SUMMARY| PEST MANAGEMENT ADVISORY COMMITTEE RESEARCH GRANT REVIEW MEETING
CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION

February 9, 2023

Produced by the Consensus and Collaboration Program, CSU Sacramento College of Continuing Education

Contents

1. Attendance

Pest Management Advisory Committee (PMAC) Members

1. Brenna Aegerter, University of California, Agriculture and Natural Resources
2. Bill Allayaud, Environmental Working Group
3. Whitney Brim-DeForest, University of California Cooperative Extension
4. Jenny Broome, Driscoll Strawberry Associates, Inc.
5. Greg Browne, USDA Agricultural Research Service
6. Robert Ehn, California Garlic and Onion Research Committee
7. Jonathan Evans, Center for Biological Diversity
8. Jim Farrar, Director, Statewide UC IPM Program
9. Terry Gage, California Agricultural Aircraft Association
10. Brian Gress, California Department of Food and Agriculture
11. Jon Holmquist, Association of Applied IPM Ecologists
12. Hanna Kahl, Community Alliance with Family Farmers
13. Victoria Kalkirtz, California Stormwater Quality Association
14. Anne Katten, California Rural Legal Assistance Foundation
15. Farzaneh Khorsandi, UCD Department of Biological and Agriculture Engineering
16. Gabriele Ludwig, Almond Board of California
17. Nick Lupien, California Association of Pest Control Advisors
18. Melissa O'Neal, Pro Farm Group, Inc.
19. Nicole Quinonez, Madden Quinonez Advocacy
20. Margaret Reeves, Pesticide Action Network North America
21. Stephen Scheer, California Agricultural Commissioners and Sealers Association

California Department of Pesticide Regulation (DPR)

22. Julie Henderson
23. Aimee Norman
24. Leslie Talpasanu
25. Dr. Matt Fossen
26. Jordan Weibel
27. Dr. John Gerlach
28. Hannah Jensen
29. Catherine Bilheimer
30. Dr. Tory Vizenor
31. Kimberly Crispin
32. Dr. Brian Ingel
33. Dr. Andy Nguyen

Facilitation Support, CSU Sacramento

34. Ariel Ambruster
35. Julia Csernansky

2. Opening Comments and Background

Introductions and Opening Comments

Julie Henderson, Director, Department of Pesticide Regulation (DPR) Integrated Pest Management (IPM) Branch, welcomed everyone and thanked the Pest Management Advisory Committee (PMAC) members for their time and commitment to reviewing the large number of Research Grant proposals this year.

Ms. Henderson formally welcomed new committee member Victoria Kalkirtz, California Stormwater Quality Association, and announced that Dave Tamayo will now serve as Ms. Kalkirtz's alternate on the committee.

Public comments and questions would be taken after each proposal item via email to DPRpmgrants@cdpr.ca.gov and by raised hand for those in the Zoom webinar.

3. Research Grant Proposal Overview

Jordan Weibel, DPR IPM Lead on Research Grants presented the meeting agenda, and highlighted the research grant proposal discussion as the focus of the meeting. He then shared updates regarding the 2023 IPM Grants Program.

Mr. Weibel indicated there are $3.15 million in funding available. Similar to last year, DPR will consider projects that have up to a two-and-a-half-year timeline. In contrast, prior year grants were open to projects of up to three years. Mr. Weibel noted enhanced outreach and assistance this year, consisting of 10 virtual information sessions and sample proposal applications for both the Research and Alliance Grants programs.

Mr. Weibel announced 19 total submissions for Research Grants this year, with 17 of the 19 qualifying and a total funding request around $7.9 million.

Mr. Weibel informed attendees that the 2023 Alliance Grant proposal application period closed in December of 2022 with $1.5 million in funding available. PMAC members will receive proposal applications for review at the conclusion of DPR's screening process. The PMAC meeting to review Alliance Grants will occur on May 11th, 2023.

2023 Research Grant Summary of Proposals

Proposal Short and Full Title	Principal Investigator	Budget
Swett – Fusarium IPM and Decision Support Tool (DST) Reducing Current and Future Fungicide Use in California Crops by Providing Decision Support and Rotation Tools for Managing the Emerging, Highly Damaging *Fusarium falciforme* Pathosystem	**Dr. Cassandra Swett**	$598,497
Rugman-Jones – SIT for ACP Can the Sterile Insect Technique [SIT] Provide an Alternative to Pesticides for Controlling the Spread of a Major Pest of Citrus, the Asian Citrus Psyllid (ACP), in California?	**Dr. Paul Rugman-Jones**	$567,775

