Stone Fruits—Implementation

Why Did OFM Mating Disruption Break Down in Australia?

Philipp Kirsch
Trécé Inc., West Linn, OR

Keywords: oriental fruit moth, BASF, Consep, Biocontrol, ShinEtsu, azinphosmethyl, Isomate, peach

Mating disruption (MD) for oriental fruit moth has been often regarded as a standard against which other disruption systems can be compared. This system was one of the first programs to be commercialized in tree fruit crops, being introduced in Australia in August 1984, in California in January 1987, and in Europe also in 1987. Products have been developed by three different companies including BASF, Consep and Biocontrol/ShinEtsu. Use in California has resulted in considerable reduction in the reliance on conventional chemical pesticides and has been instrumental in management of OFM resistance to azinphosmethyl.

OFM MD was readily adopted in several production districts in Australia. However, prior to 1990-91, use was very limited in Cobram, the principal cling peach district, due to the cost of manual labor for two applications of the initial 3 month dispenser. An improved product, Isomate-OFM Plus, labeled for season-long control, was introduced in the 1990-91 season. Adoption of the season-long dispenser was quite rapid, due to high grower interest in only one application per season. However, control efficacy was very variable in Cobram in 1990-91 and in subsequent seasons, 1991-92 and 1992-93 (Table 1).

While OFM MD has been so effective in California, why the control failures in Cobram? Table 2 demonstrates clear differences with respect to OFM population dynamics and pest management between Cobram and California. Despite these differences, the same extended-life formulation was introduced in both regions. The first season breakdown in efficacy suggests that there was a lack of comprehensive field testing in Australia prior to introduction of the new extended-life formulation. Preliminary UC studies on Isomate-OFM release rates in the 1990 season had indicated that the extended-life formulation was effective for only 120-140 days under California summer conditions.

Analysis of trends in population levels and mating status (Table 3) suggests that OFM MD breakdown occurs within the third generation leading to recovery in fourth to sixth generation population levels. The presence of high numbers of mated females at this time correlates closely with a breakdown in dispenser pheromone release rates.

Mating disruption is not a robust control technology. As this approach at best interferes with male behavior, it is critical that comprehensive product testing be completed prior to commercialization. The success of OFM MD in California can be correlated directly with the expansive field evaluations undertaken by UC entomologists and farm advisors. Finally, MD is a very complex technology, requiring detailed understanding of entomology, meteorology, chemistry and controlled release. Mechanisms of disruption are still not well understood. To accelerate commercial implementation of MD, it will be important to focus research in identification of mechanisms and the modeling of pest complexes under disruption pressure, with or without supplementary control strategies.

Acknowledgements to David Bell, who compiled the above data, and the Cobram farmers and industry personnel who helped explain pertinent parts of the puzzle. Further details can be found in David Bell's paper, "Mating Disruption—Australian Experience" (Aust. IPM Conf. 1993).

Table 1. Survey of grower results: OFM MD control failures as percent of total use (Cobram District, Australia).

	Percent of growers	Percent of OFM MD area treated in district
1990-1991	88	83
1991-1992	44	32
1992-1993	81	50

Table 2. Differences between Cobram, Australia, and the Sacramento Valley, California.

	Cobram, Australia	San Joaquin Valley
# OFM generations/yr	6	5
OFM pressure	moderate-very high	very low-moderate
# OFM insecticides/season (standard program)	8-10 applications	1-3 applications
% crop with >4 OFM generations (estimate)	90%	15%

Table 3. Average female moth mating status per month (terpinyl acetate trap); application of dispensers in early September, n=# orchards sampled).

	October ('91-'92, n=1)	November ('91-'92, n=3)	January ('91-'92, n=3)	February ('91-'92, n=2)	February (control) ('91-'92, n=1)
% mated females	41.7%	49.5%	44.2%	89.6%	84.2%