**ACCOMPLISHMENTS**

**OBJECTIVE 1: INCREASE PARTICIPANTS' SKILLS, KNOWLEDGE, AND AWARENESS OF REGIONAL/NATIONAL IPM ISSUES, SYSTEMS, AND STRATEGIES.**

**Alaska**

- Established an "Alaska Slug and Snail Watch" set of web pages. These pages educate on the different species of pest slug found in the state, as well as tips for taking good photos to aid in identification.
- Three regional slug presentations and two state TV interviews were completed, including a webinar on Alaska Slug Management and Invasive Slugs presented at the Second Annual Alaska Farm Convention and Trade Show.
- Provided slug education throughout Alaska and at SE Alaska Farmer Summit.
- Integration of the Alaska UAF Citizen Scientists Monitoring Portal to submit and receive slug reports from across the state, combined with iNaturalist sightings and compilation maps: https://alaskainvasives.org
- Established a DNA specimen processing vendor and sampling protocol.
- IPM scouts/assistants were established/maintained and provided continued training. Bi-weekly meetings were held throughout the year.
- Dr. Matney has prepared for and hosted the WERA-1017 meeting in Homer, Alaska during September 2023.
- Provide Alaskan growers, Master Gardeners, farmers, producers, and communities field visits and response to IPM inquiries as needed (66% complete).
- Information was provided to Alaskan growers, Master Gardeners, farmers, producers, and communities in the form of field visits, booths at state/regional fairs (3), and response to IPM inquiries as needed.
- Record and summarize data on IPM inquiries across Alaska (66% complete).
- Data was recorded on IPM inquiries across Alaska. Over 2,500 IPM consultations have been provided so far during the second year of the project. Data continues to be collected as work is implemented.
- Provide Alaskan growers, Master Gardeners, farmers, producers, and communities IPM education (66% complete).
- Onsite scouting and consultation as well as virtual consultations for IPM inquiries were deployed across Alaska.
- IPM Facebook page has been posting a Bug of the Week to increase community awareness of pest, native, and beneficial insects. In 2022 and so far in 2023, we have made 63 posts, which have gained thousands of views.
- Over 40 IPM education and instruction events (reaching over 500 individuals) were provided to Alaskan growers, Master Gardeners, farmers, producers, and communities across Alaska.
- Developed early recommendations for reducing risk to pollinators when choosing/applying pesticides over a sequence of four presentations.
- Conducted a Peony Grower IPM Survey across 53 farms. Response rate was 33%.

- Developed and published 5 online learning modules - Insect IPM Strategies for Peony Production
- Developing recommendations for pollinator-friendly seed formulations that can be propagated in Alaska for use in revegetation projects: Seed mixes and seed plot locations established and Seeding of plots has taken place for 2023.
- Two 3-day online IPM Pesticide Applicator Trainings offered (January and April) 2023 for a total of 64 students.
- Two half-day IPM Certified Pesticide Applicator Workshops offered in March 2023 for a total of 107 participants.
- Certified Pesticide Applicator Workshops were provided with assistance and networking with the Oregon State University IPM Center.
- A full three-day PSEP Canvas online course was developed and is being reviewed.
- The 5 IPM Peony Modules are going through certification to offer as CEUs.
- Alaska hosted the 2022 Alaska Invasive Species Workshop (3 days) which trained and provided professional development for natural resource managers from across the state.

**Arizona**

The Arizona Pest Management Center (APMC) integrates, coordinates and supports our statewide programs in Vegetable / Specialty Crops IPM, Agronomic Crops IPM, School & Community IPM, Public Health IPM, IPM Assessment and Insect Diagnostics. We also have a team that specializes in IPM Assessment. Highlights presented throughout this report span across teams and programs and emphasize multi-state collaborations.

ThryvOn Cotton

Genetically modified ThryvOn cotton, resistant to Frankliniella thrips and Lygus bugs, was successfully introduced on a limited scale in 2021. Our research and Extension supported the use of this new technology. In 2022, ThryvOn cotton increased from 6% to 8% of upland cotton in Arizona and was grown without restriction in commercial production in 2023. Our data show that growers of ThryvOn cotton saved about 1 to 1.3 foliar sprays on their crop, valued at about $20 to $26 per acre, or about $150,000–178,000 saved by the cotton industry per year since 2021. A survey of growers and Pest Control Advisors at an August 2023 field day showed that 43% would “definitely” adopt ThryvOn cotton, while 28.5% were “very likely” and 28.5% were “somewhat likely” to adopt ThryvOn cotton. No respondents were negatively disposed toward adoption.

Better Cotton Initiative (BCI) Cotton IPM Field Day

As a commitment of our 2023 Better Cotton Initiative grant, we held a comprehensive and inclusive field day at Ak-Chin Farms, hosting over 40 pest control advisers, researchers, growers and industry representatives to give them hands-on experience in scouting for pests and natural enemies, and deploying “Predator Thresholds” that account for the impact of natural enemies on whitefly spray decisions. We also demonstrated the impact of ThryvOn cotton on Lygus management and presented economic results of ThryvOn cotton adoption. The session highlighted field research outcomes in partnership with tribal growers, including successful

strategies for preserving a balanced ecosystem with the goal of safeguarding natural enemies, fostering thriving cotton growth, and optimizing yield. The session was interactive and included many hands-on demonstrations and collaborative discussions. More details and an outstanding video produced by Better Cotton Initiative are available here: https://bettercotton.org/us-better-cotton-farmers-adopt-innovative-pest-management-techniques/

Vegetable IPM Program Reduces Pesticide Risk and Supports Strong Industry Outcomes

The Vegetable IPM program led by Dr. John Palumbo provides insect pest management expertise to the produce industry centered around Yuma, Arizona. In 2020, Arizona fresh vegetables (lettuces, leafy greens, brassicas) and melons were valued at over $1.15bil. IPM plays a critical role managing insect pests, weeds and plant diseases while balancing human health, environmental and economic risks to deliver product to market. The Vegetable IPM Team addresses these significant challenges in a fun and engaging way that makes growers and pest managers true partners in the program. The team maintains "constant contact" with stakeholders through bi-weekly Arizona Vegetable IPM Update newsletters delivered via email, smart phone and web, reaching over 1,000 growers, pest control advisors and others engaged in desert vegetable production in the Southwest region. Based on user surveys:

- 80% of growers and pest managers adopted reduced-risk pest management practices *because* of timely research and information from the Vegetable IPM program
- 83% reported increased yields
- 80% reported decreased use of broad-spectrum chemistries
- 70% reported that our outreach helped them avoid economic losses through IPM

Food Safety and IPM to Support Tribal Producers

Food safety is effectively integrated pest management. Food safety and IPM are very much alike and rooted in the very same principles of prevention and avoidance, sampling and remediation. Integrated Pest Management. Our Public Health IPM Team brings together expertise across disciplines to address IPM and food safety issues for underserved audiences. Dr. Margarethe Cooper with Dr. Channah Rock, Natalie Brassill and Dr. Shujuan "Lucy" Li integrate food safety into overall public health programs. They work with stakeholders to identify food safety education needs and leverage grant-supported projects for the protection of public health. In collaboration with the Produce Safety Alliance, Inter Tribal Council of Arizona, and many other program partners, they conducted a series of Food Safety and IPM Workshops on tribal lands in 2022-2023. Training topics covered the Food Safety Modernization Act (FSMA) and followed the main training competency areas of the FSMA Produce Safety Rule. Topics also included kitchen pests and their management, pesticide safety, microbial threats, and disinfectants and sanitizers in food handling/prep facilities. Over 200 tribal participants attended the in-person trainings. As the result of this collaborative effort, tribal participants improved awareness and knowledge of food safety practices to protect public health and reduce food-borne illnesses. Results have been presented at several annual meetings and conferences.

Public Health IPM Programs Impact Tribal Communities

Arizona is home to 22 tribal nations, more than any other state. Many tribal members live in remote areas with minimal access to medical facilities and advice and are particularly

vulnerable to public health threats. Since 2018, the Public Health IPM team has partnered with 15 of Arizona's federally recognized Native American Nations and has reached nearly 250,000 residents on 42,604 square miles of reservation lands with science-based outreach.

- From 2018 to 2020, we reached 18,286 people in trainings, workshops, IPM demonstrations & other outreach events
- Surveys from 2019 (n=326) indicated up to a 75% increase in knowledge of IPM, public health pests and pesticide safety
- A majority of tribal collaborators say they will use IPM to improve their lives and communities
- At least 4 tribes have adopted IPM within their disease-prevention programs, protecting over 24,300 tribal residents from illnesses such as Rocky Mountain Spotted Fever and West Nile virus that can be spread from brown dog ticks and mosquitoes, respectively

<u>Increasing Awareness and Involvement in Federal Pesticide Regulatory Policy</u>

We developed an email listserv and newsletter on pesticide regulatory issues and opportunities for comment to EPA. In a 2023 survey of EPA Comment Newsletter participants (n=23, 7.2% response rate), participants agreed (strongly agreed / somewhat agreed) that, as a result of our newsletter:

- 96% (83% / 13%) are more informed about pesticides under review
- 96% (87% / 9%) are more informed about deadlines to submit comments
- 87% (48% / 39%) are more informed about potential risks of pesticides
- 95% (78% / 17%) are more informed about policy decisions that may impact them
- 96% (83% / 13%) said they had improved access to submit comments to EPA
- 78% (39% / 39%) felt empowered to influence policy decisions at the federal level as a result of resources we have developed with leveraged funding through the Arizona Specialty Crop Block Grant Program.
- 74% said information provided in our updates has helped inform actions they've taken or decisions they've made related to pesticides under review. Listed actions included submitting comments to EPA, discontinuation of broad-spectrum insecticide use, and a reduction in wide spectrum herbicide use.
- We recently began providing information related to EPA's handling of its obligations related to the Endangered Species Act in pesticide registration reviews. All respondents indicated this was helpful. (22% extremely helpful, 43% very helpful, 35% somewhat helpful)

**California**

Improving communication of farming to the general public: Accurately communicating good farming practices, including IPM practices, with the general public is difficult. As a member of IPM Voice Board of Directors, Jim Farrar participated in an eight-year project to understand the mental models (=frames) the public commonly uses to think about farming and then develop communication strategies to promote productive communication about farming. Results and suggested communication strategies were presented to agricultural communicators in two workshops funded by a grant from Western Sustainable Agriculture Research and Education.

One workshop was held in Oregon and the other in California with 25 participants at each workshop.

**Colorado**

We have increased the participants skills, knowledge, and awareness of IPM issues and strategies through extensive training, demonstrations, and engagement with IPM practitioners in the field:

- Pest Management in the Intermountain West 2022 Conference, Fort Collins, CO. "Identification and management of Palmer amaranth in CO." 18 November 2022, approx. 100 attendees.
- e 4-H conference attendees, 15 4-H students, "Becoming an Agricultural Biologist". 23 June 2022.
- Expert content reviewer for script for American Chemical Society's YouTube series Reactions about glyphosate mode of action and glyphosate resistance. August 2022. Over 10,000 views of video to date.
- Article for 2022 CO Wheat Field Days Technical Report, p. 48, "Developing Non-chemical Harvest Weed Seed Control Strategies in Dryland Crops"
- Regional Wheat Virus Working Group, "Colorado Virus Updates." April 24, 2023
- Bacterial Leaf Streak Meeting (Northern Midwest Regional), "Two virulent and recent-collected Xanthomonas translucens isolates encode TAL effectors distinct from older, less-virulent isolates." March 3, 2023.
- Improved infrastructure and communication regarding disease incidence in wheat in Colorado.
- CSU Wheat Entomology Program website: Home (csuwheatentomology.com)
- Wheat stem sawfly fact sheet, distributed at wheat_stem_sawfly_fact_sheet.pdf (csuwheatentomology.com).
- Sawfly FAQ and Survey Report. Will be featured in the 2023 CSU Crops Testing Wheat Field Days handout (https://csucrops.com/winter-wheat/).
- Colorado Wheat Entomology Newsletter:5 issue in 2022. Distributed via Colorado Wheat at Wheat Pest and Disease Update | Colorado Wheat. Also distributed via CAM Crops at CAMCrops (csucrops.com). It is being continued bi-weekly during 2023 field season.
- Akron Customer Focus Meeting- USDA ARS (In-Person Mar. 2023)
- CSU Extension Crops Input Conference (In-Person Mar. 2023)
- "Wheat Stem Sawfly: Life History, Agronomic Impacts, and CSU Research"- Greeley Farm Show (In-person Jan. 2023)
- "Biology and Management of Wheat Stem Sawfly"- National Crop Insurance Services CO-WY Annual Meeting (In-Person Jan. 2023)
- CSU Extension Crops Clinic (In-Person Dec. 2022)
- Akron Field Day/Sawfly Expert Panel- USDA ARS (In-Person Aug. 2022)
- Pest Management in the Intermountain West – 25 min talk "A new pest of quinoa – a stem-boring agromyzid fly". December 2022 (~100 attendees).
- Master Gardener training – 90 min presentation on major pests of interests, their ID and biology. October 2022

- Online resources focused on promoting IPM implementation (https://agsci.colostate.edu/agbio/ipm/):
- Agricultural pests (6 websites); Tree and shrub pets (7 websites); Fruiting tree and shrub pests (8 websites); Turf grass (6 websites); Household pests (14 websites); Industrial hemp pests (8 websites); Vegetable pests (10 websites); Live weekly monitoring for key pests across four counties
- IPM resources for a new, aphid-transmitted virus of chili peppers
- The Plant Diagnostic Clinic (PDC) processed 202 plant samples, 111 samples for phytosanitary testing, and 335 samples for potato pathogen screening, and performed 21 insect identifications.
- The PDC contributed to a biweekly wheat disease newsletter by providing descriptions of diseases observed in diagnostic samples.

