99th Orchard Pest & Disease Management Conference

Keynote address:

From Avocados to Almonds, My Journey in Agricultural Entomology

Brad Higbee
Trécé Inc.

Hilton Portland, Portland, Oregon
January 15th – 17th, 2024

Keynote Speaker: Brad Higbee

Brad is currently the Field R & D Manager for Trécé Inc, a biotechnology company specializing in insect pheromone and kairomone products. He was formerly the Director of Entomology Research at Wonderful Orchards (2002-2017), the largest grower and processor of almonds, pistachios and pomegranates in the world. After graduating from the University of California, Irvine (B.S., Biological Sciences), he began his career as a technician with the USDA-ARS in Yakima, Wash. From 1978 to 1990, he worked on the development of biological control programs for pests of pears and insect predator rearing techniques. He continued his studies at U.C. Berkeley, Central Wash. Univ., Heritage College and Washington St. Univ. and was promoted to the level of scientist in 1990. His research shifted to various aspects of apple and pear pest management, including pioneering work in the use of insect hormones for the control of pear psylla, a key homopteran pest of pears in the Pacific Northwest. In 1995, he was further promoted and assigned to manage two Codling Moth Areawide Projects, which were pivotal in the integration of mating disruption into the pest management programs of the apple and pear industries. In 2002, he accepted a position with Paramount Farming Co. and established a research laboratory. His work with Paramount (now Wonderful Orchards) included research leading to the implementation of mating disruption for control of navel orangeworm, development of pheromone and kairomone attractants, and the overall development of pest management tactics and programs for pests in almonds, pistachios and pomegranates. From early in his career, he was focused on practical pest management solutions that assisted growers in achieving sustainable economic viability.

Brad attended his first WOPDMC meeting in 1979 and was an active (sometimes over active!) participant until 2020. He has published over 70 research articles in peer reviewed scientific journals, 4 book chapters and has served on numerous industry and professional committees, including serving as President of the Pacific Branch of the Entomological Society of America in 2018.

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99th Annual Orchard Pest and Disease Management Conference

Artwork: ***Peter's Tree*** by Betty LaDuke Westigard.

Orchard Pest and Disease Management Conference
2025 Agenda

Below is the order in which the sessions will be given and the projected time slot in which they will occur. Note that the agenda is NOT a fixed time schedule and the actual time at which you are called to give your talk may vary.

Wednesday, January 15th	
8:00 AM – 9:00 AM	**Registration/Name Tag Pickup**
9:00 AM – 10:00 AM	**Opening Business**—Tobin Northfield, OPDMC Chair
10:00 AM – 11:30 AM	Biology/Phenology– Chris Adams (Oregon State University)
11:30 AM –1:00 PM	**Lunch (on your own)**
1:00 PM – 2:00 PM	Biology (cont.)
2:00 PM – 2:30 PM	Mating Disruption -
2:30 PM – 3:00 PM	**Coffee Break**
3:00 PM – 4:00 PM	Mating Disruption (cont.)
3:15 PM – 4:00 PM	Implementation -
4:00 – 5:00 PM	**Keynote Address: Brad Higbee** From Avocados to Almonds, My Journey in Agricultural Entomology
5:00 PM	**Adjourn**
5:00 PM – 7:00 PM	**No Host Mixer (Hilton Lobby)**
Thursday, January 16th	
8:00 AM – 8:15 AM	Implementation
8:15 AM –10:00 AM	Thresholds/Monitoring -
10:00 AM – 10:30 AM	**Coffee Break**
10:30 AM – 10:45 AM	Thresholds/Monitoring
10:45 AM – 11:30 AM	Biological Control
11:30 AM – 1:00 PM	**Lunch (on your own)**
1:00 PM – 2:00 PM	Biological Control
2:00 PM – 2:30 PM	Pathology -
2:30 PM – 3:00 PM	**Coffee Break**
3:00 PM – 3:30 PM	Invasive Species -
3:30 PM – 5:00 PM	Chemical Control -
3:30 PM	**Adjourn**
Friday, January 17th	
8:00 AM – 8:15 AM	Chemical Control
8:15 AM – 9:45 AM	Late Submission talks
9:45 AM – 10:45 AM	**Closing Business -** *OPDMC Chair; Tobin Northfield*
10:45 AM	**Adjourn**

Orchard Pest and Disease Management Conference
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For more information, see: http://opdmc.org/

Order of Presentations

FOR THE 99th ANNUAL

ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

January 15, 16, & 17, 2025

Keynote Presentation: Wednesday, 4:00pm – 5:00pm

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Brad Higbee
Trécé Inc.

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Biology/Phenology

Moderator: Christopher Adams (OSU)

Digging for worms: Filbertworm Development Through the Hazelnut Growing Season

Betsey Miller[1], Vaughn Walton[1]
[1]Department of Horticulture, Oregon State University, Corvallis, OR

Keywords: Filbertworm, *Cydia latiferreana*, hazelnut, development, phenology, diapause

Abstract: Filbertworm (*Cydia latiferreana*) is a key pest of hazelnut production in Oregon. Larvae enter into nuts to feed, which results in unmarketable crop. Though it is generally accepted, that filbertworm (FBW) have just one generation per year in the Pacific Northwest, the period of adult flight can last from June through September. To assess the susceptibility of hazelnut clusters to filbertworm (FBW) damage from fertilization (in June) through kernel development and shell hardening to harvest (October), we conducted a semi-field trial on two cultivars on a commercial farm in Albany, Oregon in 2023. Observations from this trial indicated that FBW could complete their lifecycle on developing nuts early in the growing season, which is yet another part of a growing body of evidence that FBW can, in fact, have two generations in the Willamette Valley. In 2024, we repeated the crop susceptibility trial and expanded it to include destructive sampling of FBW-infested clusters during the growing season to better understand larval development within the developing crop.

On June 1, 2024, organza mesh bags were placed on branches with nut clusters to exclude them from FBW naturally occurring in the orchard. A set of bags were then infested with FBW eggs each week from June 4 to October 1. We bagged and infested enough clusters of each cultivar to allow for the collection of five samples per cultivar at three, four, five and six weeks after infestation. In the laboratory, all leaves and clusters were visually examined and/or dissected to note the stage of kernel development and search for developing FBW larvae. The life stage and location of each developing larvae was recorded.

Preliminary analysis indicates that eggs placed on clusters in June and early July can develop into adults during the growing season, feeding on the husk and the pericarp while the embryo and kernel are still developing. Eggs placed in mid-July and beyond appear to arrest their development at the last instar larval stage. These results suggest that there are cues for initiation of diapause in developing larvae, presumably related to photoperiod, that regulate development in the latter part of the growing season so FBW can overwinter as larvae. These data provide important information on the life cycle of FBW and the potential for multiple generations during the growing season.

Reevaluating Filbertworm, *Cydia latiferreana* (Walsingham) (Lepidoptera: Tortricidae), Phenology for Improved Degree Day Modeling

Natalie Lareau, Abby Dhone, Austin Carey, Eric Rudolph, Nik Wiman

Oregon State University

Key words: *Cydia latiferreana* , degree day modeling

Abstract: The Filbertworm (FBW), *Cydia latiferreana* (Walsingham) (Lepidoptera: Tortricidae), is the key pest of hazelnuts in Oregon's Willamette Valley, where 99% of the US crop is grown on roughly 95,000 acres. Low tolerance for damage (<1% nut infestation) necessitates spray treatments against FBW. While there is a simple degree-day model to guide management timing, preliminary data suggests poor model performance. The objective of this research is to develop a new foundation for a FBW degree-day model using data from a large smart trap network and intensive field sampling of immature stages. In 2022 and 2023 we worked with cooperators to deploy 400+ automated traps in orchards across the region. These data indicated a prolonged flight season beginning earlier and ending later than predicted with multiple peaks in capture rate and geographic differences in flight patterns. For field sampling in 2023, we collected 200 random shoots per week and searched for eggs and larvae on the leaves and nut clusters under a dissecting microscope. Eggs and larvae were classified by development stage and reared in the lab. We observed that oviposition occurred independently of developed nut clusters traditionally considered susceptible to infestation by FBW. In the early growing season, damage to nut clusters in early stages of development caused yield loss, and moths continued to oviposit after nuts had matured and dropped. In the lab, we found larvae completed development on leaves alone, raising questions about the necessity of nut kernel feeding. Flight and immature stage data demonstrated some evidence for bivoltinism.

Chrysobothris mali Identified as Flatheaded Borer Attacking Pear Fruit

Cindy R. Kron[1], Axel David Gonzalez Murillo[2], Clebson G. Gonçalves[3], Broc G. Zoller[4], Karla Addesso[5], William E. Klingeman[2], J. Kevin Moulton[2]

[1]University of California Agriculture and Natural Resources, Santa Rosa, CA; [2]University of Tennessee, Department of Plant Sciences; [3]UCANR, Lakeport, CA; [4]The Pear Doctor, Inc., Kelseyville, CA; [5]Tennessee State University, McMinnville, TN

Keywords: *Chrysobothris mali*, Pacific flatheaded borer, European pear, bartlett pear

Abstract: The family Buprestidae comprises over 15,500 species of metallic wood-boring beetles. The genus *Chrysobothris* includes over 690 species with at least 69 of those species found in California. One behavioral trait that these beetles have in common are that their larvae are wood boring. In August 2023, flatheaded borer larvae of an unknown species were found feeding in numerous Bartlett Pear fruits in four orchards in Lake County, CA. A larval sample sent to the California Department of Food and Agriculture was returned with a *Chrysobothris* species ID based upon morphological characteristics. DNA from four larval samples sent to the University of Tennessee were found to be consistent with that of the Pacific flatheaded borer, *Chrysobothris mali.* Forty-two larvae were collected and placed on an artificial diet to rear out to adults. Eight adults emerged and traditional morphological examination of a lab reared adult corroborated results of larval molecular identification. In August of 2024, visual surveys of ~113 acres were conducted in a subset of pear orchards located in three pear growing regions of Lake County, CA. *C. mali* damage was found in 5 organic orchard blocks within a 0.62-mile radius of the epicenter in Kelseyville CA. The Pacific flatheaded borer has a wide host range of at least 70 host species belonging to 40 genera in 21 different plant families. This is the first documented detection of a Buprestid attacking fruit indicating a possible behavioral shift by this species.

Spatial and within-tree vertical distributions of invasive C*arpophilus truncatus* in California's nut crops

Jhalendra Rijal, Mahesh Ghimire, Chang Vue, Houston Wilson, and Idong Mokwunye

University of California, Riverside

Key words: invasive species, C*arpophilus truncatus*, spatial distribution

Abstract: Studies were conducted in multiple almond and pistachio orchards in the San Joaquin Valley in 2024. Spatial distribution within the orchard was assessed by collecting samples from the orchard edge and interior of the orchards and assessing for *C. truncatus* damage in three almond orchards. Similarly, within the tree distribution of *C. truncatus*, abundance was assessed by collecting samples from three different canopy layers. The study showed that *C. truncatus* abundance is higher in the orchard edge compared to the interior. The lower canopy layer had the highest *C. truncatus* density compared to the top of the tree. Study results studies will be discussed in the context of *C. truncatus* biology and behavior and its implications in managing this pest in nut orchards.

