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SCREENING AND SELECTION FOR BACTERIAL WILT RESISTANCE IN CHILLI

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ABSTRACT

One hundred and forty six chilli accessions belonging to three *Capsicum* species, viz., *C. annuum, C. frutescens* and *C. chinense*, were screened for resistance to bacterial wilt in the wilt sick soil of the College of Horticulture during 1987-88. Two cluster-fruited accessions, CA 219 and CA 33, were found resistant to bacterial wilt in field evaluations and under artificial inoculations. The resistant accessions were further improved by selection and the two cluster-fruited selections from CA 219, i.e. CA 219-1-19-9 and CA 219-1-19-6, and two from CA 33, i.e. CA 33-1-4-6 and CA 33-1-12-3 were found highly promising for yield with complete resistance to bacterial wilt.

Key words: Chilli, bacterial wilt resistance.

Cultivation of chilli, the spice-cum-vegetable crop, is hampered by heavy incidence of bacterial wilt caused by *Pseudomonas solanacearum* E. F. Smith. It is particularly serious in acidic soils of Kerala. Yield losses up to 100% are reported in wilt- prone areas. None of the high yielding varieties is resistant to the disease. Chemical control measures are also not effective.

The present study has been undertaken in the ICAR ad-hoc scheme on "Breeding for resistance to bacterial wilt in chilli and brinjal" at the College of Horticulture, Vellanikkara, during 1986-89. The location is identified as 'hot spot' for bacterial wilt incidence by the All India Co-ordinated Vegetable Improvement Project (ICAR). One hundred and twenty six lines belonging to *C. annuum*, eight lines of *C. frutescens*, and 12 of *C. chinense* collected from different districts of Kerala and Tamil Nadu were screened during July–December 1987 and June–October 1988. Artificial inoculation was done as per Winstead and Kelman [1].

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Bacterial wilt was confirmed by the ooze test. The experiment was conducted in randomized block design with two replications. There were 10 plants/ accession/ replication. Rating of accessions into resistant, moderately resistant, moderately susceptible, and susceptible was done as per Mew and Ho [2]. The bacterial wilt resistant accessions were improved further by single plant selection and evaluated during June–October 1989.

Table 1. Classification of *Capsicum annuum*, *C. frutescens* and *C. chinense* accessions based on bacterial wilt incidence

Reaction to wilt	Wilt incidence, %	Number of accessions	Accessions/ varieties
A. *C. annuum*			
Resistant	20	2	CA 33, CA 219
Moderately resistant	20–40	1	CA 345
Moderately susceptible	40–60	6	
Susceptible	60	117	
B. *C. frutescens*			
Resistant	20	Nil	
Moderately resistant	20–40	1	CA 446
Moderately susceptible	40–60	3	
Susceptible	60	4	
C. *C. chinense*			
Resistant	20	Nil	
Moderately resistant	20–40	4	CA 180, CA 182, CA 211 and CA 212
Moderately susceptible	40–60	6	
Susceptible	60	2	

Note. Moderately susceptible and susceptible genotypes, being of no consequence, not indicated in the last column.

Heavy incidence of bacterial wilt was observed when 126 *C. annuum* accessions were evaluated during 1987-88. Only two accessions, CA 33 and CA 219, were resistant to bacterial wilt (Table 1). CA 345, a solitary erect fruited accession, was rated moderately resistant. Jwalasakhi, a variety released from the Kerala Agricultural University, Purple Chuna, a cultivar in Kerala homesteads, and four more accessions were rated moderately susceptible. The incidence of bacterial wilt was more than 60% in 117 *C. annuum* accessions of which complete wilt incidence was in 47 accessions. None of the *C. frutescens* and *C. chinense* accessions were resistant to wilt. The strain CA 446 of *C. frutescens* and CA 180, CA 182, CA 211 and CA 212 of *C. chinense* were moderately resistant, having wilt incidence of 20–40%. Out of the eight *C. frutescens* accessions evaluated, three were moderately susceptible and four highly susceptible, while the number of such strains was six and two, respectively, in *C. chinense*.

The wilt resistant accessions CA 33 and CA 219 were clustered fruited, while all the remaining were solitary fruited. Both the lines have compact growth habit with elongate, smooth, erect, highly pungent and deep red coloured fruits which are dark green in CA 219 and light green in CA 33 at immature stage. Fruit length in CA 219 is more than that of CA 33 (6.5 cm and 4.0 cm, respectively).

The resistant accessions CA 33 and CA 219 were further improved by single plant selection and evaluated during June–October, 1989. Remarkable variation was observed in wilt incidence and dry chilli yield/plant between the solitary and cluster fruited selections obtained by open pollination from CA 219 (Table 2). The mean wilt incidence in the solitary fruited selection of CA 219 was 35.8% compared to 14.1% in the cluster fruited selections. The dry red chillis/plant were more in the solitary than in the clustered fruited selections (55.7 and 39.3 g/plant, respectively). Two cluster fruited single plant selections, CA 219-1-19-9 and CA219-1-19-6, were completely free from bacterial wilt with the dry chilli yield of 31.2 and 42.0 g/plant, respectively.

All the plants in the solitary fruited selections from CA 33 succumbed to wilt (Table 3), while none of the cluster fruited selections were affected by wilt. The dry fruit yield/plant was maximum in CA 33-1-4-6 (60.9 g/plant), followed by CA 33-1-3-3 (52.4 g/plant).

Table 2. Bacterial wilt incidence and yield/plant in solitary and clustered fruited selections of CA 219

Selection	Wilt incidence (%)	Dry chillis yield/plant (g)
A. Solitary fruited		
CA 219-4-12-4	20.8	73.4
CA 219-2-14-5	53.6	67.5
CA 219-2-15	28.7	54.4
CA 219-8-16-10	42.0	47.3
CA 219-8-17-5	28.2	53.9
CA 219-8-18-1	41.7	37.7
Mean	35.8	55.7
B. Cluster fruited		
CA 219-9-23-5	19.4	47.6
CA 219-9-23-2	7.1	47.5
CA 219-9-24-5	13.6	27.5
CA 219-5-22-4	12.5	50.2
CA 219-9-24-2	5.0	45.9
CA 219-9-24-1	14.0	37.3
CA 219-9-21-9	24.4	45.3
CA 219-5-22-7	20.0	47.8
CA 219-1-21-9	25.8	37.7
CA 219-1-21-7	0.0	31.2
CA 219-1-19-9	26.9	12.5
CA 219-1-19-6	0.0	42.0
Mean	14.1	39.4

Table 3. Bacterial wilt incidence and yield/plant in selections of CA 33

Selection	Wilt incidence (%)	Dry yield/plant (g)
A. Solitary fruited		
CA 33-1-14-2	100	—
B. Cluster fruited		
CA 33-1-12-3	0	13.2
CA 33-1-3-3	0	52.4
CA 33-1-12-4	0	25.3
CA 33-3-7-7	0	24.5
CA 33-1-3-6	0	11.6
CA 33-1-4-6	0	60.9
CA 33-2-8-5	0	43.8

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