

Mating Disruption/SIR

New uses for an old technology: Scentry fiber-pheromone formulations for codling moth and obliquebanded leafroller mating disruption

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Abstract: Scentry Biologicals provided NoMate Fibers loaded with codling moth (CM) or obliquebanded leafroller (OBLR) pheromone. CM fibers were attractive for up to 60 days in both generations. Fibers were only slightly less attractive than a fresh 1 mg lure. A similar pattern was observed with fibers loaded with OBLR pheromone. These were not as attractive as a fresh 1 mg lure but were as or more attractive than a fresh 0.05 mg lure. Scentry Biologicals contracted with Blue Line Manufacturing to develop a prototype fiber applicator. This applicator was field tested for fiber distribution, retention and ability to suppress CM and OBLR moth captures in pheromone-baited traps in 2002. Suppression of CM capture was reasonably good in most plots that were treated and the effect lasted for up to 35 days. A high level of reduction in OBLR captures was noted in two replicated sites and the effect lasted the entire generation.

Introduction

Mating disruption has been used successfully in WA to control CM. Approximately 40% of pome fruit production uses pheromone mating disruption as part of an IPM program. The main formulation and delivery method has been hand-applied dispensers. New technologies of pheromone disruption are continually being evaluated in an effort to improve control or reduce costs.

Scentry Biologicals' (Billings, MT) NoMate Fiber formulation has been used successfully in cotton to control pink bollworm. We have begun a program to critically evaluate the potential of NoMate CM Fiber and NoMate OBLR Fiber for their potential as attractants and mating disruptors in pome fruits. Little is known about the longevity of attractancy with CM or OBLR fibers or the effect of Bio-Tac sticker on attractancy and retention when applied to tree surfaces (foliage or bark). Previous tests using an aerial applicator typically used in cotton showed that this did not appear to be a reliable method of applying fibers to trees. Thus, Scentry Biologicals contracted with Blue Line Manufacturing (Moxee, WA) to develop a prototype fiber applicator that was ground operated. This applicator was field tested for fiber distribution, retention and ability to suppress CM and OBLR moth captures in pheromone-baited traps in 2002.

Materials and Methods

Attractancy of pheromone fibers. Scentry Biologicals provided fibers loaded with CM or OBLR pheromone. Individual fibers or a grouping of five fibers, with or without a BioTac

coating, were evaluated for their ability to attract male CM or OBLR moths to delta traps. The attractancy of the fibers was compared to standard 1X pheromone lures and, in the case of OBLR, a low-load 0.05X lure was included in the design. There were five replicates of each treatment. Traps were examined three times per week, the number of moths counted and removed and then the location of traps rotated. After each rotation in the CM test was completed the lure was replaced but the fibers were aged throughout the duration of the test. The OBLR lures were left in place for the entire test. The same test was repeated starting with fresh fibers and lures in the second generation of CM and OBLR.

Field-aged fibers. Fibers in the above tests were never exposed to the environment, being protected from UV light by the trap. To address this concern, fibers containing CM pheromone were coated with BioTac and placed on the upper surface of leaves in an orchard. Fibers were removed from leaves at regular 7-day intervals (0, 7, 14, 21, 28, 35, and 42 days), placed in foil packets and then stored at 0°C. Once all the fibers had been aged and collected they were removed from the cold storage and placed in traps as groups of five fibers. There were five replicates of each fiber age class evaluated along with a fresh 1 mg lure. Traps were placed in the field for 7 days, after which the number of moths captured was counted.

Retention of fibers on trees. The prototype applicator was loaded with blank fibers mixed with BioTac (50:50 mixture of 25 grade and 100 grade BioTac). The applicator was run in four locations for two minutes at each station. Fiber retention was evaluated by tagging the location of 40-50 fibers at each site and recording the number of fibers remaining in place every 7 days.

Distribution of fibers by prototype applicator. The prototype applicator was operated for a period of two minutes in a stationary position in an open field. The applicator was surrounded by 1 ft² targets placed in expanding rings around the tractor from 3-20 ft away. The number of fibers found on each target was counted.

Fiber field trials. NoMate CM Fibers were applied against CM at 4 locations each in a side-by-side, treated vs. untreated, design. NoMate OBLR Fibers were evaluated at 2 locations, each with an alternating treated-untreated design of 3 replications. The exact amount of fibers applied was difficult to evaluate but the target was 100 grams of fibers per acre (5-10 gm AI of pheromone). Each 2-3 acre plot was monitored with two delta traps baited with 1X pheromone septum lures. Traps were checked for 35 days after treatment in the CM treated plot and 52 days in the OBLR treated plots.

Results

Attractancy of pheromone fibers. Fibers loaded with CM pheromone were attractive for up to 60 days in both generations (Fig. 1). Fibers were only slightly less attractive than a fresh 1 mg lure. The fibers may have lost some relative attractancy after the initial rotation, but they maintained relative attractancy at nearly 60% of a fresh 1X septum from the second rotation through the end of the test. Single OBLR fibers attracted about 20% as many male OBLR moths as a 1X septum, which was equivalent to a low-load 0.05X lure (Fig. 2). The grouping of 5 fibers attracted significantly more moths than the single fibers. The OBLR fibers did appear to lose

relative attractancy compared to the 1X lure at each rotation. The BioTac had no negative effect on attractancy.

Field-aged fibers. There was no difference in the capture of CM in traps baited with fibers aged in the field from 0 to 42 days (Table 1). These fibers also captured as many moths as a fresh 1 mg lure. These data indicate that the fibers provide protection of CM pheromone from environmental degradation.

