

Original Research Article

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Screening of Parental Lines and their F₁ Crosses of Brinjal to Bacterial Wilt (*Ralstonia solanacearum*)

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ABSTRACT

Keywords

Brinjal, *Solanum melongena*, Bacterial wilt, Lines, Testers, Crosses

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The present investigation was undertaken with an objective of screening of parental lines and their F₁s for bacterial wilt (*Ralstonia solanacearum*). The experiment was conducted at Research Farm of Department of Agril. Botany, Dr. BSKKV, Dapoli during the period *rabi* 2014-15 in naturally bacterial wilt sick plot. The result on screening analysis revealed that all the three lines Mgt, Mlp and BR 14 were found to be highly susceptible, while four testers *viz.*, BB 64, BB 54, BNDT and PPC were found resistant and one tester *viz.*, Kasral was found moderately resistant. Among the 15 F₁ crosses, only two *viz.*, Mgt x BB 54 and Mlp x BNDT were found to be resistant, whereas BR 14 x BNDT, BR 14 x PPC and BR 14 x Kasral were found moderately susceptible.

Introduction

Brinjal (*Solanum melongena* L.; 2n = 24) belong to the Solanaceae family, are native to the South East Asian region and were first domesticated there over 4000 years ago. It is one of the most important vegetables worldwide. India ranks second in area and production of brinjal in the world after China. In India, it is grown in an area of about 0.68 million hectares with annual production of 12.70 million tonnes and productivity of 18.7 tonnes/ha. At National level West Bengal ranks first in area and production. Tripura

ranks first in productivity (46.43 MT/HA). In Maharashtra brinjal is grown on 27.30 thousands hectares with total production of 5.61 lakh tonnes and productivity 20.55 MT/HA (Anonymous, 2015). The commercial varieties are susceptible to this disease and chemical control through treatment of soil is both cumbersome and uneconomical. Therefore, breeding varieties for bacterial wilt resistance combined with high yields and acceptable quality is the present day need. Hence, an attempt was made to screen the parental lines and their F₁ crosses of brinjal for resistance to *Ralstonia* wilt.

Materials and Methods

Eight parental lines viz., Kasral, Bandhathivare local (BNDT), Pusa Purple Cluster (PPC), BB-64, BB-54, BR-14, Malapur (Mlp) and Manjari Gota (Mgt) and 15 F₁ crosses were transplanted in randomized block design with 3 replication during rabi 2014-15 in naturally bacterial wilt-sick plot available at research farm of Agril. Botany, Dapoli. Only uniform sized, healthy, forty days old seedlings were transplanted at spacing of 60 x 60 cm having one seedling per hill. The susceptible variety Manjari Gota (Mgt) and resistant variety “Swarn Pratibha” were used as check. The recommended package of practices was followed throughout the period of investigation to maintain healthy brinjal crop. The observations were recorded on bacterial wilt incidence at 30 days intervals. Ooze test was carried to ensure the death of plants due to bacterial wilt. All the plants showing wilting symptoms were subjected to ooze test up to final count {120 days after transplanting (DAT)}. The number of plants wilted in each entry in the field were recorded and expressed as per cent. The angular transferred values were used for the analysis. The wilt incidence

was calculated by following formula:

Wilt incidence (%) = (Total number of plants affected in the plot/ Total number of plants in plot) X 100

The plant wilting (per cent) at 120 days after transplanting was statistically analyzed and used for disease reaction following the scale of Hari Har Ram (2012) as follows:

Disease rating	Reaction	Plant wilted (%)
0	Highly resistant (HR)	No wilting of plants
1	Resistant (R)	1-20% plants wilted

2	Moderately resistant (MR)	21-40% plants wilted
3	Moderately susceptible (MS)	41-60% plants wilted
4	Susceptible (S)	61-80% plants wilted
5	Highly susceptible (HS)	More than 80% plants wilted

Results and Discussion

The experimental results obtained on the evaluation of bacterial wilt incidence in the parents and their F₁s as on 30, 60, 90 and 120 DAT are given in Table 1. The results of field experiment revealed that, the severity of wilt caused by *R. solanacearum* was least at 30 DAT in all brinjal genotypes. The mean bacterial wilt incidence ranged from 0 % to 21.67 % while maximum severity was observed in line Mgt (21.67 %) and crosses Mgt x BB64 (18.33 %), Mlp x BB64 (21.67 %) and BR14 x BB64 (18.33 %).

