

# RESISTANCE IN SOME PROMISING VARIETIES OF SUGARCANE TO DIFFERENT BORERS

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## ABSTRACT

Eight early promising cultivars of sugarcane viz. MS.91.CP.1157, MS.91.CP.1154, MS.91.CP. 582, CP.87/1628, CP.87/1248, CP.85/1491, CP.80/1827 and Mardan-93 were tested against shoot borer (*Chilo infuscatellus*), gurdaspur borer (*Bissetia steniellus*) and root borer (*Emmalocera depressella*) at Sugar Crops Research Institute Mardan during 2001 and 2002. Randomized Complete Block design was followed. Experimental results showed that, significantly lowest infestation of shoot and root borers were recorded in plant crop varieties MS.91-CP. 1154, while gurdaspur borer was lowest in variety MS.91-CP. 582. In ratoon crop infestation of shoot borer was recorded as lowest in varieties MS.91-CP. 1157 and MS.91-CP. 1154. Gurdaspur borer was lowest in variety CP. 87. 1248 while root borer was recorded minimum in variety MS. 91. CP. 582. Significantly highest infestation of all borers was recorded in variety Mardan-93 in both plant and ratoon crops.

**Key words:** Sugarcane, Varieties. Borers, *Chilo infuscatellus*, *Acigona steniellus* *Emmalocera depressella*, Varietal resistance, Plant and Ratoon.

## INTRODUCTION

Sugarcane (*Saccharum officinarum*) is an important cash crop of Pakistan. It is mostly grown in three provinces of the country namely Sindh, Panjab and NWFP. It is an important source of income and employment for the farming community of the country. It also forms essential item for industries like sugar, chip board, paper, confectionery, uses in chemicals, plastics, paints, synthetics, fiber, insecticides and detergents (Malik and Gurmani, 2005). Total area of sugarcane in Pakistan during 2004-05 was 9, 45, 000 hectares with production of 4,72,38, 000 tons. Out of this NWFP had 1, 06, 445 hectares with production of 48,16,187 tons (Malik and Gurmani, 2005). Among the factors contributing to lower yield in our country, the attack of insect pests is of great importance. Various insect pests like termites, borers, pyrilla, whiteflies, bugs and mites etc. attack this crop and cause heavy losses in terms of low yield and quality. Sugarcane borers make tunnels in stubbles and internodes due to which food supply to aerial parts of stem and leaves stops and also pave ways for certain diseases. Gupta and Singh (1997) stated that, damage by 3<sup>rd</sup> and 4<sup>th</sup> brood of sugarcane borers may result more than 25% reduction in weight. By avoiding unnecessary aerial spray against sugarcane insect pests since 1991 in Peshawar valley, pests feeding externally i.g pyrilla, whiteflies, bugs, mites and thrips etc. were excellently controlled due to the encouragement of natural enemies (Jan, 1994). However control of borers is still a serious problem due to their concealed feeding behavior. Mohyuddin *et al.* (1987) stated that, sugarcane borers are hidden pests, therefore approach of pesticides and limited use of biological agents were found less effective. Borers resistant varieties provide the additional control needed in the IPM program. Jan

(1990) stated that, sugarcane varieties CP.65/357 and L. 62/96 were found more susceptible to top, stem, gurdaspur and root borers in Peshawar and Charsadda districts. Keerio (2003) tested different varieties of sugarcane against borers and reported that variety (Thatta-10) was infested significantly more than Q-88 or BL-4 varieties. Reagan *et al.* (1997) tested 19 sugarcane varieties against borers at Sugar Research Unit, Houma (USA) and reported that, cultivars HOC86-845, CP70-321 and L98-207 had lowest bored internodes. Suhartaulan (1998) tested 29 varieties of sugarcane in India against stalk borer and reported that, out of 29 varieties only 9 were found resistant and the remaining were moderately resistant. Jan *et al.* (1999) tested 16 promising varieties of sugarcane 8 each of early and mid maturing groups against stem, gurdaspur and root borers at Sugar Crops Research Institute, Mardan. They reported that varieties S.82.US.631, CP.65/357 and CP.72/356 in early maturing group while CPF.145, and S.82.US.630 among mid maturing group had lowest infestation of borers compared to other varieties. Similarly Gul *et al.* (2002) also tested 16 promising sugarcane varieties 8 each of early and mid maturing groups at Sugar Crops Research Institute, Mardan and reported that variety Mardan-93 in early maturing group significantly received more infestation of borers in both plant and ratoon crops while in mid maturing group variety CPF. 182 received maximum borers infestation compared to other varieties.

