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Studies on seasonal incidence and nature of damage of girdle beetle and stem fly in soybean

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Abstract

Field experiment was conducted during Kharif season of 2015 at Zonal Agriculture Research Station, R.A.K. College of Agriculture, Sehore to study the seasonal incidence and nature of damage of girdle beetle and stem fly in soybean. Plant infestation with stem fly abruptly increased and reached up to 80 percent in the last week of September with highest stem tunneling (48.50 percent). The fly-infested almost every plant (90%) in the first week of October 2015. The Maximum infestation of girdle beetle in 2nd week of September it ranged from 11.6 to 15.00 percent. Negligible level of Plant infestation was also observed during the 1st fortnight of October.

Keywords: Plant infestation, girdle beetle, Stem fly, stem tunneling

Introduction

Soybean [*Glycine max* (L.) Merrill] is now a cash crop and has occupied an important place in agriculture and oil economy of the country. Soybean has occupied first rank among oilseed crops in India since 2005 onwards. There is a continuous increase in area and production. The area under soybean cultivation has increased from 8.12 million ha. To 8.87 million ha. And production from 7.96 million tones to 9.46 million tones, i.e, about 9.2% and 18.7% in 2006-2007 and 2007-2008, respectively which is a peculiar increase. In Indian scenario, Madhya Pradesh contributes about 67% and 56% in total area and production of soybean, respectively in the country and is called as "soya state" (Anonymous, 2005 and Anonymous, 2007) ^[1-2]. In India, soybean has acquired third position among the oilseeds after groundnut and mustard.

The grub of girdle beetle, *Obereopsis brevis* (Swed.) bores the main stem and branches, resulting in stunting plant growth and sometime whole plant succumb to injury. The early-stage infestation of the pest is even more disastrous (Ramesh Babu, 2010) ^[7]. The stem fly, *Melanagromyza sojae* attacks the soybean throughout the growing season, but the most vulnerable period is within three to four weeks after germination the maggot may tunnel up to 70% of the stem length (Singh and Singh, 1990) ^[9] and may reduce the grain yield up to 33 percent (Singh and Singh 1992) ^[8].

Chaudhary *et al.* (2014) ^[4] reported girdle beetle, (*Obereopsis brevis* Swed) as a predominant borer. Adult female makes girdles in the petiole and even some time on the main stem of plant. It has been observed that girdle beetle cause higher reduction in yield in early and most vulnerable crop stages identified in between 30 to 55 days when girdler confined to petiole.

Materials and Methods

The research work was carried out during *Kharif* season of 2015 at Zonal Agriculture Research Station, R.A.K. College of Agriculture, Sehore. Madhya Pradesh under "All India Coordinated Research Project on Soybean" financed by ICAR, New Delhi.

Observations recorded

Girdle beetle

To record the seasonal incidence of girdle beetle, observation on the number of girdled plants by girdle beetle was recorded at weekly intervals starting from the initiation of infestation till harvest of the crop. The pest incidence was recorded by counting healthy and damaged plant by girdle beetle and the data was calculated in percentage.

Stem fly

Observation on stem fly was recorded on 3 randomly selected plants at weekly interval starting from the initiation of infestation till harvest of the crop. To record the stem tunneling caused by the maggot of stem fly the plants were uprooted and open vertically. Plant height and tunnel

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length were measured for calculating percent tunneling. Data thus obtained was calculated in percentage.

Identification of damaged plants

Girdle beetle

Damaged plants were identified based on drooping leaves/withered leaves due to construction of two parallel rings (Girdles) on the stem, petiole and base of central trifoliolate leaf by female girdle beetle. As a result of girdle formation, the leaf withers at the distal ends and dried up ultimately. In the course of time, the girdled parts also dry up.

Stem fly

The maggot of stem fly mines the leaf lamina until it reaches one of the veins which leads it to midrib and through petiole it travels to the main stem where it forms narrow zig-zag tunnels turn dark brown and are filled with frass. Due to its damage, plant vigour is adversely affected.

Result and Discussions

To study the Seasonal incidence and nature of damage of girdle beetle and Stem fly in soybean during Kharif 2015

During Kharif, 2015, stem fly *Melanagromyza sojae* (Zehnt.) and girdle beetle, *Obereopsis brevis* (Swed.) were recorded as major stem borers infesting on soybean crop. Observation on infestation of girdle beetle and stem fly were recorded seven days after germination to till harvest of the crop.

Stem fly, *Melanagromyza sojae* (Zentener)

The studies on the seasonal incidence of soybean were conducted during Kharif-2015. Stem fly infested soybean crop throughout the crop season but initially, its infestation was low and reached its peak in the last week of September 2015. The infestation of stem fly started in 3rd week of August, 2015 at 28 DAG with 10 percent plant infestation and 1.48 percent stem tunneling. Plant infestation by the stem fly was continued up to harvest of the crop. Infestation abruptly increased and reached up to 80 percent in the last week of September with highest stem tunneling (48.50 %). The fly infested almost every plant (90 %) in the first week of October 2015.

The stem tunneling was caused by maggot of stem fly. It entered the stem through the leaf petiole and bored up and downwards. The reddish colour tunnel was observed in all the affected plants. (Table-1 & Fig-1).

