

## **Successful development of a paraffin wax-based pheromone dispenser for season-long mating disruption of the Oriental fruit moth, *Grapholita molesta* (Busck) in commercial peach orchards in Michigan, USA**

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Paraffin wax, in both a solid and emulsified form, has been demonstrated to provide a good matrix for dispensing volatile compounds (Atterholt 1996). Oriental fruit moth (OFM) pheromone was released at a nearly linear rate from solid paraffin disk dispensers, made in our lab, and placed in an apple orchard for an eleven week period. A paraffin wax emulsion dispenser was commercially-developed by Gowan Co. under the brand name "Confuse-OFM". Release rate characteristics of Confuse-OFM were quantified in a field environment using gas chromatography. The dispensers released more than half of the pheromone they held, very rapidly, in the first three weeks after deployment. Beginning at week four, they released pheromone at a more steady, and slower rate for the remainder of the dispenser's life time (6-10 weeks, approximately one OFM generation).

In 2001 and 2002, we tested Confuse-OFM *versus* treatments with Checkmate OFM-F (Consep, Inc.) microencapsulated pheromone, Isomate-M100 (Shin-Etsu Chemical Co., Ltd.) ropes, and conventional pesticide programs (comparison) in commercial peaches in southwestern Michigan. Pesticide application was reduced, but not eliminated in pheromone-treated plots. Confuse-OFM was applied twice per season. M100 was applied once per season. In both years, significantly more moths were caught in lure-baited traps placed in comparison plots than in pheromone-treated plots. More male and female moths were caught in terpinyl acetate/brown sugar-baited bucket traps placed in comparison plots than in Confuse-OFM-treated plots and shoot and fruit injury was statistically equivalent in all treatments during the 2001 season. Bucket trap and injury data for the 2002 season are pending. Virgin female-baited traps were placed in all plots in 2002; moths were caught in conventional plots, no moths were caught in pheromone-treated plots.

In 2002, we developed a new paraffin emulsion dispenser. Release rates for this dispenser were quantified and compared to release rates from Confuse-OFM in a laboratory environment. The thick emulsion dispenser had release characteristics intermediate between those of solid wax disks and Confuse-OFM. Glue was added to enhance emulsion adherence to trees. The efficacy of this emulsion was tested in the 2002 trials. Data gathered from emulsion-treated plots were equivalent to those gathered from other pheromone-treated plots, as described above. To date, according to data gathered from lure-baited and virgin female-baited traps, essentially 100% mating disruption has been achieved. Due to adhesion problems at low temperatures early in the season, some emulsion dispensers were replaced with new dispensers containing more glue as late as the end of May. Following that time, no reapplication of the emulsion was made.

The emulsion we developed has favorable release characteristics and may be comparable in longevity and control to Isomate-M100 ropes. It also offers the additional advantages of a simple manufacturing process and quick application.