Biological Forum – An International Journal **16(5): 78-80(2024)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Seasonal Occurrence of Bihar Hairy Caterpillar and Tobacco Caterpillar on Black gram under Unsprayed Conditions

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(Received: 04 March 2024; Revised: 21 March 2024; Accepted: 17 April 2024; Published: 15 May 2024)
(Published by Research Trend)

ABSTRACT: The infestation of Bihar hairy caterpillar (*S. obliqua)* appeared in 1st week of August (32th SWM) with an average population of 0.26 larvae/mrl. The peak larval population (3.80 larvae/mrl) was observed during 2nd week of September (37th SMW). The infestation of Bihar hairy caterpillar had positive correlation with minimum temperature (r = 0.33), morning relative humidity (r = 0.33) and evening relative humidity (r = 0.62) and whereas, negative correlation with rainfall (r = -0.55) and maximum temperature (r = -0.25). Tobacco caterpillar (*Spodoptera litura* Fab.) was observed throughout the crop growth period *i.e.,* from 1st week of August to 1st week of October. The infestation gradually increased and reached its peak (3.27 larvae/mrl) during 2nd week of September (37th SMW). The infestation of Tobacco caterpillar was positive correlated with minimum temperature (r = 0.34) and morning relative humidity (r = 0.38) and evening relative humidity (r = 0.62), while negatively correlated with rainfall (r = -0.28) and maximum temperature (r = -0.11).

Keywords: temperature, caterpillar, Tobacco Caterpillar, Black gram, *Vigna mungo.*

INTRODUCTION

Black gram, *Vigna mungo* (Linn.) popularly known as urd beanormash kalai or black bean is native of India andthe fourth important pulse crop with high nutritive value (Singh, 2004). The average 2.5 to 3.0 million tonnes of pulse production are lost annually due to pest problems (Rabindra *et al*., 2004). The vegetative stage is mostly preferred by defoliator which cause noticeable damage. Bihar hairy caterpillar (*Spilosoma obliqua*) is a polyphagous pest and affecting numerous important crops, including vegetables, legumes, oil seeds and medicinal plants. Lal (2008) reported that among 64 insect-pests there were four pests noticed as major leaf defoliators namely, Bihar hairy caterpillar, tobacco caterpillar, green semilooper and pod borer. Keeping this in view, the present study was undertaken toknow the seasonal incidence of insect pests on black gram and their relationship with abiotic factors.

Despite its importance, black gram faces several challenges, and insect pests are a major concern for farmers. Among the pests affecting black gram, two notable ones are the Bihar hairy caterpillar (*Spilosoma obliqua*) and tobacco caterpillar (*Spodoptera litura*). These caterpillars can cause substantial damage to the crop by feeding on leaves, flowers, and pods. Understanding the seasonal incidence of these pests is crucial for developing effective pest management strategies. Monitoring their population dynamics under unsprayed conditions provides valuable insights into their life cycles, infestation patterns, and potential risks to the crop. This knowledge is instrumental in devising timely and targeted interventions to mitigate the impact of these caterpillars on black gram cultivation. The investigation was conducted throughout the growth season of black gram, monitoring the incidence of these caterpillars at various stages of crop development. The study also correlated the observed population dynamics with key weather parameters such as temperature, rainfall, relative humidity, and wind velocity.

MATERIALS AND METHODS

A field experiment was carried out at the ARS Ummedganj-Kota, located approximately 12 km to the east of Kota. The research station is situated at an altitude of 258 meters above mean sea level, at coordinates 25°11′0″ N latitude and 75°50′0″ E longitude. During the kharif season of 2020, a field experiment was conducted to study the population dynamics of Bihar hairy caterpillar and Tobacco caterpillar in black gram crops. The Pratap urd – 1 black gram variety was chosen for the experiment. The experimental design employed was a Randomized Block Design (RBD), with a planting arrangement of 30 × 10 cm and plot dimensions of 4.2 × 5.0 m². Throughout the entire growth season of the black gram crop, continuous monitoring was conducted to observe the fluctuations in the populations of Bihar hairy caterpillar and tobacco caterpillar. The observation of Bihar hairy caterpillar and tobacco caterpillar

