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Varietal screening of Basmati rice varieties against rice stem borer and leaf folder

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ABSTRACT : A study was undertaken to assess the resistance of rice varieties Pusa Basmati-1509, Pusa Basmati-1460, Pusa Basmati-1121, Pusa Basmati-1, T-3 and Basmati-370, against rice stem borer and rice leaf folder and their effect on yield, under rice- wheat cropping system during Kharif 2015. Rice varieties Pusa Basmati-1509 and Pusa Basmati-1460 were the most resistant varieties against rice stem borer as 15.75% and 19.25% dead hearts, and 5.75% and 6.20% white heads lower than the other tested basmati varieties. Similarly T-3 and Basmati 370 was the most susceptible variety against leaf folder. Pusa Basmati-1460 resulted in to highest (56.55 qt/ha) yield, whereas Basmati-370 resulted into lowest (16.45 qt/ha) yield.

Key Words: Rice varieties, rice stem borer, leaf folder and yield.

The Basmati are known for their typical fragrance when cooked. They also fetch a premium price in the local and regional market, besides having considerable export potential. The Basmati is promising foreign exchange earner (Singh *et al.*, 1997). The fine grain, soft texture and extra elongation with least breadth-wise swelling on cooking endow “Basmati” rice a special place in the domestic and international markets (Siddiq, 1990). The Indian subcontinent basmati rice is high priced in the international market for its unique quality.

Rice is the second most important cereal crop of India after wheat and plays multifarious role in its economy. The average yield is low against potential yield. This low yield is ascribed to many factors such as limited adoption of scientific cultivation, improper management of pest insects and diseases (Iram *et al*., 2003). Rice crop is affected by several insect pests’ right from nursery to harvest. Rice stem borer (*Tryporyza incertulas)* and rice leaf-folder (*Cnaphalocrocis medinalis*) are of prime importance insect pests among these. Rice plants result into dead hearts and white heads, when attacked by rice stem borers at early age and panicle initiation stage respectively. Rehman *et al.* (2002) reported that rice stem borer *Scirpophaga incertulas* and *S. innotata* are serious insect pests of rice in south and south-east Asia resulting into huge crop losses. Bashir *et al*., 2004 reported that Rice leaf folder damages the crop in its larval stage by scraping the open as well as rolled leaves and a single larva can damage a number of leaves. This activity disturbs the photosynthetic activities of the plant resulting into drastic yield losses (Alvi *et al*., 2003). Second instar larvae of rice C. *medinalis* glues the growing paddy leaves longitudinally and feeds voraciously on green leaves (Khan *et al*., 1989). The leaves of rice plants infested by Rice leaf folder are predisposed to bacterial and fungal infection (Bashir *et al.*, 2004).

Knowledge of resistance level of a certain variety is also very important for planning good management practices. Certain varieties of crops are less attacked by insect pests of that crop than others because of their natural resistance (Atwal, 1994). Akram *et al.* (1994) reported that rice variety Phakal was resistant to *Chilo supressalis* and *Cnaphalocrosis medinalis*. Khan *et al.* (2003) found that variety KSK-282 was resistant while Gomal-6 and Gomal-7 were moderately resistance against rice stem borer. Khan *et al.* (2005) noted that rice stem borer infestation varied significantly among different

Basmati varieties under different chemical, biological and natural environmental conditions.

Six basmati varieties i.e. Pusa Basmati-1509, Pusa Basmati-1460, Pusa Basmati-1121, Pusa Basmati-1, T-3 and Basmati-370, were selected for assess the performance of different basmati rice varieties against rice stem borer and rice leaf folder.

