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Seasonal abundance of tomato fruit borer, *Helicoverpa armigera* (Hubner) in relation to weather parameter in Manipur valley situations

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Abstract
A study on the seasonal incidence of *Helicoverpa armigera* on tomato was studied at the Vegetable Research Farm, College of Agriculture, Central Agricultural University, Imphal during two consecutive Rabi seasons of 2020-21 and 2021-22. The study revealed that the first appearance of *Helicoverpa armigera* in both the years was observed from 7th standard meteorological week i.e. 12th-18th February, with similar mean population of 0.13 larvae per plant. Thereafter the larval population gradually increased and attained maximum population of 2.23 and 2.15 larvae per plant on 12th and 13th standard meteorological week in both the years respectively. During 2020-21, the correlation studies showed that there was positive and significant association with maximum temperature. However, in 2021-22, Minimum temperature showed positive and significant correlation with larval population.

Keywords: Tomato, *Helicoverpa armigera*, seasonal incidence, correlation

Introduction
Tomato is an important commercial vegetable crop of India. Fresh/chilled tomatoes are exported from India to different countries like United Arab Emirates, Nepal, Qatar, Maldives, Oman, Bangladesh, Singapore, Pakistan, Saudi Arabia etc. (Anon., 2018) [1]. Several factors however, affect the yield of tomato. Among the biotic stress, tomato fruit borer (*Helicoverpa armigera*) is one of the most destructive pests of tomato causing serious damage with a yield loss of 55 percent (Talekar *et al*., 2006) [12]. It is a serious and polyphagous pest, attacking nearly 200 cultivated and wild host plants and a key constraint in production of several crop including chickpea, pigeonpea, chilli, tomato, okra, cotton, maize, sunflower, tobacco (Singh and Yadav, 2009; Dhillon *et al*., 2012; Ahmad *et al*., 2014) [11, 4, 2]. Weather factors do play an important role in regulating the population of *Helicoverpa armigera* (Hameed *et al*., 2015) [5]. For developing proper pest management strategy, information on seasonal incidence of insect pests is necessary with weather factors as it can give an idea of the environmental factors that regulate the occurrence of the pest and helps in understanding the ecology and behavior of insect pests. Keeping this in view, the present investigation was conducted to study the seasonal incidence of *Helicoverpa armigera.*

Materials and Methods
A field experiment was carried out to determine the seasonal activity of *Helicoverpa armigera* on tomato variety Manikhamnu for two consecutive *Rabi* seasons 2020-21 and 2021-22 at the Vegetable Research Farm, College of Agriculture, Central Agricultural University, Imphal, Manipur. The experiment was laid out in four plots measuring 3m x 4m each. Weekly observations were taken on larval population on randomly selected 10 plants from each plot starting from the pest appearance till harvest. Correlation studies on seasonal abundance of fruit borer in relation to weather factors *viz*., maximum temperature, minimum temperature, relative humidity (R.H.), rainfall and sunshine hours were studied. The weekly meteorological data during the experimental periods were collected from ICAR research complex for NEH region, Lamphel, Manipur.

Results and Discussion

The data on the larval population of *Helicoverpa armigera* in relation to weather parameter during 2020-21 and 2021-22 are presented in table 1 and 2. During 2020-21, the pest incidence was first observed in 7th SMW (12-18 February) with mean larval population of 0.13 larvae per plant. The larval population was found to be increased gradually and reached its peak level of 2.23 larvae per plant, which was attained during 12th SMW (19-25 March). Thereafter, the pest incidence was found to decline in the following weeks till the end of cropping season. Similarly, during 2021-22, the pest incidence was first observed during 7th SMW (12-18 February) with population of 0.13 larvae per plant. The pest population gradually increased and attained its peak population of 2.15 larvae per plant in 13th SMW (26 March-1 April). Then, the pest population decline till the harvest of cropping season. The results obtained here are in conformity with the findings of Chakraborty (2011) [3], Mandloi (2015) [9], Harshita *et al*., (2018) [6] who reported that the incidence of *Helicoverpa armigera* commenced from first week of February with the peak population in March. Shinde *et al.* (2013) [10] also reported that the second peak period of *Helicoverpa armigera* was from 13th March to 4th April.

