III. Program Summary Narrative

Introduction

I am an Area Integrated Pest Management (IPM) Advisor, serving California's northern San Joaquin Valley (San Joaquin, Stanislaus, and Merced counties). My working region – North San Joaquin Valley, is one of the most productive regions of the Central Valley of California, with a gross agricultural commodity value of over $10 billion annually. Three counties (i.e., San Joaquin, Stanislaus, and Merced) have >280,000 acres of almonds (~31% of the state total), >70,000 walnuts (~25% of the state total), and ~15000 acres of pistachios (USDA NASS 2020). Among tree fruits, cherries and canning peaches are two major ones. Other crops include grapes, tomatoes, and vegetables. Although my research program primarily focuses on the arthropod pest management of permanent crops in the area, as a regional representative of the UC Statewide IPM Program, I serve clientele in all IPM-related issues in the region. For example, for plant disease and weed control-related questions, I consult with other CE advisors and specialists and invite them to our IPM breakfast and field meetings to ensure that my clientele can obtain specific information from the experts. Pomology Farm advisors from all three counties have the background and experience in plant pathology. Recently, I have begun research in processing tomato on insect vector and the curly top virus diseases in collaboration with the local Vegetable Crop Advisor. We work in concert to address various plant diseases, weed, and other pest issues.

For establishing a robust IPM research and extension program, I set my program priorities based on clientele needs and ANR's Strategic Vision. I exhibited a strong collaboration with ANR and non-ANR colleagues, including out-of-state academics and extension professionals. This was possible with my involvement in 17 applied research and extension projects (PI/Co-PI in 15 projects, and collaborator in 2 projects) that include two multimillion-dollar projects funded by the national USDA-NIFA grant, four projects funded by the state agencies (CDFA, CDPR), and the rest funded by commodity boards and private industries. During 4 years at Associate Rank (Oct. 1, 2017, to Sept. 30, 2021), I gathered over $1 million in funding to support my program. Over four years, I organized and spoke at over 100 extension events, contributed 13 peer-reviewed and 88 extension articles that engaged over 15,000 clienteles. The overall goals of my program are to, 1) generate science-based knowledge on key arthropod pests and their effective management following the principles of Integrated Pest Management (IPM), and 2) extend the knowledge base to the clientele to implement improved pest management practices, which ultimately lead to changes in growers' behavior and increased adoption of best practices. Over 6 years of my career at UCANR, especially the last four years in Associate Rank, my program has strongly demonstrated a very positive trajectory in achieving my program goals. I witnessed significant improvements in pest management practices, which ultimately increased economic and environmental benefits to all Californians. My program contributed to multiple condition changes (CC), grouped under two of UCANR's public value statements: **1) Promoting economic prosperity in California (CC1:** increased agriculture and forestry efficiency and profitability)**,** and **2) Protecting California's natural resources** (**CC2:** increased ecological sustainability of agriculture, landscapes, and forestry; **CC3**: improved air quality).

Clientele group needs assessment is the backbone of the successful research and extension program. To build my IPM research program, from the beginning of my career at ANR, I actively

participated and engaged in a series of meetings with CE Specialists and Advisors; leaders of the allied local and state agencies; members of the production and research committees of crops such as almonds, walnuts, cherries, peaches, tomato; industry representatives; growers; and pest control advisors (PCAs). I also conducted a formal need assessment survey through which the highest number of participants (~39%) identified the navel orangeworm as the most significant pest problem, followed by mites (23% participants), plant and stink bugs (16% participants) in almonds. In the last 5 years, I have visited several walnuts orchards with this "new" issue of flatheaded borer causing significant crop damage and economic loss to many farmers, primarily in the northern San Joaquin Valley. This is most likely due to the recent drought and changing climate that California has faced in the last decade. One of the focuses of my current research program is related to the potential impacts of droughts and climate change in pest management to address these issues. A long-term vision of my IPM research and extension program can be summarized under three themes, **1)** *Tackling Endemic and Invasive Pests to Protect California Agriculture*, **2)** *Building Sustainable Agroecosystems Through Enhanced IPM*, and **3)** *Impacts of Droughts and Climate Change on Pests and Exploring Adaptation Measures*.

Theme #1: Tackling Endemic and Invasive Pests to Protect California Agriculture

Background, Clientele, Goals, Inputs

Background. Invasive insect pests are a constant threat to California agriculture - spotted wing drosophila and brown marmorated stink bug are some examples. In addition to the invasive pests, my research and extension program has focused on finding practical options to manage other endemic and resurgent crop pests to minimize the potential economic losses.

Clientele. My clientele includes orchard crop growers, PCA, local Cooperative Extension Advisors, and other allied industries, including private sectors and county and state agencies.

Goals. Understand the biology and behavior of invasive (i.e., brown marmorated stink bug, spotted wing drosophila) and endemic pests in order to develop effective monitoring, containment, and control practices for these pests.

Inputs. My team focused on the primary goal of understanding the pest's biology, exploring monitoring tools, and finding management solutions (see Project Summary Table). In the last five years, one of my impactful research was an invasive pest- brown marmorated stink bug (BMSB). BMSB has been a serious threat to major tree fruits and vegetable crops since its invasion in commercial orchards on the east coast, and apple growers in 3 states lost over $37 million just in one year. Brown marmorated stink bug is relatively new to California crops, first detected in 2016 in Stanislaus County. I had the opportunity to participate and lead in many aspects of BMSB research in crops in infested areas. I gathered funding from three sources (USDA NIFA SCRI multiyear grant, California Cling Peach Board, and Almond Board of California) and continue to work on this issue, as this pest is expanding its range and crop damage to more areas in California. The USDA-funded brown marmorated stink bug project was a multi-state project; therefore, multiple collaborators representing over 20 universities and other institutions nationwide were involved. Two years ago, California Pear Board requested my help to provide guidance to other UC advisors for BMSB monitoring in pear orchards outside of the tri-county

area because of my early experience working on this pest. I serve as a co-PI for the new round of national USDA-NIFA grant applications that is underway now.

My research on another invasive species, such as the spotted wing drosophila (SWD), the most critical pest issue for cherry growers, started in 2016 and continues with funding support from cherry growers via the California Cherry Board. Since invading California in 2008, SWD has become the most challenging pest for many soft fruits and berry crops throughout the U.S., including cherry growers in California. Recent study estimated about $500 economic loss by SWD in the United States. Repeated use of insecticides near harvest leads to increased insecticide residues exceeding the maximum residue limit (MRL). This condition can also increase the risk of pesticide resistance.

Research Results

I reported the first incidence of BMSB damage to the almond crop. The results from my report alerted industry clientele that almonds were the new host of BMSB. Since then, I determined the seasonal activity of the pest in peach and almond orchards, identified the extent of economic damage at different times of the year, and tested and recommended a practical and efficient version of the BMSB monitoring trap (sticky panel trap with a lure) and other scouting methods.

For SWD, we identified several neem-based insecticides with oviposition (i.e., egg-laying) deterrent activities. In a recent study, we found a newer insecticide, *cyclaniliprole,* showed good control of the adult flies. Both discoveries are critically important as two of these reduced-risk insecticides can be incorporated into the program to strengthen the SWD management program in cherry orchards.

Methods, Outcomes, and Impacts

Response to brown marmorated stink bug invasion in California's high-value crops:

Methods. After finding BMSB in orchards in California, we designed solutions-oriented research studies to understand the pest's biology in California, identify the most vulnerable crop stages, and explore monitoring and management tools. For that, we conducted several laboratory, semi-field, and field studies to answer some of the important questions about BMSB in the northern San Joaquin Valley.

Outcomes. Crop damage photos, videos, and data derived from our feeding study have been used in several extension articles, trade magazines, and other educational materials. With the increase of BMSB infestations in tree crops in the northern San Joaquin Valley, growers, and pest control advisers are utilizing the new information from my research to make BMSB scouting and treatment decisions. In the last 4 years, I educated 3945 clientele by giving 38 extension talks and reached over 15000 clienteles by contributing 17 extension articles on this topic. Also published 4 poster presentations, several media interviews, and two peer-reviewed articles.
I published comprehensive peer-reviewed guidelines for BMSB management in almonds (http://ipm.ucanr.edu/PMG/r3303211.html). In collaboration with the UC Statewide IPM Program, I recently published a video on monitoring BMSB in almond orchards, which appeared in My AgLife podcast to cover this topic and more.

Impacts. BMSB pest can impact over one million acres of almond production in California. In one almond orchard in the 2019 season, a grower lost ~25% of his almond orchard (100 acres) production, equivalent to a $187,000 loss. These losses can be minimized by using proper guidelines that have been published and distributed by myself and my collaborators. Our pioneer work on BMSB has been adopted by peach and almond growers. The information we generated helps to correctly identify BMSB pest issues on time so that growers can save their crops from damage or, in some cases, save money and the environment by taking no action. Below are two testimonials from a grower and a consultant.

Grower Testimonial. Grower Brent Barton called Rijal to express his appreciation for the information in a Rijal extension publication. Barton had a nut drop in his orchard and initially did not know why it was occurring. He now understands it is because of brown marmorated stink bug feeding and is aware of where brown marmorated stink bugs can be found (e.g., near woodpiles and refuse areas). Rijal and Barton are working together to put traps in the orchards to help Barton manage brown marmorated stink bug in his almond orchards.

Consultant Testimonial. "The timely arrival of the April 2020 issue of "The Scoop" with a comprehensive and detailed article on the monitoring and management of plant bugs and stink bugs by Dr. Rijal in almonds enabled me to correctly identify a stink bug captured in one of the almond orchards that I monitor. The stink bug had been misidentified as a brown marmorated stink bug the day before, and we were contemplating the need of a lengthy and expensive spray program to control this invasive pest. The article in "The Scoop" helped me to easily identify the insect and it became a relatively non-issue as far as pest control is concerned" -N. Eric Leer, PCA

In both cases above, a grower and consultant were able to save money. Our pioneer work on BMSB in California will ultimately help to *increase agricultural profitability, leading to the promotion of economic prosperity in California.*

Better management tools for reducing pesticide resistance risk in spotted wing drosophila
Methods. I have conducted several laboratory and field studies to explore natural and reduced-risk insecticides as an alternative for SWD control in the last 5 years. The project aimed to identify an effective and environmentally sustainable solution for managing spotted wing drosophila in cherries. I have collaborated with researchers to examine and release natural biological control options for this pest and am currently planning a collaborative pilot field trial.
Outcomes. A recently published work from Frank Zalom's lab at UC Davis has shown that spotted wing drosophila has developed a tolerance to common insecticide (spinosad). The availability of the new options would help growers mitigate the risk of pesticide resistance. I delivered three talks contributed to five extension articles and one podcast during this period.
Impacts. California cherry growers are aware of this potential pesticide resistance issue and have been very open to adopting newer ways to minimize that risk. Rotating multiple insecticide active ingredients is the best way to slow down that risk and manage the pest effectively. California cherries are primarily for the export market, and better management tools can benefit farmers' economic outlook. Also, reduced-risk options will ultimately *improve environmental (air/water quality) and human health conditions* – one of the ANR's public value statements.

Theme #2: Building Sustainable Agroecosystems Through Enhanced Integrated Pest Management (IPM) Practices

Background, Clientele, Goals, Inputs

Background. Given the scale and scope of the high-value crops grown in California's San Joaquin Valley, it is crucial to adopt IPM measures that minimize crop damage and maximize economic returns for the farmers. At the same time, there is a need to reduce repeated use of chemical insecticides to avoid risks associated with the chemicals, such as pesticide resistance, secondary pest outbreak, and negative impacts on natural enemies and the environment. More importantly, to satisfy consumers' demand for sustainably grown products, integrating novel and softer pest control options such as mating disruption and biological control methods into the conventional and organic production systems are vital for the industry's long-term sustainability. This theme supports UCANR condition changes (CC2: '*Increased ecological sustainability of agriculture, landscapes, and forestry' and* CC3: '*Improved air and water qualities').*

Clientele: My clientele includes crop growers, pest control advisers (PCA), local Cooperative Extension Advisors, allied industries, commodity boards, the private sector, county and state agencies.

Goals: Encourage the adoption of new technology by exploring newer and minimal-risk pest control alternatives that provide economic benefits to producers and protect human and environmental health in the long term.

Inputs: I conducted six applied research projects that align with this theme of building sustainable agroecosystems (see Project Summary Table). These projects aim to address the IPM-related issues of major arthropod pests such as navel orangeworm, walnut scale, walnut husk fly, etc. Multiple commodity boards, private pest control industries, and other local and state agencies funded these projects. Several UC and USDA researchers collaborated on these projects.

Research Results

For navel orangeworm, through several collaborative studies conducted in the northern (J. Rijal) and the southern (D. Haviland) portions of the San Joaquin Valley over two years, we found that multiple commercial navel orangeworm mating disruption products reduced the almond nut damage by ~46% compared to the absence of mating disruption. In separate studies looking for biological-based and reduced-risk insecticides for managing navel orangeworm, my multi-year trials showed good efficacy of several softer insecticides, including biological ones.

For scale insects, my research demonstrated that insect growth regulators (IGRs) are effective alternatives for scale insect control to replace some of the broad-spectrum insecticides.

For walnut husk fly, we evaluated biologicals, mainly insect pathogenic fungi and nematodes, which have shown good efficacy against husk fly larvae or pupae based on our results. This is a new concept and promising alternative for the industry, as the current standard practice requires using insecticides multiple times in the summer to target adult flies.

Methods, Outcomes, and Impacts

Effective integration of non-chemical methods for navel orangeworm control

Methods. Navel orangeworm is the most economically damaging pest of almond, pistachio, and walnut. I have been involved in navel orangeworm mating disruption and IPM research since 2016, and my research and extension efforts have been supported by multiple funding agencies, including the Department of Pesticide Regulation (DPR), Almond Board of California, and private industry. I tested several new and alternative control methods, such as mating disruption, by forming several collaborative trials to address different ongoing issues with navel orangeworm. Mating disruption is a non-chemical and 'green' method with minimal to no risks to non-target insects and the environment. For the last five years, I conducted more than half a dozen mating disruption trials in walnut and almonds to evaluate the efficacy of these mating disruption products in the northern San Joaquin Valley.

Outcomes: Based on the grower/PCA survey and the latest use report from various agency surveys, statewide navel orangeworm mating disruption use has increased from 6.5% in 2017 to 25% of the bearing nut crop acreage in 2021. In 4 years, I delivered over 38 extension talks to 4393 clienteles on this topic. I contributed 11 articles about navel orangeworm, 5 of which were published in various trade magazines run by JCS marketing which has over 12000 subscribers as per the company's report.

