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Issue

The Science Policy Field Tour Concept: A New Platform for Communicating Science for Public Policy

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Abstract

The public is concerned about reports of decreasing pollinator populations and has sought policy actions to provide solutions. There are diverse stakeholders involved in issues that intersect with pollinators and it can be difficult to build consensus. To provide a platform for first-hand interaction on pollinator health, the Entomological Society of America (ESA) Plant-Insect Ecosystems Section organized an inaugural event, *Science Policy Field Tour: 'Balancing Pest Management and Pollinator Health'*, in cooperation with Mississippi State University on 22–24 August 2017. The field tour enabled candid discussions with the goal of learning from the experiences of Mississippi stakeholders that were instrumental in developing the Mississippi Honey Bee Stewardship Program. Attendees gained hands-on understanding of pollinators and issues that intersect: pollinator habitat, pests of pollinator, beekeeping practices, and row crop production and management. The event convened ESA members and stakeholders representing 22 states and the District of Columbia. Stakeholder groups included federal and state science agencies, policymakers, nongovernmental organizations, crop protection and commodity groups, and beekeepers. Themes that reflect on the Mississippi Honey Bee Stewardship Program mission emerged from the tour: the need to build relationships, invite all parties to participate in program development, build awareness about the needs of all groups, use integrated pest management, and remain flexible. The Science Policy Field Tour provides a model for how a professional society can serve as a leader to create an unbiased platform for addressing issues and play an advocacy role when work done by scientists impacts issues affecting the public.

Key words: science policy, pollinator, Entomological Society of America, honey bee

A Need for Scientific Objectivity on Policy Issues

There are many areas of public policy that fundamentally rely on scientific information such as issues involving health and the environment. Scientists are specialists in generating new information for a scientific audience, but they have not traditionally been trained to communicate with policy makers or the public. There is renewed recognition about the importance of scientific information for policy uses (Schaal 2017). Entomology research intersects on many fronts with issues that concern the public including pest management, conservation, and public health. There is a need for liaisons who can broker communication between scientists and nonscientists who are in need of scientific content for decision-making. Professional scientific organizations are positioned to take on an objective role to foster communication between diverse groups. In 2014, the Entomological Society of America (ESA) initiated an emphasis on science policy efforts, including development of science policy position statements and initiation of a new Science Policy Fellows program. These programs have reinvigorated ESA to ensure entomologists can contribute information to public policy issues that intersect with entomology.

Entomological Society of America Action on Pollinator Health

In 2016, ESA identified pollinator health as an active science policy advocacy priority as a result of persistent public concern

about reports of decreasing pollinator populations (Potts et al. 2010, Goulson et al. 2015). This designation was preceded by a position statement published in 2015 July, in which ESA recognized that pollinators, both introduced honey bees, *Apis mellifera* Linnaeus (Hymenoptera: Apidae), and wild pollinator populations, are vital components of natural and agricultural ecosystems and are reported to be in decline in the United States and worldwide (Entomological Society of America (ESA) 2017). Entomological Society of America established that the problem related to pollinator decline is multifaceted and complex and would require a large-scale, multidisciplinary, and nationwide effort that encompasses fundamental research on pollinators, applied research on sustainable pollinator and integrated pest management (IPM) practices, and active communication among the public, scientific community, stakeholders, and policymakers. A report by the Council for Agricultural Science and Technology specifically highlighted the key role of communication amongst diverse stakeholders to protect pollinators (Spivak et al. 2017). Entomological Society of America has identified several priority areas that can support research-informed policy to protect pollinator communities and is in a unique position to provide scientific content to the discussion on pollinator health because society members include researchers, educators, and private-sector partners (Table 1).

The Plant-Insect Ecosystems section within ESA also identified pollinator health as a section-specific initiative because of the expertise on this issue within section membership. Goals of the Plant-Insect Ecosystems section on this issue are to provide technical educational materials and opportunities to members and to leverage this knowledge to the general public, media, policymakers, and other key stakeholders. The issue around pollinators affects nearly all of the approximately 2,500 Plant-Insect Ecosystems section members, many of whom have a technical background and practical understanding of pollinator biology. The Science Policy Field Tour was conceived as a model for raising awareness, fostering communication, and ultimately, constructive problem solving.