Proposal Short and Full Title	Principal Investigator	Budget
Bolton – Grape Canine Virus and Pest Detection Canine Detection of Invasive Vine Mealybugs and Leafroll Virus (Glrav-3) in California Vineyards	**Dr. Stephanie Bolton**	$428,118
Gautam – Citrus IPM Alternatives New Sustainable Methods to Reduce Pesticide Use on Citrus	**Dr. Sandipa Gautam**	$673,031
Westphal – Walnut Nematode Suppression Use of Walnut Byproducts for Suppression of Plant-parasitic Nematodes	**Dr. Andreas Westphal**	$495,612
Wildermuth – RNA interference (RNAi) for Grape PM Formulation and Field Testing of RNA-Based Biological Control Product for Grapevine Powdery Mildew	**Dr. Mary Wildermuth**	$465,422
Nansen – Mite and Thrip Greenhouse LED IPM Use of Light-Emitting Diode (LED) Technologies to Enhance Performance of Pesticide Applications in Greenhouse Pest Management	**Dr. Christian Nansen**	$326,561
Westphal – Nematode Suppressive Soils Soil Suppressiveness Against *Pratylenchus vulnus* One of the Key Foes of Almond Production	**Dr. Andreas Westphal**	$562,674
Jin – Peptide Control of PD and HLB Controlling Grape Pierce's Disease (PD) and Citrus Huanglongbing (HLB) and their Transmission Vectors Using a Stable Plant-Derived Antimicrobial Peptide	**Dr. Hailing Jin**	$276,736
Larbi – Spray Drift Modeling Development and Validation of a Mechanistic Airblast Spray Drift Model for Orchard and Vineyard Applications	**Dr. Peter Larbi**	$513,336
Donohue – Biopesticide Efficacy Testing Accelerating Grower Biopesticide Adoption by California Growers to Meet Unmet Pest Management Needs and as Alternative to Restricted Chemicals	**Mr. Dennis Donohue**	$320,000
Zaifnejad – Tomato Fungicide IPM Alternatives Replacing High-Risk Soil Fumigation for Processing Tomato Crops with a Combination of an Environmentally Friendly Thyme-Oil-Based Nematicide/Fungicide and a Humic-based Soil Microbial Biostimulant	**Dr. Mojtaba Zaifnejad**	$333,012
Baer – Evaluating Bee Repellents Safeguarding Bees and their Pollination Services	**Dr. Boris Baer**	$385,064
Larbi – Remote Nozzle Selector Development of a Remote Nozzle Selector for Increased Productivity and Reduced Operator Exposure to Pesticides	**Dr. Peter Larbi**	$345,919
Yu – Grape Cover Crops and Tilling Can Cover Crops and Tillage Serve as an IPM Tool in California's Central Valley and Central Coast Vineyards?	**Dr. Runze Cliff Yu**	$520,325
Layfield – UAS for Specialty Crops Utilization of Unmanned Aerial Systems (UAS) to Apply Treatments to Specialty Crops in Areas with Limited Access and Resources by the Development of Crop Specific Booms that Provide Precision Application and Minimize Drift	**Ms. Briana Layfield**	$312,577
Langroodi – GWSS Plasma Fogging Development of Site-Specific Management of Glassy-Winged Sharpshooter (GWSS) via Non-Equilibrium Short-Pulsed (Cold) Plasma Fogging System	**Dr. Saeed Langroodi**	$749,798

Twenty PMAC members reviewed the proposals ahead of the meeting and submitted ranks for each proposal. Mr. Weibel shared the initial ranking, as presented in the following chart, shown in ranked order.

2023 Research Grants Program Initial PMAC Proposal Rankings *(average of 20 rankers)*

Principal Investigator	Project Short Title	Final Ranking	Average	Standard Deviation	High	Low
Swett	Fusarium IPM and DST	1	4.22	2.44	1	9
Rugman-Jones	SIT for ACP	2	6.25	3.94	1	14
Bolton	Grape Canine Virus and Pest Detection	3	6.3	5.14	1	17
Gautam	Citrus IPM Alternatives	4	6.65	4.65	1	17
Westphal	Walnut Nematode Suppression	5	6.65	3.81	1	14
Wildermuth	RNAi for Grape PM	6	7	3.21	2	14
Nansen	Mite and Thrip Greenhouse LED IPM	7	7.2	3.85	1	16
Westphal	Nematode Suppressive Soils	8	7.55	3.87	2	16
Jin	Peptide Control of PD and HLB	9	7.7	4.27	1	14
Larbi	Spray Drift Modeling	10	8.95	5.04	1	17
Donohue	Biopesticide Efficacy Testing	11	9.26	3.64	4	16
Zaifnejad	Tomato Fungicide IPM Alternatives	12	9.7	4.57	2	16
Baer	Evaluating Bee Repellents	13	10.3	4.85	2	17
Larbi	Remote Nozzle Selector	14	10.84	4.67	2	17
Yu	Grape Cover Crops and Tilling	15	10.85	4.03	4	17
Layfield	UAS for Specialty Crops	16	12.95	3.57	2	17
Langroodi	GWSS Plasma Fogging	17	13.2	3.88	3	17

Quorum Count

Aimee Norman, DPR IPM Branch Chief, initiated roll call to verify that PMAC member attendance achieved quorum in the meeting, in accordance with the Bagley-Keene Act. Ms. Norman reminded PMAC members of their legal obligation to disclose any conflicts of interest and initiate recusal as appropriate. The following PMAC Member recusals were announced:

- Brenna Aegerter had a conflict of interest with and recused from the Swett Proposal.
- Whitney Brim-DeForest had conflicts of interest with and recused from both the Swett Proposal and Larbi Spray Drift Modeling Proposal.
- Ken Giles had conflicts of interest with and recused from both Larbi Proposals.
- Melissa O'Neal had a conflict of interest with and recused from the Donahue proposal.

Ms. Norman noted that one member was being represented by their alternate:

- Brian Gress for Karen Ross, California Department of Food and Agriculture

Ms. Norman noted that the two Ex Officio members, Jim Farrar and Brian Gress, do not count toward quorum and affirmed that quorum had been attained. See above for the attendance list.

