Almond Pest Management Alliance

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Background:
The Almond Pest Management Alliance (PMA) was initiated by the Almond Board of California with funding from the California Department of Pesticide Regulation to evaluate the reduction of pesticides (mainly organophosphates and pyrethroids) inputs in California almonds. The PMA was a statewide program with orchards in Butte, Stanislaus and Kern County. The project ran for six years and produced the following results: 1) Both reduced and conventional pests management practices control insects damage below economic levels; 2) in the Sacramento Valley, dormant sprays were not always needed and they were reduced by 77%; 3) in Kern County, however, dormant sprays were needed for the control of San Jose Scale (SJS).

The PMA accomplished its objective to reduce pesticide usage in almonds, however, it also brought forward new questions. For example, in the Kern County orchard, where dormant sprays were not applied for four years, SJS populations exploded killing fruiting spurs and reducing yields. The value of the no dormant treatment was the establishment of spray threshold levels for SJS control. However, it also created concerns. For instance, how long an SJS infested tree will take to recover lost yields? Therefore, to assess SJS infestation on orchard productivity, we need to determine the recovery period. In the Sacramento Valley, there was an unusually high level of crop damage from worms in 2003, and the Butte PMA site was an ideal location to determine whether pest populations were building due to low pesticide inputs for five years, or unusual weather caused higher pest pressures. Continuation of the almond PMA will address several other issues related to long-term reduced pesticide inputs. These include:

1. The value of a barley cover crop was an increase in water penetration which is very important in mite management. However, the ant damage was consistently higher in the barley cover crop than on the conventional management system. To evaluate the pros and cons of barley as a cover crop, we need to determine if this cover crop interferes with ant bait treatments.
2. The control of webspinning mites using standard predatory mite releases was erratic in the PMA orchard. In some years, it worked like a textbook example but in other years its control was less than satisfactory. Nevertheless, this is an environmental friendly control method that needs further evaluation. We need to determine the control of the webspinning mites by increasing the number of predatory mite releases in conjunction with summer oil sprays.
3. After six years with no insecticide sprays, an increase in San Jose Scale was seen in the dormant sample taken in January 2005 in several treatment blocks. Will this population increase by controlled by an application of oil only?

A reduction in the application of broad spectrum pesticides can result in an increase in secondary pests, as well as beneficial insects. There is increasing interest in the almond PMA's research and demonstrations to help the industry understand and manage these changing pest pressures.

The focus of this proposal is to continue efforts to demonstrate reduced-risk strategies on almonds and to improve communication and cooperation among different groups involved in almond production.

Results – 2004

The almond PMA has yielded the following results:

1. Publication of the "Seasonal Guide to Environmentally Responsible Pest Management Practices in Almonds" which includes guidelines based on University of California research and results of the Almond Pest Management Alliance.
2. There were no significant differences in total insect damage between conventional and reduced risk management practices.
3. The yields were higher in the conventional than in the reduced. However, the difference was not statistically significant (Kern).
4. Ant damage was a reversal from the last five years. It was higher in the natural vegetation than in the barley cover crop (Kern).
5. There were no significant differences in yields between infested and non-infested SJS treatments.
6. Agri-Mek® gave the best mite control. It lasted the whole season. Acramite® gave 30 days of mite control. However, predatory mite releases were not as effective as other years. They provided some control early in the season but by July the webspinning mites were out of control (Kern).
7. High damage levels of OFM and PTB seen in 2003 were not repeated (Butte).

Objectives – 2005

1. Continue to research and demonstrate reduced risk practices by maintaining the existing Almond PMA regional projects. The continuing projects are located in the Northern Sacramento Valley (Butte County) and the Southern San Joaquin Valley (Kern County), locations which highlight the different pest management pressures within the industry. There is a high level of interest from growers and researchers in the need to continue the reduced risk plots to see what happens in the next several years. Both sites will continue to focus on locally current pest management issues in each respective location. Intensive monitoring of the complete almond pest complex will continue in each treatment block. Monitoring pest populations with traps provides orchard-specific information for spray timing, and allows comparisons over many years. Growers and other interested parties can see firsthand the monitoring techniques, and that pests, and damage, are controlled in the cooperating orchards. Collaboration with growers and Pest Control Advisors from each region will help to promote confidence in these low input strategies.
2. Encourage the adoption of reduced risk pesticide practices in almonds through outreach and education using the framework created by the Almond Pest Management Alliance. The focus of the PMA is the extension of information gathered from demonstration and field-testing of long-term reduced risk almond pest management, compared to conventional farming methods. Increasing attendance at field meetings and dormant-season workshops shows that growers are interested in reduced risk practices and continue to be proactive. The Almond PMA newsletter provides updates on the project to a large audience. The newsletter has been a model for other commodities' outreach efforts due to its professionalism and timely subject matter. The PMA Management

