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## Seasonal incidence of fruit borers (*Conogethes punctiferalis* and *Deudorix isocrates*) in guava cv. Taiwan white

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### Abstract

A number of insect pests are known to infest fruits of guava in India. The most important pest is fruitflies (*Bactrocera dorsalis*, *B. zonata* and *B. correcta*) followed by the next report of the fruit borers (*Conogethes punctiferalis* and *Deudorix isocrates*). However, the experiment was conducted on seasonal incidence of fruit borers on guava cv. Taiwan white at the College of Horticulture and farmer's orchard, Venkataramannagudem-West Godavari during 2019-2020. The peak larval population of guava fruit borer *Conogethes punctiferalis* (4.50 larvae/tree) and its fruit infestation (32.79%) was found in 9th Standard Mean Week of 2020. The highest incidence and infestation of *Deudorix isocrates* was recorded in 5<sup>th</sup> Standard Mean Week of 2020 (4.25 larvae/tree and 30.80 per cent fruit infestation). The maximum and minimum temperature was negatively correlated and relative humidity is having positively correlation with the incidence of fruit borers whereas, rainfall was negatively correlated with the incidence of *Conogethes punctiferalis* and positively correlated with incidence of *Deudorix isocrates*.

**Keywords:** Fruit borer, *Conogethes punctiferalis*, *Deudorix isocrates*, number of larvae, fruit infestation, guava cv. Taiwan white

### Introduction

Guava (*Psidium guajava* L.) belongs to the family Myrtaceae, which is universally called as "poor man's fruit" and is one of the most commercial fruits in India after mango, banana and citrus. The guava is one of the choicest fruits due to its delicacy and nutritive value. The fruit is rich in vitamin C, pectin, carbohydrates, protein, calcium, phosphorus and iron with pleasing aroma; it contains 2- 4 times more vitamin C than oranges and ten times more than tomatoes (Pandey and Reddy, 1989) [4]. The guava roots, bark, leaves are traditionally used for treating gastroenteritis, diarrhoea, dysentery, ulcers, coughs, throat, chest ailments, inflamed gums, cerebral ailments, nephritis, convulsions and cachexia (Naseer *et al.* 2018) [3]. Taiwan guava is becoming more attractive in this present days among guava growers due to its consistent fruiting character with good size, sweetness and two harvests for a year (Reddy 2019) [6]. But, guava fruits are attacked and damaged by more than 80 species of insects and mites, thereby affecting the growth, yield and quality of fruit (Butani, 1979) [2]. Out of these insect pests of guava, fruit borers also have been reported to cause substantial damage. The fruit borers *viz.*, *Conogethes punctiferalis* Guen. and *Deudorix isocrates* Fab. which were earlier considered pests of minor importance are currently assuming serious pest status in changing horticulture scenario. (Yadav and Pandey, 1995) [9]. Therefore, the present investigations were undertaken on the seasonal incidence of fruit borers in guava cv, Taiwan white and their correlation with the weather parameters in two gardens at Venkataramannagudem.

### Materials and Methods

The present research on "Seasonal incidence of fruit borers, *Conogethes punctiferalis* and *Deudorix isocrates* 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. Five untreated trees in two guava gardens were selected for each fruit borer at random for recording observations on seasonal incidence at weekly intervals. Observations were recorded in respect of number of larvae and fruit infestation by the borers from five untreated randomly selected trees of two gardens and the average of two gardens are correlated 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 larvae per tree

Number of larvae per tree was taken from the five randomly selected trees of two locations by counting the number of larvae in the infested fruits of each tree and the average number of larvae per tree of two locations is correlated with weather parameters.

#### b. Fruit infestation (%)

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

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

#### c. Statistical analysis

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

### Results and Discussion

#### 1. Incidence of Castor capsule borer, *Conogethes punctiferalis* on guava cv. Taiwan white and their

#### correlation with weather parameters

The occurrence of *C. punctiferalis* larvae in guava cv. Taiwan white commenced from first week of November 2019 and continued till last week of February 2020 i.e. 44<sup>th</sup> SMW to 9<sup>th</sup> SMW (Table 1 and figure 3). Its activity reached to a peak level of 5 larvae/plant and 32.79 per cent fruit infestation during last week of February (9<sup>th</sup> SMW) followed by 8<sup>th</sup> SMW (32.10 per cent) and minimum density (1 larva/plant and 7.90 per cent) during first week of November (44<sup>th</sup> SMW).