What's in a Name? A Biosystematic Classification of *Colladonus* Vectors of Cherry X - Disease

W. Rodney Cooper[1], Adrian Marshall[1], Tamera Lewis[1], Jacob Pitt[2], Tobin Northfield[2] and David Horton[1]

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[2] Washington State University, Tree Fruit Research and Extension Center, Wenatchee, WA

Keywords: "*Candidatus* Phytoplasma pruni", *Colladonus,* mountain leafhopper, little cherry disease, stone fruit

Abstract: The cherry industry of the Pacific Northwest, especially Washington, is experiencing a renewed outbreak of X-disease responsible for substantial economic losses to the industry. Extensive surveys in the region provide evidence that the leafhopper *Colladonus montanus reductus* is a primary vector of the X-disease pathogen responsible to the ongoing outbreak. *Colladonus montanus reductus,* previously considered rare in Washington, is currently classified as one of three subspecies of *Colladonus montanus*. The remaining two subspecies include *C. m. montanus* and *C. m. mulsus.* The last major revision for this genus was published ~70 years ago with the acknowledgement of the need for further research to determine specific classification of species groups. Interpretation of historical reports on *Colladonus* vector biology are difficult to interpret largely because of the ambiguous classification of the leafhopper species. Our goal was to address *C. montanus* species boundaries based on morphological and ecological observations and molecular phylogenetics. We suggest that *C. m. reductus* should be elevated as a separate species, *C. reductus. C.* reductus differs from *C. montanus* in morphology of the male genitalia, absence of a yellow wing spot, genotypes of the 16S, CO1, 18S, and 28S barcoding genes, and structure of the male copulation song. In addition, *C. reductus* inhabits a wider range of habitats than *C. montanus* that includes arid and semi-arid deserts, sagebrush-dominated steppes, and irrigated orchards. These refined classifications for *Colladonus* more naturally define X-disease vectors and provide clarity for current and future studies on X-disease vector biology.

Groundcover Management for Reducing X-disease Spread

Abigail E. Clarke[1], Tawnee D. Melton[1], Adrian T. Marshall[2], and Tobin D. Northfield[1]

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Keywords: X-disease, "*Candidatus* Phytoplasma pruni", stone fruit, alternative hosts, groundcover management, cultural control, chemical control, herbicide

Abstract: X-disease (XD) is currently causing an epidemic in Washington stone fruit (cherry, peach, nectarine) orchards. In Washington State, the phloem-limited X-disease phytoplasma that causes this disease is vectored to *Prunus* trees by leafhopper feeding that develop on weedy hosts in the orchard groundcover. Most prominent broadleaf weeds in the orchard groundcover are commonly found to host X-disease phytoplasma as well as serve as feeding and reproductive hosts for vectors. Here, we report the results of two methods of groundcover management, 1) using broadleaf specific herbicides, and 2) planting competitive grasses to reduce the abundance of broadleaf hosts within orchard groundcovers and evaluate their impact on key leafhopper vectors in WA, relative to a no-treatment control. Herbicide treatments were evaluated in conventional cherry orchards, and the grass planting trial was evaluated in an organic peach orchard. Trials occurred in four locations within Washington State as complete randomized block experiments. Both methods significantly reduced leafhopper vector abundance in blocks with abundant leafhoppers. We discuss the value of managing alternative hosts as a key component of X-disease management.

Transmission Mechanics: X-disease Infection Rates of Stock and Supercharged Vectors

Adrian Marshall[1], Scott Harper[2], Cody Molnar[2], Abigail Clarke[3], Cesar Reyes-Corral[3], Tawnee Melton[3], Tobin Northfield[3], and W. Rodney Cooper[1]

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[3]Washington State University, Tree Fruit Research and Extension Center, Wenatchee, WA

Keywords: "*Candidatus* Phytoplasma pruni", leafhopper, *Colladonus*, latent period, stone fruit, *Prunus*

Abstract: An outbreak of the X-disease phytoplasma, which induces production of small unmarketable fruit, has caused the removal of vast amounts of cherry acreage in Washington State. A 1950's X-disease vector survey in Washington found six species of leafhopper capable of transmitting the pathogen, but relied solely on plant symptoms for confirmation. With the progression of molecular-based techniques, acquisition and transmission of X-disease can be confirmed using DNA presence allowing more precise validation and screening of potential vector species. From 2021-2022, we collected leafhoppers from 24 orchards across Central Washington during each of the three *Colladonus reductus* generation peaks (June, August, and October), sorted them by species, and tested them for X-disease phytoplasma using qPCR. From 2023- 2024, we conducted lab assays to determine the acquisition rate and latency period of *C. reductus* by providing highly infected cherry tissue (Ct < 25) for three days and testing for X-disease at 6, 13, and 20 days after acquisition. X-disease phytoplasma was not detected in any of the leafhopper species with unknown vector status. *C. reductus* was the most abundant leafhopper vector captured followed by *Euscelidius variegatus*. Both *C. reductus* and another vector, *C. geminatus*, had higher titers of X-disease phytoplasma in their heads later in the season, indicating a higher chance of transmission. When provided highly infected material, nearly half of the *C. reductus* acquired X-disease and were able to transmit within 20 days. These results will help to focus on the primary vector species of Washington and timelines for X-disease management.

Smarter Pest Monitoring: Using AI to Understand Environmental Drivers of Moth Emergence

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Keywords: oriental fruit moth, *Grapholita molesta*, phenology, precision agriculture, monitoring, IPM, stone fruit, peaches, apples, pome fruit

Abstract: Traditional methods for monitoring insect pests, done primarily by manually checking traps weekly, often lack the precision to account for environmental variations that affect pest development. Using new AI-powered photo traps, we can now monitor pest populations daily, providing detailed insights into how environmental factors influence pest activity. The Oriental fruit moth (*Grapholita molesta*, Busck) is an important agricultural pest in apple and peach orchards. We collected data across commercial orchards in seven different counties in Pennsylvania. This data was then combined with satellite and on-site weather monitoring to explore how regional environmental differences, such as temperature and humidity, impact moth flight activity. The objectives are to assess the influence of environmental conditions on the variations in moth capture rates across regions of Pennsylvania and to identify the similarities and differences between degree day development model estimations and daily moth capture rates. With more accurate models, orchard management can be better optimized which will allow for timely and targeted management practices that can reduce the need for pesticide applications and provide economic savings to tree fruit growers.

Survival and Development of Brown Marmorated Stink Bug on Four Hazelnut Cultivars

Edwin Harris[1] and Vaughn Walton[1]

[1]Oregon State University Dept. of Horticulture

Keywords: brown marmorated stink bug, *Halyomorpha halys*, hazelnut, *Corylus avellana*, phenology, development

Abstract: The brown marmorated stink bug, *Halyomorpha halys*, has emerged as an economic threat to hazelnut producers globally and was recently classified as a primary pest of this crop in the Pacific Northwest. Hazelnut, *Corylus avellana*, is susceptible to injury by *H. halys* from shell expansion until harvest, with the form of injury varying based on host phenology. The suitability of hazelnut as a developmental host for *H. halys*, which is highly polyphagous and benefits from a mixed host diet, has not been confirmed until now. By conducting feeding experiments on trees of four cultivars, we demonstrated that *H. halys* nymphs can develop to adulthood on a diet of hazelnut alone. Rates of development and survivorship increased between our first (Jul-Aug) and second (Aug-Sept) experimental periods in all cultivars except for Barcelona. Survival and physiological status of insects reared on a mixed diet and placed on hazelnut as adults did not differ among cultivars. Our findings indicate that host phenology and genetics influenced the suitability of hazelnut as a developmental host for *H. halys* nymphs.

Homologous Odorant Receptor in Tortricidae Moths Responds to Plant Derived Volatiles

Heidi Pullmann-Lindsley[1,2], William B. Walker III[3], Jason R. Pitts[1]

[1] Baylor University, Waco, TX, [2]George Fox University, Newberg, OR,
[3]USDA-ARS, Wapato, WA

Key words: Tortricidae, *Cydia pomonella*, odorant receptors, behavior

Abstract: Numerous species from the Lepidopteran family Tortricidae are prominent agricultural pests. Many of these pests lay eggs on fruit crops, resulting in a larval infestation and unprofitable produce. One modality through which the moth species can locate host plants is through olfaction. The codling moth, *Cydia pomonella,* has female-biased expression of a specific odorant receptor (CpomOR22), indicating that it may be involved in a female specific behavior, such as oviposition. Homologous receptors are found in two other tortrix moths: *Lobesia botrana,* the grapevine moth, and *Hedya nubiferana,* the green budworm moth. In this study we utilize the electrophysiological technique two-electrode voltage clamping to identify potential ligands of these receptors. Our study indicates that these receptors are tuned to the eleven carbon compounds undecanal and gamma-undecalactone, which have demonstrated behavioral influences in other moth and arthropod species. This can inform future behavioral studies and can contribute to a greater understanding of tortrix physiology and control strategies.

Mating Disruption/SIR

Moderator: Calliope Arkilic (UC Berkeley)

Alternatives to Gamma-Irradiation for Sterilization of navel Orangeworm (*A. transitella*) Used in Sterile Insect Technique

Lars Laber[1], Dylan Tussey[1], Charles Burks[2], Houston Wilson[1]

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Keywords: *Amyelois transitella*, treecrops, xray, electron beam, sterile insect technique,

Abstract: Navel orangeworm (*Amyelois transitella*) is a major pest on pistachios, almonds and walnuts in California. There, it causes massive losses in revenue for growers, not only by destroying crops (up to 30 % of total yield is possible) but also by higher management costs. Californian growers have spent 471 million USD in 2022 alone on conventional navel orangeworm management, which includes orchard sanitation and pesticides.

As part of an integrated pest management program, a sterile insect technique program focused on navel orangeworm is being developed and implemented in California. Navel orangeworm are mass reared, sterilized with a gamma-irradiator and then deployed to threatened areas, where they are supposed to mate with wild individuals and not produce offspring, therefore reducing the overall population.

Since the use of a gamma-irradiator carries inherent risks, dangers and additional costs, the US government is seeking alternatives to phase out gamma irradiators all around the country. Recently, electron beams have also moved into the spotlight since they operate on similar principles and are already in use to sterilize all kinds of goods in large quantities.

In this presentation, we want to show the effects of xray and eBeam sterilization on flight ability, longevity, oviposition and development of navel orangeworm. These are important factors in determining if the sterilized navel orangeworm are competitive in the field and can mate with wild individuals as intended.

