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# Studies on the Seasonal Influence on the Occurrence of Shoot and Fruit Borer (Leucinodes Orbonalis Guenee) in Brinjal (Solanum Melongena L.) Var. KKM-1

KEYWORDS


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**INTRODUCTION**

Vegetables serve as an important source of vitamins, minerals and plant proteins in human diets throughout the world. Vegetables are rapidly becoming an important source of income for the rural population. Brinjal, Solanum melongena L, is one such typical vegetable and its commercial cultivation not only helps to improve human nutrition, but also increase income generation for the grower. In the hot wet monsoon season when other vegetables are in short supply, brinjal is practically the only vegetable that is available at an affordable price for rural and urban poor. In India, brinjal is grown over 0.75 million ha with a production of 8.04 million tonnes with an average yield of 16.84 t/ha (Anonymous, 2009a), while in Tamil Nadu, the area and production of brinjal are 2.86 lakh ha and 86.94 lakh tonnes, respectively (Anonymous, 2009b). Brinjal is often infested by a plethora of insect pests throughout Asia. A survey on vegetable pests by Asian Vegetable Research and Development Centre (AVRDC) indicated that brinjal fruit and shoot borer is the most destructive pest in major brinjal producing countries of South Asia, as the larvae tunnel inside the plant shoots (or fruit, if available), adversely affecting marketable fruit yield. The presence of holes and larval excreta in tunnels made in the fruit, favour the development of secondary infection by microorganisms as well as the entry of insect scavengers, resulting in fruit decay. Holes made by the first and second instar larvae partially heal up with the increase in fruit size.

In the light of the above, the present study was carried out with the following broad objectives.

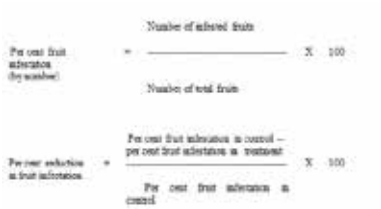
1. To study the seasonal influence on the occurrence of shoot and fruit borer Leucinodes orbonalis in brinjal, Var. KKM-1.
2. To study the impact of weather factors viz., temperature, rainfall, relative humidity, sunshine hours and wind velocity on the incidence of shoot and fruit borer.
3. To elucidate informations on the effect of different dates of sowing and transplanting on the incidence of shoot and fruit borer.

Shoot damage

The total number of terminal shoots drying / drooping from the randomly selected plants were counted starting from 5th day after transplanting, till 130 days of crop growth. After each observation, the damaged shoots were removed. The per cent shoot infestation and per cent reduction in shoot infestation were calculated using the following formula.

**Fruit damage**

When the damage started from 55-60 days after transplanting. The number of infested fruits and un infested fruits from twenty selected plants were recorded and per cent fruit infestation and per cent reduction in fruit infestation were calculated using the following formula



Observation on the larval mortality were made 72 hrs after 1st spray ie. on 3rd,7th and 15th day of spraying. Data were recorded on the number of larvae died in each treatment including untreated control. These figures were converted to percent larvae died taking in to consideration the number of larvae died in untreated control also by adopting Abbott's (1925) formula and the corrected mortality was worked out.

**RESULTS**

Correlation between pest incidence and weather parameters Simple correlation co-efficients estimated between the damage on shoot/ fruit by L.orbonalis and weather parameters of Current week (CW), Previous Week ( PW) and Previous Second Week (PSW) for October, January and April plantings are furnished. Simple correlation co-efficient for the appropriate weeks, based on the maximum 'r' values for individual plantings are furnished. The estimated co-efficient for the pooled data for the above three planting seasons indicated non-significant values for all the weather parameters studied with respect to shoot damage however the parameters viz., minimum temp., sunshine hours and wind velocity registered negative and significant with respect to fruit damage. The correlation co-efficient based

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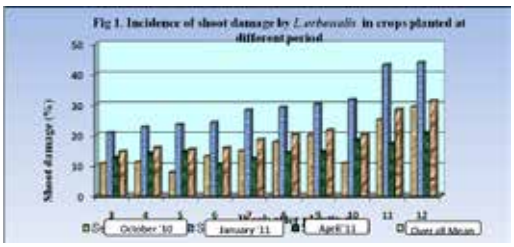
on high 'r' values indicated negative and significant values for the parameter viz., temperature with respect to both shoot and fruit damage while sunshine hours and wind velocity showed significant and negative correlation with respect to fruit damage alone.

The results showed that, shoot damage in October planting had positive association with relative humidity (0.701*); and negative association with maximum temperature (-0.750**), minimum temperature (-0.762**) and sunshine hours (-0.705*). In January planted crop, a positive association of shoot damage with maximum temperature (0.906**) and minimum temperature (0.769*) was observed while, there was a negative association observed for relative humidity (-0.834*). However association of fruit damage with weather parameters was not evident in October and January planted crop.

In April planted crop, minimum temperature (0.670) showed positive and relative humidity (-0.697) exhibited a negative association (-0.697**). Fruit damage in April planting recorded positive correlation with minimum temperature (0.769**) and wind velocity (0.600*) and negative association with maximum temperature (-0.849**).



