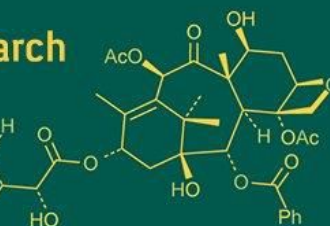


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Seasonal abundance of stem fly on soybean and correlation with weather parameters

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Abstract

The present investigation on seasonal abundance of stem fly on soybean and its correlation with weather parameters was conducted at Research Farm of Entomology Section, College of Agriculture, Nagpur during *kharif* 2024. The results revealed that, the infestation of stem fly was noticed from 29th Standard meteorological week (SMW) i.e. third week of July with 3.15 % plant infestation and 5.04% stem tunnelling and abundance was evident till harvest. The peak infestation was observed during 38th SMW i.e. third week of September with 25.20 % plant infestation and 45.11 % tunnelling. The correlation analysis of weather parameters with stem fly infestation revealed that, evening humidity ($r = 0.853$) had significant positive correlation with infestation of stem fly at 1 % significant level and rainy days ($r = -0.644$) registered significantly negative correlation with infestation of stem fly at 5 % level. The evening humidity ($r = 0.751$) had significant positive correlation with stem tunnelling by stem fly at 5 % significant level.

Keywords: Soybean, stem fly, seasonal abundance, simple linear correlation, weather parameters

Introduction

Soybean (*Glycine max*) is one of the most important leguminous crop belonging to family Leguminosae syn. Fabaceae. Though, soybean is a legume crop, yet it is widely used as oilseed. Major soybean growing states in India are Madhya Pradesh, Maharashtra, Rajasthan, Andhra Pradesh and Karnataka. It provides 40% protein, well balanced essential amino acids, 6-7% total minerals, 20% oil, rich in poly unsaturated fats specially Omega 6 and Omega 5 fatty acids, 17-19% carbohydrates, 5-6% crude fibre (Chauhan and Joshi, 2005).

Stem fly and girdle beetle are the main borers appearing on soybean crop. The stem fly attacks the soybean crop throughout the growing season, but the most vulnerable period is within three to four weeks after germination. The maggot may tunnel upto 70 % of the stem length and may reduce the grain yield about 33 % (Singh and Singh, 1990).

Material and Methods

The field experiment was conducted during *kharif* 2024 to study the seasonal abundance of stem fly on soybean at Research Farm of Entomology Section, College of Agriculture Nagpur. A separate plot of 100 m² area was sown. Soybean variety JS 95-60 was used for sowing. The observation on seasonal abundance of stem fly was recorded from 8th July (27th SMW) to 23th September 2024 (38th SMW).

Observations of stem fly infestation, total number of plants/seedlings and plants/seedlings damage by the stem fly were counted from one meter row length of 10 randomly selected spots at 7 days interval from 7 days after germination till the harvest of the crop and calculated per cent infestation. Plant height and length of stem tunnel was measured in 10 plants for calculating per cent stem tunnelling. Simultaneously, weather data were recorded and it was correlated with the pest population.

Results and Discussion

The infestation of stem fly was noticed from 29th standard meteorological week (SMW) i.e. 22nd July 2024 with 3.15 % plant infestation and 5.04% stem tunnelling and it was recorded

till harvest (Table No. 1). The peak infestation was observed during 38th SMW i.e. 23rd September 2024 with 25.20 % plant infestation and 45.11 % tunnelling.

The correlation coefficient analysis data revealed that, the evening humidity ($r=0.853$) had significant positive correlation with infestation of stem fly at 1 % significant level and rainy days ($r= -0.644$) had significant negative correlation with infestation of stem fly at 5 % significant level. Morning humidity ($r=-0.280$), rainfall ($r=-0.478$), maximum temperature ($r=-0.326$), minimum temperature ($r=-0.057$), bright sunshine hours ($r=-0.515$) and wind speed ($r=-0.483$) had non-significant negative correlation with infestation of stem fly. However, evaporation ($r=0.067$) had non-significant positive correlation with infestation of stem fly.

