

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

Duration: 1 October 2025 to 30 September 2030

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Non-Technical Summary

NRSP-4 activities with the IR-4 Project help facilitate the registration of crop protection technology for specialty crops (fruits, vegetables, nuts, herbs, ornamentals, other horticulture crops) and minor uses on major crops (corn, soybean, wheat, etc.) to manage insects, plant disease, weed, and other destructive pests. NRSP-4/IR-4 partnership accomplishes its mission by developing the data required by the U.S. Environmental Protection Agency, the states, and the industry to expand bio-based and chemical pesticide registrations. This facilitates registration in markets that lack adequate sales to support their development investment. Significant deliverables with positive impacts to stakeholders that include new registrations for key pests; extending registrations to include similar crops through crop grouping/data extrapolation, and assisting in the harmonization of international Maximum Residue Levels to remove pesticide residues in crops as a trade barrier are provided. The research focuses on lower-risk technology that respects human health and the environment. This gives the specialty crop farmers/growers access to crop protection technology to better manage pests in a sustainable and environmentally friendly manner. Organic growers also benefit from registrations of biopesticides derived from natural materials.

Statement of Issues and Justification

The companies that develop and market bio-based or chemical crop protection products often focus their research and development efforts on large acreage crops with the potential for significant sales and profits. The cost of getting a new crop protection product to market cost nearly \$300 million and takes 8-10 years. Crop protection product sales on specialty crops and low volume, specialized uses on major crops have limited potential for product sales. Often, the cost of data development to gain registrations in these small markets far outweighs the potential sales and leads to an unacceptable return on investments. Without intervention by the public sector, growers of specialty crops would have legal access to only a few crop protection products. This lack of access to safe and effective crop protection products is known as the “Minor Use Problem.” The U.S. Congress established Interregional Research Project Number Four (precursor to NRSP-4) in 1963 with the objective of giving the growers of specialty crops access to crop protection products to manage pests with the additional benefit of giving the public access to high-quality fruits, vegetables, nuts, herbs, and non-food ornamentals at affordable prices.

NRSP-4 activities and actions within the national IR-4 Project have facilitated the regulatory approvals by the U.S. Environmental Protection industry of over 24,000 registrations on food crops and over 60,000 approvals on non-food crops. The goal is to give specialty crop farmers access to products to manage

insects, plant diseases, weeds, and other pests that reduce crop yields or quality while promoting public well-being.

IR-4 continues to receive new requests for assistance from U.S. commodity growers, Cooperative Extension, and the public sector research network. Because the number of requests for assistance that have not been addressed exceeds available resources, priorities are necessary. Research priorities are established during an open and transparent process at priority-setting workshops. Decisions are made for importance and urgency in multiple areas. This includes EPA guideline “Magnitude of the Residue” studies on food crops, product performance testing on food and ornamental crops, as well as efforts to address hard-to-manage pest damage situations by integrating biopesticide products, emerging biotech products, and reduced-risk chemical pesticide products into an Integrated Solutions Platform (ISP) system.

In addition to the above, NRSP-4/IR-4 research and relevant data are part of larger USDA-sponsored efforts to manage invasive pests such as Citrus Greening, Spotted Wing Drosophila, Impatient Downy Mildew, etc.), international efforts to protect pollinators from Varroa Mites, as well as the opening lucrative international markets for exports of domestically produced specialty crops.

The specialty crop/minor use community faces unprecedented challenges in gaining approvals for safe and effective crop protection technology registrations. On top of the list are complex regulatory issues--such as legislative and judicial directives that EPA comply with the provisions of the Endangered Species Act when registering new pesticides and pesticide uses. Because of the uncertainty regarding mitigations and outcomes, many registration actions are significantly delayed or even abandoned. Other regulatory reassessment actions, including endocrine disruptors, pollinator protection, water, etc., are equally challenging. Pesticide resistance to pests is another factor influencing the useful tools available to growers. Certain products are no longer efficacious. Variations in international policies influence what can be used in the United States on export crops. Growers often do not know if a product is headed to domestic or international markets when an in-season pesticide application is made. This makes it difficult if US regulations are not harmonized with trading partners. Finally, public perception of pesticides continues to impact what growers can use.

There is an emphasis on utilizing the Integrated Solutions platform to provide growers with solutions while responding to the challenges mentioned above. The ISP marries the favorable characteristics of conventional chemical pesticides with biopesticides and emerging technologies in a system-like approach.

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

- **Stakeholder Engagement:** Encouraging input from stakeholders in the prioritization process for potential research projects through on-line and workshop participation.
- **Communicating the IR-4 Mission:** Providing outreach materials for the national IR-4 program through the website, technical reports, blogs, newsletters, special publications and social media.
- **Database Management:** Maintaining multiple databases to track research progress and to disseminate results to stakeholders.
- **Providing Data Access to Stakeholders:** Maintaining an online portal that allows specialty crop growers, commodity group representatives, SAES researchers, Cooperative Extension educators,

USDA-Agriculture Research Service (ARS) scientists and the Integrated Pest Management (IPM) community to submit “Requests for Assistance” for crop protection solutions.

- **Research Planning:** Interacting with registrants of pest management technology and regulatory authorities to determine the type and amount of data needed to allow for regulatory approval. Developing protocols with researchers at appropriate research sites and analytical laboratories to ensure that data meet regulatory requirements.

The partnership of having NRSP-4 activities within the IR-4 Project 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.

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 crops¹ 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 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. Partners include:

- The State Agricultural Experiment Stations via NRSP-4 contributions and hosting IR-4 research and research administration facilities
- Congressional appropriated funding allocated via USDA-National Institute of Food and Agriculture grants
- U.S. Environmental Protection Agency waiver of Pesticide Registration Improvement Act fees
- USDA-Agriculture Research Service provides scientists/technical assistance and testing facilities,
- The crop protection companies providing financial support, donation of testing materials and technical assistance,
- The specialty crop farmers and commodity groups providing financial support and testing sites

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

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).”

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.

