

NEW TECHNOLOGY IN HAND-APPLIED PHEROMONE DISPENSERS
FOR ORIENTAL FRUIT MOTH DISRUPTION
2004

Arthur M. Agnello
Dept. of Entomology
New York State Agricultural Experiment Station, Geneva

This trial was conducted in mixed plantings of fresh and processing apples on six commercial farms in Wayne and Ontario Counties, NY. A low-density pheromone "bag" dispenser was compared against two types of "twist-tie" dispensers for efficacy in suppressing pheromone trap catches of oriental fruit moth (OFM), *Grapholita molesta*, when applied against the 2nd and 3rd generations of this pest. Apple varieties included Gala, R.I. Greening, Golden Delicious, Red Delicious, Monroe, Ida Red, Empire, and McIntosh.

Materials & Methods

The pheromone bag treatment, termed "MSTRS" technology (Metered Semiochemical Timed Release System, AgBio Inc., Westminster, CO) consisted of food-grade plastic enclosing a 6.4 x 6.4 cm natural fiber pad containing 65.8 g of OFM pheromone (85.4 : 5.5 : 0.9% of Z:E8-12:OAc : Z8-12:OH), which was deployed in a grid pattern at a spacing of 22.9 m (75 ft) between dispensers, resulting in densities between 11–20 per ha (5.2–8.0 per acre). A pole+hoop applicator was used to position the dispensers in the top one-third of the tree canopy; deployment took place from 9–13 July.

The MSTRS dispensers were compared against the following treatments in single-plot replicates ranging in size from 1.2–2 ha (3–5.0 acres):

- 1 – Isomate M-100 ties (CBC America), applied 16–18 June at a rate of 250/ha (100/acre) at two of the sites: Furber and Trammel (Fig. 1).
- 2 – Isomate M Rosso ties (CBC America Corp., Commack, NY), applied 16–22 April at a rate of 500/ha (200/acre) at four of the sites: Bartleson, Beckens, Datthyn, and DeBadts (Fig. 2).

Grower standard blocks were used as check plots at each site, and had no pheromone treatments, but received pesticide sprays according to conventional practice. Treatment efficacy in depressing adult male trap catch was monitored by using 3–4 Pherocon IIB traps per plot, each baited with a standard Scentry oriental fruit moth lure, and checked weekly from 9 July to 16 September.

Results

As ease of use and labor requirements are considerations in deciding the type of pheromone dispenser to be used in a particular situation, data were taken on the time and number of people required to deploy the MSTRS dispensers in each plot. This product is used at a certain inter-dispenser spacing rather than a specific per-acre rate, so plot geometry as well as area dictate the total number of dispensers needed per block; density decreases as area increases. The following specifics pertain to the six sites where the MSTRS were deployed in this trial:

Site	Area, A (ha)	Dimensions, ft (m)		No. Applied		Time req'd. (worker-min)	
				Total	per A (ha)	Total	per A (ha)
Bartleson	5.0 (2.0)	360 x 450	(110 x 137)	26	5.2 (12.8)	40	8.0 (20.0)
Beckens	5.0 (2.0)	216 x 920	(66 x 280)	33	6.6 (16.3)	60	12.0 (30.0)
Datthyn	3.5 (1.4)	294 x 504	(90 x 154)	28	8.0 (20.0)	30	8.6 (21.5)
DeBadts	3.5 (1.4)	273 x 425	(83 x 130)	24	6.9 (17.3)	25	7.1 (17.8)
Furber	5.0 (2.0)	312 x 1512	(95 x 461)	36	7.2 (18.0)	40	8.0 (20.0)
Trammel	3.0 (1.2)	180 x 760	(55 x 232)	22	7.3 (18.3)	25	8.3 (20.8)

Time measurements for hand-applied deployment of the twist-tie OFM dispensers taken in parallel studies have averaged approximately 240 ties/hr/person, or 25 min per A (62.5 min per ha) for the Isomate M-100 dispenser, and 50 min per A (125 min per ha) for Isomate Rosso. The MSTRS time requirements correspond to a ~50–70% reduction over the M-100 ties, and ~75–85% over the Rosso ties.

Pheromone trap catches of OFM adult males in the test sites were lower than they might normally have been, owing to unfavorable cool and rainy weather during July and August. Nevertheless, sufficient numbers of moths were caught in the non-disrupted check plots to indicate the degree of effectiveness of the pheromone treatments in the adjacent plantings. Both the Isomate M-100 and Rosso treatments completely suppressed OFM trap catches in their respective plots for the duration of the study; in 4 of the 6 sites, traps in the MSTRS plots caught 1–2 moths on one or two occasions (Fig. 3).