The evening humidity ($r=0.751$) had significant positive correlation with stem tunnelling by stem fly at 5 % significant level. While, rainfall ($r=-0.257$), rainy days ($r=-0.490$), maximum temperature ($r=-0.310$), morning humidity ($r=-0.052$), bright sunshine hours ($r=-0.586$), wind speed ($r=-0.586$) and evaporation ($r=-0.055$) had non-significant negative correlation with stem tunnelling by stem fly. However, minimum temperature ($r = 0.101$) had non-significant positive correlation with stem tunnelling by stem fly (Table No. 2).

The data trend of present study is in agreement with findings

of Ahirwar *et al.* (2013) ^[1], who reported that the stem fly (*Melanagromyza sojae*) infestation was 4.4% on the 31st SMW whereas, the highest percentage of infested plants was 67.7% in 37th SMW. They reported one more peak with infestation of 54.4% on 39th SMW and 69.9% on 41st SMW which was moderately higher than the present trend. Similarly, Yeotikar *et al.* (2015) ^[7] observed 59.45% stem tunnelling by stem fly at physiological maturity. Comparatively higher infestation levels of stem fly than the present study was reported by Kumar *et al.* (2019) ^[4] who identified stem fly as significant soybean stem borer and reported that 18% of plants were infested with stem flies, and 1.35 % of stems showed tunnelling in August 2017 with infestations of 78% in September, with 48.40% of the stems tunnelling where almost 90 % of the affected plants showed tunnelling, which was caused by the stem fly maggot. Similar findings were reported by Chouhan *et al.* (2019) ^[3] who reported plant infestation upto 80 % in the last week of September with highest stem tunnelling (48.50 %). The stem fly infested almost every plant (90%) in the first week of October 2015. Whereas, comparatively lower infestation levels of stem fly than the present study was reported by Patidar *et al.* (2021) ^[5] who revealed that the incidence of stem fly began in the third week of August (34th standard week) with a 1.2% stem tunnelling and peaked at first week of October (40th standard week) with a 11% stem tunnelling.

Table 1: Seasonal abundance of stem fly on soybean and weather data

Date of observations	Meteorological week	Stem fly		Rainfall (mm)	Rainy days (Days)	Temperature (°C)		Humidity (%)		BSH (Hour)	Wind speed (m/s)	Evaporation (mm/day)
		Infestation (%)	Stem tunneling (%)			Max	Min	Mor	Eve			
	26	00.00	00.00	96.60	4	45.1	25.1	34	18	9.4	3.7	2.5
08-07-2024	27	00.00	00.00	82.80	5	35.1	24.7	76	42	4.6	4.3	3.0
15-07-2024	28	00.00	00.00	57.60	4	33.9	23.9	98	40	2.2	4.1	1.7
22-07-2024	29	03.15	05.04	307.60	6	32.9	23.7	88	43	3.0	4.3	2.7
29-07-2024	30	05.18	08.86	103.00	4	29.5	22.7	93	38	1.3	4.9	2.9
05-08-2021	31	10.94	09.18	32.20	4	30.7	22.5	87	67	1.4	5.3	2.9
12-08-2024	32	15.00	10.45	08.80	1	33.7	24.1	83	63	3.8	3.7	2.5
19-08-2024	33	17.00	15.80	45.00	3	33.5	23.5	90	70	3.9	4.1	2.0
26-08-2024	34	19.00	20.90	67.00	3	32.5	23.5	89	65	4.7	2.9	2.9
02-09-2024	35	21.42	29.71	115.80	4	32.5	23.1	94	82	2.3	3.3	2.4
09-09-2024	36	23.68	40.05	41.80	2	30.3	23.1	92	85	3.8	2.9	1.6
16-09-2024	37	24.78	42.70	40.60	2	30.3	24.1	87	62	4.0	4.4	3.0
23-09-2024	38	25.20	45.11	00.00	0	32.3	23.1	91	76	4.2	3.9	2.9

Table 2: Correlation of seasonal abundance of stem fly on soybean with weather parameters during *kharif* 2024.