Retention of fibers on trees. Most fibers applied by the prototype applicator land on leaves. Fiber retention was better on foliage than on bark and better on top of leaves than underneath. Fibers that were less securely attached fell off over the first 21 days of evaluation, after which no further loss of fibers was noted through at least 50 days (Fig. 3). It was estimated that approximately 50% of the fibers that initially were attached to trees remained in position for the duration of the test. It is possible that fibers fell from their original location and reattached elsewhere on the tree.

Distribution of fibers by prototype applicator. Fibers were flung off the spinning cone and landed from 3 to at least 20 feet away. If the tractor was heading north the fibers tended to be clustered in a southwestern and northeastern direction.

Fiber field trials. CM pressure ranged from low to very high in the test orchards. Suppression of CM capture was reasonably good in most plots and did not appear to be affected by background pressure (Table 2). The effect of the fibers appeared to last at least 35 days without a notable decrease in relative suppression. A high level of reduction in OBLR captures was noted in two replicated sites and the effect lasted the entire generation (Fig. 4). The OBLR fibers appeared to lose relative activity with time, but it should be noted that trap suppression remained high through the entire 52 days of evaluation.

Table 1. Relative attractancy of NoMate CM Fibers aged in direct sunlight for 0-42 days, 2002

“Lure” treatment	Total CM/7d
0 Days	8.4a
7 Days	5.8a
14 Days	7.8a
21 Days	7.2a
28 Days	7.4a
35 Days	4.6a
42 Days	8.8a
1X septa	10.2a

Means in the same column followed by the same letter not significantly different (p=0.05, Student’s Paired *t*-Test).

Table 2. Efficacy of NoMate CM Fiber formulation in suppression CM capture in 1X pheromone baited traps at four locations, 2002

Orchard	n	% Reduction in capture from untreated						
		2 Days	6 Days	9 Days	14 Days	19 Days	29 Day	35 Days
Daniels	45	71.4	87.5	40.0	80.0	86.8	94.1	100.0
Wade	11	---	---	33.3	33.3	0.0	75.0	66.7
CV 18	68	88.9	91.3	90.9	76.9	83.9	92.9	62.5
Royal	186	89.5	77.0	37.3	38.1	57.9	75.9	-21.1
Average (SE)		83.3 (5.1)	85.3 (3.7)	50.4 (13.6)	60.7 (14.9)	57.2 (20.1)	84.5 (5.2)	52.0 (25.7)

n Total moth capture in two 1X pheromone baited traps in untreated section.

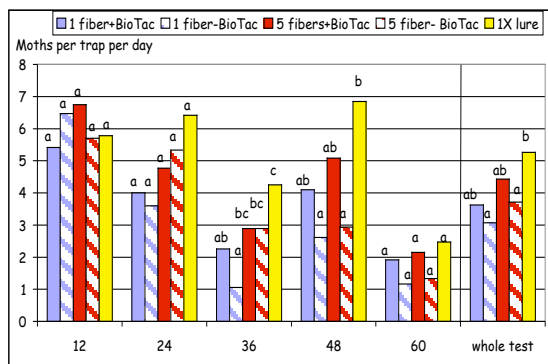


Fig. 1. Relative attractancy of NoMate CM Fibers and 1X pheromone lure during the second CM generation, 2002.

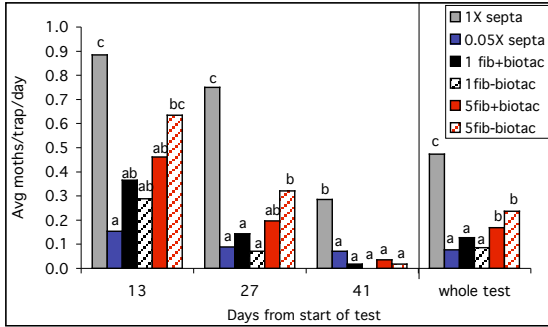


Fig. 2. Relative attractancy of NoMate LR Fibers and 1X and 0.05X pheromone lures during the first OBLR generation, 2002.

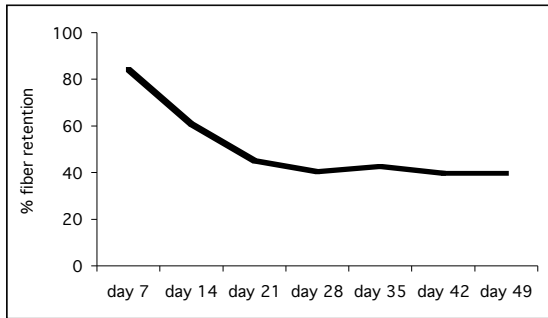


Fig. 3. Retention of blank fibers applied by prototype applicator, 2002.

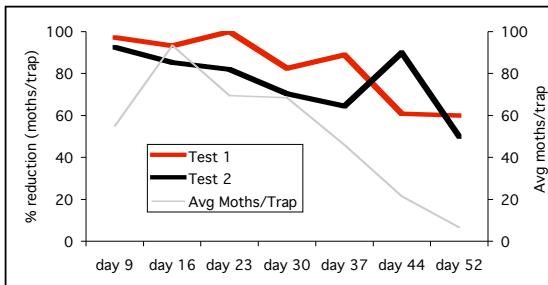


Fig. 4. Relative suppressive activity of NoMate OBLR Fibers during the second generation, 2002.