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

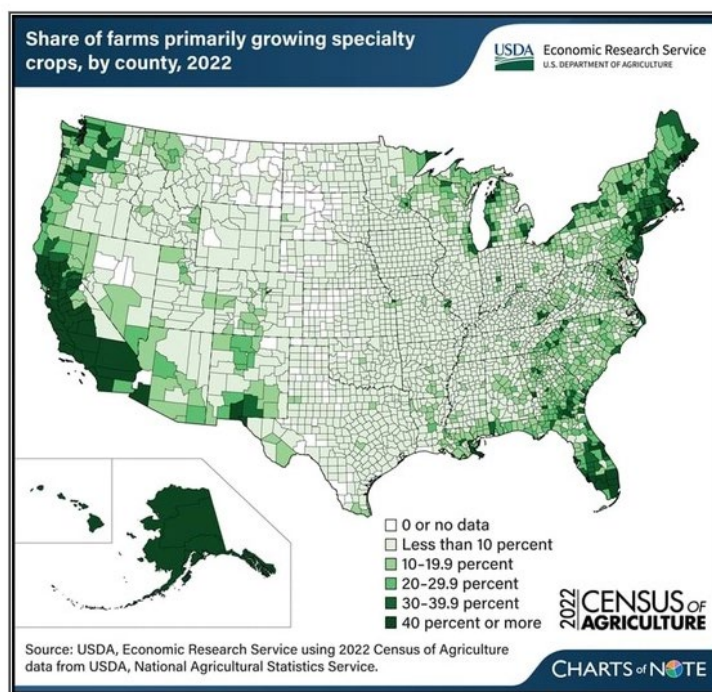
Food Program	State Sites	ARS Sites
Residue Field Sites	CA, CO, FL, HI, ID, MD, MI, NC, ND, NJ, NY, OH, OR, PR, SD, WA, WI	CA, GA, OH, SC, WA,
Processing Facilities	ID	
Analytical Laboratories	CA, FL	GA, WA
Product Performance	AR, AZ, CA, DE, FL, HI, ID, IN, MD, MI, MT, NC, NJ, NY, OH, OK, OR, PA, PR, 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	GA, OH, OR SC,

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 that are a 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, former NRSP RC Chair, wrote in a letter to the NRSP-4 Administrative Advisors, "The midterm evaluation of NRSP-4 was very positive. NRSP-RC commends NRSP-4 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 production². When considering food and non-food specialty crops (ornamentals), it is safe to assume that **specialty crops 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 land, 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. **NRSP-4/IR-4's ability to support the crop protection needs of specialty uses on**

² <https://crsreports.congress.gov/product/pdf/r/r44719/5>

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 support NRSP-4 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 NRSP-4/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/ESCAP

NRSP-4 activities in the IR-4 Project and deliverables address most of the Grand Challenges identified in the updated Science Roadmap³. 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 report⁴ on ***the economic impact of the IR-4 Project and Programs. The report stated, “The IR-4 Project***

³ https://escop.info/wp-content/uploads/2017/05/Updated-Science-Roadmap-Report_FINAL20181220_optimized.pdf

⁴ 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>

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 reducing 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.”*

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 IR-4 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, IR-4 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. In addition, and in conjunction with USDA Foreign Agricultural Service, IR-4 has hosted training for international Borlaug Scholars. 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 advised 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 involving 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 working⁵.

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 and Michael Martin of American Hort, 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 I2025.

Implementation

A. Objectives

⁵ 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.

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 that are 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 regulations⁶.
- 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.
- 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 proposed 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 ⁷	Average annual achievements via NRSP-4 contributions	Project average annual achievements
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⁶ Chapter 40, Code of Federal Regulations, Part 160

⁷ Details at https://www.ir4project.org/about-ir4/annual_report/

		Current period ⁸	via NRSP-4 contributions ⁹
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

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.

⁸ 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

⁹ 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.

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 2024¹⁰.

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 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, IR-4 receives approx. \$15 million of in-kind contributions from (1) SAES/Land-grant Universities (LGU) by absorbing expenses associated with hosting IR-4 field centers, analytical laboratories, and management offices, (2) EPA via accepting waivers of Pesticide Registration Improvement Act fees, and (3) 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 IR-4 Project Executive Director. 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.

¹⁰ <https://www.in2013dollars.com/us/inflation/1997?amount=481182>

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, 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 administering 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 benefits 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% of 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 be needed to 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.**

Many 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 fortunate 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 stakeholders¹¹ have advocated 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 of increased funds is currently bleak.

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 during the midterm review 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 reassessing 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 during the mid-term review 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

¹¹ Friends of IR-4, see <https://ir4friends.org>

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.

The need for IR-4 remains exceptionally high. While there is substantial support by stakeholders to encourage Congress to increase IR-4 funding, new funds to keep existing research capacity intact are likely at this time.

IR-4 continues to evolve and redirect efforts from its traditional work with chemical pesticides and engages more with bio-based products. One key platform is IR-4 Biopesticide Regulatory Support. In this Platform, IR-4 provides assistance in getting biopesticide and emerging technologies discovered/developed by the public sector and approved by the EPA. IR-4 is currently working on 6 projects by providing no-fee consultancy services. This includes high profile projects with biotechnology to manage Citrus Greening, a biochemical for Fireblight and double stranded RNA to control crown gall in walnut. There are another 12 project requests in the que seeking assistance.

While the reduction in NRSP-4 funds will not stop the efforts to provide assistance to new and emerging pest management technologies, it will slow movement into this area. For example, prior to July 2024 and a retirement by a key staff member, IR-4 has maintained approx. 1.33 FTE involved in its Biopesticide Regulatory Support Platform with funds for the position coming from the NRSP-4 grant, the Congressional appropriated NIFA funds and unrestricted industry donations.

In anticipation of reducing the NRSP-4 funding, IR-4 made the difficult decision to deferred hiring a replacement position in this critical area. The impact of deferring this rehiring of someone to take leadership in Biopesticide Regulatory Support means that some technology developed by land-grant institutions, USDA-ARS, or other public institutions will take longer to get through the regulatory process and be available to growers.

IR-4 would like to fully reestablish activities in supporting registration of biopesticides and biotechnology developed/discovered by the SAES and other public sector scientists. IR-4 respectfully requests that the current **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 equip the growers of specialty crops with next-gen pest management technology that in many cases it will be deemed more acceptable to the consumers.

In association with this request for reconsideration, we have provided two variations of the budget tables. The first one addressed the budget with the previous NRSP Review Committee recommendation to reduce NRSP-4 funds to \$409,005. The second model is \$481,182, or the existing funding level.

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 Integrated 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). Recently, IR-4 was asked to participate in a USDA-Foreign Agriculture Service Advisory Committee for its Assisting Specialty Crop Exports Program. Participation in these Boards/Committees 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 homepage that provides program information, accomplishments and outreach to external audiences.
- Development and implementation of 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)¹²
 - IR-4: 60 Years and Beyond (2024)¹³
 - Video tutorials in the priority-setting process, including¹⁴
 - Submitting a Project Clearance Request
 - Nominating Projects for the Food Use Workshop
 - The Food Use Workshop Process
 - Priority Upgrade Proposals
- Approximately five 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.

