Original Research Article

Seasonal incidence of major insect pests of chilli and their correlation with weather parameters

ABSTRACT

An experiment was conducted to find the seasonal incidence of insect pests of chilli and their relation with weather parameters in Biswanath College of Agriculture, Assam. The experiment was conducted during*Rabi* 2022. During this study three sucking pests *viz*, *Aphis gossypii, Scirtothripsdorsalis,Amrascabiguttulabiguttula* and one borer pest *Helicoverpaarmigera* was found infesting the chilli plants. Weather parameters such as maximum temperature, minimum temperature, average relative humidity, rainfall and bright sunshine hours were correlated with the insect populations. Weekly observations revealed that the pest populations are highly influenced by weather parameters. Aphids were positively correlated with sunshine hours (r=0.503*), thrips showed negative correlation with average relative humidity (r= -0.620*), jassids had a negative correlation with minimum temperature (r=-0.701*) and fruit borer showed negative correlation with sunshine hours (r= -0625**). Rainfall had no significant effect on incidence of pest population in chilli.

Keywords: Chilli, Suryamukhi, thrips, aphids, jassid, population dynamics, correlation

1.INTRODUCTION

Chilli, scientifically known as *Capsicum annum L.,*belonging to the family Solanaceae is a widely cultivated crop in many parts of the world.It is an economically important vegetable and spice crop with culinary and therapeutic uses. It is packed with vitamin A and C, as well as minerals such as potassium, magnesium and manganese (Bhattand Karnatak, 2020). The origin of chilli can be traced back to South and Central America, specifically Mexico and Central America.Chilli plants are susceptible to a variety of pests, which can cause significant damage to the crop. The sucking pests of chilli include aphids, thrips, whiteflies, and mites, which feed on the sap of the plant, leading to weakened growth, reduced yields and

also prone to viral diseases.Fruit borer infestations also result in significant yield losses by making bore holes into the fruit making it unmarketable.

Weather conditions have a significant impact on pests that attack chilli plants. Changes in temperature, humidity, rainfall and other meteorological parameters can directly and indirectly affect the population dynamics, distribution and behavior of insect pests attacking chilli plants. Due to different agro-climatic conditions between regions, insects show different trend in the incidence and extent of crop damage. For effective pest control, studying the impact of various factors responsible for population fluctuations can help predict their occurrence in a particular area. (Begam *et. al*., 2016). The study on seasonal incidence of major insect pests of chilli were lacking under BiswanathChariali conditions of Assam, India and was undertaken to give an insight on the peak of their activities.

2. METHODOLOGY

The experiment was conducted at PG experimental farm in Biswanath College of Agriculture, Sonitpur, Assam during *Rabi* 2022-23. For this experiment Suryamukhi variety of chilli was used. The seedlings were raised in open nursery beds and 25-30 days olds seedlings were transplanted to a field of 342 sq. m. with each plot size of 9 sq. m. and plant to plant distance of 60cm x 60 cm. The experiment was carried out in Randomized Block Design. All the required agronomic practices were carried out at regular intervals. Pest population was recorded from 5 random plants in each plot. The observation of pest population was taken regularly at weekly intervals. To determine the effect of various weather parameters on incidence of insect pests of chilli, the weekly meteorological data was collected from Department of Meteorology, Biswanath College of Agriculture, Assam Agricultural University.The data collected during seasonal incidence studies of insect pests affecting chilli crops were subjected to correlation and multiple regression with various weather parameters viz., maximum temperature, minimum temperature, average relative humidity, rainfall and bright sunshine hours.

3. RESULT AND DISCUSSION

During the course of the investigation aphids, thrips, jassids and fruit borer were recorded as the major insect pests of chilli. The results pertaining to the seasonal incidence of these insect pests and their respective peaks are presented and discussed in table 1and 2.