**Hawaii**

- University of Hawaii at Manoa IPM team participates in regional extension and outreach activities to promote improved understanding of IPM through collaborations with Hawaii Department of Agriculture (HDOA), USDA and non-profit organizations such as Hawaii Invasive Species Council (HISC) and Coordinating Group for Alien Pest Species (CGAPS).
- These efforts include multistate collaborations with BugWood and the University of Georgia and South Carolina in MyIPM app development to expand reach of IPM identification and management tools locally.
- University of Hawaii at Manoa IPM team coordinates with California Dept. of Agriculture (CDFA) to exchange information on pest interceptions between CDFA and HDOA. This allow IPM team to improve IPM tactics of exporters struggling with pest interceptions. Improve upon HDOA export grower certification program and reduce pest interceptions across state lines.
- University of Hawaii IPM team led import replacement efforts for Myrtaceae throughout the state. HODA ban on Myrtaceae importation due to invasive fungal pathogens. Improved IPM strategies and were deployed through a variety of extension activities, including field days, webinars and publications.
- University of Hawii IPM team catalogued over 35 orchid diseases and in the process of incorporating them into online website and MyIPM app.
- University of Hawaii at Manoa participation in the WERA 1017 annual meetings provided members an opportunity for exchange of federal and regional IPM RFA programs.
- Additionally, University of Hawaii's provided opportunities for implementation of relevant federal and regional IPM RFA's program through grower involvement in the form of hosting Grower Forum (round-table discussions) with extension agents and researchers to better understand grower needs as they relate to federal and regional programs. These events took place on every island (Hawaii, Maui, Oahu, and Kauai) and were produced in collaboration with multiple grower association groups.
- University of Hawaii conducted over 5 needs assessments to determine stakeholder needs and tailor improve IPM publications to the local requirements.

- University of Hawaii updated over 20 BMPs for invertebrate pests that were over 15 years old, and updated University Crop Knowledge Master website. An online tool for pest identification and management.

**Idaho**

- A new University of Idaho publication series focused on IPM of key Idaho pests in specialty crops, agronomic crops, and home and landscape settings was created during this reporting period. This series contains content on IPM of all major pest groups: weeds, insects, diseases, and nematodes. So far 11 of these publications have been accepted for publication.
- Educational videos are also used to reach a wider audience. During this reporting period there were 12 videos concerning biological control of weeds produced and made available online. Nine video recordings of EIP team members' presentations concerning priority IPM topics were made available online (see publications for selected examples). A video concerning spider mites in sugar beets was identified as a priority for video production, and is in the final stages of production, to be available online during the next reporting period. Further informational videos are under development including the use of degree days and degree day models in IPM programs, spiders as nuisance pests, and protecting pollinator health.
- A new University of Idaho IPM site (https://www.uidaho.edu/extension/ipm) was launched on 6/5/2023, and now directs clientele to a wide variety of resources and tools. The new site hosts a wide variety of educational content, including up-to-date information concerning pesticide safety and education and pesticide licensing; the site also directs users to various other UI-based resources. Pages with Idaho-specific IPM information on over 40 prominent pests have been created and are accessible through the site. These pages cover all major pest types (arthropods, pathogens, and weeds) that can be found in agricultural, urban, and landscape settings. Creation of further content for this site is an ongoing effort. The new UI IPM site also directs clientele to the pest tracking and alert systems also supported by the EIP, and to other UI Extension services related to IPM such as plant and weed diagnostics labs, pest identification services, analytical sciences lab services, and cocoon testing for alfalfa seed growers. Lastly, the new IPM site provides links to updated courses, webinars, and other educational resources, directing clientele to key resources that facilitate the adoption and success of IPM programs.
- The four pest monitoring networks maintained by the University of Idaho are now hosted on a centralized monitoring dashboard (https://idahopestmonitoring.org/). The networks hosted include a psyllid/liberibacter monitoring network, a spore trap network, and aphid/virus monitoring networks in both northern and eastern Idaho. The hosted monitoring programs post current season data, as it is collected, to alert managers of potential outbreaks, as well as historical data from previous years' monitoring efforts. In addition to weekly reporting (graphs and distribution maps) our dashboard includes blogs for each of the monitoring networks to summarize key findings and make management recommendations to producers.

- Over 57 presentations were delivered to address pest issues in Idaho's wide variety of crops. These presentations were delivered at events such as crop schools (3), IPM workshops (3), and field days (>17). One key event was UI's annual Idaho Potato Conference, with 815 attendees. Another key event was the University of Idaho Snake River Weed Tour and Field Day, with 86 attendees.
- A course site for Idaho Master Gardeners was created where new pesticide safety study materials are available at no cost to participants. So far, 63 Master Gardeners have taken this online training as a companion to their other coursework.
- Revisions to chapter 9 of the Master Gardener Handbook (Pesticide management and safety) were submitted on May 15, 2023. Authors are currently working on revisions to the chapters concerning insect identification and management, as well as the creation of a new chapter devoted to IPM principles. These revised and new chapters will also be turned into interactive modules that will be hosted online on the new Idaho Master Gardener course site.
- Successful implementation of IPM programs relies upon proper pest identification, which often requires advanced training or consultation of an expert. The Idaho Insect Identification site was visited a total of 730 times by 619 unique users during the reporting period. During this reporting period, 85 samples were submitted and provided with identifications.
- UI Extension Pesticide Safety Education Programs (PSEP) led the Green Collar College program held at the Idaho Horticulture Expo. This event is hosted by the Idaho Nursery and Landscape Association, which brings together retail nurseries and garden centers, wholesale, growers, landscape contractors and maintenance firms, arborists, and allied trades. The event focuses on enhancing the efficiency and sustainability of management practices in nursery and landscape settings in Idaho.
- In early 2023, UI Extension PSEP launched 6 separate online recertification webinars that are Idaho State Department of Agriculture (ISDA) approved.
- Pre-license education for pesticide safety has been delivered in-person and online.
- Early detection of potato psyllids is critical in managing the vector-borne zebra chip disease (ZC). Potato psyllids were monitored weekly in 55 (2023) and 73 (2022) commercial fields across southern Idaho over June to early September. Psyllids were tested individually for the presence of the ZC pathogen using PCR. Weekly reports from trapping efforts were extended to growers through the Idaho Pest Monitoring Dashboard and the PNW Pest Alert system, allowing growers to make informed decisions regarding the need for and timing of insecticide applications to manage ZC in their potato crop. This service helps with effective ZC management in >300,000 acres of potatoes in Idaho.
- During this reporting period, over 10,050 youth participated in a program where they were allowed to hold and interact with live insects and other arthropods. This program facilitates greater comfort with insects and other invertebrates, aiming to reduce over-use of pesticides and acceptance of the presence of benign and beneficial insects.
- The University of Idaho Parma Cocoon Testing Laboratory is a non-profit, extension-oriented service focused on providing statistically accurate estimates of the proportion

of live cells, chalkbrood mortality, pollen ball mortality and parasitoids of the alfalfa leafcutting bee nest cells to growers. During this reporting period we provided analysis of over 50 leafcutting populations for alfalfa seed growers.

- The Ag Talk Tuesday virtual series, in which UI professionals and peers discuss current crop issues and timely topics during the field season, held 7 virtual sessions between May and September 2022, and 6 virtual sessions between May and August 2023.
- The Idaho Rangeland Livestock Symposium was held in person in 3 locations in southcentral Idaho as well as online. This event educated participants to facilitate the improvement of range use and productivity, as well as operation profitability. Since rangeland covers approximately 55% of Idaho's land base, education of rangeland managers is key. This symposium included discussion of weed management, and was a collaborative effort between UI, the Idaho Rangeland Resource Commission, Idaho State Department of Agriculture, Idaho Department of Lands, Idaho Cattle Association, and Natural Resources Conservation Service.
- The Regional Master Gardener Convention in Rexburg Idaho had over 50 participants and covered many IPM-related topics such as: the microscopic world of botany and entomology, Water conservation in landscapes, Caring for young trees so they can be great mature trees, Pest management year-round: using integrated practices, Root washing: exposing root problems before planting, and Math is fun! learning sprayer calibration.

**Nevada**

- Master Gardeners: Provided 13 classes (27 IPM training hrs.; 879 total participants).
- Green Industry professionals: Provided eight (8) classes for (24 IPM training hrs.; 173 total contacts). Attendees were asked to rate their knowledge of the topic before and after attending the classes (1=no knowledge; 5=thorough knowledge). The mean rating before the classes was 2.48; the mean rating after was 4.01 for an increase in knowledge of 38% (P<.000)
- Our Green Industry Training program provided a total of 15 PSEP CEUs.
- Presented one (1) bilingual IPM trainings; 49 people attended.
- Pesticide Applicators: Held Pesticide Safety Education program classes on December 6, 2022 and April 13, 2023
- Provided ten (10) classes for a total of ten (10) PSEP CEUs with 110 pesticide applicators in attendance. December 2021 attendees were asked to rate their knowledge of the topic before and after attending the classes (1=no knowledge; 5=thorough knowledge). The mean rating before the workshops was 3.21; the mean rating after the workshops was 4.02 for an increase in knowledge of 25.3% (P<.000). Of April 2023 attendees, 97% reported improved knowledge and 90% reported that they would put at least one IPM strategy into practice.
- Grow Your Own, Nevada! Webinar Series. Provided four (4) IPM-focused classes; 600 people attended the live presentations and there were 252 recording views. Attendees were asked to rate their knowledge of the topic before and after attending the classes (1=no knowledge; 5=thorough knowledge). The mean rating before the workshops was

2.56; the mean rating after the workshops was 3.93 for an increase in knowledge of 53.2% (P<.000).

- NevadaScapes: New program that emphasizes pest prevention, water conservation and pesticide reduction using hands-on landscape design exercises for the core curriculum. 38 participants. Attendees were asked to rate their knowledge of the topic before and after attending the classes (1=no knowledge; 5=thorough knowledge). The mean rating before the workshops was 3.20; the mean rating after the workshops was 4.64 for an increase in knowledge of 44.88% (P<.000).
- 4-H Pollinator Ambassadors: Provided 2.5 hours of IPM trainings for the 16 youth participants in this statewide program

**New Mexico**

- IPM Workshop. NMSU AES and NIFA EIP IPM Program and Cotton Inc. "Demonstration of Field Sampling for Insect Pests and Beneficials".
- Vegetable Pest Short Course-We participated in three in-person workshops on integrated pest management for vegetable pests and hosted three speakers on managing vegetable pests in the online "Ready, Set, Grow" series
- Over twenty presentations on topics such as integrated pest management, noxious weeds, kissing bugs, horticulture, and beneficial insects have been given to stakeholders around the state
- The 2023 Master Gardener program included classes on pest identification, prevention and integrated pest management, and pollinator and beneficial insect conservation
- Participated in New Mexico Beekeeping Association and New Mexico Department of Agriculture Bee Inspector training which provided information on basic honey bee biology, honey bee pests, and hive inspections.
- Train the Trainer - we provided 2 half-day field workshops for county Master Gardeners to learn directly from state specialists to provide hands-on training with insect, weeds, plant pathogens, and general plant ID
- >50 virtual and in-person trainings, workshops, and field days with IPM-related content given across the state for various stakeholders (Master Gardeners, agricultural producers, extension educators, etc) given by several NMSU Extension Specialists and IPM Program Manager.
- 9 virtual trainings presented through the Ready, Set, Grow webinar series on IPM-related content: “Squash Bugs, Other Hemipteran Insects, and How to Distinguish the Pests from Beneficials”, “Approaches to Addressing Troublesome Wildlife in Your Garden”, “Top 10 Most Common Plant Diagnoses” and “Pollinators”, and more
- Participated youth events on insects and weeds throughout the state, including the AgVenture Days at Southern New Mexico State Fair – weeds, insects, and pollinators to 3rd graders
- Provided support for IPM promotion in the NMSU Ideas for Cooking and Nutrition Seed to Supper program, which teaches beginner vegetable gardening
- NMSU IPM Social Media pages – Facebook, Instagram, YouTube
- Partnered with the Albuquerque Backyard Refuge Program, managed by the Friends of Valle de Oro National Wildlife Refuge, to plant demonstration pollinator gardens at four

sites around Albuquerque (Valle de Oro National Wildlife Refuge, Loma Linda Community Center, Van Buren Middle School, and El Camino Real Academy). We have been planting a mix of perennial flowers, grasses, and shrubs at these sites. Volunteers and students are involved with the plantings and learn not only how to plant but about the benefits that these plants have to pollinators and other wildlife.