At 60 DAT, the severity of wilt incidence was increased among genotypes. The mean bacterial wilt incidence ranged from 0 % to 61.67 %. The maximum severity of disease was recorded in line viz., Mgt (61.67 %) while minimum severity of disease was recorded in testers viz., BNDT (1.67 %) and PPC (3.33 %) and in crosses viz., Mgt x BB54 (6.67 %) and Mlp x BNDT (11.67 %).

At 90 DAT, the severity of wilt incidence was significantly increased among all genotypes as compared to standard check (10 %). The mean bacterial wilt incidence ranged from 6.67 % to 81.67 %. The bacterial wilt incidence was at its highest peak in all genotype at 120 DAT. The maximum wilt was noticed in line viz., BR14 (91.67 %) and in cross viz., Mlp x BB64 (91.67 %) while minimum wilt incidence was recorded in tester viz., PPC (6.67 %).

Table.1 Reaction of different genotypes grown under natural wilt sick soil condition at 30, 60, 90 and 120 DAT

Genotypes	Days After Transplanting				Reaction	Rating
	30	60	90	120		
	Per cent wilt incidence	Per cent wilt incidence	Per cent wilt incidence	Per cent wilt incidence		
Mgt	21.67(27.74)	61.67(51.75)	75.00(60.00)	88.33(70.03)	HS	5
Mlp	16.67(24.09)	40.00(39.23)	73.33(58.91)	90.00(71.57)	HS	5
BR14	06.67(14.96)	31.67(34.24)	50.00(45.00)	91.67(73.22)	HS	5
BB64	11.67(19.97)	13.00(22.79)	16.67(24.09)	16.67(24.09)	R	1
BB54	00.00(00.00)	00.00(00.00)	08.33(16.78)	11.67(19.97)	R	1
BNDT	01.67(07.42)	01.67(07.42)	08.33(16.78)	11.67(19.97)	R	1
PPC	00.00(00.00)	03.33(10.52)	06.67(14.96)	06.67(14.96)	R	1
Kasral	11.67(19.97)	16.67(24.09)	18.33(25.35)	21.67(27.74)	MR	2
Mgt x BB64	18.33(25.35)	51.67(45.96)	70.00(56.79)	88.33(70.03)	HS	5
Mgt x BB54	03.33(10.52)	06.67(14.96)	10.00(18.43)	20.00(26.57)	R	1
Mgt x BNDT	05.00(12.92)	30.00(33.21)	60.00(50.77)	80.00(63.43)	S	4
Mgt x PPC	10.00(18.43)	40.00(39.23)	80.00(63.43)	91.67(73.22)	HS	5
Mgt x Kasral	08.33(16.78)	35.00(36.37)	71.67(57.84)	76.67(61.12)	S	4
Mlp x BB64	21.67(27.74)	43.33(41.17)	81.67(64.65)	91.67(73.22)	HS	5
Mlp x BB54	10.00(18.43)	38.33(38.25)	71.67(57.84)	86.67(68.58)	HS	5
Mlp x BNDT	10.00(18.43)	11.67(19.97)	15.00(22.79)	16.67(24.09)	R	1
Mlp x PPC	06.67(14.96)	38.33(38.25)	65.00(53.73)	81.67(64.65)	HS	5
Mlp x Kasral	08.33(16.78)	46.67(43.09)	66.67(54.74)	78.33(62.26)	S	4
BR14 x BB64	18.33(25.35)	56.67(48.83)	76.67(61.12)	80.00(63.43)	S	4
BR14 x BB54	01.67(07.42)	43.33(41.17)	68.33(55.76)	75.00(60.00)	S	4
BR14 x BNDT	06.67(14.96)	20.00(26.57)	35.00(36.27)	46.67(43.09)	MS	3
BR14 x PPC	08.33(16.78)	33.33(35.26)	53.33(46.91)	60.00(50.77)	MS	3
BR14 x Kasral	08.33(16.78)	25.00(30.00)	50.00(45.00)	58.33(49.80)	MS	3
Check (Swarn Pratibha)	05.00(12.92)	08.33(16.78)	10.00(18.43)	10.00(18.43)	R	1
S.E.±	-	-	-	4.31		
CD at 5%	-	-	-	12.26		
CV %	-	-	-	14.89		

