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Field Screening of AVT lines for the management of stem fly and girdle beetle of soybean

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Abstract
An investigation on "The screening of AVT lines of soybean against stem fly and girdle beetle" the field experiment was conducted at research farm, Department of Agricultural Entomology, College of Agriculture, Badnapur. During *Kharif* season 2017. The experiment was conducted under the Randomized Block Design (RBD) with 14 AVT lines and two replications in protected and unprotected set of conditions.

At 15 DAG the lowest seedling mortality due to stem fly was observed in check JS-335 while the highest mortality recorded in DSB-28-3 and at 30DAG the lowest seedling mortality due to stem fly was observed in JS-335 while the highest mortality was noticed in MACS-1340. At flowering lowest stem fly infestation were observed on genotype KDS-1045 and KDS-921 while the highest infestation was recorded on genotype MACS-1340 and MAUS 158. At harvesting the lowest infestation were noticed on check JS 97-52 and JS-335 while the highest infestation was observed on RSC-10-70.The lowest girdle beetle damage was recorded in check MAUS-2 while the highest damage was noticed in KDS-921.

Keywords: screening, soybean genotypes, stem fly, girdle beetle, yield

Introduction

Soybean is a wonder crop of twentieth century. It is an excellent source of protein and oil. It contains about 40 per cent high quality protein and 20-22 per cent oil besides minerals and vitamins. It ranks first among the oilseeds in the world as well as in India. In India it grown on 101.56 lakh ha with the production of 83.50 lakh metric tons and an average yield of 822 kg per ha. Madhya Pradesh, Maharashtra, Rajasthan, Andhra Pradesh, Karnataka, Chhattisgarh and Gujarat are the leading producers of soybean. Since, soybean is giving consistent yield and good monetary returns the area under this crop in Maharashtra is increasing particularly in Vidharbha, South Maharashtra and Marathwada. Maharashtra rank second in area as well as production in India. Soybean accounts more than 34.48 lakh ha area with production of 29.0 lakh metric tons in Maharashtra (Anonymous, 2017) [1]. The major soybean growing districts in Maharashtra are Buldhana, Latur, Amrawati, Yawatmal, Vashim, Nanded, Akola and Hingoli. The luxuriant crop growth, soft and succulent foliage attracts many insects and provides unlimited source of food, space and shelter. In Marathwada region of Maharashtra, about 16 different species of insect pests have been reported on soybean. The important ones are leaf miner (*Aproaerema modicella*, Deventer), stem fly (*Melanagromyza sojae*, Zehntner), girdle beetle (*Obereopsis brevis*, Gahan), leaf eating caterpillar (*Spodoptera litura*, Fabricius) and green semilooper (*Chrysodeixis acuta*).

Stem fly, *Melanagromyza sojae* Zehntner is a serious pest of soybean In India, its infestation is as high as 85-90 per cent *M.sojae* has been reported a serious pest of soybean in Maharashtra (Munde, 1982) [4]. Sharma *et al*., (1994) reported that grain yield was negatively correlated with the infestation and stem tunneling percentage by *M. sojae*. The impact of stem fly damage is more severe in determinate short duration varieties which are cultivated in poor soils under rainfed situation. Its infestation significantly reduced the plant height, number of branches per plant, number of trifoliate leaves, leaf area per plant and dry matter accumulation (Talekar, 1980) [8]. Gangarde (1976) [2] observed 84.4 and 47.2 kg per ha reduction in the pod and seed yield, respectively due to girdle beetle.

These insect are causing appreciable loss to the crop therefore to grow the resistant varieties is the better option which can help to minimize the cost of pest management. Present investigation was undertaken to screen some of the promising soybean cultivar lines for their resistance against stem fly and girdle beetle.

Material and Methods

The experiment was laid out in randomized block design (RBD) by using 14 AVT lines replicated two times in two sets i.e. protected and unprotected. This lines was sown on 17th July 2017 in two lines of three meter of each genotype with spacing 45×5cm. The crop management practices (i.e. field preparation, weeding, fertilizer application, etc.) were adopted as per the recommended practices.

