Pak. J. Biotechnol. Vol. 17 (3) 129-132 (2020) pISSN: 1812-1837 eISSN 2312-7791 www.pjbt.org
http://doi.org/10.34016/pjbt.2020.17.3.132

POPULATION DYNAMICS OF MANGO FRUIT FLIES IN TEHSIL JATOI, PUNJAB, PAKISTAN

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Article received 8.6.2020; Revised 20.7.2020, Accepted 28.7.2020

ABSTRACT:

Mango is known as king of fruits and important source of foreign exchange. The production of mango is reduces due to various insect pests. Among insect pests, fruit fly is major threat that can cause huge yield losses in the globe. An experimental study was conducted in tehsil Jatoi to check the population dynamics of fruit flies using of different traps (Pheromone, bottle and jar). Pest data was recorded since two consecutive years *i.e.* 2016-2017. During the study, it was observed that highest male fruit fly captured in pheromones traps followed by bottle and jar traps. June and July were the peak months of pest population or infestation, population level of pest was recorded zero in January and December month of study period (2016-2017). The maximum population of male fruit flies per trap was captured in pheromones traps (187.03) followed by bottle traps (186.44 male/trap) during 2017. The maximum male fruit flies per trap were captured in pheromone (160.83) followed by bottle trap (121.03) and jar trap (45.99) during 2016.

Keywords: Mango, Fruit fly, Population dynamic, Tehsil Jatoi, Punjab, Pakistan

INTRODUCTION

Mango (*Mangifera indica* L) is king of fruits and grown above 100 countries of the world especially in tropical region (Singh *et al.,* 2016). Mango is the main source of protein, carbohydrates, minerals (Ca, K and Fe) and vitamins (A and C) (Larraur*et al.,* 1999; Fowomola, 2010). There are various varieties of mango (daseri, langra, sindhri, chaunsa and anwar Ratool) which grown throughout the world. Mango can be used for various purposes like jams, pickles, mango leathers, juices and squashes etc. Pakistan is the 4th and 10th largest mango producing and exporting country of the world respectively (Memon, 2015). Pakistan mango production is 9-10 tons/ha low as compared to other mango producing countries like China, India and Mexico (Abbas *et al.,* 2018). Insect pests are the major reason for low production. Various insect pests (hopper, bees, bugs, midges, beetles and fruit flies) are attack on the various parts of mango like leaves, shoots, inflorescence, fruits, roots and shoots for shelter, nectar and food (Karar *et al.,* 2016).

Among these, fruit fly belongs to Tephritidae family is considered an important and destructive pest for agricultural and horticultural crops especially mango (Joomaye *et al.,* 2000; Chinajariya wong *et al.,* 2003; Prabhakar *et al.,* 2012; Chowdhury, 2015). There are about 4000 fruit fly species founded all over the world. Among them, *Bactrocera* consists of 440 species which are distributed hot and humid areas of world like Australia and Asia (Haider *et al.,* 2011; Prabhakar *et al.,* 2012). In Pakistan, *B. dorsalis* can causes 5-100%age damage and 80% yield loss to mango and guava fruits respectively (Abdullah *et al.,* 2002; Gillani *et al.,* 2002; Khan *et al.,* 2005).

Adult female fruit fly lays 10-50 eggs by inserting their pointed ovipositor into the fruit pulp (Mohd *et al.,* 2011). Eggs are hatched within 1-2 days and larvae known as maggot starts feeding and damage inside the fruit (Dekker and Messing, 2016). During severe attack of fruit fly larvae, shape and taste of fruits deteriorate. After some days, legless creamy white maggots are converted into pupae and fall down to ground for pupation. Attacked fruits fall down to the ground and no for use. During favorable conditions, fruit flies can complete their life cycle within 30 days (Rattanapun, 2009).In this way, fruit fly damage the quality and quantity of fruits. Depending on host variety, location, season and fruit fly population fruit fly can caused 90-100% yield losses without proper control (Juma *et al.,* 2014).

Various methods have been practiced by farmers at national and international level to control the fruit fly such as cultural, physical, mechanical, botanical, biological and chemical (Hsu and Feng, 2006; Verghese *et al.,* 2012; Khan *et al.,* 2015). Among these, chemical is used extensively at large as well as small scale to control the fruit fly but excessive uses of insecticide have caused resistance against this notorious pest. Excessive use of chemical is becoming major threat for human, ani-

mals and environment (Kamel and Hoppin, 2004). Fruit fly is the serious and major risk for mango production in mango growing areas of the world including Pakistan. The control of this serious pest is first priority for mango quality and quantity. For this purpose, an effective and alternative control method is needed to manage the current pest. By keeping in mind, the current study was conducted to determine the fruit fly population at tehsil Jatoi by adopting traps strategy.

MATERIALS AND METHODS

Study site and experimental design: Experimental study was conducted at farmer field Mouza Beelywala at Jatoi to monitor the fruit fly population in consecutive two years (2016-2017). Methyl eugenol pheromone traps were installed on selected orchards of mango trees. During whole study period, all cultural practices were maintainned in the orchards. The randomized complete block design was used with three replications.

