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EFFICIENCY OF PHEROMONE TRAPS AGAINST FRUIT FLY (*Bactrocera zonata*: Diptera) POPULATION IN PEACH ORCHARD KHYBER PAKHTUNKHWA, DISTRICT MARDAN

Muhammad Aamir[1], *Shabir Ahmed[2], Saiqa Khattak[2], Syed Zaheer Abbas[3], Ayesha Zahir[4], Aqib Zahir[3], Siraj Ahmad[3], Khan Danish[5], Aafaq Khan[2], Azaz Ahmad[2], Javaid Iqbal[6]

[1] Department of Plant Protection, The University of Agriculture Peshawar Amir Muhammad Khan Campus, Pakistan

[2] Department of Plant Protection, The University of Agriculture Peshawar, Pakistan

[3] Department of Entomology, The University of Agriculture Peshawar, Pakistan

[4] Department of Horticulture, The University of Agriculture Peshawar, Pakistan

[5] Department of Agriculture Chemistry and Bio Chemistry, The University of Agriculture Peshawar, Pakistan

[6] Department of Plant Protection, MNFSR, Pakistan

Abstract

Peach fruit fly, (*Bactrocera zonata)* is considered as one of the most economically important pests for several kinds of fruits and vegetables. In order to reduce the cost of annihilation technique for controlling *B. zonata,* doses of Methyl Eugenol, Cue-lure and Tri-Medlure, were evaluated along with Deptrix in peach orchards to determine the efficiency of pheromones traps in district Mardan. Cue-lure showed the mean number of captured males over eight (8) weeks was significantly higher than Methyl Eugeno and Tri-Medlure. However, it is concluded that Methyl Eugenol and Tri-Medlure did not show significant results in capturing male adults of *B. zonata*. Cue-lure worked effectively in controlling male population of *B. zonata*.

Keywords: fruit fly; pheromone traps; mardan

Introduction

Peach fruit fly is native from India where it was first recorded in Bengal (Kapoor, 1993). It is present in numerous countries of tropical Asia: India, Indonesia, Laos, Sri Lanka, Vietnam, Thailand, Mayamar, Nepal, Bangladesh and probably all of South-east Asia (White and Elson-Harris, 1992; Kapoor, 1993). Fruit Fly has about 4500 species worldwide among which 50 species are recorded as major pests and about 30 species are minor pests (Robinson and Hooper, 1989). Four hundred species belonging to the genus Bactrocera are widely distributed in Tropical Asia South Pacific and Australia region, but very few species of such genus were recorded in Africa (Drew and Hencock, 1994). Fruit flies are common in homes, restaurants, supermarkets and wherever else food is allowed to rot and ferment. Adults are about 1/8 inch long and usually have red eyes. The front portion of the body is tan and the rear portion is black. Fruit flies lay their eggs near the surface of fermenting foods or other moist, organic materials. Upon emerging, the tiny larvae continue to feed near the surface of the fomenting mass. This surface-feeding characteristic of the larvae is significant in that damaged or over-ripened portions of fruits and vegetables can be cut away without having to discard the remainder for fear of retaining any developing larvae. The reproductive potential of fruit flies is enormous; given the opportunity, they will lay about 500 eggs. The entire lifecycle from egg to adult can be completed in about a week. Fruit flies (Diptera: Tephritidae) are among the most economically important pests attacking fruits worldwide and usually attack commercial fruits (White and Elson-Harris, 1994). They are found in almost everywhere in the world with hosts plants (Mun *et al*., 2003). They damaged the fruits and losses to fruits throughout the world, known as major pest of horticultural industries (Permalloo, 1989). They have great economic importance in Pakistan due to their heavy losses to fruits at the farm level with estimated loss of 200 million US dollar annually and the small farmers suffer in particular, being the main growers of highly susceptible guava, mango, peach and cucuribits are being unable to afford existing protection measures (Stonehouse *et al.*, 2002). The attack of fruit flies reduces fruit yield and quality. It infests the skin of fruit by inserting ovipositor and lay eggs beneath the skin. The maggot developed inside the fruits and eventually drill their way out for pupation in the soil, and emerge as wing adult to begin the life cycle. The losses caused to fruits by fruit flies varied according to species and the host fruit plant species. Oriental fruit fly, *Bactrocera dorsalis* (Hendel) is the most serious pest species because of 5-100% loss to various fruits. Highest loss of 80 percent in guava fruit was reported by Kafi

