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CODLING MOTH IN BAKHTARAN PROVINCE

(1981 - 1983)[1]

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Summary

Applying Pheromone traps. three generations of Codling Moth have been observed in three regions : Bakhtaran, Sahneh and Bilavar (Sourni). The third generation observed in Bilavar does not hold so much importance and great population and it can be considered as the beginning of the third generation. Emergence ot the first male moths of *Laspeyresia pomonella* L.in Sahneh and Bakhtaran is almost coincided with the appearance of buds, it is coincided with the blooming time of Lebanese apple trees in Sourni. The infestation begins about one month after the emergence ot moths. The first penetrations of the first generation in Bakhtatan and Sahneh occur 7 to 11 days and in Sourni 15 - 18 days after the petal fall. At the time of the first penetrations the longest diameter of the largest fruit in Sahneh, Bakhtaran and Sourni have been measured 18, 20 and 25 milimeters respectively . Chemical control against the first generation is recommended at this time which cioncides with may 17 - 20 in Sahneh, May 22 - 25 in Bakhtaran and early June in Sourni. The proper time for spraying against the second

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generation is suggested July 6 - 11 in Sahneh, July 11 - 16 in Bakhtaran and late July in Sourni. Chemical control against the third generation, which seems to be necessary in Bakhtara and Sahneh is performed late August.

Introduction

Codling moth is one of the most important pests of apple trees causing remarkable damage if not controlled. For this reason, in spite of much studies carried out on this pest, more researches are still necessary. Davatchi and Esmaili (1965) during their investigations, tested five insecticide formulations on this pest. Radjabi et *al.* (1978) studied the biology of this insect during the years 1975 - 1977 illustrating some points of its life such as the number of generations, the date of entering into diapause of larvae, connection between effective sum ot temperature and the growth stages of apple trees with the proper times of controlling and the rate of damage in the areas investigated. Oloumi - Sadeghi and Esmaili (1980) did a research on the population fluctuation of the codling moth by using four kinds of traps (Female pheromone, Synthetic pheromone, light and bait) in order to obtain the proper times of controlling. In continuation of these investigations, Akrami (1984) also studied the diapause of colding moth and its connection with population fluctuation of this pest in East Azarbaidjan. Dates and number of spraying times against this pest (based on the number of generations) have been tested by Radjabi et *al.* (1980).

In this paper the number of generations of codling moth in three regions : Bakhtaran, Sahneh and Bilavar, as well as the date of first infestation occurrence, its relation with the growth stages of Lebanese apple trees , connection between daily effective sum of temperature with the different life stages of codling moth and proper times of spraying are discussed.

Materials and methods

Codling moth was studied in Bakhtaran, Sahneh and Bilavar (Sourni) during the years 1981 - 1983. Three orchards were selected in these regions :

1 - Bakhtaran orchard :

Bakhtatan orchard is located in north - east of Bakhtaran and there is no other orchard in the near - by. The orchatd planted in 1969 is as big as 500 hectars, with an altitude of about 1325 meters. The varieties of pome and stone fruit trees are found in separated or mixed blocks. One of the apple tree blocks was selected as the sample for making researches. A part of this block was not sprayed during the years 1981 - 1982 as a check. This patr of the block included 65 apple trees (mostly golden variety) in 6 lines.

2 - Sahneh orchard :

Sahneh orchard is located in a valley, near a river. The concerned studies were carried out in the years 1981 - 1982. In 1983, the researches continued in another orchard named Chahar - Bagh - e - Sahneh. Both orchards are located at an altitude of 1430 meters with varieties of rosaceous fruit trees.

3 - Sourni orchard :

This orchard, the fruit trees of which are mostly Lebanese apples (mainly golden variety) is located in Bilavar and Sourni village with an altitude of about 1450 meters. This orchard was planted in 1969 and is rather older than the orchards in the near - by. No spraying was done in some part ot this orchard including 40 golden and red delicious apple trees in 5 lines during the years 1981 - 1982.

Sex pheromone traps employed :

These traps are made of P. V. C. pipes with a length of 20 cm. and diameter of 10 cm. A sheet of plastic smeared with glue and pheromone capsule which both are inserted in the P. V. C. pipe. These traps which capture the male codling moths were installed in the experimental orchards in March or April and were used for 7 to 8 months each year. The captured moths were counted once every week. Pheromone capsule and the glue smeared plasric sheet were replaced once every four weeks. More details and the specifications of these traps are introduced in the paper of Radjabi et *al* (1978).

Phenological relation :

In order to investigate the possibility of any relation between the first

penetration and different stages of growth of apple trces the percentage of occurrence of every stage was checked and recorded in the experimental orcharas, once a week from early April on. When the fruits were obviously formed, the longest diameter of the largest apples were measured. This obser - vation continued till the infestation rate recorded as 1% in the apples on the trees.