4. Research Grant Proposal Discussion

The facilitator, Ariel Ambruster from the Consensus and Collaboration Program at California State University, Sacramento, outlined the process for proposal discussion and review, and noted that the role of PMAC is to provide recommendations and feedback helpful to inform Director Henderson's funding decisions.

First, PMAC members discussed whether there was an obvious bright line separating out proposals they'd recommend not funding. PMAC members were in consensus that they would not recommend the Layfield and Langroodi proposals for funding.

Discussion of Proposals

PMAC members discussed the merits, concerns, and areas needing clarification for each project proposal, in the order of their initial ranking. Below is a summary of PMAC members' comments for each proposal. Comments reflect individual PMAC member observations, not consensus opinions. Thus, merits and concerns may occasionally appear to be contradictory.

Swett – Fusarium IPM and DST

Merits

- The proposal lays out well the lack of options for an alternative in this system and the need for funding.
- Good diagnostics are important to inform the selection of the right practices.
- This pathogen impacts berry crops as well, so it could be very impactful across the state.
- This is a good concept with recognizable need, value, and impact.
- This is a persistent and hard problem to get rid of with no currently existing alternatives.
- The proposal is important for onion and garlic growing, where this is a very serious pest of concern.
- This is a serious pest of concern for a number of different crops so this will have a big impact.
- The proposal indicates a strong team of advisors who have agreed to provide samples.
- There are strong letters of support, a solid team, and a true IPM approach.

Concerns

- The proposal should address perennial crops, such as pistachios, that can't employ crop rotation.
- There is not enough cost information to identify how the economics will be evaluated and shared with growers to inform their practices.
- At the field level, this seems like a first step that will need additional research regarding crop rotations.
- Will greenhouse trials be enough to convince growers to support this tool?

- This is an appropriate tool to get at soil and microbial impacts, but it would be valuable to follow up with field work in non-sterile soil.

Clarifications

- None.

Public Comment

- None.

Rugman-Jones – SIT for ACP

Merits

- SIT is a generally proven technology.
- Having a technique that would work in urban and suburban environments is valuable to deal with known potential threats in those areas.
- This is a widely used and very effective tool.
- ACP is a high priority pest of serious concern.
- This is a very effective non-chemical approach to the problem.
- The proposal could be useful for urban and adjacent areas.
- The described methods are rigorous.
- Given that the use of neonics is under scrutiny and restrictions are coming, this is a good tool to have in our toolbox.
- It is very important to have non-chemical options, especially in urban areas.
- The proposal is well written and makes sense.
- This proposal would be valuable to keep proving the worth and solidify the value of SIT since there is skepticism around the technique.
- The proposal included discussion of the benefits of combining this approach with other biological control approaches.
- This is an appropriate tactic to manage the disease by going after the vectors, the best way to prevent the disease.

Concerns

- The numbers are low so far for this disease, so how effective will this be? Is this the right timing and trajectory of this pest to consider this approach?
- There has been a lot of focus on managing vectors and not so much on managing the disease – what about suppressive soils and supporting the vigor of the crop itself to resist pests?
- There were concerns around methods, including if it is appropriate to release as many as 2,000 insects to a single tree.
- Would involving undergraduates increase risks? There needs to be a responsible system that avoids release of fertile ACP.

Clarifications

- The proposal did not delineate the sex of insects to be released, which are typically male.
- Wouldn't this project need longer-term funding beyond this grant in order to sustain its benefits and impacts?
    - Another member responded that, while this would involve long term investment, the federal government is engaged now regarding critical pests and providing funding. This is a very effective solution.
    - Another member responded that it can be a lot to scale up and will need a sustained effort, educators, and alliance stakeholder engagement.

Public Comment

- None.

Bolton – Grape Canine Virus and Pest Detection

Merits

- One member expressed excitement about this approach and technology.
- Canines have been a great tool and the overall approach has merits in terms of early detection.
- This approach worked really well in the past for more structural IPM issues for bedbugs and is very creative.
- The proposal is well written and clear.
- This proposed approach would be a good set up for biocontrol of pests, given that early detection should make biocontrol more feasible.

Concerns

- There is no economic evaluation. While this approach can be effective, economic issues might affect implementation.
- The economics of the proposal are not clear, for example how many dogs are needed.
- The budget primarily addressed the first year and needs more information about the second year.
    - What will happen after the company buys the two dogs?
    - How will the money be used over the two-year period?
- This proposal needs to pull it all together within an IPM approach so we can see how this method can be used along with other tools.
    - How can these approaches complement each other?
    - After detection, then what?

Clarifications

- None.

Public Comment

- None.

Gautam – Citrus IPM Alternatives

Merits

- There are strong letters of support.
- This is a straightforward IPM approach.
- The project has a rigorous economic component.
- There is good explanation of the ecology of the system, which is not often seen.
- It is rare to see such a good and diverse team.
- There are controlled conditions for conducting the research.
- If successful, it would have strong benefits.

Concerns

- Multiple members questioned the project's feasibility, given the very broad nature of the approach for the amount of requested funding.
- How would all of this work be completed in two and a half years?
- A slightly smaller project may make more sense here.
- There needs to be more of an ecosystem approach in assessment of strategies such as cover crops, as insects impact a wider area – look at larger acreage, not just rows.
- There was no explanation of the metal mulch, and a member questioned its sustainability and potential impacts.
- This proposal is light on specifics regarding methodology, including plot sizes, treatments, statistical analysis, controls, and monitoring multiple different pests. It is not well laid out, preventing members from being able to assess effectiveness.
    - Was there a control for the mulch treatment? If so, that should be mentioned.

