

Original Research Article

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Screening of Maize Cultivars against Maize Stem Borer *Chilo partellus* (Swinhoe), under Natural Field Condition

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ABSTRACT

This study was carried out at Crop Research Center Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut during *kharif* 2014. The experiment comprised of fifteen maize cultivars viz. Pmh-117, Buland, Parkash, Bio-9637, Seedtech-2324, Hqpm-7, Bio-9681, Hybrid maize gs-802, Sujata, Dhs-42 hybrid, African tall, NmH-920, Bharat kaveri, Manjira-1 and Malika nmh-920. Among all cultivars Pmh-117, Buland and Parkash cultivars recorded moderately resistant. Bio-9637, Seedtech-2324, Hqpm-7, Bio-9681 and Hybrid maize gs-802 cultivars recorded moderately susceptible. Cultivars Sujata, Dhs-42 hybrid, African tall and NmH-920 recorded susceptible. Maximum (45.92) per cent infestation recorded in Hybrid madhuri. Dead hearts formation recorded in screening experiment after thirty and forty five days of sowing. Minimum dead heart formation recorded in Buland after forty five days of sowing followed by Pmh-117, Bio-9637, Hqpm-7, Seedtech-2324 and Hybrid maize gs-802, respectively. Maximum dead hearts formation recorded in Hybrid madhuri. Leaf injury rating recorded in thirty and forty days after sowing. Minimum leaf injury rating recorded in Pmh-117 with 3.33 per cent of infestation and maximum leaf injury rating recorded in Hybrid madhuri with 8.00 per cent of infestation after forty five days of sowing.

Keywords

Maize, Stem borer, Cultivars, Natural field.

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Introduction

Maize (*Zea mays* L.) occupies an important place in Indian agriculture. It ranks third, next only to wheat and rice with respect to both production and area. The primary origin centre of maize is Central America and it was introduced in India in the beginning of the seventeenth century. Maize can be grown in a wide environmental range. It is a crop of warm countries. Although maize can be grown in all the season in India, but *Kharif* (monsoon) is the main growing season in Northern India. The most suitable temperature for germination is 21 °C and for growth 32 °C. Annual rainfall requirements vary from

513 mm in Karnataka to about 2200 mm at Almora, Uttarakhand (Shaw, 1997). Maize is grown globally in about 185.12 million hectare area. In India, maize occupies about 9.43 million ha areas with annual production of 24.35 million tons and productivity of 2583 kg/ha in (Dept. of Ag. & Coop., 2014). Maize grain contains about 10 percent protein, 4 percent oil, 70 percent carbohydrates, 2-3 per cent crude fiber, 10.4 percent albuminoides, 1.4 percent ash. Its protein "ZEIN" is deficient in two essential amino acids, tryptophan and lysine. It also contains significant quantities of vitamin E calcium

and phosphorus. Around 250 insect and mite species are attacking different stages of maize. Maize stem borer, *Chilo partellus* Swinhoe (Lepidoptera: Pyralidae) is one of the major biotic constraints in successful maize and sorghum production worldwide (James, 2003), particularly in Asia and Africa (Siddiqui and Marwaha, 1993). It has been reported to cause severe losses in maize crop throughout its geographical distribution including India. Yield losses of 24-75% have been reported by the attack of this pest alone.

Materials and Methods

The experiment was conducted at Crop research center, (C.R.C.) of the university in western Uttar Pradesh. The farm is geographically located at 29° 13' 96" N latitude, 77° 68' 43" E longitudes and at an elevation of 218 meters above the mean sea level. Fifteen maize cultivars viz. Pmh-117, Buland, Parkash, Bio-9637, Seedtech-2324, Hqpm-7, Bio-9681, Hybrid maize gs-802, Sujata, Dhs-42 hybrid, African tall, Nmh-920, Bharat kaveri, Manjira-1 and Malika nmh-920. The experiment was laid out in Randomized Block Design (R.B.D.) with fifteen treatments and replicated thrice. Sowing was done on a well prepared soil on third week of June. The total numbers of plots were forty five. The maize seeds of different fifteen cultivars were sown in plots size 4 x 3 m². The furrows were opened with the help of furrow opener adjusted at a row to row distance of 60 cm and plant to plant 20 cm. Each row consisting 14 maize plants and each treatment plot consisted 5 rows, thus, experimental plot consisting of 70 maize plants.

Maize cultivars were grown under natural field condition for screening against maize stem borer. The observation were recorded after fifteen days of sowing (29th S.W.) to 105 days after sowing (41th S.W.) in the interval of fifteen days. The observations were taken

on randomly selected forty plants from inner three rows of each plot, outer rows to avoid border effect. The dead hearts due to attack of stem borer were counted from randomly selected ten plants, at 30 and 45 DAS and their percentage was calculated on the basis of total plants observed.

