PINK BOLLWORM[1] MOTH DISPERSAL IN AND AROUND COTTON, SUGAR BEETS, AND ALFALFA[2]

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ABSTRACT

Huber oil traps baited with gossyplure were used to compare early season pink bollworm, *Pectinophora gossypiella* (Saunders), moth catches in beets and nearby cotton, and catches throughout the growing season in alfalfa and cotton. Differences between trap catches in sugar beets and cotton were generally not significant at the 0.05 level. Traps in cotton caught significantly more moths than those in alfalfa during most of the season. Late in the season there were no significant differences between the two groups. Traps placed in nearby non-crop and fallow areas generally caught fewer moths than those in cotton, alfalfa or sugar beets.

Key Words: Pink bollworm, *Pectinophora gossypiella* (Saunders), pheromone trapping, dispersal, cotton, gossyplure.

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INTRODUCTION

Coad (1929) established that the pink bollworm, *Pectinophora gossypiella* (Saunders), has a distinct migratory period beginning about the first of September and continuing until frost. Migration of overwintered adults in early spring was reported by Bariola et al. (1973). Van Steenwyk et al. (1978) have shown that dispersal may vary with the suitability of cotton as a host. Sharma et al. (1971) made some comparisons between pink bollworm male moth catches in traps in cotton and in nearby sorghum or fallow fields. They found that fewer moths were caught outside cotton than in it. In another pertinent study, Flint et al. (1976) found that males were caught predominantly in fields planted to cotton, regardless of crop rotation. The purpose of this study was to determine whether pink bollworm moths would disperse into other crops at times when cotton was unsuitable as a host, and whether moth catches in the other crops were significantly different than trap catches in cotton.

MATERIALS AND METHODS

The research was conducted near Sacaton and Casa Blanca on the Gila River Indian Reservation, about 40 km south of Phoenix, AZ. Eight pheromone traps were placed in fields of sugar beets (four each in two adjoining 16.2 ha fields) and

[1] *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae).

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8 in adjoining cotton fields (four each in two adjoining 16.2 ha fields) on 17 May 1977 in order to compare early season moth movements. Traps were checked weekly until the last sugar beets were harvested on 17 July. These were compared with 8 nearby traps in non-crop locations.

Twenty-seven pheromone traps were placed in a 32.4 ha alfalfa field and 18 traps were placed in an adjoining 32.4 ha cotton field on 26 May 1977. The traps were checked weekly through October and then bi-weekly through 17 November. The trap catches from these were compared with catches from 18 traps in adjacent fallow fields.

Pheromone traps used in these experiments were Huber oil traps (Huber et al. 1979). Wicks containing 1.2 μl of gossyplure (the pink bollworm pheromone) were replaced once during the growing season (4 August). Traps were filled with cotton picker oil to just below the level of the holes. All moths were counted and removed during each check.

Ten random cotton plants were checked on a weekly basis for plant development. Mean numbers of squares, blossoms, and bolls in their various developmental stages (young, susceptible to pink bollworm attack, old, and open) were recorded.

Data were analyzed using one-way analysis of variance in order to determine group means. The Student-Newman-Keuls multiple range test, corrected for unequal sample sizes when necessary (Steel and Torrie 1960, p. 114), was used to separate means at the 0.05 level of significance.

RESULTS AND DISCUSSION

Data on pink bollworm catches in sugar beets and nearby cotton are shown in Table 1. Although the mean number of moths caught in traps in sugar beets never surpassed that of traps in cotton, only during the first week of observation was the difference between the two statistically significant. Moth catches in nearby non-crop traps were generally greater than those in sugar beets, and in some cases greater than those in cotton.