Clarifications

- One member requested more information to understand metal mulch and its potential impacts.

Public Comment

- None.

Westphal – Walnut Nematode Suppression

Merits

- This proposal addresses a high-priority problem of high significance.
- There are no good alternatives to address the nematode problem during the time trees are in the ground.
- Recycling orchard waste and establishing a circular economy is beneficial.
- It is important to find an alternative to existing solutions that are not synthetic pesticides.
- This proposal builds on successes with almond whole tree recycling.
- This proposal is founded on IPM principles of using sustainable practices to reduce pesticide use and using byproducts.
- There are strong grower support letters.

- The proposal asks the right questions and takes into account the big picture.
- The method of taking a byproduct and finding another use is consistent with IPM principles.
- The methods are clearly laid out.
- There is good refining of previous assumptions.
- The project could further carbon sequestration, which might also offer opportunities for future subsidies that could help the economics of the project as a whole.

Concerns

- The statement of work is not clear, emphasizing water extracts early in the research, and then solid materials later in the field.
- For the funds requested, there should be more thorough field monitoring. There needs to be more detailed discussion of collecting cost information, more information and rationale on why the different plants are used for testing.
- There is not a lot of cost information provided or analysis of the economics of this approach going forward.
- The statistical analysis explanation is weak and needs more detail.

Clarifications

- None.

Public Comment

- None.

Wildermuth – RNAi for Grape PM

Merits

- This could be promising research.
- Powdery mildews are impactful for a number of crops.
- The research incorporates recently learned techniques.
- The practical roadblocks for scaling up are addressed in the proposal, which could be helpful in overcoming obstacles to adoption of this approach.
- The Principal Investigator (PI) would work with growers and Pest Control Advisors (PCAs).
- The proposal is targeted to a pest of concern and could be generally applied for use in other IPM systems if the roadblocks and scaling issues can be overcome.
- This has the potential to be a safer alternative to currently used fungicides.

Concerns

- People have been working on this approach for 15 years – how successful will this be?
- This approach is fairly academic and there is a question about how to bring it out into the real world.
- There are serious safety concerns that needs to be addressed. RNAi technologies are virtually unregulated domestically and internationally and there has been no analysis of

human health risks, such as inhalation exposure. The literature suggests this technology suffers from high off-target effects.
    - Another PMAC member differed on potential human health risks, saying undergraduates do lab experiments with RNAi and this would not be genetic engineering or in the environment.
- Safety and toxicity issues include that environmental fate data is limited. Chitosan coatings are described as making nanoparticles that could have potential environmental impacts.
    - Another PMAC member said that chitosan has been given 25B status by the EPA, generally recognized as safe.
- There is no plant pathologist involved and are dealing with a plant pathogen.
- Under methods, there is no description of how disease severity will be assessed, which highlights the lack of pathologist involvement.
- The researcher has a patent related to this technology which is potentially problematic.
- The economic analysis is weak and needs to be more robust.
- The scaling issue is major.

Clarifications

- None.

Public Comment

- Dr. Stephanie Bolton: We are in strong support of Doctor Wildermuth's efforts to use RNA-based biocontrol for powdery mildew. She is an excellent scientist who can clearly communicate with industry and she is engaged with growers. Her project is also transferable to other diseases we face.

Nansen – Mite and Thrip Greenhouse LED IPM

Merits

- There is potential here with light technology and doing more controlled work with the cutting-edge technology of affordable LEDs.
- This is a really creative approach and use of new technology, using lights from different angles to manipulate insect behavior.
- There is good preliminary data.
- It could be beneficial to diminish pesticide use in greenhouse spaces.
- The proposal indicates good connections with industry stakeholders.
- The extension component in this proposal is well described and thought out.

Concerns

- There is nothing in the proposal related to human safety and health regarding exposure in this work.
- There is no information regarding cost of the approach: changing lighting, electricity costs, etc.

- Another member agreed, saying the proposal lacks a description of potential expenses in transitioning from standard industry LED light systems.
    - A member responded that part of this early-stage research will be collecting that cost information, as there is a protocol for collecting cost information.

Clarifications

- How would the LED lights influence the biocontrol methods?

Public Comment

- None.

Westphal – Nematode Suppressive Soils

Merits

- The focus on suppressive soils holds promise for managing soil-borne diseases and they are looking at real field soils.
- This would be a substitution for a problematic fumigant.
- The emphasis on soil health is important.
- This proposal emphasizes ecological methods to improve agriculture and reduce pesticide use in favor of sustainable methods.
- It is an IPM approach.
- The proposal builds on past work and inquires into the mechanisms of a complicated question regarding soil suppressiveness.
- There are good learning opportunities within this proposal.

Concerns

- This proposal focuses on one of three nematodes that affect almonds. It is uncertain if it will work for other nematodes.
- The proposal needs more information regarding suppression factors. Specifically, more detail on documenting that whole orchard recycling suppresses nematode populations in the field. It may be difficult and challenging to locate suppressing organisms with this proposal's approach.
- This proposal makes some presumptions regarding locating suppressing organisms.
- There needs to be more information on collecting costs throughout the study, which seems particularly applicable here.
    - Another PMAC member said some costs are collected, and the research is not yet at the stage where full costs can be assessed. A number of the proposals do not include gathering cost data because their focus is on the early stages of determining feasibility of the scientific approach at managing pests.
- One member raised an issue about the research, that it appeared all samples might be from 2018 and not more recent; what if a lot of the suppression is not organism driven but instead organic byproduct decomposition driven and so has already occurred?