- Participated in New Mexico Beekeeping Association and New Mexico Department of Agriculture Bee Inspector training which provided information on basic honey bee biology, honey bee pests, and hive inspections.
- >10 presentations on pollinators and pollinator health have been given across the state to various stakeholder groups
- Demonstration Plantings -We sponsored a pollinator-friendly hedgerow, a garden area with annual flowers, and demonstrate the use of pollinator-friendly cover crops at NMSU's Growing Forward Farm in Aztec, NM in late June 2023
- Bumble Bees of New Mexico - Content includes importance of bumble bees, conservation actions, natural history, and identification tips for species commonly found in New Mexico. We are now working with the Xerces Society for Invertebrate Conservation on this publication.
- FFA demonstration: On campus event discussing plant pathology and entomology related material and activities.
- “Ready, Set, Grow”: Online presentation to stakeholders on IPM of commonly grown New Mexico fruit trees.
- Pesticide applicator trainings: Conducted three in-person workshops with five presentations on topics such as diseases, weed management and beneficial insects with an emphasis on IPM practices.
- WSARE training: Participated in the Western Sustainable Agriculture Research and Education 3-day workshop with a presentation on how to collect diseased specimens for better identification and diagnosis.
- Hosted and collaborated with Utah State Extension Plant Pathologist to identify challenging pathogens affecting urban trees in NM.
- Participated in a forage IPM workshop which included presentations on pest identification, diseases and noxious weeds.
- Participated in Ag-Ventures day at the Southern New Mexico State Fair discussing plant pathogens and ways to manage them.
- 2022 and 2023 Master gardener programs which focused on identification and management of plant diseases.
- Numerous guest lectures both in state and out of state discussing plant pathology/IPM.
- Conducted a chile disease workshop at the Navajo Agricultural Products Industry (Sovereign land)
- Train the trainer field day workshops for county Master Gardeners discussing plant pathogens and how to manage them.
- Western Pecan Growers Association: Online webinar discussing regional diseases of pecan trees.

- Arizona Pecan Growers Association: In person conference discussing regional new and emerging diseases of pecan trees
- Identified weed specimens submitted to the NMSU Plant Diagnostic Clinic (1 of 6 Star-D Accredited diagnostic labs in the US) for county agents and clientele in 22 different counties in the state of NM, and 2 counties in the state of TX.
- 32 Master Gardeners presentations in NM and TX focusing on weed identification and management. When weather and climate permitted, attendees also participated in weed identification tours in the field to help with ID skills and discuss IPM-based management options.
- 36 CEU-based trainings to help pesticide applicators throughout numerous states (NM, TX, AZ, CO, and UT) maintain their applicator's licenses and provide IPM-based management strategies for more successful and sustainable weed control.
- Provided approximately 40 different field tours and workshops throughout NM focusing on weed identification and IPM-based management strategies.
- Presentation, "Evaluating the Efficacy of Alternative Herbicide Active Ingredients for Organic Weed Control in Landscape Systems" at the 2023 WERA 2017 annual meeting in Homer, Alaska. Co-Author Tim Stock from Oregon State University.
- Presented weed ID and information on how weeds impact our daily lives to 3$^{rd}$ graders and high school students at the 2023-2023 AGventures Day at the Southern State Fair field trip and educational outreach activities.
- Provided IPM-based weed identification education to producers as part of the Navajo Sustainable Agriculture Project Team in partnership with the San Juan County Soil and Water Conservation District
- Worked with numerous Soil and Water Conservation District and Bureau of Land Management teams and projects to provide IPM-based weed identification and management options for invasive and noxious weeds throughout NM.
- Provided 15 informative video presentations in partnership with the Taos Soil and Water Conservation District to provide information focusing on identification and IPM-based weed management strategies (specifically in the absence of herbicides) for noxious weeds found throughout Taos County.
- 13 guest lectures for classes and labs where the subject was IPM-based weed identification and management on campus at NMSU and Kentucky
- Worked in partnership with the New Mexico Department of Agriculture to print and distribute printed copies of the Noxious and Troublesome Weeds in New Mexico weed identification booklet to multiple Extension, Soil and Water Conservation District, and Bureau of Land Management offices throughout NM.
- NMSU Plant Diagnostic Clinic worked and collaborated with labs and diagnostician in multiple states to help with pest ID and provide education to various stakeholders.
- Provided multiple presentations and field weed ID and management educational tips to attendees of the 29$^{th}$ Annual Noxious Weeds Short Course in Farmington, NM that is open to attendees and land managers/licensed pesticide applicators within the area of the four corners (NM, AZ, UT, CO).
- **10** 4-H Entomology Contest Workshops in 2023. Artesia, NM. 146 contacts

- Agriculture Career Day, Park Junior High, Artesia, NM, "Introduction to Entomology ", Reached over 600 students.
- Urban Pest Managers Technical Committee (UPMTC) presentation “Kissing Bugs in the Southwest: Issues and Challenges”. Las Cruces, NM. 48 Contacts.
- La Semilla Agriculture Fellows, Artesia, NM, workshop " Insect Pests and Beneficials in New Mexico Cropping Systems", 10 contacts.
- NMSU AXED Farm tour and workshop. Biological Control in New Mexico. Artesia, NM. 11 contacts.
- 2 Presentations and demonstrations at Living Desert Zoo and Gardens Zoo Camp. Bugs, Bugs, Bugs. Carlsbad, NM. 250 contacts.
- Recorded CEU-based training to help pesticide applicators maintain their licenses. “Integrated Pest Management of Insect Pests in NM”
- Presentation, “IPM in New Mexico” at the WERA1017 annual meeting in Homer, Alaska
- 2 Radio interviews on KSVP 990 AM discussing IPM in cotton
- NMSU Agricultural Science Center at Artesia Field Day, Artesia, NM, "Cotton IPM”. 100 Contacts.
- 588 contacts in 2023 for insect pest identification and control
- Southeast New Mexico College (SENMC) Intro to Environmental Science Class. Workshop and Presentation on Insect Pest Management in New Mexico. 11 contacts.
- IPM of Forage Insects *In* Forage IPM Workshop, NMSU AES and NMSU EIP Program.Los Lunas, NM. 78 Contacts.
- Artesia Intermediate/Jr High STEM summer workshop. Artesia, NM, " Biological Control in Southeastern New Mexico ", Presentations and Field Collections 20 Contacts
- Southeastern New Mexico Agricultural Research Association (SENMARA) Annual Meeting presentation, “IPM in Entomology Update”. Artesia, NM. 14 contacts.
- NMSU FFA Workshop, NMSU, Skeen Hall, Las Cruces, NM, "That Bug Us". 14 Contacts
- Eddy County Insect Pinning Workshop, NMSU, Eddy County Fairgrounds, Artesia, "Insect Collection and Pinning". 8 Contacts.
- New Mexico Pesticide Training CEU's. Roosevelt County Cooperative Extension Office, Portales, NM, "Insect Pest Management in Eastern New Mexico". 34 contacts
- **7** 4-H Entomology Contest Workshops in 2022. Artesia, NM. 121 contacts.
- New Mexico Pesticide Training CEU's. Colfax County Cooperative Extension Office, Raton, NM, "Insect Pets Management in Northeastern New Mexico". 28 Contacts
- STEM night. Ocotillo Elementary, Carlsbad, NM. "Intro to Entomology ". 300 Contacts
- New Mexico Pesticide Training CEU's. Chaves County Cooperative Extension Office, Roswell, NM, "Insect Pest Management in Southeastern New Mexico".
- 678 contacts in 2022 for insect pest identification and control
- Yucca CowBelles, ASC Artesia, "Insect Pests and Beneficials. 12 Contacts
- NMSU Pesticide Applicators Series, Hobbs, NMSU, "Insect Pest Management".
- La Semilla Agriculture Fellows, Artesia, NM, " Insect Pests and Beneficials in New Mexico", 16 Contacts.
- New Mexico Pesticide Training CEU's. Rex E. Kirksey Agricultural Science Center at Tucumcari, NMSU, Tucumcari, NM, "Insect Pests and Beneficials of New Mexico", 31 Contacts

- Rex E. Kirksey Agricultural Science Center at Tucumcari Field Day, NMSU, Tucumcari, NM, "Mozema Bug a Concern in New Mexico and Texas Cotton."
- SE New Mexico Agricultural Research Association & Legislative Finance Committee, Artesia, NM, "IPM of Insects in New Mexico 2021". 14 contacts
- Agriculture Career Day, Park Junior High, Artesia, NM, "Intro to Entomology ", Reached Approximately 600 students.
- Cottonwood 4H Monthly Meeting, Artesia, NM, "Entomology Contest", 58 contacts.
- NMSU Open House, NMSU, Skeen Hall, Las Cruces, NM, "Insect and Plant Diagnostics".
- ASC - Artesia Annual Farm Planning Meeting, Artesia, NM, "IPM of Insects Developments in New Mexico". 10 Contacts
- 59 arthropod museum outreach events with a total of 4226 visitors, an average of 70 visitors per event in 2023
- 65 outreach events by the arthropod museum with a total of 3445 visitors an average of 53 visitors per event in 2022
- Truth or Consequences Pesticide Applicator's Training CEU Course – Beneficial Insects of New Mexico "Beneficial insects and IPM" for CEU Course. 17 people.
- NM Chile Conference, 'Combating Chile Pepper Pests Using IPM ". 179 people.
- 2023 Master Gardener Training Course, "Arthropod Identification and IPM ". Recorded Lecture. 199 people.
- Q&A with Master Gardener Training Class, 67 people.
- Fruit Tree Pest Management Workshop, "Fruit tree pests and IPM" at the Larry P. Abraham Agri-Nature Center, Los Ranchos De Albuquerque, NM. 23 people.
- 2023 NMSU In-Person Pesticide Applicator CEU Training, "Beneficial insects and IPM" at the 2023 NMSU In-Person Pesticide Applicator CEU Training in Farmington, NM. 44 people.
- Navajo Sustainable Agriculture Project Outreach, "Common pests and how to deal with them". Navajo Sustainable Agriculture Project. 10 people.
- Lush & Lean Workshop, "Pests and Beneficials - Bugs in Your Landscape? Who's Who & What's What?". 60 people.
- Native Plant Society presentation, "Beneficial Insects of New Mexico". 34 people.
- New Mexico Agriculture Sustainability Workshop, Insect walk and presentation on: "Insect Pest Management: Aphids, Squash Bugs, Beet Leafhoppers, & Grasshoppers" at the Larry P. Abraham Agri-Nature Center, Los Ranchos De Albuquerque, NM. 95 people.
- Master Gardener Field Training 2023. Trained Master Gardeners in hands-on entomology at the Larry P. Abraham Agri-Nature Center, Los Ranchos De Albuquerque, NM. 46 people.
- IPM/Beneficial Insect 4-H Ag-Tivity Camp and Community Event. Two-day event for children and adults in Aztec, NM: 1) June 22, 2023 outreach for ~12 children. Showed live and prepared specimens and then took everyone to look for bugs. Second event = IPM and pest presentation for 6 adults. 2) June 23, 2023 - outreach for 15 children. There were multiple adults present throughout all these events. 44 people
- Ready, Set, GROW! "Hemipteran Beneficials & Pests". 75 people,