Correlation analysis of larval population and fruit infestation of *C. punctiferalis* and weather factors were illustrated in table 2. The correlation results convey that maximum and minimum temperature (-0.478\*, -0.552\* and -0.476\*, -0.544\*) had significant but negative correlation and rainfall is negatively correlated (-0.140 and -0.120) whereas, relative humidity (0.571\*, 0.642\* and 0.566\*, 0.650\*) had significant positive correlation with number of larvae and fruit infestation of *C. punctiferalis*. The above results are reinforced by the findings of Suganthy (2007) [8] found that capsule borer, *C. punctiferalis* peak incidence was noticed during December to January. Interestingly, Patel *et al.* (2015) [5] and Shivakumar (2016) [7] also conveyed that maximum and minimum temperature having negative correlation and relative humidity having positive correlation with the incidence of *C. punctiferalis* in castor and guava.



Fig 1: Damaged fruit, larva feeding inside the fruit, pupa and adult of *C. punctiferalis*

Table 1: Incidence of *Conogethes punctiferalis* in guava cv. Taiwan white

SMW	<i>C. punctiferalis</i>						Weather parameters				
	No. of larvae		Mean	Fruit infestation (%)		Mean	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
	G1	G2		G1	G2		Max.	Min	Max	Min	
44	1.00	1.00	1.00	7.69	8.11	7.90	33.16	25.55	89.43	60.57	3.10
45	1.40	1.20	1.30	11.36	10.26	10.81	33.30	23.74	86.00	49.57	0.00
46	1.80	1.60	1.70	12.50	11.36	11.93	33.62	24.52	87.00	51.86	0.00
47	2.00	1.80	1.90	13.73	13.04	13.38	32.40	22.96	88.57	52.86	0.00
48	2.00	2.00	2.00	14.81	14.89	14.85	32.04	23.87	87.43	55.57	0.00
49	2.20	2.20	2.20	16.95	16.67	16.81	31.18	22.03	85.29	51.29	0.00
50	2.60	2.40	2.50	19.67	18.37	19.02	31.18	22.03	85.29	51.29	0.00
51	2.80	2.40	2.60	20.97	17.31	19.14	30.94	22.48	88.86	54.14	0.00
52	3.00	2.60	2.80	22.22	18.52	20.37	29.61	21.29	86.38	58.88	0.00
1	3.00	2.60	2.80	23.81	19.30	21.55	29.45	23.40	85.86	67.43	8.13
2	3.40	2.80	3.10	25.76	20.69	23.22	30.17	21.40	90.14	58.00	0.50
3	3.60	2.80	3.20	27.27	21.67	24.47	31.12	22.22	89.29	55.14	0.75
4	3.80	3.00	3.40	28.13	23.81	25.97	31.37	22.63	90.14	61.00	0.50
5	4.20	3.20	3.70	31.25	25.00	28.13	31.54	22.73	89.71	61.57	0.04
6	4.60	3.40	4.00	34.33	26.15	30.24	31.40	22.41	90.14	62.00	0.13
7	4.80	3.40	4.10	36.23	26.15	31.19	31.59	22.80	90.00	63.14	0.00
8	4.80	3.60	4.20	36.92	27.27	32.10	31.60	22.63	89.86	62.43	0.04
9	5.00	4.00	4.50	37.88	27.69	32.79	31.40	22.71	89.86	63.00	0.09

**Table 2:** Correlation coefficients between weather parameters and incidence of *Conogethes punctiferalis* in guava cv. Taiwan white

Weather parameter		<i>C. punctiferalis</i>	
		No. of	Fruit
Temperature (°C)	Max.	-0.478*	-0.476*
	Min.	-0.552*	-0.544*
Relative humidity (%)	Max.	0.571*	0.566*
	Min.	0.642*	0.650*
Rainfall (mm)		-0.140	-0.120

SMW: Standard meteorological week

G1: Garden 1 - COH, Venkatramannagudem

G2: Garden 2 - Venkatramannagudem village

## 2. Incidence of pomegranate fruit borer, *Deudorix isocrates* on guava cv. Taiwan white and their correlation with weather parameters

The activity of *Deudorix isocrates* was initiated from first week of November 2019 (44<sup>th</sup> SMW) which is the lowest incidence (0.7 larvae/tree). Its activity increased on 5<sup>th</sup> SMW of 2020 (4.25 larvae/tree) and steadily decreased during subsequent week to 4.10 larvae/tree in 6<sup>th</sup> SMW of 2020. Again, the incidence intensified to another peak (4.20 larvae/tree) during 7<sup>th</sup> SMW of 2020 and declined to 2.7 larvae/tree in 9<sup>th</sup> SMW of 2020 which is shown in table 2 and

figure 4. The fruit infestation in guava cv. Taiwan white by *D. isocrates* showed an increasing trend from 44<sup>th</sup> SMW of 2019 (8.34 per cent) and reached peak during 5<sup>th</sup> SMW (30.80 per cent) and declined on 6<sup>th</sup> SMW (30.24 per cent). However, the borers infestation again reached another peak in 7<sup>th</sup> SMW (30.77 per cent) and afterwards, declined till 9<sup>th</sup> SMW of 2020 (27.33 per cent).

