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Seasonal incidence of fruit fly in guava *cv.* Taiwan white

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ABSTRACT

Taiwanese guava was most famous for its crisp texture, sweet crispy taste with harvesting character as twice per year during February to March and July to August. The yield and quality of Taiwan guava is restricted by various insect species. Among that, fruit fly is the major one damaging about much portion of the yield and quality. So the present study was conducted on seasonal incidence of fruit fly at two guava gardens i.e., College of Horticulture and farmer's orchard in Venkataramannagudem, West Godavari, Andhra Pradesh. The peak activity of fruit fly, *Bactrocera dorsalis* maggot population (15.8 maggots/fruit and fruit infestation (30.80 percent) was observed during 7th standard meteorological week in first season and during second season, the peak activity of fruit fly is observed on 37th standard meteorological week with maggot population of 18.12 maggots per fruit and fruit infestation of 34.66 %. The incidence of fruit fly showed significant but negative correlation with maximum and minimum temperature in first season and second season, rainfall is negatively correlated in first season while it is highly significant and positively correlated in second season, the maximum relative humidity and minimum relative humidity is positive and highly significant in both the seasons.

Key words : *Fruit infestation, Number of maggots, Relative humidity, Rainfall and temperature*

Introduction

Guava (*Psidium guajava* L.) belongs to the family Myrtaceae, which is universally called as "the apple of the tropics" and is one of the most important commercial fruits in India after mango, banana and citrus. Guava fruit is a rich source of vitamin C, pectin, dietary fiber, iron, manganese, calcium, folic acid, potassium and phosphorus with high antioxidant properties, nutritive and medicinal values (Naseer *et al*., 2018). Amongst guava cultivars Taiwan guava is fetching popular for its consistent fruiting character with two harvest seasons every year (Reddy, 2019). But the production of guava is limited by over 80 species of insects, resulting in decline of yield and quality of guava fruits. Amongst the various insect pests of guava fruit, the fruit flies, *Bactrocera spp.* are the major limitation in guava production with 20 – 46 per cent infestation which causes loss up to 16–40 per cent and the estimated loss of 26,902 million rupees (Sharma *et al*., 2011). Hence, the investigation on seasonal incidence of fruit fly in guava cv. Taiwan white was carried out in West Godavari district in two locations.

Materials and Methods

The present research on "Seasonal incidence of fruit

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fly in guava cv. Taiwan white" was carried out at College of Horticulture and farmer's orchard in village Venkataramannagudem, District - West Godavari, A.P during 2019-2020 in two seasons from November, 2019 to September, 2020 i.e., winter and rainy season. Five untreated trees in two guava gardens were selected at random for recording observations on seasonal incidence at weekly intervals. The data on number of maggots per infested fruit and it's percent infestation was recorded from five untreated randomly selected trees of two gardens and the date of two gardens' average is done with correlation studies with weather parameters *viz.*, maximum and minimum temperature, maximum and minimum relative humidity and weekly total rainfall. The weather data was collected from meteorological observatory of College of Horticulture, Venkataramannagudem were used for correlation studies.

a. Number of maggots per infested fruit

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

b. Fruit infestation (%)

The percentage of fruit infestation was worked out with the help of following formula given by Abott (1925):

$$\% \text{ infestation of fruit/plant} = \frac{\text{Number of infested fruits/plant}}{\text{Total number of fruits/plant}} \times 100$$

Statistical analysis

Data collected on incidence of fruit fly of guava cv. Taiwan white during the period of investigation was subjected to statistical analysis for calculation of Correlation coefficient.

Results and Discussion

During the investigation, we observed the fruit fly, *Bactrocera dorsalis* in guava field which is confirmed under Stereo-microscope in Department of Entomology. The infestation of fruit fly during November to February was depicted in the Table 1 and Figure 1, revealed that the mean maggot population of *B. dorsalis* in infested fruits and fruit infestation in guava cv. Taiwan white started from 44th SMW. The peak fruit fly (maggot population), was observed at 7th SMW with 15.8 maggots/infested fruit. However, the lowest maggot population, i.e. 3.63 maggots/infested fruits was recorded on 44th SMW. Fruit fly infestation was low during 44th SMW (8.34 per cent) and maximum in 7th SMW (30.80 %). During the second season (June to September) according to the data in Table 2, the peak activity of fruit fly maggot

