7. Mating Disruption/SIR

EVALUATION OF MEC FORMULATIONS IN MICHIGAN

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Currently the most widely used method of pheromone deployment for pest control in fruit crops is the hand-applied dispenser. Two rope dispensers, Ismote C Plus and Isomate M100, are widely used for control of codling moth and oriental fruit moth, respectively. Sprayable formulations have been developed for some key fruit pests and may provide a better fit in some fruit production regions. They can be used as-needed and tank-mixed with other sprays. The major weaknesses of sprayable formulations are that they must be applied at very high rates and they have only provided 2-3 weeks of activity. In this project, entomologists have teamed up with agricultural engineers to develop and test methods that will deliver microencapsulated (MEC) formulations of sprayable pheromones to fruit crops in a more efficacious manner than is currently achieved.

Targeted Deposition: The field efficacy of the MEC formulations applied with a standard orchard air-blast sprayer or a "targeted tower system" was directly compared at the MSU Trevor Nichols Research Center (TNRC). Four treatments were compared: 1) MEC applied at a reduced volume in the upper canopy using a Proptec experimental atomization unit, 2) MEC applied in the whole tree canopy using a standard air-blast sprayer, 3) MEC applied to the orchard floor using a standard air-blast sprayer and 4) a no pheromone control. Capture of oriental fruit moth (OFM) males in lure-baited pheromone traps was be used to evaluate the effectiveness of treatments in test plots.

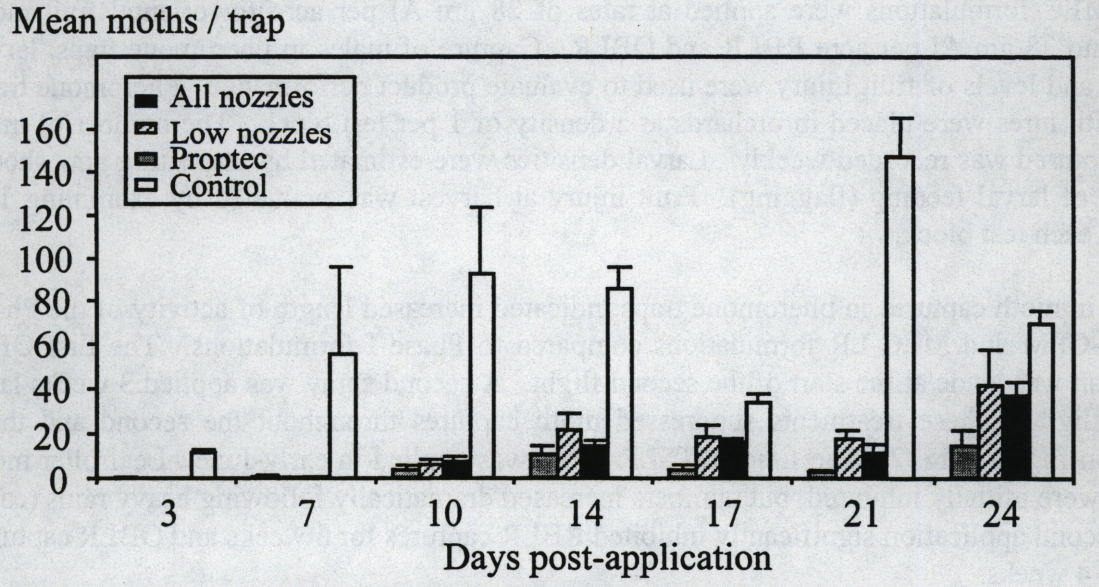

Fig. 1. Performance of MEC-OFM using different application methods.

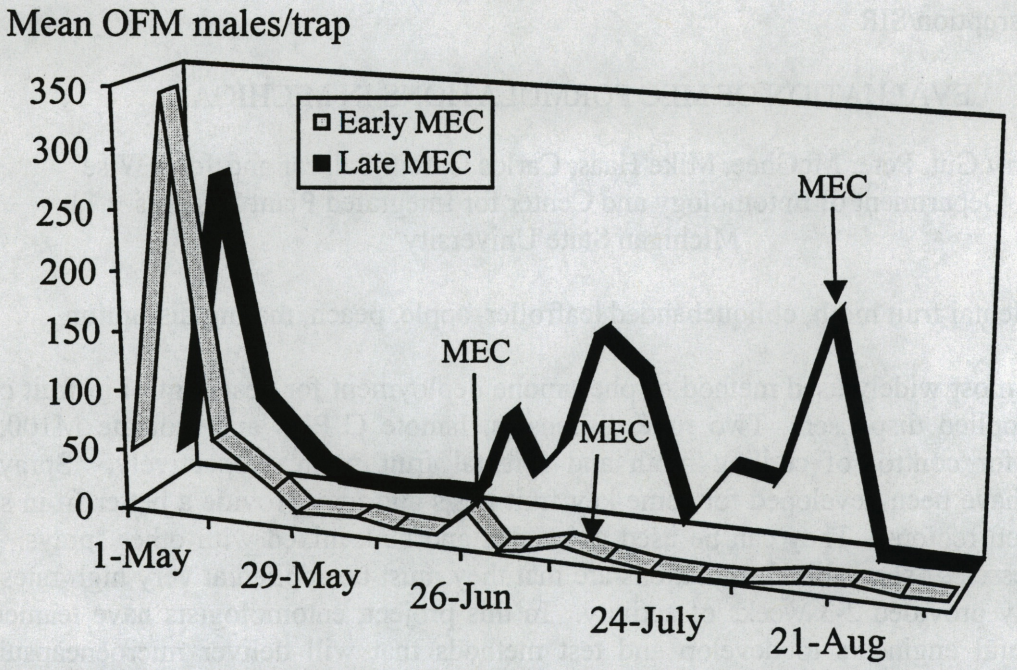

Fig. 2. Moth captures following early and late season applications of MEC-OFM.

The all nozzle treatment provided the best suppression of moth catches (Fig 1). Unexpectedly, the lower nozzle application suppressed activity as well as the targeted (Proptec) application. For MEC-OFM treatments, each of the two application methods inhibited moth catches for about 21 days. Measurements of pheromone concentrations on the foliage following MEC sprays revealed a good relationship between pheromone deposition and activity.

Field performance: The performance of Phase III formulations of MEC for oriental fruit moth (OFM), redbanded (RBLR) and obliquebanded leafroller (OBLR) were evaluated in small-plot (0.15 ac) trials at the TNRC. Pheromone and non-pheromone treatments were replicated four times. MEC formulations were applied at rates of 28 gm AI per acre for oriental fruit moth (OFM) and 38 gm AI per acre RBLR and OBLR. Capture of males in pheromone traps, larval densities and levels of fruit injury were used to evaluate product performance. Pheromone traps baited with lures were placed in orchards at a density of 1 per test block. The number of male moths captured was recorded weekly. Larval densities were estimated by inspecting new shoots for signs of larval feeding (flagging). Fruit injury at harvest was evaluated by examining 100 apples in each test block.

Changes in moth captures in pheromone traps indicated increased length of activity of the Phase III MEC-OFM and MEC-LR formulations compared to Phase I formulations. The first OFM application was made at the start of the second flight. A second spray was applied 3 weeks later at peak flight. These treatments suppressed moth captures throughout the second and third generation flights (Fig. 2). The first MEC-LR spray was applied in early-June. Leafroller moth captures were initially inhibited, but numbers increased dramatically following heavy rains (ca 3-in). A second application significantly inhibited RBLR captures for 6 weeks and OBLR captures for about 4 weeks.