Assessment of Oviposition of Codling Moth Controlled by Mating Disruption Augmented with Sterile Insect Releases

Broc Zoller[1], Charles Burks[2], Cindy Kron[3], and Clebson Goncalves[4]

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Keywords: codling moth, *Cydia pomonella*, oviposition survey, sterile Insect technique, cut fruit technique

Abstract: Codling moth (CM) control using mating disruption (MD) control augmented with sterile insect releases (SIR) was assessed in 3 northern California Bartlett pear blocks in 2 districts (Sacramento Delta and Lake County) in 2023 and 2024. The sites were chosen to assess the possibility of increasing CM control in blocks experiencing increasing moth trap catch the last few years, possibly from removals of neighboring blocks. Grid trap capture of wild and sterile released moths in these blocks, is described in another report at this meeting. This report assesses measurement of control using a cut fruit technique (Zoller - Seasonal Comparison of Monitoring Techniques for Codling Moth in Mating Disrupted Pear Orchards.pdf) to attract oviposition and facilitate sampling of eggs at each trap location. Oviposition sampling showed the likelihood of reduced control by MD on up wind edges. Increased control on these edges with SIR augmentation was not suggested at the rates of insect releases used in these tests (weekly release of 800 sterile CM/acre).

Assessing Compatibility of Mating Disruption and Sterile Insect Technique for Codling Moth (Lepidoptera: Tortricidae) in California Pear Orchards

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Keywords: codling moth, pear, California, mating disruption, SIT

Abstract: Codling moth (CM) is a key pest of pear in California, and addition of least-toxic pest management tactics is desirable to insure against loss of current tools for control. Sterile Insect Technique (SIT) for CM is long established in British Columbia and has been used commercially in Washington State, but more data on the performance and impact of sterile CM are needed for use in more southerly and warmer pome fruit orchards in California. An experiment was conducted in 2023 and 2024 to examine recovery and dispersal of released sterile CM and the impact on wild CM abundance and fruit damage. Sterile CM were released evenly over half of a 16- to 20-acre orchards from mid-April until the end of August. All orchards were under mating disruption for CM. Release were performed in the upwind half in 2023, and the downwind half in 2024. Recapture of CM was examined using a grid of 9 pear ester/acetic acid traps in an evenly-spaced 3 x 3 grid in each 10 acre plot. The trap overflooding ratio (sterile/wild CM in traps) varied widely between weeks, location, and year, with year-long ratios ranging from 0.8 to 16.9. The season-long recovery of sterile moths ranged from 0.2 to 0.8%. The proportion of sterile moths recovered in the adjacent comparison plot ranged from 20 to 37%, indicating a capacity for dispersal. Mating in wild females was greater in release blocks in 2023, whereas no trend was seen in 2024. These data indicate that both SIT release and orientation to prevailing wind influence the distribution and mating of sterile CM. Assessment of crop damage and impact of SIT treatments is discussed in a separate presentation.

Integrating Mating Disruption and Threshold Sprays for Managing Key Lepidopteran Pests in Non-Compliant Apple Orchards

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Keywords: codling moth, *Cydia pomonella,* oriental fruit moth, *Grapholita molesta,* integrated pest management

Abstract: Codling moth, *Cydia pomonella*, and oriental fruit moth, *Grapholita molesta*, are key drivers for pest management in apple orchard systems. A common tool is mating disruption deployed to prevent reproduction in orchard blocks; however, this strategy comes with recommendations for use in large, flat, uniform blocks, which do not align with many growers, particularly on the east coast. Here, we present results on integrating mating disruption into non-compliant apple blocks to reduce apple damage from these pests.

Utilizing Fluorescent Markers for Navel Orangeworm Mark-Release-Recapture Research in California Nut Crops

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Key words: UV fluorescent marker, external insect marker, dispersal, tree nuts

Abstract: The navel orangeworm, *Amyelois transitella* (Walker) (Lepidoptera: Pyralidae) is a key pest of almonds and pistachios in California. Its strong dispersal capacity can undermine localized management efforts, as its movement between orchards creates challenges for effective control. Understanding the timing and extent of this movement is crucial for improving pest management strategies. Mark-release-recapture studies offer a valuable approach to address this but require a reliable insect marker that is durable, easily identifiable, and minimally affects *A. transitella*'s behavior. We evaluated various colors of SmartWater fluorescent markers and a fluorescent powder for marking *A. transitella*, focusing on their retention time on the moths. Our results showed that green and yellow SmartWater and the powder marker were suitable for marking *A. transitella*. Retention of green and yellow SmartWater remained steady for up to 7 days, while the powder marker exhibited excellent retention, with a high proportion (0.9) of marked moths still carrying the powder after 14 days. We discuss future research directions and the application of these markers in future mark-release-recapture studies.

Enhancing Radiological Security in Sterile Insect Technique: X-Rays for Codling Moth (*Cydia pomonella*) Sterilization

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Keywords: Sterile Insect Technique (SIT), X-ray sterilization, Codling moth (*Cydia pomonella*), modular rearing

Abstract: M3 Agriculture Technologies and the Colville Confederated Tribes, in partnership with the National Nuclear Security Administration, Office of Radiological Security, and Sandia National Laboratories, developed a modular X-ray sterilization system to reduce the startup costs of Sterile Insect Technique (SIT) and facilitate the transition from gamma irradiation to X-rays. This project addresses the security and logistical challenges of isotopic sources like cobalt-60 and cesium-137 while advancing the state of the art in SIT programs. The team demonstrated X-ray sterility in codling moth (*Cydia pomonella*) on par with gamma irradiation, achieved precise dose uniformity ratios (DUR), which are critical for operational SIT programs, and released X-ray sterilized moths in 2024. The modular design supports cost-efficient scalability by providing smaller starting points for pilot projects and can integrate seamlessly into larger mass-rearing systems. This innovation transforms SIT programs, reduces reliance on high-activity radioactive sources, and strengthens Integrated Pest Management strategies.

Implementation

Moderator: Christopher Adams (OSU)

Comparing Pear Pest Management Across Regions

Molly Sayles[1], Robert Orpet[2], Chris Adams[3], Rebecca Schmidt-Jeffris[4], Louis Nottingham[5]

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Keywords: *Pyrus*, pear psylla, *Cacopsylla pyricola*, IPM

Abstract: The Pacific Northwest contains the top pear-growing regions in the country, and pear psylla is widely considered to be the top pear pest in these regions. Several major pear growing regions have been implementing integrated pest management (IPM) for pear psylla over the past couple of decades. However, some pear growing regions, such as the Wenatchee Valley of WA, is slower to implement these strategies and instead relies on broad-spectrum sprays, costing about $1500/acre in materials. Insect monitoring in 2024 confirmed Wenatchee experiences higher pear psylla pressure than Yakima and Hood River. To determine pest management practices between regions and barriers to IPM implementation, we conducted in-depth interviews of pear pest management stakeholders in major pear-growing locations: the Wenatchee and Yakima regions of WA, the Hood River and Medford regions of OR, Lake County, CA, and British Columbia, Canada. Our findings suggest that successful IPM implementation has been in response to consistent research or industry leadership. General differences between regions such as monoculture, tree size or cultivar, and weather may play a role, but perhaps are less important than widely thought. An understanding of what has enabled some regions to successfully implement pear IPM will inform developing an effective IPM program in Wenatchee.

Thresholds/Monitoring

Moderator: Roman Garzelloni
(UC Berkeley)

Development of a New Pheromone Lure for Leaffooted Bugs

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(2) Department of Environmental Science, Policy and Management, University of California - Berkeley

Key words: pheromone lure, leaffotted bug

Abstract: Leaffooted bugs (Coreidae: Leptoglossus spp.) (LFB) are a major pest of almonds, pistachios and pomegranates in California. Adults overwinter in aggregations within sheltered areas. In the spring, adult LFB disperse into almond orchards and feed on the developing new crop nuts, which negatively impacts crop yield and quality. Monitoring for LFB adults is currently very time and labor intensive, and no economic thresholds exist for this pest. As such, we set out to develop a trap and lure system for this pest based on the male-produced aggregation pheromone. Here, we present findings to date from our work to identify and synthesize the pheromone compounds, as well as confirm their attractiveness to LFB under field conditions.

Developing a Delta-Lactone lure for Monitoring WHF

Calliope Arkilic[1], Roman Garzelloni[1], Melissa Thayer[1], Dan Kuzmich[2], Spenser Walse[2], and Robert Van Steenwyk[1]

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Key words: Walnut husk fly, pheromone lure development, monitoring

Abstract: The walnut husk fly (WHF) is an important economic pest of walnuts. For the past three years, the Van Steenwyk laboratory has been working on developing the lure as a monitoring tool to be released commercially in the coming season. A discovery by Sarles et. al. in 2018 found a new pheromone, composed of δ (delta)-heptalactone and δ-hexalactone, in the head capsules of male WHF. Research continued by the Van Steenwyk laboratory in 2022 found that the lactones are aggregation pheromones attracting both males and females, the combination of the lactones with ammonium bicarbonate was more effective than ammonium bicarbonate or the lactones by themselves, polymeric plug lures were more effective than septa lures with a load rate of at least 200 mg in a polymeric plug. In 2023, it was found that δ-heptalactone caught more WHF than δ-hexalactone or AC earlier in the season, δ-hexalactone and AC have similar effectiveness, and the longevity is 4-5 weeks. In 2024, we found that impurities found in commercially available δ-heptalactone can be overcome by doubling the amount of lactone and the effectiveness of δ-heptalactone seems to be density dependent. The lure was additionally evaluated in different walnut growing regions of California. From the three years of research, we are recommending a use rate of 200 mg of pure δ-heptalactone or 400 mg of impure (50%) δ-heptalactone with a replacement of the lures every 4 weeks with or without commercial AC lures.

Improving Attract-and-Kill Methods of Walnut Husk Fly with Delta-Lactone

Calliope Arkilic[1], Roman Garzelloni[1], Melissa Thayer[1], Dan Kuzmich[2], Spenser Walse[2], and Robert Van Steenwyk[1]

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Key words: Walnut husk fly, attract and kill, monitoring

Abstract: Walnut husk fly (WHF) is a significant pest of walnuts and has increased in importance over the past 20 to 30 years. The discovery of the δ (delta)-heptalactone and δ-hexalactone aggregation pheromones has provided an opportunity to improve upon the current control and monitoring methods. Control of WHF is based on repeated applications of broad-spectrum insecticides to control adult populations. The repeated applications of broad-spectrum insecticides on a full cover or skip row cover application methods are not only costly but may result in secondary outbreaks of other insect and mite pests. The use of an attract-and-kill strategy can provide cost effective and efficacious control while limiting the exposure of foliage to the insecticide. Furthermore, initiation and evaluation of the efficacy of spray programs depend on the amount and timing of WHF caught in baited yellow sticky traps. Previous studies in 2022-2023 on the monitoring ability of the δ (delta)-heptalactone pheromones showed that lures containing δ-heptalactone were more effective than δ-hexalactone or ammonium carbonate alone. Further research this year determined the effectiveness of the δ-hexalactone and δ-heptalactone used in combination with GF-120 as an attract-and-kill method. It was determined that the addition of 25 to 100 mg of ca. 98% pure δ-heptalactone significantly improved the attractiveness of GF-120 as compared to GF-120 alone. Also, as little as 5 mg of δ-heptalactone showed improved attractiveness of GF-120 as compared to the GF-120 alone. Research will continue in the following season on the best and most cost-effective combinations of the δ-lactones with GF-120.

