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Original Research Article

Screening of Different Okra Genotypes against Okra Fruit and Shoot Borrer (*Earias vittella*)

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Keywords

Okra Genotypes , Okra Fruit, Shoot Borrer (*Earias vittella*)

A B S T R A C T

The present investigation was carried out during *rabi* season (March - June) 2017 at central research farm of SHUATS, Allahabad in RBD with three replications. The ten okra genotypes viz. HRB-55, H14-A, JPM-20-16-32, IIVR-10, IC-14-934, IC-45862, JC-034-1124-A, VRO-6, 317-10-1, 326-10-1 were taken to know their response on shoot and fruit borer (*Earias vittella*) infestation. There was none of the genotype present in shoot and fruit borer Resistant. Among these ten genotypes the genotype VRO-6 had recorded lowest shoot and fruit borer infestation followed by IIVR-10, HRB-55, H14-A were recorded moderately resistant. IC-45862, JPM-20-16-32 and 317-10-1 were recorded moderately susceptible while IC-140934, 326-10-1 and JC-034-1124-A were recorded Susceptible.

Introduction

Okra *Abelmoschus esculentus* L. (Moench), belongs to family Malvaceae, is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. This crop is suitable for cultivation as a garden crop as well as on large commercial farms. Cultivated okra is polyploid in nature (Joshi and Harda, 1956). The somatic (2n) chromosome number in the genus *Abelmoschus* ranges from 72 to 144. It is grown commercially in India, Turkey, Iran, Western Africa, Yugoslavia, Bangladesh, Afghanistan, Pakistan, Burma, Japan, Malayasia, Brazil, Ghana, Ethiopia, Cyprus and the Southern United States. India ranks first in the world with 6.34 million tons (72% of the total world production) of okra produced from over 0.51 million hectare land (NHB 2014-15). In U.P. area, production and productivity of okra is 14.18 thousand hac, 181.66 thousand tones, 12.2 metric tons per hectare respectively (NHB 2014-15).

The roots and stems of okra are used for clarification of sugarcane juice from which gur or brown sugar is prepared (Chauhan, 1972). Its ripe seeds are roasted, ground and used as a substitute for coffee in some countries. Mature fruits and stems containing crude fibre are used in the paper industry. Extracts from the seeds of the okra is an alternative source for edible oil. The greenish yellow edible oil has a pleasant taste and odour, and is high in unsaturated fats such as oleic acid and linoleic acid. The oil content of the seed is quite high at about 40%. Okra provides an important source of vitamins, calcium, potassium and other mineral matters which are often lacking in the diet in developing countries (IBPGR, 1990).

It has good nutritional value. Per 100 g of edible portion of okra contain calories 35.0, Moisture 89.6 gm., Carbohydrates 6.4 gm., Protein 1.9 gm., Fat 0.2 gm., Fibre 1.2 gm., Minerals 0.7 gm., Phosphorus 56.0 mg., Sodium 6.9 mg., Sulphur 30.0 mg., Calcium 66.0 mg., Iron 1.5 mg., Potassium 103 mg., Magnesium 53 mg., Copper 0.19 mg., Riboflavin 0.01 mg., Thiamine 0.07 mg., Nictonic acid 0.06 mg., Vitamin C 13.10 mg., Oxalic acid 8.0 mg. (Gopalan *et al*., *2007*).

Okra is attacked by a number of insect pests. There are about 13 major insect and non-insect pest species, which attack this crop at various stages of growth (Dhamdhere *et al.*, 1984). Unfortunately, okra is the worst sufferer of shoot and fruit borer (*Earias vittella* Fab.), which is main bottleneck for cultivation of this crop. Under different agro-climatic conditions, the losses may vary from 10.1 to 50.0 per cent (Kashyap and Verma, 1983).When the crop is young, larvae bore into tender shoots and tunnel downwards which wither, drop down and growing points are killed. In fruits, the larvae bore inside these and feed on inner tissues which become deformed in shape with no market value. The infested fruits become unfit for human consumption, thus resulting in 35 to 76 % decrease in yield and caused severe damage to the crop leading to yield losses to an extent of 35-90% (Koulagi *et al*., 2009).

Materials and Methods

The experiment was conducted during the *Rabi* season 2016- 2017 at Central research field of SHUATS, Allahabad which is situated at 25.41^{o} North latitude 81.84^{o} East longitude and at an altitude of 98 mt. above sea level. The climate is typically semi-arid and subtropical. The maximum temperature reaches up to 49^{0} C in summer and drops down to 1.5^{0} C in winter. The site selected was uniform, cultivable with typical sandy loam soil having good drainage.