Impacts: Based on a two-year assessment of multiple almond orchards (40-120 acres size) in the San Joaquin Valley, on an average year, growers can increase crop value by $240 per acre when they use mating disruption. Extrapolating that number to one million bearing almond acres, mating disruption can increase crop value by $240 million statewide. Also, mating disruption is a 'green product' because of its minimal impact on natural enemies, and there is no exposure risk of pesticide residues or other health-related concerns. Therefore, the adoption of the practice has increased to 500,000 nut crop acres statewide. Our mating disruption work team won four awards from state agency (DPR) to professional society (Entomology) for this work. The primary driver of this increase is the UC collaborative research and extension program delivery by regional IPM Advisors. Currently, I am working with the Almond Board in a DPR-funded project to develop an online tool that connects small acreage growers, encouraging the adoption of a "neighborhood-wide" approach to mating disruption. I believe that statewide adoption of mating disruption will positively enhance crop quality and, at the same time, improve the environment. My local research and extension efforts have been reflected in a recent testimonial provided by Anna Genasci from the Stanislaus County Farm Bureau:

"I have worked with Jhalendra for several years, most recently in my current role with Stanislaus County Farm Bureau. My responsibilities include providing training and education to our growers. Jhalendra is always on the top of my list. He is a great speaker and presenter and provides useful IPM information in a way that growers understand and more importantly can implement. In addition to the grower classes, Jhalendra serves on our County's Spray Safe Committee. Each year, nearly 500 growers and employees come together for this pesticide continuing education event. Jhalendra has been a frequent presenter and provides essential insight regarding timely topics that need to be addressed. Just this past week he spoke to Stanislaus Farm Supply's PCAs about current inspect pressures and control measures. Jhalendra's work with our industry and growers is so important and appreciated."

Exploring reduced-risk insecticide biologicals for scale insects and husk fly

Methods. I worked on several studies collaborating with insecticide and pest management companies to test new and improved insecticide products against important insect pests in tree crops. In the 2017-18 season, I conducted trials to test the efficacy of available insect growth regulators (IGRs), which are specific to the targeted stage of the pest and thus have minimal non-target effects) against the walnut scale. Our trial indicated that two commercial IGRs showed good efficacy against walnut scale control. For walnut husk fly, we pursued this novel way to potentially manage this pest by utilizing biological insecticides when larvae/pupae are present in the soil to reduce the population for the next season. This is critical in finding alternatives to control the husk fly population. The current industry standard is not sustainable because of its heavy reliance on multiple insecticide sprays for 2 to 3 months during the summer to target flying adults. The California Walnut Board recognized the need to move the industry forward on walnut husk fly control options and funded my research last year.

Outcomes. Growers in the northern San Joaquin Valley are using these IGRs for walnut scale control. For walnut husk fly, insect pathogenic nematodes can be used for targeting larval or pupal stages.

Impacts. Reduced air and water contamination risk by avoiding broad-spectrum insecticides during the winter. Also, with the phasing out of Chlorpyrifos and the risks associated with pyrethroids, growers are shifting their practices to using oil or IGR-based insecticides. This behavior change in growers helps reduce the impacts of chemicals on the non-target species. For walnut husk fly, successful integration of biologicals that kills husk fly larvae or pupae in the soil helps to reduce the pest population over time. This would help reduce reliance on the in-season use of chemical insecticides in the future.

Theme #3: Impacts of Droughts and Climate Change on Pests and Exploring Adaptation Measures

Background, Clientele, Goals, Inputs

Like other sectors, periodic droughts and climate change impact California's agriculture and production and pest management practices. The changing climate and weather patterns increase the risk of growing invasive species and elevate the threats from endemic pests. As increased temperature favors most insect pests, we have begun to experience increased reemergence of insect pest issues, which is problematic for sustainable crop production. Although several insect pests and natural enemies are likely impacted by these climate-related factors, in the last 2 to 3 years, my program has begun to focus on two major pests -navel orangeworm and flatheaded borer. Navel orangeworm is the most destructive insect pests of nut crops which occupy over 2.5 million acres of the Central Valley today. Flatheaded borers are the larvae of a specialized group of beetle insects. The larvae bore into tree branches, twigs, and trunks, leading to breakage of branches, declining yield, and death for young trees. In the last 6 to 10 years, the incidence of this pest in walnut orchards has significantly increased and become a resurgence issue. The ongoing droughts in California most likely drive this scenario.

Clientele: My clientele includes crop growers, pest control advisers (PCA), local Cooperative Extension Advisors, allied industries, commodity boards, county, and state agencies.
Goals: Evaluate the impacts of ongoing droughts and climate change on pest populations, and most importantly, create awareness and suggest adaptation measures.
Inputs: For navel orangeworm, I collaborated with climate experts (T. Pathak, M. Maskey from UC Merced). We conducted modeling to look at the effect of climate change on navel orangeworm. For flatheaded borer, since it was an urgent issue raised by walnut growers, the California Walnut Board began to fund the project's initial stage to understand fundamental aspects of this pest and get a better sense for "what's going on." Later I collaborated with over ten institutions as a part of the national USDA-NIFA SCRI grant and obtained funding for multiple years to look at the multitude of aspects related to flatheaded borer biology, as no reliable science-based information from pest biology control methods existed about this pest. I hired a Ph.D.-level scientist with expertise in entomology for this project.

Research Results

Our recently published study predicted that we would see one more navel orangeworm generation (five instead of the three or four currently) in the southern San Joaquin Valley counties as early as 2040, and pretty much in all counties (21 of 23 counties in the study) by the end of the century. The time to complete one generation (i.e., time to go from egg to adult) was predicted to be faster too, by as much as 6 weeks in some regions of the Central Valley.

Our study confirmed the flatheaded borer species causing damage to walnuts as Pacific flatheaded borer. We subsequently developed damage identification symptoms, determined the seasonal cycle of this pest, and suggested ways, including cultural practices, to reduce the damage.

Methods, Outcomes, and Impacts

<u>Drought influenced flatheaded borer resurgence in the Central Valley</u>
Methods. As flatheaded borer is a "new" issue, limited information was available for grower's use. We proposed studying this pest, focusing on pest biology, the degree of infestation in the state, documenting the damage symptoms, and developing monitoring and management tools. We used multiple lab and field studies for three seasons and confirmed the seasonal cycle of the pest. Currently, we are working to identify risk factors for walnut orchards, including the role of droughts, water-stressed conditions, and more.
Outcomes. Information that my program generated in the one-season study is helping growers and PCAs to understand the borer infestation symptoms, adult activity time in the orchard, and potential use of any control measures if warranted. I gave over ten talks covering this pest with a combined attendance of over 1500 participants. I published two podcasts (My AgLife and UCCE Growing the Valley) and over ten extension articles (including CAPCA Advisor). My team generated and disseminated the most comprehensive information on this pest to date.
Impacts. Based on cost estimation in consultation with the growers and PCAs from five orchards (ranging in orchard age from 1 yr to mature trees) in the northern San Joaquin Valley, we estimated the minimum of $750,000 loss due to the flatheaded borer infestation in 2018 and 2019 in the northern San Joaquin Valley. A better understanding of this pest and the insecticide

treatment timing will ultimately minimize crop loss. Based on a grower survey at the statewide walnut meeting, 91% of participants responded that they would adopt the practices they learned from the pest management session, which included my flatheaded borer talk.

Climate change impacts navel orangeworm IPM strategy

Methods. We used climate change models under two different emissions scenarios to predict the climate change influence on navel orangeworm population in the future. We looked at the potential effect of the climate model-generated future temperatures on navel orangeworm biology and generations for 23 Central Valley counties from Tehama to Kern.

Outcomes. Information that we generated helped provide a potential warning about future populations of the navel orangeworm and the risks this can pose to the growing nut crop industry. UCIPM published an article about this work in their 2020 annual report. I gave more than 8 invited talks covering this topic in professional, and extension meeting settings, published 4 extension and newsletter articles, and appeared in a podcast.

Impacts. Understanding climate change effects early could prepare for future pest management needs and minimize risks as the climate changes, enabling growers to continue successfully producing agricultural crops in California. I found considerable interest in learning about the study results by the industry. This is a positive sign as the industry seems to be ready to address future pest issues proactively. Currently, we are working on similar aspects but looking at different pest issues in other systems as well. Recently, USDA funded over $1.5 million grants to the UC climate-change team led by Tapan Pathak (UC Merced). The project focuses on the participatory approach involving stakeholder needs assessments, climate-smart agriculture training for technical service providers, regional workshops for farmers and ranchers, and more. I am one of the regional coordinators in the project.

University & Public Service

University Service. I served 31 different University Service-related activities with significant roles in most tasks (See tables). I have been taking an additional new responsibility as an Associate Director for the agricultural IPM with the Statewide IPM Program as of June 2020. I had the pleasure to be nominated by the ANR Vice-President office to attend the 2020 CARET/AHS meeting and participate in the delegation to meet legislators in Capitol Hill, Washington DC. I also had an opportunity to represent ANR's agriculture-focused CE Advisors in telling a story about our role as a researcher/educator during the virtual ANR tour for UC President Drake, UC regents, and state legislators (3 occasions). I served in two separate Ad-hoc committees for CE Advisors' promotion/acceleration. I am serving in the Advisor Representative Committee of the Academic Assembly Council (AAC). I served in the search committee for hiring CE Advisor (two times), UC and county staff positions, and ANR's Sr. Public Information Representative. I chaired the search committee for hiring non-CE Associate Specialist and Laboratory Assistant positions.

Public Service. During my Associate Rank, I have participated in 28 public service activities (See tables). I provided insect identification service to the public, Farm Advisors, and the Agricultural Commissioner Office; answered homeowner's bug identification questions. I attended 5 local Farm Bureau meetings and a County Department Heads meeting. I judged the high school student's 'Agricultural Pest Control' contest three times during the FFA Field Days at Merced

College. I served the local Stanislaus County Spray Safe Committee, which has representatives from the Stanislaus Farm Bureau, Ag Commissioner Office, and others. I participated in the interaction program with the dean and faculties of the Modesto Junior College-College of Agriculture during annual UCCE-MJC meetings twice. My staff and I participated in countywide AgVenture Day in San Joaquin County. We showcased our insects and pollinator collections provided a 10-15 min. description about insects for over 100 elementary school kids.

Professional Competence

I endeavor to enhance my professional competence by taking advantage of in-service training and other professional development opportunities as they arise. I also actively participated in the UC IPM annual planning meetings and IPM Advisors' meetings. I have organized symposia with the Entomological Society of America (ESA)-national and branch levels. I gave talks at professional societies and regularly contributed to other activities such as judging student competitions and poster and program committees. I was invited to talk at the UC Davis Environmental Law student's symposium. I am an executive committee member of the Pacific branch ESA. I have been active as a book, journal article, and grant reviewer. I co-edited a special issue in the journal *Insects*. I have been invited to give guest lectures presentations in various forums and formats. Altogether, I participated in 44 professional development-related activities and contributed to 60 professional competence activities (See tables).

Affirmative Action

My clientele group includes commodity-based CE Advisors, growers, and Pest Control Advisors. My secondary clienteles include industry representatives, commodity board leaders, and other agencies. During the meetings, I provide information to all participants irrespective of their gender, sex, race, or other protected class. In addition, I make conscious efforts to reach out to the under-represented groups and encourage them to subscribe to UCCE newsletters and my IPM Blog. At meetings and in other interactions, I always talk, provide my contact information, and encourage them to contact our office. I also direct them to the UCIPM site-Publications in other languages (http://ipm.ucanr.edu/IPMPROJECT/otherlang.html) or other related websites like this page http://ipm.ucanr.edu/IPMPROJECT/recursos-espanol.html, for the Spanish language. In the last three years, I have joined two Punjabi nut crop farmers' 'What's app' groups. I provide pest management-related information and inform other UC educational events and activities. In the last six years, I hired two students and one junior specialist, and all of them were women, and two of them were Hispanic students. Some of these students can be future growers, and others will contribute to the California workforce.

I have actively participated in webinars and online training related to race and diversity. I attended webinars offered during Black History Month and Asian Pacific Heritage Month. I completed 5-part training series of JEDI (Justice, Equity, Diversity, and Inclusion) facilitated by Mikael Villalobos, UC Davis, and organized by the UCIPM Program. I have participated Intercultural Development Inventory (IDI) and am in the process of developing an Intercultural Development Plan. I will continue my effort in providing services to those who have not benefited from my program yet. I also discussed the best ways to enhance the representation from the under-served groups with my colleagues.

IV. Supporting Documentation

A. Project Summary

Project Title	Role	Collaborators	Support Amount/Duration (if applicable)	Support Source
Tackling Endemic and Invasive Pests for Protecting California Agriculture (8)				
Management of Brown Marmorated Stink Bug in US Specialty Crops	Co-Principal Investigator	Kent Daane @ UC ANR, Mark Hoddle @UC ANR, Jim Walgenbach @North Carolina State University, Tracy Leskey @USDA-ARS West Virginia, Elizabeth Beers @ Washington State University, Nik Wiman @ Oregon State University, Chris Bergh @Virginia Polytechnic Institute & State University, Ann Nielson @Rutgers University, Diane Alston @Utah State University, Frank Zalom @UC Davis	$ 3.7 million (Total) $125,000 (Rijal: Estimated amount for 5 yrs.) Duration: Aug 2016-Jul, 2021	USDA-NIFA SCRI
Biology, monitoring, and management of native and invasive stink bugs in almond orchards	Principal Investigator	Andrea Joyce @ UC Merced, Raman Bansal @USDA-ARS (Parlier, CA), Sudan Gyawaly @UCANR	$170,927 Feb 2021-June, 2023	Almond Board of California
Monitoring of Brown Marmorated Stink Bug (BMSB) in the Northern San Joaquin Valley Peach Orchards	Principal Investigator	Roger Duncan @ UC ANR,	$22, 419 (2017-19)	California Cling Peach Board

Integrated Pest Management of Spotted Wing Drosophila in Cherries (2016-18) Exploring new and alternative insecticides for resistance management of SWD in cherry	Principal Investigator	Joseph Grant @UCANR Sudan Gyawaly@ UCANR, Mohamed Nouri @UCANR, Kari Arnold @UCANR	$9000 (2016-18) $49,573/ Apr 2019-Mar 2021	California Cherry Board
Source, Monitoring and Management of Lepidoptera Pests in Walnuts (2017-19) Movement and Monitoring of Navel Orangeworm in Walnuts (2020-22)	Co-Principal Investigator	Emily Symmes @ UCANR Charles Burks @ USDA-ARS (Parlier, CA) Houston Wilson @UC Riverside	$25000 (2017-19) $40,804 (2020-22)	California Walnut Board
Biology and Control of Pacific Flatheaded Borer	Principal Investigator	Steve Seybold @USDA Forest Service (Davis, CA)	$14,877 (2018-19)	California Walnut Board
Local Applied Research and Extension Activities	Principal Investigator	Sudan Gyawaly @UCANR	$12,000 (2019-21)	Walnut Board of California
Survey of the Natural Enemies of Brown Marmorated Stink Bug	Collaborator. Conducted biweekly natural enemies survey using sentinel egg masses.	Charlie Pickett @CDFA, Ricky Lara @CDFA, Sudan Gyawaly @UCANR	$0 (In-Kind) (2019-21)	California Department of Food and Agriculture (CDFA)
Building Sustainable Agro-Ecosystems Through Enhanced Integrated Pest Management (IPM) Practices (7)				

