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### To study seasonal incidence of guava fruit fly, *Bactrocera* spp. and its impact on yield

**Umesh, Dr. Rajesh Kumar and Gaurav Kant**

#### Abstract

The present study entitled “Seasonal incidence of guava fruit fly, *Bactrocera* spp. and its management through methyl eugenol traps” were carried out during both rainy and winter season at farmer’s field at village Sunderpur, District Rohtak, Haryana during 2016-17. The maggot population of guava fruit fly, *Bactrocera* spp. started appearing from 29 th SMW (4.8 maggots/infested fruit) reaching its maximum in 31st SMW (32.3 maggots/infested fruit). During winter season, the maggot population was at its peak during 44th SMW (12.1 maggots/infested fruit) which went on decreasing till 48th SMW (1.12 maggots/infested fruit). There was no maggot population from 49th to 9th SMW. During termination phase of winter crop season, a low maggot population i.e. 2.29 and 3.31 maggots/infested fruit were recorded in 10th and 11th SMW, respectively. The fruit infestation in rainy season guava due to fruit fly ranged from 60 to 90 per cent on number basis while 53.49 to 87.20 per cent on weight basis, being highest during 31st SMW and lowest during 36 th SMW both on number and weight basis. During winter season guava, the highest fruit infestation due to fruit fly i.e. 26.67 and 22.43 per cent on number and weight basis, respectively was recorded during 44th SMW. There was no fruit infestation from 51st to 8th SMW. There was 68.53 per cent reduction in yield of guava in rainy season due to guava fruit fly, *Bactrocera* spp. As compared to 5.49 per cent in winter crop season with an overall yield reduction of 37.54 percent.

**Keywords:** guava, fruit fly, *Bactrocera* spp., methyl eugenol, traps

#### Introduction

Fruits and vegetables play an important role in human nutrition, as they are source of vitamins (C, A, B6, Thiamin, Niacin, E), minerals and dietary fiber. In daily diet, these have been strongly associated with reduced risk for some forms of cancer, heart disease and other chronic diseases. An average man should consume 120g fruits per day to keep himself healthy. India is the second largest producer of fruits in the world after China with an annual production of 277.4 million tons from an area of 24.2 million hectares and contributes to more than ten per cent of world’s total fruit production (Indian Horticulture Database, 2014) [17].

Among all the fruits, guava (*Psidium guajava* L.) is a very important fruit crop in India, which is highly rich in minerals like phosphorus and calcium. Guava is being planted in area of 2.68 lakh ha in India and 0.107 lakh ha in Haryana with a production of 36.67 and 1.25 lakh mt, respectively (Indian Horticulture database, 2014) [17].

There are many factors which are responsible for low yields of guava. Among various factors, the insect-pests are major one that have been reported to attack guava at different stages. Guava is infested by around 80 species of insect pests like fruit flies, bark eating caterpillar, capsule borers, mealy bugs, hairy caterpillar and many sucking pests, out of which fruit fly is the major one causing a heavy loss in the yield (Verghese and Sudhadevi, 1998; Rajitha and Viraktamath, 2005) [5, 9].

The crop loss can vary from a few to 100 per cent, depending on population, locality, variety and season (Kumar *et al.*, 2011; Sharma *et al.*, 2012) [4, 8]. Fruit flies belong to the family Tephritidae which is one of the largest, most diversified families of order Diptera. The family includes about 4000 species arranged in 500 genera. These are commonly called “fruit flies” due to their close association with fruits and vegetables. Out of 4000 species, 392 species have been recorded in India (Kapoor, 1993) [3].

## Materials and Method

The present studies entitled "To study seasonal incidence of guava fruit fly, *Bactrocera* spp. and its impact on yield" carried out at farmer's field in village Sunderpur, District Rohtak, Haryana during 2016-17. Five untreated trees of guava were selected at random in guava orchard for recording observations on seasonal incidence and damage potential of guava fruit fly.

### Recording of observations

#### (a) Fruit infestation

During rainy season crop, fruit infestation (%) both on number and weight basis were recorded from last week of June till end of fruiting season. For winter season crop, fruit infestation (%) both on number and weight basis were recorded from last week of October till end of fruiting season. For this, a sample of 15 fruits at random (per replication) were collected at weekly intervals both during rainy and winter crop season. The infested (based on oviposition punctures) and healthy fruits were counted and weighed separately. The weight of the fruits was taken with the help of weighing machine.

