RESEARCH ARTICLE :

Screening of maize genotypes against pink borer, *Sesamia inferens* Walker under artificial infestation in the field

■ V. SAILAJA, K. VIJAYA LAKSHMI AND K. LOKA REDDY

SUMMARY : The varietal screening studies of ten maize genotypes were carried out under field conditions with artificial infestation of *Sesamia inferens* and the classification of the maize genotypes was done based on the dead hearts and leaf injury rating. Among the ten maize genotypes, Madhuri (5.03) was classified as highly resistant genotype, while BML 7 (5.33) was placed under resistant category. The genotype, HKI 163 (5.87) was classified as moderately resistant genotype. The remaining five genotypes *viz.,* HQPM 1 (6.50), MP 717 (6.93), BML 6 (7.03), BH 40625 and BH 1576 (7.90) were grouped as highly susceptible.

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BACKGROUND AND OBJECTIVES

Recently pink borer is appearing as a serious pest limiting the production of maize grown under post rainy (*Rabi*) season and enough work has not been done to understand its behaviour. The individual control measures may not be sufficient to adequately control *S. inferens* and it is necessary to integrate the available methods. Host plant resistance is one such method that have been successfully used for the management of lepidopteron stem borers. It is environmentally safe, economically acceptable to farmers and it is compatible with other components of IPM. Keeping in view of the need of the resource poor farmers and ecological consequences of chemical control, there is a need to develop maize germplasm with moderate levels of resistance to insect pests (Bergvinson *et al.,* 2002).

RESOURCES AND METHODS

The larvae and pupae of *S. inferens* collected from maize fields of college farm and ARI, Rajendranagar, Hyderabad were kept separately in glass jars (10 x 15 cm) for the emergence of adults under laboratory conditions. The moths (male and female in equal numbers) after emergence kept in wooden ovipositional cages and were allowed to lay eggs on potted maize plants (10 day old). Four days after the release of moths,

the plants were removed and the leaf sheath containing egg portion were cut and kept at 27 ±2° C for incubation. These eggs were used as nucleus culture for mass rearing of *S. inferens.*

Screening was done with ten maize genotypes *viz.,* BML 7, BML 6, MP 717, BH 1576, HQPM 1, HKI 163, Madhuri, BH 40625, Basi local and CM 500. The seeds were procured from Winter Nursery Center, Directorate of Maize Research, Rajendranagar, Hyderabad. The field experiment was conducted in Randomised Block Design with ten genotypes as ten treatments and three replications during *Rabi* season of 2008-09. Each genotype was planted in three rows of 2.5 m length with row to row and plant to plant distance of 75 x 20 cm, respectively. Three border rows were maintained in between the treatments. A gap of 2 m distance was maintained between the replications. All the normal recommended agronomical practices were followed in raising the crop. In each plot, ten neonate larvae of *S. inferens* per plant were artificially infested into the whorls of ten day old plants with the help of Bazooka developed by CIMMYT (1997). The crop was infested between 8 to 11 AM or 4 to 6 PM to avoid larval mortality due to higher temperatures.

The leaf injury rating (LIR) of 1-9 scale (Reddy *et al.,* 2003) (Table A) was used for screening the maize genotypes at 30 days after infestation. Based on leaf injury rating, the maize genotypes were categorized into five groups, *viz.,* (i) highly resistant, with mean leaf injury rating less than resistant check (CM 500); (ii) resistant, with mean leaf injury rating equal to resistant check; (iii) moderately susceptible, with mean leaf injury rating between resistant check and susceptible check, (Basi local); (iv) susceptible, with mean leaf injury rating equal to susceptible check; (v) highly susceptible, with mean leaf injury rating above susceptible check (Sekhar *et al.,* 2004).