Beekeeping in Mississippi, Mississippi Honey Bee Stewardship Program, and Field Tour Conception and Themes

There are approximately 800 beekeepers in Mississippi, with 18 to 25 of these having commercial-scale operations (Jeff Harris, unpublished data). The primary products are honey, wax, starter colonies, and queens. Few Mississippi beekeepers are involved specifically in pollination services; however, a few do transport bees to California for almonds (*Prunus* spp.), while others pollinate melons, blueberries (*Vaccinium* spp.), and other small fruits within Mississippi. Commercial beekeepers in Mississippi produce honey during three distinct seasons. The spring crop originates from white clover (*Trifolium repens* L.), Chinese privet (*Ligustrum* spp,), Chinese tallow [*Triadica sebifera* (L.)], and other common plants and weeds. After harvesting spring honey, these beekeepers often place colonies near soybean (*Glycine max* (L.) Merr,) and cotton (*Gossypium hirsutum* L.) fields because these nectar sources result in high summer honey yields. Row-crop farmers do not require bees for crop pollination and are generally indifferent to the presence of the bees. Plants that are used for fall honey production include (but are not limited to) smartweed (*Polygonum* spp), goldenrod (*Solidago* spp.), asters (*Aster* spp.), and various wild flowers.

Table 1. Priority areas established by Entomological Society of America (ESA) that can support research-informed policy to protect pollinator communities

1. Monitor the health of managed and wild pollinator species.
2. Characterize pollinator foraging and nesting-habitat needs and develop land-management approaches to ensure that essential resources are widely available to pollinators in agricultural, urban, and restored landscapes.
3. Develop molecular tools to better monitor and manage pollinator populations.
4. Develop approaches for efficient and rapid characterization, modeling, and prediction of ecologically-relevant effects of stressors.
5. Improve best-management guidelines for raising, managing, and transporting honey bees.
6. Develop best-management-practices guidelines for 'Integrated Pollinator and Pest Management' of agronomic and horticultural crops and urban landscapes.
7. Facilitate strongly coordinated efforts among stakeholders, universities, and government agencies.
8. Develop academic and professional training programs and public outreach campaigns for pollinator management and conservation.

Explanation of the priority areas are fully described within the ESA Position Statement on Pollinator Health (Entomological Society of America 2017).

Table 2. Cooperative standards or general operating suggestions of the Mississippi honey bee stewardship program

Cooperation Begins With Communication and Education
- Know your farmer, know your beekeeper
- Use Mississippi "Bee" Aware Flag

Important Considerations for Farmer-Beekeeper Partners
- Hive Placement: Optimal placement to mitigate risk to hives while accommodating both the farmer and beekeeper.
- Hive Identification: To identify the owner and contact information for emergencies.
- Bee Aware Flag Placement: For optimal visibility by pesticide applicators.
- Everyone Should Know Apiary Locations. It is encouraged that beekeepers provide GPS locations.
- Notify Ground and Aerial Applicators of Hive Locations
- Timing of Insecticide Application: Selecting the optimal time to mitigate risk to hives.
- Wind Direction: Insecticide applications made when wind blowing away from hive.

Explanation of the standards are fully described within the Mississippi Honey Bee Stewardship Program brochure (Harris et al. 2014).

Although farmers generally consider placement of the beehives near their row-crop fields to be benign, the proximity can put the bees at risk for pesticide exposure. This potentially contentious situation led to the formation of the Mississippi Honey Bee Stewardship Program in 2014 (Harris et al. 2014). It was one of the first formal statewide pollinator protection programs developed within the United States. The Mississippi Farm Bureau Federation led the effort to convene discussions between beekeepers and row crop farmers. The discussions led to the development of a communication effort armed with a set of general operating suggestions targeting the state's beekeepers, farmers, and other pesticide applicators when bees are located in or near agricultural production areas

Table 3. Organizations represented on the field tour, encompassing Entomological Society of America members (regular, student and early career professionals) and stakeholders