Keeping in view the importance of sugarcane and huge damage caused by different borers, an experiment was carried out to study the relative preference of different sugarcane borers in early maturing varieties of

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## MATERIALS AND METHODS

Eight early maturing varieties namely MS.91.CP.1157, MS.91.CP.1154, MS.91.CP. 582, CP.87/1628, CP.87/1248, CP.85/1491, CP.80/1827 and Mardan-93 were sown in September during 2001 and 2002 as plant crop and their ratoon crops were maintained for 2002 and 2003 at Sugar Crops Research Institute (SCRI) Mardan. All crop production practices were adopted properly during the experimental period. These varieties were replicated four times in Randomized Complete Block Design. Plot size was kept as 10 x 6.75 m<sup>2</sup> with row to row spacing as 90 cm. Data regarding infestation of shoot borer from April to June and gurdaspur borer from July to September were recorded by counting the number of infested plants during last week of each month. For root borer infestation ten stubbles were examined randomly in each variety just after harvest of the crop. Percent infestation data were transformed as square-root transformation as recommended by Gomez and Gomez (1984). Data were subjected to Analysis Of Variance (ANOVA) technique and subsequently the means were separated by LSD test as test statistic.

## RESULTS AND DISCUSSION

Results of the experiment to check the infestation of shoot borer *Chilo infuscatellus*, gurdaspur borer *Acigona steniellus* and root borer in stubbles *Emmalocera depressella* on different varieties are presented in Table I for plant and ratoon crops as under.

### Plant Crop

Statistically analyzed data presented in Table I revealed that percent infestation of shoot, gurdaspur and root borers during 2001, 2002 and their means differed significantly.

Mean infestation data for 2001 and 2002 in Table I showed that, minimum infestation of shoot borer (0.76 %) was recorded in V2 followed by 0.78, 0.81, 0.84, 0.87, 0.89 and 2.03% respectively in V3, V5, V1&V4, V7, V6, V5 and V8. Analysis of the data showed non significant differences between V1 to V7, while the variety V8 had significantly the highest infestation (2.03%) among all the varieties. Infestation of gurdaspur borer was lowest (1.02 %) in V3 followed by 1.05, 1.07, 1.12, 1.21, 1.13 and 2.74 % infestation in V2, V7, (V1+V5), V4, V6 and V8 respectively. The data further indicate non significant differences among V1 to V7. Infestation of this borer in V8 was significantly the highest among all the varieties. Root borer infestation in stubbles was recorded to be the minimum (4.13 %) in V2, followed by 4.17, 4.20, 4.27, 4.38, 4.50, 4.91 and 6.22 % in V7, V1, V5, V4, V3, V6 and V8. Analysis of

the data revealed non significant differences among V1 to V7. In V8 infestation of root borer was significantly the maximum (6.22%) compared to all other varieties.

### Ratoon crop

Statistically analyzed data presented in Table II revealed that percent infestation of shoot, gurdaspur and root borers during 2002 & 2003 differed significantly.

Analysis of the data revealed that, mean infestation of shoot borer (April to June) was lowest (1.75%) in V1 and V2 followed by V7, V5, V3, V4 and V6 with 1.79, 1.81, 1.86, 1.87 and 1.91% infestation respectively. Infestation of this borer in V8 was significantly highest (2.90%) compared to all other varieties. The data further indicated that V1 and V2 were non significant from V7, V3, V4, V5, V6, V7 and V6 was also non significant with V3, V4 and V5. Significantly highest infestation of shoot borer (2.90 %) was recorded in V8 compared to all other varieties. Analysis of the data in Table II further revealed that significantly lowest infestation of gurdaspur borer (2.25%) was recorded in V5 followed by V2, V7, V4, V1, V3, V6 and V8 with 2.29, 2.35, 2.45, 2.46, 2.48, 2.58 and 3.45 % infestation respectively. Analysis of the data further showed that V5 was non significantly different from V2, V7 and V4. The data further revealed non significant differences among V2, V7, V5, V1 and V3. Analysis of the data also revealed that V6 was non significantly different from V3, V1 and V4. Significantly the highest infestation of gurdaspur borer (3.45%) was recorded in V8 among all other varieties. Root borer infestation in stubble was significantly the lowest (6.83 %) in V3. This was followed by V4, V5, V2, V6, V7, V1 and V8 with 7.23, 7.25, 7.41, 7.50, 7.80, 8.10 and 10.70 % respectively. Analysis of the data revealed that infestation in V3 was non significant with V4, V5 and V2. V4, V5, V2 were also non significant with V6 and V7. Infestation in V1 was non significant with V6 and V7. The data showed significantly highest infestation in V8 compared to all other varieties. Resistance/tolerance of sugarcane varieties to borers were due their hard rind and hairy leaves, because adults of these borers avoid their egg laying on such leaves. Reagan *et al.*(1997), Suhartaulan (1998), Jan *et al.* (1990 and 1999), Gul *et al.* (2002), Keeno (2003) also tested different promising varieties of sugarcane to borers but the varieties were different from the variety tested in this experiment. However, maximum borers infestation in variety Mardan-93 is fully supported by Jan (1999) and Gul

