The Pharma Innovation

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Seasonal incidence of gundhi bug (*Leptocorisa acuta* Thunberg) on scented rice under organic farming and its correlation with different abiotic factors

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Abstract
The field experiment was conducted during *Kharif* 2020 at Instructional farm of BTC College of Agriculture and Research Station, Bilaspur, IGKV, Raipur (C.G.). The studies on the seasonal incidence of gundhi bug, *Leptocorisa acuta* Thunberg infesting scented rice that the first appearance of pest was started during second week of September 2020 (37th SMW) and attended peak (4.8 nymphs and adults/hill) in the first week of November 2020 (45th SMW). The correlation studies revealed that minimum temperature (r = -0.668), average temperature (r = -0.547), morning relative humidity (r = -0.671), evening relative humidity (r = -0.853), average relative humidity (r = -0.859) and rainfall (r = -0.616) had significant negative correlation and significantly positive correlated with sunshine hours (r = 0.767), while the maximum temperature showed non significant correlation with nymphs and adults of gundhi bug.

Keywords: Gundhi bug, seasonal incidence, correlation, abiotic factors

Introduction
Rice, *Oryza sativa* L. is one of an important cereal crops, being the staple food for more than 65 per cent of the world population (Mathur *et al.,* 1999) [9]. India is the second largest producer and consumer of rice in the world after China. In India, total area under rice cultivation is 43.79 million hectares with production of 109.70 million tones and productivity of 2494 kg ha-1 (Anonymous, 2018) [1]. The total production of rice in Chhattisgarh is 6.91 million tones and the total area is about 3.79 million hectares with productivity of 1482 kg ha-1 (Anonymous, 2018) [2].

Rice contains protein (8.1%), Vitamins, minerals, fibers (2.2%) and carbohydrates (77.1%) with a total of 349 calories (Bisen *et al.,* 2019) [4]. Rice contains the "Oryzinin", a protein which is responsible for softness of rice after cooking.

The average yield loss in rice have been accounted for 30 % loss due to stem borers, while plant hoppers 20%, leaf folder 10% and other pests causes, 25%, respectively (Krishnaiah and Varma, 2015) [7].

It is a staple crop, which is cultivated in diverse agro ecosystem in India and abroad. The crop is grown under different agro climatic conditions and production systems. However, the most common practice is the transplanting method in puddle condition. Organic farming is getting importance when people are polluting the soil and environment with harmful chemicals and pesticides. Organic farming provides the option of enriching the soil with organic compost and preventing soil from chemicals. Soil is origin for many food crops, hence the food we get from organic soils are good for health as well (Buragohain, 2020) [3].

Rice gundhi bug is the most dangerous insect pest in rice growing areas of India. This is a very damaging pest of rice and can reduce yield by as much as 30 per cent. Nymphs are more destructive than the adults. They prefer grains at the milky stage. Bugs damage rice by sucking the contents of developing grains from pre-flowering to soft dough stage. Both nymphs and adults feed on grains at the milky stage. Such grains remain empty or only partially filled. The panicles in heavy infested fields contain many shriveled and unfilled grains and usually remain erect. An infested field can be recognized by rice bug's pungent odour. Adults are active in the late afternoon and early morning, resting in the shaded areas (Pathak *et al.,* 1977) [8]. The present investigation were undertaken to study the seasonal incidence of gundhi bug on scented rice in the prevailing agroclimatic conditions of Chhattisgarh.

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Material and Method

The experiment was conducted at Instructional Farm BTC CARS, Bilaspur a constituent college of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). To study the seasonal incidence of gundhi bug *(Leptocorisa acuta* Thunberg) on scented rice and it's correlation with different weather parameters during *Kharif* 2020.

The scented rice seedlings were transplanted in the plot size of 10 m × 10 m with planting distance of 20 cm × 10 cm during first week of August with following all the improved recommended package of practices for raising the crop except plant protection measures.

To record the observation on gundhi bug infesting scented rice, ten hills were randomly selected from the plot. Weekly observations were taken after 18 days of transplanting till its harvest (Dutta and Roy, 2016) [5].

The weekly meteorological data on temperature, relative humidity, rainfall and sunshine hours were also recorded for whole of the cropping season from the meteorological observatory located at BTC CARS, Bilaspur (C.G.). The obtained data were correlated with various abiotic factors and correlation coefficients were worked out as suggested by Snedecor and Cochran, 1967 [12]. The graphical representation was applied to depict the seasonal incidence of the gundhi bug.

Results and Discussion

The seasonal incidence of gundhi bug was observed on scented rice var. Vishnubhog starting from second week of September 2020 to last week of November 2020 at weekly interval (Fig 1). The prevailing weather parameters during the experimental period have been shown in Table 1. The first occurrence of gundhi bug was observed on scented rice during second week of September 2020 (37th SMW) at late tillering stage. The maximum population (4.8 nymphs and adults/hill) was recorded during first week of November 2020 (45th SMW). During this period, the weather conditions prevailed were maximum (30.22ºC), minimum (12.28ºC) and average (21.25ºC) temperature, morning (87.42%), evening (49.14%) and average (68.28%) relative humidity, rainfall (0.00 mm) and sunshine (8.34 hours).

Sulagitti *et al.,* (2017) [11] who also reported the first appearance of gundhi bug during 2nd week of September and reached highest level during 4th week of October. Sharma *et al.,* (2004) observed maximum population of gundhi bug in second and third week of October. Girish *et al.,* (2012) observed gundhi bug population appeared during reproductive phase of the crop.

