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Seasonal Incidence of Sucking Insect-Pests of Soybean [*Glycine max* (L.) Merrill]

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ABSTRACT: The present investigation on "Seasonal Incidence of Sucking Insect-Pests of Soybean [*Glycine max* (L.) Merrill]" was conducted during *kharif*, 2019 at Agricultural Research Station, Ummedganj, Agriculture University, Kota. The results revealed that among the sap feeding insects whitefly and jassid were reported on the crop almost all cropping period. Maximum infestation of whitefly (7.8/3 trifoliate leaf) observed in first week of September, whereas maximum number of jassid (2.8/3 trifoliate leaf) was recorded in third week of September. The correlation study reveals that the whitefly and jassid population showed significantly negative correlated with rainfall. Among all the pests. sucking pests have recently got more attention due to its widely destructive nature by acting as a vector of some virus diseases in soybean, such as yellow mosaic virus dissemination by *Bemisia tabaci*.

Keywords: Seasonal, incidence, jassid, whitefly, correlation, peak, infestation.

INTRODUCTION

Soybean [*Glycine max* (L.) Merrill] is one of the most important oilseed commercial crop of India. It is world's most useful and cheapest sources of protein (Akinyele and Harshbarger 1983), vitamins, minerals, carbohydrate and other ingredients. Soybean is a legume crop mainly but seeds widely used as oilseed. It contains 40% protein, well balanced in essential amino acids; 20% oil, rich in poly unsaturated fats specially Omega 6 and Omega 5 fatty acids; 6-7% total minerals; 5-6% crude fiber and 17-19% carbohydrates (Chauhan and Joshi 2005). Madhya Pradesh, Maharashtra and Rajasthan covers an area 52.4, 39.3, and 9.3 lakh ha, respectively. The Rajasthan state stands third occupying the soybean area and second in productivity (1244 kg/ha). The crop covers 92 to 93 per cent area and production by these three states Madhya Pradesh, Maharashtra and Rajasthan (Anonymous, 2018).

There are many problems in cultivation of soybean in India as well as Rajasthan, as all stages of this crop are prone to heavy infestation by insect-pest complex. The crop is infested by more than 275 insect pests throughout its growth stage from germination to matrity (Babu *et al.,* 2017). In India, 20 insect species have been recorded major pests infesting soybean crop (Singh and Singh 1990). Among borers, girdle beetle (*Obereopsis brevis* Swed.) is predominant, among defoliators, tobacco caterpillar (*Spodoptera litura* Fabricius) and green semiloopers (*Chrysodeixis acuta* Walker) are predominant. Immature stages (larva or caterpillar) of both tobacco caterpillar and green semilooper damage the crop mostly at vegetative stage and in severe case, it completely defoliates the crop resulting drastic yield loss. *Spodoptera litura* larvae even damage to soybean pods also (Chaturvedi *et al.,* 1998; Singh *et al.,* 2000). Therefore, the present study of the insects-pests and their relative occurrence with reference to different crop stages was conducted, to determine the management strategy pertaining to their nature of damage at most vulnerable or susceptible crop stage so that feasible and economic control measure can be determined for their effective and economic management in the crop.

MATERIALS AND METHODS

The field experiment to investigate the Seasonal Incidence of Sucking Insect-Pests of Soybean [*Glycine max* (L.) Merrill]" was conducted during *kharif*, 2019 at Agricultural Research Station, Ummedganj, Kota. The experiment was laid out in plots measuring 4.2 m × 5 m (21 m^2) replicated thrice. Soybean variety JS-335 was sown in the second week of July, *kharif* 2019 after onset of monsoon which is a general practice of sowing in the region adopting all agronomical practices required for raising the crop. The sucking pests *i.e.* whitefly and jassid population was counted on three leaves per plant (upper, middle and lower part of plant) from five randomly selected plants in each replication as per method suggested by Heathcote (1972); Satpathy (1973). The population was estimated by gently holding

the leaf between the halves of petri plate (10 cm diameter) and then counting of adults and nymphs within the petri plate. The nymphal population was counted with the help of magnifying lens**.** Population was expressed as number per three leaves.

Simple correlation was worked out between the population of insect pests and abiotic factors by the Karl Pearson's coefficient of correlation formula (Steel and Torry 1980):

$$r_{xy} = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sqrt{\left[\sum X^2 - \frac{(\sum X)^2}{n}\right]\left[\sum Y^2 - \frac{(\sum Y)^2}{n}\right]}}$$

Where,

r_{xy} = Simple correlation coefficient

X = Variable *i.e.* abiotic component.

(Average temperature, relative humidity and total rainfall)

Y = Variable *i.e.* mean number of insect pests per plant

n = Number of observations.

The correlation coefficient (r) values were subjected to the test of significance using t-test:

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2} \sim t_{n-2} \text{ d.f.}$$

The calculated t-value obtained was compared with tabulated t-value at 5% level of significance.