***Figures in parentheses are angular transformed values.**



Fig.1 Bacterial infected plants

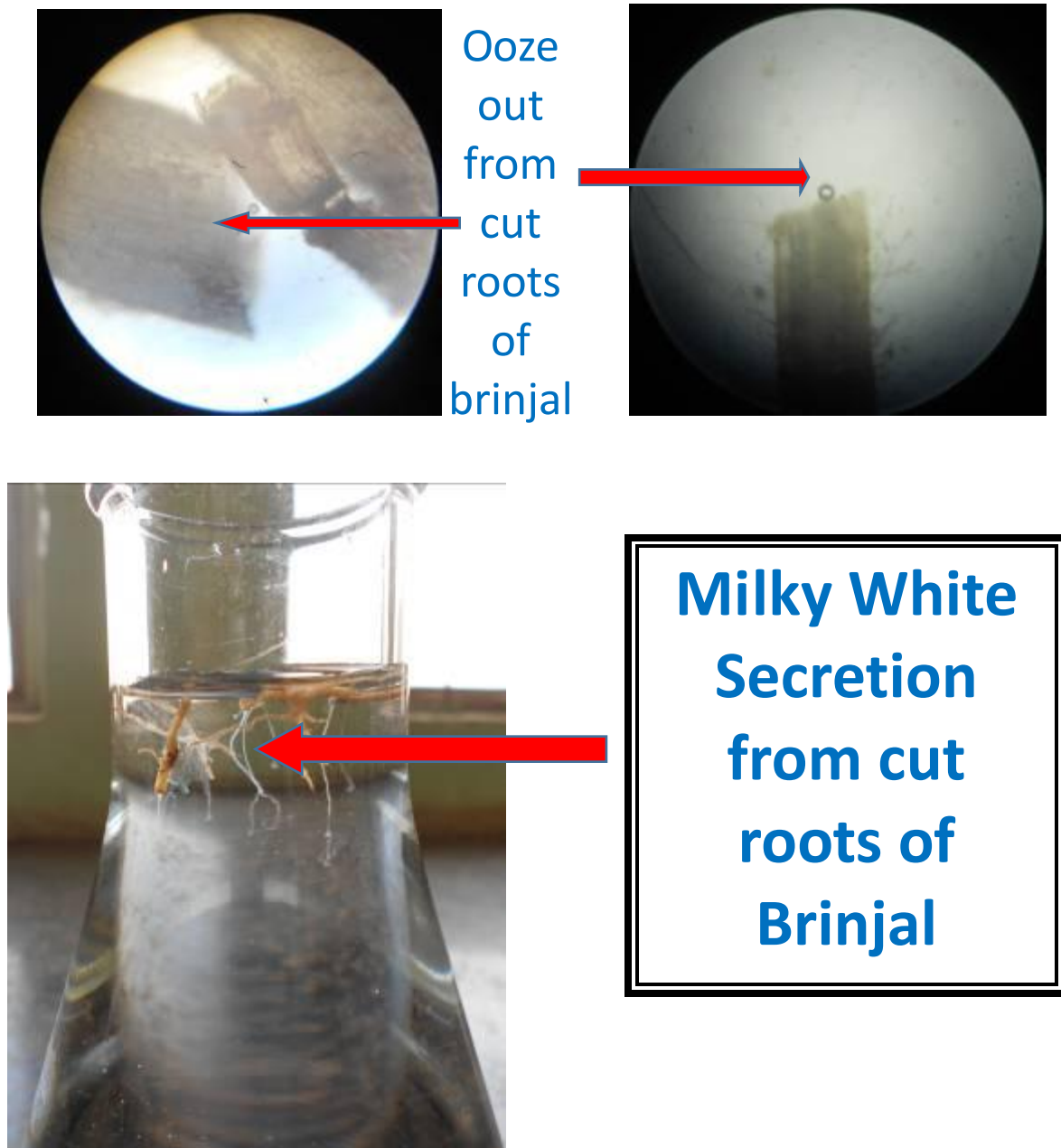


Fig.2 Ooze test

The reaction types were assessed after the final observation on disease intensity recorded at 120 DAT. On the basis mean performance, all three lines *viz.*, Mgt, Mlp and BR14 were highly susceptible to bacterial wilt. Among the testers, BB64, BB54, BNDT and PPC were resistant whereas Kasral was moderately resistant to bacterial wilt. Out of 15 F₁ crosses tested, only two crosses *viz.*, Mgt x BB54 and

Mlp x BNDT showed resistant reaction (R), three crosses *viz.*, BR14 x BNDT, BR14 x PPC and BR14 x Kasral showed moderately susceptible reaction (MS), five crosses *viz.*, Mgt x BNDT, Mgt x Kasral, Mlp x Kasral, BR14 x BB64 and BR14 x BB54 showed susceptible reaction (S) and five crosses *viz.*, Mgt x BB64, Mgt x PPC, Mlp x BB64, Mlp x BB54 and Mlp x PPC showed highly

susceptible reaction to bacterial wilt cause by *Ralstonia solanacearum*.

Variation in the screening of bacterial wilt cause by *Ralstonia solanacearum* in the genotypes and crosses had also been reported by different workers as Chaudhary and Sharma (2000) reported that the genotypes Arka Kesav, Arka Neelkanth, Arka Nidhi and SM 6-6 were observed to be resistant to bacterial wilt. Gopalakrishnan *et al.*, (2000) observed two purple fruited hybrids *viz.