

HETEROISIS IN BACTERIAL WILT RESISTANT HYBRIDS OF BRINJAL (*SOLANUM MELONGENA* L.)

Gectha Varghese and M. Abdul Vahab

College of Horticulture, Vellanikkara 680 654, Trichur, India

Abstract: Studies on heterosis in three wilt resistant F₁ hybrids and their six parents for four seasons revealed that two hybrids viz., SM 6-2 x Pusa Purple Cluster and SM 6-6 x SM 132 exhibited significant relative heterosis, heterobeltiosis and standard heterosis for fruit number and yield per plant in most of the seasons.

Key words: Bacterial wilt, brinjal hybrids, heterosis, resistance, *Solanum melongena*.

INTRODUCTION

Bacterial wilt caused by *Pseudomonas solanacearum* E.F. Smith is the most serious problem in brinjal cultivation. This is more so in warm humid tropical climate and acidic soils, which limits cultivation of high yielding varieties/hybrids. The average productivity of brinjal is low (2030 t ha⁻¹) in India (Som and Maity, 1986). This is attributed to non-availability of high yielding varieties/hybrids and incidence of serious pests and diseases. Productivity of F₁ hybrids is very high compared to varieties. Yields of F₁ hybrids like Sulphal and Arka Navneeth are as high as 62 t ha⁻¹ and 68.72 t ha⁻¹ respectively. Exploitation of hybrid vigour in brinjal is economical as each fruit contains a large number of seeds. The present study was undertaken to identify wilt resistant F₁ hybrids suitable for year round cultivation.

MATERIALS AND METHODS

The materials comprised of six lines of brinjal and three F₁ hybrids. Three of these lines viz., SM 6-2, SM 6-6 and Surya were derived from SM 6, a highly segregating line reported resistant to bacterial wilt (Gopalakrishnan and Gopalakrishnan, 1985). The other lines were Pusa Purple Cluster, SM 132 and Pant Rituraj. The three F₁ hybrids were SM 6-2 x Pusa Purple Cluster, SM 6-6 x SM 132 and Surya x Pant Rituraj. These parents and hybrids were grown in a randomised block design with three replications for four seasons. The crops were grown as per the recommended practices (KAU, 1989). Observations were recorded on fruits per plant, percentage of wilt and total

yield per plant. Relative heterosis, heterobeltiosis and standard heterosis were calculated as per Hayes *et al.* (1965).

RESULTS AND DISCUSSION

Heterosis over mid-parent (relative heterosis), better parent (heterobeltiosis) and standard variety 'Surya' (standard heterosis) for these characters are presented in Tables 1 and 2.

Total fruits per plant

During the first season, none of the hybrids was heterotic for total fruits per plant. During the second season, SM 6-2 x Pusa Purple Cluster had significant relative heterosis (63.28%), heterobeltiosis (62.41%) and standard heterosis (71.5%). During the third season SM 6-2 x SM 132 showed significant relative heterosis (79.81%), heterobeltiosis (47.89%) and standard heterosis (61.4%). Surya x Pant Rituraj showed maximum relative heterosis (122.72%) and heterobeltiosis (52.65%) in the fourth season. However, standard heterosis was maximum in SM 6-2 x Pusa Purple Cluster (120.74%). Heterosis for total fruits per plant was reported by Dixit and Gautam (1987), Geetha (1989) and Singh and Rai (1990).

Incidence of bacterial wilt

The hybrids and parents showed significant differences for the incidence of bacterial wilt (Table 3) in all the four seasons. Pooled data showed SM 6-2 as the genotype with least incidence of wilt (6.26%). Among the hybrids SM 6-6 x SM 132 was the least susceptible.

Table 1. Mean performance of parents and F1 hybrids for fruits per plant and yield per plant in brinjal

Parents & hybrids	Fruits per plant				Yield per plant (g)			
	Season 1	Season 2	Season 3	Season 4	Season 1	Season 2	Season 3	Season 4
Surya	33.13	28.63	26.58	15.67	1566.0	1448.1	957.9	565.0
Pant Rituraj	6.00	2.65	2.45	5.80	176.7	27.3	33.0	455.0
SM 6-6	43.88	42.63	28.96	21.63	1412.9	1066.0	687.9	527.9
SM 132	22.09	19.75	18.75	8.21	938.3	606.9	609.2	312.1
SM 6-2	27.63	29.84	19.96	18.21	1101.9	940.0	655.4	583.8
Pusa Purple Cluster	34.59	30.17	18.09	44.29	842.4	628.3	357.5	831.7
Surya x Pant Rituraj	12.21	2.84	2.68	23.92	643.5	105.5	71.2	1251.3
SM 6-6 x SM 132	39.13	36.58	42.83	17.59	1763.3	1059.6	1361.3	706.7
SM 6-2 x Pusa Purple Cluster	44.96	49.00	26.46	34.59	1671.7	1579.4	917.5	1136.3
CD (0.05)	23.86	12.71	8.96	4.51	972.8	328.8	279.5	162.0
CD (0.01)	32.87	17.51	12.34	6.21	1340.4	448.9	385.2	223.2