The percentage of fruit infestation was worked out with the help of following formula given by Abott (1925) [1].

- Percentage of fruit damage (no. basis) =  $\frac{\text{Number of damaged fruits} \times 100}{\text{total no. of fruits (damaged + healthy)}}$
- Percentage of fruit damage (wt. basis) =  $\frac{\text{weight of damaged fruits} \times 100}{\text{total wt. of fruits (damaged + healthy)}}$

#### (b) Number of maggots per infested fruit

The number of maggots in the infested fruits were recorded by dissecting the guava fruits.

#### (c) Total and marketable yield

##### Total yield

- Total yield was calculated by adding the weight of fruits at each picking.

##### Marketable yield

Reduction in yield due to fruit fly damage was worked out by using data on per cent fruit damage on weight basis recorded at weekly interval during crop season

Reduction in yield =  $\frac{\text{Total yield} \times \text{Mean fruit damage on weight basis (\%)}}{100}$

Marketable yield = Total yield – Reduction in yield

## Results and Discussion

The experiments on the seasonal incidence and damage potential of guava fruit fly, *Bactrocera* spp. On guava were carried out both during rainy and winter seasons.

### 1.1 Seasonal incidence and damage potential of *Bactrocera* spp. In guava

The data presented in Table 1 indicated that observations on the maggot population of fruit fly, *Bactrocera* spp. on infested fruits were recorded from 28<sup>th</sup> standard meteorological week till 36<sup>th</sup> SMW (end of rainy season crop). The first appearance of maggots of fruit fly (4.8 maggots/infested fruit) was observed during 29<sup>th</sup> SMW reaching its highest in 31<sup>st</sup> SMW

(32.3 maggots/fruit). During rainy season, the harvesting of fruits stopped after 36<sup>th</sup> SMW where 18.4 maggots/infested fruit were recorded.

**Table 1:** Incidence of fruit fly (maggot population), *Bactrocera* spp. on guava crop during rainy season

Sr. No.	Date	SMW	No. of maggots/infested fruit
1	10/07/2016	28	0
2	17/07/2016	29	4.8
3	24/07/2016	30	10.2
4	31/07/2016	31	32.3
5	07/08/2016	32	18.5
6	14/08/2016	33	19.5
7	21/08/2016	34	13.8
8	28/08/2016	35	26.5
9	04/09/2016	36	18.4

The data indicated that recording of observations on maggot population of fruit fly *Bactrocera* spp. in infested fruits (based on oviposition marks) was started from 43<sup>rd</sup> standard meteorological week but no maggot population was found at this stage. The maggot population was at its peak during 44<sup>th</sup> SMW (12.1 maggots/infested fruit) which went on decreasing till 48<sup>th</sup> SMW (1.12 maggots/infested fruit). There was no maggot population from 49<sup>th</sup> to 9<sup>th</sup> SMW. During termination phase of winter crop season, a low maggot population i.e. 2.29 and 3.31 maggots/infested fruits were recorded in 10<sup>th</sup> and 11<sup>th</sup> SMW, respectively.

**Table 2:** Incidence of fruit fly (maggot population), *Bactrocera* spp. on guava crop during winter season

Sr. No.	Date	SMW	No. of maggots/infested fruit
1	23/10/2016	43	0
2	30/10/2016	44	12.1
3	06/11/2016	45	6.39
4	13/11/2016	46	4.5
5	20/11/2016	47	1.67
6	27/11/2016	48	1.12
7	04/12/2016	49	0
8	11/12/2016	50	0
9	18/12/2016	51	0
10	25/12/2016	52	0
11	01/01/2017	1	0
12	08/01/2017	2	0
13	15/01/2017	3	0
14	22/01/2017	4	0
15	29/01/2017	5	0
16	02/05/2017	6	0
17	12/02/2017	7	0
18	19/02/2017	8	0
19	26/02/2017	9	0
20	05/03/2017	10	2.29
21	12/03/2017	11	3.31

### 1.2 Fruit infestation due to fruit fly, *Bactrocera* spp. in guava

The fruit infestation due to fruit fly was recorded both during rainy and winter crop season in guava during 2016-17.

The data presented in Table 3 indicated that the fruit infestation in rainy season guava due to fruit fly ranged from 60 to 90 per cent on number basis while 53.49 to 87.20 per cent on weight basis, being highest during 31<sup>st</sup> SMW and lowest during 36<sup>th</sup> SMW both on number and weight basis.

