Journal of Agrometeorology 23 (2) : 249-251 (June 2021)

Short communication

Influence of meteorological parameters on population build-up of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee in Assam

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Brinjal (*Solanum melongena* L.) is one of the most important *Solanacious* vegetable crop, cultivated extensively in all parts of India. Unfortunately, the crop is infested by various noxious insect pests right from seedling stage till final harvesting and amongst all insect pests, brinjal shoot and fruit borer, *Leucinodes orbonalis*is the major player which is responsible for 80-90% yield loss (Regupathy *et al.* 1997). Different meteorological factors also affect the incidence of brinjal shoot and fruit borer. Furthermore, for development of prediction module of insect pest management of brinjal, forecast of meteorological parameter on insect damage is very much essential, as Kataria *et al*., 2019 observed that, crop sown at normal date was less affected by infestation of whitefly than late sown crop.

The experiment was conducted during the two consecutive *rabi* seasons of 2017-18 and 2018-19 at the Farmer's field, Alengmora, Jorhat under All India Coordinated Research Project on Biological Control of Crop Pests and Weeds (AICRP on Biological Control). The brinjal seedlings (Varity: Hazari) were transplanted at spacing at 60 x 75 cm^2 during second fortnight of October in a large plot size of 20 m x 15 m . As such five plots were prepared and the data were recorded from five randomly selected plants from each plot. Since brinjal shoot and fruit borer initially attack at the shoot portion and after fruit set it transmit to budding fruit; three shoots were sampled from each of the five random plants and the for both the cropping seasons and data on per cent insect damage of shoot number of holes per shoot or bored fruit were recorded till final plucking of the fruits with an weekly interval.

The meteorological data were collected from Department of Meteorology, Assam Agricultural University, Jorhat and fruit were collected from the field as discussed above. Pooled data of both seasons worked out to estimate correlation and t-test was performed to relate the significance. Correlation of different meteorological parameters shoot and fruit damage was calculated by using Karl Pearson method. Likewise, the prediction of per cent shoot and fruit damage (dependent variable) was in terms of various meteorological parameters(independent variables) was estimated by using Microsoft Office Excel and was selected on the basis of *p* (less than 0.05) value and R^2. In addition, the age of the plant also considered as an independent variable for the study.

Incidence of L. orbonalis and its relationship with meteorological factors

The brinjal shoot and fruit borer, *L. orbonalis* was appeared in the brinjal field during both vegetative and reproductive stage of the crop. However, in vegetative stage the pest was appeared during first week of October in 2017 and 2018 i.e. approx. 14 days after planting (DAP). Fruit infestation was recorded from last week of November (70 DAP) for both the years. However, the borer infestation was recorded throughout the cropping season. Similar trend of infestation was also noticed by earlier workers (Birla, 2011 and Borah and Saikia, 2017) and they reported that *L. orbonalis* was remained active throughout the year.

In present investigation, the maximum shoot infestation (9.71%) was recorded in the month of November (49 DAP). But Nayak *et al.* (2012) recorded the maximum infestation of shoots during August and September. These variations in infestation of pest might be due to effects of temperature and relative humidity. The maximum fruit infestation was recorded at 105 DAP *i.e*. last week of December; when maximum and minimum temperature, average relative humidity and bright sunshine hours were 24.9°C, 11.7°C, 84.65% and 5.8 hr, respectively. Chandrakumar *et al*. (2008) recorded during first and last week of December.

Table 1: Correlation studies of brinjal shoot and fruit borer with the weather parameters (Pooled data of 2 years)

Perameter Meteorological	Shoot infestation	Fruit infestation
Maximum temp (ºC)	0.66**	-0.81**
Minimum temp (ºC)	0.58*	-0.78**
Avg. Mean temp	0.63**	-0.81**
Average RH (%)	-0.21	0.07
Total Rainfall (mm)	0.27	-0.43
BSSH(hr)	0.39	-0.21
Age of the plant	-0.78**	0.90**