RESULT AND DISCUSSION

Seasonal incidence of sucking insect-pests *viz.*, whitefly (*Bemisia tabaci* Genn.) and jassids (*Empoasca kerri* Pruthi) was studied during *kharif* 2019. The whitefly appeared during fourth week of July and peak in the first week of September with a mean population as 7.80 whitefly/ 3 trifoliate leaves (Table 1 & Fig. 1). Thereafter, the population declined and reached to minimum levels of 2.60 whitefly/ 3 trifoliate leaves during 42th SMW. Whitefly population showed negatively significant correlation with rainfall (r = -0.67). The correlation with atmosphere temperature (r = -0.03) was negatively non-significant, whereas correlation with relative humidity (r = 0.24) was positively non-significant.

The infestation of jassid started during first week of August with a mean population of 0.80 jassid/ 3 trifoliate leaves and peak in the third week of September with a mean population of 2.80 jassid/ 3 trifoliate leaves (Table 1 & Fig. 1). The pest population showed negatively significant correlation with rainfall (r = -0.63). The correlation with temperature (r = -0.35) was negative, where as in case of relative humidity (r = 0.05) was positively non-significant.

The present findings are well collaborate with the results of Meena *et al.* (2010) who reported that the incidence of jassid and whitefly were started in the first week of August and touched their peak during second half of September. The correlation between pest population and abiotic factors was non-significant. Similarly Jyothirmai *et al.* (2002) also observed higher incidence of jassid during the mid-September and Yadav *et al.* (2007) reported that the jassid and whitefly population was activated in first week of September and first week of August, respectively and touched its peak during second week of September and third week of September, respectively.

Table 1: Seasonal incidence of sucking insect-pests infesting soybean during *kharif*, 2019.

SMW No.	Period From – To	Mean temp. (°C)	Mean relative humidity (%)	Rainfall (mm)	Sucking pest (3 trifoliate leaf/ plant)	
					Bemisia tabaci	*Empoasca kerri*
30	23 July – 29 July	28.7	81.0	246.0	0.2	0.0
31	30 July – 05 Aug	28.7	76.4	116.0	1.0	0.8
32	06 Aug -12 Aug	28.1	80.5	148.5	0.4	0.4
33	13 Aug -19 Aug	26.4	87.7	331.0	1.2	1.0
34	20 Aug -26 Aug	28.2	74.8	30.0	3.2	1.8
35	27 Aug – 2 Sep	28.3	78.9	57.0	4.4	1.2
36	03 Sep – 09 Sep	29.1	86.9	32.0	7.8	1.4
37	10 Sep – 16 Sep	28.2	86.9	91.0	4.2	2.2
38	17 Sep – 23 Sep	27.2	79.3	26.5	6.4	2.8
39	24 Sep – 30 Sep	26.1	87.5	23.2	5.8	2.0
40	1Oct.- 7 Oct.	28.0	75.5	0.0	4.6	1.8
41	8 Oct – 14 Oct	27.4	80.2	0.0	3.8	1.4
42	15 Oct – 21 Oct	26.3	79.7	0.0	2.6	1.6
Coefficient of correlation (r) for population and mean atm. temp.					-0.03	-0.35
Coefficient of correlation (r) for population and mean RH					0.24	0.05
Coefficient of correlation (r) for population and total rainfall					-0.67*	-0.63*

* Significant at 5% level of significance

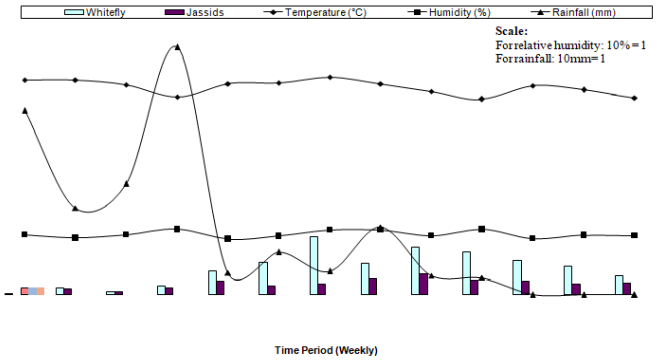

Fig. 1. Seasonal incidence of sucking insect pests infesting soybean during *kharif*, 2019.

CONCLUSIONS

Study of population dynamics of insect pests is one of the most important objective of pest management. Population dynamics provides the data of seasonal fluctuation and peek activity of insect pests. Correlation study of insect pests with pest's population also provides information about weather influence on insect pest population. The information collected in this study is useful in insect pest management.

FUTURE SCOPE

Sucking pests are one of the important causes of economic losses of soybean crop. Proper information on biology, its important diagnostic features and seasonal occurrence play an important role in deciding the management practices to combat losses caused by the sucking pests. Although the development of resistance and biotypes is one of the major issues concerning the management of sucking pest lately, but the use of integrated pest management evolved as promising tool to alleviate losses caused by the pest. The ability of these insects to show exceptional reproductive nature and physiological modification has been making its management a challenging task for researchers.

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Conflict of Interest. None.

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