3.1 APHID (*Aphis gossypii* Glover)

The first occurrence of aphid was observed during thefirst week of November 2022 (45 SMW) with a mean population of 5.82/leaf. Peak population was observed during 49 Standard Meteorological Week with a population of 12.54/leaf. The population of aphids varied from 3.73/leaf to 12.54/leaf during different weeks of observation.The mean aphid population showed a non-significant positive correlation with maximum temperature (r=0.227). Minimum temperature (r= -0.145), average relative humidity (r= -

0.479) and rainfall (r= -0.449) resulted in a non-significant negative correlation. The average aphid population recorded a significant positive correlation with bright sunshine hours (r=0.503). The findings of Kachave*et al.*(2020) in which it was observed that aphid had a positive association with bright sunshine hours on tomatoes are supported by this finding.

3.2 THRIPS (*Scirtothripsdorsalis* Hood)

The appearance of thrips was observed in third week of observation (47 SMW). Peak population was found during 51st SMW with a population of 5.86/leaf. In thrips, both maximum temperature (r = -0.204) and minimum temperature (r = -0.441) displayed non-significant negative correlations. Similarly, bright sunshine hours (r = -0.137) and rainfall (r = -0.083) also exhibited non-significant negative correlations with thrips population levels. Average relative humidity (r = -0.620) demonstrated a significant negative correlation with thrips population. Similar results were documented by Begam *et. al*.(2016) who found thrips to have a significant negative correlation with average relative humidity. The differences in the peak activity of thrips observed during different weeks of observation may be attributed to the climatic conditions, date of transplantation, and the specific chilli variety employed in the experiment.

3.3 JASSID(*Amrascabiguttulabiguttula* Ishida)

Jassid or leafhopper population was first observed during 45 SMW. The population fluctuated during different weeks of observation. The average population of leafhoppers displayed a prominent and statistically significant negative correlation (r = -0.701) with minimum temperature. Maximum temperature (r = -0.399) and rainfall (r = -0.557) were also observed to exhibit non-significant negative correlations with average leafhopper population, while bright sunshine hours showed a similarly non-significant negative correlation (r = -0.204).The present findings are supported by the work of Kumar and Singh (2022) who reported that minimum temperature had significant negative correlation with mean population of leafhopper in tomato. Waman *et. al.* (2023) also found highly significant negative correlation of leafhopper population with minimum temperature in Okra.

3.4 FRUIT BORER (*Helicoverpaarmigera*Hubner)

First appearance of fruit borer population was observed during 50th SMW. Highest population was found during 4th SMW with a mean population of 2.36/plant. The population of fruit borer displayed a negative and non-significant correlation (r = -0.407) with maximum temperature. Similarly, it exhibited negative and non-significant correlations with minimum temperature (r = -0.701) and average relative humidity (r = -0.128). Rainfall demonstrated a positive but non-significant correlation (r = 0.056). Bright sunshine hours, revealed a negative and highly significant correlation (r = -0.625) with mean fruit borer population. The present findings corroborate the findings of Bhatt andKarnatak (2020) who found significant negative correlation of fruit borer population with bright sunshine hours in chilli.

Table 1. Seasonal incidence of major insect pests in chilli crop

SMW No.	*A. gossypii* No./leaf	*S. dorsalis* No./leaf	*A. biguttulabiguttula*No./leaf	*H. armigera*No./plant	Temperature		BSSH (hrs)	Average RH (%)
					Maximum(°C)	Minimum (°C)		
45	5.82	0.00	0.20	0.00	29.60	14.31	9.27	72.21
46	6.07	0.00	0.00	0.00	29.57	13.88	8.83	72.42
47	7.23	0.60	2.93	0.00	27.65	11.32	8.45	73.42
48	6.07	2.98	2.00	0.00	27.71	11.38	9.11	71.50
49	12.54	5.75	1.13	0.00	27.88	11.87	8.96	68.14
50	7.86	4.32	4.60	0.26	27.31	11.42	8.38	70.00
51	10.20	5.86	4.20	0.31	26.62	12.21	7.69	72.35
52	4.40	1.03	2.60	1.60	26.31	13.25	7.44	73.92
1	4.82	1.12	1.00	1.02	21.87	11.20	2.6	77.21
2	8.06	3.13	3.97	0.82	24.57	8.01	7.91	68.35
3	6.07	4.63	3.46	1.18	25.82	9.34	5.73	68.00
4	5.93	4.12	4.26	2.36	23.65	8.44	2.84	68.57
5	5.24	3.60	3.07	1.32	25.67	9.77	7.13	69.50
6	5.80	2.94	2.48	2.32	27.21	13.24	4.04	71.88
7	3.73	3.00	0.80	0.40	23.08	13.58	1.92	73.81