- 29th Annual Southwest Noxious Weed Short Course. “Principles of Biological Control” and “Southwest Biological Control Update”. San Juan College, Farmington, New Mexico. Also showed insects of weed biological control on the field day on the 19th. 60 people.
- 90-minute lecture on “Arthropod Identification and IPM” for Pesticide Applicator training. Morarity, NM at the Edgewood SWCD Building. 60 people.
- 2023 Alcalde Field Day. “Fruit Tree IPM”. 100 people.
- Recorded lecture, “Beneficial insects and IPM” for the 2023 PAT NMDA CEU application in NM.
- Navajo Sustainable Agriculture Project Outreach, “Plant Pollinators”. 10 people.
- Doña Ana Co Master Gardener 2023-24 Training Class. Taught the 6-hour Master Gardener 2023-24 Training Class on Entomology. Half of the course was devoted to IPM in Entomology. A 90-minute lecture was given on IPM and then a pest management learning game was used to actively teach components of IPM. 8 people.
- Pest Management Game: “Pest Friends Demo for the Learning Games Lab”. 7 People.
- Identified 764 Nematode specimens submitted to NMSU, a USDA certified containment facility and a USDA P526 diagnostic permit for the USA. Samples came from NM, AZ, TX, NV, UT as well as the Navajo Nation.
- “Undercover Tomatoes: The Plot Thickens” for the 38$^{th}$ Tomato Disease Conference at Purdue University.
- “Intro to Plant ID and Using APPs” for the online Train the Trainer IPM Workshop.
- “Plant Diagnostics” for the Valencia County Cooperative Extension Workshop.
- “Diagnosing & Preventing Common Tree Problems” for Grant County Yard & Garden Expo.
- Enhancement of the pollinator habitat and community engagement at our Learning Garden at the Agricultural Science Center at Los Lunas also continues with the installation of dozens of new species, decorative and informative signage, a first-annual pollinator-friendly Fall Native Plant Sale and Talks on Oct. 7, 2023. Over 100 community members were in attendance. Interactive presentations focused on attracting native beneficial insects and other wildlife and selecting and planting native and adapted species in home landscapes for plant and habitat health.
- Guest lecture in EPWS 505 course (Advanced Integrated Pest Management) on “Biological control of plant pathogens.” The lecture delineates the importance of non-chemical components as integral parts of IPM.
- Training of peach grower and his associates on identifying *Phymatotrichopsis omnivora* on roots of peach trees, and on using Trichoderma for root rot control.
- Presented on “Evaluation of Biorational Approaches for Management of Soilborne Pathogens” at the Leyendecker Field in Las Cruces, NM
- Presented on “Overview of Wilt Diseases in Vegetable and Nut Crops in the Rio Grande Valley” at the East El Paso AgriLife Extension event in Anthony, TX
- Presented an invited departmental seminar (Instituto de Ciencias Biomedicas-Quimico Biologicas, Universidad Autónoma de Ciudad Juárez, Mexico) on “Using Agricultural Probiotics and Biostimulants for Managing Soilborne Diseases in Annual and Perennial Crops”.

- Presented on “Chile Disease Management” at the Chile Field Day at Curry Farms, Pearce, AZ.
- All the presentations focused on using biopesticides (biochemical and microbial formulation) as IPM tools.

**Montana**

- Maintained a website for the real-time monitoring of the wheat midge (2 states) and alfalfa weevil (4 states). https://pestweb.montana.edu/Owbm/Home/Index
- MSU Extension 2 day IPM workshop "Diagnosing Plant Health Problems." Workshop participants were extension agents, crop consultants, agronomists, pesticide applicators and Montana Department of Agriculture employees. Overall usefulness of presentations and sessions on days 1 and 2 were rated 4.63 and 4.57 (out of 5), respectively. Knowledge on topics increased by 15% and 22%. 100% of participants would recommend this workshop.
- Hands-on training and materials were provided through 41 webinars, Ag. Alerts, workshops, continuing education classes, presentations, seminars, newspaper articles, podcasts, book chapters, journal articles, extension and education publications, communications, and conference abstracts/proceedings.
- Panel members on 13 episodes of Montana Ag. Live focused on agronomic crops.
- IPM member participated in the palmer amaranth awareness workshop with producers, agricultural professionals, and state and federal agencies to raise awareness of palmer amaranth and waterhemp in Montana, worked across state lines with North Dakota.
- A Hybrid Level 1 Master Gardener course created for the Digital Chalk platform. 26 course offerings were added to the platform. Individuals were able access curriculum online for self-paced learning, this allowed for more time for hands-on activities during in-person class sessions.
- Youtube videos, webinars, online articles, and the online "Monthly Weed Post" newsletter for MSU Extension, reaching approximately 600 subscribers each month.
- Sixth edition of the Montana Master Gardener Handbook released in April of 2023.
- "Turf to Trees" workshop for green industry professionals, MSU Extension agents, Master Gardeners, and horticulture professionals.
- Published extension "rack cards" providing information on management and prevention of invasive pigweed plant species.
- 4 Gallatin Valley Farm to School (GVF2S) horticulture facts sheets for children.
- 7 New Agent Horticulture Toolkits distributed during New Agent Orientation to incoming county extension faculty with horticulture responsibilities.
- 1000 copies of the publication "Revegetation Guidelines: Considering Invasive and Noxious Weeds."
- 34 presentations, Ag. alerts, workshops, magazine/newsletters, peer reviewed journal articles, and extension publications by IPM members.
- 2 episodes of Montana Ag. Live focused on providing learning materials for IPM implementation in communities.
- 17 workshops, Ag. alerts, classes, and webinars on a range of pollinator topics.

- Presentations on the insect pests of apples.
- 15 presentations to 450 stakeholders on IPM in fruits and vegetables. Completed a video on bird management in berries and soft fruits.
- The Schutter Diagnostic Lab was awarded the MSU Extension Director's Team Award in October 2022.
- Providing written reports and/or phone conversations on identifications, the SDL conducted 1431 disease/injury diagnoses through physical, email, and Plant Sample Submission app samples.
- The lab sent out 20 alerts, either urban (8; 612 subscribers; https://mturbanalert.org) or ag. (12; 1,879 subscribers; https://mtagalert.org), that informed our clientele about issues statewide via text or email.
- 7 New Agent Horticulture Toolkits distributed during New Agent Orientation to incoming county extension faculty with horticulture responsibilities.
- 25 plant disease diagnostic kits for the detection of fire blight from Agdia® were distributed to extension offices in 4 counties (Gallatin, Flathead, Lewis & Clark, Madison-Jefferson) and one agricultural research center. 28 samples were tested in 2022; 14 samples were diagnosed "positive" for fire blight.

**Oregon**

- Oregon State University School IPM Program: Pest issues in schools and school IPM implementation strategies were shared with colleagues and stakeholders from other states:
- Oregon State University School IPM Program conducted 22 hands-on school IPM coordinator training events throughout the state that reached over 95% of Oregon’s 197 school districts, representing over half a million students.
- Oregon State University School IPM Program educated health inspectors that conduct inspections at over 1,000 school kitchens two times per year, and provide pest prevention and management guidance to kitchen staff.
- Oregon State University School IPM Program developed a process to co-create Extension publications with school IPM coordinators and develop cadre of participant/peer-trainers at School IPM Program training events.
- Oregon State University School IPM Program director serves on the steering committee for the 11th International IPM Symposium, to increase knowledge and awareness of regional, national, and international IPM issues, systems and strategies.

**Washington**

- Presentations and publications on IPM topics to growers of crops including alfalfa seed, apples, barley, carrots, cherries, hops, juice grapes, onions, potatoes, sweet potatoes, wheat, wine grapes.
- Presentations on IPM topics to urban pesticide applicators including turf and landscape specialists.
- Training in IPM for Master Gardeners
- Presentations and publications on IPM in pollinators for beekeepers and audiences that use managed pollinator services

- Updates to websites including: Washington State University Extension IPM, WSU Tree Fruit Research and Extension Center, WSU Small Farms Program, WSU Northwestern Washington Research and Extension Center, WSU Plastic Mulches, WSU Wheat and Small Grains, WSU Viticulture & Enology, WSU Honey Bees + Pollinators

**OBJECTIVE 2: INCREASE RELEVANCE OF FEDERAL AND REGIONAL IPM RFA'S, PROGRAMS, AND POLICIES TO BETTER ALIGN THEM WITH REGIONAL STAKEHOLDER NEEDS.**

**Alaska**
At the annual Alaska Certified Pesticide Applicators Workshop, we included guest speaker Kaci Buhl (Associate Professor, Director PSEP/NPIC, Oregon State University) to provide pesticide research updates and clarification of regulations/updates with EPA Bulletins Live! Two.

**Arizona**
Dr. Peter Ellsworth serves as a Co-Director of the Western IPM Center as well as IPM Coordinator for the state of Arizona. In this role, he convenes the IPM Coordinating Committee, a stakeholder body that identifies and informs priorities for Arizona IPM programs. He provides input on the RFAs of the Western IPM Center, input which is informed by broad engagement with stakeholders across IPM Programs in different settings and environments.

Dr. Al Fournier serves as IPM Network Coordinator for the Desert Southwest, maintaining a vital information network for the arid southwest region culminating in evidence-based testimony to our regional and federal partners, especially the U.S. Environmental Protection Agency, with a focus on pesticide registration review. The sub-region of the West that we represent includes Arizona, New Mexico, Nevada, and the desert regions of California. Our expert testimony includes pesticide use data from the Arizona Pest Management Center Pesticide Use Database and Crop Pest Losses surveys from our region, as well as detailed input from growers, pest managers, Extension personnel and scientists across the sub-region that we represent. Information provided in our comments helps the Environmental Protection Agency make more informed regulatory review decisions that protect people and the environment while supporting the tenants of IPM and productive and efficient agriculture throughout the Desert Southwest.

Another relevant activity we contributed to this project term is the National Survey of State IPM Coordinators, which was developed and implemented by the Regional IPM Centers. This survey gathered numeric data on the number of personnel and the different program areas in which we invest. These data will support an analysis of national IPM Program investments that should create a foundation for understanding current IPM infrastructure and shortcomings to identify where additional investments should be made.

**California**
Developing a national strategic plan for publicly funded IPM programs: In 2020, Jim Farrar was the Chair of the National IPM Coordinating Committee (NIPMCC). He initiated development of a strategic plan for the publicly funded state and territory programs as a unified enterprise. He

worked with a committee of national volunteers to draft “Groundwork for Growth: A Strategic Plan for Public IPM Research and Extension in the United States.” Farrar’s successors in NIPMCC leadership are documenting current IPM infrastructure as a step toward developing proposed targets and milestones for the strategic plan.

Incorporating IPM in climate resilience and climate change mitigation planning: As a member of IPM Voice Board of Directors, Jim Farrar is participating in efforts to include IPM practices in federal agency discussions of agricultural practices to support climate resilience and climate change mitigation. Discussions currently focus on incorporation of IPM practices in Natural Resource Conservation Service standards which compensate growers for implementing specific practices.

**Colorado**

- Advisory Board was formed to guide Extension efforts to suppress a major pest of quinoa in Colorado. The Board was essential in securing funding to support the work. The AB is comprised of quinoa producers, crop consultants, University scientists, independent crop consultants, and industry partners.
- Advisory Board was formed to align the stakeholder needs with federal grant program to address emerging issues with suppression of corn earworm in sweet corn on Western Slopes. The AB is comprised of sweet corn producers, crop consultants, commercial pesticide applicators, industry partners and University faculty and staff.

**Hawaii**

- University of Hawaii at Manoa participation in the WERA 1017 annual meetings provided members an opportunity for exchange of federal and regional IPM RFA programs.
- Additionally, University of Hawaii’s provided opportunities for implementation of relevant federal and regional IPM RFA’s program through grower involvement in the form of hosting Grower Forum (round-table discussions) with extension agents and researchers to better understand grower needs as they relate to federal and regional programs. These events took place on every island (Hawaii, Maui, Oahu, and Kauai) and were produced in collaboration with multiple grower association groups.
- University of Hawaii conducted over 5 needs assessments to determine stakeholder needs and tailor improve IPM publications to the local requirements.
- University of Hawaii updated over 20 BMPs for invertebrate pests that were over 15 years old, and updated University Crop Knowledge Master website. An online tool for pest identification and management.

**Idaho**

- The annual WERA 1017 meeting and International IPM symposium provided opportunities for the state IPM coordinators of the western US to share ideas and input with the USDA-NIFA Program leadership in the RFAs, and to the Western IPM center.
- Annually the UI IPM EIP team meets to discuss priorities for the program, with team members bringing feedback from stakeholder groups into consideration. Regional advisory boards set up for the Extension Implementation Program allow team members

to get stakeholder input on ongoing and planned programs and ensure programs within the state as well as programs coordinated among multiple states are addressing key stakeholder needs.