Table 1. Mean number of pink bollworm moths per trap, by group, for traps placed in sugar beets, cotton, and nearby non-crop areas in Sacaton, AZ, in 1977.*

Climatological week	Inclusive dates	Cotton	Sugar beets	Non-crop
12	May 17 - 23	24.5 b	6.2 a	19.0 ab
13	24 - 30	62.1 a	48.9 a	94.2 a
14	Jun 31 - 6	37.2 a	23.1 a	17.1 a
15	7 - 13	9.0 a	7.2 a	7.9 a
16	14 - 20	1.6 a	0.8 a	4.4 b
17	21 - 27	1.0 a	0.0 a	3.1 b
18	Jul 28 - 4	0.9 a	0.8 a	0.8 a
19	5 - 11	1.3 a	0.2 a	0.4 a
20	12 - 18	0.8 a	0.0 a	0.6 a
21	19 - 25	0.2 a	—	0.8 a

* Numbers on the same line followed by the same letter are not significantly different (α = 0.05, Student-Newman-Keuls test).

First blossoms in the cotton were detected on 20 June. Prior to that date the cotton was generally unsuitable as a host. It is not surprising that many moths were caught in sugar beets prior to that time, as the beets provided suitable cover. Harvesting of the sugar beets began on 13 June, with irrigation being terminated about three weeks prior to harvest. As the beets dried up they provided little cover for the moths. And, as cotton begins fruiting, pink bollworm moths are attracted to cotton, their natural host.

Higher trap catches in non-crop traps may be related to unavailability of cotton as a host and termination of irrigation of sugar beets. Since the non-crop traps were not positioned in areas of extreme cover or moisture availability, this would seem to indicate a general dispersal in times of stress.

Data comparing pink bollworm moth catches in adjoining fields of alfalfa and cotton are presented in Table 2. Results are similar to early season results in sugar beets in that moth catches in alfalfa, with one exception (week 18), were below those in cotton. Generation peaks are apparent in Table 2, with differences in trap catches being non-significant only between generations until very late in the season. After 15 September the cotton had become senescent and unsuitable as a host. As many or more moths were then caught in alfalfa as in cotton, with differences being statistically non-significant. There was no correlation between moth catches and alfalfa cutting dates.

Table 2. Mean number of pink bollworm moths per trap, by group, for traps placed in alfalfa, cotton, and nearby non-crop areas in Casa Blanca, AZ, in 1977.*

Climatological week	Inclusive dates	Cotton	Alfalfa	Non-crop
15	Jun 7 - 13	4.7 b	4.3 b	1.6 a
16	14 - 20	3.3 b	1.8 a	1.1 a
17	21 - 27	3.1 b	1.3 a	0.6 a
18	Jul 28 - 4	0.8 a	0.8 a	0.4 a
19	5 - 11	1.1 b	0.3 a	0.2 a
20	12 - 18	19.1 b	0.6 a	0.3 a
21	19 - 25	4.7 b	0.9 a	0.7 a
22	Aug 26 - 1	1.0 a	0.8 a	0.4 a
23	2 - 8	6.9 b	1.0 a	0.6 a
24	9 - 15	33.9 b	5.9 a	1.7 a
25	16 - 22	73.8 b	6.9 a	2.3 a
26	23 - 29	19.9 b	4.6 a	2.2 a
27	Sep 30 - 5	13.9 b	5.8 a	2.1 a
28	6 - 12	77.8 b	9.0 a	5.4 a
29	13 - 19	170.4 b	43.4 a	39.8 a
30	20 - 26	16.1 a	14.6 a	13.3 a
31	Oct 27 - 3	26.2 b	11.6 a	11.9 a
32 - 33	4 - 17	206.9 b	235.0 b	110.1 a
34	18 - 24	81.3 a	80.1 a	62.1 a
36	Nov 1 - 7	43.1 a	46.1 a	33.1 a
38	15 - 21	7.2 a	8.4 a	8.4 a

* Numbers on the same line followed by the same letter are not significantly different (α = 0.05, Student-Newman-Keuls test).

As with sugar beets, traps in non-crop (or fallow) fields around the alfalfa were in areas providing essentially no cover or moisture availability to moths. Those traps invariably caught fewer moths than those in cotton or alfalfa. However, they did catch considerably higher numbers during times when those crops were generally unsuitable as a host or for cover, again indicating a general dispersal during times of stress.

The data reflect a much more general dispersal in the spring prior to complete cotton development. Fall dispersal seemed to be a direct reflection upon the condition of the host and of general conditions affecting the survival of the moths.

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