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TOMATO LINES RESISTANT TO BACTERIAL WILT

Bacterial wilt caused by *Psoudomonas solanacearum* E. F. Smith is the single disease, causing considerable damage to tomatoes in the acidic soils (pH=5.1) of Kerala. Isolation of a tomato line tolerant or resistant to this disease, would have considerable impact on tomato production. The annual report of the school of Agriculture, North Carolina State College (1951—52) contains the first report on breeding for resistance to bacterial wilt in tomato. Lines with good field resistance to bacterial wilt were developed. These lines had smaller fruit size resulting in low marketable returns. Green house testing indicated higher susceptibility of younger plants than older ones. Abeygunawardena and Siriwardena (1963) tested 49 hybrids and their parents for resistance to bacterial wilt. The North Carloina lines 1960—8, 1960—2a, 1962—B2 and 1961—57—55M, Master Globe, Rahangala and Sel-2 were observed more resistant. The crosses involving the popular varieties of USA, Manaluci and Floradel with a resistant stock from North Carolina resulted in the evolution of a few lines resistant to *Pseudomonas solanacearum* (University of Florida, 1967). Subsequently a good number of varieties and hybrids were reported resistant to the disease (IRAT, 1970; Henderson and Jenkine, 1971; Akiba *et al.*, 1972; Chetia and Kakati, 1973; Daly, 1973; Sunarjono *et al.*, 1976. Sonoda, 1977; Sonoda and Augustine, 1977; AVRDC, 1978; IITA, 1978 and Sonada *et al.*, 1979. The present study was aimed to isolate line (s), if any, resistant to bacterial wilt. Attempt is also made to estimate realised selection reponse under pureline, mass and bulk methods of selection based on yield *per se* associated with resistance in the lines identified.

Seventy seven tomato lines collected from different sources were grown during September—December 1980 in soils known for high inoculum density of *Pseudomonas solanacearum.* The cropping was done in plots where the previous crop was tomato which failed due to high incidence of wilt. The lines under screening were grown along with known susceptible line (Sioux) to prove the inoculum potential of the soil. Sioux was grown in alternate rows and got wilted subsequently confirming presence of virulent inoculum in the soil. The lines screened were Pusa Ruby, King Kig and Pusa Early Dwarf from IARI, New Delhi, AC 238, AC 259, 11-5-2-3-1, AC 111, 11-2-74-3-1, 11-5-2-0-1 and LE 74 from Pantnagar,' CL 8d-0-7-1 GS, CL 11 d-0-2-2-0-3 UG, CL 32d-0-19GS, CL 143-0-6-9 UG, LIGS, CL 9-0-0-1, CL 143-0-10-3, CL 123-2-4, CL 1591-5-0-1-6, L 1, L 387, Tropic, VC 98-1, VC 48-1-1-2, VC 8-1-2-1, VC9-1-UG, VC 11-1-UG, VC 2029, VC 8-1-2-1, VC 11-2-2-79, (TRxVC 11-2)-2-1, (TR x VC 48-1)-11-2, Walter, Florida MH, Venus, Saturn, Galaxy, Anahu, Kewalo, White Skin, Green Fruit and Hotset from AVRDC; China, La-Bonita from NBPGR, New Delhi, PKM-1 and Co-2 from TNAU; Coimbatore, LE 93 from IIHR Bangalore, Master No. 1 and Hope No. 1 from Takii, Japan, New York Special, Quinte, Veepick VF 419 A. Star Shot 408, Veepro 464 A, Starfire, Veeroma VF 418 and Basket Vee 326 from Strokes Seed Ltd; Canada, LE

518 from Petro Seed Co., USA, Hosen-Elion and Gamed from Hebrew University of Jerusalem Israil, Mandal 502, Monpracos RS, Bonset F-IRS, and Tobol (No. 748) from Holland, Roma, Yellow Pear, Red Cherry, Beefsteak, India River and Early Large Red from Redwood City Seed Co; USA, Sioux from NSC, New Delhi, HS 110 from Hisar, Red Cloud, Grosse Lisse and Rouge De Marmande from Yates Co; Australia and two locals from Vellayani. The source of LE 134 is unknown.