PCA and Grower Evaluation of the New Delta-Heptalactone Lure for Walnut Husk Fly

Roman Garzelloni[1], Calliope Arkilic[1], Melissa Thayer[1], Dan Kuzmich[2], Spenser Walse[2], and Robert Van Steenwyk[1]

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Key words: walnut husk fly, pheromones, monitoring

Abstract: Walnut husk fly (WHF) is a significant pest of walnuts and has increased in importance over the past 20 years. Control of WHF is based on repeated applications of insecticides to control the adults. Initiation of the spray program and monitoring of the efficacy of the spray program is based on captures in yellow panel traps baited with an ammonium carbonate (AC) feeding lure. An improvement in monitoring through increased fly catches would aid in determining the proper time to initiate an insecticide control program and in determining the efficacy of the control program. In 2019, Sarles et al. discovered a male produced WHF aggregation pheromone (delta (δ)-heptalactone and δ-hexalactone). Research conducted last year determined that 1) lures containing δ-heptalactone were more effective than lures with AC and 2) δ-heptalactone lures captured WHF earlier in the season than AC lures. To assess the potential utility of the δ-heptalactone lure, growers/PCAs in 4 walnut growing regions of California recorded WHF catch in the new WHF lure alone, the WHF lure combined with a standard AC lure, and the standard AC lure alone. The data show that the δ-heptalactone lure is more effective than the AC and combination lures in orchards with low WHF population densities. However, in orchards with high WHF population densities the AC and combination lures are more effective than the δ-heptalactone lure. This suggests that WHF exhibit a density-dependent response to the pheromone. The δ-heptalactone lure also captured WHF earlier in the season as compared to ammonium carbonate lures.

Assessing the Influence of Nearby Landscape Composition on Almond Orchard Susceptibility to Leaffooted Bug (Hemiptera:Coreidae) Springtime Colonization.

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Dr. Houston Wilson, Dept. of Entomology, University of California, Riverside
Dr. Jacob Wenger, Dept. of Plant Science, California State University, Fresno

Keywords: Leaffooted bug, Hemiptera, *Leptoglossus zonatus*, Almonds

Abstract: Leaffooted bug (LFB) (Coreidae: *Leptoglossus zonatus*) is a key pest of almonds, pistachios, and pomegranates, as well as numerous vegetable crops. In nut crops, LFB feed on the immature nuts with their piercing sucking mouthparts, which damages the developing embryo and can lead to premature nut drop. LFB overwinter in aggregate clusters in sheltered locations, such as perennial vegetation or residential areas. In the Spring, LFB migrate into almond orchards and then later in the season move on to other crops such as pistachios and pomegranates. The risk of LFB damage to almonds based on the composition of surrounding habitats and crops is poorly understood. This study aims to evaluate the influence of nearby landscape composition on LFB migration into almond orchards. To accomplish this, LFB were monitored weekly in April and May at twenty almond orchards throughout Central California. Data on LFB populations was then evaluated to determine the extent to which various landscape features can be used to predict the timing and abundance of LFB arrival into almond orchards. This information has the potential to help growers assess their risk of LFB colonization based on the composition of habitats surrounding their orchards.

A Data Driven Approach to Olive Fruit Fly Monitoring in California: Integrating Trap Data with Predictive Modeling for Early Detection

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Keywords: Olive fruit fly, *Bactrocera olea*, Olives, Monitoring, Predictive modeling

Abstract: Olive fruit fly (*Bactrocera olea*, OLFF) is an important economic pest of olives, reducing both oil quality and commercial yield of table olives. Originally native to Africa, it was first identified in California in 1998. To monitor the fly's population over time, the California Olive Committee (COC) initiated a weekly, year-round monitoring and trapping program in 2001, using pheromone traps across olive sites in the southern San Joaquin Valley (SSJV) and Sacramento Valley (SV) of California. With direct assistance from crop consultants, we were able to access the data and perform separate descriptive and inferential analyses on population dynamics of historic OLFF trends in each region. Furthermore, to analyze anticipated future patterns, we trained the Random Forest Classifier (RFC), an extensively used supervised machine-learning model, on OLFF trap data as well as weather data from CIMIS from 2019 to 2023, and then deployed as a web application using Google Cloud Platform (GCP). The assembly of this historic dataset allows for reflection of olive fruit fly population trends and provides a baseline for evaluation of future trends under changing environments and cultural practices, assisting in making data-driven pest management decisions and reducing insecticide applications through early identification of pest risk.

Diversity of Navel Orangeworm Lipid Profiles and Their Implications for Monitoring in California Tree Nut Landscape

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Keywords: navel orangeworm, *Amyelois transitella*, almonds, pistachio, walnuts, lipids

Abstract: Navel orangeworm (NOW) is the primary insect pest in almonds and pistachios while being a serious pest in walnuts. Pest management techniques such as well-timed insecticide sprays and mating disruption are aided by monitoring NOW movement. Tracking insect movement hinges on sourcing insects to their place of origin within a landscape. Analysis of fatty acids in adult NOW can distinguish NOW from almond and walnut orchards. However, a single tool to separate moths from all three tree nuts remains unidentified. An untargeted metabolomics approach was used to detect and compare as many compounds as possible in adult NOW reared on almonds, pistachios, and walnuts. The variation in lipid classes and their amounts were good predictors for separating NOW based on their larval diet. While the majority of the compounds detected were unknown, several classes, such as fatty acids, diglycerides, and triglycerides, were shown to influence results. Untargeted metabolomics may offer researchers a method to trace the movement of NOW in the field originating from any of the three major California tree nut crops. Further experimentation is needed to refine protocols (e.g., sample collection) and measure potential environmental effects like crop cultivar and nut maturity.

Applying Pear IPM: Scouting and Thresholds

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Keywords: pear psylla, *Cacopsylla pyri,* integrated pest management, economic thresholds, scouting

Abstract: The Pacific Northwest of the United States, encompassing Washington and Oregon, produces approximately 75% of U.S. pears, significantly impacting the agricultural economy. However, high production costs and inconsistent pest management, particularly poor control of the pear psylla (*Cacopsylla pyricola*), challenge orchardists. In response researchers have collaborated with pear growers and crop advisors to develop Integrated Pest Management (IPM) strategies, incorporating selective insecticides and biological control methods to manage pear psylla more sustainably. Here we will discuss how new tools thresholds and scouting add to the pear IPM toolbox which has recently expanded to include a suite of selective products and a pear phenology model developed by partner research groups. The Scouting Network project was established as a pilot initiative to support the transition to IPM by providing critical pest and natural enemy data through a network of trained scouts. This project, concentrated in the Wenatchee River Valley, WA, uses a mobile application and a cloud-based database for real-time data collection and dissemination. The scouting reports enabled growers to make informed pest management decisions, optimizing interventions and improving fruit quality while reducing unnecessary pesticide use. Feedback from participants indicated significant benefits, including better spray timing, enhanced fruit quality, and increased adoption of IPM practices. Additionally, through Scouting Network data collection we were able to implement and test recently developed economic thresholds and natural enemy inaction thresholds.

Biological Control

Moderator: Claire Donahoo (OSU)

Effect of Entomopathogenic Nematode and Fungus on Walnut Husk Fly Population in Walnut Orchards in California

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University of California Agriculture and Natural Resources & Statewide IPM Program

Keywords: walnuts, IPM, walnut husk fly, pest management

Abstract: Walnut husk fly (Diptera: Tephritidae) is an increasingly problematic pest of commercial walnuts in California. WHF overwinters as pupae in the soil beneath infested trees. Adult flies begin emerging early to mid-summer (June-July) and can remain active through October. Females deposit eggs under the walnut skin on the husk, and maggots feed until maturity before dropping into the soil to pupate. Although WHF has one generation yearly, an extended adult emergence makes them a consistent pest throughout the summer. In this research, we investigated the effects of entomopathogenic nematodes (EPN) and fungi (EPF) on the emergence of adult walnut husk flies in a laboratory, semi-field (potted trees), and field studies. Untreated control treatments were included in all experiments. Pupae of the walnut husk fly collected in the fall were used for laboratory and pot experiments, while natural population was assessed in the field experiment. In the lab experiment, treatments were applied in petri dishes containing WHF pupae and adults emerged were recorded. In the potted trial, treatments (i.e., entomopathogenic nematodes and fungi) were applied to walnut-growing pots containing pupa-infested soil. In the field trial, three treatments (EPN, EPF, and Control) were applied in a walnut orchard replicated three times. Results of all three experimental systems will be discussed in the context of the overall efficacy of the entomopathogens and their implications in integrated pest management (IPM).

Appropriate use of *Cydia pomonella* Granulovirus Products: Best Practices and Resistance Management

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Keywords: Codling Moth, *Cydia pomonella*, Cydia pomonella granulovirus (CpGV), Madex HP, Madex XLV, Cyd-X, Cyd-X HP, Virosoft

Abstract: *Cydia pomonella* (codling moth) is a key pest in pome fruit orchards. Cydia pomonella granulovirus (CpGV) are a cornerstone in the management of codling moth and have been used successfully in organic and conventional orchards since over 35 years. In organic production, cases of resistance occured locally, which were successfully encountered with new, resistance-breaking CpGV isolates. CpGV are now also widely used in integrated production. Such strategies bring many benefits, such as the protection of beneficials, the reduction of residues and the improvement of resistance management strategies for the sustainable control of codling moth. This presentation is going to provide an overview of organic and conventional application strategies with CpGV and explains how the Andermatt CpGV isolate management can overcome resistance issues.

Development of a New Tool for Pear IPM; Lure Baited Monitoring Traps to Measure Natural Enemies of Pear Psylla

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Keywords*:* Pear psylla, natural enemies, pears, IPM

Abstract: Pear psylla (Cacopsylla pyricola) is an important pest of pear production in Oregon. Excessive amounts of honeydew, produced as a biproduct of feeding, can lead to black sooty mold and russeting on fruit. Natural enemies are an important part of an IPM strategy for controlling this pest. Accurately measuring the quantity and timing of these natural enemy populations within the pear orchard is difficult and time consuming. The current method for scouting natural enemies is tapping tree limbs over a beat sheet and recording the beneficial arthropods that fall onto the beat sheet. This method is inefficient and often misses important adult insects that evade detection by flying away. To improve measures of natural enemies our lab has developed a lure baited monitoring trap. Using lure baited monitoring traps to collect various natural enemies of pear psylla, we hope to improve monitoring efficiency, provide action thresholds, and improve confidence in management decisions, specifically when it is safe to withhold pesticide applications.