OBSERVATIONS AND ANALYSIS

The per cent dead hearts and leaf injury rating obtained with different maize genotypes are presented in Table 1. The per cent dead hearts recorded in different maize genotypes indicated that significantly highest number of dead hearts were observed in MP 717 (38.88%) and HQPM 1 (38.86%) which are on par with the susceptible check, Basi local (38.89%). Significantly lowest number of dead hearts were recorded in BML 7 (20.35%) and Madhuri (20.37%) when compared to the resistant check, CM 500 (24.07%). The per cent dead hearts recorded in BML 6 (24.06%) were on par with the resistant check, CM 500. The maize genotypes *viz.*, BH 1576 (29.63%), BH 40625 (29.62%) and HKI 163 (29.60%) recorded significantly higher dead hearts than the resistant check, CM 500. The leaf injury by *S. inferens* scored on 1-9 scale at 30 days after infestation to ten maize genotypes varied from 5.03 to 7.9. Among the ten maize genotypes Madhuri recorded lowest mean LIR of 5.03 less than the resistant check, CM 500 (5.33). The genotype BML 7 showed leaf injury rating (5.33) equal to the resistant check, CM 500 while HKI 163 recorded the leaf injury rating (5.87) between the resistant and susceptible checks. On the remaining five maize genotypes *viz.,* HQPM 1, MP 717, BML 6, BH 40625 and BH 1576 the mean leaf injury rating was in the range of 6.50 to 7.90.

The varietal screening studies of maize genotypes to *S. inferens* by the earlier workers showed significant

Table A : Mean leaf injury rating (LIR) scale (1-9) used for screening of maize genotypes against *Sesamia inferens*	
Rating	Description
1	Apparently healthy plants
2	Plant with parallel, oval or oblong holes, slightly bigger than pin sized (2-3 mm) on 1-2 leaves
3	Plant with more elongated holes (4-5 mm or matchstick-head sized) or shot holes on 1-2 leaves
4	Plant with injury (oval holes, shot holes and slits of 1-4 cm) in about one third of total number of leaves and mid rib damage on 1-2 leaves
5	Plant with about 50% leaf damage, oblong holes, shot holes, slits and streaks of 5-10 cm and mid rib damage on leaves
6	Plants with a variety of leaf injuries to about two thirds of the total number of leaves (ragged appearance) or one or two holes or slits at the base of the stem (>10 cm streaks are observed)
7	Plants with every type of leaf injury and almost all the leaves damaged (ragged or crimpled appearance), with tassal stalk boring or circular dark ring at the base of the stem
8	Plants with stunted growth in which all the leaves are damaged
9	Plants with dead hearts

difference among the genotypes. Satyanarayana *et al.* (2002) screened 132 elite maize germplasm lines to identify highly resistant donor parents against *S. inferens* under natural conditions with two controls Basi local (susceptible) and DHM 105 (resistant). The intensity of *S. inferens* infestation among the genotypes ranged from 1.20 (Entry No. 681) to 8.95 (Entry No. 762), respectively whereas resistant check (DHM 105) and susceptible check (Basi local) recorded 1.85 and 8.85, respectively. Entry numbers 681 and 691 recorded the lowest incidence rating of 1.20 and 1.25. Reddy *et al.* (2002) evaluated forty - six maize genotypes for resistance to stalk borer *S. inferens* Walker under artificial conditions. In case of full season, medium and early maturity groups, the leaf injury due to pink borer ranged from 3.77 to 7.00, 3.26 to 6.30 and 3.21 to 6.90 on 1-9 scale, respectively. Sekhar *et al.* (2004) evaluated sixty two insect resistant genotypes obtained from the International Maize and Wheat Improvement Centre (CIMMYT), Mexico along with two Indian checks (one resistant and one susceptible) against pink stem borer, *S. inferens* under artificial infestation during *Rabi* season and leaf injury rating of the various genotypes ranged from 3.1 to 8.3 on the rating scale of 1-9. Sekhar *et al.* (2008) conducted two trials involving twenty eight inbred lines and forty five single crosses, respectively received from CIMMYT India programme along with resistant and susceptible checks. They recorded the leaf injury rating in CIMMYT maize lines, from 2.5 to 8.6 on 1-9 scale, while in single crosses it ranged from 2.4 to 7.5.

The maize genotypes were classified into 5 categories namely, (1) highly resistant, (ii) resistant, (iii) moderately resistant, (iv) susceptible and (v) highly susceptible as per the classification given by Sekhar *et al.* (2004). Among the ten maize genotypes, Madhuri (5.03) which recorded a mean leaf injury rating less than the resistant check (5.33) was classified as highly resistant genotype, while BML 7 (5.33) with mean leaf injury rating

Table 1 : Relative susceptibility of maize genotypes to pink borer, *Sesamia inferens* under field conditions

