

## Implementation

### THE CALIFORNIA WALNUT IPM EXPANSION PROJECT—Year 1

Patrick W. Weddle, Larry Elworth  
Center for Agricultural Partnerships, Placerville, CA

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*Abstract:* The Center for Agricultural Partnerships (CAP) in cooperation with growers and their organizations, crop consultants, researchers and farm advisors is developing a project to implement sprayable mating disruption and other new technologies on 25% of the walnut acreage susceptible to codling moth infestation (approximately 25,000 acres by the end of the third year).

Codling moth is one of the key pests of walnuts, infesting 60% of the more than 200,000 acres in California. Uncontrolled codling moth can lead to economic damage of up to 40% of the crop. The walnut crop in California was valued at \$278 million in 2000.

#### **Year 1, Project initiation**

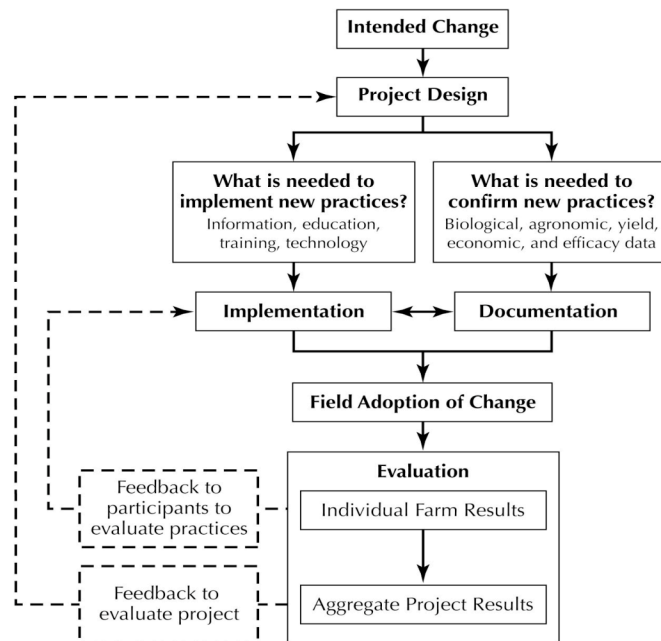
The Center for Agricultural Partnerships (CAP) is initiating, through a cooperative effort with growers and their organizations, crop consultants, researchers, farm advisors and the Walnut Pest Management Alliance program, a commercial implementation project designed to increase use of mating disruption on at least 25% of the walnut acreage susceptible to codling moth infestation (approx. 25,000 acres by the end of the third year) by:

- Implementing a systematic process to further on-farm adoption of mating disruption and other novel insecticides on a wide scale in commercial walnut production over three years;
- Documenting and disseminating economic, biological and decision making changes in the adoption of new codling moth management technologies on the farm, project, and industry levels;
- Implementing and validating the effectiveness of kairomone-based lure as a key component in the use of mating disruption on a wide scale in commercial walnut production.

#### **Methodology**

Initial project design, organization and funding occurred in year 1 (2001). Field initiation will occur on approximately 1000 acres in three growing regions during the 2002 growing season (Year 2). Cooperator and acreage expansion will occur in subsequent years.

The diagram below shows the integrated process used by CAP in this project:



CAP will coordinate oversight of the entire effort and work with participants among the three cooperating walnut growing regions. Frequent written updates will be provided to grower and PCA participants regarding trap counts, pest pressure, economics and other information identified as important in initial participant group discussions. During the season, educational meetings will be organized in each region in cooperation with cooperating industry organizations and other interested stakeholders. CAP and the participating organizations will carry out communications within the walnut industry about the project and its results through newsletters, presentations, and electronic means.

At the beginning of the second project year, a baseline survey of the walnut industry will be conducted. The survey will 1) establish a baseline of current industry codling moth management practices and industry awareness of the new technologies; 2) determine the most appropriate communications messages, audiences and media to help increase industry-wide interest in new practices; and 3) identify the best routes for increasing adoption within the industry as the project continues.

Implementation of the technologies will be done during the growing season by cooperating growers with the support of their crop consultants. Crop consultants will conduct field monitoring, provide training for the growers, and collect and interpret data to make it possible for the growers to master the new technology and the information necessary to successfully use it. To ensure consistency among grower and consultant efforts, the project's regional coordinators will assist CAP in organizing field implementation, analyzing results, facilitating learning and sharing of results among participants in the three different growing regions. In addition, collaboration with participants in the Walnut Pest Management Alliance (PMA) and companies providing pheromone and monitoring products will provide technical

information on protocol design and field implementation. In year one, implementation sites totaling approximately 1000 acres will be established in each of three major walnut growing regions throughout the Sacramento-San Joaquin valley. Collaborating crop consultants and growers will adapt protocols, developed by the PMA and the pheromone companies, to the implementation sites. Treatment protocols will be designed based on site-specific considerations of historical pest pressure and any other site-pertinent characteristics. Each implementation site will receive applications of pheromone for CM control and, depending on site-specific considerations, supplemental insecticide sprays, only as necessary to prevent unacceptable crop damage. Where possible, reduced risk insecticides will be used. Where sites are 20 acres or larger, the orchard may be divided into two comparable blocks. One block will receive the pheromone treatment protocol and the other a “standard” or conventional treatment. Pheromone baited traps and an equivalent number of DA2313 baited traps will be placed in each pheromone implementation site, both pheromone treated and, where available, the “standard” site. A documentation system will be carried out for each site and region and will measure multiple parameters including environmental conditions (i.e., weather,) spray records, trap counts, pest phenology, supplemental monitoring data and other pertinent information as determined to be important to implementation. CAP with cooperation from the regional coordinators will tabulate the weekly data and provide weekly summaries to grower and PCA cooperators.