Table 1: Treatment details of AVT lines

Treatment code	Advance variety	Treatment code	Advance variety
T1	AMS-MB-5-18	T8	KDS-921
T2	KDS-1045	T9	DSb-28-3
T3	KDS-980	T10	RSC 10-70
T4	DS-3105	T11	MAUS-158(RC)
T5	MACS-1340	T12	MAUS-2 K-2017 (SC)
T6	RVS 2007-6 K-2017	T13	JS 97-52 K-2017(NC)
T7	RVS-2010-1	T14	JS-335 (NC)

Stem fly

In this experiment observations on seedling mortality of stem fly was recorded at 15 and 30 days after germination and observation on per cent infestation was recorded by uprooting the randomly selected 10 plants from each variety and dissected to observe the stem fly infestation and percentage stem fly damage was worked out by using following formula.

$$\text{Seedling mortality} = \frac{\text{No. of seedling dead}}{\text{Total number of observed seedlings}} \times 100$$

$$\text{Percent stem fly infestation} = \frac{\text{No. of plants infested}}{\text{Total number of observed plants}} \times 100$$

Girdle beetle

Number of girdled plants by girdle beetle was counted in each variety by recording the number of plants showing ring formation and typical cutoff symptoms at 7, 14, 21, 28, 35, 42 days after germination and expessed as percent damage by using following formula.

$$\text{Percent damage by girdle beetle} = \frac{\text{No. of plants showing cutoff symptoms}}{\text{No. of plants damaged}} \times 100$$

Statistical analysis

The percent damage stem fly and girdle beetle was subjected to angular transformation. The data was statistically analyzed by standard analysis of variance methods suggested by Panse and Sukhatme (1967) [5]. The variance due to treatment were compared against variance due to error to test the null hypotheses by 'F' test of significance at p= 0.05.

Results and Discussion

The results of the present study along with relevant discussion have been presented as under:

Per cent seedling mortality in soybean due to stem fly

The results on the seedling mortality due to stem fly in soybean at 15 and 30 DAG are presented in Table 1.

The per cent seedling mortality due to stem fly was recorded from 2.1 to 5.7 per cent at 15 DAG. The genotype KDS-921 recorded significantly less (2.2%) seedling mortality compared to rest of genotypes followed by KDS-1045, KDS-980 and RSC-10-70 which recorded 2.6, 2.8 and 3.1 per cent seedling mortality respectively and at par with check JS-335 (2.1%) and JS 97-52 (2.8%). The seedling mortality due to stem fly was recorded from 2.8 to 7.4 per cent at 30 DAG. Among the different genotypes RVS-2010-1 (4.4%) recorded significantly less seedling mortality followed by RSC-10-70 (4.6%), KDS-1045 (4.6%) and at par with check line JS 97-52 (3.7%) and JS-335 (2.8%) were significantly superior over rest of genotypes. The results of present investigation are discussed in the light of findings of previous workers. Jadhav (2011) [3] reported that the genotypes NRC-55, NRC-51, NRC-52 and DSb-101 were recorded significantly lower stem fly incidence and stem tunneling per cent compare to rest of genotypes. The promising genotypes MACS-798, MACS-740, MACS-817and DSb-102 were also recorded moderate stem fly incidence and stem tunneling and found next best to NRC'S and DSb-101 genotypes but proved superior over national check. The genotypes MAS-2000-1 and KHSb-2 were recorded higher stem fly incidence and stem tunneling and found significantly inferior among the genotypes.