Table 2. Correlation coefficient of various pests population with weather parameters

Insect pests	Maximum temperature (°C)	Minimum temperature (°C)	Average Relative humidity (%)	Bright sunshine hours(hr)	Rainfall(mm)
A. gossypii	0.227^{NS}	-0.145^{NS}	-0.479^{NS}	**0.503***	-0.449^{NS}
S. dorsalis	-0.204^{NS}	-0.441^{NS}	**-0.620***	-0.137^{NS}	-0.083^{NS}
H. armigera	-0.4670^{NS}	-0.186^{NS}	-0.128^{NS}	**-0.625****	0.0556^{NS}
A. biguttulabiguttula	-0.399^{NS}	**-0.701***	-0.432^{NS}	-0.204^{NS}	-0.557^{NS}

`*Significant at 0.05 level; **Significant at 0.01 level

4. CONCLUSION

The findings from the present study suggest that the seasonal abundance and activity of insect pests of chilli crop are significantly impacted by a variety of abiotic factors. Weather parameters such as maximum temperature, minimum temperature, average relative humidity and bright sunshine hours played a significant role in regulating and appearance of the pest population density. These findings can help in implementing effective pest control measures by identifying the susceptible stages of these pests and when to take control measures.

REFERENCES

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

Bhatt, B. and Karnatak, A. K. Seasonal incidence of major insect pests of chilli crop and their correlation with abiotic factors. Int. J. of Chem. Stud.,2020; 8(2): 1837- 1841.

Havanoor, R., & Rafee, C. M. (Seasonal incidence of sucking pests of chilli (*Capsicum annum* L.) and their natural enemies. J. of Entomol and Zool Stud., 2018; 6(4), 1786-1789.

Kachave, D. R., Sonkamble, M. M. and Patil, S. K. Population dynamics of major insect pests infesting to tomato, *Lycopersicon esculentum* (Miller). J of Pharmacognosy and Phytochemistry,2020; 9(3): 344-348.

Kumar, Shivam, and Sameer Kumar Singh. "Incidence of insect pests on tomato under the influence of weather factors."Environment and Ecology 2022; 40 (3): 1144—1149.

Reddy, A. A., Reddy, N., Anitha Kumari, D., and Rao, M. Seasonal incidence of thrips and relation to abiotic factors in chilli (*Capsicum annum* L.). J. of Entomo. and Zool. Stud,2017; 5(5), 88-91.

Samanta, A., Sen, K., and Basu, I. Incidence study of yellow mite and thrips and their natural enemies in relation to weather parameters on chilli. J. of Entomol. and Zool. Stud, 2017; 5(4), 1213-1216.

Waman, S. U., A. R. Hajare, D. R. Bankar, S. A. Pawar, and S. R. Kulkarni. Influence of weather parameters on seasonal incidence of sucking pests and their natural enemies on okra. The Pharma Innovation Journal 2023; 12(12): 1593-1596

Yadav, S., Kumar, L., Jakhar, A., Kumar, H., Jat, M. K., Kapoor, P. and Kumar, V. Population dynamics of major sucking insect pests on chilli (*Capsicum annum* L.). J. of Agri. and Eco., 2022;13: 79-91.

Suhasini , L., Bhanusree , M. R., Venkatram , A., Harika , M., Malathi , S., &Rao , M. J. M. (2023). Evaluation of Chilli Varieties for Growth, Yield and Thrips Incidence in Central Telangana Zone. International Journal of Environment and Climate Change, 13(4), 285–291. https://doi.org/10.9734/ijecc/2023/v13i41735

Aarwe, R., Shukla, A., Patidar, S., &Bajpai, R. (2022).Arthropod Pests of Chilli and Associated Natural Enemies in Kymore Plateau and Satpura Hill Zone of Madhya Pradesh (India). International Journal of Environment and Climate Change, 12(6), 55–64. https://doi.org/10.9734/ijecc/2022/v12i630687