Because of time constraints resulting from a shipping error at the production facility, the MSTRS dispensers were received without the proper tree-attaching clips, so an arrangement was improvised using rubber bands. Unfortunately, these degraded with the prolonged exposure to sunlight, so a certain proportion (10–20%) of the bags ended up on the ground in most plots by late August or early September, possibly detracting from the degree of pheromone saturation attained in the tree canopy space. Nonetheless, overall treatment efficacy and efficiency of this type of dispenser appears to be high enough to encourage further investigation of opportunities to integrate this type of product into future demonstration-research plots involving OFM mating disruption as one management component.

The principle of using a low-density, high-yield dispenser to disrupt chemical communication between the sexes incorporates elements of both mechanisms of mating disruption as currently proposed—false trail following by the males as they are attracted up the plumes from the bags, coupled with sex pheromone habituation from exposure to the strong doses—which would serve to arrest them in mid-flight. While this approach may be suitable for a species such as OFM, which is relatively easy to disrupt, other studies have shown that species such as codling moth tend to respond better to higher numbers of pheromone point sources, with perhaps greater concentrations on the block edges. Therefore, the utility of the MSTRS design may be best realized against a selected smaller number of pest species.

Acknowledgments

Thanks are due to D. Bartleson, B. Beckens, D. Datthyn, R. DeBadts, T. Furber and K. Trammel for allowing these trials to be conducted on their farms; to Dorothy and Dianne

Mitchell, Rachel Mussack and Rachel Falkey for field assistance in setting up and maintaining the plots, and for T. Baker and J. Meneley (AgBio, Inc.) for arranging to provide the dispensers.

Fig. 1. Plot details of two of the six sites where the MSTRS dispensers were assessed in Ontario and (Trammel) Wayne Counties (Furber), NY. 2004

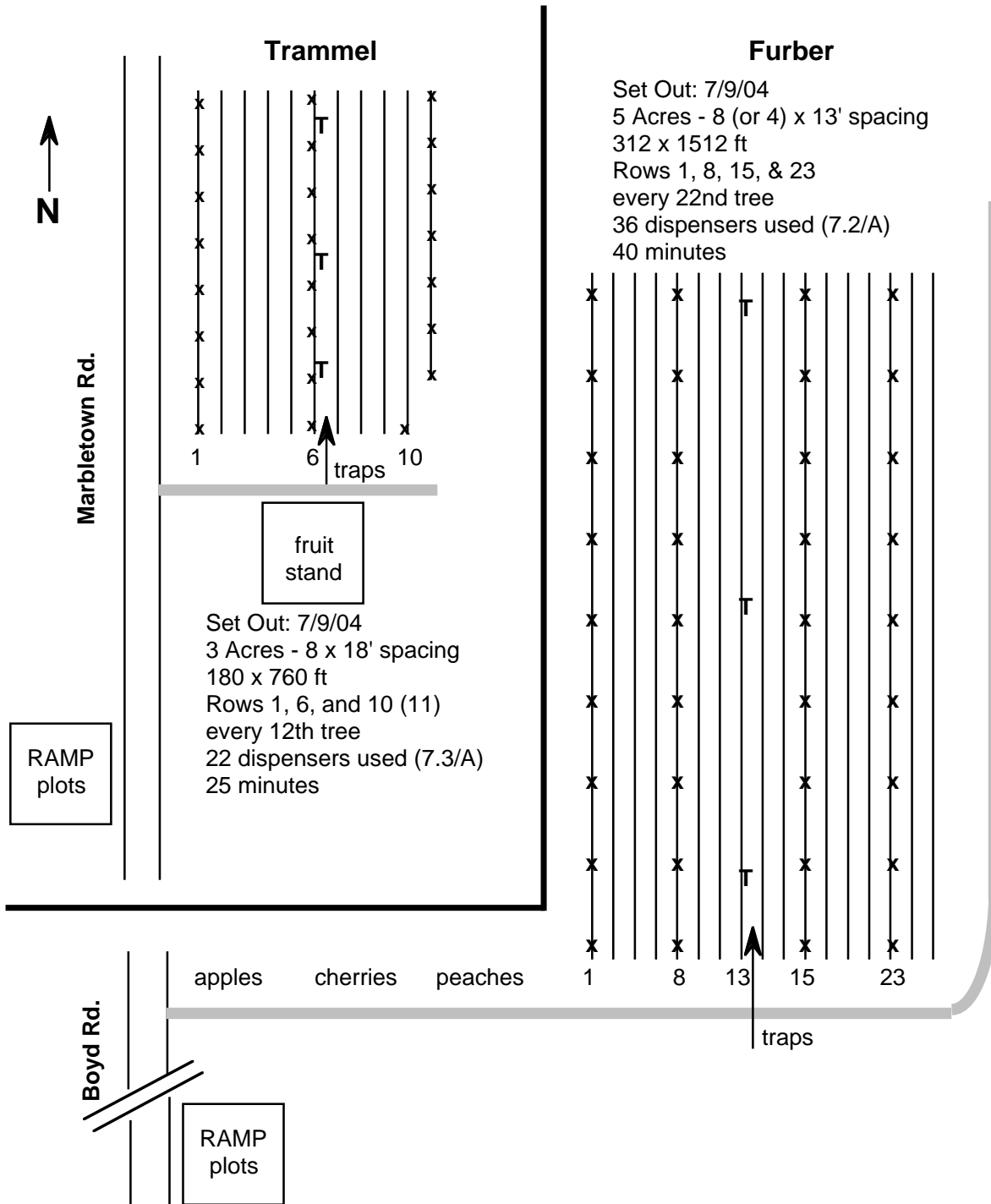


Fig. 2. Plot details of four of the six sites where the MSTRS dispensers were assessed in Wayne Co., NY. 2004