Update on the Status of Resistance to CpGV in Washington Codling Moth

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Key words: resistance, granulovirus, codling moth, autosomal,

Abstract: Codling moth is a keystone pest in apple, pear, and walnut orchards worldwide. *Cydia pomonella* granulovirus (CpGV) is used to control codling moth in organic and conventional production and is applied as Cyd-X HP, Madex HP (both CpGV-M) or ViroSoft CP4 (CpGV-S) in the US. In Washington State, CpGV is a key aspect of organic control of codling moth and reports suggest it is applied up to 20x within a growing season to combat multiple generations of codling moth. Recent management failures and high levels of infested fruit spurred a survey of 5 organic orchards in 2019-2020 to determine susceptibility to CpGV-M compared to a susceptible laboratory colony. The results indicated a resistant population (WA3), the first evidence of CpGV resistance in the USA. Additionally, this population had reduced susceptibility to all available CpGV materials in the US. In 2023 a new geographically distinct population (WA6) had suspected resistance issues bioassay results indicate reduced susceptibility to CpGV-M and CpGV-S. There are three types of resistance to CpGV materials. Type 1 is dominant and linked to the Z-chromosome, type II is autosomal, and type III is unknown. To determine the type of resistance in WA3, mass crossings and selection using CpGV-M and CpGV-S were conducted. WA3 appears to follow a type II resistance pattern confirming resistance to both isolates. A new isolate, formulated as Madex XLV was applied under an EUP showed efficacy under field and laboratory conditions to both populations and will be foundational in a resistance management plan.

Baculovirus Efficacy Against *Cydia* Species

William Walker

USDA-ARS – Temperate Tree Fruit and Vegetable Research Unit

Key words: *Cydia pomonella*, granulosis virus, biopesticide

Abstract: The *Cydia pomonella* granulosis virus (CpGV) has long been used as a biopesticide against codling moth in apple orchards and is a viable solution for organic production systems. However, the first reported case of codling moth resistance to CpGV within USA, sourced to a population from Washington State, was published in 2022. In 2019, A novel virus identified in false codling moth, the CrpeNPV, was reported to also kill codling moth larvae. In research supported by the Washington Tree Fruit Research Commission, we have obtained the CrpeNPV and have conducted codling moth larval mortality bioassays against specimen from our laboratory colony at concentration levels comparable to field-rates for CpGV. For these experiments, virus formulations are applied to the surface of standard codling moth artificial diet, and neonate larvae are individually applied to vials containing the diet and allowed to feed unrestricted. Dose-response and time-course effect assays were conducted. Entomopathogenic viruses often have very narrow host ranges. Thus, we also sought to explore the efficacy of both of these viruses against the filbertworm, *Cydia latiferrana*. These results may provide the Washington tree fruit and Oregan hazelnut industries with effective biocontrol options while safeguarding against the development of virus resistance to the CpGV.

Artificial Eggs of Brown Marmorated Stink Bug for Host Selection Behavioral Research of its Biological Control Agent, the Samurai Wasp

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Keywords: *Halyomorpha halys*, *Trissolcus japonicus*, invasive species, specialty crops, parasitism

Abstract: The brown marmorated stink bug, *Halyomorpha halys* (Hemiptera: Pentatomidae), is an invasive and highly polyphagous pest causing extensive crop damage around the globe, with a projected impact of $1 billion in hazelnuts alone. Because of their high mobility and feeding behaviors, chemical controls and other pest management strategies have been ineffective in mitigating their populations in the Pacific Northwest. In the native range of *H. halys*, an egg parasitoid, *Trissolcus japonicus* (Hymenoptera: Scelionidae), has proven to be a successful biological control agent of this pest, creating high demand for releases of this agent in areas with high *H. halys* damage, such as the Willamette Valley in Oregon, USA. However, effective rearing of egg parasitoids also requires successful rearing of their hosts for egg development, all of which requires extensive time and resources for researchers. A potential solution is the utilization of artificial host eggs capable of successful parasitism and full development of parasitoid offspring. In this study, we performed 3 experiments involving the following: developing egg-like structures mimicking *H. halys* eggs, testing various formulations of these artificial *H. halys* eggs and their effect on *T. japonicus* host acceptance behaviors using no-choice tests, and comparing the presence and absence of host selection chemical cues on *T. japonicus* host acceptance behavior using choice tests. Here, we describe the first phases of our research on development of artificial *H. halys* eggs and evaluation of their potential as a behavioral research tool, with the ultimate goal of successful parasitism and improved rearing of *T. japonicus*.

Impact of Size on Mating Preference of Navel Orangeworm (Lepidoptera: Pyralidae) and Implications for Sterile Insect Technique

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Keywords: Navel Orangeworm, *Amyelois transitella*, almonds, pistachios, walnuts, sterile insect technique, mating

Abstract: The navel orangeworm (NOW), is a major insect pest of California almonds, pistachios, and walnuts. The use of the sterile insect technique is under development for future use as part of an integrated pest management program for this insect. Mating selection of this insect can have implications for the application of this technique in the field, which aims to mass-produce sterile moths that are competitive when released into the wild. Moreover, the density of insects in the diet under rearing conditions can affect the adult size of the organisms. We aim to evaluate if size and weight have an impact on mating selection of a locally reared Phoenix strain of NOW. To study female selection, we placed a female with five males in a cage, and for male selection, we placed a male with five females. The insects were checked for mating within an interval no longer than 10 minutes. Time was recorded when a pair was observed in copula and insects were immediately isolated in cups. Measurements of head length and width, body length, and right forewing length and width were taken. Dry weight was obtained for all insects. Statistical analyses evaluated differences between mated and unmated insects.

Rearing *Ganaspis kimoroum* (Gk) and *Leptopolina japonica* (Lj) on an Artificial Diet.

Maggie Freeman[1], and Chris Adams[1].

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Keywords: Spotted Wing Drosophila, *Ganaspis kimoroum, Leptopolina japonica*, biological control, rearing

The invasive spotted wing drosophila, *Drosophila suzukii* (Matsumura), is a major economic pest of soft skinned fruits in the United States. Management for this pest largely consists of regular insecticide applications while developing fruit that are susceptible to attack. Classical biological control through the rearing and release of the federally approved parasitoid *Ganaspis kimoroum* (Gk) and the adventive *Leptopolina japonica* (Lj) may provide a sustainable solution for reducing this pest in the environment. However, there are challenges in mass rearing these parasitoids that need to be overcome in order to make these wasps a viable tool for all fruit growers impacted by this pest. This presentation will provide an overview of the current challenges faced rearing Gk and Lj utilizing current rearing protocols, and the possibility of using an easier artificial diet.

Pathology/Diseases

Moderator:

Genetic Insights in Two *Colladonus* Species that Infect Cherry Trees with X-disease

Katherine Easterling

USDA-ARS Temperate Tree Fruit and Vegetable Research Unit

Key words: gene expression, X-disease, *Colladonus*

Abstract: "*Candidatus* Phytoplasma pruni" is the causal agent of X-disease in commercial cherry (*Prunus avium*). This plant pathogen is transmitted by several species of leafhoppers. We sought to explore the relationship between the X-disease phytoplasma and two of its U.S. vectors, *Colladonus geminatus* and *C. montanus reductus* at the molecular genetic level. We examined gene expression differences in *Colladonus* insects that were either infected or not infected with phytoplasma in order to better understand mechanisms of infection and insect responses to a pathogen that can be devastating to pear crops. Currently, entire cherry orchards that are infected with X-disease are being removed to reduce infection spread. With an improved perspective on the biological underpinnings of this complex pathosystem, it is possible to seek alternative solutions and expand breeding programs for genetic variety and disease resistances. This study is the first genetic look at both the insect vector and the pathogen itself and will serve as an important step in developing new strategies for improved integrative pest management.

A Non-Recycling In-Field Postharvest Fungicide Applicator in Pome Fruit to Enhance Disease Control and Food Safety

Achour Amiri, Clayton Haskell, Gwen Hoheisel, Claire Murphy

Washington State University, Tree Fruit Research and Extension Center
Wenatchee, WA, 98801

Key words: fungicide, cold storage, pome fruit

Abstract: Drenching apples and pears at harvest with fungicides has been a common practice to protect fruit from decay in storage for decades in the Pacific Northwest. Around 2015, the industry has adopted the monebulization as a common practice to apply postharvest fungicides. Both technologies have their advantages and drawbacks. While drenching may provide a better protection, cross-contamination can be an issue given that the same tank can be reused to treat up to 800 bins. Herein, we report on a new applicator that can apply postharvest fungicides right after harvest in the orchard or at packinghouse facilities in a way that avoids recycling fungicide suspensions and, therefore, eliminates cross-contamination. During the 2021-22 season, Honeycrisp apples from four lots (4 bins each) were treated with the field applicator in a single-pass and compared to same number of bins from the same lots treated with a traditional packing house drencher, in addition to an untreated control. Before and after each treatment, samples of apples were collected from different positions within the bins to analyze fungicide residue levels and surface microflora. Additionally, 100 apples were collected per treatment and stored at 2.7°C and inspected monthly for postharvest diseases. Our results indicate that the field applicator provides fruit coverage like that of a drencher and has resulted in lower disease incidence compared to the packing house drencher. This new applicator could open new opportunities to reduce fungicide input and increase packout.

Invasive Species

Moderator:

First Record of *Otiorhynchus* (*Podoropelmus*) *albidus* (Stierlin, 1861) in North America

[1]Susanna Acheampong, [2]Patrice Bouchard, [3]Paul K. Abram, [4]Tara D. Gariepy, [1]Diana Balcaen, [2]Owen Lonsdale and [1]Ryan Smith

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Keywords: *Otiorhynchus albidus*, *O. raucu*s, pitfall trap, mouse and insect glue trap, survey, invasive

Abstract: We report for the first time the detection of *Otiorhynchus albidus* in North America in Kelowna, British Columbia, Canada in June 2022. *O. albidus* is a pest of European origin and it is known to attack tree fruits and ornamental plants. In initial samples, *O. albidus* sometimes co-occurred with *O. raucus*, an introduced European weevil species in British Columbia and a pest of tree fruit, grapes, vegetables, and ornamental plants. To test different surveillance methods and understand the seasonal occurrence of *O. albidus* adult weevils, surveys were conducted with mouse and insect glue traps (inside and outside the home) in 2023 and pitfall traps (outside the home) in 2023 and 2024. Both *O. albidus* and *O. raucus* were recovered with pitfall and mouse and insect glue traps, and were found in both years. *O. albidus* adult weevils were a nuisance in the home in 2023 but not in 2024.

Understanding the Seasonal Dynamics of *Carpophilus truncatus* in Central Valley Almond Orchards

Mahesh Ghimire[1], Houston Wilson[2], Sudan Gyawaly[1], David Haviland[1], Raman Bansal[3], Idong Mokwunye[1], and Jhalendra Rijal[1]

[1]University of California Agriculture and Natural Resources & Statewide IPM Program
[2]University of California Riverside, Department of Entomology
[3]United States Department of Agriculture – Agricultural Research Service, Parlier, CA

Keywords: *Carpophilus truncatus*, almonds, mummy nuts, phenology, monitoring, cultural control

Abstract: The recently introduced *Carpophilus truncatus* (Coleoptera: Nitidulidae) beetle poses a potential threat to California's almond industry. This study investigates the seasonal dynamics of *C. truncatus* in California almond orchards to understand its activity patterns and develop effective management strategies in future. We are monitoring the beetle populations in several highly infested almond orchards in the central valley beginning from December 2023, and monitoring will be continued until the end of the season. Techniques include deploying emergence cages with mummy nuts at various locations within the orchards and collecting samples (mummy nuts and harvest samples) at regular intervals. The emergence cages will be inspected on weekly basis for any kind of beetle activity. The collected samples will be assessed in the laboratory for different stages of Carpophilus beetles. Additionally, we continue to examine infested almond nuts under the stereoscope to determine the developmental stages of the beetle (eggs, larvae, pupae and adults) within. By correlating trap captures and developmental stages with weather data, we aimed to identify peak activity periods and potential environmental factors influencing *C. truncatus* populations.