- One member looked through the proposal and responded that the concern is valid, that there are no more recent samples.

Clarifications

- One member noted an issue: both Westphal proposals indicate 100% Full-Time Equivalent (FTE) of the same staff and thus both could not be feasibly carried out as described if both were to be funded. What would happen in that case?

Public Comment

- None.

Jin – Peptide Control of PD and HLB

Merits

- This is a very interesting approach and in theory, it has huge potential.
- There are currently very few tools to manage bacterial diseases. This would be a new tool, if it works.
- This is a novel and potentially very impactful method for targeting bacterial diseases.
- One member appreciated that the proposed approach arises from a known, naturally resistant line of trees.

Concerns

- The proposal needs more description of experimental protocols.
- There is only one letter of support and one reference article.
- The proposal is confusingly written.
- The write-up needs more detail and information, including more clarity regarding any non-target impacts, how this is a more precise tool, and how this will achieve the overall goals of pest management.
- The potential for non-target impacts to beneficial bacterial or humans needs to be investigated especially since this is a systemic method.
- The proposal contains very different and separate objectives, which indicates a lack of focus and follow-through thread.
- This is a confusing proposal.
- It seems like the PI may not have experience writing this kind of proposal before, as it is not well written. It was suggested that the PI rewrite the proposal based on suggestions and submit it again next year.

Clarifications

- The 4th objective is confusing: Will they be doing the experiments, or just recommending a treatment protocol?

Public Comment

- None.

Larbi – Spray Drift Modeling

Merits

- Dr. Larbi has extensive experience in this field and is an experienced PI.
- There are many possible economic benefits from this project for growers, especially for reducing operational costs.
- This proposal has strong letters of support.
- It is important for crops requiring the use of air blast sprays, which is a lot of California crop trees and vines.
- The proposal leverages large and previously developed data sets.
- One member noted personal knowledge that Dr. Larbi's focus is to have better models for growers and acknowledged this proposal doesn't help reviewers understand that he is working on those practical elements.
- Anything we can do to improve the technology of deposition will improve control measures.
- There have not been good improvements to this technology in many years, so this could be a wonderful development.
- Multiple PMAC members said the research could have IPM-related benefits.
    - Part of IPM is minimizing pest use, which relates to efficient use. Therefore, this could fit within IPM standards due to reduction in waste because of excessive drift.
    - This proposal could reduce pesticide use and contamination resulting from spray drift, which fits into IPM goals.
- One member noted that this proposal falls into a grey area for IPM, the delivery method for application of pesticides, but recognizes that a better understanding of dispersal systems could be valuable for IPM goals.
- The proposal includes assessing pesticide use in the state.

Concerns

- Multiple PMAC members saw the proposal as only peripherally related to IPM, if that.
    - Both Larbi proposals are not consistent with IPM goals, given there are no ecosystem manipulation or pesticide alternatives.
    - This proposal jumps right into modeling for pesticide use and misses foundational IPM aspects.
    - This proposal mostly develops a method for more precisely estimating deposition of pesticides on a plant – where is the reduced use?
    - One member noted that it doesn't feel like this proposal fits within the spirit of IPM and would rather see projects focused on alternatives or significant reduction.
    - This model may be better for risk assessment than use reduction.
    - EPA risk assessment already uses a worst-case scenario of small trees without leaves so that spray is more conservative.
        - In response, another PMAC member said there are concerns that

conservative models may result in failure sprays and ultimately more sprays overall, so the approach could result in reduced spraying.
    - This proposal seems to push for less conservative guidelines regarding spray drift which conflicts with goals of this program.
- This is no clear focus for the end product of this project being adopted as a practical tool for growers and applicators in the field.
- This project seems more targeted to the pest regulation and label development space.
- It is unclear whether growers will use this tool. However, in several of the other proposals, the grower may not be using those methods and techniques either.

Clarifications

- None.

Public Comment

- None.

Donohue – Biopesticide Efficacy Testing

Merits

- This has the possibility to be hugely impactful research.
- More robust testing of biopesticides is necessary to increase user confidence.
    - This proposal seeks to address a lack of publicly available data on the benefits of these biopesticide materials from independent analysts or researchers. Often the data comes straight from companies selling the product with no third-party vetting, which contributes to widespread distrust by farm advisors. This attempts to find a different way to get more reliable efficacy data into the hands of growers.
- This proposal is a step in the right direction on the continuum towards ecological IPM.
- It is good that several growers and grower groups will participate in the study, a very participatory based research approach engaging growers.
- The general idea is a good one, trying to help growers implement these materials.
- There is genuine interest in this proposal.

Concerns

- These are all registered biopesticides with various public research trials. Is this proposal adding anything more, or duplicative of existing work?
- The method section on incorporating/running trials into the full programs need to be more specific. In theory this is a good idea to assess impact, but there are a lot of other variables in the mix here for the statistical analysis to tease out the significance of this one material and scientific implications.
- Most of the team members are from industry or commodity backgrounds. Multiple PMAC members said it would have been helpful to include researchers, such as from University of California Cooperative Extension (UCCE), who could help with the research design.