Granular Chlorpyrifos Quarterly Report Analysis of Pesticide Use Trends	Principal Investigator.	5-7 UCCE Advisors based on quarterly pesticide use reports in different counties and regions	$149,999 (2021-2023)	
Field Evaluation of Novel Adult Trap Designs and Lures for Walnut Husk Fly in Walnuts	Principal Investigator	Houston Wilson @ UC ANR, Spencer Walse @ USDA-ARS (Parlier, CA) Robert Van Steenwyk @ UC Berkeley, Cindy Kron @UCANR, Elizabeth Body @CSU Chico	$7,500 and in-Kind support from USDA-ARS for all supplies (2020-21)	California Walnut Board
Refining Sustainable Navel Orangeworm Management in California Almond	Principal Investigator	Charles Burks @ USDA-ARS, Parlier, CA	$115,000 (2019-22)	California Department of Food and Agriculture (CDFA)
Promoting Biologically Integrated Orchard Systems (BIOS) in Walnuts	Co-Principal Investigator	Sara Tiffany@ Community Alliance with Family Farmers (CAFF); Joe Grant @California Walnut Board	$1 million (Rijal's portion: $105, 000)/ Nov 1, 2020- Jan 31, 2024	California Department of Food and Agriculture (CDFA)
Prediction of Navel Orangeworm Damage Independent of Mating Disruption	Co-Principal Investigator	Charles Burks @ USDA ARS (Parlier, CA), David Haviland @ UC ANR,	$128, 341 (Rijal's portion: $32,339)/ Feb 1, 2021-Jun 30, 2023	Almond Board of California
Overwintering Biology, Emergence, and Seasonal Activity of Walnut Husk Fly	Co-Principal Investigator	Houston Wilson @ UC ANR, Charles Burks @ USDA-ARS (Parlier, CA) Emily Symmes @ UC ANR	$8,995 (2017-18)	California Walnut Board

Integrated Management of Navel Orangeworm, Stink Bugs, and Spotted Wing Drosophila	Principal Investigator. (Multiple projects but related projects)	R&D representatives of multiple private companies that include Marrone BioScience, Syngenta, FMC, Corteva, Vestaron)	$40,000 (2019-21)	Private Industries
Impacts of Drought and Climate Change to Pests, and Exploring Adaptation Measures (4)				
Flatheaded Borer Management in Specialty Crops	Principal Investigator	Karla Addesso @ Tennessee State University, Nik Wiman @ Oregon State, University, Jason Olivier @ Tennessee State University, David Shapiro Ilan @ USDA-ARS, Georgia, Oscal Liburd @University of Florida, and more.	$3.5 million (Rijal's portion $414,000; first phase: $259,000) (Sep 1, 2020 – Aug 31, 2024)	USDA-NIFA Specialty Crop Research Initiative (SCRI)
Monitoring Beet Leafhopper Population in Processing Tomato Production in Stanislaus County	Co-Principal Investigator	Zheng Wang @ UC ANR	$16544 (2020-2022)	California Tomato Research Institute
Study the Impacts of Climate Change on Major Insect Pests of Fruit and Nut Crops	Co-Principal Investigator	Tapan Pathak @ UC ANR, Mahesh Maskey @ UC ANR, Sudan Gyawaly @ UC ANR, Ning Zhang @ UC ANR	$0 (In-Kind) (2019-22)	California Department of Food and Agriculture
Quantifying the Effect of Rangeland Conversion on Ecosystem Functions: Linking Land Use Systems to Enhance Farm Profitability	Collaborator. I helped conduct entomology-related field studies, developed protocols,	Fadzayi Mashiri @UCANR, Theresa Becchetti @UCANR, Anthony Fulford @UCANR, and more	$0 (In-Kind)	USDA Sustainable Agriculture Research and Education (SARE)

	installed traps, and assisted student employees in identifying collected insects.			

B. Professional Competence and Professional Activity

Professional Development and Training

Begin Date - End Date	Location	Name, Description and Occurrence of Activity
October 1, 2019 - September 30, 2021		
Nov 26, 2019	Virtual	Completed training, UC Sexual Violence and Sexual Harassment Prevention.
Mar 8, 2020	Virtual	UC Cyber Security Awareness Fundamentals
Mar 31, 2020	Virtual	Completed an annual Pesticide Policy Training, organized by the UC Statewide IPM Program
Apr 1, 2020	Virtual	Completed UC Laboratory Safety Refresher training
Apr 6, 2020	Virtual	Completed a training, UC Davis Travel Card Liability
May 13, 2020	Virtual	Attended 3-h webinar, Spotted Lanternfly Update, organized by the Cornell Cooperative Extension
May 21, 2020	Virtual	Participated in a webinar, Climate Action & Agriculture Symposium, organized by UCCE San Diego
Jun 1, 2020 (Ongoing)	Virtual	Associate Director for Agricultural IPM for the Statewide IPM Program. In this role, I have participated in monthly 3-h long UCIPM leadership meetings to provide updates from all Ag-related IPM advisors and affiliates. Participated in several statewide discussions and meetings related to invasive and other pests and their management topics with other state agencies such as the Department of Pesticide Regulation, CA Department of Food and Agriculture, commodity boards, and industry partners.
Jun 13, 2020	Virtual	Completed Heat Illness training
Jul 31, 2020	Virtual	I contributed a training/presentation on 'how to use Microsoft Teams' as a tool to communicate among the groups and teams at one of the UCIPM monthly meetings.
Aug 6, 2020	Virtual	Completed Procurement Card training
Aug 20, 2020	Virtual	Completed N95 Respirator Voluntary Use training, organized by UCANR

Begin Date - End Date	Location	Name, Description and Occurrence of Activity
Sep 2, 2020	Virtual	Received training and obtained a certificate on using ARM (Agriculture Research Management). This training (2 sessions, September 2, and 9) helped me manage research trials and projects.
Sep 2, 2020	Virtual	Received training and obtained a certificate on using ARM (Agriculture Research Management). This training (2 sessions, September 2, and 9) helped me manage research trials and projects.
Oct 1, 2019 - Sep 30, 2021	Virtual	Attended multiple ANR Town Hall meetings to learn more about various successful programs within ANR and received updates from the leadership.
Oct 1, 2020	Virtual	Attended webinar, Contracted Services and UC Regents Policy 5402
Oct 9, 2020	Virtual	Participated in Fall UCIPM Advisors Retreat, organized by the UC Statewide IPM Program. In this meeting, several guest speakers delivered in-service training: 1) Writing Program Impact Statements (Kit Alviz), 2) Cost Recovery Planning (Joni Rippee), 3) Sabbatical Leave - Opportunities, Planning, Resources (Chris Greer)
Oct 13, 2020 - Nov 5, 2020	Virtual	Attended four-part training (Oct. 13, 22; Nov. 2, 5) Affirmative Action/ Civil Rights Compliance Trainings organized and coordinated by UCANR leaders and others
Feb 2, 2021 - Feb 16, 2021	Virtual	Attended 3-part (Feb. 2, 9, 16) webinars, Endemic and Invasive Pests and Diseases (EIPD) Spotlights, organized by the EIPD SI leader. The topic included: 1) reporting and communicating about new pests, 2) permits for working with regulated pests, 3) extension professionals working with clientele and regulators during new pest outbreaks.
Feb 10, 2021	Virtual	Participated in UCANR webinar and discussion related to Black History Month
Mar 8, 2021 - Oct 6, 2021	Virtual	Completed JEDI (Justice, Equity, Diversity, and Inclusion) 5-part training series. The meeting was organized by the UC IPM Program, and facilitated by Mikael Villalobos, UC Davis Office of the Diversity,

Begin Date - End Date	Location	Name, Description and Occurrence of Activity
		Equity, and Inclusion. Topics for individual series were: Session 1 (March 8): Diversity consciousness: striving for equity and inclusion; Session 2 (May 27): Understanding implicit and explicit bias; Session 3 (July 8): Addressing micro aggregations; Session 4 (September 29): Cross-cultural communications and competence; Session 5 (October 6): Diversity in conflict modes
Apr 27, 2021 - Apr 28, 2021	Virtual	Actively participated in the discussions, training, and contributed to the report during the UCIPM annual planning meeting.
May 4, 2021 - May 25, 2021	Virtual	Attended Asian Pacific Heritage Month Events: May 4 - The Asian Pacific Identity: Experiences and Stories May 11 - Asian Pacific Farmers in California: Past and Present May 18 - Violence in Asian Pacific Communities: Exclusion, Internment and Hate Crimes May 25 - Supporting Our Friends and Colleagues: Bystander Intervention Training
Sep 21, 2021	Virtual	Contributed to a discussion at one of the Open Conversations with ANR Senior Leadership meetings.
Sep 1, 2021 – Sep 30, 2021	Online	Took Leadership Development Series courses. The series included leadership foundations; leadership tactics, tips; strategic thinking, building your team; motivating and engaging employees; coaching skills for leaders and managers
Apr 1, 2021-Jun 1, 2021		Participated in the Intercultural Development Inventory (IDI) survey, obtained results, and now in the process of developing Intercultural Development Plan for my program
Sep 24, 2021	Virtual	Presented my work and participated in the discussion during the UC Merced/UCANR Climate Resiliency Collaboration Forum hosted by Vice President Humiston
October 1, 2017 - September 30, 2019		
Sep 26, 2016 - Nov 7, 2018	ESA Headquarter	I served to the Entomological Society of American as the Pacific Branch representative of the Early Career

Begin Date - End Date	Location	Name, Description and Occurrence of Activity
		Professional Committee (ECP). The activity included a presentation of ECP updates to the ESA PB branch president and the executive team, advocating on behalf of the ECP members, attending monthly meetings, organizing ECP symposia.
Nov 6, 2017	Denver, CO	I judged the 'Undergraduate 10-min Presentation Competition' session during the annual meeting of the Entomological Society of America
Nov 7, 2017	Denver, CO	I co-organized and moderated an organized symposium at the annual meeting of the Entomological Society of America
Nov 29, 2017 - Dec 1, 2017	Visalia, CA	I attended the annual conference of the Association of Applied IPM Ecologists (AAIE) and contributed to the nut crop roundtable discussion. My contribution was to provide updates on 1) activity of navel orangeworm in nut crops in the upper San Joaquin Valley, and 2) the status of invasive stink bug (BMSB) spread in California agriculture and my ongoing research on BMSB.
Jan 10-12, 2018	Portland, OR	I moderated the 'Biological Control' session of the 92nd Orchard Pest and Disease Conference in Portland, OR.
Feb 23, 2018	Webinar	I attended the webinar organized by the spotted wing drosophila national project group on the topic "Good bugs vs. bad: using biological controls in SWD management."
Apr 10, 2018	ANR Statewide Conference, Lancaster, CA	I attended the in-service training on 'Innovative Data Collection and Analysis: Technological side of the citizen science-IGIS' delivered by Dr. Megan Kelly.
Apr 17, 2018	UC Davis Alumni Center, Davis, CA	I attended the IPM summit organized by the UCIPM Program and CA-Department of Pesticide Regulation. Participated in small-group discussions covering pesticide and IPM related topics of agriculture and urban importance. Speakers: Director of the UC IPM Program, Director of DPR, and more.

Begin Date - End Date	Location	Name, Description and Occurrence of Activity
May 8, 2018 - May 9, 2018	Putah Creek Lodge, Davis, CA	I attended the UCIPM annual planning meeting and contributed to the discussion.
May 8, 2018	Putah Creek Lodge, Davis, CA	I attended in-service training on 'Strategic Initiatives and Statewide Programs Update' delivered by Vice Provost, Mark Bell, during the UCIPM annual planning meeting.
Jun 12, 2018	Reno, NV	I co-organized and moderated a symposium with one Entomology Faculty of Utah State University, Diane Alston, at the Pacific Branch-Entomological Society of America meeting on "Advances in Brown Marmorated Stink Bug research in the Western United States." I initiated the symposium concept, wrote an initial proposal. Diane and I both invited speakers for their contributions.
Aug 10, 2018	Web (Zoom Conference)	I attended and contributed to the progress update meeting of the USDA-NIFA SCRI brown marmorated stink bug project
Aug 13, 2018	Web (Zoom)	I attended UCANR annual evaluation/merit/promotion training hosted by Chris Greer
Feb 11, 2019	Web (Zoom)	UC Path Training
Jul 5, 2019	Online	Completed ANR recommended training on 'Responsible Conduct of Research for Administrators'
Aug 7, 2019	ANR Building, Davis, CA	I attended the 'UC ANR Regional Information Sessions.' Also, had an opportunity to ask questions with the leadership, and at the same time learned more about ANR public value statements and conditions changes indicators
Aug 14, 2019	Online	Procurement Card Training

Disciplinary Society or Professional Association

Disciplinary Society/Prof. Assoc Name	Membership/Meetings Attended/Activities
Pacific Branch Entomological Society of America (Member)	• Branch member (since 2014) and has been contributing by presenting research

Disciplinary Society/Prof. Assoc Name	Membership/Meetings Attended/Activities
	• Serving in Executive Committee since 2019 • Participated in society related activities such as organizing symposia
Entomological Society of America (Member)	Member- I attended and presented at the annual meeting every year (in-person/virtual). Participated in society related activities such as organizing symposia, judging student competitions, serving in committees.
Association of Applied IPM Ecologists (AAIE) (Member and Contributor)	Member- I attended annual conferences (2016-2018); participated in nut crop roundtables and other events
Early Career Professional Committee (ECP) of the Entomological Society of America (ESA) (Pacific Branch Representative, Oct. 2016-Sept. 2018)	• Attended and contributed to monthly ECP conference call. • Developed the concept and co-organized a symposium and provided an opportunity for early-career professionals to present their research at the Pacific Branch Entomological Society.
10th International IPM Symposium, Denver, CO (Feb. 28-Mar. 3, 2022)	• Serving in the program committee since 2019 • Serving as a chair of the International Committee

Evidence of Professional Competency

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
October 1, 2019 - September 30, 2021		
Oct 1, 2019 – Sep 30, 2021	In-person, virtual	Received team awards for my contribution for increased adoption of mating disruption tools for navel orangeworm management: 2020: Plant-Insect Ecosystem (P-IE) Integrated Pest Management Team Award 2020: Entomology Team-Work Award, Entomological Soc. Am. Pacific Branch 2020: IPM Achievement Award (Team Award), California Department of Pesticide Regulation