Table 1: Seasonal incidence of fruit borer, *Helicoverpa armigera* (Hubner) on tomato and their correlation with weather parameters during *Rabi*, 2020-21

Sl. No.	Standard meteorological week (SMW)	Mean larval population/plant	Weather parameters					
			Temperature (ºC)		Relative Humidity (%)		Rainfall (mm)	Sunshine hours
			Max.	Min.	A.M.	P.M.		
1.	7	0.13	26.5	6.7	92.3	28.7	0.0	9.2
2.	8	0.25	26.9	9.9	88.3	35.1	0.0	6.8
3.	9	0.78	27.2	13.2	85.3	32.4	0.5	8.1
4.	10	1.00	26.9	13.3	85.3	40.3	1.6	6.8
5.	11	1.50	30.0	11.9	80.3	30.0	0.0	9.1
6.	12	2.23	30.3	12.8	71.6	25.0	0.0	6.9
7.	13	1.80	28.8	13.4	77.6	35.6	7.8	5.8
8.	14	1.48	29.5	14.0	83.0	34.7	1.0	6.0
9.	15	1.10	30.7	16.4	75.1	35.9	0.9	7.4
10.	16	0.43	24.4	13.4	67.1	40.3	4.4	5.3

Correlation studies on weather factors with larval population were analyzed during both the cropping seasons and presented in table 3. The study revealed that in the year 2020-21, there was positive significant correlation with maximum temperature (r= 0.767*), and positive non-significant correlation with minimum temperature (r= 0.509) and rainfall (r= 0.193) while negative non-significant association was found with morning relative humidity (r= -0.460), evening relative humidity (r= -0.349) and sunshine (r= -0.195). However, during the year 2021-22, there was positive significant correlation with minimum temperature (r= 0.654*) and positive non-significant association with maximum temperature (r= 0.593), morning relative humidity (r= 0.102), evening relative humidity (r= 0.423) and rainfall (r= 0.035) while sunshine (r= -0.491) showed negative non-significant association with fruit borer population. Vijay *et al*., (2017) [8] also reported that there was positive and significant association between fruit borer population and mean atmospheric temperature. The present findings are also in partial agreement with that of Kumar *et al*., (2015) [7] who reported that the correlation between larval population and maximum temperature, minimum temperature and rainfall was positive while, negative correlation was found with relative humidity.

Table 2: Seasonal incidence of fruit borer, *Helicoverpa armigera* (Hubner) on tomato and their correlation with weather parameters during Rabi, 2021-22

Sl. No.	Standard Meteorological week (SMW)	Mean larval population/plant	Weather parameters					
			Temperature (ºC)		Relative Humidity (%)		Rainfall (mm)	Sunshine hours
			Max.	Min.	A.M.	P.M.		
1.	7	0.13	23.7	5.3	85.4	27.3	0.0	9.6
2.	8	0.30	22.4	8.3	86.4	37.7	1.4	7.2
3.	9	0.90	26.6	9.6	81.7	30.7	0.0	9.1
4.	10	1.00	30.2	11.3	78.0	26.7	0.0	8.7
5.	11	1.33	32.1	14.4	79.0	32.6	0.0	8.3
6.	12	1.50	30.6	14.9	78.0	35.4	3.3	5.6
7.	13	2.15	25.7	17.0	84.7	63.4	4.9	2.7
8.	14	1.43	28.9	18.6	81.6	49.7	0.0	4.5
9.	15	0.90	27.1	18.1	84.4	60.1	7.9	2.5
10.	16	0.20	24.2	14.7	70.3	46.7	6.6	5.6

Table 3: Correlation coefficient (r) between fruit borer, *Helicoverpa armigera* and weather parameters during 2020-21 and 2021-22.

