

Seasonal Incidence of Stem Fly and Sucking Insect of Soybean (*Glycine max*) and Their Correlation with Weather Parameters

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Abstract

The present investigation was undertaken to find the seasonal incidence of major insect pests of soybean during kharif 2019 at the Research farm, College of Agriculture, Tikamgarh, Madhya Pradesh. The results revealed that the incidence of stem fly (*Melanagromyza sojae*) started from third week of August (34th standard week) with a population of 1.2% stem tunneling and reached to a peak level during the first week of October (40th standard week) with a population of 11% stem tunneling. The incidence of White fly (*Bemisia tabaci*) started from third week of August (33rd standard week) with a population of 8.00 white fly per 3 leaves/plant and reached to a peak level during the second week of September (37th standard week) with a population of 23.56 white fly per 3 leaves/plant Whereas Jassid (*Amrasca bigutulla bigutulla*) was started from second week of August (33rd standard week) with 6.68 jassid per 3 leaves/plant and reached its peak during first week of September (36th standard week) with 16.40 jassid per 3 leaves/plant. Correlation studies showed that among the various abiotic factors, rainfall ($r = -0.71$) exhibited significant negative correlation with stem fly. In case of white fly population, maximum temperature exhibited significant positive correlation ($r = 0.71$). The incidence of jassid showed significant positive correlation with maximum and minimum temperature ($r = 0.8, 0.89$).

Keywords: Seasonal incidence, soybean stem fly, White fly, jassid

Introduction

Major production of soybean comes from Madhya Pradesh, Maharashtra and Rajasthan. In Madhya Pradesh total area under soybean cultivation is 51.952 lakh ha with production of 40.107 lakh tons and productivity 772 kg /ha. In Tikamgarh district total area under soybean cultivation is 0.175 lakh ha and production and productivity is 834 kg/ha and 0.146 lakh million tones respectively during 2019^[7]. Soybean attacked by more than 300 insect's species, amongst them only a few attain major pest status. They damage the crop from seedling stage to maturity and cause nearly 25% reductions in yield. These are girdle beetle, stem fly, tobacco caterpillar, green semilooper, bihar hairy caterpillar, white fly and aphids, their distribution, host plant, biology, symptoms of damage and

various control measures for the management of insect pest to enhance the productivity of soybean^[2]. Now it is high time to think of those strategies to reduce pesticide load in environment by using bio-agents and bio-pesticides, which are eco-friendly and environmentally safe as well as control the pests efficiently by passing the above mentioned problems. In this context that the relevance of use of botanicals, organic amendments, bio-control agents, organic based insecticides, newer insecticides along with understanding the pest status for managing the key pests assumes greater significance. However, one cannot fully avoid the use of synthetic chemical insecticides; but its use should be judicious, need based or based on Economic Threshold Level (ETL) concepts.

Materials and Methods

The field experiment was conducted at Research Farm, College of Agriculture, Tikamgarh (M.P.) on soybean variety, JS-9560 during *Kharif* 2019. Seeds were drilled in rows 30 cm apart and 5 cm between plants. All the agronomical practices, except the package recommended for insect pests management were adopted to raise a good crop. The recommended dose of fertilizers such as N, P₂O₅ and K₂O (30:60:30) were applied for crop production. The full dose of nitrogen, phosphorus and potash were applied as basal dose at the time of last ploughing. The data were recorded from the first appearance of the stem fly and sucking insect and continued till maturity of the

Results and Discussion

Stem fly

The incidence of stem fly was started from 3rd week of August (34th standard week) with a population of 1.2% stem tunneling. The peak activity (11% stem tunneling) of the pest was observed during first week of October (40th standard week). The infestation of stem fly starting from the second week after showing and continued up to (42 SW) until harvest^[1].

crop at weekly intervals. The populations of stem fly were recorded by the number of stem tunneling from ten randomly selected plants. The population of white fly and jassid were recorded on 3 leaves each from upper, middle and lower plant canopy. The healthy and tunneled plant was counted and percent plant infestation was calculated at the time of harvesting. Weekly data of various abiotic factors such as maximum and minimum temperature, morning and evening relative humidity, rainfall and sunshine hours was also recorded. The data so obtained was then subjected to statistical analysis for correlation and test of significance.

