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RESEARCH ARTICLE

SCREENING OF TOMATO GERMPLASMS AGAINST *ALTERNARIA SOLANI* UNDER SOUTH GUJARAT CONDITION

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ABSTRACT

A study has been conducted at Regional Horticultural Research Station, Vegetable Research Scheme, Aspee College of Horticulture and Forestry Navsari Agricultural University on screening different genotypes/ germplasms against early blight of tomato caused by *Alternaria solani.* Thirty three genotypes/ germplasms were screened under natural field condition. Among them nine were found highly resistant, fifteen were found resistant, five were found moderately resistant and four genotypes were found susceptible against *A. solani.* None of the genotypes were found highly susceptible.

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INTRODUCTION

Tomato (*Solanum lycopersicum* L.) is a crop of immense value in olericulture. Tomato is one of the most widely cultivated solanaceous fruit vegetable crop in the world believed to have its origin in Tropical America (Thompson and Kelly, 1957). It is a diploid plant with 2n = 24 chromosomes. Naturally, the tomato is a perennial plant, but it is cultivate annually because of having a great economical and commercial advantages. It is known as Love apple, Tomate, Tomat, Tomatar, Rangam, and Tomati in different parts of the world it is also popularly called as 'Poormen's orange'. It is grown extensively and marketed throughout the world. It ranks third largest vegetable crop after potato and sweet potato. Tomato is a traditional vegetable crop commercially cultivated with a large area and higher production and productivity in India. The major tomato producing states are Gujarat, Bihar, Karnataka, Uttar Pradesh, Orissa, Andhra Pradesh, Maharashtra, Madhya Pradesh, and West Bengal. In Gujarat, average of five years it is extensively cultivated in the area 44.57 ('000 ha) with production of 1259.01 ('000 Tons) and productivity of 28.2 MT/ha (Anon. 2014-15). The major tomato growing districts of Gujarat are Gandhinagar, Mehsana, Sabarkantha, Patan, Vadodara, Surat, Navsari, Valsad, and Dang (Ghinaiya and Pandya, 2017). Tomato is an important source of nutrients as it has high nutritive value of vitamin A, B, C, E and other important nutrients viz., protein, carbohydrates, fibre, fat, biotin, malic acid, citric acid, oxalic acid etc. it contains fibers, and is known as free in having cholesterol. Generally, the average size of tomato equal to (148g) boasts only 35 calories. Approximately 20–50 mg of lycopene/100g of fruit weight can be found in tomato. Lycopene is a member of the family of pigments, which called as carotenoids. This family have the ability to form colours in fruits and vegetables, naturally. Lycopene is the best powerful antioxidant in the carotenoid family and it prevents humans from free radicals that degrade many parts of the body, lycopene is also known to protect human from cancer.

At present, tomatoes are utilized at a higher rate in the developed countries than in the developing countries and hence it may be referred to as a luxury crop. Tomato is commonly affected by numerous diseases among early blight of tomato caused by *Alternaria solani* is one of the common and wide spread diseases. In every year, it appears in devastating form in major tomato growing areas of Gujarat. In India, tomato crop is heavily affected by early blight disease, resulting severe yield losses in Gujarat. Keeping these things in mind the present study was conducted to test the efficacy of different bio agents on the management of early blight of tomato.

Table- 1. Lists of genotypes of Tomato against early blight disease under field condition

Sr.No	Genotype	Sr.No	Genotype	Sr.No	Genotype
1.	GT 2	12.	NTL-23	23.	NTL-45
2.	NTL-6	13.	NTL-24	24.	NTL-50
3.	NTL-9	14.	NTL-31	25.	NTL-55
4.	NTL-11	15.	NTL-32	26.	NTL-56
5.	NTL-12	16.	NTL-33	27.	NTL-71
6.	NTL-16	17.	NTL-34	28.	NTL-72
7.	NTL-17	18..	NTL-35	29.	NTL-73
8.	NTL-19	19.	NTL-37	30.	NTL-74
9.	NTL-20	20.	NTL-38	31	NTL-76
10.	NTL-21	21.	NTL-39	32.	NTL-97
11.	NTL-22	22-	NTL-42	33.	NTL-98

Appendix-1. Disease rating scale for the assessment of early blight of tomato

Scale	Description of the symptom
0	Leaves free from infection
1	Small irregular spots covering <5% leaf area
2	Small irregular brown spots with concentric rings covering 5.1-10% leaf area
3	Lesion enlarging, irregular brown with concentric rings covering 10.1-25% leaf area
4	Lesions coalease to form irregular and appears as a typical blight symptom covering 25.1- 50 % leaf area
5	Lesions coalease to form irregular and appears as a typical blight symptom covering > 50 % leaf area

(Horsefall and Barette *et.al.*, 1945.)