Table 1. Incidence of *Bactrocera dorsalis* in guava cv. Taiwan white during November to February (2019- 2020)

SMW (winter season)	*B. dorsalis*						Weather parameters				
	No. of maggots		Mean (%)	Fruit infestation (%)		Mean	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
	G1	G2		G1	G2		Max.	Min.	Max.	Min.	
44	3.60	3.66	3.63	8.57	8.11	8.34	33.16	25.55	89.43	60.57	3.10
45	4.40	3.75	4.08	12.50	11.36	11.93	33.30	23.74	86.00	49.57	0.00
46	5.80	4.20	5.00	15.91	13.64	14.77	33.62	24.52	87.00	51.86	0.00
47	6.60	5.20	5.90	18.37	15.22	16.79	32.40	22.96	88.57	52.86	0.00
48	7.60	5.40	6.50	19.61	16.00	17.80	32.04	23.87	87.43	55.57	0.00
49	8.20	7.60	7.90	20.75	16.98	18.87	31.18	22.03	85.29	51.29	0.00
50	9.40	7.80	8.60	22.81	17.86	20.33	31.18	22.03	85.29	51.29	0.00
51	10.60	9.40	10.00	24.14	18.97	21.55	30.94	22.48	88.86	54.14	0.00
52	11.60	9.40	10.50	25.42	20.34	22.88	29.61	21.29	86.38	58.88	0.00
1	12.20	11.60	11.90	27.87	21.31	24.59	29.45	23.40	85.86	67.43	8.13
2	12.60	13.60	13.10	30.16	22.58	26.37	30.17	21.40	90.14	58.00	0.50
3	13.00	13.80	13.40	32.31	24.62	28.46	31.12	22.22	89.29	55.14	0.75
4	14.00	14.00	14.00	34.33	26.15	30.24	31.37	22.63	90.14	61.00	0.50
5	14.40	14.40	14.40	29.17	25.49	27.33	31.54	22.73	89.71	61.57	0.04
6	15.40	15.40	15.40	32.00	25.86	28.93	31.40	22.41	90.14	62.00	0.13
7	15.80	15.80	15.80	34.62	26.98	30.80	31.59	22.80	90.00	63.14	0.00
8	15.80	15.40	15.60	33.85	27.69	30.77	31.60	22.63	89.86	62.43	0.04
9	16.00	15.00	15.50	33.33	28.13	30.73	31.40	22.71	89.86	63.00	0.09

population was recorded during 37th SMW with 18.12 maggots/ fruit and highest fruit infestation was recorded during the same week with 34.66 per cent. Correlation between *B. dorsalis* and weather factors were depicted in Table 3. The correlation studies during first season revealed that maximum and minimum temperature (-0.567* and -0.576*) showed significant but negative correlation with *B. dorsalis* whereas, maximum and minimum relative humidity (0.590** and 0.686**) had highly significant positive correlation with *B. dorsalis*, whereas, rainfall (0.034*) showed negative correlation with *B. dorsalis*.

Similarly, Correlation of fruit infestation by *B. dorsalis* with weather parameters in Table 3 showed that there exists significant but negative correlation with maximum and minimum temperature (-0.575* and -0.624*), highly significant and positive correlation with maximum and minimum relative humidity (0.537**and 0.608**) and negative correlation with rainfall (-0.082). The correlation studies during second season (rainy) depicted in Table 3 showed the negative but highly significant relation of maggot population (-0.970** and -0.836**) and per cent fruit infestation (-0.968** and -0.858**) with temperature whereas, there is highly significant and positive correlation between maggot population (0.982** and

a. b. c. d.

a. B. dorsalis adult ovipositing on guava fruit b. Oviposition puntures on guava fruit by *B. dorsalis* *c.* Discoloured semi liquid mass and maggot in fruit d. Emerging holes of fruit fly maggots on guava fruit

Fig. 1. Fruit fly, *Bactrocera dorsalis* infestation on guava cv. Taiwan white

Table 2. Incidence of *Bactrocera dorsalis* in guava cv. Taiwan white during June to September (2020-2020)

