Resistance in sorghum to *Sitophilus oryzae* Linn.

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MS received 15 May 1978; revised 7 June 1979

Abstract. An attempt was made to screen out some promising varieties of sorghum resistant to *Sitophilus oryzae* Linn. The studies revealed that varietal reaction in regard to number of weevils emerged was significant. Hybrids CSH–8R, CSH–1 and CSH–5 and varieties, 168 and 370 showed least population of weevil than local R–16 and 604. The developmental period of the weevil showed no significant differences. The results obtained in respect of the number of females emerged were significant while the reverse was the case with the number of males emerged. An overall higher percentage of females was observed in majority of the varieties tested. Local varieties R–16 and 370 favoured development of females. Varieties 604 and 370 had maximum percentage of infested grains and also recorded maximum weight loss than hybrids. The resistance rated was CSH–8R > 168 > CSH–1 > CSH–5 > 370 > R–16 > 604 taking weevil emergence as a criterion.

Keywords. Sorghum resistance; *Sitophilus oryzae*.

1. Introduction

Large quantities of seeds of newly developed high yielding varieties and hybrids of sorghum are stored for varying periods in the subsequent season. During storage the grains are liable to be damaged by a variety of stored grain insect pests. Of these, rice weevil, *Sitophilus oryzae* Linn. is one of the most destructive pests of stored cereals in general and sorghum in particular. Venkatrao *et al* (1958) reported that this insect caused heavy loss in weight of grains. Its presence in grains reduces its value for milling and bread quality. Cereals have been reported to behave differently towards the attack of this pest (Singh *et al* 1968; Bhatia and Gupta 1969). As the storage facilities are meagre in rural areas where most of the grains remain in the hands of producers, studies on varietal resistance of sorghum to the attack of this pest under storage conditions will be of great help to cultivators in selecting proper varieties. Since a large number of promising sorghum varieties are being tested at Sorghum Research Station, Parbhani, it was felt desirable to screen them for varietal resistance to *S. oryzae*. Though, reports on varietal responses are available there is a dearth of information on existing varieties under cultivation. The present investigation was therefore undertaken.
2. Materials and methods

To study varietal resistance of different sorghum varieties to *S. oryzae*, fresh healthy grains of 7 varieties (table 1) were obtained from Sorghum Research Station, Parbhani. The methodology given by George *et al* (1974) was adopted. Hundred grains of each variety were taken in glass vials of 8.5 cm height and 2.1 cm diameter, covered with muslin cloth and then fastened with a rubber band. There were 3 replications for each variety. The grains were conditioned for 7 days by placing them at 30 °C and 70% relative humidity. One-week old 3 pairs of adult weevils were examined for rostral character as given by Halstead (1963) from ready culture and then released in each vial separately. Insects were allowed to remain in these vials for 12 days for oviposition after which they were removed and grains were left undisturbed for 30 days (i.e. till the emergence of adults). Grains were inspected daily up to 80 days and the number of weevils emerged were counted, as males and females separately. Weeviled grains were taken as infested grains. After removing visible dust, the grains were weighed and the difference in weight was recorded. The data recorded on the number of weevils emerged, the developmental period, the number of females and males emerged, sex ratio, per cent infested grains and per cent loss in weight are presented in table 1.

Table 1. Resistance in sorghum to *S. oryzae*.