- The scope seems overly ambitious with regard to seven different areas and different cropping systems within the proposed timeline.
    - The proposal includes a lot of crops and materials without enough detail about how this research would take place in reality. This is not easy, and you could end up without a lot of useless information unless the research is well thought out.
- There is no clearly defined plan for reaching out to the growers, which can take a lot of work.
- There is no identification of the crop/pest combinations to be targeted.
- The PI's entire budget goes to a subcontractor, not well described, as a testing firm, which has not been seen before.
- Letters of support were sparse, including one from the subcontractor and one from the PI, and only one letter of support from a grower, the California Tomato and Research Initiative.
- A grower's group member said he disagreed with the impression conveyed by the proposal that growers are not informed or reliable to provide information – his group works with Extension and funds a lot of research including on these biopesticides. He deals with a lot of contract researchers and had not heard of the subcontracting company.
- The supplemental tables were helpful but were not included in the proposal until later.

Clarifications

- None.

Public Comment

- None.

Zaifnejad – Tomato Fungicide IPM Alternatives

Merits

- The proposal tries to assess the efficacy of a biopesticide.

Concerns

- There has never been a university study indicating efficacy of the soil microbial biostimulant.
- Multiple members raised concern about the lack of neutral research participants and the financial interest of the PI. There is already lack of trust surrounding funding for certain research projects. This proposal is a registered manufacturer seeking funding to test their product for their use with no outside or non-financially-involve all personnel. It is hard to see why it should be funded.
- With respect to the proposal's approach and plans, it is not clear what the benefit is in the first year. The fields are already treated with metam and only in later years will they test the biopesticide as an alternative, which is odd.

- A member looked for efficacy trial reports on the two materials and found several studies that showed no significant difference. The letter of support from a Louisiana professor noted no statistically significant impact.
- The proposal requests a lot of money to do a one-treatment efficacy trial for the company.
- There is no analysis of pathogen presence and disease.
- There is no clear hypothesis here as to why are they measuring all the things they are measuring.

Clarification

- Is thyme oil equally effective for both nematodes and fungus?

Public Comment

- None.

Baer – Evaluating Bee Repellents

Merits

- The topic of repellents for homes is interesting and helpful as a way to keep them out of unwanted spaces.
- Beekeepers desire a repellant option.
- The urban pest application has potential, given the high cost to remove Africanized bee swarms, which are a significant problem.
- This is a creative way to try to protect bee health.
- There is a broad spectrum of potential benefits with this proposal to honey bees, native bees, and urban swarm issues.
- This could be useful for urban households.

Concerns

- Multiple PMAC members questioned whether the proposed approach is IPM.
    - Is adding a repellant to a pesticide an IPM technique?
    - This proposal could actually expand neonic pesticide use by allowing spraying during bloom periods.
- The proposal doesn't discuss what the registration process for the products would look like, or the phytotoxicity data.
- Members discussed the potential benefits for urban pest management. One member noted that swarming bees are a significant problem. However, implementation was not clear. How to predict where swarms could affect structures and make repellant treatments ahead of time, unless there is a structure with history of repeated swarms?

Clarifications

- How long would the repellants last?

Public Comment

- None.

Larbi – Remote Nozzle Selector

Merits

- One PMAC member saw this proposal as clearer than the other Larbi proposal regarding the link to reducing exposure of sprayer operators, which is an important human health consideration.
    - If this proposal works it could reduce worker exposure to harmful chemicals.
- This project may reduce the time and effort associated with spraying by simplifying the spraying process through more efficient and targeted application.
- This could fit into IPM principles, given that tailoring nozzle use could enhance efficient use of pesticide, which fits with minimal use of pesticides in IPM strategy.

Concerns

- Is this consistent with IPM principles?
- There is an issue still around worker exposure. Exposure could increase during spraying, because the more complicated technology could get knocked off target by branches. And exposure could increase during maintenance, which is often the worst point of exposure, if the new hardware is harder to maintain.
- This proposal raises issues of privately funded research versus publicly funded research. Why hasn't this been privately developed by companies that manufacture air blast sprayers?
    - There is a sprayer with multiple nozzles available.
- There is a feasibility issue given that most of the proposal is about system design and there is only one month allotted for testing.

Clarifications

- How would this be implemented?

Public Comment

- None.

Yu – Grape Cover Crops and Tilling

Merits

- The soil health space has a gap in understanding the impact on pests and beneficials in a holistic way. This proposal seeks to address that gap, which is exciting.
- This is a strong diverse, multidisciplinary, team from different institutions.
- The nod to climate change mitigation is appreciated.
- The proposal evaluates impact on vine physiology in addition to pests and beneficials.
- There are strong letters of support from industry partners.
- These are practices already adopted by growers for issues not related to pest management, so impact on pest pressure would be important and useful information for growers.

- There are related and positive precedents from the almond industry in the 1980s which this proposal would study. These precedents are recently neglected.
- There is a lot of existing momentum and encouragement around the adoption of cover crops in vineyards with some data on pest impacts Adoption happened without knowing the potential benefits and pitfalls.
- One member said she rated this highly because of the systems approach and the team.
- One member applauded the use of cover crops in vineyards for plant and soil health, when complexed, and related research.

