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Population dynamics of different species of fruit flies (Diptera, Tephritidae) in Bahauddin Zakariya University Multan

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Abstract

Fruit fly belongs to family Tephritidae found all over the world. Nearly 5000 described spp. of tephrited fruit fly have been categorized in almost 500 genera. Fruit flies are the most important limiting factor due to economic importance and direct damage to the fruit crops. The aim of this study was to define fruit fly species diversity and population dynamics on mango trees at BZU Multan. Three species *Bactrocera dorsalis, B. zonata and B. cucurbitae* were collected through methyl eugenol trap after every seven days and preserved. The main peak populations of fruit flies were captured during month of August i.e. *B. cucurbitae* 212, *B. dorsalis* 210 and *B. zonata* 201 respectively while minimum number of fruit flies were captured in month of February, coinciding with the phonological stages of fruiting, ripening, and harvesting of fruits. Results of the present investigation may be utilized in developing a sustainable pest management strategy in the agro ecological system.

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Introduction

Fruit flies (Diptera, Tephritidae) sustain the majority of the harm to foods grown from the ground in the diverse territories of Pakistan. The individuals from the subfamily Dacinae cause damage to the wide range of fleshy fruits vegetables including solanaceous and cucurbitaceous plants. The greater part of these species are particular, and are host particular, in their bolstering propensities while a few others are generalists and assault an extensive variety of foods grown from the ground (Kapoor *et al*., 1980). It has been observed throughout the world that there are near about three most important species of fruit flies including *Bactrocera zonata* which is commonly known as peach fruit fly as well, *Bactrocera cucurbitae* which is also known as melon fruit fly and *Bactrocera dorsalis* commonly known oriental fruit fly. These flies are responsible for the serious damage to plants and are considered much ruinous and infamous as well. These species are across the board in the Oriental area. *Bactrocera zonata* started in South and South-East Asia where it assaults numerous (more than 50) host plants including guava, mango, peach, apricot, fig and citrus (White and Elson-Harris, 1992). *Bactrocera cucurbitae* has been recorded from more than 125 products of the host species. The species of fruit flies which are famous for causing the damage in the most of the tropics of the old world are *B. cucurbitae* (melon fruit fly), *B. zonata* and *B. dorsalis* (oriental fruit fly). These fruit flies cause a lot of destruction to the most of the crops.

There are many methods to control the fruit flies and the mostly used methods to control these flies are chemical methods in which different chemicals used to trap the fruit flies but these methods for controlling the fruit flies are not so much efficient (Tandon and Lal, 1980; Yousuf and Ashraf, 1987). It will be most attractive to control the flies by evolving the cultural techniques as well as by controlling them biologically. These methods can be successful to control the pests. Many scientists are consistently interested for evolving the new cultural techniques and methods like that biological control.

Substance control strategies for the coarse bug and also for the fruit flies have been wasteful (Tandon and Lal, 1980; Yousuf and Ashraf, 1987). There has been reliable enthusiasm to advance social and organic control routines. It has been reported utilization of the polyethylene groups for powerful control of the flies on mango and other fruits. A few predators of mango coarse bugs and fruit flies have been recognized (Syed *et al.,* 1970; Moore and Cros, 1993; Boavida *et al*., 1995 and Bokonon and Neuenschwander, 1995). The fruit flies have been killed by the utilization of pheromone traps and other male demolition systems (Steiner and Larches, 1955; Ushio *et al.,* 1982). In the present research the population dynamics of different species were studied due to economic importance and the losses incurred by the fruit fly infestation to mango fruits. The objective of this research was also to update knowledge on the diversity of fruit fly species from the family Tephritidae and seasonal distribution of fruit flies in the studied area.