Materials and Methods

The trial was conducted at the Technology Park of Krishi Vigyan Kendra Bijnor, during Kharif 2015 to investigate the relative resistance of different rice varieties against rice stem borer and rice leaf folder. In present Study six varieties of rice namely, Pusa Basmati-1509, Pusa Basmati-1460, Pusa Basmati-1121, Pusa Basmati-1, T-3 and Basmati-370 were assessed under unsprayed conditions for their resistance/tolerance against rice stem borer and rice leaf folder. Sound nursery was sown and transplanted at the age of 21 days with a standard plant to plant 20 cm and row to row distance of 15 cm. All the other standard agronomic practices were applied uniformly to each plot. Observations data (dead hearts and white heads) was recorded at booting and panicle formation stage. For the estimation of data obtained the formulae were used as per given as below

$$\% \text{ Dead hearts} = \frac{\text{Infested tillers}}{\text{Total tillers}} \times 100$$

The data regarding white heads was recorded by counting total No. of healthy and white panicles produced by a randomly selected hill. A total of fifteen plants per treatment were observed. The data obtained were converted into percent white heads as:

$$\% \text{ White Heads} = \frac{\text{No. of White panicles}}{\text{Total Number of panicles}} \times 100$$

Results and Discussion

From the data in Table-1 it is quite clear that Basmati-370 and T-3 were the most susceptible varieties to rice stem borer with 52.50%, and 49.75% dead heart respectively. Results also showed that variety Pusa Basmati-1509 and Pusa Basmati-1460 were resistant against rice stem borer. In case of white heads formation Pusa Basmati-1509 and Pusa Basmati-1460 is very resistant variety comparison to other varieties.

From the data in Table-1 it is quite clear that among the tested varieties, Pusa Basmati-1509 with 16.50% infestation showed maximum resistance against rice leaf folder, followed by Pusa Basmati-1460, Pusa Basmati-1121. Similarly Basmati-370, T-3 and Pusa Basmati-1 showed their susceptibility to rice leaf folder as compared to the other tested varieties.

From the data in Table-1 per hectare yield of Pusa Basmati-1460 and Pusa Basmati-1509 was significantly higher than other tested varieties. These two varieties, however, were significantly at par with each other but were significantly better than Basmati-370 and T-3.

Resistant varieties also play important role in the management of these insect pests and better yield. Results of the present studies showed that the rice varieties T-3, Basmati-370 and Pusa Basmati-1 were susceptible to rice stem borer and rice leaf folder and had maximum infestation. Pusa Basmai-1509 and Pusa Basmati-1460 proved resistant with minimum infestation of rice stem borer and rice leaf folder**.** Shah *et al*. (2008) also reported that Basmati-385 and KSK-282 were susceptible to leaf folder, with damage rating score of 7 while IRRI-6 was moderately susceptible with damage rating score of 5. Non-aromatic genotypes of rice were resistant to rice stem borer and resulted into high yield as compared to the aromatic rice genotypes (Rajput *et al*., 2004). Abdullah and Shah (1996) found significantly more unfilled grains in fine variety Basmati-283 followed by IRRI-6 and KSK-282. With respect to yield, KSK-282 and IRRI-6 gave highest yield compared to other tested varieties. The results are supported by Shafique *et al.* (2000) who reported that among the coarse rice varieties IR8-151, IR6-20, B/94, IR6-25-1 and IR6-25 B/94 were comparatively resistant to

Table-1 : Comparative resistance of different rice varieties against rice stem borer and leaf folder with yield performance.

Varieties	Infestation of Stem borer		% Infestation of leaf folder	Yield (qt/ha)
	% Dead Hearts	% White Heads		
PB-1509	15.75	5.75	16.50	52.45
PB-1460	19.25	6.20	18.10	56.55
PB-1121	21.55	11.60	21.25	45.15
PB-1	42.50	15.15	29.50	42.50
T-3	49.75	16.00	31.35	18.25
Basmati-370	52.50	18.25	32.55	16.45
Mean	33.75	12.15	24.90	38.55

borer attack and produced high yield/ha.

The results of present study suggest that for the obtaining better yield from any variety depend on their resistant against insect pests. Pusa Basmati-1509 and Pusa Basmati -1460is the high yielding variety of basmati rice crop.

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