*et al.* (2002) in both plant and ratoon crops, because this variety has soft rind and hairless leaves.

## CONCLUSION

Infestation of shoot, gurdaspur and root borers were highest in standard variety (Mardan-93) because of soft rind compared to candidate varieties (V1 to V7) in both plant and ratoon crops having hard rind.

**Table I** *Percent Infestation Of Borers In Different Early Maturing Varieties Of Sugarcane (Plant Crop)*

Varieties	Shoot borer (April-June)			Gurdaspur borer (July-September)			Root borer (In stubbles after harvest)		
	2001	2002	Mean	2001	2002	Mean	2001	2002	Mean
MS.91-CP.1157 (V1)	0.71 b	0.97 b	0.84 b	1.31 b	0.94 bc	1.12 b	3.54 cd	4.87 cd	4.20 b
MS.91-CP.1154 (V2)	0.71 b	0.81 c	0.76 b	1.13 cd	0.98 bc	1.05 b	3.22 d	5.05 bc	4.13 b
MS.91-CP.582 (V3)	0.71 b	0.86 bc	0.78 b	1.12 d	0.92 bc	1.02 b	3.87 cd	5.13 b	4.50 b
CP.87-1628 (V4)	0.71 b	0.97 b	0.84 b	1.42 b	1.01 b	1.21 b	3.97 bc	4.79 d	4.38 b
CP.87-1248 (V5)	0.76 b	0.87 bc	0.81 b	1.29 bc	0.96 bc	1.12 b	3.40 cd	5.14 b	4.27 b
CP.85-1491 (V6)	0.79 b	1.00 b	0.89 b	1.27 bcd	1.00 b	1.13 b	4.67 b	5.15 b	4.91 b
CP.80-1827 (V7)	0.86 b	0.89 bc	0.87 b	1.26 bcd	0.88 c	1.07 b	3.33 cd	5.01 bc	4.17 b
Mardan-93 (V8)	1.58 a	2.48 a	2.03 a	2.43 a	3.06 a	2.74 a	6.77 a	5.67 a	6.22 a

**Table II:** *Percent Infestation Of Borers In Different Early Maturing Varieties Of Sugarcane (Ratoon Crop)*

Varieties	Shoot borer (April-June)			Gurdaspur borer (July-September)			Root borer (In stubbles after harvest)		
	2002	2003	Mean	2002	2003	Mean	2002	2003	Mean
MS.91-CP.1157 (V1)	1.40 c	2.10 c	1.75 c	2.25 bc	2.67 b	2.46 bc	8.31 b	7.90 b	8.10 b
MS.91-CP.1154 (V2)	1.45 bc	2.06c	1.75 c	2.15 c	2.44 bc	2.29 cd	7.04 c	7.78 b	7.41 cd
MS.91-CP.582 (V3)	1.54 b	2.19 bc	1.86 bc	2.49 b	2.47 bc	2.48 bc	6.45 d	7.22 b	6.83 d
CP.87-1628 (V4)	1.46 bc	2.29 b	1.87 bc	2.40 bc	2.50 bc	2.45 bcd	6.98 cd	7.49 b	7.23 cd
CP.87-1248 (V5)	1.46 bc	2.16 bc	1.81 bc	2.23 bc	2.28 c	2.25 d	7.10 c	7.40 b	7.25 cd
CP.85-1491 (V6)	1.51 bc	2.32 b	1.91 b	2.41 bc	2.76 b	2.58 b	7.91 b	7.10 b	7.50 bc
CP.80-1827 (V7)	1.39 c	2.18 bc	1.79 c	2.29 bc	2.42 bc	2.35 cd	8.03 b	7.57 b	7.80 bc
Mardan-93 (V8)	2.36 a	3.45 a	2.90 a	3.09 a	3.82 a	3.45 a	11.32 a	10.10 a	10.70 a

Figures in columns having same letters are non-significantly different by LSD test at  $\alpha=0.05$  different by LSD test at  $\alpha=0.05$

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