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Oct 1, 2019 (Ongoing)	Virtual	Contributed to the scientific society by becoming reviewers for multiple peer-reviewed publications
Nov 17, 2019 - Nov 20, 2019	Saint Luis, MO	At the Entomological Society America annual meeting, I co-organized a symposium on Linking Insect Movement Ecology with Applied Pest Management.
Nov 18, 2019	St. Luis, MO	Gave a symposium talk on use of spatial distribution in monitoring and managing arthropod pests, including the role of natural enemies in multiple cropping systems, during the annual meeting of the Entomological Society of America
Nov 18, 2019	St. Louis, MO	Presentation at the annual Entomological Society of America on 'Effects of Fruit Development Stage and Variety on Brown Marmorated Stink Bug (BMSB) Damage to Almond'
Dec 3, 2019	Stockton, CA	Invited presentation at California Walnut Board Entomology PRAC on flatheaded borer topic
Dec 13, 2019	Davis, CA	Almond Workgroup
Jan 29, 2020	Bodega Bay, CA	Walnut Research Conference
Feb 7, 2020	Online	Ad-hoc Reviewer of the scientific publications. Reviewed 1 book chapter, 1 UC IPM Guideline, and 9 journal manuscripts (Annals of the Entomological Society of America, Environmental Entomology, Journal of Economic Entomology, Insects, PLOS ONE, Entomogia Genaralis)
Feb 26, 2020	Modesto, CA	Invited presentation at the Master Gardners Training on "Entomology: The Study of Insects."
Mar 6, 2020	Davis, CA	Invited to give a presentation on Integrated Pest Management (IPM) and its Implications for the Sustainability of Commercial Agriculture at UC Davis Environmental Law Symposium
Apr 20, 2020	Virtual	Received an Entomology Teamwork Award of the Entomological Society of America - Pacific Branch, as a part of the IPM teams among colleagues. This is in recognition of David Haviland and my contribution to

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
		almond IPM by making a positive impact in encouraging the adoption of a safer pest management option - mating disruption, in almonds
Oct 7, 2020	Virtual zoom (broadcast via YouTube as well)	Invited talk on "Integrated Pest Management (IPM) and its Implementation in Managing Pests in Nut Crops in California" at Science Colloquium session for the Modesto Junior College (MJC).
Nov 18, 2020	Virtual	At the annual Entomological Society of America meeting, I co-organized a symposium, Advancement in Natural and Biological-based Insecticide Research.
Dec 2, 2020	Virtual	Presentation at the California Walnut Board-Entomology Research Workgroup about new walnut pest management-focused projects. CDFA and USDA-NIFA funded projects on walnut pests, and the workgroup was interested to hear about these projects as they are important to the walnut industry.
Jan 1, 2021 - Mar 31, 2021	Virtual	Contributed to the booklet, Almond Production Resources: Pests, Water, and More, as an expert. The publication is a joint venture between the Almond Board of California and UCANR
Jan 26, 2021	Virtual	Presentation at the ANR Walnut Workgroup about new walnut pest management-focused projects. CDFA and USDA-NIFA funded projects on walnut pests, and the workgroup was interested to hear about these projects
Jan 28, 2021	Virtual	Presented at the annual Walnut Research Conference
Feb 2, 2021	Davis, CA	I was invited to speak at the stakeholder meeting organized by the USDA-NIFA Brown Marmorated Stink Bug project team. I provided an update about the status of this invasive BMSB pest in California orchard crops.
Feb 10, 2021	Virtual meetings/document exchange vis email	Contributed my expertise in preparing "documentation for using Integrated Pest Management (IPM) program for navel orangeworm control in almonds" by NRCS. This document is used to evaluate cost-sharing eligibility for small-acre farmers in adopting improved IPM practices. Farmers can apply under NRCS Conservation Practice 595 Pest Management System

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Mar 24, 2021	Virtual	UCIPM - Ag Expert Talk
Mar 29, 2021	Virtual	Invited to give a lecture and lab instructions on general Entomology and Pest Management for University undergraduate and graduate students at the California State University-Stanislaus
Apr 8, 2021	Virtual	Serviced as a judge for graduate student paper competition at Entomological Society of America-Pacific Branch meeting
May 12, 2021	Virtual	Invited to provide an update to the CDFA's Invasive Species Council on invasive pest brown marmorated stink bug in California
Jun 1, 2021	Arbuckle, CA	Nickels Soil Lab Annual Field Day
Jun 9, 2021	Virtual	Presented at Entomology Workgroup about USDA-NIFA funded project (flatheaded borer in walnuts) objectives and potential collaborations
Jul 15, 2021	Virtual	I was invited to speak about new climate change issues and their impacts on pest management at Pistachio Work Group. I gave an example work that I have done in collaboration with an ANR Specialist looking at the effects of climate change on pest management.
October 1, 2017 - September 30, 2019		
Jul 9, 2019	Albuquerque , NM	We (D. Haviland, J. Rijal, E. Symmes, R. Beede, R. Curtis, J. Zaninovich, S. Rill) as a team of UC Extension Entomologists received the Western Extension Directors Association Award of Excellence.
Jan 10, 2019	Portland, OR	I gave a talk (Title: Characterization of Brown Marmorated Stink Bug (BMSB) Feeding Damage in California Almonds) at the 93rd Orchard Pest and Disease Management Conference
Jan 23-25, 2019	Bodega Bay, CA	I gave a proposal (Title: Biology and Control of Pacific Flatheaded Borer in Walnuts) and research updates (Northern San Joaquin IPM Updates & Pupation Biology of Walnut Husk Fly in Walnut Orchard Soil)

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Feb 6, 2019	Fresno, CA	I was invited to give a presentation at the American Society of Agronomy-California Chapter about the new invasive pest, brown marmorated stink bug
May 21, 2019	Modesto, CA	Updated Wonderful Orchard research team about the current brown marmorated stink bug (BMSB) status in California
Apr 3, 2019	San Diego, CA	I was invited to give a talk (Title: What do we know about the BMSB invasion to agricultural areas in upper San Joaquin Valley, California) at the Pacific Branch-Entomological Society of American meeting
July 1-2, 2019	McMinnville, TN	I was invited to give a talk (West Coast: Walnut Production and Factors Affecting Borers and Management) and participate in a USDA-SCRI funded national workshop on flatheaded borer, organized by Tennessee State University in McMinnville, TN. I developed a collaboration and now submitted the full proposal for NIFA USDA-SCRI Grant in which I serve only the PI representing California
Aug 20, 2019	Aurora, OR	I was invited to give a talk (Title: Pacific Flatheaded Borer: An Emerging Issue in California Walnut Production) during an extension meeting for hazelnut growers organized in North Willamette Research and Extension Center-Oregon State University. Pacific flatheaded has become an emerging pest in hazelnuts and walnuts.
Sept 27, 2019	Visalia, CA	I served one of the panel members (J. Rijal, K. Daane, D. Haviland) on a discussion about invasive pests and challenges in California BMSB Infestation in California Crops: Pest ID, Monitoring, and Management
Jan 9, 2018	Portland, OR	Attended the stakeholder meeting of the USDA NIFA SCRI Grant on the brown marmorated stink bug and contributed to the west group of the project by providing the updates of BMSB infestation in CA agriculture.
Jan 10-12, 2018	Portland, OR	Gave a talk on ‘an update on brown marmorated stink bug spread to the crops in the northern San Joaquin

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
		Valley, California' at the 92nd Orchard Pest and Disease Management Conference.
May 9, 2018	Davis, CA	UC IPM Planning meeting. Delivered an update about my ongoing research and extension program to the meeting attendees
Jun 11, 2018	Reno, NV	I was invited by the President of the PB-Entomological Society of America to provide an update on Early Career Professional (ECP) activity during the opening Preliminary Business Meeting session of the PB-ESA annual meeting
Jun 12, 2018	Reno, NV	I gave an invited talk at the Pacific Branch Entomological Society of America on my pioneer work on brown marmorated stink bug research on California crops.
Oct 1, 2017-Mar 22, 2018	Baltimore, MD	Served on the Posters Committee for the 9th International IPM Symposium, 19-22 March, Baltimore, MD. Actively participated in monthly meetings among members; planned all aspects of student competition and other poster submissions (175 total posters submitted); recruited poster reviewers; reviewed ten poster abstracts.
Mar 7, 2018-Mar 9, 2018	Carlsbad, CA	Gave an invited talk on 'biological control of spotted wing drosophila in cherries and blueberries' at the Biocontrol Conference USA West, organized by the Meister Media
Jul 1, 2018 - Sep 30, 2019	Electronic communication	Student Award Judge. Served as a member of the Award Committee for 'Megha Parajulee SONE Graduate Student Award.' The award recognizes one accomplished Entomology graduate student of Nepalese origin. (Served 5 consecutive years in a row, 2015-2019). Society of Overseas Nepalese Entomologists (SONE) is a professional group of entomologists of Nepalese origin within the Entomological Society of America.
Oct 1, 2017 – Sep 30, 2019	Ad-hoc Reviewer of the scientific publications	Reviewed 1 book chapter, 1 UC IPM Guideline, and 9 journal manuscripts (Annals of the Entomological Society of America, Environmental Entomology, Journal of Economic Entomology, Insects, PLOS ONE, Entomogia Genaralis)

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Oct 1, 2017 – Sep 30, 2019	Multiple Universities	**Expertise:** I utilized my expertise on 'analysis of insect spatial distribution using geospatial techniques (Variogram, SADIE) to collaborate with the faculties of other universities (Dr. G. V. Reddy, Montana State University to study alfalfa insect pests and natural enemies; Ph.D. student of UC Davis to study the spatial distribution of Tadpole shrimp in rice; serving as a Co-PI along with faculties at University of Georgia, USDA-ARS, Beltsville, in submitting the multi-state proposal for the USDA-NIFA CPPM)
Nov 4, 2018	Visalia, CA	Research update meeting with Trece Pheromone Company about the NOW Mating Disruption Trial Results
Nov 7, 2018	Davis, CA	I was invited to give a talk (Title: Walnut Short Course Codling Moth, Navel Orangeworm & Minor Worm Pests) at the Walnut Short Course
Nov 8, 2018	Sacramento, CA	As a Co-PI of state-funded project. I delivered a final report talk on 'Demonstration and Implementation of IPM in Almonds'
Nov 13, 2018	Vancouver, Canada	I was invited to give a talk (Title: Story of the BMSB Invasion into California Agriculture, Including Almonds - a five-billion-dollar industry) at the symposium during the ESA annual meeting
Nov 27, 2018	Walnut ENTO PRAC Meeting, Sacramento, CA	Gave a presentation to the Entomology-Production Research Advisory Council (PRAC), California Walnut Board, updating the status of flatheaded borer pest resurgence issue in walnuts
Nov 29, 2018	Visalia, CA	I was invited to give a talk (Title: Major Arthropods and Their Control in Organic Almond Orchards) at the Association of Applied IPM Ecologists (AAIE) Conference
Dec 7, 2018	Almond Workgroup meeting	I gave an update on brown marmorated stink bug research to ANR and USDA colleagues
Nov 8, 2017	Denver, CO	Attended and gave a talk on 'phenology and infestation of brown marmorated stink bug in fruit and nut crops in

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
		the north San Joaquin Valley' during the annual meeting of the Entomological Society of America
Nov 17, 2017	Ag Center, Stockton, CA	Gave a talk on the walnut husk fly research update to the CA Walnut Research Board-Entomology PRAC Committee meeting.
Nov 7, 2017	Denver, CO	I co-organized an organized meeting of the Society of Overseas Nepalese Entomologists at the annual meeting of the Entomological Society of America. Also, I judged the 3-minute student competition session at that meeting.
Oct 1, 2017-Mar 22, 2018	Baltimore, MD	Served on the Posters Committee for the 9th International IPM Symposium, 19-22 March, Baltimore, MD. Actively participated in monthly meetings among members; planned all aspects of student competition and other poster submissions (175 total posters submitted); recruited poster reviewers; reviewed ten poster abstracts.
Nov 8, 2017	Denver, CO	Attended and gave a talk on 'phenology and infestation of brown marmorated stink bug in fruit and nut crops in the north San Joaquin Valley' during the annual meeting of the Entomological Society of America
Nov 17, 2017	Ag Center, Stockton, CA	Gave a talk on the walnut husk fly research update to the CA Walnut Research Board-Entomology PRAC Committee meeting.
Nov 7, 2017	Denver, CO	I co-organized an organized meeting of the Society of Overseas Nepalese Entomologists at the annual meeting of the Entomological Society of America. Also, I judged the 3-minute student competition session at that meeting.

C. University Service

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
October 1, 2019 - September 30, 2021			

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Oct 1, 2019	I served in the Ad hoc committee established for ANR academics promotion/acceleration evaluation	Division-wide	Committee member
Oct 25, 2019	ACE 10 Tour 2019 (Innovation and Entrepreneurship tour)	University-wide	Co-hosted a tour stop for a high-level representative's tour led by ANR VP Humiston. I provided information about how UCANR has been working with private industry to develop and extend the science-based information to the Ag community by providing the 'mating disruption demonstration trial' that we conducted collaboratively statewide. Tour participants were the government and policy level representatives from 24 different countries worldwide.
Jan 31, 2020 - Jan 29, 2021	I served as a Chair-Elect for the Walnut Research Conference for 2021. As a member of the organization committee, involved in all decision-making processes in conducting the conference.	State	Organizer/Presenter
Jan 31, 2020 - Jan 29, 2021	UC Walnut Research Conference	University-wide	Vice-Chair for 2021 Walnut Research Conference -annual 3-day scientific presentation event. I played a role in discussing and making decisions about the WRC conference sessions, requesting speakers, and more.
Feb 1, 2020	Ad hoc committee	Division-wide	As a member of the ANR 2020 Ad hoc committee, I took the lead in two and secondary roles for additional 4 dossiers to evaluate

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
			them for the promotion and acceleration
Mar 1, 2020 - Mar 4, 2020	Attended the 2020 Joint CARET/AHS (Council for Agricultural Research, Extension, and Teaching) meeting and visited Capitol Hill to meet members of congress. Represented agricultural scientist from the UC highlighted the value of UCANR in conducting research and educating farmers to the California legislators or their staff members at the Capitol Hill visit	National	Presenter/Delegate
Mar 1, 2020 - Mar 5, 2020	Council for Agricultural Research, Extension and Teaching (CARET) of the Association of Public & Land-grant Universities.		As one of the members of the University California delegation to CARET, I had an opportunity not to attend the meeting but also to present our work and impacts to the house of representatives and senators or their office staff. I represented all UCANR advisors working on Agriculture and Natural Resource program areas.
Apr 1, 2020 - Sep 30, 2020	I served as a Search Committee member for hiring a UCCE Advisor	Division-wide	Search Committee Member
Jun 1, 2020 - Jun 25, 2025	I was appointed as Associate Director for Agricultural IPM at the Statewide IPM Program by ANR Vice Provost Mark Bell. The role of this position includes a) bridging the gap between IPM Advisors/Affiliates and UCIPM	Division-wide	Associate Director

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
	leadership; b) representing UCIPM in the western States, c) providing support to the UCIPM in various agricultural pest management affairs.		
Sep 1, 2020 - Aug 31, 2023	Academic Assembly Council	University -wide	Elected as a member of the Advisor Representative Committee of Academic Assembly Council (AAC)
Oct 1, 2020	Search Committee	Division-wide	Search Committee member for hiring UCIPM Pest Management Guidelines Coordinator.
Nov 20, 2020 - Dec 8, 2021	UCANR Virtual Tour	University -wide	Participated as one of the speakers of the VP Humiston-led UCANR Virtual Tour for California legislators (Nov. 20), UC regents (Dec. 2), and the UC President Michael Drake and some UC regents (Dec. 8). Presented examples of impacts of UCANR researchers on California agriculture.
Mar 1, 2021	ANR Grant Reviewer	Division-wide	The UCANR Grants office invited me to review NIFA Equipment Grant Program. I reviewed three grants and provided technical feedback to ANR.
Mar 16, 2021	Worker Safety Training	Region	I took the initiative and organized worker safety training for UCCE county office employees about pesticide safety education.
Apr 1, 2021 - Jul 1, 2021	Search Committee	Division-wide	Served as a search committee member for hiring UCANR's Sr. Public Information Representative
May 2021 - Sep, 2021	Search Committee	Division-wide	Served as a search committee member for hiring Area Citrus IPM

