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Studies on seasonal incidence of hairy caterpillar on jute

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Abstract
The objective of this research work was to study the seasonal incidence of hairy caterpillar of jute *Spilosoma obliua* and to study its correlation with different weather paramaters during the *kharif* season of 2018. The incidence of hairy caterpillar was observed throughout the season with varying degree of intensity. The data on average population of *S. obliqua* per meter row length were recorded at weekly interval. The infestation of *S. obliqua* was first observed at 48 DAS in 33rd MW, with larval count of 7.11 larvae per mrl. The higher level of infestation was noticed from 34th to 36th MW. However, the peak infestation of 10.77 larvae per mrl was recorded in 35th MW. Then, the infestation of *S. obliqua* started to decrease from 36th MW (9.77 larvae/ mrl). The larvae of hairy caterpillar were not noticed at the time of crop harvesting. It was revealed that the infestation of *S. obliqua* was significantly negatively correlated with maximum temperature (r = -0.704) and significantly positively correlated with evening relative humidity (r = 0.705); while minimum temperature (r = 0.260), morning relative humidity (r = 0.464), wind (r = 0.071) and rainfall (r = 0.109) showed non- significant relation with infestation of *S. obliqua* and Sunshine (r = -0.493) was negatively but non- significantly correlated with infestation of *S. obliqua.* There were some variations due to changes in the agro-climatic conditions and cultivar used for the study.

Keywords: Seasonal incidence, hairy caterpillar, *Spilosoma*

Introduction
Jute is an important natural fibre crop in India next to cotton and ranks second only to the cotton in fibre production (Talukder *et al*., 1989) [12]. Jute is known as 'Golden Fibre' due to its golden brown colour and its importance (Anonymous, 2018) [2]. Raw jute is an important aspect of the country's economy. Being biodegradable and also renewable source, it also is considered as an environment friendly crop. Jute helps in maintaining ecological balance.

India ranks first in area coverage and production of jute with the contribution of 60% to world's production. The domestic market is the mainstay of industry which uses about 87% of the total production. At the same time, earns from export are about 2095 crores annually (B. S. Gotyal *et al*., 2015) [4]. Together with Bangladesh, West Bengal contributes 90% of the world jute production. Therefore jute has been regarded as traditional strength of Indian agriculture (Rahman and Khan, 2007) [7] but jute is not a traditional crop of Maharashtra. However, it produces large quantity of quality seeds through Maharashtra State Seed Corporation and National Seed Corporation.

Major pests attacking jute includes semi looper (*Anomis sabulifera* Guen.), hairy caterpillar (*Spilosoma obliqua* Walk.), stem weevil (*Apion corchori* Marshall.), grey weevil (*Myllocerus discolor* Bohemus.), yellow mite (*Polyphagotarsonemus latus* Banks.) and root knot nematode (*Meloidogyne incognita* Chitwood.) (Rahaman and Khan, 2011) [8] among these pests *S. obliqua* is the worst one and is popularly known as jute hairy caterpillar (Sharif, 1962; Kabir and Khan, 1968; Alam *et al*., 1964) [10, 5, 1].

Jute hairy caterpillar (Lepidoptera: Arctiidae) though once was considered as a sporadic pest of jute. With the time passed it became a major threat to jute plant and also acquired the status of major pest in the last two decades. Some of the reasons for it are cultivation of high yielding (fertilizer responsive) cultivars, gradual change in the cropping patterns in the jute growing areas and change in climatic condition (Satpathy *et al*., 2014) [9]. *S. obliqua*, is widely distributed in India, China, Bangladesh, Myanmar, Nepal and Pakistan (CPC 2004). In India, it is a serious pest in West Bengal, Bihar, Madhya Pradesh, Uttar Pradesh, Punjab and Manipur. However, the incidence of different pests occurs at different degree on predominantly grown jute varieties, but the effect of plant characteristics of jute varieties on pest incidence are not known yet.

Therefore, the present study was undertaken to determine the effect of plant characteristics of popular varieties on pest incidence and the role of weather factors affecting their populations.

