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## **Effect of population dynamics on bark borer (*Indarbela tetraonis* Moore) in Guava (*Psidium guajava* L.)**

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### **Abstract:**

*Guava (Psidium guajava L.) is quite popular fruit for each class of people in India. Uttar Pradesh is most important guava producing state of India where it covers an area of about 68547 acres. It grows well in a PH which may be ranging upto 9.5 in various soils. Indarbela larvae are wood borers. It is polyphagous insect and its larva bores into stem to about 15 to 25cm and feeds on the bark mostly during night under shelter of webs. Among five varieties of guava. It is observed that the average population was positively and significantly correlated with maximum temperature (0.364) and Minimum temperature (0.397) and humidity in different varieties of guava. Only one larva is seen inside a bore hole and consequently 15 to 30 larvae are found on a single tree. In such conditions a serious infestation results death to the stem. It arrests the growth of the tree leading a heavy loss to growers.*

**Keywords :** Population dynamics, Bark borer.

### Introduction:

Guava (*Psidium guajava* Linnaeus) is one of the most common and nutritious fruit because of its delightful taste, flavor, rich source of vitamin 'C' and pectin (Agnihotri et al., 1962). Uttar Pradesh is most important guava producing state of India. It is eaten as such, cooked and also used for making processed Jam and Jelly (Chen et al., 2002). Guava fruit is infected by both major and minor pests. Major pests include coccids (Scale insects and mealy bugs). Beside it, bark eating caterpillars, fruit flies etc. damage the guava fruit crop. *Indarbela tetraonis* (Moore) is a polyphagous pest and attacks on number of trees of orchards (Mann, 1993 and Kirk, 1997). It also destroys the crop of Jamun, Citrus, Mango, etc. *Indarbela tetraonis* belongs to the family cossididae and measures about 40 mm in length. They feed mostly during the night under the protective covering of webbing consisting fecal pellets and silken threads secreted by the larvae, and remain hidden during the day time (Mann and Dhooria, 1994). As a result of their feeding on the bark, the sap conducting tissues are damaged. The yield and quality of fruits are adversely affected.

### Material and Methods:

The present investigations were carried out at River bed area of Bithoor, Kanpur over five varieties of guava. The experiment carried out on the population dynamics, temperature and relative humidity. The texture of experimental soil was loam, well drained with medium fertility. The fields were well manured and have uniform cultural practices.

### Experimental Findings:

Data of the experiment exhibit the results of the multiple regression analysis relating to its population in 5 varieties of guava are summarized as follows:

Multiple regression of *Indarbela tetraonis* in Allahabad Safeda was observed that the average population was positively and significantly correlated with maximum temperature (0.364) and minimum temperature (0.397) at least 58 per cent of significance. Partial regression coefficient of population on different independent variables was only minimum temperature (-0.403) which was negatively significant at 5 per cent level of significance. The other two partial regression

coefficients, Maximum Temperature (1.168) and Relative Humidity (0.360) were also found significant of 0.1 and 5 per cent level of significance. This indicate that the average incidence is greatly affected by Maximum Temperature, Minimum Temperature and Relative Humidity. The multiple correlation coefficient ( $R = 0.551$ ) was found significant at 5 per cent level of significance. This indicates that dependent variable, average population was highly and jointly correlated with independent variables. In this case it was apparent that about 50 per cent of the variation depends upon it.

The correlation of population of *Indarbela tetraonis* in Lucknow-49 variety were recorded in observations that Maximum Temperature (0.317) and Minimum Temperature (0.476) revealed positive and significant correlation. However, Relative Humidity showed positive but non-significant correlation. This indicated that population was not affected with the relative humidity. In partial regression coefficient maximum temperature (1.317) and Relative Humidity (0.578) showed positive and highly significant with Maximum Temperature and Relative Humidity.

The multiple correlations coefficient was found positive (0.632) and significant at 5 per cent level of significance. This indicated that the dependent variables average incidence was jointly correlated with Maximum Temperature, Minimum Temperature and relative Humidity.

Variety Apple Colour Data of the observations indicated that population of *Indarbela tetraonis* showed positive correlation with Maximum Temperature (0.298) and Minimum Temperature (0.063). However, Relative Humidity revealed negative correlation. In the partial regression coefficient population was found to be positive and significant with Maximum Temperature (1.658) and negative with Minimum Temperature (-1.133) at 5 per cent level of significance. The multiple correlation coefficient was found  $R = 0.632$ . It was found significant at 5 per cent level of significance. This indicated that the dependent variables average population was jointly correlated with Maximum Temperature, Minimum Temperature and Relative Humidity. In this case it was observed the R is found about 40.00 per cent of the variation in the dependent variable.

Variety Red Flesh Data were recorded in the observations that population of *Indarbela* in Red flesh variety of guava exhibited non-significant correlation with

Maximum Temperature, Minimum Temperature and Relative Humidity. Partial regression coefficient showed positive but non-significant correlation with Maximum Temperature and Relative Humidity. However, Minimum Temperature revealed negative correlation. The multiple correlation coefficient was found ( $R=0.415$ ) to be non-significant at 5 per cent level of significance. This indicated that the dependent variable, average infestation was not jointly correlated with Maximum Temperature, Minimum Temperature and Relative Humidity. Variety local seedling data recorded in observation in respect of correlation of population dynamics of guava insect *Indarbela* in local seedling guava were calculated by the multiple regression analysis. It was observed that correlation coefficient positively correlated with maximum temperature (0.360). In partial regression coefficient of population on different independent variables, it was only Maximum Temperature (0.737) presents positive and significant correlation. However, Minimum Temperature and Relative Humidity exhibited negative but significant correlation at 5 per cent level of significance. The multiple correlation coefficient ( $R=0.767$ ) was found to be significant at 5.0 per cent level of significance. This indicated that the dependent variables average infestation was highly correlated with Maximum Temperature, Minimum Temperature and Relative Humidity.