The experiments were conducted with ten okra genotypes viz. HRB-55, H14-A, JPM-20-16-32, IIVR-10, IC-14-934, IC-45862, JC-034-1124-A, VRO-6, 317-10-1 and 326-10-1 in three replication. Size of plots was 1×2 m^{2} and sown with the spacing of 45×30 cm. The crop was raised following all standard agronomical practices and no any chemical pesticides were used.

The observations on shoot and fruit borer were recorded on 5 randomly selected plants with respect to shoot damage till flowering stage, while flower and fruit damage were record till fruiting and final harvesting stage, respectively at seven days interval.

The average percentage damage and intensity of damage to shoot and fruit was calculated by counting damaged shoots and fruits on selected plants in each plot and counting total number of shoots and fruits on selected plants, respectively.

The per cent shoot and fruit damage were calculated by adopting the following formulas-

Per cent shoot infestation = $\frac{\text{Number of damaged shoots}}{\text{Total number of shoots}} \times 100$

Per cent fruit infestation = $\frac{\text{Number of damaged fruits}}{\text{Total number of fruits}} \times 100$

(Narayanan *et al*. 2016)

Results and Discussion

Mean per cent infestation of *E. vittella* on shoot

During investigation, the shoot infestation ranged between 7.91 and 32.14 % (Table 1 and fig.1). Out of 10 genotypes screened, significantly minimum shoot infestation was registered by genotypes VRO-6 (check) (7.91 %), IIVR-10 (15.31 %). The infestation on these genotypes were found to be statistically at par with each other and graded as moderately resistant while, the varieties were found to be statistically at par with each other and graded as moderately resistant while, the varieties HRB-55 (15.26 %), H14-A (17.66 %). The genotypes or IC-45862 (22.33%), 317-10-1 (28.51 %), JPM-20-16-32 (28.97 %), were found moderately susceptible. Whereas, maximum infestation was registered by varieties 326-10-1 (31.58 %) JC-034-1124-A (31.51%) IC-140934 (32.14%) of infestation and were graded as susceptible (Table 2).

The present study is conformity with those of Gupta and Yadav (1978) and Singh *et al.* (2005) indicating that none of the lines/varieties were immune. This result is in accordance of Gonde *et al.* (2013). Similar results were also reported by Shukla *et al*. (1998) who tested seven Varieties of okra and among them AROH-2 and Komalhy. showed lowest shoot damage (4 and 5% respectively). Varieties Ankur 35 and Parbhani Kranti (PK) registered significantly higher shoot damage (7.5 and 8%).