Materials and Methods

Materials

To conduct the studies on seasonal incidence of hairy caterpillar, var. JRO-204 was used; while for field screening, twenty genotypes of jute were made available by All India Network Project on Jute and Allied Fibres, Cotton Improvement Project, MPKV, Rahuri. The genotypes used for study were selected on the basis of their diverse morphological characters.

Chemicals and laboratory facilities required for the analysis were made available by the Department of Agricultural Entomology and Department of Biochemistry, MPKV, Rahuri. Petri plates, glass wares, plastic container, filter paper, mortar and piston, etc. were obtained from the Department of Agricultural Entomology; while hot air oven, spectrophotometer were used from Department of Biochemistry, MPKV, Rahuri.

Method

In order to study the seasonal incidence of jute hairy caterpillar, the seeds of the variety JRO-204 were sown. For varietal reaction of jute cultivars to hairy caterpillar, the seeds of the twenty cultivars were sown. The tillage operation for land preparation, application of farm yard manure and other fertilizers and bed preparation was followed according to the recommended agronomic practices.

Seasonal incidence of hairy caterpillar on jute

S. obliqua population was recorded in the unsprayed plot for seasonal study at weekly interval.

Method of recording observations

The observation on larval population of *S. obliqua* was taken at weekly interval three randomly selected spots of one meter row length in each replication leaving border rows. Larval count was made by shaking the plant gently over a white cloth placed in between the rows and average number of caterpillars found per meter row was recorded.

Observation on meteorological parameters

In order to study the incidence of climatic condition on the incidence of pests, meteorological parameters *viz.*, maximum and minimum temperature (^{0}C), relative humidity at morning and afternoon (%), sunshine period (hr) and rainfall (mm) were taken into account to study the correlation. The meteorological data were obtained from the meteorological observatory located at the central campus Farm of MPKV, Rahuri for the period of July 2017 to October 2018. The correlation coefficient (r) between climatic parameters and incidence of pests was worked out by following standard statistical procedure (Gomez and Gomez, 1984).

Results

Table 1: Seasonal incidence of *S. obliqua* on jute

Metero. Week	Date of obs.	*S. Obliqua* Larvae per mrl	Weather parameters						
			Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Wind Velocity Km/hr)	Sunshine (hrs)
			Max.	Min.	Morn.	Even.			
31	30/07/2018	0	31.0	22.9	71	53	0	7.2	3.9
32	06/08/2018	0	30.8	22.9	82	58	0	8.4	3.8
33	13/08/2018	7.11	28.4	22.4	79	72	1.2	9.1	2.5
34	20/08/2018	9.00	29.8	22.4	78	74	0	4.3	1.6
35	27/08/2018	10.77	27.6	22.2	76	66	0	5.3	3.1
36	03/09/2018	9.77	29.8	21.7	71	59	0	3.8	5.1
37	10/09/2018	7.22	32.6	18.9	75	54	0	1.5	8.5
38	17/09/2018	5.11	30.8	21.8	81	48	3.8	0.8	4.1
39	24/09/2018	3.00	34.0	20.5	75	46	0	2.8	8.5
40	01/10/2018	1.44	33.6	21.4	64	41	0	0.8	8.8
41	08/10/2018	0.00	33.6	19.9	62	36	0	2.2	8.8
42	15/10/2018	0.00	34.0	16.9	44	28	0	1.5	8.8
Mean		5.34							
SE ±		0.42							
CD @ 5%		1.25							
CV (%)		13.63							

The data on seasonal incidence of *S. obliqua* were recorded at weekly interval and presented in Table 1

The infestation of *S. obliqua* was first observed at 48 DAS in 33rd MW, with larval count of 7.11 larvae per mrl. The higher level of infestation was noticed from 34th to 36th MW. However, the peak infestation of 10.77 larvae per mrl was recorded in 35th MW. Then, the infestation of *S. obliqua* started to decrease from 36th MW (9.77 larvae/ mrl). The larvae of hairy caterpillar were not noticed at the time of crop harvesting.

