The Pharma Innovation Journal 2021; SP-10(11): 266-269

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(11): 266-269

www.thepharmajournal.com
Received: 07-09-2021
Accepted: 09-10-2021

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Seasonal incidence of green semilooper, *Chrysodeixis acuta* (Walker) on soybean crop at Raipur (Chhattisgarh)

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Abstract
The field experiment were conducted at Research Cum Instructional Farm at IGKV, Raipur (C.G.) during kharif season of 2020-21, to know the seasonal incidence of green semilooper, *Chrysodeixis acuta* on soybean. The incidence of Green Semilooper, *Chrysodeixis acuta* was first observed during 34th SMW *i.e.* third week of August with 0.7 larvae/mrl then it gradually increased and the maximum number of semilooper was observed during 39th SMW *i.e.* last week of September with 2.5 larvae/mrl.
The correlation between Green Semilooper, *Chrysodeixis acuta* and weather parameters during kharif 2020 results indicated that the The Green Semilooper, *Chrysodeixis acuta* showed significant and positive correlation with maximum temperature (r= 0.595), minimum temperature (r= 0.561) and morning relative humadity (r= 0.610).

Keywords: correlation, incidence, soybean, semilooper

Introduction
Soybean (*Glycine max* L.) is a unique crop with high nutritive value, providing 40% of protein and 20% edible oil besides 26.5% carbohydrate, 5.5% minerals and 2% Phospholipids. The Soya Protein is called complete protein because it supplies sufficient amount of amino acids. It is used as protein supplement in human diet, cattle and poultry feed (Rai *et al.*,1973) [3] and supports many industries for manufacturing antibiotics, paints, varnishes, adhesives, lubricants, etc.
Soybean is the major *kharif* crop of Madhya Pradesh, which contributes 59.3 and 60.2 per cent in total area and production of the country respectively and is called the "Soya state " (Anonymous, 2009) [1]. However, the average yield of soybean in the state is about 1003 kg/ha. In Chhattisgarh kharif season 2017 the state sowing area is 1.320 ha. which contributes 0.863 million ton production of Soybean (SOPA, 2017) [6].
Among the various factors responsible for low yield, the insect pests have been considered to be of prime importance. The luxuriant crop growth, soft and succulent foliage attracts many insects and provides unlimited source of food, space and shelter. About 380 species of insects have been reported on soybean crop from many parts of the world. About 65 insect species have been reported to attack soybean from cotyledon stage to harvesting stage in Karnataka (Thippaiah 1997) [8].
Soybean crop are mainly threatened by lepidopteran pests, requiring more cares to management. This pests decreases grain quality as well as yield reduction. This insects feeds on growing plants eats on leaves and burrow the fruits, stems and roots also.
The defoliators (*Spodoptera litura* Fab., *Thysanoplusia orichalcea* Fab., *Spilarctia obliqua* Walk., *Chrysodeixis acuta*, walker) and *Helicoverpa armigera* (Hubner) feed on foliage, flower and pods causing significant yield loss (Singh and Singh 1990) [4]. The tobacco caterpillar, *S. litura* (Fab.) is a serious and regular pest in soybean crops. It damages soybean from mid August to October in kharif and from November to March in rabi (Anonymous 2007) [2].
The soybean semilooper, *Chrysodeixis acuta* (Walker) is a light to dark green caterpillar. Females deposit eggs at the underside of leaves (Smith *et al.* 1994) [5]. Pupation occurs on the underside of leaves. The adult moth is small, brown to black in color (USDA 2016) [9]. Forewings are darker in color than the hindwings, and possess silvery white spots. Presence of these spots can be used to distinguish the soybean looper from many other crop feeding pests.
Green semilooper, *Chrysodeixis acuta* feeds on many crops and flowers like soybean, peanut,

cotton, corn, peas, cruicifers, begonia, carnation, chrysanthemum, geranium, lantana, and sunflower (Specht *et al.* 2015) [7].

Larvae are known to consume large amounts of foliage in the lower half of the canopy and then moving up and outwards (Smith *et al.* 1994) [5]. and occasionally feed on pods and fruits, while moths feed solely on flower nectar. When scouting for pests, this type of feeding pattern can be easily overlooked, as the outer canopy appears undamaged until the top of the plant is defoliated.

To avoid losses caused by these defoliator pests, various chemical control measures have been attempted earlier, which were found effective but were temporary. However, indiscriminate use of chemicals led to the problems like pest outbreak, development of resistance by pest to insecticides, elimination of natural enemies, risk to human and animal health besides environmental pollution. Hence, in the present investigation newer insecticides were used to manage green semilooper on soybean crop.

2. Materials and Methods

A field experiment was conducted at Research Cum Instructional Farm at IGKV, Raipur, (C.G.) during *kharif* 2020 under field condition to know the occurrence of insect pests on soybean. For recording population dynamics of insect pests first variety JS97-52 was sown on area of 10x10 m^2 randomly 10 plants was selected for the study of insect pest complex. On randomly selected plants insect population was counted through direct visual counting method on 10 plants.