Member affiliations	Stakeholder affiliations
Bayer CropScience (regular)	American Beekeeping Federation
Dow AgroSciences (regular)	American Honey Producers Association
DuPont Pioneer (regular)	American Seed Trade Association
Entoniche Consulting (regular)	Cornerstone Government Affairs
Iowa State University (regular, student)	CropLife America
Louisiana State University AgCenter (ECP)	Environmental Protection Agency
Michigan State University (student)	Georgia Department of Agriculture
Montana State University (regular)	IPM Institute
Monsanto (regular)	Minnesota Soybean Growers Association
Oklahoma State University (regular)	National Association of State Departments of Agriculture
Purdue University (regular, student)	National Corn Growers Association
Syngenta Crop Protection (regular)	National Cotton Council
The University of Tennessee (regular)	The Foundation for the Preservation of Honey Bess
University of Arkansas (student)	The Nature Conservancy
University of California Extension – Ventura (ECP)	The Xerces Society for Invertebrate Conservation
University of Florida (student)	USDA Office of Pest Management Policy
University of Georgia (regular)	U.S. Fish and Wildlife Service
University of Minnesota (regular, ECP)	Western Growers
University of Nebraska (ECP, student)	World Wildlife Fund
Washington State University (regular)	
Western Connecticut University (regular)	

Table 4. The agenda provided for learning across many subject areas that intersect – crop production, insect pests of economic importance, pollinators, and pollinator habitat

Themes	Associated questions
Crop Production	
Gain understanding of row crop production problems, integrated pest programs implemented, and pesticide application techniques for southern U.S.	What new learnings or perspectives have been developed?
	What tactics have row crop producers implemented to mitigate risks to pollinators while still effectively producing their crop?
Mississippi Honey Bee Stewardship Program	
Assess the development of the Mississippi Honey Bee Stewardship Program	What tactics worked well and what tactics did not toward developing the program? In hindsight, what could have been executed differently?
Assess challenges encountered between beekeepers and row crop farmers and how they found common ground.	What elements of what was learned through this case study could be leveraged to other specific geographies? Elements include Stewardship Plan details, "techniques" used or implemented to enable stakeholders to find common ground, etc.
	What did Mississippi leaders do to enhance communication between potentially polarized groups. And how to keep communication lines open?
Beekeeping	
Assess how four main stressors affect Mississippi beekeepers (parasites, pathogens, pesticides, and poor nutrition).	What tactics does a beekeeper use to mitigate these stressors?
Understand the process used by a beekeeper to select a field site.	Are particular landscapes more suitable than others? What are key attributes of a site within a landscape that a beekeeper is choosing among?
Conservation Programs	
Assess conservation programs established for pollinators in Mississippi.	Are conservation programs providing impact and value? Are there challenges to implementing conservation programs? Are there other methods to consider for broad pollinator protection?
"Pollinator Friendly Integrated Pest Management" is a contemporary phrase used.	Define "Pollinator Friendly Integrated Pest Management". Is integrated pest management for row crops compatible with conserving pollinators?

Listed are themes and associated questions that the field tour organizers asked participants to consider.

Fig. 1. Panel discussion at Mississippi Farm Bureau Federation in Jackson, MS.

Fig. 2. Tour participants watched a demonstration of how smoke is laid down by aerial applicators to test wind direction to mitigate off-target pesticide drift (top) and to interact closely with a fixed-wing aircraft (bottom) at Provine Helicopter, Inc. in Greenwood, MS (Photo credit: Delta Council).

Fig. 3. Certified Crop Consultant for Due West Farms in Glendora, MS, Tucker Miller, talked about his role in execution of integrated pest management programs in cotton, soybean, and corn. (Photo credit: Delta Council).

Fig. 4. Participants sample cotton for tarnished plant bug, *Lygus lineolaris* (Hemiptera: Miridae), a key pest in the Mid-Southern United States at Due West Farms, Glendora, MS. (Photo credit: Robert K.D. Peterson, Ph.D.)

(Table 2). Plant-Insect Ecosystem section membership became more broadly aware of work in Mississippi during the 2016 International Congress of Entomology when Dr. Jeff Harris, Extension Specialist in Apiculture at Mississippi State University, presented on 'Finding Common Ground Among People with Different Perspectives of the Pesticide-Pollinator Conflict'. Dr. Harris described how beekeepers and agricultural producers from across Mississippi discussed ways of fostering better working dialogue, all in the spirit of coexistence and cooperation.

The unique success of the Mississippi Honey Bee Stewardship Program prompted the Plant-Insect Ecosystems section to develop a proposal for a new event called a 'science policy field tour' to learn about the Mississippi program. A science policy field tour is a unique event because it convenes people from diverse backgrounds to learn about a scientific issue with public policy implications in the field. When an issue has potentially divergent points of view, it can be valuable to experience different aspects of the issue first-hand. A scientific society is a good broker for such an event because science-based evidence provides an objective basis for understanding an issue.