Team actively seeks input from end users to ensure compatibility between research and implementation. Outreach programs conducted by the almond PMA continue to result in increased interest in these programs in almonds and are an ideal forum for grower-cooperators and others to share their successes and to address issues related to transition.

3. Expand the efforts already begun by the PMA participants by continuing to collect data to use in refining pest management guidelines. The PMA has drafted monitoring guidelines for use in reduced risk almond orchards, which are based upon multiple years of data collection and include treatment thresholds. Additional years of data collection will increase the accuracy and validity of these pest-monitoring guidelines, reinforcing the success of reduced risk almond farming. This is especially important because of the high level of rejects found in these two growing regions in 2003, the 5th year of the PMA project. Growers in Butte and Kern Counties are interested in seeing the demonstration sites continue for an additional 2 years to see what happens in the next few years when using reduced risk farming methods.

Plans and Procedures – 2005

Key pests (NOW, SJS, OFM and PTB) are being monitored in both Butte and Kern County. Trap catches will be used to determine biofix and application timing for pest control materials. Webspinning mites are being monitored using the absence-presence sampling method. This is being done more extensively at the Kern site than at the Butte site. During the winter, dormant spur samples will be examined for live and parasitized SJS, European Fruit Lecanium (EFL) and mite eggs. A spring and dormant field meeting were held in each of the two regions, Northern Sacramento Valley and Southern San Joaquin Valley. Harvest samples will be collected from all treatment blocks to determine insect damage. Each PMA orchard is being managed independently to reflect local pest pressures. The detail pest management of both Butte and Kern County is the following:

Kern County. The same orchard and cooperator is being utilized for the PMA project. The orchard consists of 160 acres allowing us to establish replicated treatments. The conventional management system was the following: 1) and dormant 8 gallons oil in 200 gallons of water, 2) organophosphate insecticide for NOW, PTB and ant control. The reduced risk management system will consist of the following: 1) six gallons of oil in 200 gallons of water per acre, 2) NOW and PTB will be controlled using Intrepid® and 3) Clinch® will be used for ant control. Both conventional and reduced risk is replicated four times.

Research will continue regarding the effect of SJS scale infestation on death of spurs and yield reduction. Recovery time, when the tree will return to full productivity is also being studied. SJS crawlers will be monitored using sticky tape as well as traps and dormant spur samples. The success of ant control in the presence of a barley cover crop compared to natural vegetation will be determined using randomized and replicated treatments of Clinch®, Lorsban®, Distance® and untreated control. The effectiveness of webspinning mite control using conventional miticides versus environmentally friendly treatments such as predatory mite releases and summer oil sprays is being evaluated. The conventional mite treatments were Agri-Mek® and Acramite®. Yields will be taken from both reduced and conventional management systems. In the past numerical yield reductions have occurred in reduced risk management program.

Butte County. At this location, the PMA orchard continues with the same cooperator (Nick Bertagna of Bertagna Orchards Inc.). The original treatments were the following: 1) grower's standard (no insecticides), 2) PMA (Bt applied 2001), 3) organophosphate-Diazinon® plus oil at dormant and 4) organophosphate-Diazinon® plus oil at dormant and Diazinon® at hull split.

The insect damage was maintained at low levels for four years. However, in 2003 the insect damage due to PTB and OFM was very high. To understand the change in pest pressure, the following treatments were established: 1) two applications of OFM phermone mating disruption, 2) Diazinon® and oil at dormant plus two applications of phermone mating disruption and 3) Imidan® at hull split.

In 2004, grower's standard and PMA blocks had a high level of SJS infestation in the dormant spur samples. For this reason, these blocks received an oil only spray at dormant. Furthermore, the organophosphate was changed from Diazinon® to Imidan® in the original treatments.