Fig.1 Reaction of different Okra genotypes against shoot and fruit borer damage

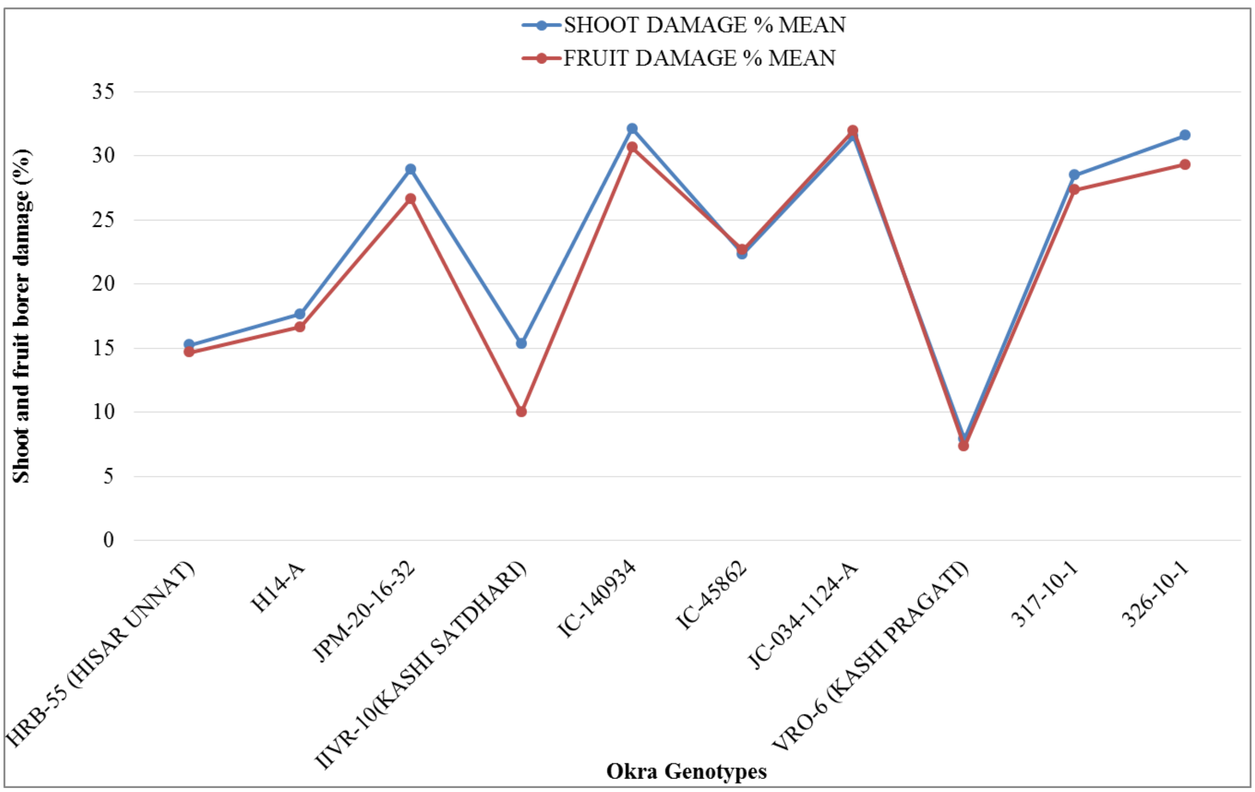

Table.1 Reaction of different Okra genotypes against shoot and fruit borer damage

Sr.no	Genotypes	Shoot damage (%) *E.vittela*		Fruit damage (%) *E.vittella* Number basis	
		Mean (%)	**Grade**	**Mean (%)**	**Grade**
1	HRB-55	(15.26)[e]	MR	(14.66)[f]	MR
2	H14-A	(17.66)[d]	MR	(16.44)[f]	MR
3	JPM-20-16-32	(28.97)[b]	MS	(26.66)[d]	MS
4	IIVR-10(KASHI SATDHARI)	(15.31)[e]	MR	(9.77)[g]	MR
5	IC-140934	(32.14)[a]	S	(30.66)[ab]	S
6	IC-45862	(22.33)[c]	MS	(22.66)[e]	MS
7	JC-034-1124-A	(31.51)[a]	S	(32.00)[a]	S
8	VRO-6 (CHECK)	(7.91)[f]	MR	(7.55)[h]	MR
9	317-10-1	(28.51)[b]	MS	(27.55)[cd]	MS
10	326-10-1	(31.58)[a]	S	(29.33)[bc]	MS
F-test		Sig		Sig	
SE±		17.714		24.26	
CD (0.05%)		1.70		1.99	

Table.2 Grading of different okra genotypes based on fruit infestation (Gupta and Yadav,1978)

Sr.No	Category	Grade	Level of fruit infestation	Okra genotypes (% of fruit infestation)
1	Resistant	R	1-5 percent	None
2	Moderately resistant	MR	6-15 percent	VRO-6 (check), HRB-55, H14-A, IIVR-10
3	Moderately susceptible	MS	16-30 percent	JPM-20-16-32, IC-45862, 317-10-1
4	Susceptible	S	31-50 percent	326-10-1, JC-034-1124-A, IC-140934

Mean per cent infestation of *E. vittella* on fruit (number basis)

The data on per cent mean infestation of fruits by fruits borer (Table 1 and fig.1) revealed that the mean percent infestation ranged between 7.55 and 32.00 %. Significantly least infestation was observed in (check) VRO-6 (7.55 %), followed by IIVR-10 (9.77 %), HRB-55 (14.66 %), H14-A (16.44 %). These varieties were statistically at par with each other and graded as moderately resistant. During screening, infestation of fruit borer was noticed and graded as moderately susceptible varieties in IC-45862(22.66 %), followed by JPM-20-16-32 (26.66%) 317-10-1(27.55%), 326-10-1 (29.33 %). Among the tested varieties the genotype IC140934 (30.66%) and JC-034-1124-A had susceptible reaction (Table 2). Similar results have been reported by Gonde *et al.* (2013).

In conclusion, there was none of the genotype present in shoot and fruit borer Resistant. The genotype VRO-6 had lowest shoot and fruit borer infestation followed by IIVR-10, HRB-55, H14-A recorded moderately resistant. IC-45862, JPM-20-16-32 and 317-10-1 were recorded moderately susceptible while IC-140934, 326-10-1, JC-034-1124-A were recorded Susceptible. In comparison of VRO-6 (check) it was recorded that IIVR-10 genotype had low percentage of pest infestation fallowed by HRB-55 and H14-A.

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