(1986) and Ishtiaque *et al.* (1999). Similarly, Jalaludin *et al.* (1999) reported 60-80% loss in guava fruit by *Bactrocera correcta* (Bezzii). The peach fruit fly, *Bactrocera zonata* (Saunders) is another devastating pest species, found most abundantly in most of the ecological regions of Pakistan and causing losses from 3-100 % in different fruits. The Ber fruit fly (*Carpomya vesuviana*) may cause 90-100 % damage to Ber fruit (Kapoor, 1993). Fruits are a rich source of nutrients, therefore, they can be used as a treatment for many diseases. They not only provide minerals vitamins and proteins but also protect against from cancer of the stomach, lungs, oral cavity, pharynx, endometrium and pancreas. True fruit flies belong to Diptera: Tephritidae consists of four thousand and five hundred species. These fruit flies are considered as a serious pest of soft fruits. Out of these, about forty species belong to genus Bactrocera is considered a very serious pest. (Babar Hussain, Aqleem Abbas and Shahid Ullah Khan, 2018). Crop damage occurs when an adult female fly lays eggs in fruits and vegetables. A single female lay up to 500 eggs in her lifespan. The average lifespan of fruit fly adults at optimal temperature is 40-50 days and produce several batches of eggs in that time. The maggot developed inside the fruits and cut their way out for pupation in the soil, and emerges as wing adult to begin the life cycle (Kakar *et al*., 2010-2011). Fruit flies species *B. zonata* eggs are laid below the skin of the host fruit. These hatch within 1–3 days and the larvae feed for another 4–5 days. Pupation is in the soil under the host plant and adults emerge after 1–2 weeks (longer in cool conditions). Adults occur throughout the year (Christenson and Foote, 1960). Fruit flies species *B. zonata* caused about 5-100% loss in Pakistan during 1967 (Syed *et al*., 1970). Damage caused by fruit flies to fruit and vegetable growers in Pakistan is about 200 million US $ annually at farm level with added losses to traders, retailers and exporters (Stonehouse *et al*., 1998). The infestation heavily depends on the climatic condition. The hot and rainy weather favors the infestation of fruit fly. Regular monitoring of the pest plays key role to manage the pest properly. 80% loss has been observed due to fruit fly infestation without management (Clark *et al.,* 1996).

Materials and Methods

The experiment was carried out during summer, 2021. At Agriculture Officer Circle, Charguli, District Mardan. Objective of the study was Evaluation of different pheromone tarps against the population of *Bactrocera zonata*. For this reason, three types of pheromones i.e, Methyl Eugenol, Cue-Lure and Tri medlur were tested against Fruit Fly (*Bactrocera zonata*) in peach orchard.

Preparation of traps:

Pheromones	DOSE	POISON Brand name	Sugar
Methyl Eugenol (M-E)	85%/trap	Deptrix 5%/trap	10%/trap
Cue-Lure (C-L)	85%/trap	Deptrix 5%/trap	10%/trap
Tri-medlur (T-M)	85%/trap	Deptrix 5%/trap	10%/trap

Installation of traps:

Six traps were installed in the peach orchard at a height of about 6ft (2m). The size of the peach orchard was 2.0 ha, comprised 200 peach trees and was 5 years old.

Data collection:

The data were collected weekly basis each time as traps were checked, fruit fly were counted and removed.

Statistical analysis:

Collected data were analyzed by using Statistix 8.1.

Identification of species:

The collected adults were observed under the microscope with the following features.

Bactrocera zonata is about the size of house fly and predominantly red-brown in color. The characters have noted here are sufficient to separate *B.zonata* from all other known species

Dacini. The first feature to look for it is the lack of a complete costal band (it is reduced to an isolated apical spot):

Now when we look at the base of the wing, there is a raised area, in the narrow basal part of wing cell br. Check that it lacks microtrichia (i.e. tiny spicules).

Additionally, there should be no anal streak, i.e. no diagonal-colored band across the base of the wing, aligned with cell bcu: (a spot with in two lines on wing is called bcu)

Now check the face. There should be two spots, one in each antennal furrow, just above the "mouth": now examine the thorax in dorsal view. There should be a lateral yellow vita (stripe) down each side (in posterior two thirds only) and the vittae should be narrow. There should not be a third (medial) vitta down the center:

Finally, when we look at the Abdomen; abdominal markings tend to vary more than face, wing and thorax markings. There is usually a pair of dark marks on tergite III and no medial dark line except on tergiteV:

Results and Discussions

Results regarding efficiency of pheromone traps against fruit fly (*Bactrocera zonata*: Diptera) population in peach orchard during summer 2021 at charguli, district Mardan. Table 1 shows that peach fruit fly had significantly highest number of adults trapped in Cue-Lure where the averages highest population is 120 at week first followed by Methyl Eugenol and Tri-Medlure having 56 and 3 fruit fly respectively. The efficiency of Methyl Eugenol and Tri-Medlure is non significant as compared to Cue-Lure. Data in Table 1 shows that Cue-Lure revealed the highest number of fruit flies trapped in week-1 to week-3 while showed no significant difference in other weeks from M ethyl Euginol & Tri-Medlure. Moreover, Methyl Euginol and Tri-Medlure showed no significant difference in week-1 to week-5 while week-6 to week-8 showed difference in fruit flies trapped. Cue-Lure revealed to be significantly better than Methyl Euginol and Tri-Medlure in first three weeks. On week eight (8), Table 1 shows that Cue-Lure and Methyl Euginol were statistically better in attracting fruit flies than as compared to Tri-Medlure. The Graph No. 1 shows high mean number of captured males by Cue-lure traps in first week than Methyl Eugenol and Tri-Medlure traps. Moreover, Methyl Eugonol showed significant difference from Tri-Medlure.