Results and Discussion

Analysis of variance showed that all the tested maize cultivars had significant difference in their responses to maize stem borer "*Chilo partellus*" Swinhoe. The cultivar PMH-117 recorded minimum per cent stem borer infestation with 0.00, 0.00, 2.96, 4.44, 5.92, 7.40, 8.88 after fifteen, thirty, forty five, sixty, seventy five, ninety and one hundred five days after sowing. The cultivar BULAND and PARKASH also less preferred cultivar as it showed minimum stem borer infestation with 9.62 per cent infestation after 105 days after sowing. Maximum stem borer infestation was recorded in HYBRID MADHURI, BHARAT KAVERI HYBRID and MANJIRA-1, and statistically at par with each other at all the intervals. The cultivars PMH-117, BULAND and PARKASH showed moderate resistant against maize stem borer and these all at par with each other. Cultivars Bio-9637, SEEDTECH-2324, HQPM-7, BIO-9681 and hybrid maize GS-802 showed susceptibility against *Chilo partellus*. The cultivars SUJATA, DHS-42 hybrid, BHARAT KAVERI HYBRID and MALIKA NMH-920 were recorded moderate susceptibility against maize stem borer. Maximum stem borer infestation was recorded in HYBRID MADHURI and highly susceptibility against maize this pest (Fig. 1).

Dead heart formation and leaf injury rating

The minimum number of dead hearts were recorded in BULAND with 3.66 (30 DAS) and 5.00 (45 DAS) followed by PMH-117

with 3.33 (30 DAS) and 5.33 (45 DAS), BIO-9637 with 4.66 (30 DAS) and 5.66 (45 DAS) HQPM-7 with 4.66 (30 DAS) and 6.33 (45 DAS) per cent as all these cultivars at par with each other. The maximum dead hearts was recorded in HYBRID MADHURI 8.33 (30 DAS) and 9.66 (45 DAS) per cent. The other cultivars were recorded intermediate formation of dead hearts.

Minimum leaf injury was recorded in PMH-117 with 2.33 (30 DAS) and 3.33 (45 DAS) followed by PARKASH with 2.66 (DAS) and 3.33 (45 DAS), BIO-9681 with 4.33 (30 and 45 DAS), BULAND with 3.33 (DAS) and 4.66 (DAS) per cent. The maximum leaf injury rating was recorded in HYBRID MADHURI with 6.66 (30 DAS) and 8.33 (45 DAS) per cent (Fig. 2).

Fig.1 Mean number of damaged cultivars of maize by *C. partellus* (Swinhoe) during *kharif*, 2014

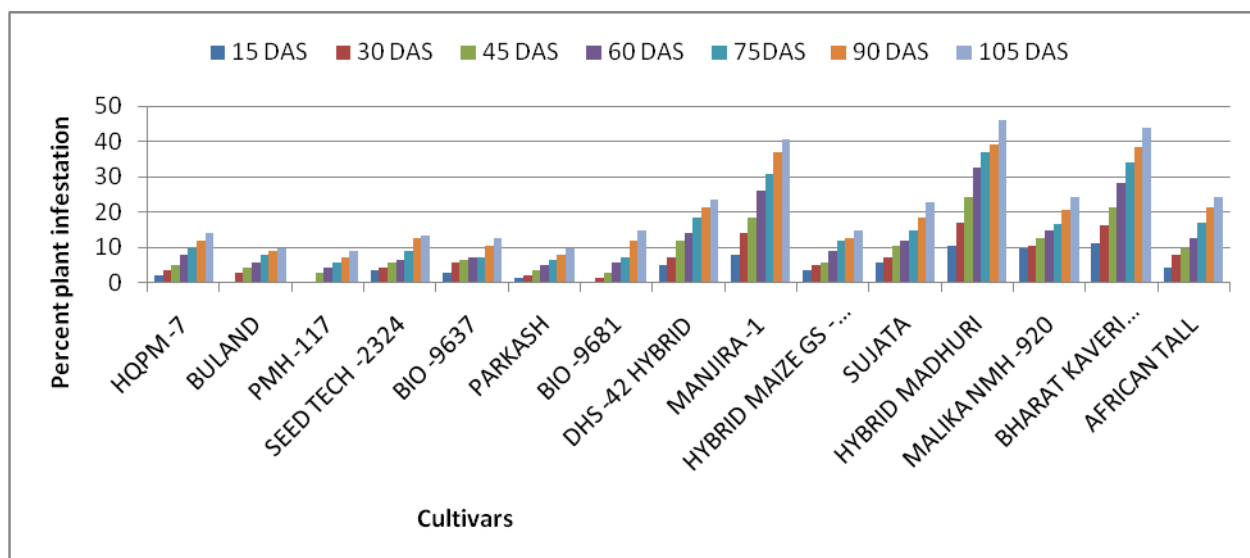
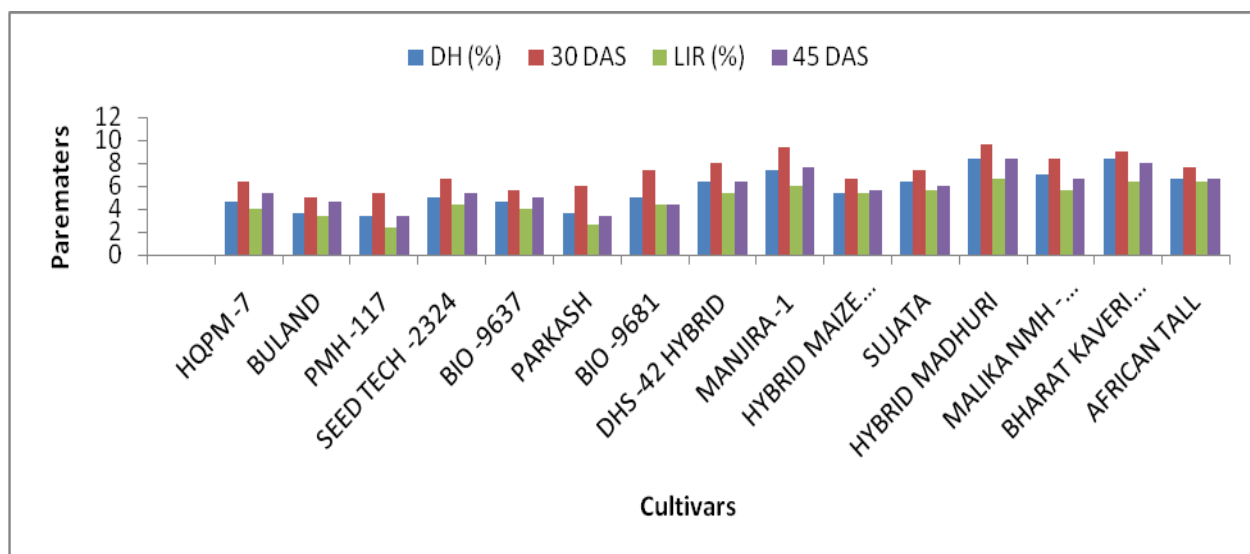


