MONITORING OF CODLING MOTH C*YDIA POMONELLA* (L.) THROUGH PHEROMONE TRAPS IN APPLE ORCHARD

S. Rajput[1], M. Salim[2], M. W. Kalroo[5], I. A. Rajput[3], A. Q. Baloch[4], M. S Depar[5], Sibghatullah[4], B. L. Meghwar[5] and M. Z. Khan[4]

[1]Department of Entomology, Shaheed Zulfiqar Ali Bhtto Agricultural College Dokri, Pakistan
[2]Department of Entomology, Sindh Agriculture University, Tando Jam, Pakistan
[3]Locust division, Department of Plant Protection, Karachi, Pakistan
[4]Horticulture Research Institute, Pakistan Agricultural Research Council, Khuzdar, Balochistan, Pakistan.
[5]PARC-Arid Zone Research Institute, Umerkot, Pakistan
Corresponding author: shahjahanrajput@gmail.com

ABSTRACT: A trial was conducted to monitor codling moth *Cydial pomonella* (L.) through pheromone traps at Barkhan (Baghao) province Balochistan. Four Pheromone traps were installed among the apple trees for the collection of the adult codling moth. These traps were installed on four randomly selected Apple tree at the height of 2.5 meters with adjacent of five trees. 7.20±0.40 *C. pomonella* moths per trap was observed in 17th standard metrological week. The numbers of *C. pomonella* population were increased gradually with 8.50±1.10 moths per trap in the 21st standard metrological week. The maximum *C. pomonella* population 12.68±1.12 moths per trap) was recorded during the 28th standard metrological week. Minimum *C. pomonella* population 5.10±0.51 and 5.53±2.10 moths per trap was recorded during 18th and 20th standard metrological week, respectively. Correlation studies indicates that there was positive and highly significant ($p<0.01$) association ($r=0.849$) for maximum and minimum temperatures ($r=0.7130$) was observed. While, there was significant but negative association ($r= -0.359$) for relative humidity with target pest was observed. In a similar way, there was negative and non-significant relationship ($r= - 0.004$) for total rainfall with *C. pomonella* population was observed. After going through the results in detail, it was concluded that pheromone trap were found effective for the control of apple codling moth

Key Words: Codling moth**,** Pheromones Traps**,** Apple orchard.

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INTRODUCTION

Like other fruits, apple is grown in all over the world and is much popular due to its delicious taste and nutrient importance for human health. It has been cultivated for the thousands of years in Europe as well as in Asia particularly in subcontinent. It also contains valuable multivitamins and B complex that is salutatory for human beings [1]. Apple codling moth, *Cydiapomonella* L. infestation causes huge economic losses to the farmers' ranges between 20-90% [2]. Typically the population of *C. pomonella* scrutinized in commercial orchards by means of traps baited with sex pheromone lures [3.4.5]. The pest infests the stone of the fruits, like quince, walnut and pear, thus mire the vitality of the fruit [6]. Pheromone traps are provided with a sex pheromone (species-specific), which attract and trap males from field populations thus spoiled the fecundity of the female [7]. Mode of action -heromone trap, its position and percentage of the components are the reasons influencing the number of insect captured [8]. Methyl eugenol are comprehensively used in pheromone traps to collect fruit flies, which can attract male adults from a distance of 800 meters as combined action of phagostimulant as well as olfactory action [9]. Stated that the cue tempt male insect unremittingly, thus baited traps are used in most orchards, this chemical composition, trap and lures male insect and found to be most effective in the orchards for the controlling of the target pest [10]. So keeping in view the above literature, our aim was to evaluate the population of codling moth through catches in apple orchard.

MATERIALS AND METHODS

A trial was conducted to record the population dynamics of codling moth at Barkhan (Baghao) Baluchistan. For the collection of adult codlig moths, four

synthetic pheromone traps were installed among the local variety namely (Red delicious) of apple trees.at Barkhan (Baghao) province Balochistan. The size of the apple orchard was one acre. Each trap was contained 1 mg of Codlemone synthetic pheromone, purchased from Shani Enterprise Multan Pakistan. Traps were perched at the lower canopy of the apple tree at the height of 2.5 meter. These traps were hanged on four randomly selected apple trees with adjacent of five trees. The codlemone capsule was replaced after fifteen days and replicated three times. The meteorological data regarding biotic factors was obtained from Pakistan Meteorological Department Quetta. No agronomical practices were applied in orchards The traps were placed in the orchard till the picking of the apple fruits. The collected data for the weather conditions was correlated with the traps. The correlation (Pearson) and Linear Multiple Regression was analyzed by using statistical software Statistix 8.1. [10].

