Research Paper :

Screening of sorghum genotypes resistance to earhed caterpillar

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SUMMARY

The present work was carried out to screen the sorghum genotypes against *Heliothis armigera* under field conditions. Fifteen sorghum genotypes were screened for their resistance to earhead caterpillar under field conditions. The genotypes having dense and compact earheads had highest incidence of earhead caterpillar followed by semicompact and loose earheads genotypes. The entries CSH-14 and SVD-9606 had lowest incidence of 0.45 and 0.52 larvae per earhead as well as lowest grain yield damage of 5.34% and 6.52%, respectively, were proved resistant genotypes. Whereas, CSH-5, CS-3541 and DSH-3 recorded highest number of 2.98, 2.92 and 2.85 larvae per earhead with grain damage of 44.70, 39.20 and 38.20 per cent, respectively were proved susceptible tendency.

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Sorghum [*Sorghum bicolor* (L.) Moench.] is an important cereal food crop of the world. Sorghum ranks fourth among the cereals next to wheat, rice and maize in the world. In India, sorghum ranks third in area and production after rice and wheat. Area under sorghum cultivation in the country has remained fairly stable. However, National Research Centre for Sorghum, Hyderabad projects a target of 21.7 million tones by 2020 A.D., which calls for raising the productivity (1200 kg/ha) close to global average.

One of the earliest records of earhead caterpillar occurring on sorghum was by Mally (1893), who observed larvae of *H. armigera* feeding on the milky and developing grains of sorghum. *H. armigera* is one of the most important earhead pests reported to cause as much as 37.11 per cent yield loss in sorghum (Kulkarni *et al.*, 1980).In recent years, research has provided increasing evidence that substantial yield advantages can be achieved from resistant varieties, which minimize the risk of complete crop failure and ensure greater stability in the crop yield under variable environmental conditions (Azam-Ali, 1995).

MATERIALS AND METHODS

Fifteen sorghum genotypes (compact, semi-compact and loose type of earheads) were selected for evaluating the relative susceptibility to earhead caterpillar, *H. armigera*. The entries were collected from the germplasm maintained at All India Co-ordinated Sorghum Improvement Project (AICSIP) Centre, University of Agricultural Sciences, Dharwad. Experiment was laid out in Randomized Block Design with two replications. The crop was sown on 8th July 2001 in five lines of 4 meter row length by following inter and intra row spacing of 45 cm and 15 cm, respectively. The list of entries for reaction of *H. armigera* are given in Table 1.

RESULTS AND DISCUSSION

The use of resistant varieties has been exploited as an effective method of pest control by itself and also can be integrated with other methods of pest management practices. Some varieties of different crop are found to be resistant or tolerant to particular insect pests. Growing of such varieties will help in

Table 1 : Evaluation of sorghum genotypes against *H. armigera*

I compact	II semi-compact	III Loose
CSH-5	DSV-2	CSH-14
CSV-15	SVD-9601	RS-29
C-43	CSH-16	SSV-74
DSV-3	DSH-3	SVD-9606
CS-3541	CSH-17	
	CSV-13	

getting good yield even in the presence of pest attack. Hence, the present work was carried out to screen the sorghum genotypes against *H. armigera* under field conditions.

Screening of fifteen sorghum genotypes (Table 2) indicated the presence of resistance on the bases of incidence and grain loss. CSH-14 (5.34) and SVD-9606 (6.52) were found to be resistant as the incidence of earhead caterpillar in these cultivars ranged between $X-2\sigma$ to $X-\sigma$. Whereas, DSH-3 (2.85 larvae/earhead), CS-3541 (2.92 larvae/earhead) and CSH-5 (2.98 larvae/ earhead) were found to be highly susceptible as they recorded more than $X+2\sigma$ larvae per earhead. When, the grain loss was considered CSH-14 and CSV-9606 recorded less than $X-\sigma$ *i.e.*, 10.15 per cent proving their resistance. The genotypes *viz.,* SSV-74 (11.49%), RS-29 (13.61%), SVD-9601 (15.38%), CSV-13 (16.67%), DSV-2 (17.86%), CS-43 (18.99%) and DSV-3 (22.15%) were moderately resistant with per cent grain loss ranging between $X-\sigma$ to X. Whereas, DSH-3 (38.20%), CS-3541 (39.20%) and CSH-5 (44.70%) were highly susceptible with more than $X+2\sigma$.

