

UJWALA - A CHILLI VARIETY RESISTANT TO BACTERIAL WILT

Introduction

Chilli is a quintessential crop grown for its pungent fruits that are used for spice and also for vegetable purposes. The crop is also valued for its highly coloured and low pungent fruits commercially known as Paprika. The cultivation of chilli in the traditional growing tracts is hampered by heavy incidence of bacterial wilt caused by *Pseudomonas solanacearum*. Since the pathogen is soil borne, chemical control of the disease is practically ineffective and the only way of combatting the disease is by the cultivation of resistant varieties. The steps and procedures involved in the development of a wilt resistant variety, Ujwala are discussed in the paper.

Materials and Methods

Breeding for resistance to bacterial wilt in chilli was undertaken during the year 1986- '97 in the College of Horticulture, Vellanikkara. Vellanikkara has been identified as hot spot for bacterial wilt screening. One hundred and forty five chilli lines belonging to *Capsicum annum*, eight lines of *C. frutescens* and thirteen lines of *C. chinense*

have been screened for bacterial wilt incidence during 1987-89' in the wilt sick soil. Artificial inoculation of bacterial wilt was also done according to Winstead and Kelman (1952). Wilted plants were further subjected to ooze test. The accessions were rated as resistant, moderately resistant, moderately susceptible and susceptible according to Mew and Ho (1976). CA-219, the accession found resistant during the initial evaluation was further improved by rigorous single plant selection and the prog-

enies were evaluated during June-October, 1989. The superior culture was compared with the released varieties and with the promising selections during June-December 1990 at the College of Horticulture, Vellanikkara in a randomised block design with two replications. The culture was also tested in the high range region during August '92 February '93 at RARS, Amabalavayal in an R.B.D with four replications.. In addition the culture was put under farm trial in different districts.

Table I

Rating of Chilli accessions according to Mew and Ho (1976) for bacterial wilt incidence

Reaction to wilt	Wilt incidence, %	Number of Accessions	Accessions Varieties
A.C. annum			
Resistant	20	2	CA 33, CA 219
Moderately resistant	20-40	1	
Moderately susceptible	40-60	16	
Susceptible	60	126	
B.C. frutescens			
Resistant	20	Nil	
Moderately resistant	20-40	1	
Moderately Susceptible	40-60	3	
Susceptible	60	4	
C.C. chinense			
Resistant	20	Nil	
Moderately resistant	20-40	4	
Moderately susceptible	40-60	6	
Susceptible	60	3	

The oleoresin, capsaicin contents and the colour values were estimated as per Theymoli *et al.* (1982) and Hort. and Fischer (1971) respectively.

Results and Discussion

One hundred and sixty six-chilli accessions belonging to three species viz., *Capsicum annum*, (135), *C. frutescens* (8) *C. Chinense* (13) were screened for resistance to bacterial wilt in the wilt sick soil of College of Horticulture, Vellanikkara. The high yielding varieties like Jwala, Pant C-1, K-2, Jawahar 218, Andra Jyothi, Bhagya Lakshmi, Jwalamukhi and Jwalasakhi were moderately susceptible or susceptible (Table-I). The incidence of bacterial wilt was more than 60 per cent in 148 accessions. Out of the 168 accessions only two viz., Manjari and C.A. 219 suffered wilt incidence less than 20 per cent and were treated as resistant. The cluster fruited accession C.A. 219 was subjected to single plant selection for three cycles for selecting ideal plant types. In the selected cultures, wilt incidence ranged from zero to 26.9 per cent with a mean of 40.9 per cent (table II).

The culture C.A-219-1-19-9 that has yielded 42 grams of dry chilli was completely free from bacterial wilt that was further subjected to rigorous selection for two more cycles. In

Table II

Bacterial wilt incidence and yield/plant in CA 219

Selection	Wilt incidence(%)	Dry chilli yield/plant (g)
CA 219-9-23-5	19.4	47.6
CA 219-9-23-5	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

the comparative yield trials at Vellanikkara and Ambalavayal CA 219 was superior to the released varieties for wilt resistance and yield. CA 219 yielded 22.18t/ha compared to 7.14t/ha of Jwalasakhi and 3.82t/ha of Jwala (Table III & IV). The low yield of Jwala K₂, Pant C-1, etc. were due to the susceptibility of the varieties to bacterial wilt. At Ambalavayal also CA 219 yielded maximum (18.9t/ha). This improved culture

Table III

Performance of CA 219 in comparative yield trial at Vellanikkara

Variety	Mean % of wilting	
	Percentage	Transformed data
White Kanthari	42.0	0.704
CA 175	42.0	0.695
CA 222	52.0	0.803
Pant C-1	98.0	1.357
Jawahar 218	92.0	1.252
Purple Chuna	60.0	0.892
CA 219	0.0	0.226
Jwala	100.0	1.345
K ₂	66.0	0.952
CA 33	0.0	0.226
Jwala Sakhi	74.0	1.038
CD		0.358

was free bacterial wilt at both the stations.