**New Mexico**

- Identified 764 Nematode specimens submitted to NMSU, a USDA certified containment facility and a USDA P526 diagnostic permit for the USA. Samples came from NM, AZ, TX, NV, UT as well as the Navajo Nation.
- 2023 Pierce, J.B. NIFA Peer Review Panel

**Montana**

The Montana Extension IPM Program Goals reflect the National IPM Road Map. Our program is designed to reduce health and environmental risk from pest management, improve IPM practices and increase IPM adoption. The Montana State University IPM Program is a highly collaborative, engaged, and effective group. We have several new and continuing programs that will be emphasized in this project that are directly related to the CPPM goals of Plant Protection Tactics and Tools, Enhancing Agricultural Biosecurity, and IPM for Sustainable Communities. Our primary areas of emphasis are Agronomic Crops; Communities; Specialty Crops; Pollinator Health; Pest Diagnostic Facilities; and Pesticide Applicators. Emphases and specific objectives include: Agronomic Crops: Real time monitoring of pests via a website and farmer cooperators; Hands-on training and research- based learning materials for agricultural professionals; Communities: Expand availability and accessibility of online learning resources; Provide hands-on training, toolkits and learning materials for stakeholders; Participate in multistate cooperative projects; Early detection and rapid response to the brown marmorated stink bug; Specialty Crops: Improve specialty crop growers' knowledge and implementation of timely tools for pest management, hands-on workshops and grower guides; Pollinator Health: Improve awareness of pollinator health and habitat; Pest Diagnostic Facilities: Educate clients of the diagnostic laboratory on IPM-based pest management options; Provide rapid diagnostic tools; Pesticide Applicators: Provide hands-on training and learning materials for Pesticide Applicators.

**Oregon**

- Oregon State University School IPM Program director was invited to provide expertise on two pieces of legislation related to IPM in schools, which resulted in significant amendments to Oregon Senate Bill 426 in 2023.
- Oregon State University School IPM Program supported multi-state research on alternatives to Glyphosate.
- Oregon State University School IPM Program director co-authored journal article directly aimed at increasing relevance of national policies and federal grant programs related to IPM implementation in schools.

**Washington**

- Collaborated, sought and utilized funding for multi-state projects from USDA NIFA programs including Specialty Crop Research Initiative, Alfalfa Seed and Alfalfa Forage System Program, and Crop Protection and Pest Management Program as well as from USDA-ARS Non-Assistance Cooperative Agreements.

- Advanced registration of reduced-risk pesticide alternatives on regionally important crops through the IR-4 program

**OBJECTIVE 3: ENHANCE COLLABORATION, SHARING OF IDEAS, AND HENCE CREATION OF REGIONAL OUTPUTS SUCH AS MULTI-STATE GRANTS AND SHARED OUTREACH MATERIALS.**

**Arizona**

WERA-1017: A Wellspring for Collaboration and the Advancement of IPM

Participation in WERA-1017 has greatly enhanced collaboration among IPM faculty in the Western Region. The WERA meetings have hosted discussions and interactions on many relevant topics, including invasive pests, school IPM, measurement of pest losses in agriculture and the impacts of IPM, and more. In this section we provide examples of University of Arizona (UA) collaborations with scientists in the Region.

Reducing Use of the Riskiest Pesticides

Several years back, Dr. Paul Jepson of Oregon State University initiated discussions among WERA-1017 participants aimed at reducing the use of Highly Hazardous Pesticides in the U.S. through state Extension education programs. This impromptu meeting led to the founding of a workgroup that provided in-service education on pesticide risk, toxicology, and risk communication. These interactions led to the inclusion of pesticide risk information in decision support tools for pest managers in Arizona, in the form of cotton insect management guidelines in 2020 (revised in 2022).

More recently, UA entomologists and Extension Specialists Peter Ellsworth and Al Fournier, with funding support from the Better Cotton initiative (BCI), conducted an extensive assessment of the use of and risks posed by several highly hazardous pesticides in U.S. cotton production and developed an analysis and set of recommendations to help the industry transition away from the most hazardous crop protection chemicals. Developing this report, published in September 2022, required many hours of interviews with cotton Extension Specialists across the cotton belt and an analysis of EPA risk assessment documents. This information was presented to growers and other stakeholders at the 2023 Cotton Beltwide Conferences as a collaboration between Ellsworth, Fournier and Karen Wynne from BCI. In 2023, Ellsworth and Fournier received additional funding from BCI ($99,900) to expand the original risk and transition analysis, conduct outreach with Arizona and California pest management professionals, and to review pesticide use records of growers in BCI's program and advise BCI on the best record keeping practices to support effective measurement of program outcomes.

Crop Pest Losses Survey: A Tool for Crop Industry Assessment and Advancement of IPM

Drs. Ellsworth and Fournier have for many years led the Crop Pest Losses and Impact Assessment Program, currently a Signature Program of the Western IPM Center. IPM programs are expected to reduce economic, environmental and human health risks for people, property, resources and the environment. In order to document these impacts, the condition of these targets must be known at various points in time relative to advances in IPM. However, few

industries or systems are actively measuring even the most basic metrics of economic, environmental or human health status. The Crop Pest Losses and Impact Assessment Signature Program develops procedures for explicitly engaging stakeholders so that they can establish the current state or condition of their industry, including yield losses to pests, pesticide use, and economic outcomes. While these data are most useful in measuring the economics of IPM, there are opportunities to infer progress in environmental and human health safety as well. This Signature Program provides tested, reliable metrics to document the impacts of IPM.

Crop Pest Losses Surveys run annually for years in Arizona and neighboring desert regions of California include Cotton Pest Losses and Lettuce Pest Losses, focusing on two of our most valuable crops. Through the Western IPM Center Signature Program, we began extending the survey and, collaboratively with colleagues, adapting this measurement system to other crops. Nowhere has this been more successful that in the Pacific Northwest, through collaborations between University of Arizona and Oregon State University. Ellsworth and Fournier teamed up with OSU partners Dr. Paul Jepson and Ms. Katie Murray to conduct hands-on workshops to survey growers and pest managers to document insect, weed and diseases losses, management costs, and outcomes for each crop. One result from this years-long collaboration, supported by the Western IPM Center Signature Program (UA-led) and a USDA Applied Research and Development Program proposal (OSU-led), is the release of 4 Extension publications this project term, led by Katie Murray of Oregon State University (OSU). These publications document the economic impact of pests in onions, cranberries, sweet cherries and hazelnuts, as well as crop management practices, current pesticide use and non-chemical pest control methods. These important publications provide a baseline to support potential ongoing discussions to reduce economic and environmental risks by advancing adoption of integrated pest management tactics in these crops.

<u>Collaborations in Urban Pest Management and Improving Environmental Health in Schools</u>
"Managing Pigeons," is a comprehensive set of Integrated Pest Management (IPM) guidelines developed by University of Arizona Extension Entomologist and Public Health Specialist, Dr. Dawn Gouge, in collaboration with Dr. Timothy Stock from Oregon State University (OSU). This publication grew out of a priority need for updated, effective management solutions for this urban pest, and from ongoing urban pest management collaborations between Dr. Gouge and Dr. Stock. Additional collaborative outputs from them during this project term include two additional Extension publications (one UA and one OSU) on fly management in school environments. The ubiquitous nature of pests like flies and pigeons makes these resources useful throughout the Western Region and beyond.

Dr. Gouge also led the development of an article national in scope, "Improving Environmental Health in Schools," published in the online journal, Current Problems in Pediatric and Adolescent Health Care. This project was in collaboration with professional colleagues from Oregon State University, University of Wyoming, Indiana University, Pennsylvania State University, Auburn University, Cornell University and the New York State IPM Program, the Institute for Tribal Environmental Professionals, Informed Green Solutions (a non-profit organization) and the IPM Institute of North America.

**California**

Keeping track of invasive shothole borers can help lightly to moderately infested trees survive: In California's urban and natural forests, tiny beetles no bigger than a grain of rice are killing thousands of trees. Sixty-five kinds of trees are susceptible to invasive shothole borers, especially common landscape trees such as sycamore, cottonwood, willow, valley oak, Engelmann oak, white alder, and box elder. There are no natural predators for this pest in California, which means beetle numbers can grow unchecked. Join UC Cooperative Extension Urban Forestry and Natural Resources Advisor Beatriz Nobua-Behrmann, Emeritus Environmental Horticulture Advisor John Kabashima, and Invasive Shotholes Borer Survey and Trapping Coordinator Hannah Vasilis, in a three-part video series about the biology, monitoring, and management of invasive shothole borers. Produced by Invasive Shothole Borers Communications Coordinator Randall Oliver, these videos aim to inform Californians of this harmful beetle, prevent their further spread, and provide instruction on management practices to keep trees alive. In *An Introduction to Invasive Shothole Borers*, Nobua-Behrmann and Kabashima introduce invasive shothole borers. They talk about beetle biology in the tree, why we should be concerned about it, and some brief trapping and management information. In *Trapping of Invasive Shothole* Borers, Nobua-Behrmann and Vasilis highlight two kinds of traps used to keep track of invasive shothole borers presence and numbers. Although visual inspections are best, traps are useful where routine visual inspections are difficult. A plant-based pheromone, quercivorol, is used to lure beetles to the traps. Learn how to handle the lures properly and the best location to place traps. Prevention, pruning, and chemical control of invasive shothole borers are discussed in the video *Management of Invasive Shothole Borers*. Vasilis goes through management options and considerations. Vasilis also teaches about amplifier trees, which are heavily infested trees that can spread beetles and fungi to nearby trees. When amplifier trees are removed, lightly and moderately infested trees in the same area can survive.

**Colorado**

Colorado State IPM Team participates in regional activities in collaboration with Kansas State University and University of Wyoming to advance IPM implementation in wheat and alfalfa. These collaborations have resulted in leveraging grant funds and Extension/outreach publications and events across the regions. We are also involved in NCERA 224, a multi-state working group focused on IPM of ornamental crops, and w multi-state working group focused on hemp pest suppression.

**Hawaii**

University of Hawaii enhanced collaboration and outputs through USDA-APHIS multistate grants in collaboration with University of Florida on the:

- post-harvest methods of managing pineapple mealybug,
- Surveillance of Giant African Snail through Dog Detection
- Development of protein lure for oriental fruit fly

University of Hawaii also produced IPM extension materials for producers of multi-state (CA, FL, MI) crops including:

- Hollyhock thrips on hibiscus
- Diseases and Management in Protea
- Western Flower thrips progress in IPM
- Eucalyptus tortoise beetle survey
- Chinese rose beetle damage to four varieties of Myrtaceae

University of Hawaii – most team members are in active collaboration with other states on regional and federal grant teams including USDA NIFA Specialty Crop Block projects, USDA-NIFA-PPQ projects, and NRCS CIG projects.

**Idaho**

- Each year, University of Idaho, Washington State University and Oregon State University collaborate to update regional pest management handbooks. Annual updates were completed in March of 2022 and 2023. Updates lead by University of Idaho faculty and staff included: insect pests of sugar beet, sugar beet grown for seed, and table beet grown for seed; insect pests of dry edible and seed pea; weeds in potatoes, oats, dry beans, sugar beets, alfalfa seed, forage alfalfa, grass hay, clover seed, non-cropland areas, pasture and rangeland; and the pesticide safety portion of the handbooks.
- Revisions to the Pest Management Strategic Plan for Sugar Beet Production in Western United States have begun, with a meeting to be held in December 2023.
- The Pacific Northwest (PNW) Pest Alert Network website was updated and maintained during this reporting period. This network notifies users across Idaho, Oregon, and Washington of pest observations and outbreaks and when management actions are recommended. This network, which has over 4000 subscribers, also is key in advertising educational conferences, field days, and other events.
- The educational boardgame Pest Friends, which teaches IPM principles, has been a well-received resource. In this board game, participants make management decisions and learn about their implications through their successes and failures in the game's crop management scenario. This game demonstrates the importance of scouting, understanding the dynamics between pest and beneficial insects, and the potential implications of failing to understand and follow pesticide label instructions.
- In a collaborative effort with Montana State University (MSU), Utah State University, University of Nevada, University of Idaho IPM delivers the Multistate "Cultivating Healthy Plants" seminar series where applicator recertification credits are also offered. This well-received seminar series was led by Nevada in 2022-23 and is currently being hosted by Idaho in 2023-24.
- An online program was created to help educate Spanish-speaking workers in the potato industry. A collaborative effort of UI faculty and staff, and experts in Mexico, this program allowed participants to log on to watch educational videos, learn about new research, and ask questions of experts. All material was provided in Spanish and Spanish translation was provided for non-Spanish speaking experts. Videos with English overdubbed are also hosted on the UI website.

**Nevada**

- Hosted and collaborated with Utah State University, University of Idaho, and Montana State University to provide a monthly IPM Cultivating Healthy Plants webinar series for Green Industry professionals and Master Gardeners
- Eight (8) collaborative IPM webinars were provided within the reporting period; 7 provided Pesticide Applicator CEUs. 1,474 unique viewers attended these webinars: 98% reported improved knowledge as a result of attendance, and 93% intend to use at least one of the recommended strategies. There were also 1,842 recording views after the live webinar.