RESULT AND DISCUSSION

The perusal of the data (Table-1) of codling moth changes considerably in variables day of the experiment. The counting of the pest in the catches and the weather parameters on different intervals of the experiment, in apple orchard, signifies that the initial infestation were 7.20±0.40 moths per trap), consequently the population gradually showed raised and it reached to 8.50±1.10 moths per trap. The least mean population of pest was recorded as (5.10±0.51 moths per trap, followed by 5.53±2.10 moths per trap. It may be due to variations in the climatic condition which directly proportional to population dynamics of the apple codling moth.

Correlation among population of codling moth with abiotic factors were calculated (Table-2), signifies mean maximum temperature showed highly significant ($p<0.01$) positive association ($r=0.8949$), likewise mean minimum temperature also showed highly significant ($p<0.01$) positive relation with codling moth build up ($r=0.7130$). Consecutively mean relative humidity also showed statistically significant ($p<0.05$) negative relation ($r=-0.359$) with pest population. The total rainfall showed non-significant negative relationship ($r=-0.004$) with *C. pomonella* population.

Codling moth (*Cydia pomonella*) is the most deleterious insect pests of apple in different parts of the world. A remarkable infestation level (80%) of the fruit has been observed due to the insect in temperate parts of all major continents [11].

The data signifies that on the 28th week of the observation the number of male catches were 12.68±1.12 moths per trap whereas the least mean population was recorded in the 18th week 5.10±0.51 moths per trap and 20th week 5.53±2.10 moths per trap, respectively. It may be due to dynamics of biotic factors on the different stages of fruit development in the orchard, besides the pest overlapping generations. The present findings are in compliance with that of [12] who reported that the moth population started building up in the orchards on 37th standard week. Further study unfold that the temperature made significant positive relation ($p<0.05$), while relative humidity made a positive impact on the pest population and signifies statistically negative interaction with *C. pomonella* population. Total rainfall showed non-significant negative relationship with *C. pomonella* population. The present findings are parallel with findings of [13] who observed that the lepidopterous and mites insect population showed a non-significant positive correlation with relative humidity and rainfall in French marigold.

Our experiment was inconsistence with findings of [14], deliberates the interaction between catches and weather parameters, and deduced that moth catches were found to be significant when the temperature is very high along with evaporation, they influenced moth catches.

Lot of work has been workout on codling moth in Apple Orchard, by different scientist like [15], studied the significance of catches against codling moth in Quetta, Baluchistan, and found that the maximum infestation was found at 19.50 and 18.85 at initial stage and 29.30 and 27.90°C was at later duration, 1998, 99. A total average of 267 and 273 moths were captured during the whole study. The researcher further unfolds that the use of catches found to be useful, and would be significant for the future IPM practices.

Table 1.Weekly mean population dynamics of apple codling moth in relation to the a biotic factors

SMW	Mean CM catches in traps	Max. Temp. (^{0}C)	Min. Temp. (^{0}C)	R.H%	Total R.F. (mm)
17	7.20±0.40	31.36	15.70	61.14	2.10
18	5.10±0.51	30.86	16.79	51.57	5.10
19	6.00±1.20	36.29	19.71	40.71	3.60
20	5.53±2.10	34.14	19.50	45.43	0
21	8.50±1.10	37.14	19.79	40.43	0
22	11.65±1.30	37.29	21.93	36.43	0
23	11.10±1.20	37.11	22.07	37.43	0
24	10.65±1.23	36.86	22.21	66.00	1.20

25	9.32±1.11	34.39	21.21	70.86	1.36
26	7.25±1.32	35.61	21.71	64.29	0
27	9.41±1.24	37.00	23.07	64.43	0
28	12.68±1.12	37.00	22.24	64.41	0

SE± = 1.2694 LSD 0.05 = 2.6325
P-value = 0.0000** ** = Highly significant

Table 2. The correlation co-efficient of Codling moth with weather parameters

Weather parameters	Correlation coefficient for *C. pomonella* population
Mean Max. Temp (^{0}C)	0.8949**
Mean Min. Temp (^{0}C)	0.7130**
Mean R.H%	-0.359*
Total Rainfall (mm)	-0.004NS

Conclusions: After going through the results in detail, it was concluded that pheromone trap were found effective for control codling moth of apple and should be applied in future IPM practices.

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