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TREE BORER SEX PHEROMONES : (1) ATTRACTION OF MALE *SYNANTHEDON MYOPAEFORMIS* TO BLENDS OF (Z,Z) AND (Z,E) ISOMERS OF 3,13 ODDA

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Abstract

In Egypt, the clearwing moth, *Synanthedon myopaeformis* (Borkhausen) Lepidoptera: Sesiidae) is a serious boring pest in apple orchards. The attractancy of male moths to blends of (Z,Z) - 3, 13 - octadecadienyl acetate (100%) or mixed with (Z, E) - 3, 13 - octadecadienyl acetate at the three ratios, 95 : 5, 90 : 10 and 50 : 50 was evaluated in Giza and Alexandria governorates throughout the flight season of 1990. The most attractive baits were the mixtures of the sex pheromone (Z, Z) - 3, 13-ODDA and (Z, E) -3 , 13 - ODDA at the ratios 90 :10 and 95:5. Ratio of 50:50 or 100% (Z,Z) were the least effective. Monitoring *S. myopaeformis* male population in apple orchards by pheromone traps indicated that the flight season started from late January or mid - February until December.

INTRODUCTION

Sesiid borers are serious cosmopolitan pests, causing economical damage to fruit trees. In Egypt, *S. myopaeformis* borer severely infests apple trees. The biology , ecology and control studies were given by Tadros (1977). Larvae bore their destructive tunnels under the tree bark. Moths emerge from January or February until December each year. Control was practiced by painting the infested sites or spraying the tree trunk and branches by insecticides.

Sex pheromone studies on Sesiid male moths started in 1964 by Cleveland and Murdock in traps baited with virgin females. Ten years later, Tumlinsen *et al.*

(1974) discovered (E,Z) and (Z,Z) - 3, 13- octadecadienyl acetates as the sex attractants for *S. pictipes* and *S. exitiosa,* respectively . In the meantime, bioassays used to monitor the isolation of *S. pictipes* were conducted in peach orchards by Yonce *et al.* (1974) . Moreover, Duckworth and Eichlin (1978) found that various blends of the 3, 13 acetate and alcohols attracted a wide range of species. Evaluation of the attractiveness of pure isomers of 3,13-octdecadienyl acetate and corresponding alcohols separately and in combinations were carried out by Nielsen *et al.* (1975 and 1978) and Nielsen and Purringtion (1978).

According to these observations and discoveries, considerable researchers in USA and Europe became interested in the taxonomy and seasonal history of various members of the family Sesiidae (Karandions *et al.,* 1977; Solomon, 1979; Voerman, 1979; Neal and Eichlin, 1983; Priesner *et al.,* 1986 ; Snow *et al.,* 1989) . In Japan, synthesized pheromones were commercially produced for monitoring mass trapping and male disruption.

In Egypt, until 1989, monitoring of tree borers was conducted by counting the empty pupal skins or exit holes, while their control was applied by insecticidal sprays.

During September - November 1989, the author had visited the Southeastern Fruit and Tree Nut Research Laboratory (USDA-ARS) at Byron, Georgia, U. S.A. and brought four sex pheromone blends in different ratios to be tested as sex attractants for *S. myopaeformis* in apple orchards in Egypt.

The aim of the present workd is therefore to evaluate the attractancy of these four blends of sex pheromone to *S. myopaeformis* in apple orchards. Such kind of studies could help monitoring , mass trapping and controlling (male disruption) the tree borers.

MATERIALS AND METHODS

Trapping studies were conducted in two infested apple orchards located at El - Saff, Giza (representing mid - Egypt) and Apies, Alexandria (representing north - Egypt) governorates throughout the flight season of 1990.

In each orchard, 12 feddans of about the same rate of infestation were chosen

and divided into 12 parts of one feddan each and the 4 traps (of the 4 blends) were randomly distributed in 3 replicates. Starting from early January, four traps, each baited with a lure of sleeve - type septa containing 1 mg of one of the following pheromone blends of (Z,Z) - ODDA and (Z, E) - ODDA isomers at the following mixing ratios:

1. (Z,Z) - 3,13 - ODDA	100%
2. (Z,Z) - 3,13 - ODDA : (Z, E) - 3, 13- ODDA	95 : 5
3. (Z,Z) - 3,13 - ODDA : (Z, E) - 3, 13- ODDA	90 : 10
4. (Z,Z) - 3,13 - ODDA : (Z, E) - 3, 13- ODDA	50 : 50

were suspended on tree branches in a semi - shady area at a height of about 1.5 meters above the ground level. They were in position where they would not become binded on branches or other objects due to windy conditions.