During the peak larval population the maximum and minimum temperatures were 31.6C and 21.6C respectively, and maximum and minimum relative humidity were 88.9% and 62.7% respectively. Whereas the rainfall was 8.1mm. During the period of activity the pest damaged stems. The stem tunneling due to stem fly at physiological maturity was noted 59.45%^[9].

Table 1 Seasonal incidence of sucking pest and stem fly on soybean at weekly interval, during crop growth period

Standard week	Period	Mean larval population/mrl		Stem fly tunne %
		White fly	Jassid	
33	12 -18 August, 2019	8.00	6.68	0.00
34	19 -25 August, 2019	11.86	9.89	1.20
35	26 Aug. to 01 Sept., 2019	16.38	12.74	7.50
36	02 -08 September, 2019	19.98	16.80	7.80
37	09 -15 September, 2019	23.56	14.22	9.80
38	16 -22 September, 2019	18.82	11.99	10.00
39	23 -29 September, 2019	12.76	9.32	10.20
40	30 – Sep. to 06 Oct., 2019	7.95	7.48	11.00

Correlation studies revealed that rainfall ($r = -0.71$) exhibited significantly negative correlation with stem fly population. Whereas maximum temperature and sunshine showed positive correlation with non-significant level.

White fly

The white fly was first recorded in the 3rd week of August (33rd standard week) with a population of 8.00 white fly per 3 leaves/plant, which reached at its peak (23.56 white fly per 3 leaves/plant) during 2nd week of September (37th Standard week). During this period maximum and minimum temperature were 31.6^oC to 24.6^oC respectively, with morning and

However minimum temperature, morning and Evening relative humidity was found to be negatively correlated ($r = -0.24, -0.11, -0.36$ respectively) with stem fly infestation to the non-significance level^[4,5].

evening relative humidity 90.4% to 86.9% respectively, and rainfall 13.0mm. Dispersion of *white fly* on soybean crop from August to October was reported earlier^[3]. The peak activity of white flies (7.1 larvae/ meter/ row) were observed during 2nd week of September 36 (SMW)^[8].

Table 2 Correlations were observed between insect pests of soybean and weather factors.

Insect pests	Temperature(°C)		Relative humidity (%)		Rainfall (mm)	Sunshine hours (hrs)
	Maximum	Minimum	Morning	Evening		
Stem fly	0.39	-0.24	-0.11	-0.36	-0.71*	0.38
White fly	0.66	0.71*	-0.17	0.26	0.18	0.36
Jassid	0.83*	0.89*	-0.30	0.13	-0.19	-0.18