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

¹² <https://www.youtube.com/watch?v=9P42Gc5dHws&t=2s>

¹³ <https://www.youtube.com/watch?v=5OIEyflwkrM>

¹⁴ <https://www.ir4project.org/industry-resources/>

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 better explain the available services to underserved populations. 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 IR-4 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 IR-4 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.

Appendix F (A)(1): NRSP-4 BUDGET -Proposed allocation (\$409,005)

	<i>MRF FUNDING</i>									
DESCRIPTION	FY 2026 (year 1)		FY 2027 (year 2)		FY 2028 (year 3)		FY 2029 (year4)		FY 2030 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	\$269,944	2.5	\$263,808	2.45	\$257,673	2.4	251,538	2.35	\$245,403	2.31
FRINGE BENEFITS	\$139,061	2.5	\$145,197	2.45	\$151,332	2.4	157,467	2.35	\$163,602	2.31
WAGES										
TRAVEL										
SUPPLIES										
MAINTENANCE										
EQUIPMENT										
TOTAL	\$409,005	2.5	\$409,005	2.45	\$409,005	2.4	\$409,005	2.35	\$409,005	2.31

Appendix F (A) (2): NRSP-4 BUDGET - Proposed allocation (\$409,005)

OTHER SOURCES OF FUNDING: <i>Minor Crop Pest Management (IR4) Funding</i>										
DESCRIPTION	FY 2026 (year 1)		FY 2027 (year 2)		FY 2028 (year 3)		FY 2029 (year4)		FY 2030 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	\$2,376,000	19.04	\$2,440,067	19.17	\$2,503,150	19.28	\$2,597,780	19.39	\$2 660 668	19.47
FRINGE BENEFITS	\$1,224,000	19.04	\$1,257,004	19.17	\$1,289,501	19.28	\$1,322 795	19.39	\$1 354,818	19.47
WAGES										
TRAVEL	\$60,000		\$61,300		\$62,424		\$63 672		\$64,946	
SUPPLIES	\$45,000		\$45,900		\$46,818		\$45,754		\$48,709	
SERVICES	\$370,000		\$377,400		\$384,948		\$382,647		\$400,500	
RESEARCH SUBAWARDS	\$9,800,000		\$9,693,329		\$9,588,159		\$9,462,352		\$9,345,359	
EQUIPMENT										
TOTAL	\$13,875,000	19.04	\$13,875,000	19.17	\$13,875,000	19.28	\$13,875,000	19.39	\$13,875,000	19.47

Appendix F (A) (3): NRSP-4 BUDGET - Proposed allocation (\$409.005)

OTHER SOURCES OF FUNDING: <i>Industry</i>										
DESCRIPTION	FY 2026 (year 1)		FY 2027 (year 2)		FY 2028 (year 3)		FY2029 (year4)		FY 2030 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
	SALARIES									
FRINGE BENEFITS										
WAGES	\$250,000	2.75	\$255,000.00	2.75	\$260,100	2.75	\$265,302	2.75	\$270,608	2.75
TRAVEL	\$250,000		\$255,000.00		\$260,100		\$265,302		\$270,608	
SUPPLIES	\$100,000		\$102,000		\$104,040		\$106,121		\$108,243	
WORKSHOPS	\$100,000		\$102,000		\$104,040		\$106,121		\$108,243	
RESEARCH SUBAWARDS	\$200,000		\$200,000		\$200,000		\$200,000		\$200,000	
EQUIPMENT	\$100,000		\$86,000		\$71,720		\$57,154		\$42,298	
TOTAL	\$1,000,000		\$1,000,000		\$1,000,000		\$1,000,000		\$1,000,000	

Appendix F (B) (1): NRSP-4 BUDGET - Existing allocation (\$481,182)

<i>MRF FUNDING</i>										
DESCRIPTION	FY 2026 (year 1)		FY 2027 (year 2)		FY 2028 (year 3)		FY 2029 (year4)		FY 2030 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	\$317,580	2.94	\$310,362	2.83	\$303,145	2.72	295,927	2.61	\$288,709	2.53
FRINGE BENEFITS	\$163,602	2.94	\$170,820	2.83	\$178,037	2.72	185,225	2.61	\$192,473	2.53
WAGES										
TRAVEL										
SUPPLIES										
MAINTENANCE										
EQUIPMENT										
TOTAL	\$481,182	2.94	\$481,182	2.83	\$481,182	2.72	481,152	2.61	\$481,182	2.53

Appendix F (B) (2): NRSP-4 BUDGET - Existing allocation (\$481,182)

OTHER SOURCES OF FUNDING: *NIFA-Minor Crop Pest Management (IR4)*

DESCRIPTION	FY 2026 (year 1)		FY 2027 (year 2)		FY 2028 (year 3)		FY 2029 (year 4)		FY 2030 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	\$2,376,000	19.04	\$2,440,067	19.17	\$2,503,150	19.28	\$2,597,780	19.39	\$2,660,668	19.47
FRINGE BENEFITS	\$1,224,000	19.04	\$1,257,004	19.17	\$1,289,501	19.28	\$1,322,795	19.39	\$1,354,818	19.47
WAGES										
TRAVEL	\$60,000		\$61,300		\$62,424		\$63,672		\$64,946	
SUPPLIES	\$45,000		\$45,900		\$46,818		\$45,754		\$48,709	
SERVICES	\$370,000		\$377,400		\$384,948		\$382,647		\$400,500	
RESEARCH SUBAWARDS	\$9,800,000		\$9,693,329		\$9,588,159		\$9,462,352		\$9,345,359	
EQUIPMENT										
TOTAL	\$13,875,000	19.04	\$13,875,000	19.17	\$13,875,000	19.28	\$13,875,000	19.39	\$13,875,000	19.47

Appendix F (B) (3): NRSP-4 BUDGET - Existing allocation (\$481,182)

OTHER SOURCES OF FUNDING: <i>INDUSTRY</i>										
DESCRIPTION	FY 2026 (year 1)		FY 2027 (year 2)		FY 2028 (year 3)		FY 2029 (year4)		FY 2030 (year 5)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
	SALARIES									
FRINGE BENEFITS										
WAGES	\$250,000	2.75	\$255,000.00	2.75	\$260,100	2.75	\$265,302	2.75	\$270,608	2.75
TRAVEL	\$250,000		\$255,000.00		\$260,100		\$265,302		\$270,608	
SUPPLIES	\$100,000		\$102,000		\$104,040		\$106,121		\$108,243	
WORKSHOPS	\$100,000		\$102,000		\$104,040		\$106,121		\$108,243	
RESEARCH SUBAWARDS	\$200,000		\$200,000		\$200,000		\$200,000		\$200,000	
EQUIPMENTT	\$100,000		\$86,000		\$71,720		\$57,154		\$42,298	
TOTAL	\$1,000,000		\$1000000		\$1000000		\$1,000,000		\$1,000,000	