Different insect pest population was recorded weekly during morning hours between 8.00a.m to 9.00 a.m. without disturbing any pest fauna. Then from 1 meter row length larval population was counted.

Weekly meteorological data were obtained from Department of Agrometeorology, Indira Gandhi Krishi Vishwavidyalaya Raipur to know the effect of environmental parameters on insect pests incidence the parameters include temperature, relative humidity, rainfall and sunshine hours during the cropping season Then ambient weather was correlated with major insect pest population. Weather effect on pests population density and their natural enemies was also considered.

The data was statistically analysed by subjecting to the correlation between weather parameters and the population of insect pests which were determined using the Karl Pearson's coefficient of correlation formula:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\,n\Sigma x^2 - (\Sigma x)^2\,]\,[\,n\Sigma y^2 - (\Sigma y)^2\,]}}$$

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:

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

with degrees of freedom equal to n – 2

Where,

r = Correlation Coefficient

n = No. of observations

The calculated t-value obtained was compared with correlation coefficient table value at 5% and 1% level of significance.

3. Results and Discussion

The incidence of Green Semilooper, *Chrysodeixis acuta* was first observed during 34th SMW *i.e.* third week of August with 0.7 larvae/mrl then it gradually increased and the maximum number of semilooper was observed during 39th SMW *i.e.* last week of September with 2.5 larvae/mrl.

The major activity period of semilooper was observed from August to September, after that the infestation was declined.

The Green Semilooper, *Chrysodeixis acuta* showed significant and positive correlation with maximum temperature (r= 0.595), minimum temperature (r= 0.561) and morning relative humadity (r= 0.610).

Similarly, More or less the present findings are similar with the findings of Chaudhary (2009) [11] who reported that the disperson of *Chrysodeixis acuta* (Walker) and *Spodoptera litura* (Fab.) on soybean crop from August to October. The present findings are also in agreement with the Punithavalli *et al.*, (2011) [10] who reported that the green semilooper, *Chrysodeixis acuta* first appeared in late July to early August, and thereafter were present continuously up to late October.

Table 1: Seasonal incidence of green semilooper, *Chrysodeixis acuta* (Walker) on soybean crop during kharif 2020

SMW No.	Green Semilooper/mrl	Max. Temp. (ºC)	Min. Temp. (ºC)	Rain fall (mm)	RH (%) Mor.	RH (%) Eve.	Wind Velocity (Kmph)	Sun Shine (hours)
32	0	30.5	23.5	81.6	89	77	7.1	1.5
33	0	28.4	25.1	71.2	88	86	10.4	0.5
34	0.7	31	25.5	29.8	86	74	7.8	2
35	0.8	29.8	24.6	235.8	90	75	8.2	3.7
36	1.8	32.9	26	8	94	74	3	4.9
37	1.2	33.2	26	64	91	67	3.4	6
38	1.4	32.7	25.8	16.4	89	71	2.9	3.6
39	2.5	32.8	25.3	0	90	59	5.1	5.3
40	0.9	31.8	25	12.8	90	63	2.6	4
41	0.8	32.5	25.3	0	90	66	4.4	5
42	0.8	31.9	23.4	7	90	57	5	6.5
43	0.3	32.6	19.2	0	87	54	2.1	8
44	0	31.8	18.5	0	82	52	2.2	7.6

Correlation coefficient (r)	0.595*	0.561*	-0.194	0.610*	-0.115	-0.276	0.168

*Significant at 5% level of significance
SMW: Standard Meteorological Week

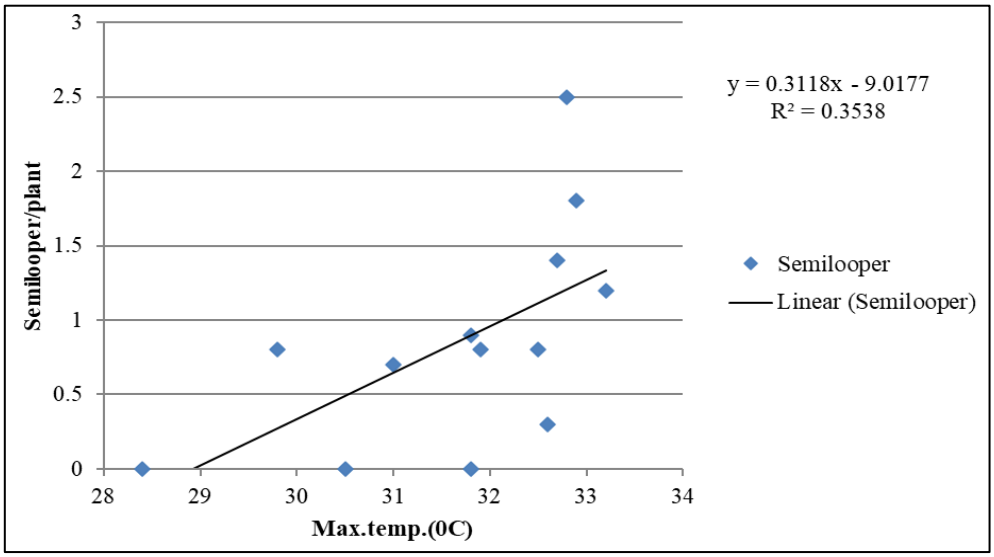

Fig 1: Regression equation between Max.Temp.(^{0}C) and population buildup of Green Semilooper, *Chrysodeixis acuta*