Table No. 1. No of male Fruit flies *B. zonata* trapped by different pheromones

Pheromones	Weeks								Mean
	1	2	3	4	5	6	7	8	
Cue-Lure	120.67a	102.00a	64.00 b	35.00c	65.00b	93.00a	101.00a	112.00a	80.89a
Methyl Eugenol	56.00 b	21.00 c	18.00 c	15.00c	32.00c	72.00a	88.00 a	85.00 a	47.77b
Tri-medlure	3.00c	4.00 c	2.67c	0.00c	1.00c	5.00c	3.00c	2.67c	2.77c
Mean	59.67 b	42.33 c	28.22 c	16.66 c	32.66 c	56.66b	64.00 a	66.55 a	43.82 c

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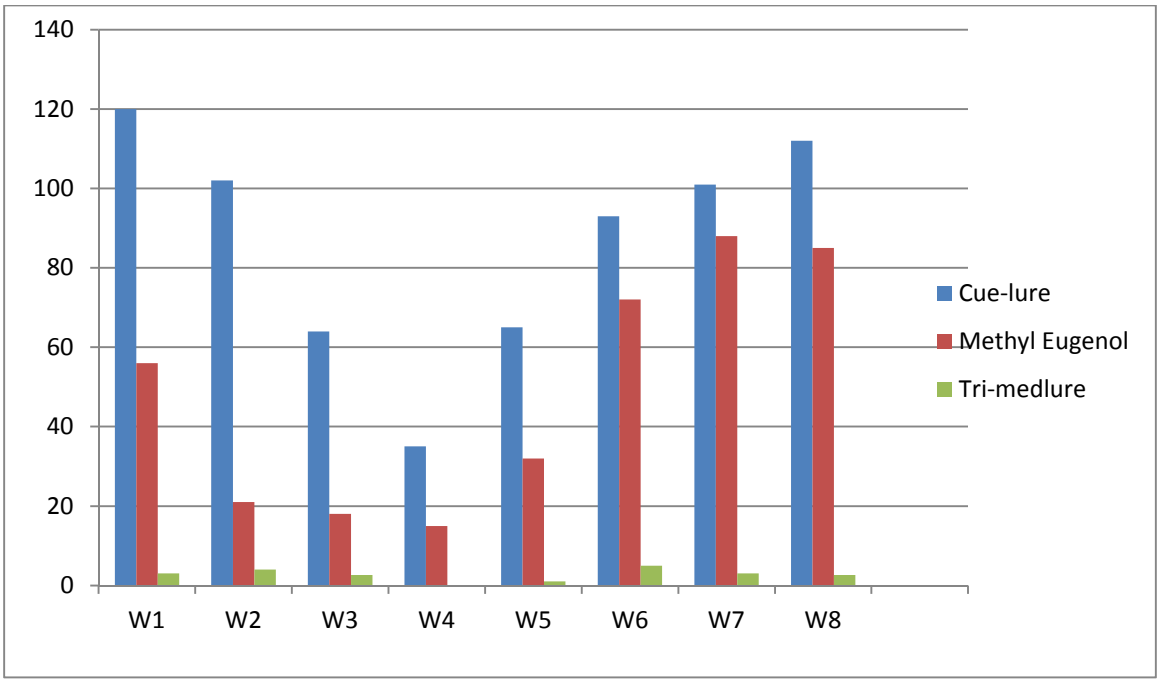
Figure 1: Shows that Cue-Lure was better in attracting male fruit flies *B. zonata*



To check the efficiency of pheromone traps against fruit fly (*Bactrocera zonata*: Diptera) population in peach orchard during summer 2021 at charguli, district Mardan. The purpose of current study was to determine the effect of different pheromones against peach fruit fly (*B.zonata*). Three different types of pheromones i.e., Methyal Eugenol, Cue-Lure and Tri-medlure were installed in peach orchard for eight (8) weeks at charguli, district Mardan.

According to Mistutaka (1993) to control fruit fly by using attractant Methyl Eugenol, there was always possibility of re-invasion, by coming flying and wandering of damaged fruit, bringing in parasitic fruit by traveler etc. Our result regarding Methyl eugenol is inconformity with the results reported by Mistutaka (1993). However, we did not report any possible reinvasion, by coming flying and wandering of damaged fruit, bringing in parasitic fruit by traveler etc. In our results we found Cue-lure attractive against peach fruit fly in District Mardan while Khan *et al.* (2015) reported that male peach fruit fly is highly attractive to methyl eugenol in district Swat.

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