What Growers Told Us: Using Listening Sessions to Guide IPM in New England Tree Fruit Systems

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Eastern U.S. tree fruits growers face unique pest management challenges, and this could be linked to greater disease and insect pressure which are associated with high humidity, a diverse insect pest community and influx of invasive species. Integrated Pest Management (IPM) strategies are continually developed and modified with the aim of reducing pesticide use, reducing pest infestations, and preventing crop loss, with the main aim of maintaining fruits quality and yield. Previous research attested to growers using IPM strategies; however, resistance to management strategies have led to myriads of crop loss.

Within the complex backdrop of issues growers are facing, the adoption/continuation of IPM practices are premised on the perception of their overall value. Additionally, evaluation of these IPM strategies reveal economic benefits; however, pest management decisions made by growers are not solely dependent on economics. Effectiveness of the IPM strategies, time to implement, management philosophy (e.g., environmental sustainability), suitability and compatibility of methods with the existing farm system are some of the factors growers consider when deciding to use IPM.

Noteworthily, failures of pest management strategies have made Massachusetts tree fruit growers grapple for solutions, with many using both chemical and biological approaches. The complexities surrounding IPM, as well as its dynamic and multidimensional decision-making process, would facilitate agricultural extension educators not to overlook critical factors influencing its adoption, and undermining the effective communication of IPM advancements. Overall, our goal was to gather insights on pest management practices, challenges, and opportunities for improvement. Specifically, we identified evolving pest problems among Massachusetts tree fruit growers, documented their IPM strategies the growers are currently using, examined the economic, social and climate concerns of growers, and examined communication channels suitable for introducing new or improved IPM strategies to encourage adoption.

Methods

Qualitative research design was adopted for this study. Focus group session were physically held in Massachusetts, U.S with 12 apple and peach growers. Guiding the focus group session, we utilized a moderator guide developed by a team of three (3) science communicators and agricultural education faculty members. The moderator guide was then reviewed by a team consisting of entomologists, economists, and extension specialists to assure accuracy of the content area and transferability. Growers from the focus group were then asked a set of questions that gave insights on pest management practices, challenges, and opportunities for improvement. They were first asked to identify their primary

pest problems and the overall impact on their production practices. Growers were then asked about their pest management strategies (current strategies and adoption challenges). They were further asked concerns related to social and community concerns, economic pressures and climate change impacts. In addition, growers identified research and development needs. Lastly, growers were asked about their preferred mode of communication. Data were analyzed using MAXQDA to identify themes related to our interest.

Results

The major pest challenge identified by Massachusetts growers was Plum Curculio, a weevil causing significant damage to both apple and peach, especially difficult to control during bloom periods. Other pest issues identified include Scab, a common fungal issue with significant economic impact, reducing marketable produce to cider apples, fire blight, and emerging bacterial disease posing threats to orchards.

Growers reported that they currently use IPM strategies, notwithstanding, they encountered adoption challenges. Strategies used include IPM principles, such as predictive pest models based on degree days and weather monitoring, frequent spraying using tailored "cocktails" of fungicides, insecticides, and plant growth regulators, and implementation of weather-based tools to optimize spray timing and efficacy. Also, practices such as trap trees, border sprays, and lure-based attractants are used for specific pests like plum curculio. The adoption challenges include risk aversion, which limits the use of unproven methods, as failures can lead to season- long impacts. Also, growers reported that resistance of management strategies that is due to over-reliance on specific chemical groups is another big issue with adoption.

Apple and peach growers in Massachusetts also mentioned that there are social and community concerns. These concerns range from public perception to community perceptions. The growers strive to balance transparency with educating the public about their practices. Growers also reported misconceptions on "organic production". Organic and non-organic growers face distinct expectations, with organic methods often misunderstood as spray-free. In addition, the visual effects of spraying and misconceptions about pesticide use are quite misleading. There is also a huge resistance from the community/neighbors. Noise from spraying operations and proximity to residential areas create tensions, requiring careful scheduling and communication.

Growers recognized some major economic concerns that could impede adoption of the new IPM strategies. These includes rising costs of chemicals, labor costs, and equipment which have eroded profit margins, especially for wholesale operations. Similarly, retail operations benefit from higher pricing due to the "farm-to-table" experience but face risks from weather-dependent customer turnout. Growers also mentioned that market dynamics makes local growers compete against cheaper, mass-produced supermarket options, emphasizing the importance of freshness and the "buy local" movement.

Furthermore, growers discussed impact of climate change, and its potential risks on apple and peach orchards. Warm winters and erratic weather patterns (e.g., sudden frosts, heavy rains) increase susceptibility to pests and diseases. Also, extended growing seasons and unpredictable conditions complicate the timing and effectiveness of pest control.

Ultimately, growers identified their top three research priority areas within the project focus, and these were decision-support tools for pests like plum curculio (including monitoring traps and degree-day models), alternative management tactics for codling moth and oriental fruit moth (such as mating disruption and nematodes), and innovative approaches like behavioral deterrents and eco-stacking (valuing ecological services).

Communicating the research development is crucial for adoption of these IPM strategies by the growers. When asked about their current communication channels, growers are heavily on reliant on weather models, extension updates, and guides like the New England Tree Fruit Management Guide. Also, majority of the growers also use private weather stations and advanced pest modeling systems to inform their decisions.

Conclusion

Apple and Peach growers in Massachusetts continually face peculiar pest problem that affects the overall fruit quality and production. This have led the growers to use IPM strategies to combat these pest pressures. Resistance to management remains one of the obstacles

that hinders adoption of the refined IPM strategies. Also, economics and market dynamics will impact adoption if not factored into IPM strategies development. Massachusetts tree fruit growers unanimously identified decision-support tools for pests like plum curculio, including monitoring traps and degree-day models as one of the pressing priority research areas. IPM research should prioritize refining and validating pest management models, so they are more accurate and adaptable across orchard systems in the region and weather patterns. Our result recommends the use of centralized platforms offering real-time updates and localized data could enhance decision-making. Lastly, enhanced communication between researchers, extension services, and growers was emphasized as critical for future success.

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