Pheromones Traps: The various kinds of trap such as jar, bottle and pheromone traps were instalLed to check traps efficacy against mango fruit fly. The plastic bottles were changed into form of bottle traps that measured 8 and 20 cm in diameter and length, respectively while jar trap and pheromone trap were purchased from nearby market. On each side of bottle trap two holes were present that is was a way of flies entry in the trap. Male fruit fly, methyl eugenol with some drops of insecticides was immersed into each trap to attract the male. During the whole study period, pheromone replaced at fortnightly and data was recorded. In the experimental orchards, traps were hung at height of 2.5 m with branches of fruit trees.

Data recording: On weekly basis, data of fruit flies was recorded and added to monthly basis. The male specimens coughed in every pheromone were counted. Mean population of male capture per month, per week and per trap were determined during the study period.

RESULTS

Fruit fly population was appeared in February and no male of fruit fly was captured in January and December months of both years in all traps (Jar, bottle and pheromone). The results indicated that highest pest population was recorded or counted in June-July (2016-17). The average population of fruit fly was found maximum during year 2017 as compared to 2016 (Table 3).

Table 3: Average population of fruit fly during both years (2016-17)

Fruit flies population captured in installed traps during 2016-2017			
Months	Bottle trap	Pheromone trap	Jar trap
January	0.0	0.0	0.0
February	3.5	7.33	3.0
March	10.44	11.41	4 3
April	41.58	45.72	26.37
May	57.27	74.02	44.60
June	**127.56**	**173.93**	**56.29**
July	**118.32**	**128.11**	**88.22**
August	62.29	72.32	65.77
September	44.86	50.49	26.23
October	7.35	10.55	8.00
November	5.33	5.75	2.56
December	0.0	0.0	0.0

The population of mango fruit fly that captured during 2017 in different traps is given in Table 2.

Table 2: Average population of fruit flies caught in different types of traps during the year 2017

Fruit flies population captured in installed traps during 2017			
Months	Bottle	Pheromone	Jar
January	0	0	0
February	7	13.16	6
March	14.66	15.83	8 1
April	64.20	68.1	3 7
May	87.66	109.5	6 9
June	**134.10**	**187.03**	**70.05**
July	**186.44**	**140.98**	**130.45**
August	99.95	90.71	90.12
September	76.16	80.05	40.00
October	10.03	15.09	13.01
November	6.00	9.01	5.00
December	0	0	0

The maximum fruit fly population was captured in pheromone traps (173.93) in June while (128.11) fruit flies in July. The highest population of fruit fly was captured in pheromone (160.83) followed by bottle trap (121.03) and jar trap (45.99) during 2016 (Table 1).

Table 1: Average population of fruit flies caught in different types of traps during the year 2016

Fruit flies population captured in installed traps during 2016			
Months	Bottle	Pheromone	Jar
January	0	0	0
February	0	1.50	0
March	6.23	7.00	5
April	20.97	23.34	15.75
May	26.89	38.54	20.21
June	**121.03**	**160.83**	**42.54**
July	**50.21**	**115.24**	**45.99**
August	24.63	53.93	41.43
September	13.56	20.93	12.46
October	4.67	6.01	3.00
November	1.00	2.50	0.12
December	0	0	0

Population of fruit flies captured in pheromone traps was13.16 male fruit flies/traps during second week of February 2017 while 1.50 in 2016. Population of fruit fly was increased with months and decreased after last week of July. The results indicated that two months *i.e.* June and July were the peak month of fruit fly population while November was least.

DISCUSSION

An experimental study was carried out during years 2016-17 to monitor male fruit flies population by the installation of different traps such as pheromone trap, bottle trap and jar trap in different areas of Tehsil Jatoi district Muzaffargarh. The study resulted that pheromone trap captured more fruit fly as compared to other traps like jar and bottle. Large numbers of male fruit flies were attrac ted towards the pheromone trap followed by bottle trap and jar trap. Our study findings are in line with the agreement of earlier researchers findings (Casana-Giner, 2003) had reported that cuelure is lure that used for the attraction of male melon flies.

During the study, no male fruit fly population was captured in first month of experiment (January) and appeared in 2nd week of February. June and July were the peak month of fruit fly population and no population was recorded in December. Similar findings have been reported by many other researchers (Chen and Ye, 2007). They have recorded the population of *B. dorsalis* and *B. zonatus* in start of April which increased till May (Chen *et al.,* 2006). Mahmood and Mishkatullah (2007) have reported that fruit fly population was found maximum in month of July which is similar to our study findings.

There is a close relation of fruit fly and environmental conditions like temperature and humidity or rain fall (Verghese and Devi, 1998; Kan-nan and Rao, 2006; Mishra *et al.,* 2012). There is positive correlation of fruit fly with temperature while negative with rain fall or humidity (Tariq *et al.,* 2002; Raghuvanshi *et al.,* 2012).

Conclusion

Mango is known as king of fruits and income source for poor people in Pakistan. It is exported in various countries of the globe and a source of foreign exchange earnings for Pakistan. The infestation due to various insect pests especially fruit flies is major issue for export in mango growing areas. This pest can be controlled by using different management strategies like cultural and chemicals either botanical or insecticides. Population dynamic of pest is key point to check its abundance, distribution and identification to determine its control methods.

Author contribution: MJ collected data and wrote manuscript, MR helped in write up while UNU, MS, NI and MAQ critically reviewed the manuscript.

Conflict of interest: Authors have no conflict of interest.

Acknowledgement: Authors are highly thankful to Agriculture Department, Pest Warning and Quality control of Pesticides, Punjab for facilitating this research work.

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