This study provides the first comprehensive data on the seasonal phenology of *C. truncatus* in California almonds. Understanding its activity patterns will be crucial for developing targeted pest management strategies, such as optimizing insecticide application timing or implementing cultural controls.

Chemical Control/New Products

Moderator: Houston Wilson
(UC Riverside)

Evaluating the Impacts of Kaolin (Surround) Applications on Key pests of English Walnuts

Sudan Gyawaly

University of California Cooperative Extension, Oroville, CA

Keywords: Kaolin clay, walnut husk flies, codling moths, spider mites

Abstract: Kaolin is a naturally occurring clay mineral that, among many other uses, is used to protect crops from heat stress and sunburn. In California, many walnut growers apply kaolin on trees around orchard rows to protect trees from heat stress and sunburn. Moreover, kaolin is a broad-spectrum crop protectant against many pests and reportedly provides good protection from some pests. While kaolin has previously been shown to be effective against walnut husk flies, its impact on other walnut pests is unclear. In this study, we evaluated the effects of two in-season applications of kaolin on walnut husk flies, codling moths, and spider mites. Our study showed that the infestation of walnut husk flies and spider mites on kaolin-treated trees was lower than that of the control trees. However, two in-season kaolin applications did not adequately control both pests. The implications of these findings are discussed.

IR-4 trial on Olive Fruit Fly 2024

Cindy R. Kron[1], Calliope Arkilic[2], Mel Thayer[2], Roman Garzelloni[2], Robert Van Steenwyk[2]

[1]University of California Agriculture and Natural Resources, Santa Rosa, CA
[2]University of California, Dept. of ESPM, Berkeley, CA

Keywords: *Bactrocera oleae,* olive fruit fly, IR-4, chemical control, insecticides, organic

Abstract: A field trial was conducted in an olive orchard to evaluate the efficacy of Danitol, Delegate, Entrust, and Sequoia (all with a high rate of bait), high rate of MBI-306 with both high and low rates of bait, and a low rate of MBI-306 with a high rate of bait and an untreated check with high rate of bait and an untreated check with low rate of bait. The high rate bait was a mixture of 150 g white sugar, 37.5 ml Brandt Insect Bait, and 56.25 ml of Nu-Lure Insect Bait and the low rate bait was a mixture of 20 g white sugar, 5 ml Brandt Insect Bait, and 7.5 ml of Nu-Lure Insect Bait. The trial was conducted in Napa, CA with a row of olive trees planted on each side of a long road dividing two vineyard blocks with a moderate olive fruit fly (OLFF) population. Nine treatments were replicated six times in a RCB design with each plot consisting of three trees. Treatments were applied using a hand-held orchard sprayer operating at 150 PSI with a finished spray volume of 75 gal/acre. Application dates were on 2 August, 29 August, and 25 September. Adult OLFF were monitored with weekly with ammonia carbonate lures attached to yellow Trécé AM-NB panel traps. The traps were deployed in the orchard on 26 July and were monitored weekly from 2 August through 29 October. Traps were counted weekly, changed as needed and the ammonia carbonate lures were replaced every five weeks. Olives were harvested on 29 October and OLFF damage was determined by dissecting 250 olives from the center tree of each replicate. The efficacy of the treatments will be reported.

Developing challenges in managing codling moth with diamide insecticides

Greg Krawczyk, Laura Mellott, Josh Gere and Tyler Seutter

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Keywords: *Cydia pomonella,* insecticide efficacy, pome fruit, diamide resistance

Abstract: During the last twenty-plus years, the management of codling moth (CM) and oriental fruit moth (OFM) in commercial apple orchards in Pennsylvania relied on the effective use of various mating disruption products supplemented by judicious use of insecticides. Since the initial introduction, insecticides belonging to two IRAC Groups, diamides (IRAC Group 28) and spinosyns (IRAC Group 5), provided excellent control of both internal fruit feeder species when such control was needed. Unfortunately, during the last few years, growers have reported increased problems with managing this pest complex, resulting in CM or OFM injury to fruit at harvest. During the 2022 season, field collected CM population demonstrated multiple folds reductions in sensitivities to various diamide insecticides (e.g., Altacor®, Exirel®, Verdepryn™, Voliam Flexi®, Besiege®, and Minecto®) but no differences in sensitivities to spinosad (e.g., Delegate™). During the 2023 and 2024 seasons, we established multiple laboratory CM populations from commercial apple orchards in Pennsylvania. Populations were either started using larvae from injured fruit or using not-destructive traps (e.g., glue-less, Universal traps, Uni-Trap, AlphaScent, West Linn, OR) baited with Pherocon® CM 4K lures attracting both moth sexes. When possible, the offspring of collected codling moth adults were used for insecticide sensitivity bioassays utilizing CM neonates in the standard diet incorporation bioassay method. The differences in diamide sensitivities between the most and least sensitive CM populations at the LC50 and LC90 levels (POLO Leora Software) were up to 39 and 43 folds, respectively. Additionally, the diamide sensitivity levels in codling moth populations collected from the same orchards over a 2-3 year period remained significantly lower than in diamide-sensitive populations. Only less than two-fold differences at the LC50 and LC90 levels were observed in the CM populations' susceptibility responses to spinetoram.

Control of Western Grape and Virginia Creeper Leafhoppers in Grapes

Roman Garzelloni[1], Calliope Arkilic[1], Melissa Thayer[1], and Robert Van Steenwyk[1]

[1]University of California, Berkeley, Dept ESPM

Key words: Western grape leafhopper, chemical control

Abstract: The Western grape leafhopper (WGLH) and Virginia creeper leafhopper (VCLH) are grape pests common in California's North Coastal grape growing regions. They cause damage to individual cells on grape leaves, reducing photosynthetic ability. When adult populations are high, they are a nuisance to workers at harvest. While chemical control is not necessary for low leafhopper (LH) populations, LH can reach levels that are damaging to the crop and thus require control. Certain pesticides that suppress LH can be harmful to natural enemies and pollinators. Therefore, it is important to choose the least harmful but most effective treatment when treating for LH. Organic and conventional insecticides were tested on WGLH and VCLH populations in a vineyard in Ukiah, CA. Of nine tested organic insecticides, Pyganic 5.0EC was the only product which provided some control of WGLH. No organic products controlled VCLH. All six tested conventional insecticides provided rapid and complete control of WGLH. The conventional insecticides were all also effective against VCLH, but control was slower than against WGLH.

Thus, while there are multiple effective conventional insecticides for WGLH and VCLH control, further research and development of organic pesticides is necessary to offer an organically acceptable chemical treatment for grape growers across California.

Experiments and Observations on Pre-Bloom Pear Psylla Management

Robert J Orpet, Christopher C McCullough, Louis B Nottingham

Washington State University, Tree Fruit Research and Extension Center, Wenatchee, WA

Keywords: pear, *Pyrus,* pear psylla, *Cacopsylla pyricola,* oil, kaolin, timing

Abstract: Pre-bloom is considered a key spray timing for pear psylla management. Pear orchardists in the Wenatchee Valley commonly use multiple kaolin sprays, insect growth regulators, and broad-spectrum insecticides like neonicotinoids, malathion, and tolfenpyrad during pre-bloom. Research is being conducted to optimize suppression and reduce management costs. Experiments at the WSU research farm in Rock Island, WA suggest that kaolin and oil is as effective as pre-bloom programs that maximize insecticide use. Kaolin timing experiments at Rock Island and Wenatchee suggest that dormant timing is more effective than post-budburst timings. Three years of observations at Wenatchee commercial orchards indicate that organic and conventional pears have similar pre-bloom pear psylla abundance despite organics lacking most spray options. Orchards following integrated management guidelines (allowing insect growth regulators and at most one broad-spectrum spray during pre-bloom) also had similar pear psylla abundance as other management programs. Altogether, spraying more did not appear to cause practical reduction of spring pear psylla beyond that of basic oil and kaolin programs. However, Wenatchee commercial orchards that use post-bloom broad-spectrum sprays have lower post-bloom pear psylla populations until late summer. Therefore, it is surprising that pear psylla are seemingly insensitive to variation in pesticide programs during pre-bloom, and it is confusing to use this evidence in management guidelines.

Plinazolin: A New MOA Insecticide by Syngenta

Victoria March

Syngenta Crop Protection

Key words: insecticide, new mode of action, codling moth, pear psylla

Abstract: Plinazolin® technology is the trademark of a new active ingredient coming soon from Syngenta. The active ingredient, isocycloseram, is an insecticide that will offer a new mode of action and will protect against a broad spectrum of agricultural pests, including mites, thrips, true bugs, beetles, certain lepidopteran pests, as well as other insect pests.

It is anticipated to receive registration for use in numerous crops and crop groups. We will review multi-year studies that showcase Plinazolin's efficacy in apples and pears on Codling Moth and Pear Psylla respectively.

Evaluation of Argentine Ant Bait and Trail Finding Pheromone Disruption Treatments for Control of ACP In Urban Citrus Next to Commercial Citrus in Hemet CA.

Greg. Simmons[1*], Raju Pandey[2], Ruth. Henderson[1], Eugenia Garcia[1], Tom Greene[1] Bodil Cass[3], Ivan Priego[2], Molly DeWitt[2], Ofelia Doroteo[3], David Jacinto[3] Enrico Ferro[4], Bill Oesterlein[5].

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Key words: Asian citrus psyllid, *Diaphorini citri,* Argentine ant, *Linepithema humile*, citrus, Antxx, spinosad, trail finding disruption pheromone, AATFD

Abstract: Previously, commercial citrus near residential areas were protected from ACP incursions by buffer insecticide treatments to backyard citrus in adjacent residential properties. CDFA discontinued these buffer zone treatments in 2023 due to budget constraints. Previous results showed that an area-wide control program for Argentine ants caused reductions in ACP as great as 75% relative to control areas. Argentine ants protect ACP from natural enemies, disrupting biocontrol.

We further investigated the potential for replacing buffer zone insecticide treatments by testing two baits (Antixx, 0.07% spinosad, hydrogel (1% boric acid) and AATFD (Shin-Etsu/Pacific Biocontrol) to evaluate its impact to disrupt ant trail finding. Treatments were replicated 8 times on backyard citrus and evaluated impacts on Argentine ants and ACP densities in treated trees.
We have showed reductions in Argentine ant density on citrus trees > 90% from Antixx and TFD application compared to the control treatments suggesting that these two materials may show promise for Argentine ant control. Future reporting will document impacts on ACP by controlling Argentine ants.
Research support: USDA and the Hemet Citrus Pest Control District.

