Response to Reviewers: NE\_TEMP2501:  *Harnessing Chemical Ecology to Address Agricultural Pest and Pollinator Priorities*.

**Comment 1**: My only criticism of the proposal is the focus on one-way communication in the prior and proposed outreach plans. The team should also work to understand barriers to adoption and stakeholder priorities through two-way communication. My reading suggests measurement of "changes in knowledge" will be prioritized but there are no clear plans to measure changes in behavior or barriers to use of some of the more readily implementable strategies (e.g., those that require changes in practices but not commercialization of new technologies). It would also be great to see more emphasis on that translation process being proposed. The group has accomplished many things during the prior project period - which outputs require next steps for them to be used by stakeholders? What are those next steps and how can the group work together to facilitate them? There is a little bit in the proposal about this but it is not fleshed out. It is great to produce many new technologies and options but the next step is to figure out how to take them to the stakeholders and what barriers need to be overcome for this to happen

***Response 1*:** This is a good idea and we are working towards moving the group from producing new knowledge to changing behaviors. We propose to explicitly address this in the next five- year period, leveraging the strength within the group and bringing in external stakeholders. Within the group currently, several members have extension appointments, directly collaborate with growers and industry, and conduct research informed by these interactions. Each year we already hear about grower and industry needs at the annual meeting, and this will be enhanced in the next cycle.

In addition, the group has a history of bringing in external stakeholders to advise on specific projects at the annual multi-state meeting. For example, Ajenor Mafra-Neto the CEO of ISCA Technologies, a company specializing in the development of semiochemical solutions for pest management, attended the annual meeting in 2022. This was a useful conversation, helping us understand the barriers towards developing multi-component semiochemicals and led to conversations with members of ISCA and the multistate group with EPA regulators on how to create a path forward for easing the costs of developing these technologies.

At each of the annual meetings, we will invite two external stakeholders to interact with the projects that fall within two of the project Objectives. These people will attend a 3 -hour block of the meeting that is organized around that multistate Objective. Organizing the annual meetings around the Objectives will also likely build collaborations on gaps in those areas. The multistate research PIs will be encouraged to present their findings and directions for future work leaving time for feedback. These external people will come from relevant commodity groups and geography. Over 2-3 years, we expect to develop this into an advisory board that will help guide projects.

We added a description of the development of the external advisory board to the section on Technical feasibility of the research and to the project Milestones.

**Comment 2**: I was expecting to see a mention of resistance management to chemical pesticides. I understand that the focus of the project is on reducing pesticide use, but the approaches developed through the project should also provide growers with alternative methods of pest control that can address and manage pesticide resistance. This is not a criticism of the work proposed as much as it is a missed opportunity in the framing of the project.

***Response 2***: Good point! Several members of the multistate group work on managing pesticide resistance, both as components of their primary research (Yolanda Chen, Vermont; Poveda, NY) and in collaboration with other non-multistate researchers (McArt and Duplais, NY; Ali, PA). This topic was added as a component of Objective 3 which was retitled: Work to find ways to minimize the impact of pesticides, manage pesticide resistance, and discover new pesticides that reduce the impact on pollinators, herbivores, microbes and natural enemies of pests.

Reference added:

[Darrington](https://resjournals.onlinelibrary.wiley.com/authored-by/Darrington/Mike), M. [J. Solocinski](https://resjournals.onlinelibrary.wiley.com/authored-by/Solocinski/Jason), [S. K. Zhou](https://resjournals.onlinelibrary.wiley.com/authored-by/Zhou/Sophia+K.), [M. C. Lecheta](https://resjournals.onlinelibrary.wiley.com/authored-by/Lecheta/Melise+C.), [S. R. Palli](https://resjournals.onlinelibrary.wiley.com/authored-by/Palli/Subba+Reddy), [Y. H. Chen](https://resjournals.onlinelibrary.wiley.com/authored-by/Chen/Yolanda+H.), [N. M. Teets](https://resjournals.onlinelibrary.wiley.com/authored-by/Teets/Nicholas+M.). 2025. Environmental factors affecting RNAi efficacy: Temperature but not plant cultivar influences Colorado potato beetle's response to insecticidal dsRNA Insect Molecular Biology <https://doi.org/10.1111/imb.12996>

**Comment 3**: In Objective 2 it would be nice to see some examples of specific multi-state collaboration listed - for example, could approaches be tested within the same crop at different types of geographic sites (with their underlying diversity of farm sizes/approaches) to better understand landscape level impacts on chemical ecology mediated pest control? The one example mentioned of neonicotinoid seed treatments nicely addresses coming policy in NY, VT, and beyond. The proposal would be strengthened through greater demonstration of specific planned research with multi-state collaboration (beyond sharing analytical facilities and information exchange).

***Response 3****: We added more specifics on the planned multistate collaborations to the Methods section for Objective 2.*

For example: Rodriguez-Saona (Rutgers) is leading a project involving collaborators from across the northeast (Whitehead, VA; Rivera, Thaler, Poveda, NY; Chen, VT; Hermann, PA) to evaluate the effectiveness of methyl salicylate in attracting predators across a variety of crops and geographical locations.

Don Weber (USDA, ARS, MD) and Jennifer Thaler (NY) are testing using a combination of attractive and deterrent aggregation pheromones to manipulate the location of Colorado potato beetles in field plots of potatoes. This work will be conducted in both NY and MD potato fields to account for differences in context.

Clare Casteel is collaborating with Jared Ali at Penn State and Ian Kaplan at Purdue University to 1) improve predictions of the plant resistance-inducing capacity of soil microbiome by measuring soil chemistry from our 85+ org farm network, 2) evaluate the effectiveness of the tool using data from new farms within NYS and outside (Pennsylvania and Indiana), and 3) expand farmer knowledge on microbiome mediate resilience within NY and regionally.

***Comment 4***: The primary weakness of this project: it advertises (in the non-technical summary) developing sustainable pest control strategies, but in reality focuses almost entirely on studying chemical interactions in many systems with the vague hope that understanding interactions will ultimately prove useful in developing control strategies. Looks like a push-pull strategy is being tested to control spotted wing Drosophila - and this is very good - but what about all the other pests mentioned? I recognize that many (most?) academics assume that if one studies a pathosystem long enough, control strategies will emerge. And, in some cases, they do. But I'd argue not nearly often enough. I'd challenge the team to test, early and often, in the field, whether their understanding of particular signaling allows for pest control in the manner they expect. (There are hints this is indeed happening, but the pests being targeted are not identified - see, e.g., section titled 'crop diversification can be used to increase sustainable pest control'). And for the majority of cases where it doesn't, to then develop and test new hypotheses about what else needs to change for the pest to be controlled. The best way to solve problems is to try to directly solve them. Not just studying aspects of the system in isolation, reveling in whatever newfound knowledge emerges, publishing, and moving on. A project whose true goal was pest control would organize the proposal around the pests for which control was being sought, would document substantial collaboration with growers affected by those pests, and outline what control strategies were being tested.

**Response 4**: Thanks for this comment, we agree field testing in realistic circumstances is important although some projects do not get this far. We added a sentence to the beginning of the Methods explaining the goal of conducting more realistic field experiments. We think working with the proposed team of external stakeholders, as described in Comment 1, will help push us further towards this goal. We have also added more examples throughout the proposal where multistate researchers are currently testing multistate objectives in the field against specific pests or implementing extension based on their research findings. In hindsight, it’s clear that the original proposal undersold how much of this is currently happening and will continue to flow from this multistate project. We made sure that each Objective now has examples of specific field research that is being planned.