**New Mexico**

- Kerns D, Pierce J, and P. Ellsworth. 2023 Evaluation of a population of southwestern corn borer, *Diatraea grandiosella* for resistance to Bt proteins. (regional project in NM, AZ and TX)
- Alana Jacobson, J. Pierce and P. Lujan etc al. Cotton leafroll dwarf virus survey in the US (we provided NM samples from around the state)
- NMSU Plant Diagnostic Clinic worked and collaborated with labs and diagnosticians in multiple states to help with pest ID and provide education to various stakeholders.
- Provided multiple presentations and field weed ID and management educational tips to attendees of the 29th Annual Noxious Weeds Short Course in Farmington, NM that is open to attendees and land managers/licensed pesticide applicators within the area of the four corners (NM, AZ, UT, CO).
- Conducted a study in partnership with Oregon State University to evaluate the efficacy of alternative herbicide active ingredients for organic weed control in landscape systems. We are currently writing the journal publication discussing the results.
- Journal publication in partnership with Purdue University: Amgain, N., L. Beck, A. Patton (2023) Ground ivy (Glechoma hederacea) control with boron and iron in Kentucky bluegrass turf. Agrosystems, Geosciences & Environment. https://doi.org/10.1002/agg2.20411.
- Western Pecan Growers Association: Online webinar discussing regional diseases of pecan trees.
- Hosted and collaborated with Utah State Extension Plant Pathologist to identify challenging pathogens affecting urban trees in NM.
- Arizona Pecan Growers Association: In person conference discussing regional new and emerging diseases of pecan trees
- Identified weed specimens submitted to the NMSU Plant Diagnostic Clinic (1 of 6 Star-D Accredited diagnostic labs in the US) for county agents and clientele in 22 different counties in the state of NM, and 2 counties in the state of TX.
- 32 Master Gardeners presentations in NM and TX focusing on weed identification and management. When weather and climate permitted, attendees also participated in weed identification tours in the field to help with ID skills and discuss IPM-based management options.
- 36 CEU-based trainings to help pesticide applicators throughout numerous states (NM, TX, AZ, CO, and UT) maintain their applicator's licenses and provide IPM-based management strategies for more successful and sustainable weed control.

- 13 guest lectures for classes and labs where the subject was IPM-based weed identification and management on campus at NMSU and Kentucky
- Identified 764 Nematode specimens submitted to NMSU, a USDA certified containment facility and a USDA P526 diagnostic permit for the USA. Samples came from NM, AZ, TX, NV, UT as well as the Navajo Nation.
- Soum, S et al. Screening of commercially available cotton seed for resistance to Verticillium wilt (Project is a regional project in conjunction with Texas A & M University)

**Montana**

- Added 7 sites to Utah State University climate-based pest monitoring service. The service allows fruit growers to time pest management in a variety of fruits to improve efficacy and reduce pesticide use.
- The Schutter diagnostic lab received samples from 51 of 56 counties and reservation offices in Montana and 4 additional states - North Carolina, North Dakota, Idaho, and Colorado. 81% percent of the sample diagnoses were associated with a weed, disease, or pest, while 19% of the diagnoses were from abiotic causes (i.e., winter injury, nutrient imbalance, suspected herbicide injury, drought, or cultural problems).
- Cultivating Healthy Plant webinar, Utah, Idaho, Nevada. Multi-state cooperative live presentations had 1, 474 in live viewers, and webinars and recorded presentations had 966 additional views.
- IPM team members shared IPM information on pulse crops in the Pulse Crop Working group with participants from South Carolina, Pennsylvania, North Dakota, South Dakota, Washington
- Work with weed scientists in North Dakota on early detection and rapid response to Palmer amaranth

**Oregon**

Oregon State University School IPM Program collaborated with University of Arizona Department of Entomology Public Health IPM Specialist Dawn Gouge to create three state Extension newsletter (peer reviewed) and one state Extension publication (peer reviewed) which led to two regional Extension publications (peer reviewed/refereed) one journal article, and one international webinar.

**Washington**

- Areawide weed management in small grains across ID MT OR WA
- Collaboration on tree fruit IPM regionally and nationwide
- Hop IPM collaboration in WA, OR, ID and in the Great Lakes states, including USDA NIFA SCRI project, Enhancing Supply Chain Sustainability and Global Competitiveness for Pacific Northwest Hops (Year 2 of 4)
- Presentations on balancing pest control with pollinator protection in alfalfa grown for seed in CA CO MT NV OR WA WY
- USDA NIFA project on fungicide resistance (FRAME Networks) in wine, table, and raisin grapes in CA GA MI NY OH OR UT WA

- Year 4 of 5 for USDA NIFA Stop The Rot: Combating Onion Bacterial Diseases with Pathogenomic Tools and Enhanced Management Strategies, includes CA GA ID MI NM NY OR PA TX UT WA

**OBJECTIVE 4: IMPROVE COORDINATION OF IPM PROGRAMS THAT ADDRESS ON-GOING, EMERGING AND OTHER CRITICAL PEST AND RELATED ENVIRONMENTAL ISSUES.**

**Alaska**
Dr. Matney hosted the Annual WERA-1017 Meeting in Homer, Alaska and provide discussion and field tours around Alaska agriculture and pest projects. Alaska also hosted the Western IPM Center Advisory Committee Meeting in June of 2023. Lastly, we included pesticide safety educators from the Oregon IPM Center and the Oregon State University Department of Horticulture in our Annual Certified Pesticide Applicators Workshop in 2023.

**Arizona**
The work of WERA-1017 is important because it brings together IPM Coordinators who manage independent IPM programs from many states. While all programs receive some base funding from USDA-NIFA's Extension Implementation Program (EIP), programs have different organizational structures and address unique IPM priorities specific to each state. The opportunity to share information, ideas, resources and outcomes helps to invigorate and inspire individual state programs which, without this Regional Coordinating Committee, would be operating largely in isolation. Our report has provided examples of WERA-1017 interactions that have inspired collaborative research and outreach which have strengthened the programs of all participating states. So many common issues impact us all: invasive species, pesticide resistance, fostering adoption of IPM and documenting its impact. These annual meetings and resultant collaborations make us more than a scattered and disconnected collection of Extension IPM Programs, they facilitate a vibrant network that is vitally important to the continuity and impact of regional and national IPM outcomes. This network is of particular importance because it allows veteran IPM personnel with long-standing programs and experience to support incoming IPM Coordinators, who often have little if any information from their own institutions about how to build effective, state based IPM programs.

**California**
Once-controlled citrus mealybug emerges as pest of citrus in the San Joaquin Valley: In July 2022, Sandipa Gautam had just started as the area IPM advisor in the San Joaquin Valley when the emails and phone calls started coming in. Pest control advisers were seeing citrus mealybug problems, which was unusual, and calling for advice. Once established, citrus mealybug is hard to control. It affects every variety of citrus and eats almost every part of the plant. Citrus mealybug is not a new pest, having first been reported in California in 1900, and has historically been controlled by natural predators. So why is it now an emerging problem? "We don't have a clear answer," says Gautam, but points to some possible factors: the deregistering of the organophosphate chlorpyrifos, which had been used to treat California red scale and may have kept mealybug numbers down; the reduced use of systemic pesticides; or the broad-spectrum pesticides used to treat citrus thrips the year before may have killed the natural enemies of

mealybugs. To address the problem, Gautam looked at pest biology, scouting and monitoring, seasonal phenology, and chemical control options. She emphasizes to actively scout for it and to look up. “Once it’s in the canopy, it’s everywhere.” The seasonal phenology of citrus mealybug is not well understood, but to start developing IPM solutions, Gautam needed to know their movement patterns, and how many generations there are per season, especially in the Central Valley. According to Gautam, “Like any scale insect, citrus mealy bug is easier to treat when it is moving, or when it is young, without its protective waxy coating.” Also, knowing when egg sacs may be present helps time the release of the mealybug destroyer predator that feeds on them. For chemical control, Gautam conducted a field trial of 13 pesticides registered for citrus. “All treatments had significant effects on mealybug populations compared to [the untreated groups], especially in the first week,” reports Gautam on the initial results of the trial.

Which California Pest Control License Do I Need? The pest management professionals responsible for safely and effectively treating pests fulfill more education and training requirements toward their licenses than the public may realize. And figuring out which license to get can be confusing because of the range of pests, sites, licenses, and agencies. To make it easier for people get licensed and get working, UC IPM Area Advisor Siavash Taravati created a simple online tool: the *Key to California Individual Pest Control Licenses*. The California Department of Pesticide Regulation (DPR) issues various licenses to control pests in the landscape, on farms and farm animals, around roads and railroads, and on golf courses, sewer systems, water bodies, and forests. The California Structural Pest Control Board (SPCB) issues licenses for treating pests in structures such as residential buildings, offices, ships, airplanes, and theaters. And the California Department of Public Health (CDPH) issues licenses for controlling pests of public health importance such as mosquitoes, ticks, and fleas. The *Key to California Individual Pest Control Licenses* poses a series of questions about someone’s work goals that narrow down the choices toward the required license and agency.

UC IPM Collaborates with Community Alliance with Family Farmers to Increase Adoption of IPM Strategies in Walnut Orchards: Navel orangeworm, codling moth, and webspinning spider mites remain harmful pests facing walnut growers and require continual study toward better IPM management strategies. Equally important is for UC IPM to share research outcomes with growers to inspire adoption of those strategies. This means academics, in this case Area IPM Advisor Jhalendra Rijal, and growers working together. The goal of the Community Alliance with Family Farmers (CAFF) and UC IPM Collaborative Demonstration Project is to “increase the adoption of innovative alternative practices to pest management in walnuts” by conducting applied research-cum-demonstration trials. This work exemplifies the long history of UC IPM advisors collaborating with innovative growers and nonprofits on research and on delivering practical IPM information to growers and other stakeholders—who in turn share best practices with others. Since 2020, over 300 people have attended the project’s field days at small-family walnut orchards.

New Rice Rotation Calculator: As the number of challenges related to climate change, weeds, and other economic issues increases, crop rotation may become an important practice for California rice growers. Rice growers rotate from one crop to another to disrupt pest lifecycles,

prevent pesticide resistance, and broaden the toolbox of pesticides that can be used in their field beyond what is available when growing rice. Crop rotation can also improve soil structure and nutrient uptake by the crop. The decision to rotate from rice to another crop depends on potential profitability, which is calculated based on chosen production practices and their associated costs. The calculations that inform this decision are complex and time-consuming. To assist growers in their decision-making process, Sara Rosenberg, a UC Davis graduate student, and UC Cooperative Extension Advisor Whitney Brim-DeForest developed the *Rice Rotation Calculator*. The online tool compares the profits of rotating from rice to tomato, sunflower, safflower, or beans. Users adjust values based on their own farm costs to calculate the costs and benefits of switching over to a rotational crop compared to staying with rice production. UC Davis Department of Agricultural and Resource Economics and UC Cooperative Extension cost and return studies and focus group interviews formed the foundation for the *Rice Rotation Calculator*.

New webinar topics and crops in 2022: In 2022, the UC Ag Experts Talk webinar series continued to expand beyond production agriculture citrus and tropical tree crops. Notably, were webinars about managing pests in vegetable crops. Topics included managing downy mildew, viruses in vegetable crops, and diseases in processing tomato. UC IPM also expanded beyond insect and disease pests to webinars on vertebrate pest management and weed control in noncrop and natural areas. Responding to a problem that has emerged over the past two or three years, one webinar covered mealybugs in citrus. And conversations about nut crops continued with a webinar on the management of nematodes: plant-parasitic nematode biology, feeding habits, and host range; monitoring; soil sampling; and management options such as rootstocks, pre-plant soil treatments, and post-plant remedies. For urban and community IPM, the new year started with a webinar titled, “New Year, New Pests,” the first in a ten-webinar series. Pests covered in 2022 included insects (bed bugs, termites), vertebrate animals (squirrels), invasive species, weeds, and spiders. Timely webinars talked about pesticides and the protection of water quality, as well as the use of disinfectants and wipes, and whether these commonly used cleaning tools are considered pesticides or not. View a recording on the UC IPM YouTube channel.

**Colorado**

- CSU joined the national GROW (Getting Rid of Weeds) USDA Areawide 5-year project to conduct chaff lining research and demonstration trials in dryland wheat.
- The CSU Team work focused on agricultural insect pests contributed to: 1) increased knowledge of the incidence and severity of wheat stem sawfly infestations in the state, and increased knowledge of the timing of greatest risk for alfalfa weevil injury to alfalfa, 2) increased adoption of resistant varieties of wheat to suppress wheat stem sawfly, and 3) greater adoption of biological control to manage wheat stem sawfly.
- The project focused on applied research and extension to suppress an emerging pest in quinoa includes university researchers from Colorado and Washington, and will ensure communication of outcomes and facilitate implementation of appropriate IPM tactics.