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
			Advisor position two times (July 2020 & March 2021)
October 1, 2017 - September 30, 2019			
Jan 1, 2017 (Ongoing)	Co-Chair of the Entomology Workgroup with UC ANR. The workgroup provides a platform for discussion and communication among ANR Advisors and Specialist who are interested and working in the field of entomology and pest management	University -wide	In 2018, I co-organized a meeting during the ANR Statewide Conference (Lancaster, CA), discussed the Entomology positions, and recommended it to the Pest Management PT. We offered 'professional development' in-service training during the workgroup meetings In 2019, I co-organized the Entomology Workgroup Meeting (1:00-3:00 PM –Tuesday, June 4, 2019) at the ANR building in Davis. I invited three new Entomology-related Specialists and Academics CDFA representatives for brief updates.
Oct 1, 2017 - Sun Sep 30, 2018	Reviewed **Pest Management Guidelines (**PMG) Guidelines for two major crops as an ad hoc reviewer during this review period	University -wide	Pest Management Guidelines Reviewer
Oct 17, 2017	I assisted the Search Committee by giving a 'field tour' for CE Vegetable Crop Advisor	University -wide	A field tour to CE Advisor candidates
Feb 16, 2018	I assisted the Search Committee by giving a 'field tour' of a candidate for the Soil Nutrient and Agronomy Advisor position	University -wide	A field tour to CE Advisor candidates
Aug 24, 2018 (Ongoing)	IPM Facilitators for the Pest Management Guidelines (PMG) for Walnut	Division-wide	My primary role has been to ensure that UC IPM principles are followed, and IPM practices are

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
			included during the PMG revision. IPM Facilitator contributes to the review process and suggests changes as appropriate.
Aug 24, 2018 (Ongoing)	IPM Facilitator for the Pest Management Guidelines (PMG) for Apricot	Division-wide	My main role has been to ensure that UC IPM principles are followed, and IPM practices are included during the PMG revision. IPM Facilitator contributes to the review process and suggests changes as appropriate.
Aug 24, 2018 (Ongoing)	Crop Team Leader for the Pest Management Guidelines for cherry	Division-wide	The crop team leader provides the leadership by recruiting authors, ensuring the revision is comprehensive, suggesting adding section(s), and more to the cherry PMG.
Oct 24, 2017	Search Committee	County	Search Committee Member. Served in a search committee for hiring a Secretary for the UC Coop. Ext. office-Stanislaus County
Jan 1, 2018 (Ongoing)	Safety Coordinator for UCCE-Stanislaus Office	County	• I have been coordinating the safety-related issues at the UCCE Office and working with the county director and other employees to improve the safety situation in the office and the safety of the employees in the office and field. • We received 'be smart about safety' funding from the UCANR in 2018. • Delivered ‘heat illness’ training to the UCCE employees
Jan 1, 2018 (Ongoing)	Website Standards and Continuity Committee-UCCE Stanislaus	County	I have been actively participating in meetings (every 2-months), discussed, and suggested improving content and look. The committee implemented changes, including revising the website

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
			outlook, updating mission statements, and more.
Oct 25, 2018	ACE 10 Tour 2019 (Innovation and Entrepreneurship tour)	University -wide	I was co-invited to host a tour stop for a high-level representative tour led by Vice President Humiston. Tour participants were the government and policy level representatives from 24 different countries worldwide. I provided information about how UCANR has worked with the private industry to develop and extend the science-based information to the Ag community by giving the 'mating disruption demonstration trial' summary.
Oct 30-31, 2018	Organized 'IPM Advisor Fall Meeting' in coordination with the Statewide IPM Program	Division-wide	I hosted the meeting at UCCE Stanislaus and arranged all the activities and agenda for the meeting.
Feb, 2019	Served in an ad-hoc committee to evaluate the Merit/Promotion of UCANR academics	Division-wide	As a member of the committee, I fully participated in the evaluation of the promotion packets of six academics
Feb-Mar, 2019	Review panel for the pest management proposal	Division-wide	I was invited to serve in the review panel by UCIPM Program for the proposals administrated through CDFA
May 2-3, 2019	Jr. Specialist recruitment	Division-wide	I served in a hiring committee for Jr. Specialist at UCCE Stanislaus

D. Public Service

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
October 1, 2019 - September 30, 2021			

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Oct 1, 2019 - Sep 30, 2021	Stanislaus County Farm Bureau	County	Attended 2 Farm Bureau meetings and updated the UCCE Stanislaus County status and UCCE IPM Program updates to the Stanislaus County-Farm Bureau members.
Ongoing	County Pest Abatement Program	County	I provided an expert to the Ag Commissioner's Office about their abatement program and other major pest and pesticide-related issues.
Ongoing	Insect ID Service	State	Although my clientele is strictly commercial agriculture-based, I identified hundreds of insects to the public via email phone calls and submitted samples to the UCCE Offices (San Joaquin, Stanislaus). Residents wanted to know the latest information, especially with Asian citrus psyllid and brown marmorated stink bug spread into newer areas. Also, urban pests are other major groups of insects that I identified for the public.
Oct 1, 2018 (Ongoing)	Spray Safe Committee	County	I am in the Safe Spray committee, representing the Stanislaus Farm Bureau, Ag Commissioner's Office, and other related organizations. The committee conducts educational and awareness programs related to pesticides' safe use and handling and farmworker safety. Attended more than 6 meetings and actively participated in the discussion about several aspects of the 'Spray Safe' workshop. The activities included a safety seminar focusing on pesticide use,

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
			regulation, worker safety, tractor and equipment safety, pesticide exposure. Spray Safe organized an annual workshop where more than 400 growers and workers attended.
Oct 29, 2019	AgVenture (San Joaquin County)	County	Participated in educating over 100 third graders about the importance of insect pollinators and discussed good bugs vs. bad at the AgVenture fair. This was the county-wide event for elementary school kids
Jan 1, 2020 (Ongoing)	Research Advisory Committee	State	As a member of the committee of the California Cherry Board, I used my expertise in providing feedback about major and emerging pest management-related issues and prioritizing them; I helped review submitted proposals to the board.
May 21, 2020 (Ongoing)	Advisory Board	National	I was invited to serve on the advisory board for the industry magazine, West Coast Nuts
Aug 29, 2020	Career Fair Speaker	International	I contributed to the career fair organized by the Association of Nepalese Professionals of Americas (NAPA). I presented job opportunities in university extension systems to graduate students and postdocs attendees.
Aug 29, 2020	Presented a talk 'Career Advice for Extension Jobs' for agricultural professionals at NAPA (Association of Nepalese Agricultural Professionals of Americas.		Presenter

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Nov 8, 2020	Gave a presentation on Strategies in Building Applied Entomological Research and Extension Program for Society of Overseas Nepalese Entomologists seminar	International	Speaker
Dec 1, 2020	Highlights in Stanislaus County Report	County	The county-wide report highlighted my research on non-harmful pest control method research and its significant contribution in reducing the almond crop damage by the major pest, navel orange worm.
Feb 2, 2021	California Cherry Board Research Advisory Committee. I served to advise the Research Committee about future research directions. Also, reviewed submitted research proposals for their scientific merits for funding consideration	State	Advisory Committee Member
Feb 3, 2021	KQED Deep Look Video	National	As an entomologist, I contributed to reviewing and editing the script of the KQED-produced educational Deep Look video "Born Pregnant: Aphids Invade with an Onslaught of Clones" https://youtu.be/vrzalLssomg. The video won the 2021Jackson Wild Award.
Mar 18, 2021	Search Committee	County	I served as the search committee member for hiring an administrative secretary position at Stanislaus County.
October 1, 2017 - September 30, 2019			
Oct 1, 2016 (Ongoing)	Member of the Spray Safe Committee for the Stanislaus	County	I attended more than 6 meetings and actively participated in the

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
	County. The committee conducts a ‘spray safe’ seminar annually to educate farmworkers and growers about safe pesticide use, regulations, worker safety, tractor and equipment safety, pesticide exposure, etc. The committee has representation from the Stanislaus Farm Bureau, Ag Commissioner's Office, NRCS, UCCE, and other related organizations.		discussions on organizing the 'Spray Safe' seminar (Nov. 17, 2017), in which more than 400 growers and workers attended.
Oct 1, 2017 - Sep 30, 2019	Stanislaus County Farm Bureau meetings	County	Attended three Farm Bureau meetings and provided updates on UCCE research and extension activities
Oct 1, 2017 - Sep 30, 2019	Service to the Agricultural Commissioner Office	County	I volunteered my expertise to the local Ag Commissioner’s Office to help in their abatement program and other major pest and pesticide-related issues.
Apr 13, 2018	IPM Guest Lecture at California State University-Stanislaus	State	I delivered a guest lecture (3 h) on 'Insect Pheromone-based Communication and Mating Disruption Techniques’ for undergraduates at the California State University-Stanislaus.
Apr 13, 2018	Guest Lecture and Lab sessions for the undergraduate students of the California State University-Stanislaus	State	I gave a guest lecture and lab for CSU-Stanislaus undergraduate students. I hosted both lab and lecture (topic: invasive pest species) at the UCCE meeting room and demonstrated different insect monitoring tools and techniques both in the lab and field
Apr 24, 2018	Guest class for Merced College students	State	Delivered 1.5 h guest lecture covering several insect pests and

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
			monitoring techniques in vegetable crops course in Merced community college
Mar 17, 2018	FFA Merced College Ag Contest Judging. Merced College hosts an annual FFA Field Day, where competitors from High Schools all over the state take part in contests and judging in various agricultural areas.	County	I judged the Insect Pest related Contest (Ag Pest Control). I also provided technical information about the important insect pest and related issues to the organizer to prepare the contest.
Oct 1, 2017 - Sep 30, 2018	Insect ID Service	County	Although my clientele is strictly commercial agriculture-based, I conducted identification of hundreds of insects to the public via email phone calls and submitted samples to the UCCE Offices (San Joaquin, Stanislaus). Residents wanted to know the latest information, especially with Asian citrus psyllid and brown marmorated stink bug spread into newer areas. Also, urban pests are other major groups of insects that I identified for the public.
Oct 1, 2017 (Ongoing)	Helping resource-poor farmers	International	I worked collaboratively with a non-profit organization in Nepal to educate vegetable farmers about pesticide safety and integrated pest management (IPM) for their vegetable production practice. I contributed voluntarily to writing proposals and obtained funding from the Horticulture Innovation Lab, UC Davis, for three separate projects (2016, 2017, 2018). Three graduate students from the US Universities were visited Nepal and helped on the project.

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Mar 16, 2019	Judged the FFA Merced College's Ag Contest in which high school students across California participated	County	I judged the Insect Pest related Contest (Ag Pest Control), summarized the results, and delivered the results to the participants
Mar 25-28, 2019	Trellis Fund Summit organized by the USAID/Horticure Innovation lab	International	Based on my involvement in the USAID funded collaborative project in Nepal for the last 3-4 years, we presented the poster (I was a co-author) at the Summit, where participants from 10 developing countries were attended
Sept 12, 2019	Tour for Japanese Scientists working on Pheromones/Organised by Pacific Biocontrol	International	Provided information about major insect pests of concern in tree crops in California, gave my IPM lab tour
Sept 1, 2019 (ongoing)	California Cherry Board-Research Advisory Committee	State	Played a critical expert role to advise the board about the need and future direction of the board's research priorities

E. Extension Activities

Meetings Organized

Begin Date - End Date	Meeting Name and Type	Topic/no. of repetitions	Role	Location(s)	Total No. of Attendees
Tackling Endemic and Invasive Pests to Protect California Agriculture (1)					
October 1, 2017 - September 30, 2019					

Begin Date - End Date	Meeting Name and Type	Topic/no. of repetitions	Role	Location(s)	Total No. of Attendees
Aug 13, 2019	Brown Marmorated Stink Bug Field Meeting	Biology and infestation of brown marmorated stink bug in almonds	Organizer/ Speaker	Turlock, CA	52
Building Sustainable Agro-Ecosystems Through Enhanced Integrated Pest Management (IPM) Practices (7)					
October 1, 2019 - September 30, 2021					
Mar 4, 2020 - Jun 17, 2020	2020 Tree & Vine IPM Meeting	Pest management updates to local growers and pest control advisors / 8	Organizer/ Speaker	Virtual	502
Mar 3, 2021 - Jun 16, 2021	2021 Tree & Vine IPM Meeting	Updates on local pest management issues to growers and pest control advisers/ 8	Organizer/ Speaker	Virtual	512
October 1, 2017 - September 30, 2019					
Mar 2019 - Jun 2019	2019 Tree & Vine IPM Meeting	Pest management updates to local growers and pest control advisors / 8	Organizer/ Speaker	Modesto, CA	488
Mar 2018 – Jun 2018	2019 Tree & Vine IPM Meeting	Local IPM activity updates to growers and pest control advisors / 8	Organizer/ Speaker	Modesto, CA	495
Apr 20, 2018	In-the-orchard workshop on integrated pest management	Integrated management of major insect pests in almonds, including navel orangeworm, mites, brown marmorated stink bug	Co-Organizer (with Almond Board of CA) & Speaker	Modesto, CA	36

Begin Date - End Date	Meeting Name and Type	Topic/no. of repetitions	Role	Location(s)	Total No. of Attendees
Jun 18, 2018	Mid-Season IPM Field Meeting	NOW demo trial. Topics covered were mating disruption control of navel orangeworm, biocontrol of mites, and IPM of ants in almonds	Organizer/ Speaker	Escalon, CA	65
Impacts of Droughts and Climate Change on Pests and Exploring Adaptation Measures					
October 1, 2019 - September 30, 2021					
Aug 27, 2021	Field meeting on, Impacts of Biologically Integrated Orchard Systems (BIOS) in Walnuts, co-organized with Community Alliance with Family Farmers (CAFF)	Seasonal pest activities: codling moth, navel orange worm and fatheaded borer / 1	Co-organizer/ Speaker	Farmington, CA	27

Educational Presentations (90)

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Tackling Endemic and Invasive Pests for Protecting California Agriculture (46)				
October 1, 2019 - September 30, 2021				
Oct 10, 2019	Stanislaus Farm Supply Merced	Biology and IPM of brown marmorated stink bug (BMSB) in almond and peach orchards / 1	Merced, CA	45
Oct 15, 2019	UCCE Merced CE Meeting	Biology and IPM of brown marmorated stink bug	Merced, CA	64