Fig. 5. At a demonstration of conservation programs facilitated by Delta Farmers Advocating Resource Management in Shaw, MS. Tim Huggins of Delta Farmers Advocating Resource Management (center), in coordination with Mississippi Delta farmer Michael Muzzi (right) discussed planning and management. Katherine Parys, Ph.D. (left) of United States Department of Agriculture-Agriculture Research Service, Stoneville, MS, discussed current research efforts to survey non-*Apis* pollinators in the region (Photo credit: D. Muzzi).

Tour plans were developed with the cooperation from Plant-Insect Ecosystem section members from Mississippi State University. The tour was proposed to bring together Plant-Insect Ecosystem section members and stakeholders, including those from government, science policy advocates, policymakers, and private and public-sector scientists. Ultimately, 50 participants attended the tour from 40 organizations and 22 states (Table 3). A goal of the field tour was to enable hands-on understanding of pollinators and the many issues on which they intersect, including pollinator habitat, pests of pollinators, insect pests of economic importance, and row crop production (e.g., cotton, soybean, corn). A second goal was to enable candid discussions and learn from a locally executed case study in Mississippi, leveraging best practices to other agroecosystems, and developing an action plan on how policies can be shaped to balance crop production and pollinator health. Tour participants were provided questions to consider before arriving at each of the tour stops aligned to the various issues (Table 4).

Overview of Mississippi Pollinator Health Tour Stops

Tour stops were intentionally selected to provide a comprehensive understanding of the diverse issues affecting pollinators and included:

1. Mississippi Farm Bureau Federation headquarters in Jackson to learn about the origins of the Mississippi Honey Bee Stewardship Program. A panel was assembled consisting of the Environmental Programs Coordinator for Mississippi Farm Bureau Federation, a farmer, and a beekeeper (past President of the Mississippi Beekeepers' Association), all of whom were active participants in the development of the pollinator protection plan (Fig. 1).
2. Provine Helicopter, Inc. in Greenwood to learn about aerial applicator perspectives on pesticide applications and pollinators, to observe an aerial application by helicopter and a fixed wing aircraft, and to understand overall operations and techniques of applications (Fig. 2).

Fig. 6. Johnny Thompson of Broke-T Farms (top), discussed site selection of his bee yards. Johnny's son, Josh, discussed beekeeping with tour attendees (bottom), in Louise, MS. (Photo credit: Delta Council).

3. Due West Farms in Glendora to visit with a farmer and his independent crop consultant to learn about how IPM is implemented on a row crop farm that includes cotton, soybean, and corn (Fig. 3). Tour participants were able to use drop cloths and sweep nets to sample insects in a cotton field (Fig. 4).

Table 5. Six themes emerged from the Mississippi case study and are supported by the quotes and discussion that were captured during the field tour and within a wrap-up session

Build Relationships	• "Plan is based on communication. Must get people from different sides in the same room." • Beekeepers are all "local", which made communication easier. • "A lot of good will demonstrated in Mississippi. No reciprocity in the process and row crop farmers are not getting anything back. Can crops be diversified?" *Response to this question discussed the lack of labor and infrastructure to diversify crops in Mississippi.* • "Farmers and beekeepers are friends and neighbors in Mississippi." • What is the relationship between landowners and beekeepers? *Response was that beekeepers mostly work directly with farmers, not the landowners.* • What about mandating registration of beehives/location of beehives? *Response was that local beekeeper do not have an "appetite" for this. But, if from out of state, or leaving state, they do require health certificates for bees and bees must be inspected. Mississippi does have a voluntary registration program, but it is essentially not used. There is too much "competition for good acres."* • Communication of some type of location information of beehives is essential between the farmer and beekeeper, even if not publicly documented. • How are the Bee Aware Flags placed? *Response was at the end of rows where tractor operator turns around in vicinity of hives.* • What triggered the change in farmer practices to accommodate beekeepers? *Response was understanding and awareness on the part of the farmer of what beekeepers need.*
Invite All Interested Parties to the Table	• "Mississippi Farm Bureau has a beekeeping section. Is this or is this not present everywhere? This seemed key to the success in Mississippi." • "It's complicated to do conservation programs. If groups are serious about conservation programs, we need the right people at the table to discuss and implement – Natural Resources Conservation Service (NRCS), seed companies, cities, etc. Be thoughtful about conservation." • "We need to put pressure on cities to take the pressure off agriculture. Increase urban forage and habitat and reduce turf."
Stay at the Table	• "How did Mississippi overcome the 10% of the time things were ugly?" *Response was that "we had to build awareness. Problems are never as bad as they really seem when you get down to it. Don't let one bad meeting stop the progress and effort. Mississippi Farm Bureau kept making everyone come back. Accept that some people will not change and you cannot change their awareness."*