NOTE: The proposal has been drafted in response to the recommendation of the midterm review that funding for NRSP-4 be reduced by 15% from its existing level of \$481,182 to \$409,005. Since this recommendation, unprecedented changes and challenges have occurred in crop protection/pest management in specialty crops. The NRSP-4 leadership encourages the NRSP-RC to support funding at the existing amount of \$481,182. This justification is based on the following challenges: 1) Climate change continues to result in unpredictable high temperatures, heavy precipitation in some areas, and drought in others at a higher frequency. This is making established pest management programs subject to failure. Climate change is expanding where pests can overwinter and become a significant problem. New pest management strategies are needed to help assist in the resiliency of existing crops to climate change. 2) 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. 3) U.S. EPA continues to reassess pesticides for hazards. Registration review measures various factors including: effects to pollinators, endocrine disruption, PFAS and other human health concerns such as offsite movement into ground or surface waters, etc. Use mitigations has greater potential to adversely impact specialty crops than they do on major row crops. 4) The European Union (EU) assesses pesticides differently than the EPA and many other countries. Assessment in the EU is based on hazard assessment. The EPA uses a risk-based approach. The hazard assessment approach in the EU is resulting in elimination/reduction of maximum residue levels allowed in imported crops. This has become a trade barrier as US grower can legally use a pesticide in the US but is prohibited from exporting the treated crop to the EU. This results in the EU standards becoming the de facto US standard for crop exports. Over the last 12 months, the pace at which the EU is removing products and impacting the uses in the US is rapidly increasing. 5) Similar to the EU, the State of California is going above and beyond EPA risk assessment and focusing on hazards to eliminate pesticide uses the state regulatory authority classifies as high-risk. California has recently started to implement its Sustainable Pest Management Roadmap and has prioritized the developments of alternatives to high risk pesticides. There is an expectation by many that IR-4 will be able to help develop alternatives to replace product uses no longer allowed in California. 6) While not a new factor, there are seeming more common occurrences of invasive pests (e.g. Citrus Greening, Spotted Wing Drosophila, Brown Marmorated Stink Bug, Spotted Lanternfly, Basil Downy Mildew, Cucumber Downy Mildew, Palmer Amaranth, etc.), impacting the production of crops and the environment. These pests often have no natural enemies and not much is known about their biology with little to no effective crop protection product registrations. 7) Also seeming more common is the situation when crop protection lose their ability to manage pests. They are no longer being effective because the pests have evolved and developed resistance to the technology. 8) The United States Supreme Court recently ruled that the Chevron Deference that 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 loss of additional critically important uses. We would also like to point out a misunderstanding in the midterm review. In the review letter it was stated that IR-4 has received "recent infusion of \$4 million" from Congressional appropriations. In fact, IR-4 funding was increased by \$2.6 million in FY2022 with a \$0.5 million increase in FY2023 for a total of \$3.1 million. While this increase is substantial, this must be viewed in context. The funding increases in FY 2022 and FY 2023, were the first increase in over a decade. Associated with the funding increase was the approval by USDA NIFA to allow the host institutions to collect 10% indirect costs. While IR-4 was supportive of the modification to allow indirect costs, approx. 50% of the new funds were allocated to indirect costs. Specialty crop agriculture is under unprecedented stress from many factors. The resiliency of the specialty crop community to provide healthy foods is threatened. IR-4, with the contributions from NRSP and other partners has the ability to provide relief to the uncertainty. The \$72,177 reduction in NRSP-4 funds may not seem like a huge amount but its loss will have a profound impact on IR-4's ability to support specialty crop agriculture. **We respectfully request that NRSP support to IR4 be renewed for another five years and that it will continue to be funded at \$481,182 per year.**

NRSP-4 BUDGET - PROPOSED ALLOCATION FROM MULTISTATE RESEARCH FUNDS

DESCRIPTION	FY 2026				FY 2027				FY 2028				FY 2029				FY 2030			
	NRSP RC Recommend.		NRSP-4 Request		NRSP RC Recommend.		NRSP-4 Request		NRSP RC Recommend.		NRSP-4 Request		NRSP RC Recommend.		NRSP-4 Request		NRSP RC Recommend.		NRSP-4 Request	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	\$269,944	2.5	\$317,580	2.94	\$263,808	2.45	\$310,362	2.83	\$257,673	2.4	\$303,145	2.72	\$251,538	2.35	\$295,927	2.61	\$245,403	2.31	\$288,709	2.53
FRINGE BENEFITS	\$139,061	2.5	\$163,602	2.94	\$145,197	2.45	\$170,820	2.83	\$151,332	2.4	\$178,037	2.72	\$157,467	2.35	\$185,225	2.61	\$163,602	2.51	\$192,473	2.53
WAGES																				
TRAVEL																				
SUPPLIES																				
MAINTENANCE																				
EQUIPMENT																				
TOTAL	\$409,005	2.5	\$481,182	2.94	\$409,005	2.45	\$481,182	2.83	\$409,005	2.4	\$481,182	2.72	\$409,005	2.35	\$481,152	2.61	\$409,005	2.31	\$481,182	2.53

NRSP Review (Submitted)

Project:
Facilitating Registration of Pest Management Technology for Specialty Crops and Specialty Uses
Dates Covered:
10/01/2025 - 09/30/2030

The following statement defines the mission of the National Research Support Projects (NRSP's):

NRSP Mission: National Research Support Projects (NRSPs) focus on the development of enabling and critical technologies (e.g., databases, cyberinfrastructure, on-line toolkits, reagents), support activities (e.g., collect, assemble, store, and distribute materials, data, resources or information) or the sharing of facilities (e.g., analytical equipment, lab, field) needed to accomplish high priority research.

Based on this mission, please rate the proposed NRSP using the following criteria.

