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BIODIVERSITY IN BRINJAL GERMPLASM AGAINST RESISTANCE TO BACTERIAL WILT

P BHAVANA* AND AK SINGH

ICAR Research Complex for Eastern Region Research Center, Ranchi-10 (Jharkhand), India

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Abstract

Brinjal or eggplant is cultivated throughout India. Biodiversity is an essential requirement to operate natural and artificial selection. Bacterial wilt of brinjal caused by *Ralstonia solanacearum*. One hundred germplasm of brinjal received from NBPGR, New Delhi were evaluated. Highest yield was recorded in IC-285126 (3.29 kg/plant; fruit weight 200.0 g; fruit length 11.40 cm and round green) followed by IC-809900 (1.81 kg/plant; fruit weight 200.0 g; fruit length 16.50 cm and long light purple). Eight lines found to be wilt resistant under natural field conditions were screened in rainy season. Out of these only two lines were found resistant at 90 DAT *viz*; IC-261786 (120.62 q/ha; fruit weight 118.0 g; fruit length 17.3 cm and long green) and IC-261793 (63.12q/ha; fruit weight 252.0 g; fruit length 7.7 cm and round green striped) with 84% plant survival against bacterial wilt. Thus the identified germplasm can further be utilized for pre-breeding aimed at developing wilt resistant high yielding varieties.

Brinjal (*Solanum melongena* L.) is one of the important vegetable crops grown in India. It belongs to the family Solanaceae and is cultivated throughout the country for its immature fruits. Major brinjal producing states are West Bengal, Orissa, Bihar, Gujarat, Maharashtra, Jharkhand, Karnataka, Uttar Pradesh and Andhra Pradesh. Tropical and subtropical climate is ideal for its cultivation, because the plant requires relatively long season of warm weather for economical fruit yield. Fruits are used in a variety of ways as cooked vegetable and in curries. The choice of varieties/hybrids varies from region to region with colour and shape of the fruit. Biodiversity is an essential requirement to operate natural and artificial selection. Rich genetic diversity available in this crop offers tremendous scope for its improvement. Selection and various breeding methods depend on the amount of variation present in the population. Germplasm need to be constantly evaluated and characterized for enriching the genetic diversity. Characterized germplasm can further be utilized for pre-breeding and various crop improvement programmes. Bacterial wilt of brinjal caused by *Ralstonia solanacearum* is a noteworthy and heavy yield loss incurring pathogen. This disease is widely distributed in tropical, subtropical and some warm temperate regions of the world with a host range of 44 plant families (Ji *et al*. 2005 and Hayward 1991). This disease limits eggplant production from 4.24 to 86.14 per cent (Sabita *et al*. 2000). Many of the commercial varieties are susceptible to bacterial wilt (Gopinath and Madalgeri 1986) and very little success has been attained using chemical control measures. Chemical control is costly and pollutes the environment. Breeding disease resistant varieties is the only socio-economical and viable alternative to reduce the cost of cultivation (Wang *et al*. 1998). The present investigation was taken to characterize brinjal germplasm for their wilt resistance which will be incorporated in development of wilt resistant varieties.

One hundred and two brinjal germplasm lines from NBPGR have been planted in an augmented block design with five blocks, each line represented in a two row with spacing of 90 × 60 cm between and within rows, respectively. Checks used were Pusa Upkar, Punjab Sadabahar, Pusa Purple Long, Pusa Kranthi, Pusa Shyamala, along with local checks Swarna Pratibha and

*Author for correspondence: <bhavanaraj2311@yahoo.co.in>.

Swarna Shyamali. The experiment was carried out during August 2010 - 2011 at ICAR RCER Research Centre, Ranchi. Data on plant height, plant spread, number of primary branches, days to 50% flowering, days to first fruit harvest, fruit length, fruit breadth, number of fruits per plant, fruit color, fruit weight and fruit yield per plant were recorded . Wilt resistance data was recorded as percentage of plants survived at 90 days after transplanting under natural field conditions. Artificial inoculation (Biovar III, Race 1) of resistant lines obtained during natural field conditions of 2010 - 2011 was done during rainy season 2011 - 2012 under wilt sick plot conditions to prove their resistance performance. Evaluating material was transplanted in wilt sick plots during rainy season and artificially inoculated with bacterial suspension in the third leaf axil from the top. Observations on death count due to bacterial wilt were recorded 90 days after transplanting. Scoring was done on the basis of percentage of wilted plants *viz.*, 1 - 20 resistant and > 20 as susceptible.