Build Awareness	• American Farm Bureau (AFB) was paying attention to discussions by the Environmental Protection Agency (EPA) Pesticide Dialog committee about pesticides. About 5 years ago the conversations started, but pollinator issues were not considered a problem in Mississippi.
	  • There were questions in Mississippi such as, "Were we addressing a problem that we didn't have?"
	  • But, commodity chairs gathered and told AFB, you do have a problem. They anticipated that there would be a concern around the pesticide and pollinator issue.
	  • It turns out bees were everywhere in Mississippi, but farmers didn't realize it.
	  • While the lead agency facilitating discussions on pollinator protection programs varies in each state, Mississippi Farm Bureau was the lead facilitator for this case study.
	• There was not awareness on the part of farmers about where bees were located. The program started with buy-in from producers that there were legitimate concerns about pollinators and AFB helped to cultivate that concern.
	• Must understand each person's side of the story. "To a beekeeper, some plants are not weeds…they are excellent bee food."
	• Farmers were not aware of the bee health issue. Farmers see beekeepers as fellow farmers. Farmers were willing to make some concessions.
	• Awareness – may be hard to measure but awareness is high today in Mississippi. Row crop Extension Entomologists are receiving calls about bees and bee safety – call they did not receive a few years ago.
	• "Beekeepers are looking to avoid bad areas." A single case of neglect with an agriculture pilot was mentioned. "Issues in Mississippi are not the same as outside Mississippi. Biggest issues has been communication and this has been improved."
	• "Don't stick your hand in the fire." *Remark made in relation to avoiding placing bee yards immediately next to cotton since insecticide sprays are more common.* "Bee yard locations are not fixed – they change from year to year."
	• "Row crop farmers in Mississippi are protecting citrus, almonds, blueberry and other crops requiring pollination services." *Comment made to describe those beekeepers that are summering colonies in Mississippi and using Delta crops for forage sources.*
	• "It's all about risk and reward". *Comment in reference to utilizing Delta crops for nutrition while balancing the risk of pesticide applications.* Hive locations often chosen near tree buffers and ditch banks. Beekeepers have learned to avoid higher sprayed crops - Generally no hives are within ¼ mile of cotton.
	• "Some solutions that seem easy, can create other problems. Planting legumes on highways and right of ways equates to 'deer feeding stations'." There were 14,000 deer collisions in Mississippi last year. Another example discussed is that legumes are a key habitat for the red banded stink bug, a damaging pest of soybean.
	• Three major elements to the Mississippi Honey Bee Stewardship Program:
	  • Know your Farmer, Know your Beekeeper.
	  • Communicate: Work with farmer to let him/her know where you place your bees.
	  • Habitat Restoration: this one has been the biggest struggle for Mississippi Farm Bureau.

Table 5. *Continued*

	• Mississippi conservation tour stop:
	  • Location of the conservation areas is key. It should have good shelter and access to water and ideally be protected on at least two sides.
	  • Communication between farmer and conservation manager is important. They also communicate about minimal spraying near conservation areas.
	  • Weed pressure can be a problem in managing the conservation area. Herbicides for grass are usually applied while conservation area is becoming established. Pre-emergence herbicide applications are common.
	  • After Bloom, plants are mowed down, which helps seed dispersal.
	  • Experimenting with fire to set back succession.
	  • There is a lot of management involved in establishing a "natural" system.
	  • After about 3 years, the management intensity is less frequent.
	  • Initial cost is high. Seed blends are expensive, requiring about 10 lbs/acre. 90 lbs. of seed costs about $3,000.
	  • Only need to commit 5 years to pollinator habitat as compared to 15 years for Conservation Reserve Programs. No long term obligation for farmers after 5 years.
	  • Seed is provided for free by the Delta F.A.R.M. management program.
	  • Pollinator habitat seed is not easy to find, especially those blends that include plants native to an area.
	  • Seed costs could go down in the future as there is more interest in conservation programs and more incentives for seed companies to produce these seed.
	  • Current research effort in Mississippi to survey native pollinators and to establish a baseline, which has never been done.