Only the line CL 32 d-0-1-19 GS survived the onslaught of bacterial wilt. This line was also transplanted in pots filled with the soil from the diseased plots. Soils supporting the wilted plants contain presumably high inoculum of virulent bacteria. No seedling was observed wilted. The tolerant line was progressed as pure line, mass and bulk. The progenies were grown during February-May 1981 to estimate the realised selection response as suggested by Falconer (1960) (Table 1 & 2).

Table 1

Mean performance of base population, selected plants, single plant and their respective progenies

Characters	Mean			
	Bulk	Mass	Pure line	CD(0.05)
Plant height (cm)	72.00 (70.74)	62.48 (73.00)	59.12 (74.00)	9.70
Primary branches/plant	4.46 (3.97)	4.68 (4.67)	4.20 (4.00)	—
Days to first fruit set	37.20 (58.86)	36.10 (48.00)	33.60 (56.00)	2.04
Days to first fruit harvest	68.37 (94.36)	65.99 (76.00)	66.55 (87.00)	—
Fruits/plant	16.32 (17.02)	19.51 (44,00)	12.99 (53.00)	—
Locules/fruit	3.65 (3.69)	3.63 (3.33)	3.42 (3.00)	—
Marketable fruit weight/plant(g)	375.51 (445.54)	391.87 (1156.67)	433.60 (1118.00)	—
Total fruit weight/plant (g)	507.00 (517.79)	485.27 (1296.33)	470.10 (1325.00)	—

Data in parenthesis indicate the mean perfcimance ofpopulation, selected plants and single plant.

Table 2

Values of selection differential (3), selection response (R) and realised hertiability (h^2)

Characters		S	R	h^{2*}
Plant height (cm)	B		1.26	—
	M	2.26	-10.52	—
	P	3.26	-14.88	
CD (0.05)			9.70	
Primary branches/plant	B		0.50	
	M	0.70	0.01	0.10
	P	0.04	0.36	
CD (0.05)			N.S.	
Days to first fruitset	B		-21.60	
	M	—10.80	—11.90	—
	P	- 2.80	—22.40	—
CD (0.05)			2.49	
Days to first fruit harvest	B		—25.99	
	M	—15.05	-13.31	0.88
	P	-. 7.36	—20.45	
CD (0.05)			3.62	
Total fruits/plant	B		—0.70	
	M	26.98	-24.49	
	P	35.98	-40.01	
CD (0.05)			7.71	
Marketable fruits/plant	B		—-1.24	
	M	25.42	-23.68	
	P	33.75	—36.23	—
CD (0.05)			4.57	
Locules/fruit	B	— 0.36	—-0.04	
	M	- 0.69	0.30	—
	P		0.42	
CD (0.05)			0.22	
Marketablefruitweight/plant (g)	B		-69.96	
	M	771.13	-764.79	—
	P	672.40	-684.60	—
CD (0.05)			440.19	
Total fruit weight/plant (g)	B		—-10.79	
	M	778.54	-811.05	
	P	807.21	-854.90	—
CD (0.05)			53.65	

* Negative values and values exceeding one are ommitted.

B = Bulk M = Mast P = Pureline.

Table 3

Resistance of CL 32 d-0-1-19 GS under field conditions

Seasons	No. of plants	Juvenile stage % of plants wilted	Adult stage % of plants wilted
September—December 1980	81	46.91	0
February—May 1981	792	1.38	0
April—August 1980	1185	3.79	1.14
April—August 1980	1781	8.02	1.34
September—December 1980	308	16.99	0
May—September 1980	541	—	0.72

The realised heritability was higher for days to fruit harvest, indicating considerable scope for selection for early lines in the tolerant/resistant line identified.

The line CL 32-d-0-1-19 GS was grown over six seasons in known wilt sick soils to confirm the resistance of the line to bacterial wilt (Table 3).

