

## Population of major insect pests on brinjal crop and correlation with abiotic factors

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### Abstract

An experiment was carried out during *Rabi* season 2021-22 at a local farm in the Jodhpur region in Rajasthan on major insect pest of brinjal. The infestation of the leafhopper was a minimum of 16/3 leaves/ plant in the 10<sup>th</sup>SW of 2022 and a maximum of 108/3 leaves/plant in the 51<sup>th</sup> SW of 2021. The infestation of whitefly was a minimum of 9.2/3 leaves/plant in the 10<sup>th</sup>SW of 2022 and a maximum of 46/3 leaves/plant in the 1<sup>st</sup> SW of 2022. The mean population of whitefly had significant negative correlation with temperature while significant positive with average relative humidity. The mean population of leafhopper had significant negative correlation with maximum temperature while non-significant positive with mean relative humidity and average temperature, negative with minimum temperature.

**Keywords:** brinjal, leafhopper, whitefly, seasonal incidence

### Introduction

Brinjal or eggplant (*Solanum melongena*) belongs to the Solanaceae family and is native to India. Brinjal represents one of the most significant vegetables in South Asia, accounting for over half of the world's growing area [1]. It is significant for its nutritional, therapeutic and commercial benefits. Brinjal has 40 g of carbohydrates, 1.40 g of proteins, 0.30 g of minerals and the vitamins C, B and A in every 100 g of the edible part [2]. Brinjal is a significant and indigenous vegetable crop in India, commonly referred to as a cash crop for farmers. Brinjal crop area is predicted to be 0.51 million ha, with a production of 16.08 t/ha. Various pests predominate in the brinjal field from seedling through harvesting and the damage caused by brinjal pests varies from year to year depending on environmental circumstances [3]. A variety of insect pests attack the crop, but the most common are aphid (*Aphis gossypii*), jassid (*Amrasca biguttula*), whitefly (*Bemisia tabaci*) and shoot and fruit borer (*Leucinodes orbonalis*). Because insect abundance and spread are affected by abiotic variables, climatic conditions play an important role in pest biology. Temperature is the most significant abiotic element regulating insect growth and development and it is especially critical for insects since pest control tactics must be properly planned to be successful. However, relative humidity, rainfall, wind speed and temperature are the primary meteorological elements that influence an insect's activity. The relationship between pest activity and abiotic variables contributes to the development of prediction models that aid in pest incidence forecasting [4]. The current research sought to learn about the seasonal appearance of several insect pests and the influence of abiotic conditions on their distribution and abundance in the brinjal crop.

### Material and methods

A field experiment was conducted at a local farm in the Jodhpur region in Rajasthan, which is situated at an altitude of 26°13 N and a longitude of 73°04 E. The brinjal variety MEBH -10 was cultivated in Randomized Block Design (RBD) during the *Rabi* season 2021. The plot size measures

4.5m x 2m maintaining the row-to-row and plant-to-plant spacing as 50cm x 50cm respectively. The incidence of selected pests was recorded from sowing to harvesting of the crop. Observations on the population of sucking pests were recorded on three leaves one each from the top, a middle and bottom canopy of the five plants selected randomly in each replication. Weekly data on different abiotic parameters were also recorded. Data so obtained were then subjected to statistical analysis for the correlation coefficient.

### Results and discussion

The study indicates (Table - 1) the incidence of insect pests in the brinjal cropping system. The leaf hopper (*Amrasca biguttula*) incidence ranged from 16 to 108/3 leaves/plants and was highest during the 51<sup>st</sup> Standard week (SW) in 2021 and lowest during the 10<sup>th</sup> SW in 2022. The infestation of whitefly (*Bemisia tabaci*) was highest (46/3 leaves/plants) in the 1<sup>st</sup> SW in 2022 and lowest (9.2/3 leaves/plants) in the 10<sup>th</sup> SW in 2022. The mean population of whitefly had significant negative correlation with minimum temperature, maximum temperature and average temperature while significant positive with average relative humidity. The mean population of leafhopper had significant negative correlation with maximum temperature while non-significant positive with mean relative humidity and average temperature and non-significant negative with minimum temperature.