Materials and methods

The studies on population of various types of fruit flies were completed in a mango developing region at Multan in Bahauddin Zakariya University Multan Pakistan. In the present study the mango orchards were selected which were almost few kilometers in the territory of BZU. On the selected areas traps are hanged on different trees. The traps which were utilized as a part of this study was Male draw traps; these traps are made of plastic jugs which measured 8 cm in distance across and 20 cm long. Two gaps on every side of the trap were available so that the flies ought to get section inside the traps from the openings. In the traps the material which was utilized to do use the cotton swabs is methyl eugenol (ME) and a pesticide has a place with pyrethroid bunch (chlorpyrifos) was additionally utilized. These baits, blended with bug sprays were supplanted week by week consistently. Methyl eugenol is normally a female attractant. Female flies are more attracted towards the methyl eugenol bat in the other studies it has also been used to attract the male flies as well and is also used as a parapharomone which is a male

attracting pheromone. Male flies were pulled in to draws, and immediately murdered by the bug spray on the cotton wick. These traps as a rule were hung two meters high with the organic product trees, in the chose test range. The test plantations included diverse assortments of mango plantations (8 section of land) having Langra and Chaunsa assortments. The caught male flies were gathered and depended on week by week premise and after that added to month to month premise. Fruit Flies were distinguished by utilizing ID key created by Mahmood and Hasan (2005). Flies were for the most part wrecked after ID and numbering.

Results

The population dynamics of different species of fruit flies at mango orchards is mentioned in Table 1. Population of *B. dorsalis* legitimize that there are least 0 flies in the month of February and most extreme 210 flies in the month of August, in 2015. Temperature, humidity, rainfall and additionally all other ecological conditions stay suitable consistently.

Number of flies in January was close around 07, number of flies caught in the months of February and March were expanded from 0 to 12. As temperature brought up in the month of April and the season get to be suitable for the generation of mango so the flies began to expand from the month of April to till admirable. In April number of caught flies expanded to 30 and the number of flies was 90,180,201 and 210 in the months of May, June, July and august respectively. There is progressive diminishing in the caught flies in September, October, November and December as 504,207 and 01 individually.

Table 1. Population dynamics of different species of fruit flies (2015).

Sr. No	Months	No of different species of fruit flies in BZU		
		B. zonata	*B.dorsalis*	*B. cucurbitae*
1	January	15	07	09
2	February	02	00	05
3	March	10	12	03
4	April	28	30	29
5	May	93	90	80
6	June	170	180	130
7	July	171	201	120
8	August	201	210	212
9	September	51	50	53
10	October	43	42	35
11	November	05	07	02
12	December	00	01	12

Population of *B. zonata* appeared legitimize that there are 0 flies in the month of December and most extreme 201 flies in the month of August, in 2015. Normal number of flies in Jan was close around 15, only 02 flies were caught in the month of February number of flies were expanded from 02 to 10 in walk. As temperature brought up in the month of April and the season get to be suitable for the creation of mango so the flies began to continuously increase from the month of April to till August. In April flies expanded to 28 and the number of flies was 93,170,171 and 01 in the months of May, June, July and August.

There was continuous reduction in the caught flies in September, October, November and December as 51, 43, 05 and 0 individually.

Population of *B. cucurbitae* appeared legitimize that there are 02 flies in the month of November and most extreme 212 flies in the month of August in 2015. Normal number of flies in Jan was close around 09, just 05 flies were caught in the month of February while the number of flies were expanded from 05 to 06 in March. In April number of caught flies expanded to 29 and the number of flies was 80,130,120 and 212 in the months of May, June, July and August due to increasing temperature. There is slow decline in the caught flies in September, October, November and December as 35, 02 and 12 respectively.