Concerns

- There is some data on etymological impacts already, so this proposal may not be new research.
- The small plot sizes are a concern, given the risk of interference, especially concerning for figuring out the effect of beneficials or insect habitats since they can move.
- There is a timing issue here, given that it takes time for changes in soil and ecology to occur, and they can be different in the third or fourth year, and this project is looking at impact over 2 ½ years.
- The proposal write-up needs more detail as it doesn't directly address the questions we need to evaluate for this grant. Specifically, the descriptions of environmental and health impacts are weak, and the narrative regarding ability to reduce pesticide use and economic barriers is weak.
- The letters of support are weak and redundant.

Clarifications

- None.

Public Comment

- None.

Layfield – UAS for Specialty Crops

Merits

- None.

Concerns

- The PI has limited background in this field. They should add a specialist, farm advisor or pest management expert to their team.
- There are already many studies related to UAS and it's not clear what this proposal adds to existing research.
- The proposal lacks important details.
- The cited literature didn't support the proposal very well.
- It is unclear if the PI is familiar with California agriculture.
- There was no letter of support from grower collaborators.

- University of California Riverside is not in the budget, so how would they conduct the described spray droplet analysis?
- California has a certain set of rules and regulations regarding water use for UAVs, and this proposed ultra-low volume application would actually not be legal in California.

Clarifications

- Where will the work take place?
- Does the PI have grower collaborators?
- What is the ideal boom or specifications of boom?
- What are they trying to accomplish and how to get there?

Public Comment

- None.

Langroodi – GWSS Plasma Fogging

Merits

- This proposal is a creative approach to address some of these pests.
- The proposal outlines good methods for collecting cost information.
- The focus is on something innovative by looking at eggs and larvae as opposed to adult control groups.

Concerns

- The proposal identifies the target as glassy-winged sharpshooter, but the research doesn't test applications against this pest group.
- There are no grower letters of support.
- There are no human health impacts mentioned.

Clarifications

- None.

Public Comment

- None.

5. Department Updates

Director Henderson thanked the PMAC members for all their work and incredibly helpful feedback. She noted it was very helpful for her to listen in on the conversation.

Director Henderson shared the following department updates and highlights:

- DPR along with the California Environmental Protection Agency (CalEPA) and California Department of Food and Agriculture (CDFA) released the Sustainable Pest Management Road Map for California, which is now available in English and Spanish on their website.

    - DPR released it on January 26th and opened a 45-day public comment period for input. Director Henderson encouraged all PMAC members to review the Road Map and provide feedback.
    - She extended gratitude to all members of the Sustainable Pest Management Work Group, but particularly those who are part of PMAC: Jenny Broome, Jim Farrar, Gabriele Ludwig, Margaret Reeves, and Dave Tamayo. She said the group worked tirelessly over nearly two years to develop an incredibly comprehensive, ambitious road map to move California to sustainable pest management at a system wide level, that really builds on all of the work that PMAC members have been focused on for so long.
    - DPR looks forward to continuing to engage with PMAC members as part of that work going forward.
- Another key initiative that DPR is continuing to push forward with is the development of its statewide notification system.
    - DPR conducted six public workshops in 2022 and is synthesizing the feedback and developing a proposal for the design of that notification system. As part of that, DPR is developing a regulation it will propose and an IT system to support the notification system.
    - DPR anticipates implementation of this system in 2024.
- DPR is continuing work on alternatives for its major funding mechanism, known as the Mill Assessment.
    - DPR released a Mill Alternatives Concept Paper on December 2 that outlines some initial options for the assessment redesign, part of an independent study by contractor Crowe LLP to identify options for the structure, sources, and levels of funding necessary for DPR to continue to fulfill its mission of protecting health and the environment. Additionally, and key to this group, is incentivizing sustainable pest management.
    - DPR anticipates releasing Crowe's workload analysis for the department and the Mill Assessment draft recommendations this spring.
- In November 2022, DPR announced a proposed regulation to strengthen restrictions on use and significantly reduce potential residential and non-occupational bystander exposure to pesticide 1,3-Dichlorpropene (1,3-D), to address both potential cancer and acute health risks based on a health protective target established in 2021.
    - After consultation with State and local agencies, DPR held a January 18 public hearing to collect comments on the proposed regulations, and staff are in the process of considering those comments now.
- DPR released a number of pesticide use reports a few weeks ago, the 2019 and 2020 Annual Reports, and the 2021 Highlights, all now available on the DPR website.
    - DPR anticipates releasing the full 2021 Annual Report in the coming months.
    - Director Henderson noted that the Annual Reports are vital and important to many stakeholders and that DPR looks forward to timely releases of future reports. .

PMAC Member Comments and Questions

A PMAC member asked if DPR could expand on the anticipated IT system for the notification system.

- Director Henderson responded that part of what DPR is developing for notification is the actual IT infrastructure that will enable DPR to provide the information about pesticide applications.
- DPR does not currently have that capability, so is working with agricultural commissioners to build that system.

A PMAC member asked if there will be more opportunities to provide comments or support on the Mill Assessment.

- Director Henderson replied that, while the concept paper comment period is complete, DPR will have ongoing discussions with stakeholders as this progresses, including a formal comment period when the recommendations are released this spring.
- Director Henderson invited any PMAC members with comments to send them to her or DPR Chief Deputy Director Karen Morrison.

PMAC Discussion on Process

A PMAC member made a comment about the grant proposal review process, saying it would be helpful to identify key themes evaluators look for to help future applicants. Common themes include diverse letters of support; engagement of grower groups; economic feasibility and economic data; diverse, multidisciplinary teams; and engagement with academia.