**Result and Discussion:**

Bark borer (*Indarbela tetraones* Moore) was found that in Allahabad Safeda variety, the average population was positively and significantly correlated with Maximum Temperature and Minimum Temperature at least at 5 per cent level of significance. Among partial regression coefficient of population on different independent variables, only Minimum Temperature was negatively significant. The other two partial regression coefficients were also found significant at 0.1 and 5 per cent level of significance. Noor and Kushwaha (1976), Seshu Reddy (1983) and Dhiman and Batra (1998) found similar results in their findings in different crops. In Lucknow-49 variety multiple correlation coefficients was found positive and significant at 5 per cent level of significance. This indicates that the dependent variables average incidence was jointly correlated with Maximum Temperature, Minimum Temperature and Relative Humidity. Present findings showed close conformity with the results of Norrbom and Kim (1988), and Parker et al. (1997).

**Table 1: Correlation of Population of Bark Borer (*Indarbela tetraonis* Moore) with temperature and relative humidity.**

1. Dependent Variables - Variety Allahabad Safeda
2. Independent Variables -

Independent Variables	Correlation Coef. with Y	Partial Regression Coef. byx	S.E. of byx	t-value
Max. Temp. $X_1$	0.364*	1.168**	0.416	2.806
Min. Temp. $X_2$	0.397*	-0.403**	0.304	-1.323
RH $X_3$	0.050	0.360*	0.120	3.004
	DF = 47			DF = 44

$$R = 0.551^*, R^2 = 0.503601 \text{ or } 50.36\%, F(3.44) = 6.410$$

Multiple regression equation-

$$Y = 26.256 + 1.168X_1 - 0.403X_2 + 0.360$$

**Table 2: Correlation of Population of Bark Borer (*Indarbela tetraonis* Moore) with temperature and relative humidity.**

1. Dependent Variables - Variety Lucknow-49
2. Independent Variables -

Independent Variables	Correlation Coef. with Y	Partial Regression Coef. byx	S.E. of byx	t-value
Max. Temp. $X_1$	0.317*	1.317**	0.604	2.182
Min. Temp. $X_2$	0.476*	-0.116**	0.441*	-0.263
RH $X_3$	0.207	0.578*	0.174	3.326
	DF = 47			DF = 44

$$R = 0.632^*, R^2 = 0.399424 \text{ or } 39.94\%, F(3.44) = 9.734$$

Multiple regression equation-

$$Y = -50.864 + 1.317X_1 - 0.116X_2 + 0.578$$

**Table 3: Correlation of Population of Bark Borer (*Indarbela tetraonis* Moore) with temperature and relative humidity.**

1. Dependent Variables - Variety Apple Colour
2. Independent Variables -

Independent Variables	Correlation Coef. with Y	Partial Regression Coef. byx	S.E. of byx	t-value
Max. Temp. $X_1$	0.298	1.658*	0.608	2.728
Min. Temp. $X_2$	0.063	-1.133*	0.444	-2.549
RH $X_3$	-0.307	0.199	0.175	1.137
	DF = 47			DF = 44

$$R = 0.475, R^2 = 0.225625 \text{ or } 22.56\%, F(3.44) = 4.270$$

Multiple regression equation-

$$Y = 22.603 + 1.658X_1 - 1.133X_2 + 0.199$$

**Table 4: Correlation of Population of Bark Borer (*Indarbela tetraonis* Moore) with temperature and relative humidity.**

1. Dependent Variables - Variety Red Flesh
2. Independent Variables -

Independent Variables	Correlation Coef. with Y	Partial Regression Coef. byx	S.E. of byx	t-value
Max. Temp. $X_1$	0.246	1.380	0.505	2.734
Min. Temp. $X_2$	0.075	-0.897	0.369	-2.432
RH $X_3$	-0.173	0.249	0.145	1.718
	DF = 47			DF = 44

$$R = 0.415, R^2 = 0.172225 \text{ or } 17.22\%, F(3.44) = 3.046$$

Multiple regression equation-

$$Y = 19.027 + 1.380X_1 - 0.897X_2 + 0.249$$

**Table 5: Correlation of Population of Bark Borer (*Indarbela tetraonis* Moore) with temperature and relative humidity.**

1. Dependent Variables - Variety Local Seedling
2. Independent Variables -

Independent Variables	Correlation Coef. with Y	Partial Regression Coef. byx	S.E. of byx	t-value
Max. Temp. $X_1$	0.360	0.737*	0.418	1.766
Min. Temp. $X_2$	-0.047	-0.763*	0.305	-2.501
RH $X_3$	-0.715	-0.304	0.120	-2.535
	DF = 47			DF = 44

$$R = 0.767, R^2 = 0.588289 \text{ or } 58.82\%, F(3.44) = 20.973$$

Multiple regression equation-

$$Y = 39.893 + 0.737X_1 - 0.763X_2 + 0.304$$

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