**SUMMARY | PEST MANAGEMENT ADVISORY COMMITTEE GRANT REVIEW MEETING**
**CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION**
Feb 12, 2015
*Produced by the Center for Collaborative Policy, CSU Sacramento, and the Department of Pesticide Regulation*

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# 1. Attendance

**Pest Management Advisory Committee (PMAC) Members**

1. Ken Giles, UC Davis Department of Biological & Agricultural Engineering
2. Mark Shelton, California Polytechnic State University, San Luis Obispo
3. Kevin Wright, California Agricultural Commissioners and Sealers Association
4. Veena Singla, Natural Resource Defense Council
5. David Bakke, US Forest Service
6. Jenny Broome, Driscoll Strawberry Associates, Inc.
7. John Steggall, California Department of Food and Agriculture
8. Joseph Grant, UC Cooperative Extension
9. Rebecca Sisco, UC Davis, Western Region IR4 Program
10. Marcia Gibbs, Sustainable Cotton Project
11. Ann Katten, California Rural Legal Assistance Foundation
12. Caroline Cox, Center for Environmental Health
13. Cliff Ohmart, SureHarvest
14. Laura Brown, California Citrus Mutual
15. Robert Ehn, Western Plant Health Association

**California Department of Pesticide Regulation (DPR)**

16. Brian Leahy, Director
17. Nan Gorder
18. Marshall Lee
19. Mark Robertson
20. Kimberly Steinmann
21. Christine Uhrik
22. Doug Downie
23. Steve Blecker
24. Nita Davidson

**Facilitation Support, Center for Collaborative Policy, California State University, Sacramento**

25. Ana Cortez
26. Grace Person

## 2. Background

**Introductions and Chair's opening comments**

Brian Leahy, Director of the Department of Pesticide Regulation (DPR), welcomed the committee members and thanked everyone for joining the meeting. The primary objective of the research grant program is to stimulate innovation and progress of integrated pest management (IPM) solutions to pesticide challenges in California. DPR's Pest Management Research Grant Program has $1.1 million available to fund proposals for the 2015-2016 grant cycle. Proposals related to fumigant alternatives are the top priority to fund; those related to non-fumigant, high-risk pesticides may be funded as program budget allows. DPR received twelve concepts: six concepts were related to fumigant issues, while the remaining six addressed other high-risk pesticides. Seven applicants were invited to submit full proposals, which were reviewed by PMAC members with the use of the Web-based Financial Assistance Application Submittal Tool (FAAST).

**Background on DPR's Pest Management Research Grant Program and Basic Procedures**

Dr. Kimberly Steinmann provided an overview of the grant application process and the seven project proposals.

Key grant program milestones are as follows:

- Solicitation documents were released September 8, 2014
- Concept proposals were received by October 2, 2014
- Full proposals were received by December 17, 2014
- Following the review period, grant projects will be selected by March 23, 2015
- Project start dates may be as early as July 1, 2015, or when the California budget is passed, whichever is later.
- Researchers will present their grant projects to PMAC in the winter of 2017/18

The research grant projects must focus on integrated pest management (IPM) solutions to risks associated with field fumigants and other high-risk pesticides and must address at least one of the following:

- Decision-making for pest management
- Prevention and management of pests currently controlled by field fumigants
- Application technology improvement
- Cost effectiveness of reduced risk practices
- Modeling or meta-analyses

PMAC members were asked to review the seven project proposals prior to the meeting. The grant program has a total of $1,100,000, with $600,000 dedicated solely to fund projects related to fumigant alternatives and the remaining $500,000 to fund projects related to high-risk pesticides, with fumigants as the priority. The following table summarizes the seven proposals that were submitted to PMAC for review:

| 2015/2016 Research Grant Summary of Submitted Proposals | | |
|---|---|---|
| **Proposal** | **Principle Investigator** | **Budget** |
| **Fumigant Projects** | | |
| Integrating Plant Horticulture and Soilborne Disease Control by Methyl Bromide Alternatives for Strawberries | **Mark Bolda**<br>University of California Cooperative Extension, Santa Cruz | $167,621 |
| Evaluation of Alternatives to Soil Fumigants and Diallyl Disulfide for the Management of White Rot in Allium Crops | **Rob Wilson**<br>University of California, Davis | $107,577 |
| Integrated approaches to replace methyl bromide in strawberry production: strategies for soilborne disease management | **Krishna Subbarao**<br>University of California, Davis | $400,000 |
| **Non-Fumigant Projects** | | |
| Development of *Phasmarhabditis hermaphrodita* (Nematoda) as a biological control agent of snail and slug pests in California | **Timothy Paine**<br>University of California, Riverside | $461,421 |
| Development and economic analysis of an IPM program for early season pests of bell peppers | **Sean Prager**<br>University of California, Riverside | $197,705 |
| Enhancing biological control of citrus pests with improved ant control technologies | **Dong Hwan Choe**<br>University of California, Riverside | $490,130 |
| Development of integrated management strategies for control of *Bagrada hilaris* in cole crops through non chemical controls | **Randall Long**<br>University of California, Santa Barbara | $350,000 |

Dr. Steinmann reviewed the meeting's purpose, which was to discuss the Pest Management Research Grant proposals and determine which are appropriate for funding by DPR.

Dr. Steinmann reminded the PMAC that committee members are not eligible to receive funds through a project unless they recuse themselves from the grant review process for that project. However, organizations with which PMAC members are generally associated are eligible for funding. In addition, only PMAC members who submitted review scores prior to the meeting may vote and rank during the discussion.

Dr. Steinmann introduced the facilitator, Ms. Ana Cortez, from the Center for Collaborative Policy, California State University, Sacramento. Ms. Cortez reviewed the meeting ground rules and initiated the discussion of the merits and concerns of the seven proposals. The discussion also revealed aspects of each proposal that needed clarification.

## 3. Rankings Based on Reviewers' Scoring

Prior to the meeting, 18 PMAC members reviewed and scored the seven proposals. The numeric scores were converted to ranks, where 1 was the most highly regarded proposal and 7 was the least, as presented in the following chart:

2015/16 Research Pest Management Grant Program PMAC Scores
Ranked Scoring Scale: 1 = First choice 7 = Last choice (Raw Scoring Scale: 100 = best possible score)

RANKED SCORES

1 = First choice
7 = Last choice

| Project | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 | R16 | R17 | R18 | Average | High | Low | $ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bolda** Horticulture + Fum Alts + Strawberry | 2.0 | 1.5 | 5.0 | 1.0 | 1.0 | 1.0 | 4.0 | 4.0 | 3.0 | 2.0 | 3.0 | 3.5 | 1.0 | 4.0 | 4.5 | 1.0 | 1.0 | 4.0 | 2.58 | 1 | 5 | $ 167,621 |
| **Wilson** Fum Alts + Allium | 5.0 | 6.5 | 1.0 | 4.0 | 2.5 | 3.0 | 1.5 | 5.0 | 4.0 | 3.5 | 1.0 | 1.0 | R | 3.0 | 3.0 | 5.5 | 5.0 | 5.0 | 3.50 | 1 | 7 | $107,577 |
| **Subbarao** Fum Alts + Strawberry | 1.0 | 1.5 | 4.0 | 5.0 | 2.5 | 5.0 | 1.5 | 1.0 | 1.5 | 5.0 | 4.0 | 7.0 | 6.0 | 5.5 | 6.0 | 2.0 | 2.0 | 3.0 | 3.53 | 1 | 7 | $400,000 |
| **Paine** Biocontrol of Snails and Slugs | 3.0 | 3.5 | 3.0 | 3.0 | 4.5 | 2.0 | 6.0 | 2.5 | 5.0 | 1.0 | 6.0 | 5.0 | 4.5 | 1.5 | 7.0 | 7.0 | 3.0 | 1.5 | 3.83 | 1 | 7 | $461,421 |
| **Prager** IPM + Bell Peppers | 7.0 | 5.0 | 2.0 | 2.0 | 7.0 | 6.0 | 3.0 | 6.0 | 1.5 | 3.5 | 7.0 | 3.5 | 2.0 | 7.0 | 1.5 | 4.0 | 7.0 | 6.5 | 4.53 | 2 | 7 | $197,705 |
| **Choe** Ant Baits + Biocontrol + Citrus | 6.0 | 6.5 | 6.0 | 6.0 | 6.0 | 4.0 | 5.0 | 2.5 | 6.0 | 6.0 | 2.0 | 2.0 | 4.5 | 1.5 | 4.5 | 3.0 | 6.0 | 6.5 | 4.67 | 2 | 7 | $490,130 |
| **Long** Bagrada Bug + Cole Crops | 4.0 | 3.5 | 7.0 | 7.0 | 4.5 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 5.0 | 6.0 | 3.0 | 5.5 | 1.5 | 5.5 | 4.0 | 1.5 | 5.17 | 2 | 7 | $350,000 |