	Weather parameters					
	Temperature (ºC)		Relative humidity (%)		Rainfall (mm)	Sunshine (hours)
	Maximum	Minimum	AM	PM		
Larval population (2020-21)	0.767**	0.509	-0.460	-0.349	0.193	-0.195
Larval population (2021-22)	0.593	0.654*	0.102	0.423	0.035	-0.491

*. r significant at 0.05 level; **r significant at 0.01 level

Conclusion

From the present study, it is concluded that the incidence of *Helicoverpa armigera* commenced from 7th SMW in both the seasons, thereafter the pest population gradually increased and maximum larval population was recorded in 12th SMW in 2020-21 and 13th SMW in 2021-22. It is recorded from the present investigation that the maximum fruit borer population was observed during March-April, i.e., during fruiting stage of the crop. During the cropping season 2020-21, maximum temperature showed significant positive correlation with fruit borer while minimum temperature showed positive and significant correlation with fruit borer during 2021-22.

References

1. Anonymous. Horticultural Statistics at a Glance; c2018.
2. Ahmad S, Ansari MS, Husain M. Effect of insecticides on the management of *Helicoverpa armigera* in chickpea agro-ecosystem. Annals of Plant Protection Sciences. 2014;22(1):107-111.
3. Chakraborty K, Revadi S, Chakravarthy AK. Incidence and abundance of tomato fruit borer, *Helicoverpa armigera* (Hubner) in relation to the time of cultivation in the northern parts of West Bengal, India. Current Biotica. 2011;5(1):91-97.
4. Dhillon MK, Pampapathy G, Wadaska RM, Sharma HC. Impact of *Bt* transgenic cottons and insecticides on target and non-target insect pests, natural enemies and seed cotton yield in India. The Indian Journal of Agricultural Sciences. 2012;82(3):284-254.
5. Hameed A, Shahzad MS, Ahmad S, Karar H. Forecasting and modeling of *Helicoverpa armigera* (Hub.) in relation to weather parameter in Multan, Punjab, Pakistan. Pakistan Journal of Zoology. 2015;47(1):15-20.
6. Harshita AP, Saikia DK, Deeve A, Bora LC, Phukan SN. Seasonal incidence of fruit borer, *Helicoverpa armigera* and its eco-friendly management in tomato, *Solanum lycopersicum.* International Journal of Chemical Studies. 2018;6(5):1482-1485.
7. Kumar S, Singh G, Singh DV, Sidhartha NR. Seasonal incidence of larval population of gram pod borer *Helicoverpa armigera* (Hubner.) on chickpea in Meerut. Progressive Agriculture. 2015;15(2):259-262.
8. Kumar V, Mahla MK, Lal J, Singh B. Effect of abiotic factors on the seasonal incidence of fruit borer, *Helicoverpa armigera* (Hub.) on tomato with and without marigold as a trap crop. Journal of Entomology and Zoology Studies. 2017;5(2):803-807.
9. Mandloi R, Pachori R, Sharma AK, Thomas M, Thakur AS. Impact of weather factors on the incidence of major insect pests of tomato. An International Quarterly Journal of Environmental Sciences. 2015;8:07-12.
10. Shinde YA, Patel BR, Mulekar VG. Seasonal incidence of gram caterpillar, *Helicoverpa armigera* (Hub.) in chickpea. Current Biotica. 2013;(1&2):79-82.
11. Singh SK, Yadav DK. Life table and biotic potential of *Helicoverpa armigera* (Hübner) on chickpea pods. Annals of Plant Protection Sciences. 2009;17:90-93.
12. Talekar NS, Open RT, Hanson P. *Helicoverpa armigera* management: A review of AVRDC's research on host plant resistance in tomato. Crop Protection. 2006;5:461-467.