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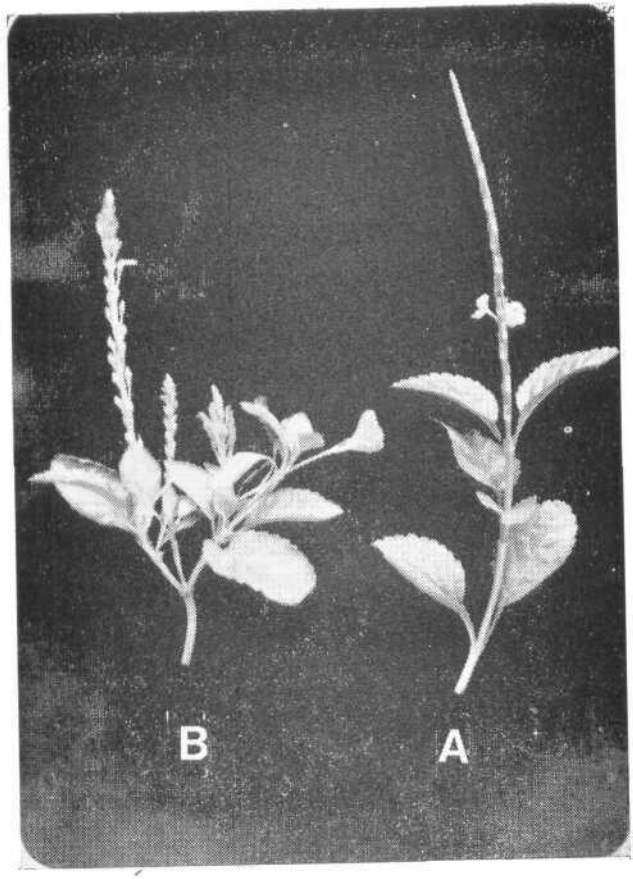

Fig. 1 A. Healthy terminal spike of S. *indica*
B. Malformed spike showing phyllod flowers

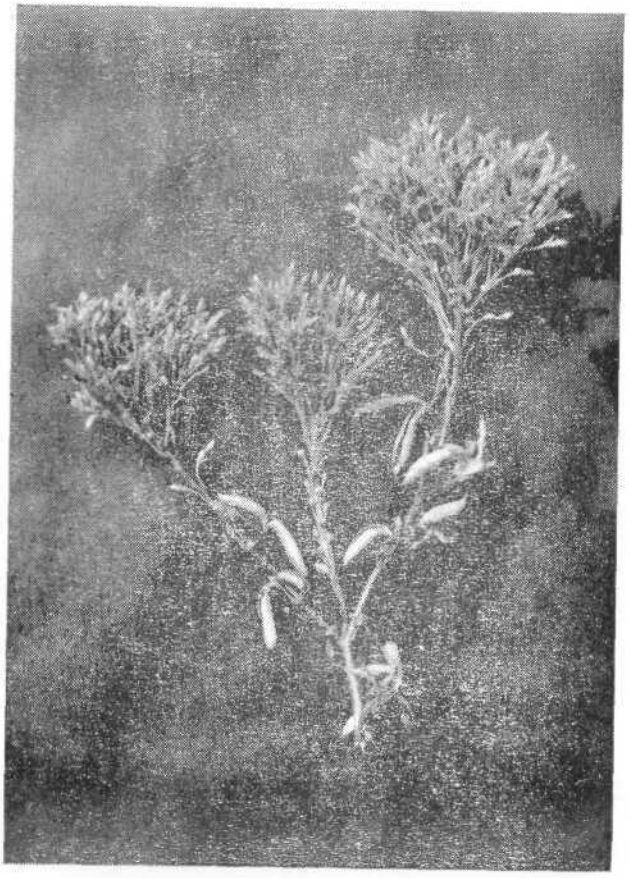

Fig 2 Witches' broom appearance of malformed spike