Mission:	
Consistency with the NRSP mission	Satisfactory
Relevance:	
Addresses and supports a high priority national issue	Satisfactory
Demonstrates clear and tangible benefits to the scientific community as a whole	Satisfactory
Clearly identified sponsoring beneficiary stakeholders	Satisfactory
Stakeholder involvement in project development, project activities, review, and/or management plans	Satisfactory
Technical Merit:	
Overall technical merit (sound scientific approach, achievable objectives, review, and/or management plans)	Satisfactory
Potential for significant outputs (products) and outcomes with impacts	Satisfactory
Implementation Plan:	
Benchmarks for success clearly identified	Satisfactory
Management structure that adequately coordinates efforts of multiple participants	Satisfactory
Well-developed business plan that captures multiple sources of funding and leverages OTT MRF	Satisfactory
Funding plan that develops alternative funding sources to reduce OTT MRF in future years	Satisfactory
Efforts integrated with Extension, academic, or international programs	Satisfactory
Outreach, communications and assessment plan that communicates the program goals, accomplishments, and outcomes, and impacts	Satisfactory

Comments (Please add general and specific comments on strengths and weaknesses of the proposal, including specific revisions that would improve the proposal):

The proposal is comprehensive and puts forward a strong case for funding. The justifications for full funding are well articulated in the letter. We found no edits needed. (Input from Doug Buhler NC, Marcel Holyoak W, and Lommel S)

Overall Recommendation:

Approve

August 20, 2024

Dr. Douglas D. Buhler
Michigan State University
Associate Vice President
Office of Research and Innovation

Dear Dr. Buhler,

On behalf of the IR-4 Project please find the renewal proposal for the NRSP-4 Project, October 1, 2025 to September 30, 2030. We appreciate the positive feedback from the NRSP Review Committee (RC) during the Midterm Review when the NRSP-RC “commends NRSP4 for the extraordinary and tremendously impactful work being done.”

The proposal has been drafted in response to the recommendation of the midterm review that funding for NRSP-4 be reduced by 15%. While we are willing to accept this reduction, we have included additional justification to support funding at the previous amount of \$481,182. The reasoning behind this request is that unprecedented changes and challenges are occurring in crop protection/pest management in specialty crops. These challenges are bringing great uncertainty to pest management programs. These challenges include:

- Climate change continues to result in unpredictable high temperatures, heavy precipitation in some areas, and drought in others at a higher frequency. This is making established pest management programs subject to failure. Climate change is expanding the area where pests can overwinter and become a significant problem. New pest management strategies are needed to help assist in the resiliency of existing crops 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 various factors including: effects to pollinators, endocrine disruption, PFAS and other human health concerns such as offsite movement into ground or surface waters, etc. Use mitigations has greater potential to adversely impact specialty crops than they do on major row crops.
- The European Union (EU) assesses pesticides differently than the EPA and many other countries. Assessment in the EU is based on hazard assessment. The EPA uses a risk-based approach. The hazard assessment approach in the EU is resulting in elimination/reduction of maximum residue levels allowed in imported crops. This has become a trade barrier as US grower can legally use a pesticide in the US but is prohibited from exporting the treated crop to the EU. This results in the EU standards becoming the de facto US standard for crop exports. Over the last 12 months, the pace at which the EU is removing products and impacting the uses in the US is rapidly increasing.
- Similar to the EU, the State of California is going above and beyond EPA risk assessment and focusing on hazards to eliminate pesticide uses the state regulatory authority classifies as high-risk. California has

recently started to implement its Sustainable Pest Management Roadmap and has prioritized the developments of alternatives to high risk pesticides. There is an expectation by many that IR-4 will be able to help develop alternatives to replace product uses no longer allowed in California.

- While not a new factor, there are seeming more common occurrences of invasive pests (e.g. Citrus Greening, Spotted Wing Drosophila, Brown Marmorated Stink Bug, Spotted Lanternfly, Basil Downy Mildew, Cucumber Downy Mildew, Palmer Amaranth, etc.), impacting the production of crops and the environment. These pests often have no natural enemies and not much is known about their biology with little to no effective crop protection product registrations.
- Also seeming more common is the situation when crop protection lose their ability to manage pests. They are no longer being effective because the pests have evolved and developed resistance to the technology.
- The United States Supreme Court recently ruled that the Chevron Deference that 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 loss of additional critically important uses.

I would also like to point out a misunderstanding in the midterm review. In the review letter it was stated that IR-4 has received “**recent infusion of \$4 million**” from Congressional appropriations. In fact, IR-4 funding was increased by \$2.6 million in FY2022 with a \$0.5 million increase in FY2023 for a total of \$3.1 million. While this increase is substantial, this must be viewed in context. The funding increases in FY 2022 and FY 2023, were the first increase in over a decade. Associated with the funding increase was the approval by USDA NIFA to allow the host institutions to collect 10% indirect costs. While IR-4 was supportive of the modification to allow indirect costs, approx. 50% of the new funds were allocated to indirect costs.

Specialty crop agriculture is under unprecedented stress from many factors. The resiliency of the specialty crop community to provide healthy foods is threatened. IR-4, with the contributions from NRSP and other partners has the ability to provide relief to the uncertainty. The \$72,177 reduction in NRSP-4 funds may not seem like a huge amount but its loss will have a profound impact on IR-4’s ability to support specialty crop agriculture. **We respectfully request that NRSP support to IR4 be renewed for another five years and that it will continue to be funded at \$481,182 per year.**

Thank you and please let me know if you have any questions or need additional information.

Sincerely,



Jerry Baron, Ph.D
Executive Director
The IR-4 Project

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),
Moses Kairo (University of Maryland Eastern Shore),
John Davis (University of Florida),
Marcel Holyoak (University of California Davis)

NIFA Representative: Rubella Goswami

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 crops¹ 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 partners² 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.

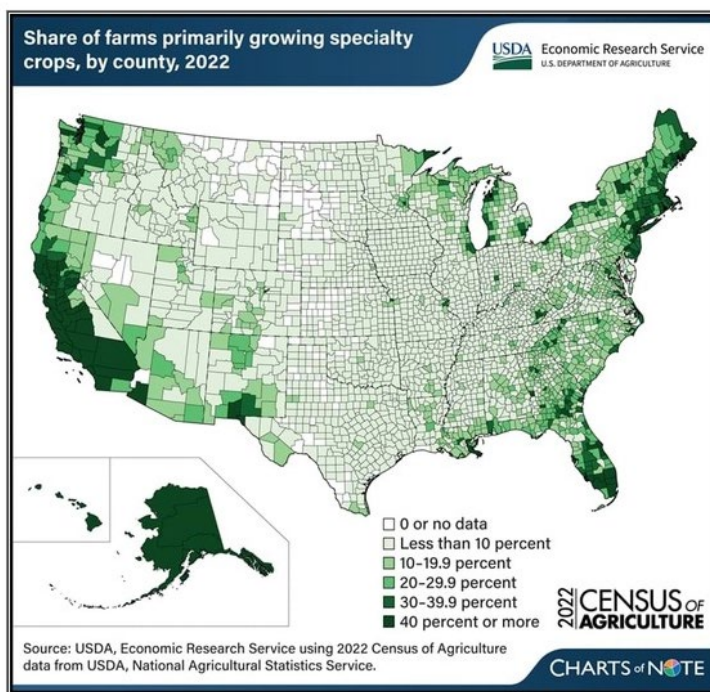
During the mid-term review of NRSP-4, it was indicated that NRSP-4 received a favorable review. Specifically, Dr. Mark McGuire, NRSP RC Chair, wrote in a letter to the NRSP-4 Administrative Advisors, "The midterm evaluation of NRSP4 was very positive. NRSP-RC commends NRSP4 for the extraordinary and 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 production³. 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 Roadmap⁴. 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 report⁵ 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 working⁶.