AXIOS™ 20 SC: Newly Registered, Novel Mode of Action Fungicide for Disease Control in Pome and Almond

Kendall Johnson, UPL NA, Inc., Wenatchee, WA

Keywords: powdery mildew, brown rot, scab, almond, pome fruit, disease control

Abstract: AXIOS™ 20 SC fungicide offers an innovative disease management solution for pome fruit and almond growers. Its active ingredient, KINOPROL®, introduces a novel mode of action, FRAC group 52, which provides increased efficacy against seasonal pathogens by using preventative and systemic activity. AXIOS 20 SC offers broad-spectrum disease control targeting key diseases like brown rot blossom blight, anthracnose, powdery mildew, and scab. AXIOS 20 SC provides growers with a great rotational product to reduce resistance development. It provides application flexibility in the almond market by offering a long residual and a 14-day PHI resulting in a season long spray window. Additionally, AXIOS is user friendly, tank mix compatible and has a low use rate at 4.0-5.0 fl oz/A (almond) and 2.25-3.0 fl oz/A (pome). AXIOS 20 SC will help keep your almonds and pome fruit healthy and productive throughout the season.

Sterile Insect Technique

How to Integrate Nutritional Geometry Principles to Optimize Insect Diets: A New Framework for Insect Rearing Using the Codling Moth (*Cydia pomonella*) as an Example

Marion Le Gall[1], Carolyn Huynh[1], and Nathan Moses-Gonzales[1]

[1]M3 Agriculture and Technologies

Keywords: Nutritional Ecology, Insect Diet, Sterile Insect Technique, Codling Moth, Geometric Framework for Nutrition

Humans have reared insects for thousands of years. Despite this long-standing relationship, the first artificial insect diet was not developed until the beginning of the 20th century. Today, insects are reared in large amounts for the release of biological control agents, as feed, or to mate with wild individuals for the sterile insect technique. Diet formulation often involves changing one ingredient at a time, a tedious and labor-intensive approach that does not always yield optimal results because it fails to acknowledge the integrative nature of nutrition. Here, we propose a framework where a cafeteria experiment precedes the classic no-choice assays to narrow down the optimal blend of macro-nutrients necessary for an organism. In other words, we incorporate the concept of "intake target" and the geometry of nutritional decisions to develop artificial diets using natural ingredients that are more cost-effective than the synthetic diets typically used with the Geometric Framework for Nutrition. We propose to test this new approach using the codling moth (Cydia pomonella), the most serious pest of apple and pear worldwide. CM is an excellent model to test this new framework as it is successfully mass-produced using an artificial diet by the Okanagan-Kootenay Sterile Insect Release (OKSIR) Program in Canada.

Phenology

Improved Understanding of Flatheaded Borers in PNW Orchard Crops

Nik Wiman[1], Heather Andrews[1], Kody Transue[1], Erica Rudolph[2]

[1] Oregon State University, [2] FMC

Keywords: plant stress, induced attack, cultural control

Abstract: Flatheaded borers can be devastating pests in apple, cherry and hazelnut orchards in Oregon's Willamette Valley and across the US. Very little research has been conducted on these pests, and this lack of information is a roadblock to improved management. These pests thrive on stressed trees and are likely to become more severe tree and orchard pests under climate change. Unfortunately, flatheaded borers are very difficult to work with and only recently has there been any success with rearing key species in vitro. We present our observations on host plant use, phenology, and plant stress factors that can lead to attacks. This baseline information is needed to improve management strategy, which should have a heavy emphasis on cultural practices to prevent the conditions that lead to attacks.

Biology

Biology and Management of *Prionus* Root Borer in Oregon Hazelnuts

Nik Wiman[1], Heather Andrews[1], Austin Carey[1], Chris Hedstrom[2]

[1] Oregon State University, [2] Pacific Biocontrol

Keywords: mating disruption, phenology, mass trapping

Abstract: Decline symptoms in hazelnuts and other orchard crops can have many causes. In 2023, it became evident that root damage from *Prionus* root borer is one of the major causes of canopy dieback and decline symptoms in young hazelnut orchards. In mature orchards populations of the borer can be extreme. While we have known this pest was attacking hazelnuts since 2020, the extent of the issue was unrealized. Unfortunately, there are no labeled products and few viable management tactics. The goal of this research is to develop some management strategies for this pest using all potentially viable methods that have some basis in research. These include mass trapping, mating disruption, biological insecticides, and conventional insecticide treatments. We discuss our research to date with a fucus on mating disruption and potential mass trapping strategy.
Abstract:

Biological Control

Natural Enemy Abundance in Proximation to Pollinator Strips in Pear Orchards

Kelley Asselin, Chris Adams, Kelsey Galimba, and Maggie Freeman

Oregon State University, Mid-Columbia Agriculture Research and Extension Center, Hood River, Oregon

Keywords: pear psylla, natural enemies, biological control, pollinator planting

Abstract: Pollinator plantings provide beneficial habitat and floral resources for pollinators. Although these plantings are designed for pollinators, they can also offer resources for natural enemies. Pear psylla (*Cacopsylla pyri*) is a common pest with several known natural enemies. As pollinator plantings become more common and mandatory with new biodiversity requirements, understanding how natural enemy populations benefit from floral plantings could provide a new resource to bolster beneficial insect populations. This preliminary study measured natural enemy abundance in proximation to pollinator plantings in controlled versus manipulated plots at Mt. Adams Orchards.

Biology/Phenology

Phenology of *Euscelidius variegates* Reared Under Controlled Conditions

Anders Wolher[1], Yan Yan[1], Maggie Freeman[1], Kelsey Galimba[1], Ashley Thompson[1], Christopher Adams[1]

[1]Oregon State University

Keywords: Leafhopper, *Euscelidius variegates*, vector, cherry X-disease, life cycle

Abstract: Several species of leafhopper are able to vector the phytoplasma that causes Cherry X-disease. In the city of The Dalles Oregon where most sweet cherries are grown the most abundant leafhopper species found is *Euscelidius variegates.* Having a better understanding of the phenology of this important species would help with management decisions. Phenology models can be generated by collecting large amounts of insect and weather data and fitting it with modeling software. It can also be done by painstakingly rearing insects under controlled conditions and directly observing and recording their development. Here we describe our methods and findings of this phenology project.

Biology/Phenology

Seasonal Polyphenism in the Cherry X-Disease Vector leafhopper *Euscelidius variegatus* (Homoptera: Cicadellidae)

Yan Yan[1], Anders Wolher[1], Maggie Freeman[1], Kelsey Galimba[1], Ashley Thompson[1], Christopher Adams[1]

[1]Oregon State University

Keywords: winter morph, seasonal polyphenism, leafhopper, *Euscelidius variegates*, vector, cherry X-disease,

Abstract: Cherry X-disease vector *Euscelidius variegatus* exhibits significant seasonal differences in morphology and pigmentation, as measured by body length, wing length, head capsule width, and intensity of pigmentation. *E. variegatus* was reared from egg to adult under environmental conditions simulating The Dalles, Oregon, during 1) the dry growing season (barley seedlings at 26–18°C, photoperiod 16:8 [L:D]) and 2) the wet winter season (barley seedlings at 18–10°C, photoperiod 10:14 [L:D]). Results indicate that adults reared under winter-like conditions exhibited, on average, 9% longer body length, similar head capsule width, 11% shorter wing length, and 36% darker pigmentation than those reared under summer-like conditions. Females were larger and darker than males across all traits and seasons, while seasonal variation in head width was significant for males only. Seasonal increases in body size may enhance energy storage for overwintering, while darker pigmentation may provide thermoregulatory and camouflage advantages in colder, low-light conditions. This research offers insights into the dimorphism and overwintering biology of *E. variegatus*, contributing to the development of more targeted integrated pest management (IPM) strategies.

Minutes of the 98th Annual Meeting

Orchard Pest & Disease Management Conference
Hilton Hotel, Portland, Oregon

2024 Meeting Minutes (submitted by William Walker)

I. Call to Order

Call to Order The opening business meeting was called to order by Chair Chris Adams at 9:03 am on January 10, 2024. Standing Introductions made by each meeting participant, including name, affiliation and location. Quick Announcement by Robert Wiederman, Chair of Ecdysis Foundation/Board. Recruiting growers for study on soil health in Washington/Oregon. No cost to growers for samples to be taken. Flyers available at the registration table.

The sessions and moderators:

Chemical Control/New Products	Chris Adams
Biology/Phenology	Erica Moreti
Mating Disruption/SIR	Calliope Arkilic
Implementation	Heather Andrews
Thresholds/Monitoring	Aldo Hanel
Biological Control	Adrian Marshall
Pathology/Diseases	Melissa Thayer

II. Old Business

A. Treasurer's Report: Treasurer Nik Wiman presented the 2023 Treasurer's Report (see Treasurer's Report posted at the end of the minutes). There was a call for questions; there were none. It was moved, seconded, and voted to approve the 2023 treasurer's report.
B. Approval of the 2023 Minutes: Chris Adams announced that the 2023 minutes were posted on the OPDMC website and printed in the back of the abstract booklet. She asked for amendments. There were none. It was moved by Chris Adams, seconded by Josh Milnes, and voted to approve the 2023 minutes.
C. Chair Chris Adams recognized industry donors to the Student Scholarships – Gold contributors included: Pacific Biocontrol and the Larry Gut Fund. Silver contributors included: Valent
    a. Funding helped student scholarship recipients attend this years' meeting – recipients included Natalie Lareau, Claire Donahoo, Madan Pandey, Yan Yan.

III. New Business

A. Chair Chris Adams recognized those members we lost in the last 3 years including Helmut Reidle and Tom Unruh
B. Chris Adams announced Keynote Speaker Rick Hilton's talk will be this evening followed by a mixer.
C. Chair Chris Adams asked Executive Director Peter McGhee for any updates – there were none at this time.
D. Chair Chris Adams reminded attendees about the Golden Apple Award and Rubber Chicken Award, and encouraged everyone to come up with nominations.
E. Committee Assignments:
    a. Nominations: Adrain Marshall, Vaughn Walton, Dylan Beale
    b. Audit: Melissa Tesche; Evan Esch; Reid
    c. Resolutions: Bob van Steenwyk, Randy Hansen, Chris Hedstrom
    d. Student Scholarships: Marco Pitino, Jhalendra Rijal, Broc Zoller
F. Chair Adams asked who had a problem with booking room using the meeting block code? (Apparent issues occurred where hotel said no rooms where available within our block, when, in reality, there were).
   Estimates are needed for next year, as OPDMC commits to a block of room-nights and this year barely met our 80% obligation for this commitment. Better early estimates for booked rooms is needed. Request made, if coming next year, please book early. And email Chris Adams with any issues. Block of rooms are allocated for us. Rearrangements can be made during the booking process if the hotel says the block is full (contact Chris Adams if this is the case).
G. Scott Ockey raised the issue of the Hilton Venue. "People don't want to come to Portland anymore." "There is a safety concern in downtown"
   Chris A reminded the group that we are committed under contract for this year and next two years (until 2026). If anyone wants to change the venue, don't just complain, form a committee, do the research, contact hotels etc., and present a proposal at the next meeting.
   Scott Ockey will look into other venues. Anyone with suggestions/ideas should please discuss this with Scott Ockey. Changing venues is a big lift and help is needed.
   Surveys have been conducted, though there were few responses and mostly by people who do attend the meeting. However, there are over 400 members, many who do not come to the meeting. Voice needs to be heard from those who don't come, about why they don't come?
   Sylvia Rodon raised issue of the PNW Insect Management Meeting that occurs just prior to OPDMC, and that they help us fulfill our room block, and are affiliated loosely affiliated with OPDMC; any changes that occur would impact the PNWIMC meeting
   The Board is open to choosing different venues/locations, but pragmatic solutions are needed, not just complaints.
H. Acknowledgements
   OPDMC Thanked Continuing Education volunteers – Melissa Thayer, Chris Stroman and Calliope Arkilic

OPDMC Thanked Rebecca Schmidt-Jeffris and her assistants (Danny and Jomari) for organizing the meeting program.