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
		(BMSB) in almond and peach orchards / 1		
Nov 5, 2019	CAPCA Educational Seminar	Brown marmorated stink bug (BMSB): pest ID, crop damage, monitoring, and management / 1	Reno, NV	450
Nov 12, 2019	Tree and Vine Expo Turlock	Plant bugs and stink bugs of concern in tree nuts / 1	Turlock, CA	225
Nov 12, 2019	Tree and Vine Expo	Plant Bugs and Stink Bugs of Concern in Tree Nuts / 1	Turlock, CA	115
Nov 20, 2019	South Valley West Coast Meeting Tulare	New challenges in tree nut production: pacific flatheaded borer & brown marmorated stink bug (BMSB) / 1	Tulare, CA	100
Dec 5, 2019	Mariposa UCCE IPM Meeting	Brown marmorated stink bug: A common enemy of multiple crops / 1	Mariposa, CA	67
Dec 13, 2019	Madera Farm Bureau CE Seminar	Plant bugs and stink bugs of concern in tree nuts / 1	Madera, CA	55
Dec 17, 2019	Cal Ag Safety CE Seminar	Navel orangeworm, codling moth, and flatheaded borer in walnuts / 1	Linden, CA	42
Dec 17, 2019	Stanislaus Farm Bureau CE Seminar	Biology and management of navel orangeworm in almonds / 1	Modesto, CA	27
Jan 24, 2020	EcoFarm Conference	Brown marmorated stink bug: What do we know about the pest and infestation in CA agriculture / 1	Pacific Grove, CA	24
Jan 29, 2020	Walnut Research Conference	Biology and control of pacific flatheaded borer in walnuts / 1	Bodega Bay, CA	48

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Jan 31, 2020	North San Joaquin Valley Almond Day	Biology and integrated management of navel orangeworm in almonds / 1	Modesto, CA	245
Feb 4, 2020	Sacramento Valley Peach Day	Brown marmorated stink bug in peach orchards: Id, biology, monitoring, and management / 1	Yuba City, CA	46
May 20, 2020	Almond Board CASP meeting	Managing mites in almond orchard with IPM / 1	virtual	84
Oct 13, 2020	Merced County CE Seminar	Biology and management of plant and stink bugs in almonds and pistachios / 1	Virtual	48
Jan 14, 2021	San Joaquin Valley Almond Day	Monitoring and management of plant and stink bugs in almonds / 1	Virtual	180
Jan 21, 2021	West Coast Nut/California Walnut Board -Walnut Educational Meeting	Biology, monitoring & management of walnut husk fly / 1	Virtual	150
Jan 26, 2021	Cherry Grower Annual Meeting	Exploring new and alternative insecticides for resistance management of spotted wing drosophila (SWD) in cherry / 1	Virtual	73
Feb 25, 2021	Statewide Cling Peach Day	Brown marmorated stink bug in peach orchards: biology, monitoring, and management / 1	Virtual	74
May 19, 2021	Farm Bureau and Ag Commissioner Educational Seminar	Managing leaffooted and stink bugs in almonds / 1	Virtual	33
Jun 10, 2021	Orchard Management Workshop Series	Spotted wing drosophila update / 1	Virtual	55

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Jul 7, 2021	Pesticide Applicators Professional Association (PAPA) Seminar	Brown marmorated stink bug (BMSB) infestation status in California / 1	Virtual	176
October 1, 2017 - September 30, 2019				
Oct 31, 2017	Mid Valley Ag PCAs meeting	Be on the alert for brown marmorated stink bug: ID, monitoring tools, and crops at risk	Oakdale, CA	62
Dec 7, 2017	Almond Board Conference	New pest update: brown marmorated stink bug	Sacramento, CA	243
Dec 14, 2017	Blue Diamond Growers Meeting	Winter sanitation other navel orangeworm control options	Turlock, CA	85
Jan 11, 2018	Orchard Pest and Disease Conference	Development of sampling methods for pre-season mite detection in almonds	Portland, CA	210
Jan 25, 2018	CAPCA (California Association of Pest Control Advisers) Educational Seminar	Brown marmorated stink bug: identification, biology, and pest status in California	Tracy, CA	110
Jan 31, 2018	Bayer PCA & Grower meeting	Mating disruption for navel orangeworm and brown marmorated stink bug update	Hilmar, CA	35
Mar 5, 2018	Quad County Walnut Day	Managing codling moth, navel orangeworm, scales, and other insects	Stockton, CA	134
Jun 18, 2018	Mid-season IPM meeting	Navel orangeworm mating disruption demonstration results	Escalon, CA	65
May 22-24, 2018	Almond and Walnut Farm Advisor Tour	BMSB infestation in almonds	Modesto, CA	42

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Jul 31, 2018	PAPA (Professional Society of Pesticide Applicators) Seminar	Asian citrus psyllid and the citrus HLB disease in California.	Stockton, CA	203
Sep 20, 2018	CAPCA Educational Seminar	Mites and updates on brown marmorated stink bug attack on California tree crops	Modesto, CA	89
Oct 16, 2018	CE Credit Seminar/Merced Ag Commissioner Office	Navel orangeworm and stink bug activity in almonds	Merced, CA	55
Nov 18, 2018	Ag Commissioner's Office CE meeting	Brown marmorated stink bug (BMSB) activity in ca crops, including almonds	Madera, CA	78
Dec 5, Dec 8, 2019	Contra Costa Ag Commissioner's Office CE meeting	Brown marmorated stink bug management	Knightsen, CA	57
Dec 6, 2018	Almond Conference	Updates on brown marmorated stink bug	Sacramento, CA	305
Dec 6, 2018	Almond Conference	Poster presentation on brown marmorated stink bug	Sacramento, CA	450
Dec 11, 2018	Wilbur-Elis Meeting	NOW mating disruption, BMSB, and flatheaded borer	Hughson, CA	17
Jan 30, 2019	Peach day	Brown marmorated stink bug infestation in local peach orchards and tools for monitoring and management	Harvest Hall, Modesto, CA	45
Feb 5, 2019	Lodi Grape Day	Invasive pests to watch out for in the vines in 2019	Lodi, CA	285
July 12, 2019	San Joaquin Ag Commissioner's CE Seminar	Brown marmorated stink bug activity in California crops – peach, almond	Ripon, CA	34

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
July 18, 2019	San Joaquin Ag Commissioner's CE Seminar	Invasive insect pests of concern of California vineyards	Lodi, CA	28
July 30, 2019	Wilbur-Ellis PCA meeting	Biology, monitoring, and management of brown marmorated stink bug in almond and peach orchards	Hughson, CA	23
Building Sustainable Agro-Ecosystems Through Enhanced IPM Practices (38)				
October 1, 2019 - September 30, 2021				
Dec 12, 2019	Research Update with Trece	NOW mating disruption trial results-2019 / 1	Sacramento, CA	10
Jan 21, 2020	Semios Navel Orangeworm Workshop	Integrated approach of navel orangeworm management / 1	Modesto, CA	35
Feb 2, 2020	CAPCA Educational Seminar	Integration of mating disruption in controlling navel orangeworm in almonds / 1	Tracy, CA	45
Mar 19, 2020	Almond Board and NRCS Collaboration Meeting	use of navel orangeworm mating disruption as a part of the ipm program in almonds / 1	Modesto, CA	15
Apr 29, 2020	Almond Board of California CASP Meeting	Use of mating disruption as a part of the navel orangeworm IPM program in almonds / 1	Virtual	80
Jun 26, 2021	Almond Board Webinar	Use of mating disruption as a part of the navel orangeworm IPM program in almonds / 1	virtual	75
Nov 10, 2020	Tree and Vine Expo	Managing navel orangeworm in almond and walnut orchards / 1	Virtual	1100

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Dec 15, 2020	Madera County Farm Bureau Educational Meeting	Managing hemipteran bugs in almonds and pistachios / 1	Virtual	38
Jun 1, 2021	Nickel's Soil Lab Field Day	Mating disruption and its role in navel orangeworm management in almonds / 1	Arbuckle, CA	50
Jun 29, 2021	Butte County Farm Bureau Outreach Meeting	Best management practices of pyrethroid insecticides in perennial tree crops / 1	Chico, CA	40
October 1, 2017 - September 30, 2019				
Oct 9, 2017	Field Day-San Joaquin Sustainable Farming Project	Almond dormant period pest management	Los Banos, CA	56
Oct 17, 2017	CE Seminar-Merced County	Options for navel orangeworm control in almonds	Merced, CA	53
Nov 16, 2017	Cal Ag Safety Meeting	Navel orangeworm in nut crops: Looking back at 2017 while planning for 2018	Linden, CA	39
Dec 7, 2017	Almond Board Conference	Navel orangeworm and mites: northern San Joaquin valley perspective	Sacramento, CA	243
Jan 17, 2018	Statewide Pistachio Day	Navel orangeworm product options and monitoring under mating disruption	Visalia, CA	343
Jan 22, 2018	Grower Meeting-Blue Diamond	Navel orangeworm mating disruption and other control options	Salida, CA	89
Feb 7, 2018	North San Joaquin Valley Almond Day	Navel orangeworm-what happened in 2017 & how to prevent it in 2018	Modesto, CA	498

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Mar 22, 2018	CAPCA Educational Seminar	Organic insect pest management in almonds	Fresno, CA	450
Apr 20, 2018	Almond Board of California CASP Program	Pests! how to plan & implement your IPM program in almonds	Modesto, CA	36
Aug 23, 2018	Crop Protection Services-Nutrien Ag Solutions	Major arthropods and their control in organic almond orchards	San Luis Obispo, CA	110
Sep 25, 2018	Navel orangeworm IPM Meeting	Navel orangeworm mating disruption: product options, field application, and other considerations	Parlier, CA	77
Nov 2, 2018	Mid-Valley Nut Crop Meeting/Trade show	Seasonal Navel Orangeworm Activity in NSJV and Control Options	Modesto, CA	105
Nov 6, 2018	Tree and Vine Meeting and Expo	Mating Disruption as an Effective Tool for Navel Orangeworm Control	Turlock, CA	120
Nov 15, 2018	Cal Ag Safety Meeting	Navel Orangeworm, Codling Moth, and Other Minor Worm and Borer Pests in Walnuts	Linden, CA	32
Dec 20, 2018	Ag Safe Educational Seminar	Navel Orangeworm Control by Using Mating Disruption Plus Other Tactics and Monitoring and Control of Mites	Modesto, CA	35
Jan 14, 2019	Syngenta Independent PCAs meeting	Biology and Management of Navel Orangeworm in Almonds	Paso Robles, CA	57
Jan 29, 2019	North San Joaquin Valley Almond Day	Advances in Mating Disruption for Navel Orangeworm Control in Almonds	Modesto, CA	350

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Feb 5, 2019	49th Annual Quad County Walnut Institute	Research Updates: Navel Orangeworm, Walnut Husk Fly, and Pacific Flatheaded Borer	Modesto, CA	136
Feb 21, 2019	CAPCA Seminar	Navel Orangeworm Mating Disruption: What We Learned from the Multiyear Trials in San Joaquin Valley	Stockton, CA	102
May 8, May 28, 2019	Almond Board's "In the Orchard IPM Workshop"	Almond Integrated Pest Management Update/2	Madera, CA Hughson, CA	25 32
June 5, 2019	Mid-Valley Ag Day	Walnut Insect Pest Management: Navel Orangeworm, Walnut Husk Fly, and Pacific Flatheaded Borer	Turlock, CA	123
July 25, 2019	San Joaquin Ag Commissioner's CE Seminar	Spotted Wing Drosophila Management in Cherries and Blueberries	Stockton, CA	37
Aug 6, 2019	Lodi PCA meeting	Pest Update: Brown Marmorated Stink Bug (BMSB) and Spotted Wing Drosophila (SWD)	Lodi, CA	27
Sept 5, 2019	CAPCA meeting	Monitoring and Control of Brown Marmorated Stink Bug (BMSB)	Sacramento, CA	150
Sept 19, 2019	CAPCA meeting	Navel Orangeworm and Brown Marmorated Stink Bug in Almonds	Modesto, CA	68
Sept 27, 2019	Crop Consultant Conference	BMSB Infestation in California Crops: Pest ID, Monitoring, and Management	Visalia, CA	135
Impacts of Climate Change to Pests and Exploring Adaptation Measures (6)				

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
October 1, 2019 - September 30, 2021				
Jan 10, 2020	Walnut Board/West Coast Nut Walnut Meeting	Pacific flatheaded borer: a new problem? / 1	Yuba City, CA	375
Mar 9, 2020	Quad County Walnut Extension Meeting	Updates on flatheaded borer and walnut scale / 1	Stockton, CA	125
Jun 9, 2020	Wilbur-Elis PCAs Meeting	NOW mating disruption, BMSB, flatheaded borer / 1	Virtual	23
Feb 17, 2021	Statewide Walnut Extension Meeting	Navel orangeworm, coding moth and Pacific flatheaded borer updates / 1	Virtual	145
Jul 12, 2021	Pistachio Workgroup Meeting	Effect of climate change on navel orangeworm population dynamics / 1	Virtual	35
Aug 12, 2021	Agricultural Commissioner's CE Seminar	Understanding pest pressure in orchards under shrinking water availability / 1	Virtual	45

Other (including websites, social media, blogs, collaborations with other agencies, organizations, policy engagement)

Begin Date - End Date	Description	No. of Instances
Tackling Endemic and Invasive Pests for Protecting California Agriculture (4)		
Oct 1, 2019 - Sep 30, 2021	My official Twitter account @IPMCorner (previously @IPMAdvisorNSJV), I posted **393** tweets and received a total of **114.5K** impressions over two years period	1
Oct 1, 2017 (Ongoing)	Collaborating with National BMSB Researcher Team via USDA NIFA funding on brown marmorated stink bug and obtained funding; contributed to list almond as a host of BMSB based on my work in almonds; contributed 6 pictures of BMSB feeding damage to almonds	5

Begin Date - End Date	Description	No. of Instances
	to stopBMSB.org website; contributed to BMSB SCRI project stakeholders meeting presentations	
January 2017-December 2018	Activity in IPM Corner blog, www.IPMCorner.com. >830 visits views in 2018, a total of 75 people subscribed, 6 articles were posted. Seasonal insect counts/degree-day information (almond, peach walnut insects) was updated frequently and provided downloadable pdf versions for the clientele.	multiple
Aug 19, 2019	I was interviewed for the Growing the Valley podcast to discuss my research findings and observations on brown marmorated stink bug (https://bit.ly/2H4zMIJ)	1
Building Sustainable Agro-Ecosystems Through Enhanced IPM Practices (3)		
Oct 1, 2019 - Sep 30, 2021	I created and ran the IPM Corner website. The website contains research and extension materials that are useful for the public. The website accumulated 1569 visits worldwide during the two years, with maximum visits from the United States, followed by Australia.	1,569
Dec 2, 2020	I participated and presented the walnut pest management research update at the California Walnut Board-Entomology Workgroup. This group meets every year and sets the research priorities in multiple pest management topics. My contribution to the discussion was to highlight entomology research needs, based on which CWB research committee prepares project priorities every year.	1
Feb 2016-Sep 2019	Activity in my professional Twitter, @IPMadvisorNSJV. 426 agriculture and pest management professionals and organizations are following me on Twitter, with 210 tweets about insect pest issues with pictures. Twitter is one of the most efficient ways to	multiple