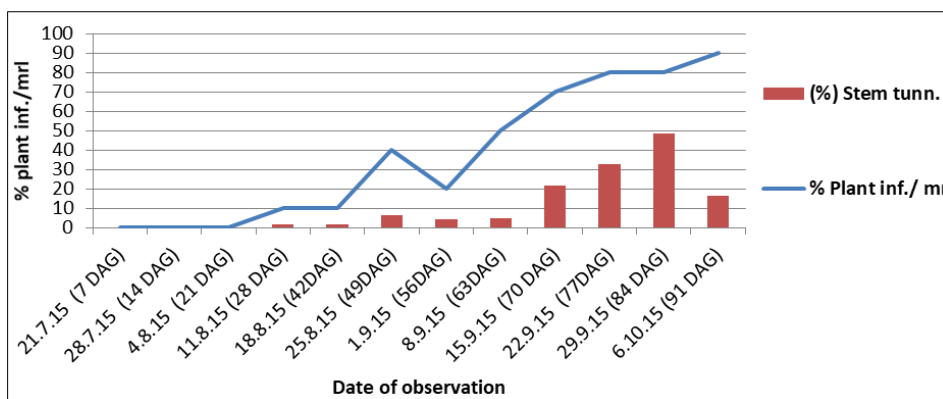


Fig 1: Stem fly incidence in soybean crop during kharif. 2015

Girdle beetle, *Obereopsis brevis* (Swed.)

The infestation of girdle beetle started in 2nd week of August when crop was 28 days old with 1.40 percent plant infestation. The infestation caused by adult of girdle beetle was initially low. However the number of infested plants were slowly increased and reached to 3.10 and 4.30 percent in 3rd and 4th week of August 2015. There was a further increase in infestation in 1st week of September having 9.20 percent.

Similar increasing trend in plant infestation continued in September. It ranged from 11.6 to 15.00 percent with the maximum infestation in 2nd week of September. Plant infestation was also observed during the 1st fortnight of October, but it was a negligible level. Thus the pest remained active for about two and a half month that is up to before harvest of the crop. (Table -2 and Fig -3).

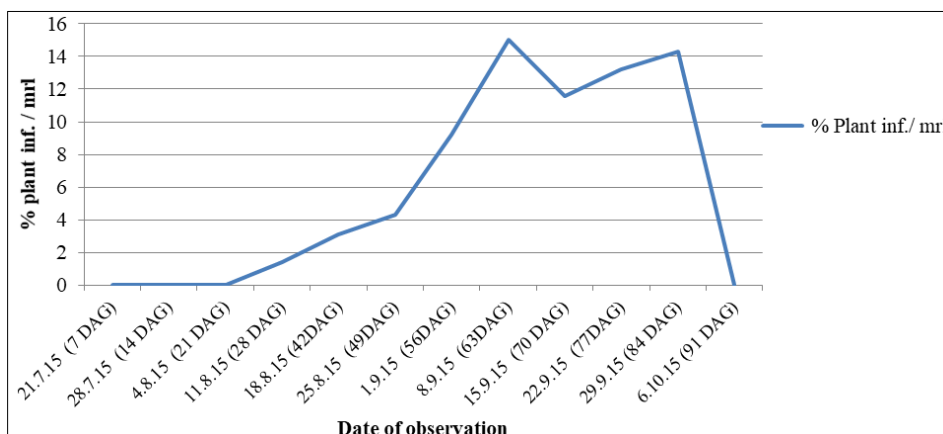


Fig 2: Girdle beetle incidence in soybean crop during kharif. 2015

Table 1: Incidence of stem borer in soybean during Kharif, 2015

Date of Observations	Stem fly incidence		Girdle beetle incidence
	% Plant inf./ mrl	(%) Stem tunn.	% Plant inf./ mrl
21.7.15 (7 DAG)	0.00	0.00	0.00
28.7.15 (14 DAG)	0.00	0.00	0.00
4.8.15 (21 DAG)	00.00	0.00	0.00
11.8.15 (28 DAG)	10.00	1.48	1.40
18.8.15 (42DAG)	10.00	1.56	3.10
25.8.15 (49DAG)	40.00	6.27	4.30
1.9.15 (56DAG)	20.00	4.10	9.20
8.9.15 (63DAG)	50.00	5.10	15.00
15.9.15 (70 DAG)	70.00	21.50	11.6
22.9.15 (77DAG)	80.00	32.60	13.20
29.9.15 (84 DAG)	80.00	48.50	14..3
6.10.15 (91 DAG)	90.00	16.60	0.00

Maggot of stem fly caused tunneling by entered the stem through the leaf petiole and bored up and downwards. The reddish colour tunnel was observed in all the affected plants our observations are similar with earlier observations of Bhattacharjee *et al.* (1986) noted that *Melanagromyza sojae* (Zehnt.) caused heavy damage to soybean in the field at Delhi in India. Damaged plants showed tunnel formation in the stem region. The infestation caused by adult of girdle beetle was initially low. However the number of infested plants were increased in 3rd and 4th week of August 2015. There was a further increase infestation in 1st week of September. These findings corroborate with Netam (2010) [5] reported that peak activity of girdle beetle and lepidopterous larvae observed during last week of August. The infestation of stem fly started in 3rd week of August, 2015 at 28 DAG with 10 percent plant infestation and 1.48 percent stem tunneling. Plant infestation by the stem fly was continued up to harvest of the crop. Infestation abruptly increased and reached up to 80 percent in the last week of September with highest stem tunneling (48.50 %). The present finding conformity with the findings of Pragma Yadav *et al.*, (2015) [6] infestation of stem fly started in first week of August, 2010 at 28 DAG with 10 per cent plant infestation and 0.30 per cent stem tunneling. Plant infestation gradually increased and reached up to 73 per cent with 48.50 per cent stem tunneling in the third week of September, 2010

Conclusion

Based on present study the maximum infestation of Stem fly population last week of September and also girdle beetle maximum infestation in 2nd week of September. So, it can be concluded that the population of stem fly and girdle beetle both were increased in September. This information can be used in formulating population modules for pest management.

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