Use Integrated Pest Management	• Consultants are key to making crop management recommendations and decisions. It is important that consultants are independent and not associated with a particular company. Education about bees and location of bees is part of consultant role.
	• "98% of Mississippi is scouted – this all affects acute toxicity" and then a follow-up comment was "reduced acute exposure helps reduce sub-lethal, chronic exposure".
	• Farmers do not want to spray. Consultant says when "not to spray" rather than "when to spray". Insecticide costs are significant in Mississippi (can be $100–110 per acre) A complex of damaging pests are present and economics drives a lot of choice and decisions - farming is complicated.
	• Aerial application tour stop:
	  • Aerial applicators need to know where the bees are and they require good communication.
	  • Weather is taken into account during applications and they can change direction of spray or turn it on and off as needed based on wind to minimize drift. A puff of smoke is used before application to determine wind direction and speed and therefore to make adjustments if needed.
	  • Expensive equipment ($1 million fixed wing airplane) is needed and aerial applicators want to protect their investment and livelihood, so they are concerned about doing the application well. One person who spoke is a second-generation aerial applicator. He takes the job seriously, "it's personal". If someone makes an accusation about an incorrect application, it is going to be taken personally, which can make later communication and compromise difficult.
	• How do you get farmers to an IPM mindset? How to encourage them to plant a buffer? *Response was "Spray is money out of a farmer's pocket, he doesn't want to spray unless he has to. Pretty much all Mississippi farmers use crop scouts."*
	• "We need an ongoing stream of new tools and technologies. Budget cuts are affecting positions getting filled and we need Extension".
	• "Focus on continually developing for year-long Best Management Practices (BMPs) for crops. BMPs help to identify opportunities to limit harm. Pesticides are needed."
	• "We have lost perspective on history and how far we have come" (i.e. cotton).
	• Related to IPM on-going efforts in Mississippi, "through graduate student research we are constantly developing and refining pest treatment thresholds."
	• Communication "pipeline" evident in Mississippi as seen through tour stops – Extension to Consultant to Farmer.
	• "Can pollinator protection drive changes towards more adoption of IPM in agriculture?"

Remain Flexible	• "The Mississippi Honey Bee Stewardship program is a starting point, it is a work in progress." • In hindsight, the survey to measure outcomes of the Mississippi Honey Bee Stewardship Program should have been initiated earlier when groups came together. • "Pesticide and Bee law is codified in law and restricts pesticide use at times or in locations that would harm bees. Camaraderie needs to be demonstrated among row crop farmers and beekeepers. Now native pollinators are the next step in developing protections. It's a free for all right now." • "There are about 3,000 native bees. Many are solitary bees. Next step is to protect natives and take the pollinator plans to the next level, add in other species. There is no support for native bees right now." • "There are unique perspectives and problems and they should be addressed on a local level. Not everything translates nationally. IPM is reactive and not preventive." • "State based programs need to be shared because beekeepers are not stationary." • "How do you measure success?" *Response specific to Mississippi,* "We do not want to measure honey bee health when Varroa are a key problem. We need to measure changes in human behavior and awareness. We are working with extension behavioral scientists to develop improved surveys."

Table 5. *Continued*

• "47 states have a program in progress. People are hard to measure. Plans need to be flexible and individual. It is not black and white. Keep talking and eating!" • "We need to share survey questions across states. We need to capture change in perception of beekeepers and everyone in the survey." The person noted that he recognized even the beekeeper present on the entire tour host (past President Mississippi Beekeepers' Association) perception of number of sprays in the Delta were changed once he came over from the Hills and learned the production system for himself first-hand. • "Every system we learned about was complicated – beekeeping, crop production, conservation programs. Trying to combine and manage many complicate systems. It's not easy." • "Lab data versus field data – be careful. Research only points to possibilities of an effect". These comments were made about the volumes of research coming out in regards to pollinator health and pesticide effects. • "We need to know more about early season pests below ground and how to predict infestations". *Comment made in regards to preventive seed treatment usage.* Follow-up comment, "If there is no alternative and the risk is huge, then have to use preventive treatments, like seed treatments." • "Pollinator seed is expensive. In Mississippi, we are exploring plantings in power line right of ways. Also, we are looking into recommendations to change mowing height. Glyphosate resistant pigweed is a major issue and we cannot let it get out of control." • An emerging issues is "How to manage mosquito vectors and protect pollinators?" • Mississippi was one of the first pollinator protection programs. How often do you meet and how often do you change the program? Response was "Mississippi stakeholders meet at least once per year. Everyone is very busy, so need to use the time well."