The correlation coefficient of leafhopper infestation with maximum temperature, minimum temperature, average temperature and average relative humidity was found - 0.5461\*, -0.2652, 0.4447 and 0.3412 respectively. The correlation coefficient of whitefly incidence with maximum temperature, minimum temperature, average temperature and average relative humidity was found -0.8094\*, -0.5902\*, -0.7456\* and 0.6746\* respectively. Almost similar results were also found by earlier researchers Sunda *et al.* found that the infestation of leafhopper was commenced from the 34<sup>th</sup> SW and touched its peak in the 40<sup>th</sup> SW and whitefly first appeared in the 34<sup>th</sup> SW and maximum

observed in the 39<sup>th</sup> SW [5]. The mean population of leafhopper was found positively correlated with average temperature. The mean population of whitefly was found significantly positive correlated with mean relative humidity. Anjali *et al.* revealed that the infestation of leafhoppers ranged from 15-110/3 leaves/ plants and was maximum in 52<sup>nd</sup> SW and minimum in March 12<sup>th</sup> SW [4]. The infestation of whitefly was a maximum of 9/3 leaves/ plants on January 2<sup>nd</sup> SW and a minimum was noted during

March 12<sup>th</sup> SW. Lal *et al.* resulted that leafhopper and whitefly populations were recorded peaked on the 1<sup>st</sup> SW [6]. Berani *et al.* were reported that the highest peak of leafhoppers recorded during the 45<sup>th</sup> SW [7]. Kumar *et al.* reported that the mean populations of leafhopper and whitefly were found positively correlated with relative humidity [8]. Tupe *et al.* found that the incidence of leafhopper and whitefly were touched its peak of 10.40 leafhoppers/3 leaves in the 46<sup>th</sup> SW [9].

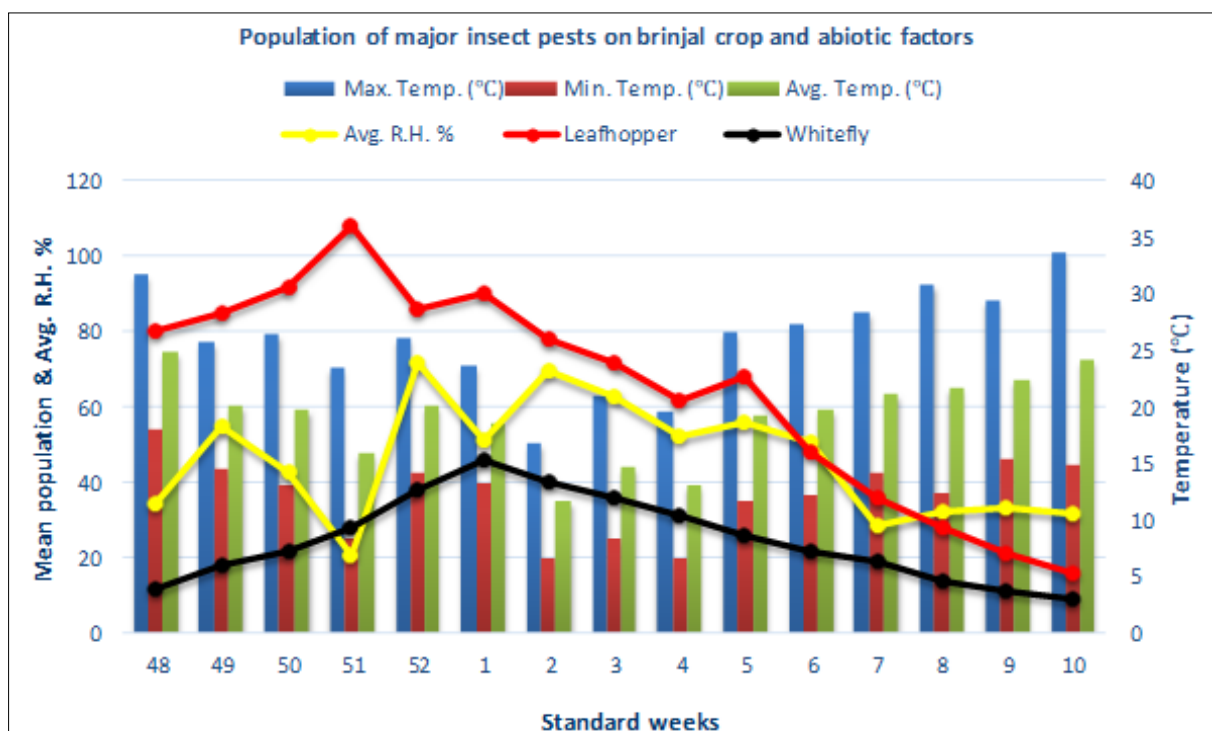
**Table 1:** Population of major insect pests on brinjal crop and abiotic factors