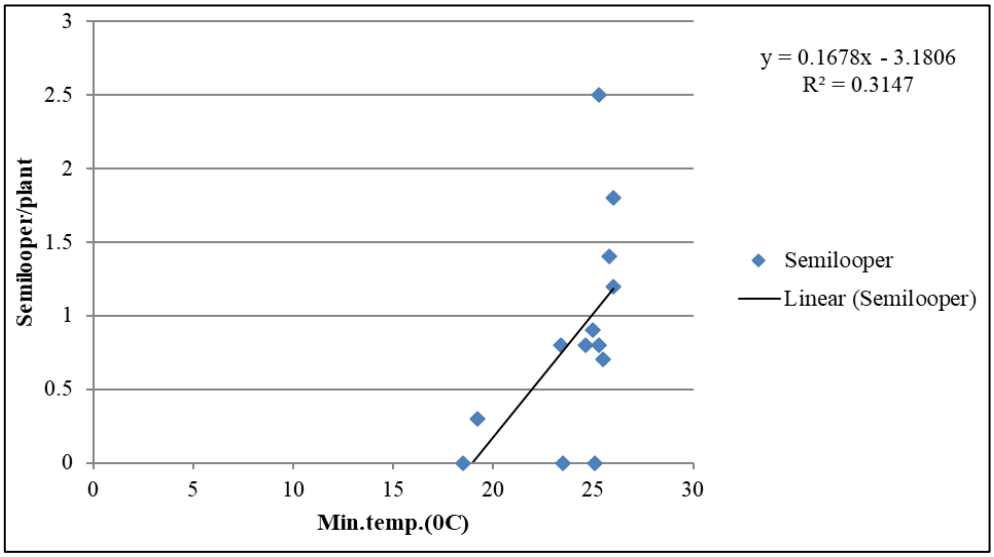

Fig 2: Regression equation between Min. Temp. (^{0}C) and population buildup of Green Semilooper, *Chrysodeixis acuta*

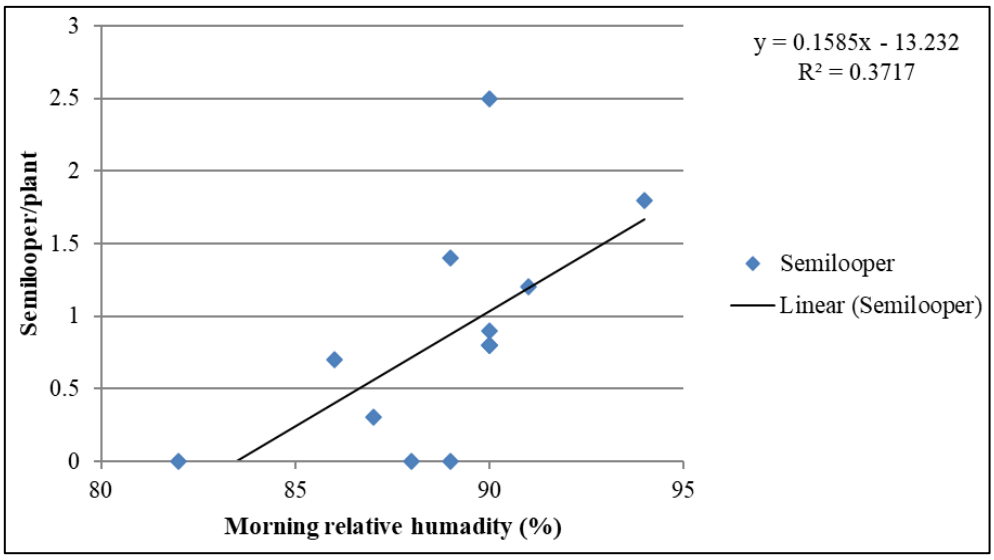

Fig 3: Regression equation between morning relative humadity and population buildup of Green Semilooper, *Chrysodeixis acuta*

4. Conclusion

The major activity period of semilooper was observed from August to September, after that the infestation was declined. The Green Semilooper, *Chrysodeixis acuta* showed significant and positive correlation with maximum temperature (r= 0.595), minimum temperature (r= 0.561) and morning relative humadity (r= 0.610).

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