**Table 3:** Fruit infestation due to fruit fly, *Bactrocera* spp. in guava during rainy season

Sr. No.	Date	SMW	Fruit infestation (%)	
			Number basis	Weight basis
1	31/07/2016	31	90	87.20
2	07/08/2016	32	76.67	72.80
3	14/08/2016	33	76.67	74.56
4	21/08/2016	34	66.67	62.61
5	28/08/2016	35	66.67	60.54
6	04/09/2016	36	60	53.49

**Table 4:** Fruit infestation due to fruit fly, *Bactrocera* spp. in guava during winter season

Sr. No.	Date	SMW	Fruit infestation (%)	
			Number basis	Weight basis
1	30/10/2016	44	26.67	22.43
2	06/11/2016	45	23.33	22.49
3	13/11/2016	46	20.00	20.56
4	20/11/2016	47	16.67	16.38
5	27/11/2016	48	10.00	8.94
6	04/12/2016	49	6.67	5.90
7	11/12/2016	50	3.33	3.41
8	18/12/2016	51	0	0
9	25/12/2016	52	0	0
10	01/01/2017	1	0	0
11	08/01/2017	2	0	0
12	15/01/2017	3	0	0
13	22/01/2017	4	0	0
14	29/01/2017	5	0	0
15	05/02/2017	6	0	0
16	12/02/2017	7	0	0
17	19/02/2017	8	0	0
18	26/02/2017	9	4.00	2.82
19	05/03/2017	10	5.33	3.03
20	12/03/2017	11	5.33	3.98

The perusal of data presented in Table 4 indicated that in winter season guava, the highest fruit infestation due to fruit fly i.e. 26.67 and 22.43 per cent on number and weight basis, respectively was recorded during 44<sup>th</sup> SMW which reduced to 3.33 and 3.41 per cent, on number and weight basis, respectively during 50<sup>th</sup> SMW. No fruit infestation was observed from 51<sup>st</sup> to 8<sup>th</sup> SMW. A negligible fruit infestation i.e. 4.00 to 5.33 per cent and 2.82 to 3.98 per cent on number and weight basis respectively, was again recorded during 9<sup>th</sup> to 11<sup>th</sup> SMW with the completion of winter crop season of guava.

### 1.3 Reduction in marketable yield of guava due to fruit fly during 2016-17

The data presented on total and marketable yield of guava during 2016-17 in Table 5 indicated that there was 68.53 per cent reduction in yield of guava in rainy season due to fruit fly as compared to 5.49 per cent in winter crop season with an overall yield reduction of 37.54 per cent during 2016-17.

**Table 5:** Total and marketable yield of guava as influenced by fruit fly

Season	Total yield (q/ha)	Marketable yield (q/ha)	Reduction in marketable yield (%)
Rainy	124.89	39.30	68.53
Winter	120.76	114.13	5.49
Rainy+Winter	245.65	153.43	37.54

### Conclusion

It has been concluded from the present investigation that the seasonal incidence and damage potential of *Bactrocera* spp.

inguava, the first appearance of fruit fly maggot (4.8 maggots/infested fruit) was noticed during 29<sup>th</sup> SMW reaching its peak (32.3maggots/infested fruit) during 31<sup>st</sup> SMW. After that the population of fruit fly maggot decreased up to crop maturity until 36<sup>th</sup> SMW (18.4 maggots/infested fruit) during rainy season crop. The abiotic factors prevailing during second fortnight of July (31<sup>st</sup> SMW) i.e. average maximum temperature 33.5<sup>o</sup>C, minimum temperature 28.1<sup>o</sup>C, morning relative humidity 85.4 per cent, evening relative humidity 76.1 per cent and rainfall 14.9 mm were congenial for peak maggot population buildup of fruit fly on guava fruits during summer season. Similar results were obtained by Jalaluddin *et al.* (1999) [2] and Rajitha and Viraktamath (2006) [6]. The fruit infestation in rainy season guava due to fruit fly ranged from 60 to 90 per cent on number basis while 53.49 to 87.20 per cent on weight basis, being highest during 31<sup>st</sup> SMW (90% on number basis and 87.2% on weight basis). The total reduction in percentage in marketable yield of guava due to fruit fly was found to be 37.54 per cent throughout year. These findings.

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