S.N.	SW	Max. Temp. (°C)	Min. Temp. (°C)	Avg. Temp. (°C)	Avg. R.H. %	Mean population per five plants	
						Leafhopper	Whitefly
1	48	31.8	18.1	24.95	34.5	80	12
2	49	25.7	14.5	20.10	55.0	85	18
3	50	26.4	13.2	19.8	43.0	92	22
4	51	23.5	8.4	15.95	20.5	108	28
5	52	26.2	14.2	20.20	72.0	86	38
6	1	23.7	13.3	18.50	51.0	90	46
7	2	16.8	6.7	11.75	69.5	78	40
8	3	21.1	8.4	14.75	63.0	72	36
9	4	19.6	6.6	13.10	52.5	62	31
10	5	26.7	11.7	19.20	56.0	68	26
11	6	27.4	12.3	19.85	50.5	48	22
12	7	28.4	14.1	21.25	28.5	36	19
13	8	30.8	12.5	21.65	32.5	28	14
14	9	29.5	15.5	22.50	33.5	21	11
15	10	33.7	14.8	24.25	31.5	16	9.2

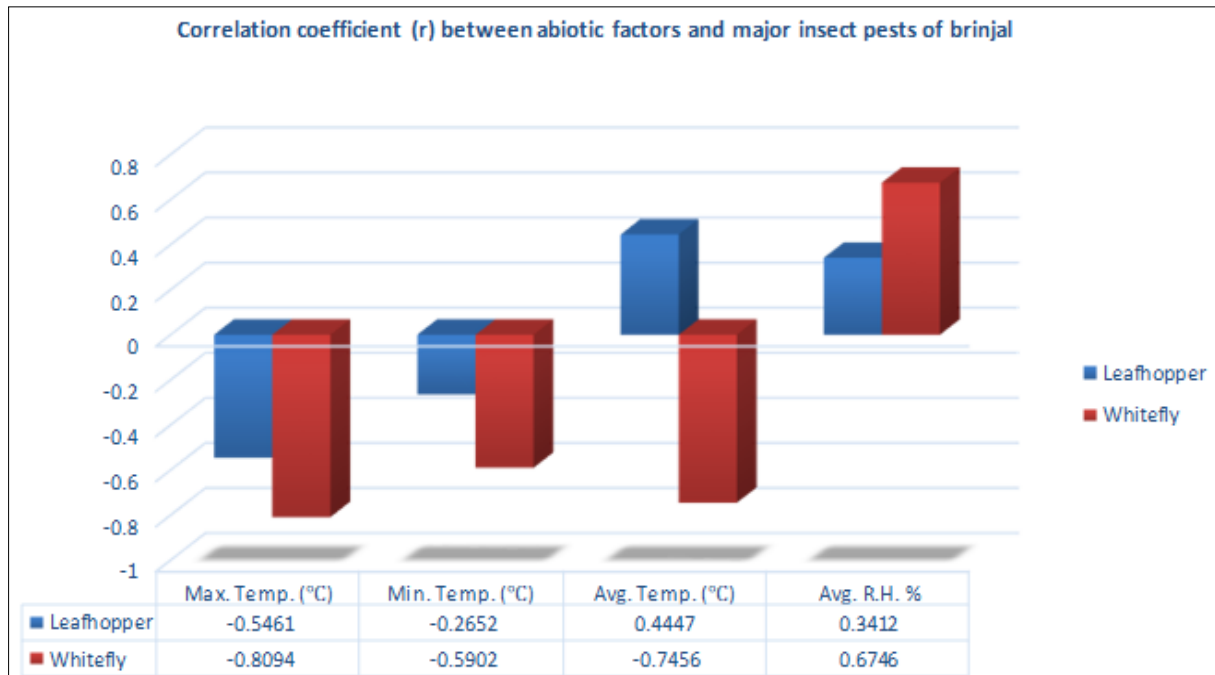
**Table 2:** Correlation coefficient (r) between abiotic factors and major insect pests of brinjal