R = recused

FUMIGANT RANK SCORES

1 = First choice
3 = Last choice

| Project | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 | R16 | R17 | R18 | Average | High | Low | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bolda** Horticulture + Fum Alts + Strawberry | 2.0 | 1.5 | 3.0 | 1.0 | 1.0 | 1.0 | 3.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 1.69 | 1 | 3 | 18 |
| **Wilson** Fum Alts + Allium | 3.0 | 3.0 | 1.0 | 2.0 | 2.5 | 2.0 | 1.5 | 3.0 | 3.0 | 2.0 | 1.0 | 1.0 | R | 1.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.12 | 1 | 3 | 17 |
| **Subbarao** Fum Alts + Strawberry | 1.0 | 1.5 | 2.0 | 3.0 | 2.5 | 3.0 | 1.5 | 1.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 | 2.14 | 1 | 3 | 18 |

R = recused

NON-FUMIGANT RANK SCORES

1 = First choice
4 = Last choice

| Project | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 | R15 | R16 | R17 | R18 | Average | High | Low | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Paine** Biocontrol of Snails and Slugs | 1.0 | 1.5 | 2.0 | 2.0 | 1.5 | 1.0 | 3.0 | 1.5 | 2.0 | 1.0 | 3.0 | 3.0 | 3.5 | 1.5 | 4.0 | 4.0 | 1.0 | 1.5 | 2.11 | 1 | 4 | 18 |
| **Prager** IPM + Bell Peppers | 4.0 | 3.0 | 1.0 | 1.0 | 4.0 | 3.0 | 1.0 | 3.0 | 1.0 | 2.0 | 4.0 | 2.0 | 1.0 | 4.0 | 1.5 | 2.0 | 4.0 | 3.5 | 2.50 | 1 | 4 | 18 |
| **Choe** Ant Baits + Biocontrol + Citrus | 3.0 | 4.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 1.5 | 3.0 | 3.0 | 1.0 | 1.0 | 3.5 | 1.5 | 3.0 | 1.0 | 3.0 | 3.5 | 2.50 | 1 | 4 | 18 |
| **Long** Bagrada Bug + Cole Crops | 2.0 | 1.5 | 4.0 | 4.0 | 1.5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 2.0 | 4.0 | 2.0 | 3.0 | 1.5 | 3.0 | 2.0 | 1.5 | 2.80 | 2 | 4 | 18 |

## 4. Discussion of Proposals

The discussion of each proposal focused on the concerns, merits, and clarifications PMAC members identified. Below is a summary of PMAC members' comments for each of the seven proposals. Comments reflect individual PMAC member observations, not consensus opinions. Thus, concerns and merits may occasionally appear to be contradictory.

### 1. Bolda: Integrating Plant Horticulture and Soilborne Disease Control by Methyl Bromide Alternatives for Strawberries

**Merits**

- The project includes a strong team.
- The project will assess disease levels and efficacy of integrated pest management techniques.
- The proposal has a reasonable budget and appears to be a good value for the level of research the team will conduct.

- There is the possibility that the benefits from this research project can transfer to other crops such as leafy greens.
- The project is well-rounded in that it combines horticultural practices with disease control: It will examine both chemical and non-chemical pest management techniques and address horticultural challenges such as nitrogen fertility and chilling requirements that are needed if the new techniques are to be effective.
- The project seeks to refine and calibrate the treatment technologies, which will increase efficacy of the pest management and possibly lower the use of total fumigant material.

