information Technology. The next step is to set up the intranet site architecture and hone in on the vision for how the intranet will be organized and what will be included.