Traps were checked and data were recorded once a week on Thursday (± 1 day) in Giza and Saturday (± 1 day) in Alexandria. The medium day (Friday) was refered to in Figure 1 for the two localities. Lure septa were only necessary to be replaced at 6- week intervals. Traps containing different pheromone blends were separated by at least 65 meters (one trap/feddan). This was done to minimize the chances of the different blends affecting captures.

Owing to the rainy season in winter, REAGRON sticky traps (REANAL Factory, Budapest, Hungary) were used during January and February. From March until December, the funnel traps (Critchley and El - Deib, 1980) were substituted. Trap sticky bottoms were replaced weekly, but if excessive numbers of male moths were not trapped , the same bottoms were used for another week or more. In such cases, the trapped insects were removed from the traps when counts were made. It was important to check the traps at least once a week , so that deterioraton due to moisture , dust or consumption of target speciment by other insects or animals leading to worng counts could be avoided. In case of funnel traps male catches were counted and removed weekly.

To smooth down the frequencey distribution curves to an almost normal form , data were cumulated each two successive weeks and 3- reading running means were worked out.

RESULTS AND DISCUSSION

Relative attraction of male *S.myopaeformis* to different sex pheromone belnd ratios

Figure 1 shows the relative attraction of *S. myopaeformis* males to four sex pheromone blend ratios in two apple orchards at two ecologically different localities in Egypt (Giza and Alexandria governorates).The resutls revealed that the most attractive mixtures were the blend ratios of the sex pheromone component (Z,Z)-3,13- octadeca- dienyl acetate (90%) and (Z,E) - 3, 13- octadecadienyl acetate (10%) . The total male catch / trap/ week was about 61.98 and 30.01 males in Giza and Alexandria, respectively.

The blend ratio (Z,Z) - 3,13 - ODDA (95%) : (Z,E) - 3, 13- ODDA (5%) showed a similar degree of attraction with slightly less male catch / trap / week , reaching 57.55 and 26.66 males at the two respective localities.

On the contrary, (Z,Z) - 3,13 - ODDA (50%) : (Z,E) - 3, 13- ODDA (50%) or (Z,Z) - 3,13 - ODDA (100%) ranked the least attractive. The respective male catches / trap/ week were about 24.71 and 20.76 males in Giza and 11.34 and 12.01 males in Alexandria. These findings are in agreement with Voerman *et al.* (1978) and Voerman (1979) who found that (Z,Z)- 3,13 - octadecadienyl acetate is the sex attractant for *S. myopaeformis.* Trematerra (1987) indicated that the most effective traps were those baited with 10mg of a mixture of the sex pheromone (Z,Z) -3, 13 - octadecadienyl acetate (95%) and (Z,E) - 3,13- octadecadienyl acetate(5%)

Seasonal fulcutation in *S. myopaeformis* population monitored by different sex pheromone blend ratios

Figure 1 fruther indicates that almost similar harmonized trend is noticed in the seasonal fluctuation of *S. myopaeformis* population when monitored in apple orchards by different blends of pheromone mixtrues. As shown in Tabel 1, moths started to appear in traps from mid - January in mid - Egypt (Giza) or early February in north - Egypt (Alexandria) until late December. The population fluctuated all the year round showing three main peaks during late April or early May, late July and early September in Giza and early - late April, Late July and late August - early September in Alexandria. From the forementioned data, it could be indicated that