Sr. No.	Maize genotype	Per cent dead hearts	Mean leaf injury rating (LIR) (1-9 scale)
1.	BML 7	20.35 (26.76)	5.33
2.	BML 6	24.06 (29.35)	7.03
3.	MP 717	38.88 (38.02)	6.93
4.	BH 1576	29.63 (32.84)	7.90
5.	HQPM 1	38.86 (38.01)	6.50
6.	HKI 163	29.60 (32.63)	5.87
7.	Madhuri	20.37 (26.47)	5.03
8.	BH 40625	29.62 (32.88)	7.13
9.	Basi local (Susceptible check)	38.89 (38.15)	6.47
10.	CM 500 (Resistant check)	24.07 (28.84)	5.33
	S.E.±	0.83	0.59
	C.D. (P=0.05)	2.49	1.77

Values in parentheses are angular transformed values

Table 2 : Classification of maize genotypes against pink borer based on leaf injury rating (1-9 scale)

Maize genotype	Mean LIR (1-9 scale)	Classification
Madhuri	5.03	Highly resistant
BML 7	5.33	Resistant
HKI 163	5.87	Moderately resistant
HQPM 1	6.50	
MP 717	6.93	
BML 6	7.03	Highly susceptible
BH 40625	7.13	
BH 1576	7.90	
CM 500 (resistant check)	5.33	
Basi local (susceptible check)	6.47	

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equal to the resistant check, CM 500 was placed under resistant category. The genotype, HKI 163 was classified as moderately resistant genotype with mean leaf injury rating (5.87) falling between the resistant check (5.33) and susceptible check (6.47). The remaining five genotypes *viz.,* HQPM 1 (6.50), MP 717 (6.93), BML 6 (7.03), BH 40625 and BH 1567 (7.90) with mean leaf injury rating more than the susceptible check, Basi local (6.47) were grouped as highly susceptible (Table 2).

Several workers also reported the differential levels of resistance/susceptibility of maize lines derived from CIMMYT-IR and MIRT, MBR and PT populations (Bergvinson *et al.,* 2002; Panwar *et al.,* 2001 and Sekhar *et al.,* 2004). Based on the varietal screening studies of maize genotypes to *S. inferens*, the three maize genotypes *viz.,* Madhuri, BML 7 and HKI 163 with varied level of resistance to *S. inferens* are found to be the promising genotypes and they can be utilized in the breeding programme for developing varieties/hybrids resistant to *S. inferens*.

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REFERENCES

Bergvinson, D.J., Vassal, S.K., Singh, N.N., Panwar, V.P.S. and Sekhar, J.C. (2002). Advances in conventional breeding for insect resistance in tropical maize. In Proceedings of the 8th Asian Regional Maize workshop, Bangkok, Thailand, August 5-8, p 325-332.

CIMMYT (Centro Internacional de Mejoramiento de Maiz y Trigo) 1997.CIMMYT Review 1997. E1 Batan, Mexico: 90 pp.

Panwar, V.P.S., Singh, N.N., Vasal, S.K. and David Bergvinson, D. (2001). Resistance of exotic germplasm to the Asian maize stalk borer *Chilo partellus* (Swinhoe). *Indian J. Genetics & Plant Breeding,* **61**: 356-357.

Reddy, M.L. and Sekhar, J.C. (2002). Evaluation of maize germplasm resistant to pink borer *Sesamia inferens*. *Indian J. Entomol.,* **64**(4) : 402-404.

Reddy, M.L., Babu, T.R. and Venkatesh, S. (2003). A new rating scale for *Sesamia inferens* (Walker) (Lepidoptera: Noctuidae) damage to maize. *Insect Sci. & Its Application,* **23**(4): 293-299.

Satyanarayana, E., Shanthi, P. and Kumar, R.S. (2002). Screening of maize elite for resistance to *Sesamia inferens*. *J. Maharashtra Agric. Universities,* **27**(2): 201-202.

Sekhar, J.C., Bergvinson, D., Venkatesh, S., Sharma, R.K., Reddy, M.L.K. and Singh, N.N. (2004). Reaction of exotic maize germplasm to pink borer *Sesamia inferens* Walker. *Indian J. Entomol.,* **66**(3) : 261-263.

Sekhar, J.C., Sujay Rakshit, Pradyumn Kumar, Mehrajuddin, Anuradha M. and Sain Dass (2008). Differential reaction of CIMMYT maize lines and their hybrid combinations to pink borer, *Sesamia inferens* Walker. *Ann. Plant Protec. Sci.,* **16**(2): 404-406.

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