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 regulations⁷.
- 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 2024¹¹.

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 stakeholders¹² 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, including¹⁵
 - 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=5OIEyflwkrM>

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.

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

Status: Submitted As Final

Duration 10/01/2025 to 09/30/2030
Admin Advisors: [\[Douglas Buhler\]](#) [\[Moses Kairo\]](#) [\[John Davis\]](#) [\[Marcel Holyoak\]](#)
NIFA Reps: [\[Christopher Phillips\]](#) [\[Amer Fayad\]](#)

Non-Technical Summary

NRSP-4 activities with the IR-4 Project help facilitate the registration of crop protection technology for specialty crops (fruits, vegetables, nuts, herbs, ornamentals, other horticulture crops) and minor uses on major crops (corn, soybean, wheat, etc.) to manage insects, plant disease, weed, and other destructive pests. NRSP-4/IR-4 partnership accomplishes its mission by developing the data required by the U.S. Environmental Protection Agency, the states, and the industry to expand bio-based and chemical pesticide registrations. This facilitates registration in markets that lack adequate sales to support their development investment. Significant deliverables with positive impacts to stakeholders that include new registrations for key pests; extending registrations to include similar crops through crop grouping/data extrapolation, and assisting in the harmonization of international Maximum Residue Levels to remove pesticide residues in crops as a trade barrier are provided. The research focuses on lower-risk technology that respects human health and the environment. This gives the specialty crop farmers/growers access to crop protection technology to better manage pests in a sustainable and environmentally friendly manner. Organic growers also benefit from registrations of biopesticides derived from natural materials.

Statement of Issues and Justification

The companies that develop and market bio-based or chemical crop protection products often focus their research and development efforts on large acreage crops with the potential for significant sales and profits. The cost of getting a new crop protection product to market cost nearly \$300 million and takes 8-10 years. Crop protection product sales on specialty crops and low volume, specialized uses on major crops have limited potential for product sales. Often, the cost of data development to gain registrations in these small markets far outweighs the potential sales and leads to an unacceptable return on investments. Without intervention by the public sector, growers of specialty crops would have legal access to only a few crop protection products. This lack of access to safe and effective crop protection products is known as the "Minor Use Problem." The U.S. Congress established Interregional Research Project Number Four (precursor to NRSP-4) in 1963 with the objective of giving the growers of specialty crops access to crop protection products to manage pests with the additional benefit of giving the public access to high-quality fruits, vegetables, nuts, herbs, and non-food ornamentals at affordable prices.

NRSP-4 activities and actions within the national IR-4 Project have facilitated the regulatory approvals by the U.S. Environmental Protection industry of over 24,000 registrations on food crops and over 60,000 approvals on non-food crops. The goal is to give specialty crop farmers access to products to manage insects, plant diseases, weeds, and other pests that reduce crop yields or quality while promoting public well-being.

IR-4 continues to receive new requests for assistance from U.S. commodity growers, Cooperative Extension, and the public sector research network. Because the number of requests for assistance that have not been addressed exceeds available resources, priorities are necessary. Research priorities are established during an open and transparent process at priority-setting workshops. Decisions are made for importance and urgency in multiple areas. This includes EPA guideline "Magnitude of the Residue" studies on food crops, product performance testing on food and ornamental crops, as well as efforts to address hard-to-manage pest damage situations by integrating biopesticide products, emerging biotech products, and reduced-risk chemical pesticide products into an Integrated Solutions Platform (ISP) system.

In addition to the above, NRSP-4/IR-4 research and relevant data are part of larger USDA-sponsored efforts to manage invasive pests such as Citrus Greening, Spotted Wing Drosophila, Impatient Downy Mildew, etc.), international efforts to protect pollinators from Varroa Mites, as well as the opening lucrative international markets for exports of domestically produced specialty crops.

The specialty crop/minor use community faces unprecedented challenges in gaining approvals for safe and effective crop protection technology registrations. On top of the list are complex regulatory issues--such as legislative and judicial directives that EPA comply with the provisions of the Endangered Species Act when registering new pesticides and pesticide uses. Because of the uncertainty regarding mitigations and outcomes, many registration actions are significantly delayed or even abandoned. Other regulatory reassessment actions, including endocrine disruptors, pollinator protection, water, etc., are equally challenging. Pesticide resistance to pests is another factor influencing the useful tools available to growers. Certain products are no longer efficacious. Variations in international policies influence what can be used in the United States on export crops. Growers often do not know if a product is headed to domestic or international markets when an in-season pesticide application is made. This makes it difficult if US regulations are not harmonized with trading partners. Finally, public perception of pesticides continues to impact what growers can use.

There is an emphasis on utilizing the Integrated Solutions platform to provide growers with solutions while responding to the challenges mentioned above. The ISP marries the favorable characteristics of conventional chemical pesticides with biopesticides and emerging technologies in a system-like approach.

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

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

The partnership of having NRSP-4 activities within the IR-4 Project 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.

Prerequisite Criteria

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 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. Partners include:

- The State Agricultural Experiment Stations via NRSP-4 contributions and hosting IR-4 research and research administration facilities
- Congressional appropriated funding allocated via USDA-National Institute of Food and Agriculture grants
- Environmental Protection Agency waiver of Pesticide Registration Improvement Act fees
- USDA-Agriculture Research Service provides scientists/technical assistance and testing facilities,
- The crop protection companies providing financial support, donation of testing materials and technical assistance,
- The specialty crop farmers and commodity groups providing financial support and testing sites

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.

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	GA, OH, OR SC,

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 that are a 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, former NRSP RC Chair, wrote in a letter to the NRSP-4 Administrative Advisors, "The midterm evaluation of NRSP-4 was very positive. NRSP-RC commends NRSP-4 for the extraordinary and tremendously impactful work being done."

[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).