*Significant at 5% level

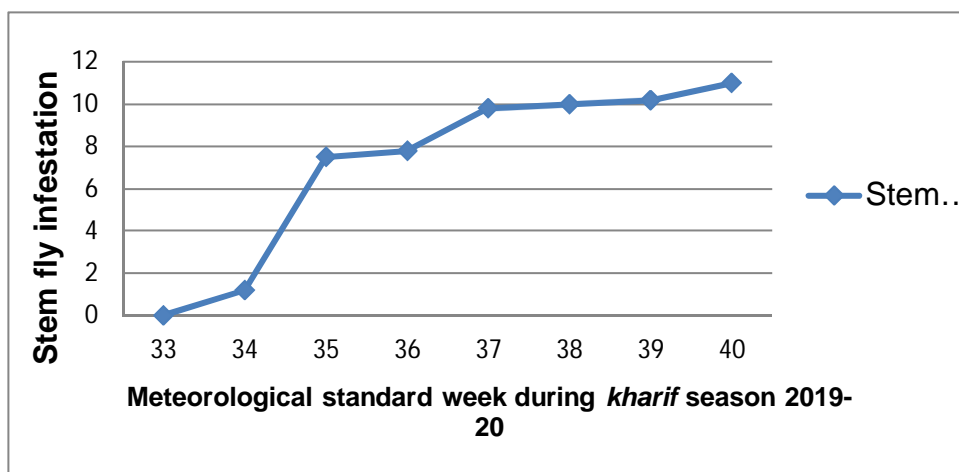


Fig 1: Incidence of stem fly on soybean

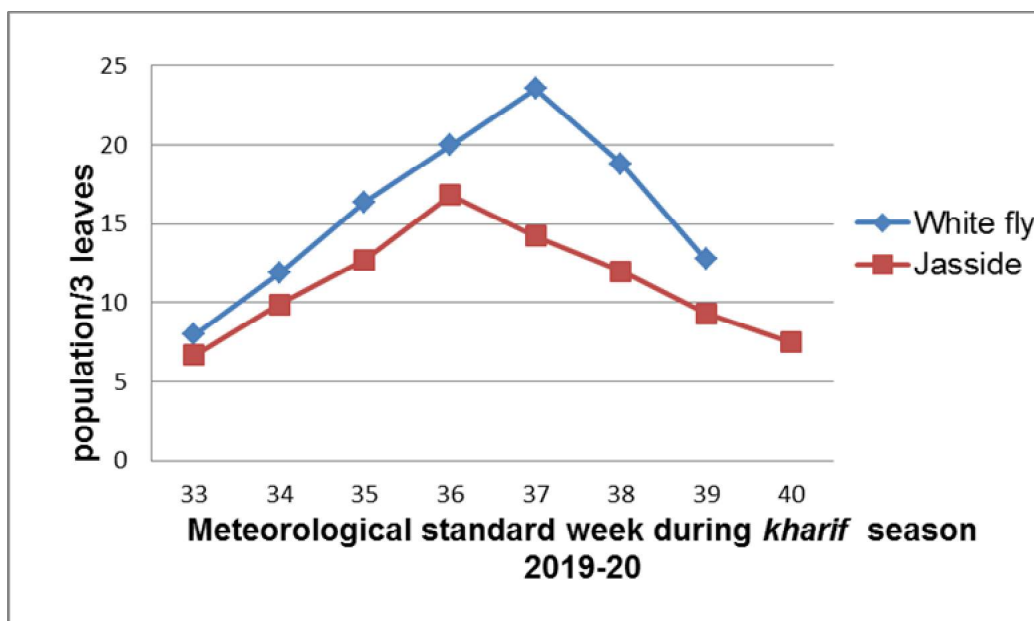


Fig 2: Incidence of sucking pest on soybean

Correlation studies revealed that minimum temperature exhibited significant positive correlation ($r= 0.71$) with white fly population. It was reported that minimum temperature exhibit significant positive correlation with the pest population. Results in present studies are in conformity to the earlier findings^[3,5,7].

Jassid

Incidence of Jassid started in 3rd week of August (33rd standard week) with (6.68 Jassid per 3 leaves/plant) and was at its peak (16.40 Jassid per 3leaves/plant) during 1st week of September (36th Standard week). During this period, maximum and minimum temperature was 33.1 C and 25.2 C, respectively, and

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morning and evening relative humidity were 87.1% and 77.9% respectively. Whereas the rainfall was 7.9 mm. The peak activity of sucking insects Jassid, (5.10 larvae/ meter/ row) is in 2nd week of September 36 SW. Results in present studies are in conformity to the earlier findings^[8].

Correlation studies revealed that maximum and minimum temperature exhibit significant positive correlation ($r = 0.8, 0.89$) with jassid infestation. In previous investigation significant positive correlation of minimum temperature ($r = 0.73$) was reported^[6] which is in agreement with the present results indicating that minimum temperature acts as a factor affecting jassid population at any place.

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