4. A pollinator conservation plot established through Delta Farmers Advocating Resource Management near Shaw (Fig. 5). Tour participants were able to learn from the conservation coordinator and the cooperating farmer about how the area to plant is identified, annual management, and overall considerations for establishing conservation programs. At the stop, tour participants also learned about surveys that have been initiated by a United States Department of Agriculture – Agriculture Research Service scientist, based in nearby Stoneville, to catalog a baseline of native pollinators in the Mississippi Delta.
5. Mississippi State University Delta Research and Extension Center in Stoneville to sample insects in soybean, view test plots, and understand the basis and infrastructure for where Mississippi row crop IPM programs are developed.
6. Broke-T bee yard in Louise to learn how a beekeeper selects the optimal placement of hives near a soybean field, overall considerations across the landscape, and hive maintenance and pest management. Tour participants were provided the opportunity to don a bee suit and interact closely with the hives (Fig. 6).

Themes from the Mississippi Case Study

Several themes emerged from the tour about the successful components of the Mississippi Honey Bee Stewardship Program. Table 5 presents supporting discussion and quotes from the tour that culminated in the following six themes:

1. Build relationships. The importance of establishing personal relationships between the people involved was key. In Mississippi, the communication between farmers and beekeepers usually involves a personal meeting rather than any formal contracts. It was noted that a state like Mississippi that has a culture of hospitality might be especially poised to take on a program based on personal relationships.
2. Invite all interested parties to the table. Everyone involved in the Mississippi program mentioned that it was important that all stakeholders were invited to participate in the development of the program. In Mississippi, most of the beekeepers are local and do not come from out of state, which was beneficial in their state for bringing everyone together.
3. Stay at the table. Several presenters mentioned that developing the Mississippi program was not easy, and it was important to have involvement of a key organization, such as the Mississippi Farm Bureau Federation, which continued to bring people back together even when conversations were difficult. The scope of interests and ecosystems involved is complicated, and it should be recognized from an early stage that persistence will assure that all stakeholders are heard and their needs are acknowledged.
4. Build awareness. Many participants in the Mississippi program stated that simply gaining better understanding of the needs of beekeepers and farmers on a personal level was enough to help them make changes in their management practices to accommodate the other parties.
5. Use IPM. The importance of IPM concepts in decision-making and good farmer relationships with crop consultants and extension specialists was frequently mentioned as an important component in building trust that pest management actions are warranted.
6. Remain flexible. The Mississippi program was developed with the knowledge that it will likely need to adapt as circumstances change. The program is not considered static, and the role of a key organizer, like the farm bureau, was cited as an important element for encouraging ongoing meetings and conversations.

Conclusion

While this field tour focused on a single case study in Mississippi, it allowed for a diverse group of attendees to better understand a range of facets in the pollinator–pest management issue. Many ideas and discussion points can be leveraged to other states and cropping systems by the field tour attendees. The concept of a science policy field tour provided for a unique forum for fostering communication, learning, and exchanging information as compared to more traditional meeting forums. The format encouraged small-group, hands-on interactions in a field setting with IPM practitioners, crop producers, and beekeepers. Technology and current practices being used in the local production of crops and in beekeeping were examined. The exclusive number of participants who represented a diverse cross section of sectors and backgrounds, coupled with bus travel between stops and common meals, optimized the conversation, relationship-building, and learning from one another. The model, whereby the Plant-Insect Ecosystems section of ESA facilitated the event, serves as precedent for how a scientific society can serve as a neutral platform and lead organization to create unbiased context and increased communication among diverse groups for critical issues in science. The Plant-Insect Ecosystems section is continuing the field tour model in 2018 with two separate events, addressing pollinators in another agroecosystem and invasive species.

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