How does the NRSP pertain as 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 (Vilsack and Parsons). When considering food and non-food specialty crops (ornamentals), it is safe to assume that **specialty crops 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 land, 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. **NRSP-4/IR-4's ability 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 support NRSP-4 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 NRSP-4/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

Priority Established by ESCOP/ESS

NRSP-4 activities in the IR-4 Project and deliverables address most of the Grand Challenges identified in the updated Science Roadmap^[1]. 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 (Miller and Mann 2022) 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 reducing 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."*

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 IR-4 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, IR-4 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-Saharan Africa, and Latin/South America. In addition, and in conjunction with USDA Foreign Agricultural Service, IR-4 has hosted training for international Borlaug Scholars. 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 advised 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.

[1] Association of Public and Land-grant Universities, Experiment Station Committee on Organization and Policy—Science and Technology Committee, "A Science Roadmap for Food and Agriculture," January 2019. https://escop.info/wp-content/uploads/2017/05/Updated-Science-Roadmap-Report_FINAL20181220_optimized.pdf

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 involving 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.
- 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 (Rossi, et al.). 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 and Michael Martin of American Hort, 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 2025.

Implementation

Objectives

1. Facilitate establishment of new bio-based and chemical pesticide tolerance
Comments: 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 . It is anticipated that data submissions will result in approx. 150 new pesticide tolerances in a 12-month period
2. Development of efficacy and crop safety data to support registrations
Comments: Product performance field trials to develop efficacy and crop safety data is required by EPA and states in association with registrations. This data is also required by companies to determine if registration is appropriate. Certain states (e.g., California) and companies to assess that the proposed use of food and non-food crops is safe and effective. Product performance data is also necessary on non-food ornamental crops. IR-4 developed data is used to support registrations and registration extrapolations. During a 12-month period, IR-4 data support approx, 1200 registrations.
3. Innovative answers for critical pest issues on specialty crops
Comments: IR-4 established an 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. Using multiple technologies it is hoped to support registrations that will allow growers solutions to their most critical pest management problems. Under this objective, IR-4 also support the registration of products that can be used in an organic production system. During a 12-month period, IR-4 conducts approx 10 Integrated Solutions projects.
4. Biopesticide Regulatory Support
Comments: IR-4 provides assistance to help facilitate the registration of novel biopesticide and emerging technologies discovered/developed by public sector scientists. IR-4 serves as a consultant and intermedate between EPA and the scientist on what is necessary to get the technology approved. In a 12-month period, one to two new registrations are approved based on IR-4 contributions. /
5. Global harmonization of pesticide registration standards
Comments: U.S. specialty crop growers desire access to lucrative international markets as the payment for produce is often significantly higher than when sold in domestic markets, Differences in pesticide regulatory systems with U.S. trading partners led to non-technical trade barriers that can prevent access to the international markets. Efforts are made to ensure that domestic registrations can be translated with global interests.

Projected Outcomes

- New food pesticide tolerances Comments: The average annual achievement of new food pesticide tolerances by IR-4 during 2020-2023 was 282. Extrapolated, NRSP-4 funds contributed 8.24 new pesticide tolerances during the current period. Projected output in the next grant cycle utilizing NRSP-4 contributions is 6.81 new pesticide tolerances .
- New food pesticide registrations Comments: The average annual achievement of new food pesticide registrations by IR-4 during 2020-2023 was 894 Extrapolated, NRSP-4 funds contributed 26.15 new pesticide registrations during the current period. Projected output in the next grant cycle utilizing NRSP-4 contributions is 21.61 new pesticide registrations.
- New food tolerance petition submission Comments: The average annual achievement of new food pesticide tolerances petition submissions by IR-4 during 2020-2023 was 18. Extrapolated, NRSP-4 funds contributed 0.5 new pesticide tolerance petition submissions during the current period. Projected output in the next grant cycle utilizing NRSP-4 contributions is 0.5 new pesticide tolerances petition submissions.
- Product performance reports Comments: The average annual achievement of new product performance reports by IR-4 during 2020-2023 was 105. Extrapolated, NRSP-4 funds contributed 3.1 product performance reports during the current period. Projected output in the next grant cycle utilizing NRSP-4 contributions is 2.5 new product performance reports
- Integrated Solutions Reports Comments: The average annual achievement of new Integrated Solutions reports by IR-4 during 2020-2023 was 45. Extrapolated, NRSP-4 funds contributed 1.5 new Integrated Solutions reports during the current period. Projected output in the next grant cycle utilizing NRSP-4 contributions is 1.1 new Integrated Solutions reports.
- Environmental Horticulture (EH) Program Research Summaries Comments: The average annual achievement of new EH Program research summaries is 22 by IR-4 during 2020-2023 . Extrapolated, NRSP-4 funds contributed 0.6 new EH Program research summaries during the current period. Projected output in the next grant cycle utilizing NRSP-4 contributions is 0.5 EH Program research summaries .

Management, Budget and Business Plan

(Please refer to attached final version of the proposal to view the tables for non-MRF additional funding)

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^[1].

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 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, IR-4 receives approx. \$15 million of in-kind contributions from (1) SAES/Land-grant Universities (LGU) by absorbing expenses associated with hosting IR-4 field centers, analytical laboratories, and management offices, (2) EPA via accepting waivers of Pesticide Registration Improvement Act fees, and (3) 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 IR-4 Project Executive Director. 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, 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 administering 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 benefits 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% of 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 be needed to 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.**

Many 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 fortunate 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^[2] have advocated 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 of increased funds is currently bleak.

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 during the midterm review 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 reassessing 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 during the mid-term review 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.

The need for IR-4 remains exceptionally high. While there is substantial support by stakeholders to encourage Congress to increase IR-4 funding, new funds to keep existing research capacity intact are likely at this time.

IR-4 continues to evolve and redirect efforts from its traditional work with chemical pesticides and engages more with bio-based products. One key platform is IR-4 Biopesticide Regulatory Support. In this Platform, IR-4 provides assistance in getting biopesticide and emerging technologies discovered/developed by the public sector and approved by the EPA. IR-4 is currently working on 6 projects by providing no-fee consultancy services. This includes high profile projects with biotechnology to manage Citrus Greening, a biochemical for Fireblight and double stranded RNA to control crown gall in walnut. There are another 12 project requests in the queue seeking assistance.

While the reduction in NRSP-4 funds will not stop the efforts to provide assistance to new and emerging pest management technologies, it will slow movement into this area. For example, prior to July 2024 and a retirement by a key staff member, IR-4 has maintained approx. 1.33 FTE involved in its Biopesticide Regulatory Support Platform with funds for the position coming from the NRSP-4 grant, the Congressional appropriated NIFA funds and unrestricted industry donations.

