Pest Management Report

ORGANIC FARMING
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Introduction

Organic farming relies on biological and cultural techniques to protect crops and livestock from pests. These integrated approaches often require more complicated experimental designs than comparing target pest mortality from chemical pesticides. A limited number of pesticides may be used in organic farming systems as a part of an integrated program if biological and cultural practices are insufficient. Pesticides allowed in organic farming are predominately biologically-based, and exceptions are made for a few that have been reviewed for their impacts on human health and the environment. Minimum risk pesticides often work by non-toxic modes of action. Organic and transitioning farmers need to know about the integrated and least-toxic approaches that work best in an organic farming system to reduce losses and maintain quality.

Advances in Biological Control Methods for Control of Key Orchard Pests in the Southeastern US

David Shapiro-Ilan, Ted Cottrell, Dario Chavez and Russ Mizell

The objective was to evaluate commercially available biopesticides in fruit and nut trees and determine which ones were the most effective. The active ingredients were all live organisms that naturally control the target pests as pathogens or parasites. These included the fungal agent *Beauvaria bassiana*, the bacterial pathogen *Chromobacterium subtsugae*, and the nematode *Steinernema carposcapsae.* Target pests included peach tree borer for peaches and the pecan weevil in peaches. Results were compared with a control by various pesticides that are prohibited for organic production. In pecan production, an integrated approach that used all three of the biopesticides showed reduction in pecan weevil damage compared with a no-treatment control, and Marrone Bio Innovation's Grandevo®, the OMRI Listed biopesticide formulation that had *C. subtusagae* as the active ingredient, was as effective as the conventional treatment. With peaches, the nematode was used as a preventive and a curative treatment. Both types of treatment were effective, with the curative treatment equal to and the preventive treatment more effective than the conventional control. The study also looked at management of two other peach pests—the lesser peachtree borer and the plum curculio. Nematodes can also significantly reduce populations of the lesser peachtree borer. Plum curculio required a more involved integrated program and had less in the way of conclusive results. Further research is needed to validate the results and address the most difficult pests to control, particularly plum curculio to increase yield and quality in organic peaches and pecans.

A New Approach for Successful Organic Peach Production
Jaine Allran, Guido Schnabel and Juan Carlos Melgar

The goals of the project are to reduce reliance on pesticides and increase production of high quality organic peaches. Despite strong market demand and high premiums for organic peaches, producers in the Southeastern US are reluctant to transition because of insect and disease pressure. Plum curculio and brown rot both damage fruit in a way to render it unmarketable. Researchers at Clemson University looked at using custom-designed paper bags as a protective barrier on the fruit. The first year, bags were put on 100 fruits after thinning and 75 fruits were tagged as controls on six trees. The second year, after thinning bags were put on every fruit on the trees in the treatment group. Fruit bagged after thinning had lower incidents of pests and diseases, while similar quality. The one qualitative difference compared with the control was that the red blush on the bagged peaches was less intense. The researchers also looked at consumer acceptance of the practice. Consumers who were uneducated about the technique did not show a strong preference, and slightly favored the redder unbagged fruit. Consumers who were informed about the bagging technique and how it reduced pesticide use prompted a favorable reaction. Further research is needed to see if it is feasible to recycle the bags. The long-run reduction of fungal and pest populations will require follow-up. A more detailed economic analysis in both the costs of production and marketing at a premium is needed to see if the practice would be profitable for organic farmers.

Shade-cloth based Permanent Pest Exclusion System for High Tunnel Vegetable Producers
Ayanava Majumdar, Will Mastin, Russell Bean, Jewel Bean and Andrew Williams

The goal of the project is to see if shade cloth can be used to reduce pest establishment while not excluding beneficial insects. Various shade cloths were used on okra and string beans in laboratory studies. The finer the mesh of the shade cloth, the lower the penetration rate of the insects. In both crops, 50% shade cloth was able to completely exclude the leaffooted bug, a pest with a broad host-range that includes many vegetable crops. In high tunnel pest exclusion experiments conducted on organic farms, shade cloth on the sides of greenhouses reduced beet and fall armyworms, cabbage and soybean loopers, corn earworm, tobacco budworm, stink bugs, squash vine borer, and cucumber beetles. Overall, the most effective shade cloth was the 50% Farmtek with fine openings. The most effective product also excluded lacewings and lady beetles. This prevents natural enemies of pests from entering the high tunnels, However, various biological control agents can be introduced and retained if needed for the management of small insects, such as aphids and whiteflies. Further research is needed to look at other products, optimize the timing, reduce labor and other costs associated with the practice, and develop an action plan for organic farmers to use.

Minimum Risk Pesticides for Organic Farmers
Brian P. Baker and Jennifer A. Grant

The objective of the project is to assess the safety and efficacy of active ingredients eligible to be used as minimum risk pesticides exempt from EPA registration. Each eligible active ingredient will be profiled. The profiles summarize the data that are available for the physical and chemical properties, human health assessment, environmental assessment, product performance, and standards and regulations that apply to the substance. The profiles are intended to help officials, practitioners, and the public to better understand the risks and benefits of the active ingredients in the minimum-risk pesticides. Most, but not all of the eligible active ingredients are also allowed in organic food production. Some are prohibited by the USDA Organic Standards and some are allowed only for non-food use. While EPA considered these active ingredients less likely to cause human health and environmental incidents, some incidents have occurred. Profiles include incident data from the National Pesticide Information Center (NPIC). The profiles will also include efficacy studies, which are expected to be of interest to organic producers. Once the profiles have been reviewed, they are expected to be published on the NYSIPM website and available open access to the public. Organic farmers could potentially benefit from further research on the efficacy of minimum risk pesticides and optimization of formulations for specific pests.

Organic IPM Working Group
Ali Loker and Karen McSwain

The research objectives of the Organic and IPM Working Group are to identify common interests and opportunities for the organic and IPM communities to help focus research and spur further discussion and action. Members include organic and IPM advocates, researchers, and practitioners from all facets of the agricultural arena, with diverse backgrounds in agronomy, entomology, plant pathology, marketing and communications, and commercial production. The Working Group maintains and expands an active member network of professionals, educators, policy makers, producers and stakeholders across the IPM and organic communities to share information and collaboratively work toward shared priorities. It has identified common interests and opportunities for the organic and IPM communities to help focus research and spur further discussion and action. The Working Group also communicates, disseminates, educates and advocates for sustainable practices that can help both the organic and IPM communities. Future planned work includes continued outreach and publication of the results of the meeting.

Conclusion
Organic crop protection requires a more sophisticated understanding of agroecology and pest biology than conventional approaches. The results show that pesticides and minimum risk pesticides can help organic farmers effectively address pest and disease challenges comparable to

conventional practices, but within the context of a systems approach. Further research on pest population dynamics, and how soil and plant health can be used with these tactical approaches can help improve their efficacy further. Cultural practices—like pest exclusion through paper bags or shade cloth barriers—offer non-chemical options as well. It is more difficult to estimate the economic viability of biological and cultural controls, given the complexities of a systems approach, but such techniques are promising ways to eliminate pesticide use entirely for certain pests or crops.