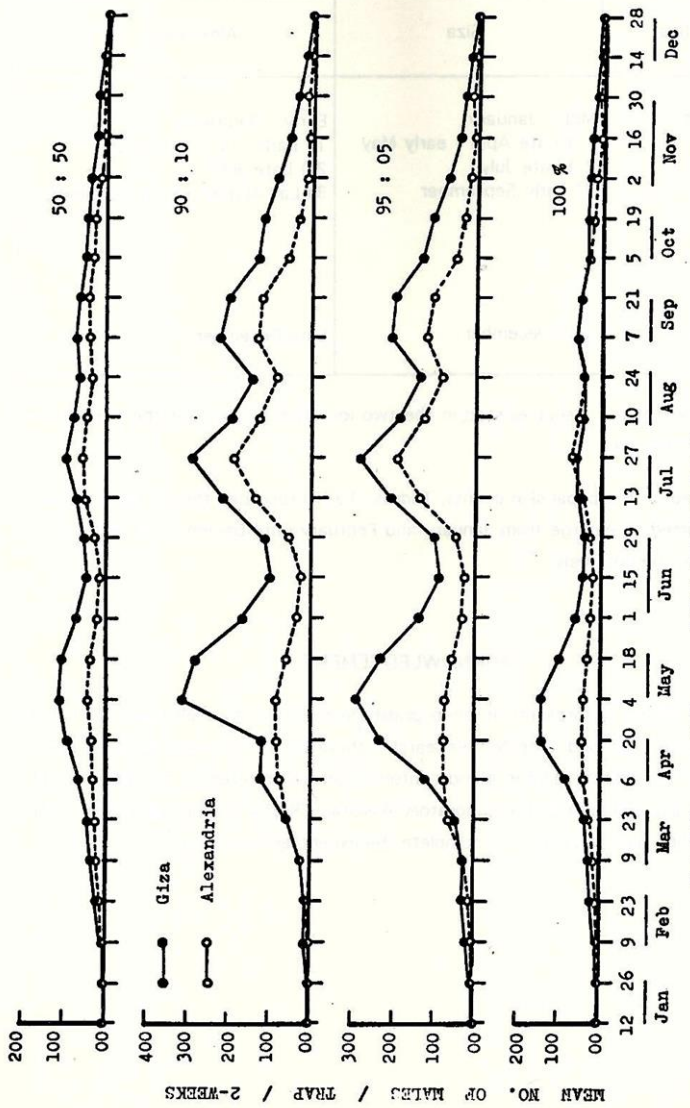

Fig. 1. Comparative catch of male *S. myopaeformis* to different blends of (Z, Z) and (Z,E) isomers of 3, 13 ODDA pheromone in apple orchards in Giza and Alexandria governorates.

Table 1. First date, peaks and last dates of male catches of *S. myopaeformis* in apple orchards in Giza and Alexandria governorates during the flight season of 1990

Catches	Giza	Alexandria
First date peaks	Mid - January 1) Late April - early May 2) Late July 3) Early September	Early - February 1) Early - late April 2) Late July 3) Lat August - early september
Last date	Late December	Late December

three broods of the insect existed in the two localities throughout the period from March to November.

Based on the pupal skin counts, Tadros (1977) recorded that *S. myopaeformis* moths started to emerge from January and February until December in Fayoum and Alexandria, respectively.

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الفرمونات الجنسية لحفارات الأشجار
(١) انجذاب ذكور حفار ساق الحلويات رائق الأجنحة الي مزيج من مشابهات (Z,Z) - 3,13 - ODDA (Z,E) - 3,13 - ODDA

أنطون ولسن تادرس

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقي

تعاني حدائق التفاح في مصر من الإصابه الشديدة بحفار ساق الحلويات رائق الأجنحة ، تم تقييم انجذاب ذكور الفراشات الي نسب مختلفه من مشابهات

(Z,Z) - 3,13 - octadecadienyl acetate :(Z,Z) - 3,13 - octadecadienyl acetate

والنسب هي : ١٠٠: صفر، ٩٥: ٥ ، ٩٠:١٠ ، ٥٠:٥٠ للمادة الأولي الي الثانيه علي الترتيب ، وذلك في محافظتي الجيزه (الصف) والاسكندرية (أبيس) خلال عام ١٩٩٠ . وجد أن أكثر المصايد جذباً للذكور هي تلك المحتويه علي طعوم بها مخاليط من الفرمون الجنسي, (Z,Z) - 3,13 - ODDA، (Z,Z) - 3,13 - ODDA بنسب ٩٠ : ١٠ أو ٩٥:٥ . أما المخاليط بنسب ٥٠:٥٠ ، ١٠٠ : صفر فكانت أقل جذباً بدرجه كبيره . كما أظهر تتبع تعداد الفراشات في حدائق التفاح باستخدام مصايد الفرمونات المحتوية علي هذه المخاليط أن نشاط الفراشات يبدأ من منتصف يناير أو أوائل فبراير ويستمر حتي ديسمبر