*, Surya x SM- 116 (purple, round to oval) and Arka Keshav x SM- 71 (purple, long) were resistant to wilt. Sharma *et al.*, (2005) evaluated 7 parental lines and 23 F₁, in bacterial wilt sick plot. 2 parents Swarna Shyamli (CH 249) and Swarna Pratibha (CH 309) were found resistant to wilt *Ralstonia solanacearum*. Only 1 F₁, cross CH 249 x CH 792 showed resistant reaction in all the 3 years of testing. Sharma and Kumar (2007) showed that the entries, *viz.*, CH 249 (Swarna Shyamli), CH 309 (Swarna Pratibha), BB 64, JC 8, Arka Keshav and Arka Nidhi showed stability in resistance to bacterial wilt. Mondal *et al.*, (2013) reported screening of local brinjal germplasm, Midnapore Local (collected from the district of Midnapore) and Bhangar (collected from district of South 24 Parganas) were found tolerant to bacterial wilt and also possess marketable qualitative fruit characters which can be exploited by the breeder to develop resistant lines. Kumar *et al.*, (2014) revealed that among the accessions of brinjal evaluated Arka Nidhi was found most resistant in IET. Pavithra *et al.*, (2014) showed that Arka Neelkanth found moderately resistant reaction to bacterial wilt (14 per cent) whereas Arka Shirish was highly susceptible to *R. solanacearum* (87.5 % wilt).

It was concluded that resistance available in 4 genotypes (BB 64, BB 54, BNDT and PPC) may be utilized to breed a resistant variety of brinjal.

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