Fig.2 Screening of maize cultivars on the basis of leaf injury rating (LIR) and dead heart formation (DH) due to *C. partellus* (Swinhoe) during *kharif*, 2014



The result of the present studies was critically examined, discussed in detail and the pertinent literature in support of the findings has been cited at appropriate places. In the present chapter, results obtained on basis and applied aspects i.e., screening of maize cultivars and dead hearts, against stem borer, *Chilo partellus* (Swinhoe) have been discussed in the light of earlier findings under the following appropriate heads-

The results of Kundu (1985) also support the present findings. He conducted trial in Somalia on 20 maize cultivars for resistance against stem borer on the basis of leaf injury, dead hearts and stem tunnelling and identified least susceptible cultivars. The present findings are also agreement of Saxena (1990) who screened 23 genotypes and reported that the genotypes IS-18363 was highly susceptible while IS-18463 and IS-2146 to be moderately susceptible, IS-4660 and IS-2205 to be moderately resistant, IS-1044 to be highly resistant against maize stem borer. Similarly Kishore (1991) reported that out of 17 sorghum cultivars four cultivars were resistant to *C. partellus*. The present findings also uphold the view of Kakar *et al.*, (2003) who reported that maize cultivars i.e. local, sadaf, sultan and akbar shown resistant against maize stem borer.

Dead hearts

In the present findings, minimum and maximum dead hearts was recorded in PMH-117 (5.33) and HYBRID MADHURI (9.66) respectively after 45 days of maize sowing. Saxena (1990) reported that out of 23 genotypes, SSV genotypes showed very significant less leaf injury rating. The finding of Verma and Singh (2003) evaluated 40 forage sorghum genotypes against stem borer. Only one genotype VSSG-121 was found to be the best by recording minimum leaf damage. Swami and Bajpai *et al.*, (2006)

screened eight selected maize varieties against maize stem borer only PARBHAT and MAHI DHAWAL were found relatively resistant against this pest with mean dead hearts (19.97 and 26.26 %).

The population of *C. partellus* fluctuated during the crop season. The cultivar PMH-117 recorded minimum per cent stem borer infestation with 0.00, 0.00, 2.96, 4.44, 5.92, 7.40, 8.88 after fifteen, thirty, forty five, sixty, seventy five, ninety and one hundred five days after sowing. Maximum stem borer infestation was recorded in HYBRID MADHURI, BHARAT KAVERI HYBRID and MANJIRA-1, and statistically at par with each other at all the intervals. The cultivars PMH-117, BULAND and PARKASH showed moderate resistant against maize stem borer and these all at par with each other.

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