A PMAC member asked about the project timeline of two and a half years for this grant program and if the time is constrained due to liquidation dates on funding.

- Ms. Talpasanu responded that DPR has requested an adjustment to give a little bit extra time for these projects. This has not been confirmed but is something that DPR officials are trying to accomplish to make timing match their regular grant cycle.

A PMAC member raised a question regarding how to handle a potential conflict-of-interest regarding upcoming Alliance Grant proposal review and decision-making, and Ms. Talpasanu offered to connect her with DPR's legal staff to clarify proper recusal procedures, noting the conflict-of-interest procedures can be complex.

Also, earlier in the meeting, a member noted that it is important for reported results of funded research to be public and said they see some summary information but is concerned that reports might not be made public.

- In response, DPR staff said that the intent is to share project reports; they are public documents and available on request.

6. Decision on Recommendations

Based on the discussion, PMAC members re-ranked the proposals.

A final opportunity for public comment was offered prior to PMAC members beginning discussion on their recommendations. There was none.

Quorum was confirmed and the re-rankings were reviewed. Re-rankings are shown in the table below. With 18 PMAC members submitting re-rankings, the overall ranking order saw changes: the top five proposals remained the same, although there was movement within their ranks; the bottom two ranked proposals remained the same; and there was shifting among the several of the mid-ranked proposals.

The PMAC's re-rankings elevated:

1. Bolton - Grape Canine Virus and Pest Detection
2. Westphal - Walnut Nematode Suppression
3. Westphal - Nematode Suppressive Soils
4. Nansen - Mite and Thrip Greenhouse LED IPM
5. Yu - Grape Cover Crops and Tilling
6. Baer - Evaluating Bee Repellents
7. Larbi - Remote Nozzle Selector

2023 Research Grants Program Final PMAC Proposal Rankings *(average of 18 rankers)*

Principal Investigator	Project Short Title	Final Ranking	Average Rank	Standard Deviation	High	Low
Swett	**Fusarium IPM and DST**	1	**2.13**	1.76	1	7
Bolton	**Grape Canine Virus and Pest Detection**	2	**3.78**	1.47	1	6
Rugman-Jones	**SIT for ACP**	3	**3.94**	2.78	1	11
Westphal	**Walnut Nematode Suppression**	4	**4.83**	2.91	1	12
Gautam	**Citrus IPM Alternatives**	5	**4.89**	3.3	2	15
Westphal	**Nematode Suppressive Soils**	6	**6.61**	3.02	1	13
Nansen	**Mite and Thrip Greenhouse LED IPM**	7	**7.11**	3	2	14
Wildermuth	**RNAi for Grape PM**	8	**8**	3.04	4	15
Jin	**Peptide Control of PD and HLB**	9	**8.28**	3.14	2	13
Larbi	**Spray Drift Modeling**	10	**10.24**	3.78	3	17
Donohue	**Biopesticide Efficacy Testing**	11	**10.59**	2.2	8	15
Yu	**Grape Cover Crops and Tilling**	12	**11.06**	3.32	6	15
Baer	**Evaluating Bee Repellents**	13	**12.17**	2.34	5	16
Larbi	**Remote Nozzle Selector**	14	**12.67**	2.47	8	17
Zaifnejad	**Tomato Fungicide IPM Alternatives**	15	**13**	2.08	8	16
Layfield	**UAS for Specialty Crops**	16	**15.28**	1.04	13	17
Langroodi	**GWSS Plasma Fogging**	17	**16**	1.8	13	17

A PMAC member proposed that the full package of PMAC recommendations be forwarded to DPR and Director Henderson for consideration. Another PMAC member seconded the proposal.

Another PMAC member offered a point of clarification, reminding members per earlier discussion the consensus that the Langroodi and Layfield proposals not be recommended for funding.

The facilitator noted that, under the proposal before the group, PMAC is offering the entirety of its work, thoughts and comments on the research proposals before it in this cycle, which would include the earlier consensus against funding those two proposals.

A PMAC member sought to understand how many of the proposals could receive funding , given the amount of money available, if DPR were to fund proposals from the top ranked project down.

- Ms. Talpasanu reminded PMAC members that DPR requests they evaluate each proposal on its individual merits as opposed to seeking to maximize the funding. She noted that the Director considers both recommendations from PMAC and DPR staff reviewers and makes a decision based on the collective feedback, and noted that $3.5 million is available for funding.
- The PMAC member acknowledged that, but said there remains a question about the mix of proposals that PMAC is ultimately recommending via its rankings, given what could feasibly move forward.

A PMAC member proposed adding the Zaifnejad Proposal – Tomato Fungicide IPM Alternatives, to the list of proposals not recommended for funding.

- Two other PMAC members agreed with this proposal.
- The facilitator asked if any PMAC members disagreed with this proposal and none raised concerns.

With that addition to PMAC's considerations on the proposals, a member proposed sending the full package of PMAC recommendations to DPR for consideration. Another PMAC member seconded.

A roll-call vote was held on the proposal that PMAC send the full package of its rankings, written and oral comments and meeting recommendations to the Director for consideration.

The recommendation was adopted with unanimous consensus, with 19 supporting and none opposed, carried with the necessary quorum.

7. Closing Remarks

Director Henderson thanked PMAC members for their interest, commitment and willingness to volunteer, and the time they committed to reviewing the proposals and attending the day's meeting.

The next PMAC meeting will take place on May 11, 2023.