**Concerns**

- The project does not include research on which methods will be used to create a control baseline.
- There is concern about the health and safety issues and data gaps for the use of allyl isothiocyanate (AITC) as a fumigant alternative and that AITC is not yet registered for use in California.
- There is a concern that a fumigant, chloropicrin, is viewed as a fumigant alternative treatment.
- The methodology is not clear on how the project will measure nitrogen levels or collect baseline nitrogen levels as controls.
- The lack of industry support implies that the project treatments are still considered to be at the experimental stage, in which case it may be too soon for a project developing a horticultural program for these treatments.
- The economic viability of the alternative pest management methods is unclear – some of the alternatives are very expensive.
- The project does not plan to examine soil chemistry, microbiology, and soil ecological communities.

**Clarification**

- A PMAC member asked about whether the project will include outreach to growers regarding the research results. Dr. Steinmann explained that the grant is for integrated pest management research, while outreach and communication efforts are part of a separate funding process – the Pest Management Alliance grant program.
- A PMAC member clarified that one of the research team members has a strong connection with the strawberry industry.
- A PMAC member asked about experimental use permits for AITC-containing products since they are not registered in California. Dr. Robertson from DPR responded that there is a process they can follow to apply for the permit. Kevin

Wright, a PMAC member, further clarified that the local agricultural commissioner would be notified and it would be treated similarly to a restricted material.

## 2. Wilson: Evaluation of Alternatives to Soil Fumigants and Diallyl Disulfide for the Management of White Rot in Allium Crops

**Merits**

- The project uses a potentially successful approach that integrates a biological approach with a fungicide to control white rot.
- The project has a very experienced team.
- The project focuses on two important separate growing areas with different environmental conditions.

**Concerns**

- The project could have been stronger if it included some other practices such as crop destruct practices to reduce sclerotia or possibly cover cropping to provide longer lasting microbial communities for a more holistic approach rather than just input substitution.

**Clarification**

- A PMAC member asked why the approach of a combination of biological and fungicide application has not been researched before.
- Another PMAC member asked about the use of garlic oil's potential to reduce other pests in garlic and onion crops.
- One PMAC member noted that the current alternative management practice to control crop exposure to white rot is to avoid production in infested fields.
- A PMAC member asked whether current fumigant use targeted more than just white rot, such as weeds or other soil diseases. Another PMAC member clarified that the fumigant is used almost exclusively for white rot.

## 3. Subbarao: Integrated Approaches to Replace Methyl Bromide in Strawberry Production: Strategies for Soilborne Disease Management

**Merits**

- The project provides a comprehensive approach that includes assessment and analysis of microbiology and soil chemistry.
- The project uses locally sourced materials to support research methods, which translates to greater probability that growers will adopt the pest management practices.
- The project team has high caliber credentials – Subbarao is considered a world expert on Verticillium.

- The project has a broad scope and the researcher will use a wide range of investigative techniques to assess combinations of management practices.
- The project's results may benefit other industries, especially the lettuce industry.
- The research includes economic analysis, which will benefit growers seeking to understand the financial impact of management efforts.

**Concerns**

- The research elements of the project appear very costly, and the budgets for those elements are complex.
- The project requires application of an extraordinary amount of Root Guard to the strawberry fields, which may not be economically viable for growers.
- PIs are only contributing 2% time, so those who will do the majority of the work may not receive appropriate guidance. In addition, the project team has not yet identified a post-doctoral candidate to support the research effort, so there is concern about what the qualifications of the eventual post-doc will be.
- The project's planting schedule is difficult to understand: it seems like an unfeasible number of plantings for one year.
- The project uses AITC on large plots which may increase worker exposure to the chemical. PMAC members noted the need for additional monitoring to address the issue of worker exposure.

**Clarification**

- The project team is in the process of selecting a post-doctoral team member from the UC Davis's pool of candidates.
- A PMAC member clarified that the planting schedule was likely to be feasible based on past papers authored by Subbarao.

