University of California - Cooperative Extension

ALMOND INTEGRATED PEST MANAGEMENT PROJECT

Project Leader: Clarence S. Davis
Project Manager: Wilbur O. Reil

In 1976, California almond growers applied 270,000 pounds of insecticides and acaracides, 220,000 pounds of herbicides, 441,000 pounds of fungicides, 141,000 pounds of fumigants and 1,845,000 of oil; a total of 2,917,000 pounds of pesticides on 336,000 bearing and nonbearing acres.* Besides causing environmental and biological problems, pesticides may become so restrictive and be so expensive that it is doubtful whether chemical controls by themselves will ever again be a valid pest management strategy. An integration of chemical, biological, cultural and all other control tactics is the only practical alternative for keeping pests at subeconomic levels.

The almond integrated pest management project is being developed to pull together the expertise of many researchers into a demonstration program. Many times the control of one pest causes a secondary pest to develop into a major problem. The initial control practice affects the natural balance between predators and pests. Field evaluation work on predator-pest relationships in almond orchards is limited. Also, evaluation of presently used materials and the affect upon the total insect-mite-disease complex needs further evaluation.

Specifically, three demonstration almond orchards in each of three different areas of the state (Southern San Joaquin, Northern San Joaquin and Sacramento Valley) will be monitored for pest and disease problems. The major pests to be monitored are navel orangeworm, peach twig borer, oriental fruit moth, mites (European red, two spot, Pacific and brown), ceratocystis canker, hull rot, blast, brown rot and shot hole. Sprays will be applied only to prevent pests from developing to economically damaging populations. Effective materials for control will be applied which are least disruptive to the total insect population balance. Cultural, biological and management techniques will be used whenever possible to encourage beneficials and decrease pest damage.

The primary objective of the Almond IPM Project is to demonstrate the feasibility of control of the navel orangeworm. This can be done through chemical and/or cultural control methods. Cultural methods will be emphasized to reduce the chances of secondary outbreaks and environmental pollution both in and outside the orchard.

The navel orangeworm, *Paramyelois transiella* (Walker), is the most serious pest to the marketed crop. In 1976, the Almond Board of California estimated this pest caused an overall loss of $18,000,000 or $70 a bearing acre. Recent experiments by the California Agricultural Experiment Station have shown, in orchards with high navel orangeworm populations, chemical control can be justified. However, chemical control of this pest often leads to a secondary outbreak of mites. There are four species of mites that commonly attack almonds. They are: Pacific mite, *Tetramychus pacificus* McGregor; twospotted mite, *Tetramychus urticae* Koch; European red mite, *Panonchus ulmi* Koch; and the brown mite, *Bryobia arborea* M and A. Predators play a significant role in controlling these pests, if not disturbed by insecticides.

Research by the university and USDA-ARS has shown that by practicing orchard sanitation and early harvest, crop losses can be reduced.

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* Source: California Department of Food and Agriculture. Pesticide Use Reports.

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Date: December 27, 1977 DAVIS, CALIFORNIA

To: Almond Integrated Pest Management Pilot Project Personnel

From: Wilbur O. Reil

Title: Staff Research Associate

Re:

Almond Integrated Pest Management Pilot Project

Project Personnel: Walter Bentley, Hodge Black, Clancy Davis, Lonnie Hendricks, Clem Meith, Wilbur Reil, Norman Ross, and Don Rough

Five year demonstration project. Locate one to three orchards in each of three production areas of state (N. Sacramento Valley, N. San Joaquin Valley and S. San Joaquin Valley). These orchards need to be at least 80 acres of as uniform trees as possible with an orchard production history of at least 1000 pounds (meat basis), and also a history of N.O.W. problems. Cooperation of the growers is essential for program success.

For the first year, standard recommended control measures will be used. Each 80 acres will be divided into eight 10 acre square blocks. Treatments in each block will be:

CA	CB	CC	CD
UA	UB	UC	UD

I. C - Winter clean up of nuts on trees.
U - No winter clean up.

II. A - No chemical spray during summer.
B - Spray with Guthion - May.
C - Spray with Sevin - hull split.
D - Spray with Guthion and Sevin.

The treatments A, B, C, and D will be across both the C and U blocks giving a total of 8 different treatments. Plot layout and randomization will be developed to fit the needs of individual orchards.

Individual grower plots will not be replicated but each orchard will be considered a replicate.

Participating growers will need to provide the following services:

1. Application of a dormant spray of oil plus an organo-phosphate (preferably Diazinon).
2. A sprayer and tractor to make necessary spray treatments plus fuel for operation.
3. Nozzles for sprayer if replacement of nozzles are necessary when sprayeris calibrated. (We will calibrate sprayers).

(4) Signs for posting orchards and permits for spraying as required by laws and regulations.

(5) Nut sweeper to use in orchard clean up operation if orchard is in sod so that nuts falling in weed free strips may be moved into grassy areas.

(6) Any pest control measures necessary which are not directly related to pests being studied.

Other normal orchard operations including harvest.

The University of California IPM project will provide the following:

The cost of orchard winter clean up (shaking, polling or other methods as required). We will reimburse those growers who provide the service for us or make our own arrangements for nut removal depending on situation.

Provide and read pheromone and attractant traps for N.O.W., peach twig borer, oriental fruit moth and fruit tree leaf roller where necessary.

Provide cards, dye and personnel to calibrate spray equipment to be used in plot.

Sample for mites when necessary.

Supply spray chemicals that the grower does not use in his normal spray program. This might include Guthion, Sevin or a miticide.

Provide a thermograph and shelter and change charts when necessary.

Reimburse grower for crop samples taken.

A rough activity time table would be:

Activity	Month
Locate orchards	December-January
Hire SRA personnel	January
Dormant spray applied by grower	January
Removal of overwintering nuts	January
Installation of thermographs	January
Mapping orchards and plot layout	January-February
Placing traps	March

Activity	Month
Calibration of sprayers	March-April
Field monitoring	February to September
Guthion spray	May
Sevin spray at hull split	June-July
Mite applications	June-July-August
Mite leaf samples	July-August
Early harvest samples	August
Late harvest samples	September
Final orchard assessment	October
Data evaluation	October-November
Summarizing results	November-December

New techniques, ideas and concepts will be incorporated into plots as developments occur. All personnel need to be attentive to any possible approach which will economically reduce pest problems without disrupting the ecosystem.

We are in the process of interviewing and hiring two field persons to handle many of the field sampling and inspection requirements. These people as well as Clancy Davis and I will need to work directly with the farm advisor involved to develop the best techniques for orchard monitoring and sampling.

Researchers supplying technical advice:

Martin Barnes
Charles Curtis
Marjorie Hoy
Marvin Gerdts
Dale Kester
John Labavitch
Bill Moller
Dick Rice
Warren Micke

Disease control and weed management will be incorporated into project after the initial insect thrust, probably starting in 1979.

If you have any questions, suggestions or comments, please let me know.

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