Correlation co-efficient was worked out between the number of nymphs and adults of gundhi bug and the weather factors *viz.*, temperature (maximum, minimum and average), relative humidity (morning, evening and average), rainfall and sunshine hours (Table 1).

The result revealed that the significant correlation with minimum temperature (r = -0.668), average temperature (r = -0.547), morning relative humidity (r = -0.671), evening relative humidity (r = -0.853), average relative humidity (r = -0.859), rainfall (r = -0.616) and significantly positive correlated with sunshine hours (r = 0.767).

The correlation studies showed that the incidence of gundhi bug on scented rice was significantly affected by temperature, relative humidity, rainfall and sunshine hours which indicated that the decrease in temperature, humidity and rainfall increased the population of gundhi bug with rise in sunshine increased the population of gundhi bug of rice.

The present finding are in conformity with Mohanta *et al.,* (2017) [10] who reported that gundhi bug showed significantly negative correlation with minimum temperature, average temperature, evening relative humidity, average relative humidity and rainfall. Gupta *et al.,* (2018) [6] were also observed the significant positive correlation between gundhi bug population and sunshine hours along with non-significant correlation with maximum temperature.
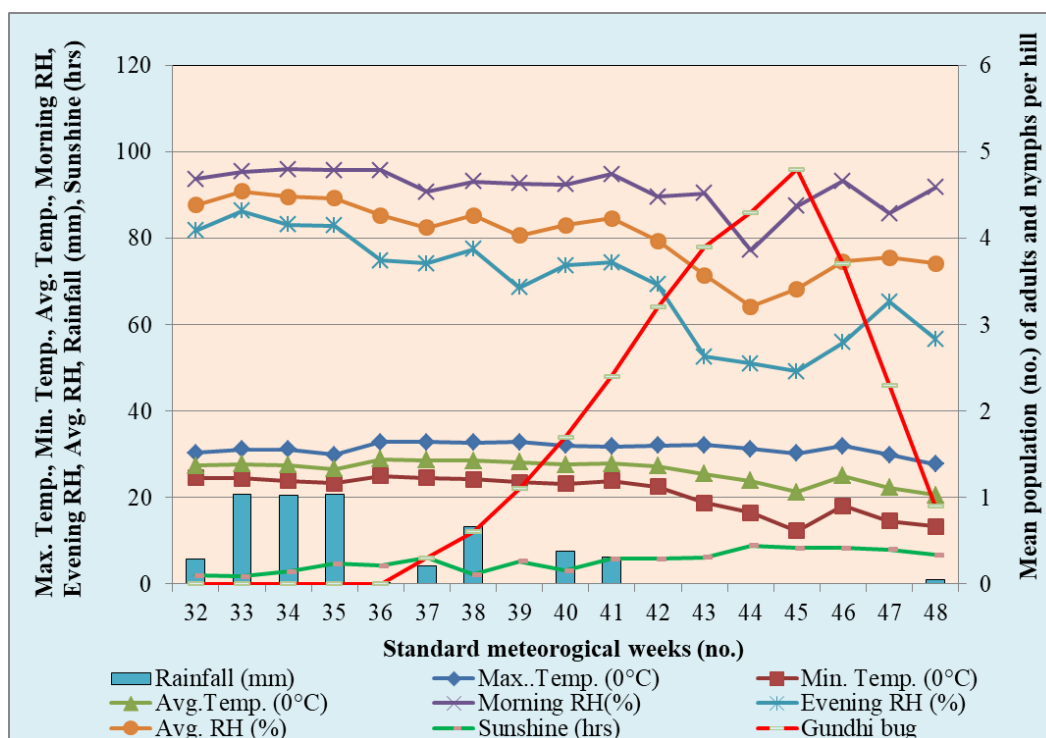

Fig 1: Seasonal incidence of gundhi bug *Leptocorisa acuta* Thunberg on scented rice at Bilaspur (C.G.) during *Kharif* 2020

Table 1: Correlation (r) and regression (byx) coefficient between meteorological parameters and nymphs and adultspopulation of Gundhi bug, *Leptocorisa acuta* Thunberg on scented rice

Meteorological parameters	Gundhi bug	
	R	b_{yx}
Maximum Temperature (°C)	-0.014	-
Minimum Temperature (°C)	-0.668**	-0.260
Average Temperature (°C)	-0.547**	-0.351
Morning RH (%)	-0.671**	-0.244
Evening RH (%)	-0.853**	-0.120
Average RH (%)	-0.859**	-0.186
Rainfall (mm)	-0.616**	-0.133
Sunshine (hrs)	0.767**	0.559

**Significant at 1%

Conclusion

The seasonal incidence studies of the pest revealed that the first appearance of gundhi bug (0.3 nymphs and adults/hills) was noticed during second week of September 2020 (37th SMW) at late tillering stage and observed gradual increase in the nymphs and adults population which attended peak (4.8 nymphs and adults/hill) in the first week of November (45th SMW) and remained active up to last week of November 2020 (48th SMW) at maturity stage of the crop.

The correlation studies between the gundhi bug and various weather parameters showed significant negative correlation with with minimum temperature (r = -0.668), average temperature (r = -0.547), morning relative humidity (r = -0.671), evening relative humidity (r = -0.853), average relative humidity (r = -0.859), rainfall (r = -0.616) and significant positive correlation with sunshine hours (r = 0.767). While, maximum temperature was found non significant correlation with the nymphs and adults population of the pest.

Acknowledgement

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