Mean values of various characters indicates sufficient variability in the germplasm and selection can be made for their improvement. Plant height varied from 103 cm (IC 111409) to 36 cm (IC 438608). Plant spread ranged from 93.5 cm (EC 329327) to 23 cm (IC 111446). Number of primary branches ranged from 9 in EC 111092 to 3 in IC 089823, IC 090812 and IC 298633. Days to 50% flowering ranged from 51 (IC 354612) to 71 days (IC 090812). Days to first fruit harvest ranged from 55 in EC 316275 to 125 days in IC 112934 and IC099674). Fruit length varied from 4.3 cm (IC 545948) to 22.3 cm (IC545844), fruit breadth from 2.6 cm (IC 112316-1) to 11.5 cm (IC 112934). Number of fruits per plant ranged from 1 in IC 099674 to 57.75 in IC 261813). Average fruit weight varied from 50 g (IC 111439) to 450 g (EC 379244). Highest yield was recorded in IC-285126 (3.29 kg/plant; fruit weight 200.0 g; fruit length 11.40 cm and round green)followed by IC 545884 (2.9 kg/plant; fruit weight 125.0 g; fruit length 9.0 cm) and least in IC 261785 and IC 090940 (0.2 kg). IC-285126 also showed resistance under natural field conditions (Table 1).

Table 1. Promising lines of brinjal germplasm that were resistant to bacterial wilt under natural field conditions.

Sl. No.	Acc. No.	No. of fruits/ plant	Yield/ plant (kg)	Fruit weight (g)	Fruit length (cm)	Fruit breadth (cm)	Fruit shape and colour	Plant height (cm)
1	EC-329327	15.12	1.48	150.0	9.30	5.60	Round purple	62.0
2	IC-809900	28.68	1.81	200.0	16.50	5.60	Long light purple	73.0
3	IC-090146	12.37	0.54	150.0	10.50	5.0	Oblong light green purple	58.0
4	IC-261786	13.33	0.85	125.0	17.0	4.0	Long green	68.0
5	IC-261793	3.43	0.39	275.0	8.50	9.50	Round green striped	64.0
6	IC-280952	14.43	0.71	150.0	15.0	4.50	Long light purple	62.0
7	IC-285126	21.31	3.29	300.0	11.40	8.20	Round green	84.0
8	IC-545948	31.75	1.53	50.0	4.30	5.0	Round green striped	67.0
9	IC-90141	12.87	0.93	300.0	13.40	7.40	Oblong light purple	68.0

Eight lines of brinjal germplasm that were found resistant to bacterial wilt in 2010 - 2011 under natural field condition were tested in bacterial wilt sick plot with artificial inoculation. IC-280952 could not be evaluated due to non-availability of seed. Out of these only two lines were found resistant at 90 DAT *viz*., IC-261786 (fruit weight 118.0 g; fruit length 17.3 cm and long green) and IC-261793 (fruit weight 252.0 g; fruit length 7.7 cm and Round green striped) with

84% plant survival against bacterial wilt (Table 2). Hence IC-261786 and IC-261793 can be exploited in wilt resistant breeding.

Table 2. Promising bacterial wilt resistant lines of brinjal under bacterial wilt sick plot.

Sl. No.	Acc. no.	Yield in q/ha up to 90 DAT	Fruit weight (g)	Fruit length (cm)	Fruit breadth (cm)	Fruit shape and colour	Survival % at 90 DAT
1	EC-329327	48.75	106.0	8.5	5.0	Oblong light purple	71.87
2	IC-089900	206.87	94.0	11.7	4.0	Oblong green striped with purple tinge	78.12
3	IC-090146	26.25	150.0	10.5	5.0	Oblong light green purple	6.25
4	IC-261786	120.62	118.0	17.3	3.9	Long green	84.37
5	IC-261793	63.12	252.0	7.7	9.0	Round green striped	84.37
6	IC-285126	97.50	176.0	9.7	8.5	Round green purple tinge	71.87
7	IC-545948	101.25	47.0	4.0	4.8	Round green striped	75.0
8	IC-90141	53.75	152.0	10.3	5.6	Oblong purple black	40.0

Similarly, Mondal *et al*. (2013) identified two wilt tolerant germplasm from local collections. Zakir *et al*. (2005) also screened 15 germplasm accessions of brinjal and found two wilt resistant genotypes. Thus the identified genotypes will be further used to develop resistant varieties.

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