At the end of each growing season, crop consultants will compile biological, yield, economic and pesticide use results to review with each of the growers. They will be able to evaluate 1) quantitative changes such as yield, quality, production costs, net revenue, amounts of pesticides used and changes in pest and predator populations; and 2) the effectiveness of mating disruption technologies and how growers want to continue, expand, or modify their use. Since this project recognizes that new practices have to be economically viable, results will be presented for each cooperating grower in terms of net revenue as well as changes in direct costs.

Following harvest, participants will also meet as a group in each of the regions to review project activities, compare results, and set out plans for the coming season. Project staff will then compile results from all of the farms, summarize the results and prepare an annual project report. The results of that report will be used in communications throughout the walnut industry, trade publications, and presentations at industry and grower meetings. Just as important, CAP will conduct press and media relations to the wider agricultural community and general public to increase awareness and support for improving water quality through environmentally sound agricultural practices.

In the second and third years, the crop consultants will expand the number of acres and growers involved in implementing the sprayable technologies. The intended outcome of the project is that 25,000 acres (one quarter of the acreage susceptible to codling moth infestation) will have implemented the sprayable mating disruption technology by the end of the project's third growing season. At the end of the project a series of focus groups will be used to assess farm and project level results. In addition, a final industry survey will be conducted to assess changes in the industry as a result of the project.

## **Background**

California produces 99% of U.S. walnuts and 38% of the world production. There are 207,520 acres of walnuts in the state, Over 90% of this acreage occurs in the Sacramento and San Joaquin valleys. In addition, this region is where the most severe arthropod pest problems exist with highest damage pressure in the southern valley.

Codling moth (*Cydia pomonella*) is the key pest of walnuts in California and the most economically important arthropod pest statewide. Two or more generations usually occur in California each summer. These later generations can be particularly damaging to harvested nuts. Summer larvae bore into the growing nut, damaging husk, shell, seed coat and kernel, and rendering the nut worthless for commercial use (USDA, 2001). In addition, infested nuts provide entry points for navel orangeworm, *Amyelois transitella*, increasing the population of this pest in orchards while coincidentally increasing pesticide applications and costs (IPM for Walnuts, 1987; Walnut Marketing Board, 2000a).

Approximately 60% of walnut acreage is susceptible to codling moth (CM) damage. Damage is generally most severe on early season cultivars, although it has been increasing steadily over the years on some late cultivars such as Chandler. Left uncontrolled, codling moth infestation can result in serious economic damage that exceeds 40% of the harvested crop. In addition to direct yield and quality losses, higher costs for sorting in the warehouse may result in additional economic penalties for growers. Codling moth feed on the walnut kernel, thereby reducing edible yield. Since edible yield is a basis of payment on shelling varieties, any level of damage reduces the grower's payment for the crop. Low levels of damage reduce or eliminate any quality bonus payments to the grower. Additional financial penalties are imposed when insect damage exceeds 5%. Any lot of walnuts with insect damage greater than 8% is disqualified from in shell shipment and the associated premiums (S. Wulfert, 2001; Integrated Pest Management for Walnuts, 1987.) As a result, walnut growers are experiencing \$16 to 40 million in losses from CM annually, with losses in recent years at the upper bound (Sibbitt, 2001; Stewart, 2001).

Codling moth management relies on one to three chemical treatments per year. The primary conventional pesticides organophosphate (OP) insecticides of which chlorpyrifos is the most widely used are being applied to more than 40% of the walnut acreage annually. To protect their crops from loss, walnut growers annually apply 1.5 to 2.2 lbs AI/acre of OPs to control CM in infested orchards. According to California's Department of Pesticide Regulation Pesticide Use Report Data Summary (2000) more than 145,000 pounds of chlorpyrifos were used on walnut production in 1999. Grower costs for these sprays may exceed \$100/acre per season. Use of these pesticides often requires additional pesticide inputs to control secondary pests which erupt when their natural enemies are suppressed by the CM sprays.

While OPs have provided a valuable mainstay of pest management in walnuts, problems associated with their use have also multiplied. CM resistance to OPs has been widely documented (Varella, 1993; Knight, 1994.) Furthermore, OPs disrupt natural enemies of secondary walnut pests such as walnut aphid, dusky-veined aphid, web spinning mites which often results in additional pesticide applications (Ramos, 1985). In short, the continued

availability of the most widely used chemicals for control of the key pest of walnuts is in significant jeopardy due to biological and regulatory reasons.

The Center for Agricultural Partnerships (CAP) is a 501(c)(3) nonprofit organization whose mission is to create programs that solve important agricultural problems by helping farmers increase the use of economically and environmentally sound practices.

CAP projects serve to bridge between the vast body of research in farming practices and the practical implementation of these innovations in the field.

In the last five years CAP has worked with partners involved in the production of lettuce, celery, apples, pears, cotton, soybeans, corn, and peanuts, in California, Michigan, Minnesota, North Carolina, Virginia, and Washington. Since its inception in 1996, CAP projects have put new farming practices in place on more than 100,000 acres nationwide.

Headquartered in North Carolina and supported by foundations, corporations, individuals, state and federal government, CAP is a leader in designing and implementing solutions for difficult agricultural and environmental problems.

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