Discussion

The maximum number of fruit flies captured during month of august and minimum number of fruit flies captured in month of February. A few critical samples utilizing olfactory attractants as a part of organic product fly control. *Bactrocera dorsalis* was killed from the Mariana Islands by the utilization of male bait methyl eugenol in addition to naled protein hydrolysate has been utilized to smother the number of inhabitants in Dacustyroni in Australia (Prokopy and Roitberg, 1984) and Mediterranean fruit flies, *C. capitata*, oriental fruit-flies, *B. dorsalis*, and melon fruit-flies, *B. cucurbitae*, in Hawaii (Harris *et al*., 1971; Broumas, *et al*., 2002). The after effects of the present studies on *B. zonata* and *B. dorsalis* swarming mango are in accordance with the other tephritid fruit flies controlled either by the utilization of male sex-draws or sustenance lure baits. Concentrates on embraced recommended that olfactory receptors reaction for plant Kairomones as methyl eugenol (citronella oil) and protein hydrolysate (raspberry ketone) might prompt conduct alteration, which might be abused for its administration. Considerable diminishments in natural product infestation might be accomplished when male and female obliteration strategies (MAT + BAT) are connected preceding the decided tops of flies' population. In the past studies there are various vital cases of applying the olfactory attractants keeping in mind the end goal to control the flies.

Bactrocera dorsalis was caught/pulverized by the utilization of male draw known as methyl eugenol. In a few studies Protein hydrolysate has been utilized to make the number of inhabitants in fruit flies to a lower level (Prokopy and Roitberg, 1984). However, Mediterranean fruit-flies, *C. capitata*, oriental organic product fly, *B. dorsalis*, and melon fruit flies, *B. cucurbitae*, in Hawaii is likewise annihilated by the utilization of protein hydrolyste and also methyl euogenol (Harris *et al*., 1971; Broumas, *et al*., 2002). Reconnaissance of organic product fly population in mango plantation by establishment of traps uncovered that top population of *B. zonata* and natural product infestation was recorded in May, June, July and August. This is on account of the mango fruits matured amid the month of July and August. Present results under write the discoveries of Anjum *et al*. (2000) who watched top population of *B. zonata* in the first week of July and the number of inhabitants in *B. zonata* was higher than of *B. dorsalis*. This was likewise affirmed by Mishkatullah (2007) in Northern Punjab that the fruit flies demonstrated a low population level from November to February, and expanded level from March to August.

Greatest number of the organic product infestation was recorded in dropped natural products which may potentially be because of the reason that the cultivator doesn't give careful consideration to the large portion of the over ripen fruits, amid the standard gathering program. Such fruits typically get low price in the business sector because of the abbreviate rack life. It has been watched that over age or diminish destinations of the natural product are more defenseless for ovipositor and/or mechanical harm to fruits due to the gathering wicker container or feathered creatures and so on might come about discharge of juice, which make it more attractive for fruit flies infestation. That is the reason dropped fruits for the most part get harmed and are of low rank with approximately no business sector esteem, cultivators additionally don't take great think about their accumulation and thus in the end such natural

products turn into a decent reproducing place for fruit flies, which at last results in the higher infestation in such gathered foods grown from the ground the end expanded trap g*et al*so.

In the present studies methyl eugenol is utilized to control the population elements of various types of fruit-flies. The consequences of the present studies on *B. zonata, B. cucurbitae* and *B. dorsalis* invading mango are in accordance with the other tephritid fruit flies controlled either by the utilization of nourishment goad draws and male sex-baits. Contemplates attempted recommend that olfactory receptors reactions for plant Kairomones as methyl eugenol (citronella oil) and protein hydrolysate (raspberry ketone) might prompt conduct alteration, which might be abused for its management. However, the mix of draws (sex and food) has not been accounted for the fruit fly administration in mangos.

Conclusion

Population of fruit flies was depending upon source of food and climate factors. There was a population fluctuation of fruit flies that was occurred in different sources of food. In this study period we observed there was a significantly high population of fruit flies on mango. When temperature was increases population of fruit flies also increased but a certain threshold level of temperature. In this study it was observed that maximum populations of fruit flies were in the month of august and minimum population was observed in February. Population of fruit flies and temperature have significant positive correlated.

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