Farm trials were carried out at 18 locations in Trichur, Ernakulam, Palakkad, Alleppey and Wayanad districts, where CA 219 yielded 17.23 t/ha of green chilli, which was 18.5 per cent more than the standard variety Jwala and 32.8 per cent over the local check.

Fruits of Ujwala are highly pungent and coloured. Out of the 20 chilli/

paprika lines tested for the quality attributes, the pungent principle, capsaicin was maximum in CA 219 (0.49%) compared to Jwala (0.37%). The colour value of CA 219 was also maximum (139.29 ASA units) and was on par with the paprika selection CA 546. This high colour, pungency and oleoresin recovery is much

Table IV

Performance of CA 219 with CYT at Ambalavayal

Variety	Yield/ha	Incidence of bacterial wilt	
		Wilt %	Transformed data
CA 345	15.94	26.0	0.533
CA 219	18.90	0.0	0.142
Manjari	7.83	8.0	0.278
Jwala	4.86	56.0	0.847
CD	3.60		0.133

Table V

Quality attributes of chilli/paprika lines*

Sl. no.	Accession no.; Name	Oleoresin (%)	Capsaicin (%)	Colour value (ASTA units)
1.	Manjari	18	0.48	125.00
2.	Ujwala	24	0.49	139.29
3.	CA 517	20	0.35	32.86
4.	CA 519	14	0.28	78.57
5.	CA 559	20	0.27	21.43
6.	CA 579	24	0.46	96.3
7.	CA 564	14	0.29	57.14
8.	CA 589	14	0.17	78.57
9.	CA 582	23	0.30	125.00
10.	CA 591	19	0.27	96.43
11.	CA 610	22	0.31	110.71
12.	CA 612	22	0.38	138.71
13.	CA 546	20	0.48	67.86
14.	Jwalamukhi	14	0.42	82.14
15.	Jwalasakhi	14	0.43	78.57
16.	CA 586	22	0.24	82.14
17.	CA 640	20	0.33	71.43
18.	CA 605	28	0.22	110.71
19.	CA 604	22	0.37	96.43
20.	CA 587	28	0.47	110.71
21.	CA 575	18	0.47	125.00
22.	Jwala	20	0.37	92.86
23.	CA 516	24	0.23	110.71
24.	CA 568	20	0.31	96.43
25.	CA 544	19	0.35	92.86

* Pericarp alone

desirable for spice industry for the extraction of oleoresin and colour from chilli.

Plants of Ujwala are non spreading but highly branching acropetaly centred around the primary branch. Fruits borne in clusters of 9-10 are dark green and glossy at the immature stage turning deep red on ripening. Fruits are medium long (6.17 cm) with an average fruit weight of 2.54 gm. The average yield is 715 gm/plant with a potential productivity of 26t/ha of green chilli.

Considering the productivity and resistance to bacterial wilt CA 219 has been released by the 18th State Seed Subcommittee meeting on 17th of September'96 under the name Ujwala for cultivation throughout the State.

Summary

Evaluation of 166 chilli accessions belonging to

Capsicum annum, *C. frutescens* and *C. Chinense* during 1987-'92 in the Kerala Agricultural University, Vellanikkara resulted in the identification of a line CA 219, resistant to bacterial wilt. CA 219 was subjected to rigorous selection for three cycles. The single plant selection, CA 219-1-19-6 was put to farm trial in the different agro climate zones of Kerala, and based on its outstanding performance, it was released under the name 'Ujwala' by the 18th State Seed Sub-Committee Meet-

ing held on 17th September 1996. Ujwala is a clustered variety with erect and dark green fruits, turning to deep red on ripening. Fruits are highly pungent and coloured, as indicated by oleoresin content of 0.49% and colour value of 139.29 ASTA units.

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**Gopalakrishnan,
T.R., Indira, P. and
Peter,**

K.V. Kerala Agricultural
University,
Vellanikkara
Thrissur,
Kerala - 680 654

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