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Table 2: Per cent seedling mortality in soybean due to stem fly

S. No.	Variety	Seedling mortality %	
		15 Dag	30 Dag
1	AMS-MB-5-18	5.2 (13.24)	7.2 (15.56)
2	KDS-1045	2.6 (9.32)	4.6 (12.38)
3	KDS-980	2.8 (9.57)	5.2 (13.18)
4	DS-3105	4.9 (12.74)	6.9 (15.23)
5	MACS-1340	3.9 (11.35)	7.4 (15.79)
6	RVS 2007-6	3.5 (10.70)	5.4 (13.44)
7	RVS 2010-1	4.8 (12.61)	4.4 (12.11)
8	KDS-921	2.2 (8.43)	5.8 (13.94)
9	DSB-28-3	5.7 (13.80)	6.6 (14.89)
10	RSC-10-70	3.1 (10.20)	4.6 (12.38)
11	MAUS 158(RC)	3.6 (10.89)	6.3 (14.54)
12	MAUS-2 (SC)	4.1 (11.61)	6.7 (15.00)
13	JS 97-52 (NC)	2.8 (9.60)	3.7 (11.09)
14	JS 335 (NC)	2.1	2.8
	SE(m)±	0.78	0.95
	CD 5%	2.28	2.76
	C.V	10.23	10.05

*figures in parentheses are arc sine transformed values

Stem fly infestation

The results on the stem fly infestation in soybean at flowering and harvesting are presented in Table 2.

The infestation due to stem fly was recorded from 40 to 70 per cent at flowering stage. The genotypes KDS-1045 (35%) and KDS-921 (35%) recorded significantly lowest stem fly

incidence compared to rest of the genotypes followed by RVS 2007-6 (45%), KDS-980 (45%), DSB-28-3 (45%), RSC-10-70 (50%) and RVS 2010-1 (50%) genotypes and at par with check JS-335 (40%) and these genotypes was significantly superior over the rest of the genotypes. The per cent infestation due to stem fly was recorded from 65 to 95 per cent at harvesting stage. The genotype KDS-1045 (65%) recorded significantly lowest stem fly incidence followed by KDS-980 (70%), DS-3105 (75%), RVS 2007-6 (75%), KDS-921 (75%) and DSB-28-3 (80%) and at par with check JS-335 (65%), JS 97-52 (65%), MAUS-2 (75%) and MAUS 158 (80%) were significantly superior over rest of genotypes.

The results of present investigation are discussed in the light of findings of previous workers. Salunke (1999) [6] evaluated that lowest per cent stem length tunneled by stem fly were observed in the cultivars *viz*., JS-335 and JS-80-21.

Jadhav (2011) [3] reported that the genotypes NRC-55, NRC-51, NRC-52 and DSb-101 were recorded significantly lower stem fly incidence and stem tunnelling per cent compare to rest of genotypes. The promising genotypes MACS-798, MACS-740, MACS-817 and DSb-102 were also recorded moderate stem fly incidence and stem tunnelling and found next best to NRC'S and DSb-101 genotypes but proved superior over national check. The genotypes MAS-2000-1 and KHSb-2 were recorded higher stem fly incidence and stem tunnelling and found significantly inferior among the genotypes.

Table 3: Per cent seedling mortality and infestation in soybean due to stem fly.

S. No.	Variety	% Infestation	
		At Flowering	At Harvesting
1	AMS-MB-5-18	60.0 (50.77)	90.0 (71.57)
2	KDS-1045	35.0 (36.27)	65.0 (53.73)
3	KDS-980	45.0 (42.13)	70.0 (56.790
4	DS-3105	60.0 (50.77)	75.0 (60.00)
5	MACS-1340	70.0 (56.79)	90.0 (71.57)
6	RVS 2007-6	45.0 (42.13)	75.0 (60.00)
7	RVS 2010-1	50.0 (45.00)	85.0 (67.21)
8	KDS-921	35.0 (36.27)	75.0 (60.00)
9	DSB-28-3	45.0 (42.13)	80.0 (63.43)
10	RSC-10-70	50.0 (45.00)	95.0 (77.08)
11	MAUS 158(RC)	70.0 (56.79)	80.0 (63.43)
12	MAUS-2 (SC)	55.0 (47.87)	75.0 (60.00)
13	JS 97-52 (NC)	65.5 (53.73)	65.0 (53.73)
14	JS 335 (NC)	40.0 (39.23)	65.0 (53.73)
	SE(m)±	3.4	4.58
	CD 5%	9.97	13.29
	C.V	10.54	10.16