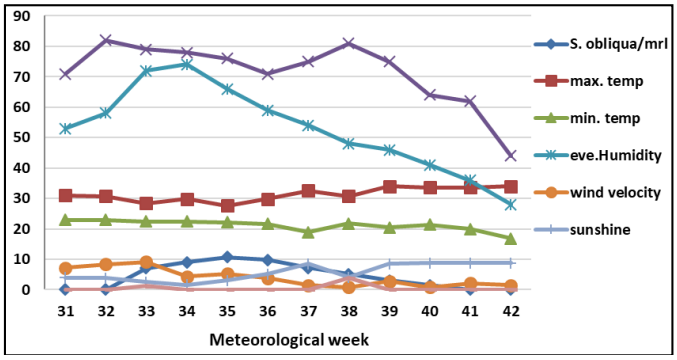

Fig 1: Seasonal incidence of *S. obliqua* on jute

Table 2: Correlation between seasonal incidence of *S. obliqua* and weather parameters

Sr. No.	Weather Parameters	Correlation coefficient (r)
1	Maximum temperature (°C)	-0.704*
2	Minimum temperature (°C)	0.260
3	Morning relative humidity (%)	0.464
4	Evening relative humidity (%)	0.705*
5	Rainfall (mm)	0.109
6	Wind (Km/hr)	0.071
7	Sunshine (hrs)	-0.493

*Significant at 5% level (0.648) **Significant at 1% level (0.794)

It is revealed from Table 2 that the infestation of *S. obliqua* was significantly negatively correlated with maximum temperature (r = -0.704) and significantly positively correlated with evening relative humidity (r = 0.705); while minimum temperature (r = 0.260), morning relative humidity (r = 0.464), wind (r = 0.071) and rainfall (r = 0.109) showed non- significant relation with infestation of *S. obliqua* and Sunshine (r = -0.493) was negatively but non- significantly correlated with infestation of *S. obliqua.*

Discussion

The infestation of *S. obliqua* was first observed at 48 DAS in 33rd MW, with larval count of 7.11 larvae per mrl. The higher level of infestation was noticed from 34th to 36th MW. However, the peak infestation of 10.77 larvae per mrl was recorded in 35th MW. Then, the infestation of *S. obliqua* started to decrease from 36th MW (9.77 larvae/ mrl). The larvae of hairy caterpillar were not noticed at the time of crop harvesting.

The present findings are in accordance with Thakur and Kaistha (1994) [13] they reported that *S. obliqua* appeared from 2nd week of August to 3rd week of September. Biswas (2005) [3] also reported that hairy caterpillar on the sesame crop was initially low but it increased gradually and then decreased slowly up to maturity. Suyal *et al*., (2018) [11] found that the peak activity defoliator *S. obliqua* were noticed after second fortnight of August. Kant and Kumar (2007) [6] reported that *S. obliqua* was predominant in month of August, September and October. Maximum infestation was observed during month of September in mulberry plantation.

All these results tend to support to the present findings, however, little deviation in the *S. obliqua* infestation and the period of peak activity varied in different location. There are some variations due to changes in the agro-climatic conditions and cultivar used for the study.

However, the present findings are in agreement with Rahman and Khan (2011) [8] they reported negative and significant relation with maximum temperature and non-significant positive relation with minimum temperature, morning humidity and rainfall with *S. obliqua* in jute. Suyal *et al.*, (2018) [11] reported that wind velocity is non-significantly and positively correlated with infestation of *S. obliqua* and Sunshine hours showed negative and non- significant correlation with infestation of *S. obliqua* in soybean crop. Yadav *et al*., (2015) [14] recorded that rainfall and wind velocity with *S. obliqua* population showed significant negative correlations; while evening humidity showed non-significant negative correlation with *S. oblique.*

Conclusion

1. Incidence of *S. obliqua* was first observed in 33rd MW and was peak in 35th MW; while gradually decreased from 36th MW, however no larval count was reported at harvest.
2. The larval population of *S. obliqua* has shown significant negative correlation (-0.704) with maximum temperature; while minimum temperature (0.260), morning humidity (0.464), wind velocity (0.071) and rainfall (0.017) showed non-significant relation, Sunshine (-0.493) showed non-significant negative correlation and evening humidity (0.705) showed positively significant correlation with weather parameters.

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