population was recorded per meter row length using the "vertical beat sampling technique" (Southwood, 1978). This was done in five randomly selected and tagged plants in a plot at weekly intervals, starting from 7 days after germination until the harvest of the crop. The data collected, including Bihar hairy caterpillar and Tobacco caterpillar populations, was correlated with various weather parameters such as temperature, rainfall, relative humidity, and wind velocity. These weather parameters were recorded from the Meteorology section of Agriculture Research Station in Kota. Mean population values were calculated using statistical procedures. Subsequently, the collected data underwent further statistical analysis, including the calculation of correlation coefficients, to discern potential relationships between the collected variables.

RESULTS AND DISCUSSION

The population dynamics of Pod borer and Spotted pod borer on black gram showed in Table 1 and Fig. 1.

Bihar hairy caterpillar (*Spilosoma obliqua*). The *S. oblique* appeared during 32th SMW (1stweek of August) with an average population of 0.26 larvae/mrl/ 5 plant. The infestation increased gradually and attained its peak in the 2nd week of September (37th SMW) with a population of 3.80 larvae/mrl / 5 plant.

The infestation of was positively correlated minimum temperature (r = 0.33) relative humidity morning (r = 0.33) and relative humidity evening (r = 0.62), while negative significant correlation with rainfall (r = -0.17) and maximum temperature (r = -0.25).The correlation study was also supported by Yadav *et al.* (2015a) who reported that relative humidity (morning and evening) showed positive correlation (r = 0.24 and 0.36 respectively). The present finding is accordance with the results obtained by Berani *et al*. (2017) similar result found positive significant correlation (r = 0.46) between minimum temperature. Mohapatra *et al*. (2018) fount the positive correlation with minimum temperature (r = 0.46). Biswas and Banerjee (2019) showed the negative correlation with rainfall (r = -0.62).

Tobacco caterpillar (*Spodoptera litura.* The incidence of *S. litura* was started on black gram the 2nd week of August (32th SMW) with an average population of 0.13 larvae/mrl. Infestation increased and reached it' speak (3.27 larvae/mrl) in the 2nd week of September (37th SMW). When the maximum temperature (34.86), minimum temperature (23.21), morning relative humidity (81.71), evening relative humidity (76.14) and rainfall was 00 mm. Thereafter, the infestation declined and reached to its minimum levels (0.20 larvae/mrl / 5 plant) during 1st week of October (40th SMW). The infestation of was positively correlated minimum temperature (r = 0.34) relative humidity morning (r = 0.38) and relative humidity evening (r = 0.62), while negative significant correlation with rainfall (r = -0.11) and maximum temperature (r = -0.38).The correlation study was also supported by Yadav *et al.* (2015a) who reported that relative humidity (morning and evening) showed positive correlation respectively (r = 0.06 and 0.31). Mohapatra *et al*. (2018) fount the negative correlation rainfall (r = -0.067) tobacco caterpillar on black gram. The infestation of was positively correlated minimum temperature (r = 0.34) relative humidity morning (r = 0.38) and relative humidity evening (r = 0.62), while negative significant correlation with rainfall (r = -0.11) and maximum temperature (r = -0.38).

Table 1: Population dynamics of bihar hairy caterpillar and tobacco caterpillar on black gram variety Pratap urd – 1 during *kharif* 2020.