*Figures in parentheses are arc sine transformed values

Per cent damage due to girdle beetle

The results on the per cent damage due to girdle beetle in soybean are presented in Table 4. Which indicates that the average infestation due to girdle beetle from germination to harvesting. The average infestation due to girdle beetle was recorded from 18.7 to 33.4 per cent. The genotype MACS-1340 (20.3%) recorded significantly lowest girdle beetle infestation followed by DS-3105 (23.6%), RVS 2007-6 (24.7%) and DSB-28-3 (25.1%) and at par with check MAUS-2 (18.7%) and JS 97-52 (20.6%) were significantly superior over rest of genotypes. The genotype KDS-921 (33.4%) recorded significantly higher infestation due to girdle beetle followed by AMS-MB-5-18 (30.5%), RSC-10-70 (29.9%), RVS 2010-1 (29.7%), KDS-1045 (27.1%) and KDS-980 (26.7%) and at par with check MAUS 158 (31.6%) and JS-335 (29.2%).

The results of present investigation are discussed in the light of findings of previous workers. Salunke *et al*., (2002) [7] reported that the girdle beetle (*O.brevis*) infestation varied from 9.62 to 18.75 per cent. Infestation was maximum in RSC-3 (18.79%) and minimum in NRC-37 (9.62%).

Table 4: Per cent damage due to girdle beetle in AVT lines

S. No.	Variety	Average infestation (%)
1	AMS-MB-5-18	30.5 (33.41)
2	KDS-1045	27.1 (31.33)
3	KDS-980	26.7 (30.93)
4	DS-3105	23.6 (29.02)
5	MACS-1340	20.3 (26.00)
6	RVS 2007-6	24.7 (29.72)
7	RVS 2010-1	29.7 (33.00)
8	KDS-921	33.4 (35.32)
9	DSB-28-3	25.1 (29.98)
10	RSC-10-70	29.9 (33.06)
11	MAUS 158(RC)	31.6 (34.16)
12	MAUS-2 (SC)	18.7 (25.58)
13	JS 97-52 (NC)	20.6 (26.98)
14	JS 335 (NC)	29.2 (32.66)
	S.E(m)±	1.76
	C.D. 5%	5.13
	C.V.	8.12

*Figures in parentheses are arc sine transformed values

References

1. Anonymous. 2017. www.SOPA.gov.in.
2. Gangarde GA. Assessment of effect on yield and quality of soybean caused by major sarthropod pests. Terminal technical report on project JNKVV, Jabalpur, Madhya Pradesh, 1976, 143.
3. Jadhav SN. M.Sc. Thesis. Bio-Ecology and management of stem fly, *Melanagromyza sojae* in soybean ecosystem. University of Agricultural Sciences, Dharwad, 2011.
4. Munde DR. Insect pest complex on soybean (Glycine max L.) in Marathwada region. J Maha. Agric. Univ. 1982; 5(3):259-261.
5. Panse, Sukhatme. Statistical method for agricultural workers. ICAR, New delhi second edition, 1967.
6. Salunke SG. Field screening and efficacy of some granular insecticides against seedling insect pest of soybean [*Glycine max* (L.)] *M.Sc. Thesis, Marathwada Agricultural University*, Parbhani, 1999.
7. Salunke SG, Bidgire US, More UG, Kestibhat SS. Field evaluation of soybean cultivars for their major pests. J Soils and crops. 2002; 12(1):49-55.
8. Talekar NS. Search for bean fly resistance in soybean, mungbean and snap beans In: Proceedings of legumes in the Tropics. Faculty of Agriculture, University Pertanian Malaysia. Sedang, Glengor, Malasia, 1980, 293-295.