Correlation co-efficient studies of *D. isocrates* with weather parameters are presented in table 4 which shows that number of larvae and fruit infestation by *D. isocrates* was highly significant but negatively correlated with minimum temperature (-0.621\* and -0.626\*\*) and maximum temperature (-0.615\*\* and -0.574\*\*) and the maximum and minimum relative humidity recorded at morning and evening (0.504\*, 0.571\* and 0.537\*, 0.598\*) and rainfall is positively correlated with number of larvae and fruit infestation (0.005 and 0.081) respectively. The present investigations are in agreement with the findings of Yadav and Pandey (1995) [9] who ascertained that the correlation between level of pest infestation with relative humidity and rainfall was significant and positive. Yogesh (2001) [10] reported that the correlation between the *D. isocrates* borer infestation and evening humidity was positive and highly significant ( $r=0.649^{**}$ ) indicating their pronounced influence on infestation.

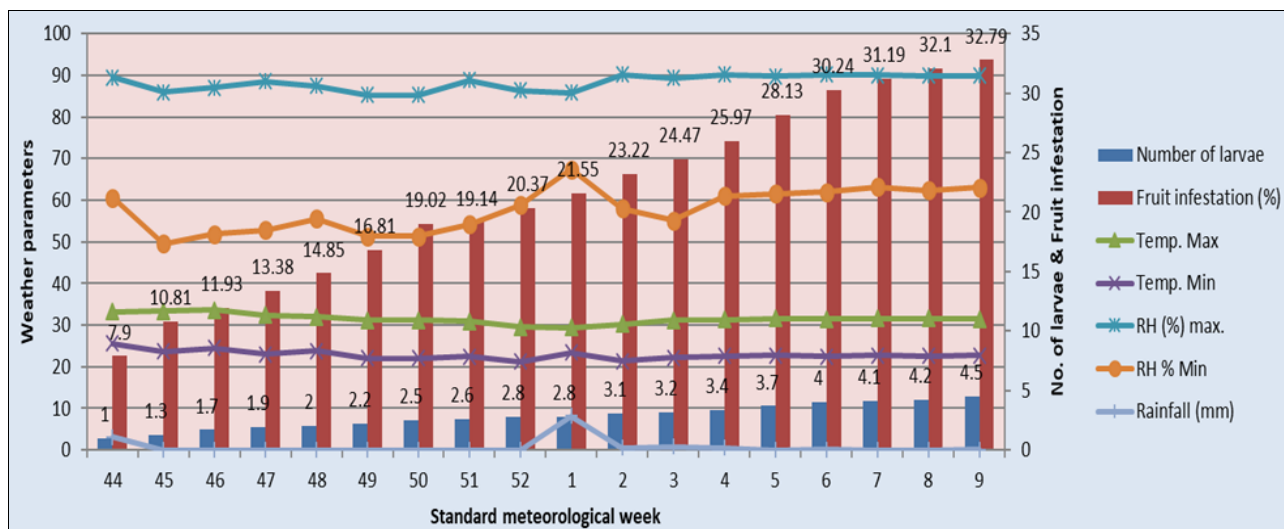
**Fig 2:** Damaged fruit, larva, emerged pupa and adult of *D. isocrates* in guava cv. Taiwan white**Table 3:** Incidence of *Deudorix isocrates* in guava cv. Taiwan white

SMW	<i>D. isocrates</i>						Weather parameters				
	No. of larvae		Mean	Fruit infestation (%)		Mean	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
	G1	G2		G1	G2		Max.	Min.	Max.	Min.	
44	0.60	0.80	0.70	8.57	8.11	8.34	33.16	25.55	89.43	60.57	3.10
45	1.00	1.20	1.10	12.50	11.36	11.93	33.30	23.74	86.00	49.57	0.00
46	1.40	1.40	1.40	15.91	13.64	14.77	33.62	24.52	87.00	51.86	0.00
47	1.80	1.60	1.70	18.37	15.22	16.79	32.40	22.96	88.57	52.86	0.00
48	2.00	1.80	1.90	19.61	16.00	17.80	32.04	23.87	87.43	55.57	0.00
49	2.20	2.00	2.10	20.75	16.98	18.87	31.18	22.03	85.29	51.29	0.00
50	2.60	2.20	2.40	22.81	17.86	20.33	31.18	22.03	85.29	51.29	0.00
51	2.80	2.40	2.60	24.14	18.97	21.55	30.94	22.48	88.86	54.14	0.00
52	3.00	2.60	2.80	25.42	20.34	22.88	29.61	21.29	86.38	58.88	0.00
1	3.40	3.20	3.30	27.87	21.31	24.59	29.45	23.40	85.86	67.43	8.13
2	3.80	3.40	3.60	30.16	22.58	26.37	30.17	21.40	90.14	58.00	0.50
3	4.20	3.60	3.90	32.31	24.62	28.46	31.12	22.22	89.29	55.14	0.75
4	4.60	3.80	4.20	33.33	28.13	30.73	31.37	22.63	90.14	61.00	0.50
5	4.40	4.10	4.25	34.62	26.98	30.80	31.54	22.73	89.71	61.57	0.04
6	4.00	4.20	4.10	34.33	26.15	30.24	31.40	22.41	90.14	62.00	0.13
7	4.50	3.90	4.20	33.85	27.69	30.77	31.59	22.80	90.00	63.14	0.00
8	3.20	3.40	3.30	32.00	25.86	28.93	31.60	22.63	89.86	62.43	0.04
9	2.80	2.60	2.70	29.17	25.49	27.33	31.40	22.71	89.86	63.00	0.09

