

Studies on Varietal Screening of Maize Against Maize Stem Borer *Chilo partellus* (Swinhoe)

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Abstract: The present study was conducted on four varieties of maize i.e. Local, Sadaf, Sultan and Akbar for resistance against maize stem borer *Chilo partellus* (Swinhoe) during Kharif 2001. Significant differences were found among genotypes regarding percent infestation, dead hearts, weight of stalks and grains. Sultan was proved to be the most tolerant variety with 8.1% infested plants, 6.46% dead hearts, 51.99 kg stalks and 23 kg grain weight plot⁻¹ followed by Akbar 10.5% infested plants, 48.63% dead hearts 51.09 kg stalks and 22.40 kg grain weight plot⁻¹. Sadaf variety having 11.2% infested plants, 10.63% dead hearts, 49.63 kg stalks and 21.20 kg grain weight plot⁻¹. The results further showed that Local was least tolerant variety with 17.0% infested plants, 12.13% dead hearts, 24.83 kg stalks and 3.2 kg grain weight plot⁻¹.

Key words: Maize, pest control, stem borer, varietal screening, susceptibility

Introduction

Maize (*Zea mays* L.) is an important cereal as well as fodder crop of the world. It occupies 27% of the world acreage and account for about 34% of the world grain production. In Pakistan, among cereals, maize rank third in acreage, production and yield. The area under maize crop in Pakistan is 944000 ha which is 4.28% of the total cultivated area. While annual maize production is 1643200 t with yield is 1741 kg ha⁻¹. In Balochistan, the area under maize crop is 2500 t, which is just 0.15% of the total maize production of Pakistan. Where as the yield is 1000 kg⁻¹, which is far below the national as well as international standard (Anonymous, 2001).

The precise route of introduction of maize into Pakistan is still a mystery. It is generally believed that it was introduced by the Portuguese in the beginning of 16th century through the western coast of India. The use of Muslim terminology (Makki) in its indigenous name seems to suggest the arrival of maize through Arab African sources (Chaudry, 1983).

Maize contributes 6.4% of total food grain production in the country and occupies a special position in the national economy (Aslam *et al.*, 1988). Along with nutritional needs, it provides industrial raw material for the production of the glucose, starch, destrin, cornflakes and corn

oil etc. Besides, a large number of pharmaceutical products, alcoholic beverages are also commercially prepared from maize.

Being a short duration crop, it is grown for grains twice in a calendar year. The grains consist, principally, of cellulose 35%, pentose 40% and Lianin 15%. Green fodder contains protein 1.56%, fat 0.30% and fiber 5.27% (Chaudhry, 1994). When grains are ground to flour fineness, diluents are used as carrier for insecticides and other pesticides.

Yield of maize in Pakistan is far low as compared to advanced countries of the world (Anonymous, 1985). Cultivation of this crop is, however, handicapped by a number of insect pests which take heavy toll of its production annually. Among insect pests, maize stem borer *Chilo partellus* (Swinhoe) is the most destructive pest. In case of severe infestation of maize stem borer alone, it renders the crop as a total failure (Hussain, 1991). Maize stem borer attack all parts of maize plant, except the roots. It prefers to feed by boring into stem, cobs and ears. The newly hatched larvae first perforate the leaves through chewing and then bore down into the stem. In the seedling stage, the feeding larvae causes dead hearts (Karimullah *et al.*, 1986) and in the letter stage it bores the maize stem. It over winters in the stubbles of host plants (Khan and Khan, 1969). According to Latif *et al.* (1960) only the maize stem borer, *Chilo partellus* (Swinhoe), damages upto 75% of the crop.

In view of the above damage by *Chilo partellus* (Swinhoe) to maize, this study was conducted at district Loralai where the test insect is a burning issue. The objective of this study was to find out the most resistant variety of maize against maize stem borer.