Resistance of CSH-14 and SVD-9606 may be attributed to loose earhead characters, which harboured higher predatory activity and proved less shelter for the pest. The genotypes DSH-3, CSH-5 and CS-3541 having compact earhead showed highest incidence of earhead caterpillar because compact earhead provided food, shelter and protection from natural enemies of earhead caterpillar. The genotypes CSH -14 and CSV -9606 were noticed with lesser seed losses attributed to loose earhead favouring less number of earhead caterpillars. Higher grain loss was noticed in DSH-1, CS-3541 and CSH-5 due to compact earhead which harboured more larvae per earhead.

Table 2 : Incidence of earhead caterpillar, *H. armigera* (Hb) on different sorghum genotypes and its effect on grain yield under field condition

Sr. No.	Sorghum genotypes	Earhead type	Number of larvae/earhead		% grain loss/earhead
			Range	Mean	
1.	CSH-14	Loose	0.2 - 0.5	0.45 (1.20)*	5.34 (14.50)
2.	SVD-9606	Loose	0.2 - 0.8	0.52 (1.23)	6.52 (18.85)
3.	SSV-74	Loose	0.4 - 1.6	1.05 (1.43)	11.49 (19.70)
4.	RS-29	Loose	0.5 - 2.0	1.23 (1.49)	13.61 (21.45)
5.	SVD-9601	Semi-compact	1.0 - 2.4	1.47 (1.57)	15.38 (30.20)
6.	CSV-13	Semi-compact	1.2 - 3.0	1.54 (1.59)	16.67 (32.35)
7.	DSV-2	Semi-compact	1.2 - 3.5	1.95 (1.72)	17.86 (27.00)
8.	CS-43	Semi-compact	1.3 - 3.8	2.18 (1.78)	18.99 (28.65)
9.	DSV-3	Semi-compact	1.4 - 4.0	2.37 (1.84)	22.15 (34.45)
10.	CSV-15	Semi-compact	1.4 - 5.2	2.47 (1.86)	24.13 (27.55)
11.	CSH-16	Compact	1.5 - 4.5	2.47 (1.86)	27.90 (33.80)
12.	CSH-17	Compact	1.4 - 5.4	2.78 (1.94)	32.94 (39.85)
13.	DSH-3	Compact	1.5 - 5.5	2.85 (1.96)	38.20 (41.60)
14.	CS-3541	Compact	1.4 - 5.6	2.92 (1.98)	39.20 (41.60)
15.	CSH-5	Compact	1.6 - 6.2	2.98 (1.99)	44.70 (38.35)
	Mean (X)			1.95	22.34
	$\sigma\pm$			0.83	11.63
	CV (%)			6.5	8.3

Figures in the parentheses are $\sqrt{x+1}$; * Transformed values; ** angular transformed value

$<X-2\sigma$ - Highly resistant
$X-2\sigma$ to $X-\sigma$ - Resistant
$X-2\sigma$ to X - Moderately resistant
X to $\sigma+\underline{\sigma}$ - Susceptible
$X+\sigma$ to $X+2\sigma$ - Highly susceptible

These results are in accordance with the findings of Kulkarni (1976) who reported that entries SPV-17 and SPV-10 had lowest number of caterpillars while CSH-5 had maximum larval population. Similarly, Wilson (1976), Kundu and Sharma (1977), Mote and Pokharkar (1981), Patil (1987). Mote and Murthy (1990) and Kishore (1994) reported that compact earhead variety had highest larval infestation and lowest in semicompact and open headed cultivars.

The genotypes having dense and compact earheads had highest incidence of earhead caterpillar followed by semicompact and loose earheads genotypes. The entries CSH-14 and SVD-9606 had lowest incidence of 0.45 and 0.52 larvae per earhead as well as lowest grain yield damage (5.34% and 6.52%) ranged between X-2σ to X-σ were proved resistant genotypes. Whereas, CSH-5, CS-3541 and DSH-3 recorded highest number of 2.98, 2.92 and 2.85 larvae per earhead with grain damage of 44.70, 39.20 and 38.20 per cent, respectively ranging between X+σ to X+2σ were proved susceptible tendency.

Thus, it is inferred from the present study and foregoing discussion that breeder may select the genotypes with loose and semicompact earhead genotypes to have less activity of *H. armigera*.

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