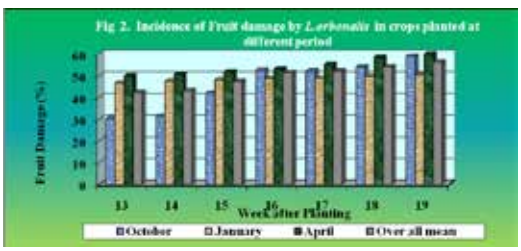




**Table 1. Estimated Correlation co-efficients based on high 'r' values**

| | Correlation coefficient | | | | | |
|---|---|---|---|---|---|---|
| | Rainfall (mm) | Temperature (0C) | | Relative Humidity (%) | Sunshine hours (h) | Wind velocity (kmph) |
| | | Maximium | Minimum | | | |
| October Planting | | | | | | |
| Shoot damage (n=11) | | | | | | |
| | 0.146 NS | -0.750** | -0.762** | 0.701* | -0.705* | -0.486 NS |
| Fruit Damage (n=16) | | | | | | |
| | -0.549 NS | 0.432 NS | -0.327NS | 0.601 NS | 0.600 NS | 0.410 NS |
| January Planting | | | | | | |
| Shoot damage (n=10) | | | | | | |
| | -0.135 NS | 0.906** | 0.904** | -0.834* | 0.596 NS | -0.529 NS |
| Fruit Damage (n=11) | | | | | | |
| | -0.328 NS | -0.505 NS | -0.474 NS | -0.386 NS | -0.293 NS | 0.212 NS |
| April Planting | | | | | | |
| Shoot damage ( n=13) | | | | | | |
| | 0.518 NS | 0.411 NS | 0.670* | -0.697 ** | 0.513 NS | 0.508 NS |
| Fruit damage (n-10) | | | | | | |
| | -0.048 NS | -0.849** | 0.769** | 0.709* | -0.384 NS | 0.600* |

**Table 2. Estimated Correlation co-efficient over three seasons pooled together**

| | | Tmperature(0 C) | | Rainfall (mm) | Evaporation(mm) | Sun shine (hrs) | Relative humidity(%) | Wind velocity(Kmph) |
|---|---|---|---|---|---|---|---|---|
| | | Max | Min | | | | | |
| Shoot damage * | | | | | | | | |
| (n=34) 0.339 0.436 | CW | 0.1054 NS | -0.3092 NS | -0.2254 NS | -0.0501 NS | 0.2003 NS | 0.1076 NS | 0.0802 NS |
| | PW | -0.0457 NS | -0.3009 NS | -0.2298 NS | -0.0931 NS | 0.1080 NS | 0.1654 NS | 0.1612 NS |
| | PSW | -0.0641 NS | -0.3915* | -0.2015 NS | 0.0116 NS | 0.1137 NS | 0.1132 NS | 0.2208 NS |
| Fruit Damage ** | | | | | | | | |
| (n=39) 0.308, 0.393 | CW | -0.1823NS | -0.4044** | 0.0611NS | 0.5651** | -0.4676** | 0.0794NS | -0.5028** |
| | PW | -0.1967NS | -0.3924* | 0.0797NS | 0.5036** | -0.4764** | 0.1155NS | -0.3631* |
| | PSW | -0.2146NS | -0.3370* | -0.0668NS | 0.1473NS | -0.5076** | 0.1786NS | -0.3122* |

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## DISCUSSION

### Influence of weather parameters on the incidence of shoot and fruit borer

The best way to avoid pest outbreak is possible, when the congenital weather condition for the insect infestation is fully known (Dubey and Thorat, 1994). Temperature is the most crucial abiotic factor influencing the life cycle of any organism. It is between any single climatic factor and the pest activity because the impact of weather elements on pest is usually confounded (Narendra reddy et al., 2001). However, temperature, sunshine, rainfall, relative humidity and wind speed are the chief weather parameters that largely direct the activity of a given species of insect. The interaction between pest activity and abiotic factor helps in deriving at predictive models that can aid in forecast of pest incidence (Chandrakumar et al., 2008). Hence the present study was directed to know the seasonal influence on the occurrence of shoot and fruit borer in brinjal ecosystem and the most influential abiotic factor that condition the pest.

Shoot damage had negative correlation with maximum temperature, minimum temperature and sunshine hours in October planted crop but had positive association in January as well as April plantings. Fruit damage in April planted crop had positive association with minimum temperature, relative humidity and wind velocity and negative association with maximum temperature. However, the trends were different during October .

Fruit damage had positive correlation with minimum temperature in April planted crop but significant association was not observed in October and January planted crops. When all the data from three plantings were pooled together the correlation was observed for shoot damage with the minimum temperature only. Whereas fruit damage had correlation with minimum temperature (-) sunshine (-) and wind velocity (-).

Earlier workers had also documented the positive association of minimum temperature (Shukla, 1989) and negative association of relative humidity (Mall et al., 1992) with the fruit borer damage. Studies of Shukla (1989) exhibited a positive influence of rainfall and relative humidity on shoot damage. Shyamprasad (1992) has highlighted the positive influence of relative humidity on shoot damage. Studies of Prasad and Logiswaran (1997) revealed a significant positive correlation with maximum temperature and relative humidity and negative correlation with minimum temperature. Shukla and Khatri (2010) brought out a positive correlation between maximum temperature as well as minimum temperature and abundance of moths of L. orbonalis during this period from their studies at Kanpur of Uttar Pradesh.

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