Materials and Methods

Four varieties of maize viz. Local, Sultan, Sadaf and Akbar were sown at measuring $3 \times 5.25 \text{ m}^2$. Each variety was replicated thrice in simple randomized complete block design (RCBD). Row to row and plant to plant distance was 75 and 15 cm, respectively, so that there were 140 plants plot^{-1} . All the plots received uniform cultural practices during the whole growing season. Number of plants attacked by *Chillo partellus* (Swinhoe) and number of dead hearts were counted at weekly intervals from 3-4 leaf stages of crop upto two months. The field was scouted for insect pest attack early in the morning. Dead hearts per stems bored by the borer were checked and percent infestation was computed.

$$\% \text{ infestation} = \frac{\text{Infected plants}}{\text{Total number of plants}} \times 100$$

Next week the infestation was calculated as,

$$\text{Next week's infestation} = \text{New infestation (\%)} - \text{old infestation (\%)}$$

The crop was harvested on 25th October, 2001. The yield was recorded by harvesting each plot separately and then the weight of stalks and the grain of 5 randomly selected plants was recorded in each plot. The data of entire growing period were subjected on ANOVA technique and LSD test by using MSTATC, a computer software package (Bricker, 1991). The best resistant variety was determined by least % infestation, fewer dead hearts, increase in weight of stalks and grain plot⁻¹.

Results and Discussion

Dead hearts (%) of maize cultivar by maize stem borer:

Data of dead hearts (%) revealed that minimum number of dead hearts were found in variety Sultan having 6.46% dead hearts (Table 1). This variety showed significant difference with all other varieties. Number of dead hearts in variety Akbar and Sadaf were 8.03 and 10.63%, being significantly different from each other as well as from other varieties. Maximum number of dead hearts were found in variety local having 12.13%. Hence local proved to be the susceptible variety. Similar results were reported by Pant and Lal (1980).

Infestation (%) by maize stem borer of four cultivars of maize:

Minimum infested plants (8.1%) were found in variety Sultan and thus Sultan proved to be the resistant variety (Table 1). It was followed by Akbar and Sadaf having 10.50 and 11.20% infestation, respectively, with non significant differences from each other but significantly different from other varieties. Maximum infestation of 17% was found in local variety with significant differences from all other varieties. Thus Local proved to be the least resistant variety. Similar results were reported by Afzal (1971) Sinha and Verma (1978) and Haleemi (1987).

Weight of Stalks (kg) plot⁻¹ of Different Maize Cultivars

The results revealed significant differences among treatments (Table 1). The highest weight of stalks (51.99 kg plot⁻¹) was recorded from plot of variety Sultan which is statistically at par with that of variety Akbar (51.09 kg plot⁻¹). The lowest weight of stalks (24.83 kg plot⁻¹) was recorded from plot of variety local and weight of stalk in variety Sadaf was (47.63 kg plot⁻¹).

Weight of Grains (kg) Plot⁻¹ of Maize Cultivars

The results revealed significant differences among treatments (Table 1). The highest grain yield being 23.00 and 22.40 kg plot⁻¹ were recorded from varieties Sultan and Akbar, respectively, which are statistically at par with each other, while the lowest weight of grain being 3.20 kg plot⁻¹ was recorded from Local variety plot. While the weight of Sadaf variety plot was 21.20 kg. The results obtained here, disagree with those of Hussain (1991). Climate of higher infestation percentage may be the determining factors.

Table 1: The dead hearts percentage, percent Infestation, weight of stalks and grains (kg) as affected by maize stem borer

Varieties	Dead hearts (%)	Infestation (%)	Wt. of stalk (kg)	Wt. of grains (kg)
Sultan	6.46D	8.10B	51.99A	23.00A
Akbar	8.03C	10.50C	51.09A	22.40A
Sadaf	10.63B	11.20C	47.63B	21.20B
Local	12.13A	17.00A	24.83C	3.20C
LSD (0.50)	1.63	1.12	2.21	1.03

Figures followed by different letters are significant at 5% level of probability

Variety Sultan was found most tolerant to maize stem borer under the agro climatic conditions of District Loralai (Balochistan) and should be sown in the area.

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