I. At 9:40am, Chair Adams asked for a motion for the close of opening business – it was moved, Josh Milnes and Pete McGhee seconded, and the meeting was closed.

IV. Closing Business Meeting

A. Chair Adams called the closing business meeting to order on January 12, 2024. Thanks given to specific people for volunteering and contributing to making the meeting happen, including moderators and speakers.

B. Request made to current volunteers for managing pesticide credits to stay on for a second year and to help future new volunteers to learn the ropes.

C. Financial Report – given by chair of audit committee – Melissa Tesche (Please see audit report)

D. The Executive director noted that we owe Hilton Hotel ca. $9000 because we didn't meet our room block obligation. So we will be in the negative and if we don't work with Hilton to make a deal, we'll go bankrupt and lose our non-profit status. Issue noted with Hilton on our block rooms not being available when people try and book them. Emphasized to please reach out to Chris Adams if this is happening for future meetings. But we do need to do better in registering early.

E. Question raised whether meeting is being promoted well enough and questions about availability of pesticide credits for all states. Noted that fewer consultants participating than in past years. There needs to be more of a shared responsibility to promote the meeting – early and often.

F. Motion made to approve the financials report? Motion by Peter McGhee. Seconded by Scott Ockey. Motion Passed.

- Nominations Committee Report (Adrian Marshall, Dylan Beale, Vaughn Walton)

Nominations:

- Charles Burks – Chair Elect
- William Walker – Secretary (2024-2026)
- Amanda Koppel – Treasurer (2024-2026)
- Chris Adams - Executive Director
- Chris Stromme – Program Chair (2025)
- Is anyone opposed to these nominations? – No.
- Motion to approve – Chris Adams. Second – Bob van Steenwyk. Approved.

G. Rubber Chicken: One Nominee Only: Bob Carr for forcing "Spider Kid" Sean Counihan to divulge his life history concerning his interest in spiders.

H. Future Key Note speakers
   a. 2025 Brad Higbee
   b. 2026 Betsy Beers
   c. 2027 suggestions needed

I. General Forum Questions and Comments
- If membership survey conducted, the right questions need to be asked to really gauge the membership whether to stay or go elsewhere.

- Question asked about what the Insect Management Conference is and why it's not more formally a part of this meeting. Mentioned that they will be impacted by the decision of OPDMC to stay in Portland or leave. Question raised about merging the two meetings.
- The sponsor list is great, but some relevant big companies are missing. Should there be a committee on this topic?
- Noted that there has consistently been around 50-60 presentations. Previously, substantially more of the attendees are from industry representatives and consultants who do not give talks. The meeting has changed a lot in makeup over time. There needs to be a re-engagement of the non-presenter audience, as there is not a shortage of talks.
- 80% of talks turned in at the meeting. This cannot continue. Management of getting the talks ready to show took too much time during the meeting. So there would need to be less talks to allot for this time, or the talks need to be submitted earlier as requested. The meeting runs a lot more smoothly when titles/abstracts/talks are submitted well ahead of time.
- Issue with mass emails reaching USDA inboxes. Noted that there is a solution for this, and it will be resolved.
- Noted that there needs to be earlier announcements for calls for talks so that the agenda can be released earlier to better promote the meeting earlier, and also facilitate the pesticide credits process. We know when the meeting will be every year, second week in January, so this process should be streamlined.
- Suggested to have OPDMC Board Meeting during the summer, or even once per quarter to ensure organization of annual meeting is on track.
- Next year's dates will be Jan. 15th – 17th.
- Question asked about student scholarships. Mentioned that this was announced during the opening business meeting and that $400 will be distributed to each of the awardees. Suggested that Student Scholars were supposed to staff the registration desk throughout the meeting, but this was not done. Needs to be ensured at future meetings.
- Question asked about raising the registration fees even modestly for better financial health of the organization.

Closing – Chris Adams thanked all of the volunteers that made the meeting successful.
Motion to adjourn made, Melissa Tesche, Seconded – Adrian Marshall.
Tobin Northfield (Incoming Meeting Chair) Gaveled the close of the meeting.

Respectfully submitted,
William Walker, Secretary Orchard Pest and Disease Management Conference, January 2024

Treasurers' Report for 2025 meeting
Prepared by Dr. Amanda L. Koppel, OPDMC Treasurer

Transactions from January 2024 – December 2024

Total Cash and PayPal Balance as of 1 January 2024:	$12,275.77
Cash and PayPal movement as of 23 December 2024	
Total number of registrations 48	
2024 Income:	$14,582.72
2024 Expenses:	-$11,273.73
Total Cash and PayPal Balance as of 23 December 2024:	$15,584.76

Total number of OPDMC 2025 Registrations as of 23 December 2024: 48

Respectfully submitted,
Amanda L. Koppel, OPDMC treasurer
Orchard Pest and Disease Management Conference

The Rubber Chicken Award

An enduring tradition of informality is the nomination, voting, and awarding of the Rubber Chicken to one of the presenters during the closing business meeting. The Rubber Chicken may be awarded for a variety of reasons, but egregious behavior in some aspect of presenting a scientific talk is the underlying theme: too long, too short, poor organization, illegible slides, and over-spinning research results are frequently cited.

Notables who have received the award include:

- **Clancy Davis**, Berkeley, California for his quiet, sober, professional demeanor on all occasions.
- **Stan Hoyt**, Wenatchee, Washington for failing to enliven methods of presentation of papers.
- **Don Berry**, Medford, Oregon for never having made a single comment over 20 years.
- **Pete Westigard**, Medford, Oregon for returning from a sabbatical with 400 color slides (all failures) and a new child (a success).

'**Winners' in the Modern Era** (following about a 15-year hiatus, the award was revived during the 75th anniversary meeting):

- **Doug Light (2003)**, USDA, Albany, California, for showing incomprehensible data slides again and again and again. (Chemists…)
- **Stephen Welter (2004)**, University of California, Berkeley, for inappropriate behavior by leaving the meeting prior to giving his presentation.
- **Bob Van Steenwyk (2005)**, University of California, Berkeley; Bob suffered at the hands of technology and he could have been forgiven for these technical glitches; however, the membership was in a surly mood after the prolonged business meeting.
- **Alan Knight (2006)**, USDA-ARS, Wapato, Washington, for not submitting a talk.
- **Andy Kahn (2007)**, Wenatchee, Washington, for giving a much too long presentation and refusing to yield the podium - Andy subsequently decapitated our alopeciate friend.
- **Jim Miller (2008)**, Michigan State University, for attempting to coerce the entire membership into his cult of the pheromone, and for admitting to having intimate relations with codling moths; Jim was responsible for the demise of yet another unfeathered friend.
- **Peter Shearer (2009)**, Oregon State University, Hood River, for forgetting, like Dorothy, that he was not in Rutgers anymore (For those of you not present, he gave his talk as the new director of the Hood River Station MACAREC, using the Rutgers template).

- **Harvey Reissig (2010)**, Cornell University, Geneva, for his presentation that introduced a new web based IPM decision support system for NY apple growers that was actually a chemical spray calendar disguised as an IPM program (well played, Harvey, well played).
- **John Dunley (2011)**, Wilbur-Ellis, Cashmere, Washington, for not being present each morning to turn on the lights, the projector, and the laptop computer before the meeting began.
- **Larry Gut (2012)**, Michigan State University, for now conducting research on pheromone puffers (and finding them effective) after 'pooh-poohing' them for many years.
- **Don Thomson (2013)**, DJS Consulting Services, for delivering the keynote speaker's address in his introduction of Camille before she had a chance to deliver her own presentation.
- **Doug Light (2014)**, USDA ARS, Albany, California, for blatantly promoting his own product during his presentation.
- **Brad Higbee (2015)**, Paramount Farms, CA, for delivering an extended talk under false pretenses, breaking the new OPDMC computer, and bragging about his 40-acre research plots.
- **Betsy Beers (2016)**, Washington State University, Wenatchee, for the incompatibility of the slideshows presented by herself and her students despite the fact that she keeps the meeting computer.
- **Lisa Neven (2017)**, USDA-ARS, Wapato, Washington, for submitting her talk late, two times, and including incorrect information on Okanagan Co. in her presentation.
- **Lucia Varela (2018)**, University of California Cooperative Extension, Santa Rosa and Napa, for claiming that she had not seen the slides prior to the presentation; however, she was second author on the presentation; for making personal statements without supporting data; for claiming to have visited every backyard in Chile to see that all had grapevines; and she requested to the audience – "shoot me".
- **Rick Hilton (2019)** was nominated for false advertising because he signed up for BMSB talk in the Invasive Species section of the conference, but then proceeded to spend half of his presentation talking about codling moth.
- **Greg Krawczyk (2020)** for showing upside-down videos, the modern version of upside-down slide carousels.
- **COVID-19 (2022)** for being generally awful!
- **Dave Crowder (2023)** for interrupting himself, with himself, during his own talk by unintentionally leaving in a Zoom-based recording of himself on one of his slides.
- **Bob Carr (2024)** for forcing "Spider Kid" Sean Counihan to divulge his life history concerning his interest in spiders.

Travel Scholarships for Students

INDUSTRY SPONSORS

For many years, industry participants of OPDMC have asked for a way to lend financial support to the event. We have established the Student Travel Scholarship fund to help support both OPDMC and the next generation of IPM specialists!

Industry contributions will be accepted in any amount, and sponsors will be recognized in the following categories: Bronze (up to $250), Silver ($251-$499), and Gold ($500+). Contributing organizations will be recognized in the conference program, as well as in the opening and closing business meetings.

INTERESTED STUDENTS

To qualify for the scholarship, students **must**:

1. Submit a complete application.
2. Attend OPDMC and present a talk.
3. Be available to help at the registration table on the first day of the meeting.

The selection committee will review applications and select award recipients from qualified applicants. The number and value of scholarships awarded will depend on the total amount of donations received.

FOR MORE INFORMATION

Visit https://opdmc.org/home/scholarships/

Thank You
2024 Student Scholarship Sponsors

Pacific Biocontrol

The Larry Gut Fund

Living the Güt Life

Gold Level

VALENT®

Silver Level

More details are available on the previous page.

Interested in Donating?

See https://opdmc.org/home/scholarships/