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Field Development of a Synthetic Sex Pheromone for Omnivorous Looper *Sabulodes aegrotata*

J.B. Bailey[1], K.N. Olsen[2], and L.M. McDonough[3]
1. Extension Specialist in Entomology, University of California, Riverside; 2.Laboratory & Field Assistant, University of California, Cooperative Extension Service, Riverside; 3. Head Research Chemist. USDA-ARS, Yakima, Washington.

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ABSTRACT

Trapping experiments were conducted to develop the synthetic sex pheromone for *Sabulodes aegrotata* as a monitoring tool. Of the three components previously found in pheromone extracts of adult females, only 6, 9-nonadecadiene was necessary for maximum trap catch. Optimum dosage per lure ranged from 3 to 30 mg.

INTRODUCTION

Sabulodes aegrotata Guenee, the Omnivorous Looper (O.L.) is a general feeder which is primarily an economic pest on avocados in California. It feeds on both foliage and fruit. This pest, however, has completely defoliated some groves, resulting in sunburned fruit and fruit bearing wood. As with other foliage feeders, higher populations can be tolerated before an economic threshold is reached than with pests that feed exclusively on the fruit. The identification of the sex pheromone of *S. aegrotata* was undertaken (1, 2) along with that of another fruit and foliage feeder of avocados, *A. cuneana* (Walsingham) (3, 4, 5). This was part of a study to develop an integrated pest management program for these two insect species based on the use of pheromone monitoring traps and release of *Trichogramma platneri* (Nagarkatti) wasps. Sex pheromones are chemicals or combinations of chemicals which one organism emits to attract others of the same species for the purpose of mating. Generally, females release pheromones to attract males. These chemicals are very species specific so that when used in insect traps as lures the great majority of the insects caught will be the desired species. Preliminary tests with virgin female *S. aegrotata* baited traps resulted in large captures of males indicating the potential for using synthetic pheromone to monitor this pest.

Subsequently, we shipped O.L. females to the United States Department of Agriculture, Agricultural Research Service (USDA-ARS) laboratory in Yakima, Washington. There, analysis of sex pheromone extracts from these females showed them to be composed of over 90% (Z, Z) 6, 9-nonadecadiene, with a few percent each of (Z)-9-nonadecene and n-nonadecane. Dr. Les McDonough, the head chemist at the Yakima lab,

synthesized the pheromone and provided us with samples to field test in California avocado groves. Here, we report the results of three field tests designed to develop this new attractant for use as a monitoring tool for male O.L. moths.

MATERIALS AND METHODS

Field tests were conducted in commercial avocado groves located in Ventura and Orange counties. Synthetic pheromone was field tested after impregnation into rubber septa (West Co., Phoenixville, PA.) which were placed in Pherocon® 1C traps (Zoecon Corporation, Palo Alto, CA). All pheromone used in this work was synthesized and formulated at the USDA-ARS facilities in Yakima. Septa were impaled on No. 17 straight pins hung from the top inside center of the traps. Traps were hung from peripheral branches on mature avocado trees, 5 to 7 feet above the ground, at a distance between traps of no less than 90 feet. Each treatment was replicated four times and arranged in a randomized block design. Traps were rotated one position each time they were checked to minimize bias of location.

Traps were checked a number of times equal to an even multiple of the number of treatments in the test. The Ventura County test was checked 4 times at 3 day intervals. The San Diego County test was checked 5 times at 3 day intervals. The Orange County test was checked 12 times at 2 day intervals.

RESULTS AND DISCUSSION

Our first test was conducted to demonstrate the ability of our synthetic sex pheromone to attract male O.L. to traps in the field. We compared three treatments consisting of different combinations of the chemicals which had been found in the O.L. female pheromone gland extract. Trap catches as depicted by Table 1 were constant for all treatments except for the control. Based on these results, the O.L. pheromone probably consists of only one component (Z, Z) 6, 9-nonadecadiene. The two minor components are probably biosynthetic intermediates.

Table 1. Effect of Identified Components from Sex Pheromone Glands of Female *S. aegrotata*. Proportions found in the gland were used. Four replicates and a 12 day test. From December 10-December 22, 1983.

Lure Composition	Total Catch, Significance[a]
1 mg. 26, 29- 19:H	54 a
1 mg. 26, 29- 19:H + 3% 29- 19:H	54 a
1 mg. 26, 29- 19:H + 3% 29- 19:H + 2.5% 19:H	59 a
Blank	0 b

[a] Duncan's new multiple range test (P=0.05).

Table 2. Effect of Dosage of Pheromone on Trap Catch of Male *S. aegrotata*. Test from March 8 - March 23, 1984. 4 Replicates.

Dose (mg.)	Total Catch, Significance[a]
0.03	12 c
0.1	31 b
0.3	99 a
1.0	126 a
Blank	0 d

[a] Duncan's new multiple range test (P=0.05).

For maximum trap catch, dispensers should be loaded with the correct amount of pheromone. This can vary greatly from insect to insect. Some species respond to a narrow dose range, while for others the range may be very broad. Our second test compared lures with different dosages of pheromone. Only lower dosages were used in this test because the pheromone was not available in large enough quantities to test larger dosages. As shown by Table 2, the higher rates captured the most moths.

Later, when more pheromone became available, we conducted a second dosage comparison with greater amounts of the pheromone. Treatments ranged from 1 mg. to 30 mg. per dispenser. As shown by Table 3, trap catch was constant for dosages of 3 mg. to 30 mg. with 1 mg. not quite as effective. Based on these tests, we have selected 3 mg. as our standard dose per dispenser. The 3 mg. rate was chosen because the larger dose was not needed. This rate is much greater than the 0.2 mg. standard for *A. cuneana,* the other major moth pest of avocados in California. The *A. cuneana* pheromone costs more to synthesize, however, so the price of a lure for each pheromone should be quite similar.

Development of both the O.L. and *A. cuneana* pheromones is nearing completion. Only a few field tests remain. We are currently locating sites throughout southern and central California to station *A. cuneana* and O.L. traps as a basis of a project we call "Monitoring-Early Warning Project". Cooperators in nine counties at 31 specific locations will check these traps weekly and report moth counts to their local U.C. Farm Advisor, who in turn will make the information available to anyone who phones requesting it.

Table 3. Effect of Dosage of Pheromone on Trap Catch of Male *S. aegrotata*. Test from May 14 - June 4, 1984. 4 Replicates.

Dose (mg.)	Catch/trap, Significance[a]
1	28.8 b
3	42.3 a
10	47.3 a
30	44.0 a
Blank	0 c

[a] Duncan's new multiple range test (P=0.05).

When we have finished development of these pheromones, a commercial firm will begin producing them so they will be readily available to growers and licensed pest control advisors.

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