Major pests of Brinjal	Max. Temp. (°C)	Min. Temp. (°C)	Avg. Temp. (°C)	Avg. R.H. %
Leafhopper	-0.5461*	-0.2652	0.4447	0.3412
Whitefly	-0.8094*	-0.5902*	-0.7456*	0.6746*

Significant @ p<.05



**Fig 1:** Population of major insect pests on brinjal crop and abiotic factors



**Fig 2:** Correlation coefficient (r) between abiotic factors and major insect pests of brinjal

### Conclusion

The following conclusions and recommendations are based on the current inquiry's findings and analysis. The major insect pests of brinjal were identified as leafhopper and whitefly with incidences of medium to high. A simple correlation showed that there was a strong and very significant relationship between the occurrence of insect pests on brinjal and several meteorological factors.

### References

1. Alam SN, Rashid MA, Rouf FMA, Jhala RC, Patel JR, Satpathy S *et al.* Development of an integrated pest management strategy for eggplant fruit and shoot borer in South Asia. Shanhua, Taiwan: AVRDC—the World Vegetable Center. Technical Bulletin No. 28. AVRDC Publication,2003:56:03-548.
2. Aycord WR. The nutritional value of Indian food and planning of satisfactory diets I.C.M.R., Special Report Series, 1983, 42.
3. Gangwar RT, Sachin JN. Seasonal incidence and control of insect pests of brinjal with special reference to shoot and fruit borer, *Leucinodes orbonalis* Guen. In Meghalaya. J. Res,1981:2(2):87-92.
4. Anjali M, Singh NP, Mahesh M, Swaroop S. Seasonal incidence and Effect of abiotic factors on population dynamics of major insect pests on brinjal crop. Journal Environment Research Development,2012:7(1):431-435.
5. Sunda NR, Kumar A, Jain HK. Seasonal incidence of major sucking insect pests of brinjal in relation to weather parameters. Indian Journal of Applied Entomology,2009:23(2):158-159.
6. Lal B, Bhadauria NS, Singh P, Tomar SPS. Seasonal incidence of sucking insect pests in brinjal and their natural enemies in gird region of Madhya Pradesh, India. Journal of Pharmacognosy and Phytochemistry,2019:8(4):2077-2079.
7. Berani NK, Patel JJ. Population fluctuation of sucking insect pest of brinjal and its relation with weather parameters. Journal of Entomology and Zoology Studies,2020:8(6):1613-1617.
8. Kumar S, Sachan SK, Kumar V, Gautam MPM, Kumar S. Population Dynamics of Brinjal Whitefly (*Bemisia tabaci* Gennadius) and Jassid (*Amrasca biguttula biguttula* Ishida) and their Correlation with abiotic parameters. J. Exp. Zool. India,2020:23(1):195-199.
9. Tupe AP, Lad AG, Pawar AA. Seasonal incidence of major insect pests of Brinjal in relation to weather parameters, The Pharma Innovation Journal,2022:11(12):2606-2609.