Seasons: 1=April 90 to Sept 90; 2=June 90 to Jan 91; 3=Oct 90 to April 91; 4= Feb 91 to June 91

Table 2. Relative heterosis (RH), heterobeltiosis (HB) and standard heterosis (SH) for fruits per plant and yield per plant in brinjal

Hybrids	Fruits per plant			Yield per plant		
	RH (%)	HB (%)	SH (%)	RH (%)	HB (%)	SH (%)
<i>April 90 to Sept 90</i>						
Surya x Pant Rituraj	-37.6	-63.2	-63.2	-37.0	-58.9	-58.9
SM 6-6 x SM 132	18.6	-10.8	18.1	50.0	24.8	12.6
SM 6-2 x Pusa Purple Cluster	44.5	30.0	35.7	71.4	51.7	6.8
CD (0.05)	20.7	23.9	23.9	872.5	972.8	972.8
CD (0.01)	28.5	32.9	32.9	1160.4	1339.9	1339.9
<i>June 90 to Jan 91</i>						
Surya x Pant Rituraj	-81.8	-90.1	-90.1	-85.7	-92.7	-92.7
SM 6-6 x SM 132	17.3	014.2	27.8	62.5**	27.5	-6.1
SM 6-2 x Pusa Purple Cluster	63.3**	62.4**	71.2**	101.4**	68.0**	9.1
CD (0.05)	11.0	12.7	12.7	282.1	325.8	125.8
CD (0.01)	15.2	17.5	17.5	388.6	448.7	448.7
<i>October 90 to April 91</i>						
Surya x Pant Rituraj	-81.5	-89.9	-89.9	-85.6	-92.6	-92.6
SM 6-6 x SM 132	79.5**	47.9**	61.1**	109.9**	97.9**	42.1**
SM 6-2 x Pusa Purple Cluster	39.0	32.6	-0.5	81.21*	40.0	-4.2
CD (0.05)	7.8	9.0	9.0	..	279.5	279.5
CD (0.01)	10.7	12.4	12.4	242.1	385.0	385.0
<i>February 91 to June 91</i>						
Surya x Pant Rituraj	122.7**	52.7**	52.7**	145.3**	121.5*	121.5*
SM 6-6 x SM 132	17.9	-18.7	12.3	68.3**	33.9*	25.1
SM 6-2 x Pusa Purple Cluster	10.7	-22.0	120.8**	60.6**	36.6**	101.1**
CD (0.05)	3.9	4.5	4.5	140.3	162.0	162.0
CD (0.01)	5.4	6.2	6.2	193.3	223.2	223.2

Table 3. Incidence of bacterial wilt in brinjal, %

Parents and hybrids	Seasons				Mean
	1	2	3	4	
Surya	0.00	14.28	11.71	14.42	10.1
Pant Rituraj	90.00	90.00	90.00	40.56	77.6
SM 6-6	9.61	21.89	21.89	11.71	16.2
SM 132	14.82	6.90	20.25	6.90	12.2
SM 6-2	0.00	0.00	20.25	4.81	6.2
Pusa Purple Cluster	20.48	6.90	23.80	4.81	14.0
Surya x Pant Rituraj	18.30	66.20	80.00	6.90	42.8
SM 6-6 x SM 132	4.81	6.90	16.51	0.00	7.0
SM 6-2 x Pusa Purple Cluster	11.71	11.71	18.22	14.81	14.1
CD (0.05)	13.99	14.69	15.60	18.93	22.2
CD (0.01)	7.40	6.50	8.61	10.23	19.8

Details of seasons are given in Table 1 & 2

Total yield per plant

In the first season, SM 6-2 x Pusa Purple Cluster had maximum values of relative heterosis (71.42%) and heterobeltiosis (51.71%) followed by SM 6-6 x SM-132 (49.99% and 24.8%) for total yield per plant (Table 3). During the second season also, SM 6-6 x Pusa Purple Cluster exhibited significant relative heterosis. During the third season, SM 6-6 x SM 132 had maximum values of relative heterosis (109.99%), heterobeltiosis (97.38%) and standard heterosis (42.1%), SM 6-2 x Pusa Purple Cluster had 81.16% relative heterosis and 39.99% heterobeltiosis. During the fourth season all the three F₁s had high values of heterosis. Heterosis for total yield per plant was reported earlier by Narayanan (1984) and Dexit and Gautam (1987).

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