Demonstration of "RAK 5 OFM" for Mating Disruption of Oriental Fruit Moth in Niagara Peach Orchards

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Introduction

Oriental fruit moth (OFM), *Grapholita molesta* (Busck) is a serious pest of stone and pome fruit in Ontario. The development of insecticide resistant pest populations in the past and the potential future loss of currently registered control products have stimulated the search for alternative management strategies for this and other moth pests.

Sex pheromones, emitted by female moths to attract mates, are species specific. Synthetic pheromones can be used to saturate an area so that males cannot find females (mating disruption). If females do not mate, they cannot lay fertile eggs and no larvae will hatch to damage a crop.

Mating disruption (MD) programs have been successfully demonstrated in Niagara peaches previously. In 2005, " BASF RAK 5 OFM" (Picture, top left) was not yet commercially available to Ontario growers, and a demonstration project was initiated to continue to raise awareness of mating disruption technology. An important goal of this project not addressed by previous trials was to demonstrate that MD could be a suitable stand-alone tool for the season-long management of OFM in Ontario peaches.

Materials and Methods

The three farms chosen for this project were located in Niagara-on-the-lake (NOTL), Jordan, and Beamsville. Three treatments, each in approximately 10 acre blocks, were compared at each site:

- **MD 1**: RAK 5 alone (no insecticide targeted for OFM)
- **MD 2**: RAK 5 and Lorsban (chlorpyrifos) (for 1st generation OFM)
- **Con**: Conventional program (Lorsban for 1st generation OFM and pyrethroids for subsequent generations and pre-pick sprays)

Placement of RAK 5 OFM "clips" occurred on May 4 - 5, before first flight of OFM. RAK 5 OFM dispensers were installed at a rate of 200/acre on the perimeter and 100/acre on the interior of the MD blocks. The average time to treat orchards with RAK 5 dispensers was 2.5 acres/person/hour.

Four "sentinel" OFM pheromone traps (Figure 1) were placed in each MD block with the first trap at the edge and the rest in a line running into the orchard. Pest activity was also monitored by shoot and fruit damage evaluations.

Figure 1: "Sentinel" pheromone traps should catch few, if any moths in MD sites.

Figure 2: Shoot damage by OFM ("flagging") was generally low but showed high pressure at one site.

Results and Discussion

When pheromone levels are high enough to ensure MD is effective, 'sentinel' traps in pheromone treated sites should not catch moths, although occasional catches in edge traps are expected. No moths were found in the traps in 82% of the checks (82/100). Of the 48 moths found in traps in the remaining 18 checks, 83% (40/48) were found in traps at the edge of MD blocks. Moths in edge traps at one NOTL site accounted for about half of the instances of moths in traps (25/48 cases). Although edge trap catches prompted extra monitoring at edge areas for damage, no additional shoot or fruit damage was found at block edges.

Scouting for peach shoot damage or "flagging" (Figure 2) was done on June 13 - 15 for 1st generation OFM and July 14 - 19 for 2nd generation. Shoot damage was below the arbitrary 1% threshold in the first assessment except at one site in Beamsville (Table 1). The Beamsville MD 1 site was deemed to have too much OFM pressure with nearly 2% flagging early in the season. Hence, that site was dropped from the MD program and reverted to insecticide sprays at the appropriate time.

Table 1. Shoot Assessment after First Generation OFM

Site	# Shoots Checked	# Flagged	% Flagged
NOTL MD 1	6000	0	0
NOTL MD 2	5700	0	0
NOTL Con	3000	0	0
Jordan MD 1	7000	4	0.06
Jordan MD 2	7000	13	0.19
Jordan Con	3000	0	0
Beamsville MD 1	5600	102	1.82
Beamsville MD 2	7500	30	0.40
Beamsville Con	4000	33	0.83

Shoot damage was again low in the NOTL blocks in the 2nd generation assessment (Table 2). Although recent shoot flagging was more evident at the Jordan and Beamsville sites than earlier in the season, it was below the arbitrary threshold of 2% for after 2nd generation flight and slightly lower in the MD blocks than the conventional blocks.

Table 2. Shoot Assessment after Second Generation OFM

Site	# Shoots Checked	# Flagged	% Flagged
NOTL MD 1	5500	1	0.02
NOTL MD 2	5000	4	0.08
NOTL Con	3000	0	0
Jordan MD 1	5000	50	1.0
Jordan MD 2	5000	49	1.0
Jordan Con	3000	55	1.8
Beamsville MD 1	-	-	-
Beamsville MD 2	5000	47	0.94
Beamsville Con	3000	33	1.10

Figure 3: Oriental fruit moth damage on fruit was low in mating disruption and conventional comparison orchards.

Twenty samples of 500 fruit each were evaluated for insect damage between July 21 and August 25. Nine varieties of early and mid-season peaches were represented in these samples and no late-season varieties were evaluated. Results from all samples are combined in Table 3 because OFM damage was extremely low in both MD and conventional sites. The slight difference in OFM damage between MD sites and conventional orchards was not significant. Secondary pest damage was also relatively low at all sites. However, it is important to monitor for all pest problems in MD treated orchards; in some cases, secondary pests may become problematic when insecticide use for OFM is reduced.

Table 3. Insect damage on fruit, 500 fruit per sample.

Treatment	# fruit samples	% OFM damage	% plant bug* damage
MD 1	8	0.075	0.60
MD 2	8	0.075	0.40
Conventional	4	0.25	0.30

* Includes tarnished plant bug, oak bug, and other plant bugs

Summary

RAK 5 OFM dispensers provided control of oriental fruit moth in peach orchards that was equivalent to a conventional pesticide program. This was true in both the combined MD and insecticide program (MD 2) and orchards using season-long MD (MD 1). RAK 5 OFM dispensers were easy and quick to install. No secondary pest outbreaks occurred in MD blocks using reduced insecticides for OFM.

The value of monitoring for shoot damage by OFM after first and second generations was shown by the identification of one site that was unsuitable for MD. Future research should determine if late-season peaches (harvest after September 1st) are adequately protected by a season-long MD program.

Figure 4: Workers should be instructed to replace dispensers in trees after pruning.

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