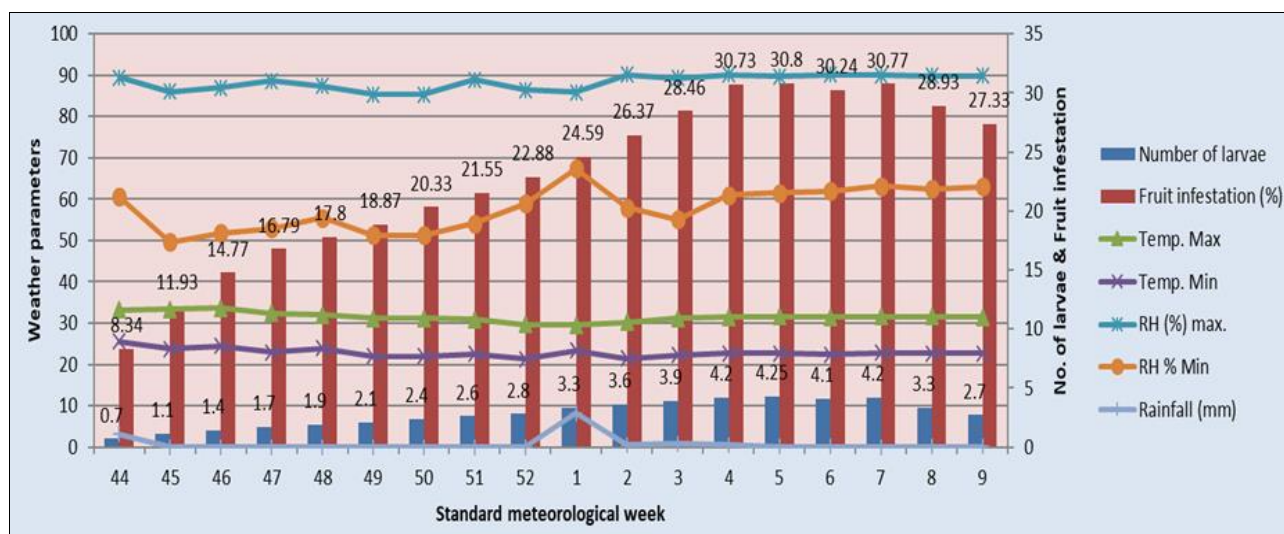
**Table 4:** Correlation coefficients between weather parameters and incidence of *Deudorix isocrates* in guava cv. Taiwan white

Weather parameter	<i>D. isocrates</i>	
	No. of larvae	Fruit infestation
Temperature (°C)	Max.	-0.615**
	Min.	-0.621**
Relative humidity (%)	Max.	0.504*
	Min.	0.571*
Rainfall (mm)	0.005	0.081

SMW: Standard meteorological week  
 G1: Garden 1 - COH, Venkatramannagudem  
 G2: Garden 2 - Venkatramannagudem village



**Fig 3:** Seasonal incidence of fruit borer, *Conogethes punctiferalis* during different standard weeks on guava cv Taiwan white (2019-2020)



**Fig 4:** Seasonal incidence of fruit borer, *Deudorix isocrates* during different standard weeks on guava cv Taiwan white (2019 – 2020)

**Conclusion**

The population of *C. punctiferalis* and *D. isocrates* was seen minimum during the 44<sup>th</sup> SMW of 2019. The peak incidence of *C. punctiferalis* and *D. isocrates* was found during 9<sup>th</sup> SMW of 2020 and 5<sup>th</sup> SMW of 2020. The correlation with weather parameters had shown that the population of the fruit borers have negative and highly significant correlation with maximum and minimum temperature. However, maximum and minimum relative humidity is significant and positively correlated with the incidence of fruit borers and rainfall is negatively correlated with the incidence of *C. punctiferalis* whereas, positively correlated with incidence of *D. isocrates* (0.005 and 0.081).

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