SMW (rainy season)	*B. dorsalis*						Weather parameters				
	No. of maggots		Mean	Fruit infestation (%)		Mean	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	G1	G2		G1	G2		Max.	Min.	Max.	Min.	
23	5.90	4.32	5.11	8.76	8.00	8.38	39.89	26.90	89.09	68.65	0.00
24	6.30	4,9	6.30	10.56	9.89	10.23	39.00	26.78	88.78	69.78	0.00
25	6.00	5.90	5.95	12.09	11.56	11.83	39.08	25.76	87.89	70.89	0.90
26	5.87	6.43	6.15	12.00	13.78	12.89	38.90	25.98	87.54	75.09	1.78
27	7.40	8.09	7.75	13.67	14.76	14.22	38.09	25.09	88.99	78.68	1.96
28	8.23	8.76	8.50	15.63	16.09	15.86	37.98	24.78	89.09	73.98	2.09
29	8.94	9.65	9.30	17.04	17.43	17.24	36.87	24.46	90.78	74.87	2.78
30	9.40	10.26	9.83	19.45	19.79	19.62	36.98	24.79	91.98	73.54	3.78
31	11.54	12.43	11.99	21.67	21.36	21.52	35.09	23.67	92.45	75.76	3.76
32	13.89	13.87	13.88	23.98	24.70	24.34	35.67	24.45	93.76	78.09	3.67
33	15.00	14.68	14.84	25.87	25.90	25.89	35.01	23.98	94.65	79.67	3.01
34	15.80	15.00	15.40	26.70	27.63	27.17	34.09	24.89	95.76	80.45	3.21
35	16.40	15.93	16.17	28.09	28.97	28.53	34.98	24.90	96.63	81.56	3.78
36	17.00	16.90	16.95	31.90	31.67	31.79	33.02	22.73	97.79	82.76	4.07
37	18.37	17.86	18.12	34.76	34.56	34.66	33.67	23.70	96.76	81.89	4.66
38	17.90	17.45	17.68	33.01	33.63	33.32	33.56	23.78	96.89	82.98	3.67
39	17.78	17.00	17.39	32.01	31.78	31.90	32.65	22.90	97.56	82.89	3.76
40	17.54	16.89	17.22	31.43	30.34	30.89	32.00	22.78	97.00	81.67	3.00

Table 3. Correlation coefficients between weather parameters and incidence of *Bactrocera dorsalis* in guava cv. Taiwan white

Weather parameter		1st Season (winter)		2nd Season(rainy)	
		Number of maggots	Fruit infestation %	Number of maggots	Fruit infestation %
Temperature (°C)	Max	-0.567*	-0.575*	-0.970**	-0.968**
	Min	-0.576*	-0.624**	-0.836**	-0.858**
Relative humidity (%)	Max	0.590**	0.537**	0.982**	0.973**
	Min	0.686**	0.608**	0.920**	0.914**
Rainfall (mm)		-0.034	-0.082	0.840**	0.857**

SMW: Standard meteorological week, G1: Garden 1 - COH, Venkatramannagudem, G2: Garden 2 - Venkatramannagudem village, * (significant), ** (highly significant)

0.920**) and fruit infestation (0.973** and 0.914**) with relative humidity and rainfall (0.840** and 0.857**)

The results pertaining to *B. dorsalis* maggot population and fruit infestation in guava are in accordance with the findings of Jalaluddin *et al*. (1999), Rajitha and Viraktamath (2006) who reported significant negative correlation between *B. dorsalis* and maximum (-0.3314*) and minimum temperature (-0.3610*) in guava. Further, the findings are in agreement with Dale and Patel (2010), Mishra *et al.* (2014), who reported significant and positive correlation of maximum and minimum relative humidity with *B. dorsalis* in guava. Recently, Wazir *et al.* (2019) ascribed that the increasing trend of fruit fly population due to increase in relative humidity and the corresponding multiple determination (R^2) values worked out to 0.973 for fruit fly population in summer squash.

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Conflict of interest

All the co-authors have *no conflicts of interest* with this manuscript and they agree with the contents of the manuscript for the submission.

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Author contribution

1. Author 1 conceived research, conducted the experiment and analyzed data of research
2. Author 2 advised the technical programme of research and approved the manuscript

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