Determination of the first penetration time :

To determine the first penetration time which is quite important for introducing of spraying date, 2000 apples on the trees and also the fallen ones were checked in the orchards once a week from mid - May and the approximate time of occurence of first penetration was so determined. To indicate the infestation rate in the check and sprayed blochs of each orchard, 10 apple trees were marked by numbers, then the fallen apples of these trees were checked and the infestation rate was shown. This operation began from the fourth week of May. The mentioned operation was performed at the time of fruit harvest as well.

Sum of temperature :

Daily effective temperature (over 10°C of daily average temperatue) was calculated by using meteorological reports of Bakhtaran airport which is located in vicinity of Bakhtaran orchard. Then effective sum of temperature was indicated for emergence of moths and the beginning of larvae infestation of first, second and third generations of codling moth.

Discussion and conclusion

A - Number of codling moth generations in various region :

The figures prepared are based on the number of moths captured by the sex pheromone traps in the orchards every week in the years 1981 - 1983 (see figures No. 1, 2, 3 in Farsi text prepared in both Farsi and English languages).

Figure 1 illustrates the trend of moths' flight of different generations ot codling moth in Bakhtaran orchard. It indicates that there are three genera-

tions in Bakhtaran in which the second generation population is larger than the other ones.

Figure 2 indicates the moths' flight of different generations of codling moth in Sahneh orchard. It implies that there are also three generations of codling moth in Sahneh in each year. The second generation population is larger than the other ones. Diagram for the year 1982 introduces the largeness of the population of this insect comparing the year 1981 and 1983 that one of its reasons can be the high fruit production in 1981. It means, delicious apple trees bear high production every other year. The high production year increase the population of codling moth so that this increase could be observed obviously in early next year which is the low fruit production year.

Figure 3 illustrates the trend of flight of codling moth by different generations in Bilavar (Sourni). This diagram introduces the first and second generations of the pest as well as the beginning of the third one in the area. Here, the second generation is of more importance too.

As the diagrams 1 - 3 indicate, there are three generations of codling moth in all three regions, in which the third one is more or less incomplete. The rate of incompletion is not the same in all these areas and it is different in each zone every year (Radjabi et *al.* 1978). For example, third generation of codling moth in Sourni in 1981 was not so important and could be ignored, but in 1982 and 1983 this generation engaged both a longer active life and large population with much importance.

The longest flight of moths was observed in Bakhtaran orchard and the shortest one in Sourni. The largest and smallest moth population also belonged to Bakhtaran and Sourni orchards respectively.

As illustrated in the diagrams, the activity of the first generation in Sourni began later than the activity in the other two areas, so it ends later. The second and third generations, in general. occur later than the other two areas. But due to the higher altitude and the colder weather in Sourni, the emergence of the moths ot the third generation stops sooner than the other two areas. It is to say that the third generation is more incomplete here rather than in

Bakhtaran and Sahneh. It means, less larvae ot this generation are able to hibernate. Although the second generation in Sahneh begins later than Bakhtaran, but it ends sooner, the reason for this can be in connection with various factors such as temperature, humidity and altitude of the areas.

First larval penetration :

Determination of the first penetration occurrence time of codling moth in the experimental orchards was rather an impossible task because checking of apples were done once a week only. But checking of 2000 apples on the trees and the ones under the trees in all orchards could introduce an approx - imate date for occurrence of first penetration and its interval until emergence of the first male moths and petal fall as well as the size of the longest diameter of largest apple at the time of first penetration occurrence.

Times of spraying controlling :

Exact time of spraying against codling moth is an important factor to be noticed, otherwise heavy damage will be inflicted.

Proper time for spraying against the first generation is when the first infestations are made. Against the second generation in Bakhtaran, Sahneh and Sourni, July 11 - 16, July 6 - 11 and the last week of July are considered as proper times. The proper time for spraying against the third generation is recommended in the last week of August in Bakhtaran and Sahneh. The above said dates are mostly after the flight - peak of the second and third generaions in the related areas. Weekly survey, in 1982,on the oldness or newness of penetration holes on 1000 apples in the orchards, more or less, confirms the determined times. In Bilavar, due to the relatively small population of the pest and the fact that the population of the third generation is not so remarkable, spraying against this generation does not seem necessary. If there is any delay of spraying on the above said dates in Bakhtaran orchard, chemical control could be done after the second peak, as there are two peaks of moth flight in each goneration.

Daily effective sum of temperature :

Calculation of effective sum of temperature and its adjustment with

the beginning of life different stages of this pest indicates that occurrence of growth stages of codling moth depends much on the daily effective sum of temperature. These degrees of temperature are calculated for emergence of moths and the beginning of infestation of first, second and third generation of codling moth in Bakhtaran, during three years. Approximate date of moths emergence of three generations as well as the beginning of infestation which is coincided with spraying time against each generation can be calculated.

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