**Hawaii**

- University of Hawaii team participated as advisors on the following associations and Invasive species working groups: Hawaii floriculture and nursery association (HFNA), Hawaii export nursery association (HENA), Orchid growers of Hawaii association (OGOH), and Hawaii tropical flower council (HTFC), Hawaii Macadamia nut association (HMNA), and Hawaii coffee association (HCA). This involvement has improved coordination of IPM programs.
- University of Hawaii's improved surveillance and expansion of IPM for invasive two-lined spittle bug through the development of two-lined spittlebug app, currently available in app stores. This tool includes identification, reporting, management guide decisions.
- Continued surveillance and publication of peer-reviewed papers on the distribution of new invasive species: Ramie moth. Concern over displaying native butterfly that feeds on native Māmaki plant. Team has distributed factsheets, presentations to stakeholders and assessed management options.
- University of Hawaii's involvement in multi-state collaboration of MyIPM is live and has over 151 downloads, across 10 countries, although 97% of the downloads are in the U.S.
- University of Hawaii has improved accessibility; uses data from multiple sources (e.g. scanned slides, online CTAHR image resources, pest management recommendations) to inform new data-based website. This website has improved appearance and navigability.

**Idaho**

- Palouse Annual Pollinator Summit was held on March 1-2, 2023. This event educated attendees on pollinator health and protection.
- Intermountain West In-Service IPM Workshops for County Educators were held in Sandpoint Idaho September 19-20, 2022. Educators from 10 counties were in attendance, and presenters covered IPM-related topics including: native bee keeping, biocontrol, tree health, soil health, organic techniques, and pesticide toxicology and residues.
- The IPM Extension Implementation Program grant supports mini grants for research and extension outreach efforts associated with emerging pests in Idaho. Understanding thrips in alfalfa, and developing economic thresholds for them, have been a key focus of these mini grants.
- A publication "Red Fire Bug — A New Idaho Invader?" discussing *Pyrrhocoris apterus* (Heteroptera: Pyrrhocoridae), came out in March 2022 and aims to profile the recent invasive pest, assist in identification, and provide management advice.
- The publication "Meadow Voles and Pocket Gophers: Management in Lawns, Gardens, and Croplands" highlights this emerging pest problem and recommends IPM tactics.
- Information on thrips, flea beetle, meadow vole, pocket gopher, and grasshopper management was highlighted on the UI IPM website, as these pests have been of increasing concern in Idaho in recent years.

**Nevada**

We completed a Statewide Needs Assessment for Agriculture, Horticulture, Natural Resources & Environment. It will result in a better coordination of ongoing IPM programs within the state. Some key findings that relate to IPM include:

- Drought conditions and higher temperature trends are impacting water supplies and leading to drought-stress and pest issues in plants throughout the state, both for urban and agriculture settings
- Increased wildfire frequency and soil erosion are of concern
- Lack of sufficient cold winters is affecting insect life-cycles
- Weeds are a high concern, with cheatgrass, Medusa head and Russian knapweed being the weeds with the highest economic impact

**New Mexico**

- Kerns D, Pierce J, and P. Ellsworth. 2023 Evaluation of a population of southwestern corn borer, *Diatraea grandiosella* for resistance to Bt proteins. (regional project in NM, AZ and TX)
- Pierce, J and P. Lujan. 2023. Working with Alana Jacobson Auburn University to determine spread of cotton leafroll dwarf virus in US by sampling in NM
- Kerns, D, J Pierce et al. 2022 Resistance to pyrethroid insecticides in *Helicoverpa zea* in Texas and NM.
- Pierce, J and P Monk. 2022-2023. Biological control of pecan weevil (project aimed at reducing populations of invasive pecan weevil in urban areas where control in home gardens is more difficult than commercial orchards) Pecan weevil is moving into NM from Texas. Eradication programs are in place but are particularly difficult to implement in urban areas.
- WSARE training: Participated in the Western Sustainable Agriculture Research and Education 3-day workshop with a presentation on how to collect diseased specimens for better identification and diagnosis.
- Hosted and collaborated with Utah State Extension Plant Pathologist to identify challenging pathogens affecting urban trees and how to implement IPM to address them.
- Western Pecan Growers Association: Online webinar discussing regional diseases of pecan trees.
- Arizona Pecan Growers Association: In person conference discussing regional new and emerging diseases of pecan trees.
- Partner with the New Mexico Department of Agriculture with a Cooperative Agricultural Pest Survey (CAPS) which targets exotic plant diseases identified as threats to US agriculture.
- $8^{th}$-$29^{th}$ Annual Noxious Weeds Short Course
- Participated in Western SARE training to provide a field tour and educational materials for IPM-based organic weed management and identification
- Partnered with the New Mexico Department of Agriculture in 2023 to make an emergency addition to the official State of New Mexico Noxious Weeds list to reflect the arrival and impacts of a new weed located in NM for the first time.

**Montana**

- Palmer amaranth task force is led by IPM team members. We found the first population in a field, coordinated with North Dakota.
- First reports of marmorated stink bug which is being monitored.

**Oregon**

- Oregon State University School IPM Program worked with University of Arizona Department of Entomology Public Health IPM Specialist Dawn Gouge to create and share multiple Extension publications, which led to an invite by the U.S. EPA to co-present at an international webinar on flies of public health significance.
- Oregon State University School IPM Program supported an OSU Turf Management Program Post-Doc to conduct research on the effectiveness and environmental impacts of organic and very-low-impact herbicides as alternatives to glyphosate, in collaboration with New Mexico State University.

**Washington**

- In cooperation with Washington and Oregon state departments of agriculture, provided information including two video productions on the invasive spotted lanternfly and its preferred host, tree of heaven
- Published extension and journal articles and conducted training sessions throughout the region on indoor queen banking as a pest management and overall health promotion strategy for honey bees
- Expanded pear growers' IPM toolkit on longstanding pest pear psylla with research and outreach on using kaolin clay, reflective plastic mulch, and acoustic disruption
- Expanded alfalfa seed growers' IPM toolkit on longstanding pest Lygus bug with research and outreach on physical barriers and border effects from alfalfa grown for forage
- Expanded wine grape growers' IPM toolkit on longstanding pest grape mealybug (vector of grapevine leafroll disease) with research and outreach on mating disruption and longstanding disease powdery mildew via use of ultraviolet light
- Conducted outreach specifically focused on invasive pests in tree fruit, including the paradigm that invasive species are the new normal for orchard management
- Addressed both ongoing and emerging weed issues in wheat and small grains across the region, including cooperative presentations at the Western Society of Weed Science

**IMPACTS**

**Arizona**

- Cotton IPM Program Saves Growers Money While Protecting the Environment. The UA Cotton IPM program has supported development & adoption of reduced risk practices and technologies that have saved growers over $600M since 1996, averaging about $25M per year, and preventing over 40M pounds of insecticide active ingredient from reaching the environment (Fig. 1). Broad adoption of selective insecticides preserves

predators and reduces the need for more sprays (Fig. 2). Since 2020, more than 85% of all arthropod sprays in cotton have used fully selective materials. In 2022, growers averaged about 1.53 insecticide sprays season long. Over 33% of the state's upland cotton acreage did not receive a foliar spray for arthropod pests in 2022.

- Reducing Use of the Most Hazardous Pesticides in U.S Cotton. In a project funded by Better Cotton Initiative (BCI) in 2022, we analyzed use of 7 highly hazardous insecticides in cotton in Arizona, California, and the rest of the cottonbelt. Today less than 1% of Arizona's cotton acres make use of any of these highly hazardous pesticides targeted for elimination by Better Cotton's sustainability standards (Fig. 3). Our Cotton Insecticide Use Guidelines help growers select efficacious products that reduce risks to human health, pollinators and other non-target species.
  https://repository.arizona.edu/handle/10150/665532
- Developing IPM Solutions for Desert Adapted Crops to Address Climate Change. Water-strapped Central Arizona needs cropping alternatives that provide economic success for growers while also reducing greenhouse gas emissions and water use. Guayule is a desert-adapted shrub grown for rubber production and other uses, currently in development by Bridgestone America. Guayule's potential as a low water use alternative to traditional field crops could provide climate benefits in carbon sequestration, reduced greenhouse gas emissions, reduced tillage and lower insecticide use. However, guayule seedlings are vulnerable to attack by the large flea beetle, *Systena blanda*, which can kill plants and significantly reduce stands. The Ellsworth lab conducted research that led to the development of a seed treatment that limits losses to this flea beetle and supported its registration under the Arizona Special Local Needs program. Recently, his program contributed to the successful awarding of a USDA Climate Smart grant to the University of Arizona. This $70M grant will help incentivize the uptake by growers of this climate-smart crop on at least 4,000 acres in central Arizona over the next five years and likely more than 25,000 acres over the next ten years.
- Vegetable IPM Program Saves Growers Money While Protecting the Environment. The Vegetable IPM program has facilitated a shift in the industry from broad-spectrum insecticides in the 1990s and early 2000s to selective materials which pose fewer risks to people and the environment. For example, with the exception of pyrethroids, broad spectrum and broadly toxic insecticides have been all but eliminated on head lettuce (Figs. 4 & 5), where selective reduced risk materials now account for over 60% of all reported insecticide sprays. Adoption of reduced-risk IPM strategies saved average grower operations an estimated $480k to $1.5mil annually in insect management costs.
- Public Health IPM Impacts Tribal Communities. Arizona is home to 22 tribal nations, more than any other state. Many tribal members live in remote areas with minimal access to medical facilities and advice and are particularly vulnerable to public health threats. Since 2018, the Public Health IPM team has partnered with 15 of Arizona's federally recognized Native American Nations and has reached nearly 250,000 residents on 42,604 square miles of reservation lands with science-based outreach.
- School IPM Provides Solutions for Tribal Communities. Our outreach has been impactful across many tribal communities. A member of the Inter Tribal Council of Arizona (ITCA) said of our programs: *"The biggest impact is that our [members] want to learn more.*

*They want to expand it to other communities, not just in schools, but in homes. People want more education and assistance on implementing more of these principles."*

- Tick Management Program Across Arizona-Mexico Tribal Communities. A recent grant-funded project led by Dr. Kathleen Walker focused on developing a sustainable tick surveillance program to combat Rocky Mountain spotted fever (RMSF), a serious disease transmitted by the brown dog tick. Since 2002, there have been more than 375 human cases of RMSF with 21 fatalities, mostly children, in tribal communities in Arizona and many more in Mexico. Over the years of the project (2020 to 2023), partners at the Tohono O'odham Nation (TON) Vet Clinic, TON Community Health and the University of Arizona Department of Entomology have established an annual mobile rabies vaccination and tick prevention clinic that visits every village in the Nation. Over 5,000 animals have been vaccinated and treated with tick preventatives, and many have received treatment for other diseases such as mange and parvo. Both the mobile clinics and the UA/TON partnership are continuing with funds from additional grants and support from TON Council. In addition, Walker and team were awarded a $500,000 grant from the Centers for Disease Control to conduct statewide assessment of ticks and tick-borne diseases. This successful program was recently featured in a full-length article in the Washington Post. https://www.washingtonpost.com/health/interactive/2023/tick-diseases-rocky-mountain-spotted-fever/
- Impacting IPM and Pesticide Regulatory Policy. As part of our Western IPM Center (WIPMC) Signature Program, we provide expert testimony (comments) on pesticide regulatory reviews and IPM issues of importance to agricultural stakeholders. We are one of several subregions that submit on behalf of the WIPMC. A new evaluation of 85 comments submitted to EPA between 2012 and 2021 showed that 90% of submitted comments provided substantive data that were considered in EPA's registration review process. This included 20% of comments for which the EPA revised risk models or altered proposed decisions in ways that addressed grower needs while mitigating risks to protect public health and the environment. (Hong & Fournier 2022, Fig. 6).

**California**

- Developing a national strategic plan for publicly funded IPM programs: As a result of this strategic planning process, state and territory IPM programs at Land-grant universities are beginning to understand that they are a unified enterprise with common goals and not a collection of separate programs competing for federal grant support.
- Incorporating IPM in climate resilience and climate change mitigation planning: This effort is still in the early stages, but the projected outcome is recognition of the value of IPM practices in climate resilience and climate change mitigation. This would result in inclusion of IPM practices in Natural Resource Conservation Service climate mitigation practices and potentially, inclusion of IPM practices in carbon offset and carbon sequestration markets.
- Improving communication of farming to the general public: The intended outcome of this project is adoption of the communication strategies by agricultural communicators, which will contribute to greater public understanding of farming and support for policies to promote good farming practices.