<table>
<thead>
<tr>
<th>Variety</th>
<th>No. of weevils emerged</th>
<th>Developmental period in days</th>
<th>No. of females emerged</th>
<th>No. of males emerged</th>
<th>Sex ratio female : male</th>
<th>Per cent infested grains</th>
<th>Per cent loss in weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSH-1</td>
<td>9.66</td>
<td>34.48</td>
<td>4.66</td>
<td>5.00</td>
<td>1.00:1.07</td>
<td>7.66</td>
<td>6.46</td>
</tr>
<tr>
<td>604</td>
<td>27.00</td>
<td>36.84</td>
<td>15.33</td>
<td>11.66</td>
<td>1.00:0.76</td>
<td>25.00</td>
<td>16.18</td>
</tr>
<tr>
<td>R-16</td>
<td>20.66</td>
<td>37.56</td>
<td>9.00</td>
<td>11.66</td>
<td>1.00:1.29</td>
<td>16.33</td>
<td>7.39</td>
</tr>
<tr>
<td>168</td>
<td>3.33</td>
<td>41.20</td>
<td>1.33</td>
<td>1.33</td>
<td>1.00:1.00</td>
<td>3.00</td>
<td>2.93</td>
</tr>
<tr>
<td>CSH-5</td>
<td>11.00</td>
<td>44.83</td>
<td>5.33</td>
<td>5.66</td>
<td>1.00:1.06</td>
<td>9.00</td>
<td>7.12</td>
</tr>
<tr>
<td>CSH-8R</td>
<td>2.66</td>
<td>35.13</td>
<td>1.33</td>
<td>1.33</td>
<td>1.00:1.00</td>
<td>1.33</td>
<td>1.04</td>
</tr>
<tr>
<td>370</td>
<td>13.00</td>
<td>39.83</td>
<td>9.33</td>
<td>3.66</td>
<td>1.00:0.33</td>
<td>18.33</td>
<td>8.86</td>
</tr>
<tr>
<td>SE ±</td>
<td>4.91</td>
<td>3.95</td>
<td>2.44</td>
<td>2.61</td>
<td>2.72</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td>15.13</td>
<td>NS</td>
<td>7.53</td>
<td>NS</td>
<td>8.40</td>
<td>6.16</td>
<td></td>
</tr>
</tbody>
</table>

Figures in the above table are mean of three replications.
3. Results and discussion

Adult emergence is a good criterion for varietal resistance (Singh et al. 1968; Bhatia and Gupta 1969). It is evident from table 1 that varietal response towards number of weevils emerged differed significantly. Varieties CSH-8R, 168, CSH-1 and CSH-5 registered significantly lower weevil emergence than R-16 and 604.

The time taken by the weevils to reach adult stage indicated no significant differences. Although, the varieties had varied weevil emergence, the suitability of the varieties under investigation for development of the weevils did not differ. However, numerically, hybrid CSH-8R favoured rapid development while CSH-5 recorded slowest development of the weevil. In general, developmental period of the weevil ranged from 34 to 44 days.

Data in respect of the number of females emerged showed significant differences. Varieties CSH-8R, 168 and CSH-1 exhibited lowest female emergence. On the contrary R-16, 370 and 604 had maximum female emergence.

Results obtained on the number of males emerged were non-significant. However, the 604 variety apparently seemed to favour development of males than CSH-8R which recorded numerically the least male emergence.

Sex ratio (female : male) observed was 1·00 : 1·07, 1·00 : 0·76, 1·00 : 1·29, 1·00 : 1·00, 1·00 : 1·06, 1·00 : 1·00 and 1·00 : 0·33 in CSH-1, 604, R-16, 168, CSH-5, CSH-8R and 370 respectively.

It may be inferred from table 1 that varieties CSH-8R, 168, CSH-1 and CSH-5 showed the least percentage of infested grains in comparison to R-16 and 370. On the contrary, varieties 370 and 604 recorded highest percentage of infested grains. The reason may be attributed to physical characters of the seed-like colour, size, hardness, tannin content, etc, in weevil damage (Russell 1962). The differences in infestation among CSH-5 and R-16 were not significant.

It was further revealed that variety 604 denoted maximum loss in weight to the extent of 16·18% while CSH-8R recorded minimum loss in weight which was followed by 168, CSH-1, CSH-5.

The overall hybrids maintained least infestation and recorded minimum loss in weight. The results are in agreement with those obtained by Prem Kishore et al. (1975). The resistance was rated as CSH-8R > 168 > CSH-1 > CSH-5 > 370 > R-16 > 604 underlining weevil emergence as a criterion.

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