SMW (Duration)	Date of observation	Temperature (°C)		Relative humidity (%)		Rainfall (mm)	No. of larvae/mrl	
		Max.	Min.	Morn.	Even.		Bihar hairy caterpillar	Tobacco Caterpillar
31(30 Jul–05 Aug)	3-8-2020	35.43	22.79	79.00	55.86	63	0.00	0.00
32(06 Aug–12 Aug)	10-8-2020	34.71	21.90	80.14	67.86	11	0.26	0.13
33(13 Aug–19Aug)	17-8-2020	35.40	23.69	65.71	57.14	111	0.73	0.46
34(20 Aug –26 Aug)	24-8-2020	34.64	23.14	84.83	64.57	107.5	1.53	1.26
35(27 Aug – 02 Sep)	31-8-2020	34.29	22.86	84.29	77.29	43.1	2.40	2.20
36(03 Sep – 09 Sep)	7-9-2020	34.29	22.93	84.14	82.29	93	3.06	2.60
37(10 Sep – 16 Sep)	14-9-2020	34.86	23.21	81.71	76.14	0.00	3.80	3.27
38(17 Sep – 23 Sep)	21-9-2020	35.80	23.00	81.71	75.14	0.00	3.26	2.06
39(24 Sep – 30 Sep)	28-9-2020	35.67	23.43	88.57	78.71	24.6	1.53	1.33
40(01 Oct – 07 Oct)	5-10-2020	35.39	22.50	82.14	78.14	0.00	0.46	0.20
Total							**17.03**	**13.51**
Correlation Coefficient (r)								
Max. temp. (°C)							**-0.255**	**-0.381**
Min. temp. (°C)							**0.335**	**0.343**
Morning R.H. (%)							**0.339**	**0.383**
Evening R.H. (%)							**0.622**	**0.629***
Rainfall (mm)							**-0.175**	**-0.117**

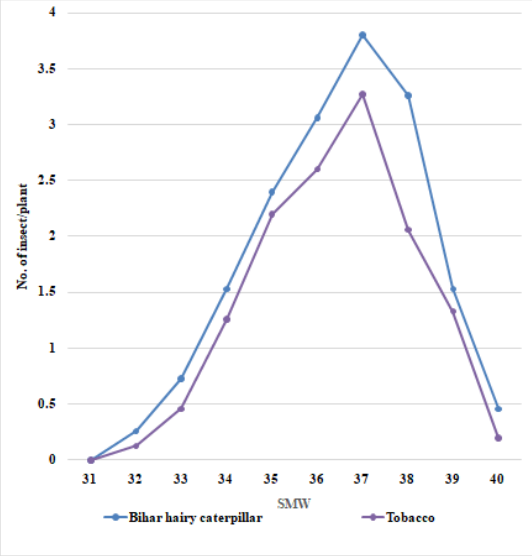

Fig. 1. Population dynamics of Bihar hairy caterpillar and tobacco caterpillar on black gram variety Pratap urd – 1 during *kharif* 2020**.**

CONCLUSIONS

The initiation of Bihar hairy caterpillar population (0.26 larvae/mrl/5 plant) started after the 1st week of August, reaching its peak (3.40 larvae/mrl/5 plant) in the 3nd week of September (37th SMW). Similarly, the initiation of tobacco caterpillar population (0.13 larvae/mrl/5 plant) occurred after the 2nd week of August, reaching its peak (3.27 larvae/mrl/5 plant) in the 2ndweek of September (37th SMW). Bihar hairy caterpillar and tobacco caterpillar population showed negative correlation with maximum temperature and rainfall, while positive correlation with minimum temperature, morning relative humidity, evening relative humidity.

FUTURE SCOPE

Bihar hairy caterpillar (*Spilosoma obliqua*) and tobacco caterpillar (*Spodoptera litura*) pose a substantial threat to black gram plants. Successful pest management demands a thorough understanding of their occurrences throughout various phenological stages of the crop. The data gathered on pest incidence and its relationship with weather conditions in this study is a valuable asset for developing a crop-pest ecological model. Such a model can predict pest incidence in advance, empowering farmers to take timely actions based on early warnings and ensuring the implementation of necessary measures for effective pest control.

Author contributions. Conceived and designed the analysis (HPM & LSS); Collected the data (LSS & MSM); Contributed data or analysis tools (HPM, MSM, LSS, DP & DKS); Performed the analysis (LSS & HPM); Wrote the paper (MSM&LSS).

Acknowledgements. The authors are thankful to all the faculty members of Entomology Department; Dean, College of Agriculture and the Director of Research, AU, Kota for providing necessary facilities and encouragement.
Conflict of Interests. None.

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How to cite this article: M.S. Meena, H.P. Meghwal, L.S. Saini, D. Parmar and D.K. Saini (2024). Seasonal Occurrence of Bihar Hairy Caterpillar and Tobacco Caterpillar on Black gram under Unsprayed Conditions. *Biological Forum – An International Journal, 16*(5): 78-80.