** Correlation is significant at 0.01 level/ * Correlation is significant at 0.05 level

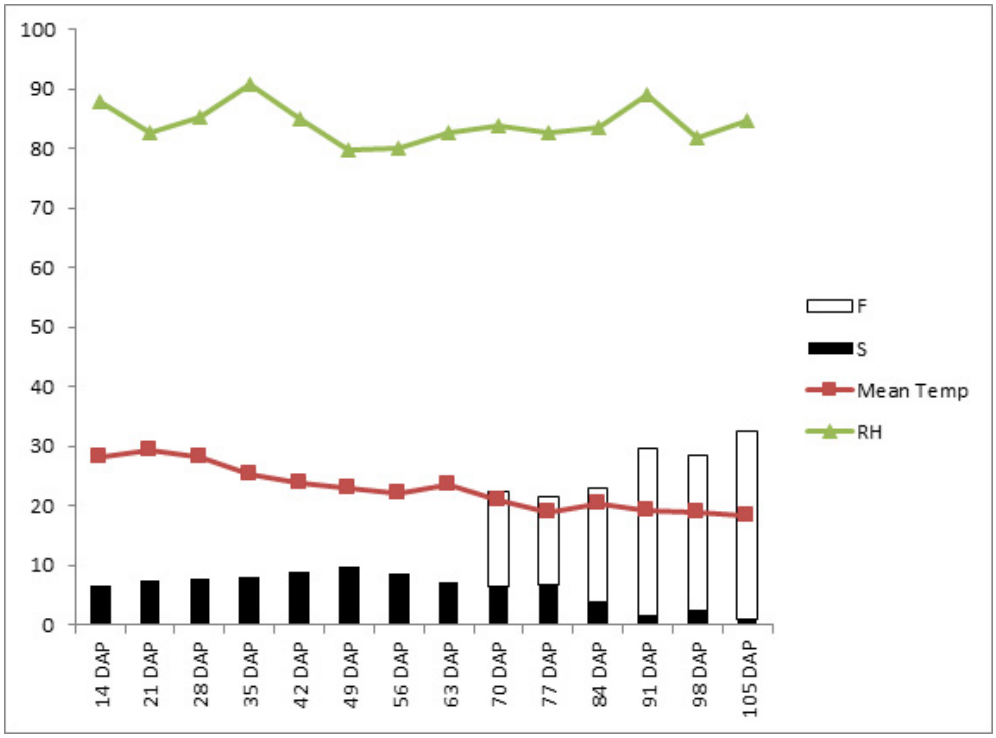

Fig. 1: Mean temperature (^{0}C), relative humidity(%) and age of the plant (DAP) on % shoot and % fruit damage by brinjal shoot and fruit borer

Correlation and regression analysis

In correlation studies (Table 1) regarding shoot infestation by *L. orbonalis*, it was found that maximum temperature (r=0.66), avg. mean temperature (r=0.63) showed a highly positive significant, while age of the plant (r= -0.78) showed a highly significant negative correlation (p=0.01) with pest; additionally, minimum temperature (r=0.58) also possessed positive significance (p=0.05) ; conversely, average relative humidity (r=-0.21) , total rainfall (r=0.27) and BSSH(r=0.39) possessed non-significant relationship with shoot infestation. The present findings were in conformity with Borah and Saikia (2017) and according to them per cent shoot infestation was positively correlated with both maximum and minimum temperature, total rainfall but negatively correlated with relative humidity.

While studying the correlation of per cent fruit infestation by *L. orbonalis* during present investigation, it was observed that, maximum temperature (r=-0.806), minimum temperature (r=-0.78), and avg. mean temperature (r=-0.81) showed a highly significant positive correlation (p=0.01) whereas age of the plant (r=0.90) possessed highly significant negative correlation. Moreover, average relative humidity (r=0.07), total rainfall (r=-0.43) and BSSH(r=-0.21) showed no significant relationship with fruit infestation.

Nonetheless, the present findings were not in agreement with the earlier workers (Singh *et al.* 2009 and Borah and Saikia, 2017). According to them, there was a significant positive correlation of fruit borer infestation on fruits with maximum and minimum temperature. Begam *et al*., 2016 also reported that temperature plays an important role for seasonal incidence of insect pests of *Bhut Joloki,* another important vegetable.

The multiple linear regression analysis was performed to estimate the prediction equation for per cent shoot infestation by *L. orbonalis* as mentioned below,

Shoot infestation (%) = 111.220-0.235 x Age of the plant -0.662xRH at R^2=0.93

The multiple linear regression analysis was performed to estimate the prediction equation for per cent fruit infestation by *L. orbonalis* as mentioned below,

Fruit infestation (%) = -428.714 + 0.777x Age of the plant + 3.336x RH at R^2=0.95

It has been observed that age of the plant and relative humidity had direct influence (Fig. 1) on per cent shoot damage (92.5%) and fruit damage (94.7%) by *L. orbonalis* of brinjal. The mean square error (MSE) and root mean square error (RMSE) was 0.720 and 0.85 for shoot damage; whereas 0.761 and 0.87 for fruit damage, respectively for this line of regression.

It can be concluded from the present findings that age of the plant and relative humidity plays an important role for per cent shoot and fruit damage of brinjal by *L. orbonalis*. Relative humidity may accelerate the oviposition of gravid female moth and increases viability of eggs.

ACKNOWEDGEMENT

The authors are grateful to the Director, NBAIR, Bangaluru for providing necessary fund to conduct the experiment. The authors also acknowledge the support received from Director of Research (Agri), Assam Agricultural University, Jorhat-Assam.

REFERENCES

Begam, N., Saikia, D. K. and Borkakati, R. N. (2016). Seasonal incidence of major insect-pests and their natural enemies of Bhut Jolokia. *Ann. Pl. Protec. Sci*., 24(2):259-264.

Birla, M. (2011). Studies on insect pest complex of brinjal, *Solanum melongena*(Linn.) and their management. MSc (Agri). Thesis submitted to JNKVV Jabalpur (MP), pp. 1-72.

Borah, N and Saikia, D. K. (2017). Seasonal incidence of major insect pests of brinjal and their natural enemies. *Indian J. Entomol*.,79(4): 449-455.

Chandrakumar, H. L.; Chakravarthy, A. K. and Putta Raju, T. B. (2008). Seasonal occurrence of major insect pests and their natural enemies on brinjal. *Current Biotica*., 2(1): 66-69.

Kataria, S.K., Pal, R.K., Kumar V. and Singh, P. (2019). Population dynamics of whitefly, *Bemisia tabaci* (Gennadius) as influenced by weather conditions infesting Bt cotton hybrids. *J. Agrometeorol*., 21(4): 504-509.

Nayak, U. S.; Baral, K.; Rath, L. K. and Mondal, P. (2012). Seasonal incidence of *Leucinodes orbonalis* Guenee in brinjal and the effect of abiotic factors on its population dynamics. *J. Plant Prot.Environ*., 9(20): 24-27.

Regupathy, A., Palanisamy, S., Chandramohan, N. and Gunathilagaraj, K. (1997). A guide on crop pests. Sooriya Desk Top Publishers, Coimbatore, pp.264.

Singh, R. K. R.; Devjani, P. and Singh, T. K. (2009). Population dynamics of *Leucinodes* or*bonalis. Annl. Pl. Pro. Sci.,* 17(2): 486-487.

Received : March 2020 : Accepted : May 2021