Begin Date - End Date	Description	No. of Instances
	communicate with clientele to create awareness about pest management issues. It also provides a powerful platform to connect with commodity boards, stakeholders, Ag-focused media and newsletters, and others.	
Impacts of Climate Change to Pests, and Search for Mitigating Measures (1)		
Sep 24, 2021	Presented and contributed to UCANR-UC Merced The Climate Change Resiliency Forum, led by VP Humiston	1

Other (including TV and/or radio interviews/programs, newspaper/trade magazine interviews) (28)

Begin Date - End Date	Interviewed/Written By (optional)	Topic	Name of Media or Publication
Tackling Endemic and Invasive Pests for Protecting California Agriculture (14)			
Mar 11, 2021	Cecilia Parsons	BMSB targets peach crops	Progressive Crop Consultant Newsletter
Apr 21, 2021	Patrick Cavanaugh	Leaffooted bug can damage almonds	Ag Information Network Radio Program broadcasted information on leaffooted bug in almonds featuring my talk (https://www.aginfo.net/report/49227/California-Tree-Nut-Report/Leaffooted-Bug-Can-Damage-Almonds)
Jun 1, 2018 - Aug 31, 2018	AgFax Media	Arthropod pest activity in the northern San Joaquin Valley	AgFax Media (Agfax.com)
Sep 1, 2018	Cecilia Parsons	Brown marmorated stink bug in pistachio	West Coast Nut
Mar 26, 2018	David Eddy	Building an IPM program to fight fruit flies	Western Fruit Grower magazine (The article was cited in UC blog)

Begin Date - End Date	Interviewed/Written By (optional)	Topic	Name of Media or Publication
Sep 19, 2018	Todd Fitchette	Farm Advisors study pacific flathead borer infestation in walnuts	Western Farm Press (cited by ANR News Blog)
Jun 7, 2018	David Eddy	Brown marmorated stink bug officially deemed pest of California almonds. growing produce	Western Fruit Grower magazine (The article was cited in the blog of the UC Small Farm Program)
Oct 3, 2018	Dennis Pollock	Mating Disruption, an Effective Tool against Navel Orangeworm	Western Farm Press
Feb 2, 2019	Cecilia Parsons	Flatheaded borer invades walnuts	West Coast Nut-Orchard Management Monthly
Aug 1, 2019	Cecilia Parsons	Stink Bug Territory Expanding	West Coast Nut
Aug 19, 2019	Jeannette E. Warnert	UCCE advisor addresses severe brown marmorated stink bug damage in Turlock orchard	UCANR Green Blog
Aug 28, 2019	Christina Souza	Stink bug causing a problem in almonds	Ag Alert
Sep 10, 2019	Logan Hawkes	Troublesome stink bug found in the almond orchard	Western Farm Press
Sep 12, 2019	Eric Escalante	Why one bug is causing a stink for Stanislaus County farmers https://bit.ly/2w15p3B	Abc10 News
Building Sustainable Agro-Ecosystems Through Enhanced IPM Practices (13)			

Begin Date - End Date	Interviewed/Written By (optional)	Topic	Name of Media or Publication
Apr 28, 2021	FMC writers	SWD expands range and impact as insecticide resistance emerges https://ag.fmc.com/us/en/fmc-news/swd-expands-range-and-impact-insecticide-resistance-emerges	FMC Insights
Jun 1, 2020	Cecilia Parsons	Evaluating your risk of now in walnuts	West Coast Nut Blog
May 1, 2020	Cecilia Parsons	Control tools for mites in almonds. https://www.wcngg.com/2020/06/01/control-tools-for-mites-in-almonds/	West Coast Nut Blog
Oct 10, 2017	San Joaquin Sustainable Project	Almond dormant period pest management	YouTube video
Nov 7, 2017	Bob Curtis-Almond Board of California	Winter sanitation key to combating Navel orangeworm	Western Farm Press
Nov 15, 2017	Almond Board of California	Winter sanitation and navel orangeworm control	Newsroom
Dec 25, 2017	Almond Board of California	Mating disruption spells trouble for navel orangeworm, delivers value for growers	Newsroom
Jan 22, 2018	David Eddy	Almond growers should take a new look at BTs	Growing Produce
Mar 1, 2018	Cecelia Parsons	Best management practices of navel orangeworm in pistachio	West Coast Nut Magazine
Oct 31, 2018	Jeannette E. Warnert	10th Americas Competitiveness Exchange Tour	ANR Report

Begin Date - End Date	Interviewed/Written By (optional)	Topic	Name of Media or Publication
Nov 16, 2018	Logan Hawkes	Sanitation is the foundation of navel orangeworm control	Western Farm Press
Dec 4, 2018	Matthew Malcolm	Youtube video on the effective use of mating disruption in navel orangeworm control program https://bit.ly/3bl2i6O	Pacific Nut Producer CaliforniaAgNet
May 2, 2019	Cecilia Parsons	No early codling moth pressure	West Coast Nut
Impacts of Climate Change to Pests, and Search for Mitigating Measures (1)			
Sep 30, 2021	Katherine Jarvis-Shean and Joseph Connell	California Almonds: Climate & Management Considerations for Future Orchards. https://agfax.com/2021/09/30/california-almonds-climate-management-considerations-for-future-orchards/	AgFax News article cited my research
Oct 27, 2020	Jeannette E. Warnert	A hike in navel orangeworm pressure expected later this century due to climate change https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=44034	UCANR Green Blog
Sep 7, 2020	Phoebe Gordon	Climate Change Part 5: Navel Orangeworm with Tapan Pathak and Jhalendra Rijal. https://www.growingthevalleypodcast.com/podcastfeed/2021/8/18/climate-change-part-5-navel-orangeworm	Growing the Valley Podcast

F. Publications (Bibliography)

	Current Cycle (10/1/2019 – 9/30/2021)	Previous Cycle (10/1/2017 – 9/30/2019)	Total*
Peer Reviewed	8	5	**13**
Non-Peer Reviewed			
A - Popular articles; newsletter stories, UC Delivers	34	24	**58**
B - Technical reports, curricula and articles	10	10	**20**
C - Abstracts, other research materials	2	8	**10**
Total	**54**	**47**	**101**

** Total for the four-year period in Associate Rank.*

PEER REVIEWED

October 1, 2019 - September 30, 2021

1. Rijal, J.P., A.L. Joyce, and S. Gyawaly. 2021. Biology, ecology, and management of hemipteran pests in almonds orchard systems in the United States. Journal of Integrated Pest Management 12.1; 24. https://doi.org/10.1093/jipm/pmab018
2. Gireesh, M., **J.P. Rijal**, and S.V. Joseph. 2021.Spatial Distribution of Hunting Billbugs (Coleoptera: Curculionidae) in Sod Farms. Insects **2021**, 12(5), 402; https://doi.org/10.3390/insects12050402
3. Gyawaly, S., **J.P. Rijal**, and S.V. Joseph. 2021. *Bagrada hilaris* (Bagrada bug or Painted Bug). https://www.cabi.org/isc/datasheet/8302. In: CABI Invasive Species Compendium. CAB International.
4. Haviland, D.R., **J.P. Rijal**, S. M. Rill, B. S. Higbee, C. S. Burks, and C. A. Gordon. 2021. Management of Navel Orangeworm (Lepidoptera: Pyralidae) Using Four Commercial Mating Disruption Systems in California Almonds. Journal of Economic Entomology. https://doi.org/10.1093/jee/toaa297
5. Fisher, J.J, **J. P. Rijal**, and F. G. Zalom. 2020. Temperature and humidity interact to influence brown marmorated stink bug (Hemiptera: Pentatomidae), survival. Environmental Entomology. https://doi.org/10.1093/ee/nvaa146
6. Pathak, T.B., **J. P. Rijal**, and M. Maskey. 2020. Impact of Climate Change on Navel Orangeworm, a Major Pest of Tree Nuts in California. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2020.142657
7. Shrestha*, G., **J. P. Rijal***, and G.V.P. Reddy. 2020. Characterization of the spatial distribution of alfalfa weevil, *Hypera postica,* and its natural enemies, using geospatial models. Journal of Pest Management. https://doi.org/10.1002/ps.6100. (* = equal contribution).

8. **Rijal, J.P.**, and F.G. Zalom. 2020. Provisional guidelines for brown marmorated stink bug control in almond. UC Statewide IPM Program Guidelines, http://ipm.ucanr.edu/PMG/r3303211.html.

October 1, 2017 - September 30, 2019

1. Joseph, S. V., and **J. P. Rijal.** 2019. Walking capacity of *Lygus hesperus* fifth instars in the laboratory and outdoors. Southwestern Entomologist 44(2): 403-408. (Article link).
2. **Rijal, J. P.**, and S. Gyawaly. 2018. Characterizing brown marmorated stink bug injury in almond, a new host crop in California. Insects. 9(4), 126. https://doi.org/10.3390/insects9040126. (Article link)
3. Baspinar, H., D. Doll, and **J. P. Rijal.** 2018. Pest management in organic almonds. *In:* The handbook of pest management in organic farming (Eds. Vincenzo Vacante and Serge Kreiter). pp. 328-347.
4. **Rijal, J.P.**, R. Regmi, R. Ghimire, K.D. Puri, S. Gyawaly, S. Poudel. 2018. Farmers' knowledge on pesticide safety and pest management practices: a case study of vegetable growers in Chitwan, Nepal. Agriculture. 8, 16.
5. **Rijal, J. P.** and L. D. Godfrey. 2018. Efficacy of selected bio-and reduced-risk insecticides on mint root borer. Arth. Manag. Tests (**Editor-reviewed**). 43(1), 1 January 2018, tsx134.

NON-PEER REVIEWED

A - Popular articles, newsletter stories, UC Delivers

Oct. 2019 – Sept. 2021

1. **Rijal, J. P.**, C. Burks, and H. Wilson (2021). Tackling the rising tide of navel orangeworm in walnuts. Orchard Origin Blog, California Walnut Board. Published January 6, 2021. https://walnuts.org/blog/orchard-origins/tackling-the-rising-tide-of-navel-orangeworm-in-walnuts/.
2. **Rijal, J. P.**, and S. Gyawaly (2021). Spring season pest monitoring activities in almond orchards. West Coast Nut. February Issue. pp. 24-31.
3. **Rijal, J. P.**, (2021). Removal of infested branches helps to minimize flatheaded borer damage in walnuts. The Scoop. UCCE Stanislaus, December 2020, Vol. 25.4.
4. **Rijal, J. P.**, T. Pathak, and P. Gordon. (2021). Climate change part 5: navel orangeworm. Growing the Valley Podcast. P. Gordon. Published September 7. https://www.growingthevalleypodcast.com/podcastfeed/2021/8/18/climate-change-part-5-navel-orangeworm
5. **Rijal, J. P.,** (2021). How Nut Growers Can Get the Best of Brown Marmorated Stink Bug. Growing Produce, April 21. https://www.growingproduce.com/nuts/how-nut-growers-can-get-the-best-of-brown-marmorated-stink-bug/
6. **Rijal, J.P.** and T. Pathak. (2021). Potential effects of drought and climate change on insect pests including navel orangeworm. West Coast Nut. July Issue. pp 8-12.
7. **Rijal, J. P.**, and C. Burks. (2021). Navel orangeworm monitoring tools for orchards under mating disruption. The Scoop. UCCE Stanislaus. April Issue. Vol. 26.1.
8. Haviland, D., and **J. P. Rijal.** (2021). Are 'May Sprays' a low-hanging fruit to cut almond costs in 2021? West Coast Nut. Published April 9. http://www.wcngg.com/2021/04/09/are-may-sprays-a-low-hanging-fruit-to-cut-almond-costs-in-2021/
9. Coatney, K. and **J.P. Rijal.** (2021). Walnuts, navel orangeworm and ethephon for 2021. K. Coatney (Ed.). West Coast Nut. https://www.wcngg.com/2021/08/11/walnuts-navel-orangeworm-and-ethephon-for-2021/
10. Green, J. and **J. P. Rijal.** (2021). Believe it or not: bugs like almonds too. Entomology Today, Entomological Society of America. Published June 17, https://entomologytoday.org/2021/06/17/true-bugs-almonds-pests-hemiptera-integrated-pest-management/
11. **Rijal, J.P.** (2021). Resurgence of Pacific flatheaded borer in walnut orchards and ongoing research efforts. 2020 Stanislaus County Agricultural Report. pp. 24-25.
12. **Rijal, J.P.** and T. Chalstrom. (2021). Pest management in spring season. My AgLife podcast. Published March 19. https://anchor.fm/myaglife/episodes/31921---MyAgLife-Episode-57-Exclusive-Interview-with-UCCEs-Jhalendra-Rijal-about-Spring-Season-Pest-Monitoring-Activities-in-Almond-Orchards-esulgj.
13. **Rijal, J.P.** and T. Chalstrom. (2021). Managing stink bugs in almonds. My AgLife podcast. Published June 25. https://anchor.fm/myaglife/episodes/62521---MyAgLife-Episode-71-Interview-with-UCCEs-Jhalendra-Rijal-about-Managing-Stink-Bugs-in-Almond-e13d1ff

14. **Rijal, J.P.** (2021). Brown marmorated stink bug (BMSB): identification and monitoring in almond orchards -Video. UC Statewide IPM Program. Published September 7. https://www.youtube.com/watch?v=fc2qv7YtaWU.
15. **Rijal, J.P.** (2021). Walnut orchard tasks. Pacific Nut Producer. February Issue. pp. 42-47.
16. Parsons, C. **J. P. Rijal**, D. Haviland, G. Brar. (2020). Dormant monitoring and control for San Jose scale. C. Parsons (Ed). West Coast Nut. http://www.wcngg.com/2020/11/18/dormant-monitoring-and-control-for-san-jose-scale/
17. J. Warnert, T. Pathak, and J.P. **Rijal,** and (2020). A hike in navel orangeworm pressure expected later this century due to climate change. UCANR Green Blog. October 27, 2020. https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=44034
18. **Rijal, J. P.**, C. Burks, and S. Gyawaly (2020). Exploring navel orangeworm monitoring tools for almond orchards under mating disruption. CAPCA Adviser. December Issue. pp. 36-40.
19. Rijal, J.P. and T. Chalstrom. (2020). Spring insect pests monitoring in walnuts. My AgLife podcast. Published December 10. https://anchor.fm/myaglife/episodes/Planning-for-Spring-Pest-Management-in-Walnuts--My-Ag-Life-Episode-42-enl4tq
20. Allen, J., **J. P. Rijal**, K. Tollerup, and T. Michaelides (2020). Nut growers preoccupied with pests, diseases. Western FarmPress. Published Demember 16. https://www.farmprogress.com/tree-nuts/nut-growers-preoccupied-pests-diseases
21. **Rijal, J. P.**, and P. Gordon. (2020). Spotted wing drosophila. Growing the Valley Podcast. P. Gordon. Published May 12. https://www.growingthevalleypodcast.com/podcastfeed/2020/5/12/spotted-wing-drosophila-with-jhalendra-rijal
22. **Rijal, J. P.**, (2020). ID, monitoring, and management of plant bug and stink bugs in almond orchards. The Scoop. UCCE Stanislaus, April Issue, Vol. 25.2.
23. **Rijal, J. P.**, (2020). IPM Task at Harvest: Identifying Insect Pest Damage Through Harvest Sampling. The Scoop. UCCE Stanislaus, July Issue, Vol. 25.3.
24. Rijal, J.P. (2020). Managing spotted wing drosophila in cherry and blueberry orhards. UCCE Tree & Vine blog. Published April 16. https://www.sjvtandv.com/blog/managing-spotted-wing-drosophila-in-blueberry-and-cherry-orchards-in-california
25. **Rijal, J. P.** (2019). Increasing evidence of Pacific flatheaded borer attack in walnut orchards in California. West Coast Nut. November Issue. pp. 28-32.
26. **Rijal, J. P.** (2020). Identifying insect pest damage through harvest sampling. Pacific Nut Produeer. Published August 27. https://pacificnutproducer.com/2020/08/27/identifying-insect-pest-damage-through-harvest-sampling/
27. **Rijal., J. P.** (2020). Reports of lilac borer infestation in commercial olive orchards in the North San Joaquin Valley. Field Notes. UCCE San Joaquin County. May Issue.
28. **Rijal, J. P. (**2020). Insect pests and pest management updates. AgFax Tree Crops Updates. Contributed to six issues from February thourgh June.
29. Parsons, C. and **J. P. Rijal** (2020). Control tools for mites in almonds almond. C. Parsons (Ed.). West Coast Nut. Published June 1.