In anticipation of reducing the NRSP-4 funding, IR-4 made the difficult decision to defer hiring a replacement position in this critical area. The impact of deferring this rehiring of someone to take leadership in Biopesticide Regulatory Support means that some technology developed by land-grant institutions, USDA-ARS, or other public institutions will take longer to get through the regulatory process and be available to growers.

IR-4 would like to fully reestablish activities in supporting registration of biopesticides and biotechnology developed/discovered by the SAES and other public sector scientists. IR-4 respectfully requests that the current **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 equip the growers of specialty crops with next-gen pest management technology that in many cases it will be deemed more acceptable to the consumers.

In association with this request for reconsideration, we have provided two variations of the budget tables. The first one addressed the budget with the previous NRSP Review Committee recommendation to reduce NRSP-4 funds to \$409,005. The second model is \$481,182, or the existing funding level.

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

[2] Friends of IR-4, see <https://ir4friends.org>

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 Integrated 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). Recently, IR-4 was asked to participate in a USDA-Foreign Agriculture Service Advisory Committee for its Assisting Specialty Crop Exports Program. Participation in these Boards/Committees 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.

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 homepage that provides program information, accomplishments and outreach to external audiences.
- Development and implementation of 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 \(2023\)\[1\]](#)
 - [IR-4: 60 Years and Beyond \(2024\)\[2\]](#)
 - Video tutorials in the priority-setting process, including [\[3\]](#)

[Submitting a Project Clearance Request](#)

[Nominating Projects for the Food Use Workshop](#)

[The Food Use Workshop Process](#)

[Priority Upgrade Proposals](#)

- Approximately five 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.

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 better explain the available services to underserved populations. 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 IR-4 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 IR-4 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.

[1] <https://www.youtube.com/watch?v=9P42Gc5dHws&t=2s>

[2] <https://www.youtube.com/watch?v=5OIEyflwkrM>

[3] <https://www.ir4project.org/industry-resources/>

Literature Cited

Anonymous. 2004 Specialty Crop Competitiveness Act of 2024. Public Law 108-465. <https://www.congress.gov/108/plaws/publ465/PLAW-108publ465.pdf>.

Baron, J. and H. Ross. 2024. 2023 Annual Report. [FINAL-2023-Annual-Report_WebReady.pdf](#)

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Miller, S.P. and J.T. Mann 2022. 2022 - Economic Impact of the IR-4 Project and its Programs. <https://www.canr.msu.edu/resources/economic-impact-of-the-ir-4-project-and-programs-2022>

Rossi, D, R. Hedberg, B. Madden, J. McFarland, and R. Ratto. 2022. IR-4 Path Forward 2.0 Report. [Path-Forward-2.0-Final-Report-5-16-22-1.pdf](#)

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[3] <https://www.ir4project.org/industry-resources/>

Organization/Governance

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Land Grant Participating States/Institutions

NC,SC

Non Land Grant Participating States/Institutions

Participation

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

Combined Participation

Combination of KA, SOI and FOS	Total SY	Total PY	Total TY
Grand Total:	1.10	99.00	0.00
213	1	99	0
212	0.1	0	0

Program/KA	Total FTE
Grand FTE Total:	0.4
213	0
212	0.13

Budgets

MRF Funding 2025

Description	Dollars	FTE
Salaries	269944.00	3.00
Fringe Benefits	139061.00	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	409005	3

Comments

Other Funding 2025

Description	Dollars	FTE
Salaries	2376000.00	19.04
Fringe Benefits	1224000.00	0.00
Wages	0.00	0.00
Travel	60000.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	10215000.00	0.00
Totals	13875000	19.04
Comments		

Description	Dollars	FTE
Salaries	250000.00	2.75
Fringe Benefits	0.00	0.00
Wages	0.00	0.00
Travel	250000.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	100000.00	0.00
Other	400000.00	0.00
Totals	1000000	2.75
Comments		

MRF Funding 2026

Description	Dollars	FTE
Salaries	263808.00	2.00
Fringe Benefits	145197.00	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	409005	2

Comments

Other Funding 2026

Description	Dollars	FTE
Salaries	2440067.00	19.17
Fringe Benefits	1257004.00	0.00
Wages	0.00	0.00
Travel	61300.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	10116629.00	0.00
Totals	13875000	19.17
Comments		

Description	Dollars	FTE
Salaries	255000.00	2.75
Fringe Benefits	0.00	0.00
Wages	0.00	0.00
Travel	255000.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	86000.00	0.00
Other	404000.00	0.00
Totals	1000000	2.75
Comments		

MRF Funding 2027

Description	Dollars	FTE
Salaries	257673.00	2.00
Fringe Benefits	151332.00	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	409005	2

Comments

Other Funding 2027

Description	Dollars	FTE
Salaries	2503150.00	19.28
Fringe Benefits	1289501.00	0.00
Wages	0.00	0.00
Travel	62424.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	10019925.00	0.00
Totals	13875000	19.28
Comments		

Description	Dollars	FTE
Salaries	260100.00	2.75
Fringe Benefits	0.00	0.00
Wages	0.00	0.00
Travel	260100.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	71720.00	0.00
Other	408080.00	0.00
Totals	1000000	2.75
Comments		

MRF Funding 2028

Description	Dollars	FTE
Salaries	251538.00	2.00
Fringe Benefits	157467.00	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	409005	2

Comments

Other Funding 2028

Description	Dollars	FTE
Salaries	2597780.00	19.36
Fringe Benefits	1322795.00	0.00
Wages	0.00	0.00
Travel	63672.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	9890753.00	0.00
Totals	13875000	19.36
Comments		

Description	Dollars	FTE
Salaries	265302.00	2.75
Fringe Benefits	0.00	0.00
Wages	0.00	0.00
Travel	265302.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	57154.00	0.00
Other	412242.00	0.00
Totals	1000000	2.75
Comments		

MRF Funding 2029

Description	Dollars	FTE
Salaries	245403.00	2.00
Fringe Benefits	163602.00	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	409005	2

Comments

Other Funding 2029

Description	Dollars	FTE
Salaries	2660668.00	19.47
Fringe Benefits	1354818.00	0.00
Wages	0.00	0.00
Travel	64946.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	0.00	0.00
Other	9794568.00	0.00
Totals	13875000	19.47
Comments		

Description	Dollars	FTE
Salaries	270608.00	2.75
Fringe Benefits	0.00	0.00
Wages	0.00	0.00
Travel	270608.00	0.00
Supplies	0.00	0.00
Maintenance	0.00	0.00
Equipment / Capital Improvement	42298.00	0.00
Other	416486.00	0.00
Totals	1000000	2.75
Comments		