## 4. Paine: Development of *Phasmarhabditis hermaphrodita* (Nematoda) as a Biological Control Agent of Snail and Slug Pests in California

**Merits**

- The project addresses an important pest situation with a new technology.
- The project has an excellent team with diverse skills.
- The proposal had detailed, well-considered methodology.
- The proposed pest control methods are successful in Europe, which bodes well for their success in California.
- The project has a large potential for success.

**Concerns**

- The project's success seems to hinge on an assumption that the nematode species can be distributed outside its current range. It is unclear if permits will be needed for this distribution and if so, how likely it is that the permits will be granted.
- There are concerns that the nematode species could become an invasive non-native within California. PMAC members noted that there is a need to establish a range for the nematode in California.
- The proposal does not articulate the research team's desired level of snail and slug control by the nematode.
- The reported estimate of 50% reduction of pest pressure may not be enough.

**Clarifications**

- PMAC members asked about the distribution of the nematode in California and the feasibility of registering a European product that has the nematode as a constituent. As clarification, other PMAC members noted that registering the European nematode product in California would not necessarily be easy because the broad biological impact would need to be understood prior to registration.
- PMAC members asked for clarification on the methodology of the proposed research process.

## 5. Prager: Development and Economic Analysis of an IPM Program for Early Season Pests of Bell Peppers

**Merits**

- An integrated pest management program for bell peppers is strongly needed.
- The project team is strong and the PI has an excellent reputation among entomologists.
- The project includes an economic assessment.

**Concerns**

- The proximity of the treatment plots to each other (1 m) seems very close to ensure independence.
- The proposal does not include clear goals for pesticide use reduction.
- The proposal does not clearly describe the crop rotation design or schedule.

**Clarification:**

- None.

## 6. Choe: Enhancing Biological Control of Citrus Pests with Improved Ant Control Technologies

**Merits**

- The project has a creative team; the inclusion of a chemical engineer is a plus.
- The research results have the potential to be applicable to other tree crops.
- The project is timely and relevant due to spread of Asian citrus psyllid.

**Concerns**

- The project methodology should be clearer.
- The project does not address the degradation and environmental fate of the hydrogel bait trap and the bait housing. The project does not include standard treatment methodologies to track where baits may end up.
- The project is expensive: it might be better if it was narrowed down to a preliminary research project.
- The project did not seem to have a standard control for comparison purposes.

**Clarification:**

- PMAC members asked whether there are additional funding options to support the research, such as partnerships within the citrus industry.

## 7. Long: Development of Integrated Management Strategies for Control of *Bagrada hilaris* in Cole Crops Through Non-Chemical Controls

**Merits**

- The project research is relevant to the industry. Bagrada bug is an important pest of cole crops in certain regions.
- The project includes diverse research strategies, integrating multiple approaches.
- The research results may be beneficial to many.

**Concerns**

- The project is very exploratory, and the use of trap crops may ultimately be too costly for growers to employ in their operations.
- The project does not have an industry partner.
- The project's research scope may be overly ambitious for the timeline to be pragmatic or feasible.
- The project would be stronger with a monitoring plan to create a treatment threshold.

**Clarification:**

- A PMAC member asked about which groups will benefit from research. Another PMAC member responded that Southern and Central valley crops would benefit and possibly home owners.

## 5. Rankings and Discussion

Based on the discussion, PMAC members re-ranked the seven proposals. The ranks mirrored the initial scores that members provided prior to the meeting.

Overall, the PMAC recommended that the three fumigant proposals—Bolda, Wilson, and Subbarao—receive grant awards. Of the four non-fumigant proposals, PMAC members had significant concerns with the Long proposal and the Paine proposal.

## 6. Next Meeting

The next PMAC meeting will be on May 15th. Proposals for Alliance grants are due in April, and the committee members' review of the projects will be due a week prior to the May meeting.

## 7. Closing Remarks

Mr. Leahy concluded the proposal review discussion by thanking PMAC members for reviewing and commenting on the proposals. DPR will advise PMAC on its final choice of proposals to fund.