

EVALUATION AND UTILIZATION OF TOMATO (*LYCOPERSICON ESCULENTUM* Mill.) GENOTYPES FOR IMPROVING DISEASE RESISTANCE TO EARLY BLIGHT

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Early blight disease of tomato caused by *Alternaria solani* Ellis and Martin (Jones and Grout) is one of the major diseases of tomato. Recently this disease has attracted much attention because of the considerable loss in yield inflicted by it (Kaur *et al.*, 1993; Datar and Mayee, 1981). This is a three phased disease which causes damping off/collar rot, leaf blight and fruit rot symptoms. The disease appears on foliage normally at fruiting stage of the crop as circular to angular, dark brown to black spots with concentric rings. On the stem, dark elongated spots, often target boarded, occur at any point, but are especially injurious when engirdle the juncture of stem. Fruits are infected usually at ripe stage, at the stem end. The pathogen remains viable on dry infected leaves and seeds. Most of the commercial varieties grown presently in the region are susceptible to early blight disease. The studies, were therefore, taken up to screen the germplasm against this disease to identify resistant /tolerant genotypes under field conditions during the year 1990, 1992 and 1993 when the disease appeared in a severe form, which could be used either as commercial varieties or as a source of resistance in the acceptable varieties.

The screening programme was carried out at the Vegetable Farm, PAU, Ludhiana, during the years 1990, 1992 and 1993. Three hundred and fifty genotypes tested, comprised varieties, hybrids and advance generation lines. All the genotypes were grown in the month of October and transplanted in the first fortnight of December in a randomized block design with three replications. The plot size was 1 × 5 mt. The data for the early blight disease were taken when the disease appeared in a severe form on the susceptible checks, Punjab Kesri and Punjab Chuhara. The disease was recorded on a 0-4 scale. The plants with mean disease index (MDI) upto 1-5 were recorded as resistant and M.D.I. upto 2.0 as moderately resistant and above 2.0 as

susceptible. The observations were also recorded on the fruit characters (fruit shape, size and weight).

The tomato genotypes screened represented a wide range of responses to early blight disease in the three growing seasons. Four genotypes viz, Ottawa 32, Ottawa 33, Ottawa 46, and Cornell 6131 were recorded as resistant and nine genotypes, viz., Ottawa 30, Ottawa 31, Ottawa 55, PI 112835, PI 207407, PI 204587, OARDC 230, AC 142 and PP-4 were recorded as moderately resistant, some of these were also reported by Datar and Mayee (1981). The fruits of resistant and moderately resistant varieties were small with fruit weight of 3-4 g and 15-20 g, respectively. The plant yield was 1-2 kg per plant (Table 1) as compared to susceptible genotypes, where the fruit weight ranged from 45-60 gm per fruit with the yield of 2.5-3.5 kg. per plant. Earlier workers (Walter and Canover, 1952; Kaur *et al.*, 1988) also observed that small fruited varieties in tomato possess high resistance to diseases.

Table 1. Performance of resistant, moderate resistant and susceptible genotypes for early blight disease and fruit yield

Genotype	Disease reaction	Fruit weight (g)	Yield per plant(kg)
Ottawa-32	R	3-4	1.0-1.5
Ottawa-55	MR	15-20	1.5-2.0
Punjab Kesri	S	50-60	2.5-3.0
Punjab Chhuhara	S	45-50	3.0-3.5

The resistant or moderately resistant varieties identified in the present studies could not be exploited as commercial varieties due to their small size fruits, however, these were used as donors for incorporating resistance in the susceptible commercial varieties which lead to the development of moderately resistant genotypes No. 48 with pear shape fruit, identified from the cross cornell 6131 × Punjab. Chhuhara and No. 21 with round fruits, from the cross PI 345559 × Punjab Chhuhara, in addition to desirable horticultural characters (Table 2). Besides this, four introductions viz. WIR 4329 and IPA-3 (oval fruits) and I-979 and WIR 4285 (round fruits) showed field tolerance in addition to good yield potential. These genotypes may be exploited for the integrated disease management programme with the limited use of fungicides.

All the commercial F₁ hybrids viz., Vaishali, Rupali, Rajni, Rashmi, Nema 1401, Nema 1435. Peto 343, MHUF 789 from various seed companies and TH 2312 (PAU) were found to be susceptible to this disease. However, a few F₁ hybrids developed at PAU, Ludhiana, sustained a fair amount of early blight disease but had higher yield potential, thus exhibiting field tolerance and such a resistance can be helpful as the variety 'Manaluchie' has been cultivated for many years with excellent disease tolerance (Allen Stevens and Rick, 1986).

Table 2. Performance of tolerant genotypes

Genotype	D.I.	Yield/plant (kg)	Fruit wt.(g)	Fruit shape
No. 48	1.50	2.30	35.0	Pear
No. 21	1.90	2.50	47.5	Round
WIR-4329	2.20	3.45	75.4	Oval
I-979	2.40	3.54	81.2	Round
WIR-4285	2.43	3.45	79.4	Round
IPA-3	2.66	3.74	79.7	Oval
Punjab Chhuhara	3.40	3.50	50.0	Pear
Punjab Kesri	3.70	2.75	55.0	Oval

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