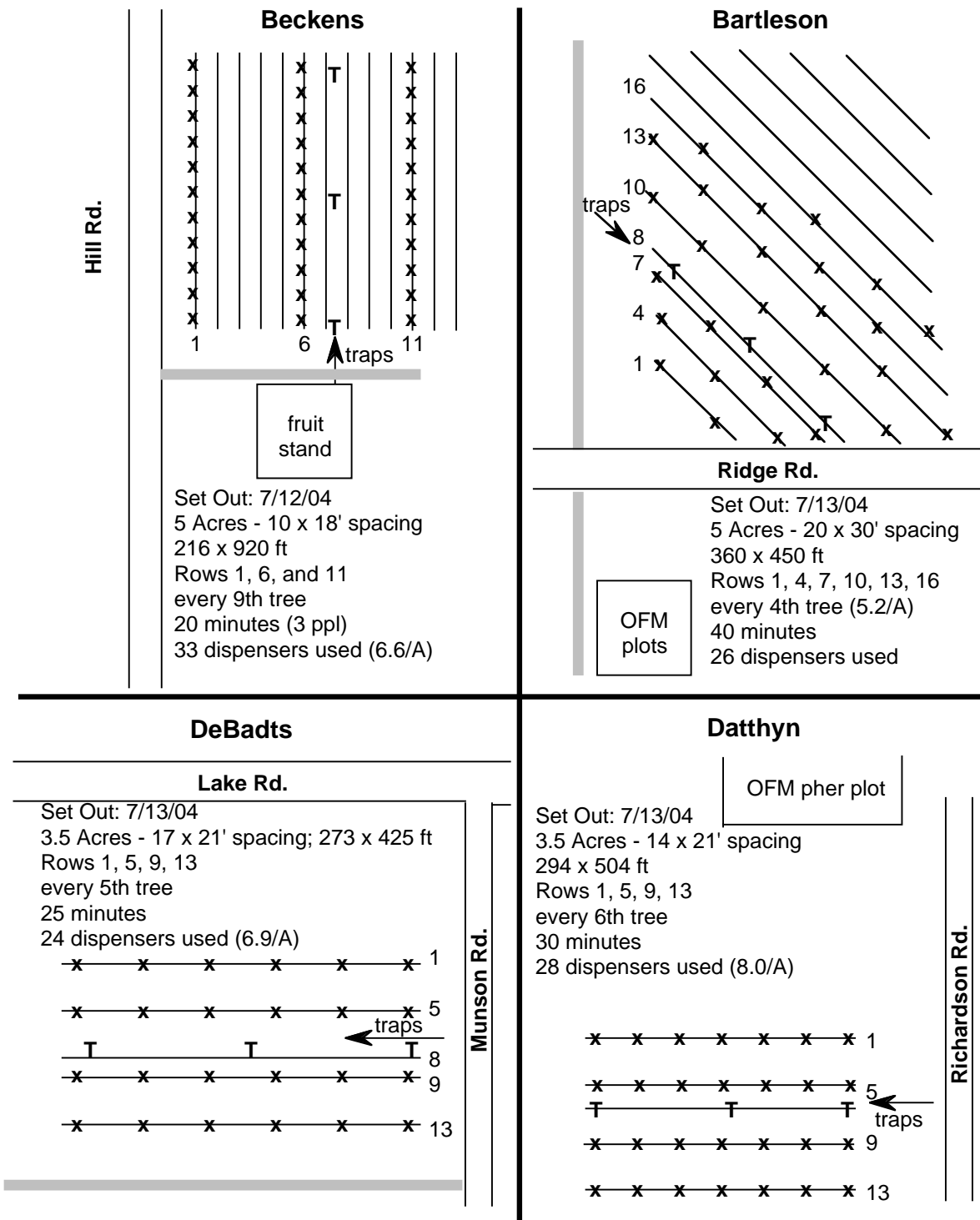


Fig. 3. Pheromone trap catches of oriental fruit moths in apple orchards treated with MSTRS pheromone dispensers vs. Isomate Rosso (Beckens, Bartleson, Datthyn, DeBadts) or M-100 (Furber, Trammel) twist-ties. Wayne and Ontario Counties, NY. 2004