- Once-controlled citrus mealybug emerges as pest of citrus in the San Joaquin Valley: Now citrus growers in the San Joaquin Valley have guidance for this emerging pest problem. Increased awareness of the pest could lead to more or better-timed monitoring, such that the younger, mobile stage of the pest is targeted for control. Preventing high pest numbers may reduce the need for pest control advisers or growers to reduce pest numbers quickly, which often involves the use of pesticides. The phenology of the pest is important for knowing when management practices will be most successful and can form the basis for developing a degree-day model for formal management timing. Knowing the biology and phenology of citrus mealybug leads to the development of potential cultural control practices and finding natural enemies that may assist with lowering pest numbers, and thus reducing the economic harm of citrus mealybug to citrus growers in California.
- Which California pest control license do I need? Now pest professionals or pesticide salespeople seeking licenses can clearly and quickly determine which license they need and from which agency, along with the links to get started. It is anticipated that the key can increase workforce retention and competency, thus developing a qualified workforce in California. With qualified pest management professionals providing services, we anticipate this will lead to increased ecological sustainability of agriculture, landscapes, and forestry (protecting California's natural resources) and improved health for all.
- UC IPM Collaborates with Community Alliance with Family Farmers to Increase Adoption of IPM Strategies in Walnut Orchards: The anticipated impact is increased exchange of IPM information, with increased awareness of new IPM research results. There could be an increase in IPM adoption as growers and pest control advisers try new practices and share information with others about what works.
- New Rice Rotation Calculator: It is anticipated that users of the *Rice Rotation Calculator* will make personalized decisions on whether to rotate from rice. Using the *Calculator* can help growers understand how certain crop production variables inform their decision to rotate or not. Increased crop rotation can prevent invertebrates, vertebrates, diseases, and weeds from reducing crop yields. Crop rotation changes the chemicals used against pests and mitigates the development of pesticide resistance.
- New webinar topics and crops in 2022: Hosting webinars follows the UC IPM philosophy of providing IPM information where people are and in the way they like to learn. Webinars enabled UC IPM to reach people in locations far away from the speaker (multi-state and multi-country). This year, emerging issues were covered in a timely manner, such as mealybugs in citrus and the new regulations around the use of disinfectants. UC IPM webinars increase knowledge of IPM practices and the number of people that adopt IPM practices.
- Keeping track of invasive shothole borers can help lightly to moderately infested trees survive: The three videos aim to inform Californians of this harmful beetle, prevent their further spread, and provide instruction on management practices to keep trees alive.

**Colorado**

- Our central website for Colorado Center for Sustainable Pest Management consolidates and organizes available and new IPM resources for stakeholders, facilitating sharing of resources and information.
- Improved communication with growers, master gardeners, general public through a central site connecting all relevant resources focused on IPM implementation.
- The Colorado Center for Sustainable Pest Management website averages over 900 events each month, highlighting its relevance to the stakeholders.
- Increasing IPM knowledge through education programming for Master Gardeners and extension and crop specialists.
- Improved diagnostic service access through a change in location and facilitating diverse educational activities.

**Hawaii**

- WERA 1017 has helped increase inter-state collaboration, exchange of ideas and progress of IPM techniques and tools. It has contributed to obtaining additional grants and funding for applied research and outreach programs focused on enhancing IPM.
- Post education surveys from Extension Field Days showed 100% of participants reported the or
- Over 151 downloads from MyIPM app. Reaching across state-lines.
- Increased surveillance of new invasive species due to extension activities, needs assessments, farm visits, and collaborations with local and state governments and invasive species groups.
- Earlier detection and rapid response to new pest introductions due to tight network of researchers, growers, NGOs, and politicians and inter-state collaborations.
- Reaching historically underserved producers through a wide range of IPM efforts.

**Idaho**

- The UI IPM made over 20,505 teaching and engagement direct contacts concerning IPM during this reporting period. Together, team members engaged in 8,900 teaching and engagement contact hours.
- The UI IPM team made over 893,431 indirect contacts, teaching a wide variety of audiences about pest management via email, online posts and publications, newsletters, social media, and print media.
- The PNW Pest Alert Network is a top-rated source among Idaho producers, with a total of 4,070 subscribers. Of these subscribers, 2,311 are signed up for crop alerts, 56 for small farm alerts, and 2,834 for gardening and landscape alerts. According to the 2022 survey of producers, as a result of PNW Pest Alert Network alerts, 34% are applying less pesticide and 34% are spending less time on pest management issues. According to the 2022 survey for Garden and Landscape users of the PNW Pest Network Alerts 50% applied less pesticide and 72% managed pests more effectively. Users indicated a wide variety of uses and impacts including using the alert system to guide pest management decisions (66% of respondents), alerting users to pest presence and activity (91% of respondents), preventing pest outbreaks (80% of respondents), sharing information with

others (77% of respondents), and attending a talk or meeting because of an announcement made through the network (73% of respondents).

- The educational board game Pest Friends has been played by over 500 individuals. In surveys from 55 players, 100% indicated that this training was more engaging than a traditional training on pest management, 90% agreed that they learned more by playing the game than they would have from traditional training, and 63% indicated that they planned to change their pest management strategies because of their experience. The game is now incorporated into IPM curriculum at the University of Idaho, University of California Riverside, Texas A&M University, and the College of Southern Idaho, and will be presented at train-the-trainer events in Alaska, Montana, Hawaii, and Utah in 2023.
- Pre-license education for pesticide safety has been delivered in-person to 117 participants state-wide. In addition, the UI Extension Idaho Pesticide Applicator Core Training housed on the national Extension Foundation course site had 49 users during this reporting period.
- The Idaho Pest Monitoring Dashboard provides users with access to up-to-date monitoring information concerning key pests and provides recommendations for management actions. Between 2/1/2023 (when analytics were launched) and 9/7/2023 the site received over 1,400 views.
- During this reporting period, the University of Idaho IPM site had over 6,447 users with a combined 8,966 sessions spread across its various resources.
- Other top resources hosted by the University of Idaho webpage included:
    - The landscapes and gardens page with over 11,700 users and 23,200 page views.
    - Publications concerning crop production and agriculture, which combined had over 3,400 users and 9,500 page views during this reporting period.
- Survey results from the 2022 University of Idaho Potato Conference IPM talks showed a significant increase in participant knowledge surrounding IPM (39 respondents, paired sample t-test, $p = 0.001$). Respondents pre- and posttest understanding scores showed increased understanding of herbicide resistance (23%), fungicide resistance (27%), insecticide resistance (22%), and IPM and UI resources (25%). Respondents reported that they planned on changing the following practices as a result of their participation in the program: Change product each application, watch resistance better, change mode of action, rotate active ingredients, crop rotation, apply IPM practices in crops, and consult a professional.
- During this reporting cycle 175 new Master Gardeners were trained, and 88 Advanced Master Gardeners continued their training and service, surpassing our total goal of 250. Statewide, these Master Gardeners devoted over 11,814 hours of volunteer service to teaching courses at libraries, schools, and senior homes, assisting city parks with plant maintenance, and maintaining demonstration and display gardens. Across the state, Master Gardeners ran hundreds of community events, extending the reach of UI Extension Education and proving a valuable resource to the general public.
- The University of Idaho pesticide safety education team has trained 249 participants in person and 721 participants through webinars.

- The Parma Cocoon Testing Laboratory processed and analyzed 50 leafcutter bee populations from alfalfa growers throughout the Pacific Northwest.

- Cereals schools were held across the state. In the southeast of Idaho, schools were held in 6 locations, across which there were 241 participants. Survey results showed a significant increase in participants' knowledge of differences in grain drills, nitrogen fertility, precision ag technology, weed control, and the new pesticide recertification program in Idaho. Of 64 survey respondents, 32 were farmers who collectively managed 66,489 acres. These participants estimated they would save $229,425 due to implementation of what they learned at UI Cereals Schools.
- The Ag Talk Tuesday virtual series had an attendance of 226 individuals over 7 sessions. Attendees reported increased knowledge (96%) and gained useful knowledge for their professions (96%). Together attendees manage over 66,500 acres of Idaho farmland.
- The online program created to help educate Spanish-speaking workers in the potato industry was attended by 48 individuals, the majority of whom were native Spanish-speaking agricultural workers.
- Over 1,392 children across nine sites in southcentral Idaho were engaged in gardening activities designed to boost science learning, teamwork, healthy eating, and social skills in afterschool and childcare settings.
- Idaho Rangeland Livestock Symposium had 150 in-person and 45 registered Zoom participants. Videos of the presentations have received over 250 views to-date.
- The Lemhi County Cattlemen's Winter School, which has included a noxious weed and pest management night since it began in 1970, was held in January 2023. Across 5 sessions, there were 140 participants. Survey respondents indicated increased knowledge concerning noxious weed identification (65%); control options (53%); biological control (50%); new invaders (50%); and invasive grasses (50%).
- As a direct result of the UI Extension Innovation Project concerning pollinator nectar resources, pollinator nectar resources are expected to increase by ~4-8 acres.
- Of students in Extension botany courses, comprised of MG students, adult gardening class students, and junior high and high school students, 90% felt that they gained valuable insight into plant structures that will assist them in making plant management decisions in the future.

**Nevada**

- Our intensive IPM educational efforts have resulted in a significant decrease in pesticide residues found in urban sites in Nevada (Huntington et al., 2020), despite a rise in population from 2.7 million in 2010 to 3.1 million in 2020 (U.S. Census Bureau, 2020).

**New Mexico**

- Biological Control has the potential to control many insect pests but is frequently undervalued. Control of insect eggs alone is often 80-90%when populations of predators are not disrupted by frequent insecticide applications. The ASC farm has maintained good control of alfalfa weevil with biological control for 20 years. Replicating this type of

control in just alfalfa and pecan will save growers $6.5 million per year in reduced losses and control costs.

- 108 contacts learned about beneficial insects through youth programs and camps across New Mexico (Anthony, NM; Aztec, NM; Belen, NM)
- 989 contacts learned about IPM programs and beneficial insects through public events (Bernalillo County, NM; San Juan County, NM; Valencia County, NM; San Miguel County, NM)
- Approximately 2,000 3rd graders learned of multiple agricultural educational programs and how pests impact their daily lives through the 2022 - 2023 AGventures Day at the Southern New Mexico State Fair field trip.
- Identified approximately 950 weed specimens submitted to the NMSU Plant Diagnostic Clinic from 2022-2023 (1 of 6 Star-D Accredited diagnostic labs in the US) for county agents and clientele in 22 different counties in the state of NM, and 2 counties in the state of TX.
- Approximately 7,000 contacts learned about weed identification and better/more sustainable management practices (e.g. IPM) annually through the educational content provided through the NMSU Extension Weed Science Program throughout the state of New Mexico and the Southwest.

**Montana**

2022 Pest Management Tour (10/3/2022 - 10/6/2022). The tour provided hands-on training and learning for attendees,who were given credits towards applicator certification/recertification. It was attended by 153 people over 4 days and 7 different locations. Average evaluations across all days and locations was 4.51 (out of 5) with an 27% improvement in knowledge. Total number of people reached by project: 223,206 (1 in 5 Montanans)

**Oregon**

- Oregon State University School IPM Program: Attendance at 22 hands-on school IPM coordinator training events held at different locations throughout the state was over 900, and included 99% of Oregon's 197 school districts. Training evaluation results indicated 90% intend to implement three or more IPM practices learned at the training.
- Oregon State University School IPM Program: Collaboration on state and regional Extension publications with Dawn Gouge, Public Health IPM Specialist at the University of Arizona Department of Entomology, led to an invite by U.S. EPA to co-present on flies of public health significance at an international webinar. There were 1,100 attendees from 48 states, plus Canada and 18 other countries. These included attendees from 129 schools / districts / universities / childcare centers representing 1.3 million students.
- Oregon State University School IPM Program: Oregon State University School IPM Program director was invited to provide expertise on two pieces of legislation related to IPM in schools, which resulted in significant amendments to Oregon Senate Bill 426 in 2023.
- Oregon State University School IPM Program: Oregon State University School IPM Program director co-authored a journal article directly aimed at increasing relevance of national policies and federal grant programs related to IPM implementation in schools.

"Improving Environmental Health in Schools", Current Problems in Pediatric and Adolescent Health Care. Vol. 53, Issue 4, is a result of years of collaboration and sharing amongst members of the National School IPM Steering Committee.

**Washington**

Extensive outreach and documented success in educating stakeholders about IPM, improving their familiarity with IPM concepts and application, and creating resources that promote IPM implementation throughout the region.