Pest	Rainfall (mm)	Rainy days (Days)	Temperature (°C)		Humidity (%)		BSH (Hour)	Wind Speed (m/s)	Evaporation (mm/day)
			Max	Min	Mor	Eve			
% Infestation of Stem fly	-0.478	-0.644*	-0.326	-0.057	-0.280	0.853**	-0.515	-0.483	0.067
% Stem tunneling by Stem fly	-0.257	-0.490	-0.310	0.101	-0.052	0.751*	-0.586	-0.586	-0.055

Table 'r' value at 1% significance level : 0.798, Table 'r' value at 5% significance level : 0.666

**Significant Correlation at 1% significance level, *Significant Correlation at 5% significance level

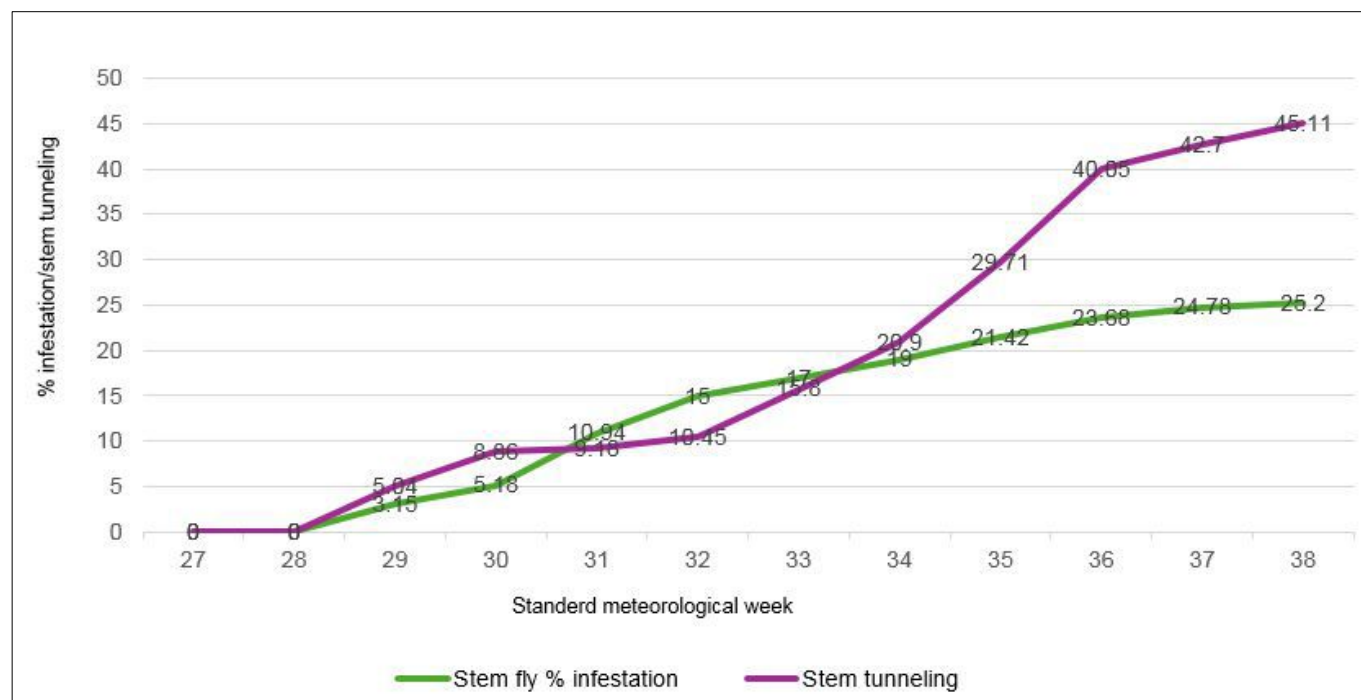


Fig 1: Seasonal abundance of stem fly on soybean

Conclusion

Soybean stem fly is a serious pest of soybean with moderate to heavy incidence during the season. The infestation of stem fly was noticed from 29th Standard meteorological week up to the harvest of crop. The peak infestation was observed during 38th SMW i.e. third week of September with 25.20 % plant infestation and 45.11 % tunnelling. Stem fly incidence showed significant negative correlation with rainy days and significant positive correlation with evening relative humidity.

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