30. **Rijal, J. P.** (2020). Walnut husk fly: understanding the biology, monitoring and management of this common pest in walnut. West Coast Nut. June Issue. pp. 44-48.
31. **Rijal, J. P. and M. Lies** (2020). Brown marmorated stink bug emerging as a significant pest in walnuts. M. Lies (Ed.). West Coast Nut. April Issue. pp. 72-75.
32. **Rijal, J. P.**, and S. Seybold. (2019). Pacific flatheaded borer as a resurgent pest of walnuts in California: background, questions, and future research needs. CAPCA Advisor, December Issue. pp. 41-47.
33. Haviland, D.R., and **J. P. Rijal**. (2019). Mating disruption for navel orangeworm available for organic nut crops. Organic Farmer. October/November Issue. JCS Marketing. pp. 16-20.
34. Hawkes, L. D. R. Haviland and **J.P. Rijal.** (2019). Orchard sanitation remains critical for NOW management. L. Hawkes (Ed.). Western Farm Press. Published December 4.

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1. **Rijal, J. P.** (2019). Importance of Integrated Pest Management (IPM) in managing arthropod pests in organic nut production in California. Organic Farmer, Vol. 2, Issue 4. pp 44-46.
2. **Rijal, J. P.** (2019). Seasonal pest management task: insect monitoring in almond and walnut orchards. West Coast Nut. April Issue. pp. 10-17.
3. **Rijal, J. P.,** and P. Gordon. (2018). Brown Marmorated Stink Bug. Growing the Valley. P. Gordon. www.growingthevalleypodcast.com/
4. Haviland, D., **J. P. Rijal**, E. Symmes. (2019). IPM Advisors demonstrate mating disruption for key almond pests. UC Delivers. Published: June 28, 2019. https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=30619
5. **Rijal, J. P. (**2019). Insect Pest Updates (3/1, 3/23, 4/12, 4/25, 6/1, 6/15, 7/15) on the AgFax Tree Crops Updates.
6. **Rijal, J.P**. and C. Parsons (2019). Almond and pistachio growers need to be on the lookout for BMSB. (Editor: C. Parsons). West Coast Nut. February Issue. pp 38-41.
7. **Rijal, J.P.** (2019). California Almonds, Walnuts: Trapping Options – Quick Overview. AgFax News (March 3), https://agfax.com/2019/03/23/california-almonds-walnuts-trapping-options-quick-overview/
8. **Rijal, J. P.** (2019). Where does the husk fly go during the winter: exploring the overwintering biology of the walnut husk fly in walnuts. CAPCA Adviser (February)
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12. **Rijal, J. P.** (2018). Old pest-new problem: Infestation of Pacific flatheaded borer in walnuts in the northern San Joaquin Valley. Field Notes Newsletter (November).

13. **Rijal, J. P.** (2018). Understanding the Overwintering Biology of the Husk Fly—A Research Update. Field Notes Newsletter (August).
14. **Rijal, J. P.** (2018). California almonds: what to expect from third now flight in upper SJV. Ag Fax Update (August 13), https://agfax.com/2018/08/13/california-almonds-what-to-expect-from-third-now-flight-in-upper-sjv/
15. **Rijal, J. P.** (2018). New Pest of Almond: The knowns and unknowns of brown marmorated stink bug in California. Progressive Crop Consultant (July/August). (Article link)
16. Martin, T., and **P. Rijal.** (2018). Brown marmorated stink bug moving into agriculture. The IPM Corner Blog (June).
17. **Rijal, J.** (2018). Mating disruption and navel orangeworm. UCCE Stanislaus Walnut News (Spring).
18. **Rijal, J. P.**, and D. Haviland. (2018). Integration of mating disruption into management programs for navel orangeworm. West Coast Nut (June). (Article link)
19. Burks, C., E. Symmes, and **P. Rijal.** (2018). Monitoring and treatment of navel orangeworm (NOW) in walnuts: a research update. Progressive Crop Consultant (March/April).
20. **Rijal, J. P.** (2018). Insect pest monitoring for tree crops (Bloom-Spring). UCCE Field Notes Newsletter (February).
21. Haviland, D., E. Symmes, **P. Rijal,** and K. Tollerup. (2017). Evaluation of the role of chlorpyrifos in almond production systems. CAPCA Adviser (December).
22. **Rijal, J. P.** (2017). Brown marmorated stink bug becomes established in Stanislaus County orchards. 2016-Stanislaus County Crop Report. 17p.
23. **Rijal, J. P. (2017)**. Invasion of brown marmorated stink bug (BMSB): Orchard pest update-peach growers beware. Vol. 34 (September/October, Issue 4). pp. 8-11.
24. **Walker, M.** and J. P. Rijal (2017). What lies beneath: grape root borer in eastern vineyards. Entomology Today artiel (featuring Rijal's work on grape root borer). M. Walker (Ed.). Dec. 14,

B - Technical reports, curricula and proceeding articles

Oct. 2019 – Sept. 2021

1. **Rijal, J.P**., R. Bansal, A. Joyce, and S. Gyawaly. (2021). Biology, monitoring, and management of native and invasive stink bugs in almond orchards. Research Update, Almond Board of California, June.
2. **Rijal, J.P.** and S. Gyawaly. (2021). Flatheaded borer in specialty crop. Year 1 California Report submitted to the USDA SCRI team, Tennessee State University.
3. **Rijal, J.P.** (2021). Refining sustainable navel orangeworm management in California almond. Biannual Research Report, Specialty Crop Block Program, California Department of Food and Agriculture (CDFA).
4. Martin, T. and **J. P. Rijal.** (2020). IPM programs may need to change as the climate changes. UCIPM Annual Report Highlights. https://www2.ipm.ucanr.edu/highlights/2020/IPM_programs_may_need_to_change_as_the_climate_changes/

5. Martin, T. and **J. P. Rijal.** (2020). Brown marmorated stink bug now an agricultural pest in almond. UCIPM Annual Report Highlights, UC Statewide IPM Program. https://www2.ipm.ucanr.edu/highlights/2019/Brown_marmorated_stink_bug_now_an_agricultural_pest_in_almond/
6. **Rijal, J.**P. and S. Gyawaly. (2020). Exploring new and alternative insecticides for resistance management of spotted wing drosophila in cherries. Annual Research Report. California Cherry Board.
7. Windbiel-Rojas, K. and **J.P. Rijal.** (2020). Monitoring of brown marmorated stink bug in the Sacramento Delta pear orchards. Annual Research Report. California Pear Advisory Board.
8. **Rijal, J.P.**, F. Zalom, and J. Fisher. (2019). Biology, monitoring and management of brown marmorated stink bug in almond orchards. Final Report, Almond Board of California.
9. **Rijal, J. P.** (2019). Monitoring of brown marmorated stink bug (BMSB) in the northern San Joaquin Valley peach orchards. Annual Research Report. California Cling Peach Board.
10. **Rijal, J. P.** and S. Seybold. (2019). Biology and control of Pacific flatheaded borer in walnuts. Annual Research Report. California Walnut Board.

Oct. 2017 – Sept. 2019

1. **Rijal, J.P.**, and S. Seybold. (2019). English walnut production and the factors affecting flatheaded borers and their management in California. Proceedings of the Flatheaded Borer Workshop, July 1-2, 2019, Tennessee State University, McMinnville, TN. pp. 32-36.
2. **Rijal, J. P.**, A. Medina, R. Duncan, J. Fisher, and F. Zalom. (2019). Monitoring and abundance of brown marmorated stink bug in peach and almond orchards in the northern San Joaquin Valley. Proceedings of the California Plant and Soil Conference, American Society of Agronomy-California Chapter, 5-6 February 2019. pp 81-86.
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4. **Rijal, J. P.** (2018). Developing sampling methods for pre-season mite detection in almonds. Final Report. Almond Board of California.
5. **Rijal, J.**P. (2018). IPM Advisors Report. Annual Progress Report submitted to the UC IPM Program, UCANR.
6. **Rijal, J. P.** (2017, 2018). Monitoring of brown marmorated stink bug (BMSB) in the northern San Joaquin Valley peach orchards. Technical Report submitted to the California Cling Peach Board.
7. **Rijal, J. P.** (2017). Efficacy of various insecticides for navel orangeworm control. Technical Report submitted to Syngenta.
8. **Rijal, J. P.** (2017). Measuring the depth of the husk fly overwintering pupae in walnut orchard floor. Technical Report submitted to California Walnut Board.
9. **Rijal, J. P.** (2017). Biology, monitoring, and management of brown marmorated stink bug in almond orchards. Research Update. Almond Board of California.
10. **Rijal, J. P.** (2018). Biology, monitoring, and management of brown marmorated stink bug in almond orchards. Research Update. Almond Board of California.

C - Abstracts, posters, and other outreach materials

Oct. 2019 – Sept. 2021

1. **Rijal, J.P.** (2019). Comparing navel orangeworm monitoring tools under mating disruption. Poster presented at the annual conference of Almond Board of California, 10-12 December, Sacramento, CA.
2. **Rijal, J.P.** (2017). New pest update: reports of brown marmorated stink bug (bmsb) infestation in peach and almond orchards in California. Poster. Almond Board of California Annual Conference, 5-7 December, Sacramento, CA.

Oct. 2017 – Sept. 2019

1. **Rijal, J.P.**, A. Medina, J. Fisher, F. Zalom. (2019). Characterization of brown marmorated stink bug (bmsb) feeding damage in California almonds. Abstract. 93rd Orchard Pest and Disease Management Conference, 9-11 January, Portland, CA.
2. **Rijal, J.P.** (2017). New pest update: reports of brown marmorated stink bug infestation in peach and almond orchards in California. Poster. Almond Board of California Annual Conference, 5-7 December, Sacramento, CA.
3. **Rijal, J. P.** (2018). Invasion of brown marmorated stink bug in California agriculture. Poster. ANR Statewide Conference, 9-12 April, Lancaster, CA.
4. **Rijal, J. P.** (2018). Developing sampling methods for pre-season mite detection in almonds. Poster. Almond Board of California Annual Conference, 5-7 December, Sacramento, CA.
5. Haviland, D., S. Rill, **J. P. Rijal** and E. Symmes. (2018). Demonstration and implementation of IPM in Almonds. Poster. Almond Board of California Annual Conference, 5-7 December, Sacramento, CA.
6. **Rijal, J. P.**, K. Tollerup, and F. Zalom (2018). Development of sampling methods for pre-season mite detection in almonds. Abstract. 92nd Orchard Pest and Disease Conference, 10-12 January, Portland, OR. page 17.
7. **Rijal, J. P.** (2018). An update on brown marmorated stink bug spread to the agricultural crops in the northern San Joaquin Valley, California. Abstract. 92nd Orchard Pest and Disease Conference 10-12 January, Portland, OR. page 30.
8. **Rijal, J.P.**, A. Medina, J. Fisher, F. Zalom. (2019). Monitoring and characterization of feeding damage by brown marmorated stink bug in almonds. Poster. American Society of Agronomy-California Chapter, Feb 5-6, 2019, Fresno, CA.

Publication Examples

Publication 1. Rijal, J.P., A.L. Joyce, and S. Gyawaly. 2021. Biology, ecology, and management of hemipteran pests in almonds orchard systems in the United States. Journal of Integrated Pest Management 12.1; 24. https://doi.org/10.1093/jipm/pmab018

Description: *While the information on pest biology and management practices of many common almond pests, such as navel orangeworm, Amyelois transitella is more developed and readily available, there is a lack of pertinent information on many other pest groups – the major one being the hemipteran pests. Although there are some information about hemipteran pests, most of the information is scattered and developed from other crops, not necessarily applicable to almonds. So, I came up with this idea to put together all information in one peer-reviewed publication. Also, my work on brown marmorated stink bug in the last 5 years is incorporated into this article. Once we wrote this article, that opened up research ideas for us. With three other collaborators, I submitted a proposal and obtained funding for three seasons from the Almond Board of California. The project aims to create an inventory of hemipteran pests, determine phenological information, and ultimately develop better monitoring and management tools for major hemipteran pests in almonds.*

Publication 2. Pathak, T.B., J. P. Rijal, and M. Maskey. 2020. Impact of Climate Change on Navel Orangeworm, a Major Pest of Tree Nuts in California. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2020.142657

Description: *I have contributed since the inception of this study concept. I was the only entomologist in this paper who has expertise on navel orangeworm biology, economic damage, and knowledge about current degree-day models. I wrote the navel orangeworm portions of the article and heavily contributed to the discussion. The other two co-authors contributed their expertise on climate modeling and conducted data analysis to produce results. After this paper was published, I have received several requests to present these results to the professional settings, multiple ANR workgroups, and industry extension meetings. This publication is the first of its kind looking at the direct impact of climate change on the major pest of high-value nut crops in California. This also opened to explore other ideas to do similar work focusing on other pests; one of them is at work.*

Publication 3. Rijal, J.P., and F.G. Zalom. 2020. Provisional guidelines for brown marmorated stink bug control in almond. UC Statewide IPM Program Guidelines http://ipm.ucanr.edu/PMG/r3303211.html

Description: *This publication has all of my work on invasive brown marmorated stink bug (BMSB) in the last five years in almonds. This publication is intended for the growers and pest control practitioners and scientists., Since almond is the new host of this pest, this is the most comprehensive practical information source for growers to understand the pest biology, utilize monitoring methods, and ultimately manage the pest based on the products listed in the article. So, I am very proud of this publication. I prepared the entire draft and received inputs and edits from the second author, Frank Zalom, before the UCIPM internal peer-review process.*