Appendix 2. Diseases reaction will be given based on PDI.

Diseases reaction	PDI
Highly resistant	0 - 12.5
Resistant	12.6 - 25.0
Moderately resistant	25.1 - 37.5
Susceptible	37.6 - 50.0
Highly Susceptible	50.1 and above

(Peteira *et al.,* 2002)

Table-2. Average per cent disease Intensity (APDI) and Reaction of screened tomato genotypes

Sr. No.	Name of Genotypes/Germplasms	APDI	Reaction
1	GT 2	24.88	R
2	NTL-6	06.22	HR
3	NTL-9	10.19	HR
4	NTL-11	06.22	HR
5	NTL-12	24.44	R
6	NTL-16	11.55	HR
7	NTL-17	04.00	HR
8	NTL-19	07.11	HR
9	NTL-20	16.00	R
10	NTL-21	03.55	HR
11	NTL-22	23.99	R
12	NTL-23	26.33	MR
13	NTL-24	23.55	R
14	NTL-31	07.99	HR
15	NTL-32	19.33	R
16	NTL-33	13.33	R
17	NTL-34	12.54	R
18	NTL-35	40.00	S
19	NTL-37	43.66	S
20	NTL-38	26.22	MR
21	NTL-39	16.10	R
22	NTL-42	31.11	MR
23	NTL-45	48.00	S
24	NTL-50	30.66	MR
25	NTL-55	33.53	MR
26	NTL-56	44.66	S
27	NTL-71	13.33	R
28	NTL-72	21.21	R
29	NTL-73	15.99	R
30	NTL-74	20.00	R
31	NTL-76	13.77	R
32	NTL-97	21.77	R
33	NTL-98	03.30	HR

MATERIALS AND METHODS

This experiment was conducted in Regional Horticultural Research Station, Vegetable Research Scheme, Aspee College of Horticulture and Forestry, N. A. U., Navsari in year 2014-15. Thirty three different genotypes were tested in natural field condition against *A. solani.* In field one genotype was three rows and one row in 10 plants. Plant spacing is 60×45 cm. Treatment details given in table -1 Screening will be done against natural infection of early blight disease during crop season. Five plants selected randomly in each genotype by observing 15 leaves from lower, middle and upper portion of plants will be recorded disease severity using 0-5 scale (Appendix-1) of Horsefall and Barette, (1945) and per cent disease Intensity (PDI) will be worked out using formula of Wheeler(1969) as given here :

$$PDI = \frac{\text{Sum of all disease rating} \times 100}{\text{Total No. of leaves observed} \times \text{Maxmum rating (Higher scale)}}$$

RESULTS AND DISCUSSION

Screening will be done against natural infection of early blight disease during crop season. Result data present in table-2. Total thirty three genotype/germplasms evaluated. Among them nine were found highly resistant *viz,* NTL-6, NTL-9, NTL-11, NTL-16, NTL-17, NTL-19, NTL-21, NTL-31 and NTL- 98. fifteen were found resistant *viz,* GT -2 NTL- 12, NTL- 20, NTL- 22, NTL-24, NTL- 32, NTL- 33, NTL- 34, NTL- 39 NTL- 71, NTL- 72, NTL- 73, NTL- 74, NTL- 76 and NTL- 97 and five were found moderately resistant *viz,* NTL-23, NTL- 38, NTL- 42, NTL-50 and NTL- 55 against *A. solani*.

Four genotype were found susceptible *viz,* NTL- 35, NTL-37, NTL- 45 and NTL- 56 against *A.solani.* None of the genotypes were found highly susceptible. This is the first attempt to screening number of genotypes/germplasms of tomato against early blight of tomato in natural field condition at south gujarat . This led to the development and release of resistant breeding lines and can be used as source of germplasm for better management of early blight.

SUMMARY AND CONCLUSION

Screening will be done against natural infection of early blight disease during crop season. Total thirty three genotypes were evaluated. Among them nine were found highly resistant *viz,* NTL-6, NTL-9, NTL-11, NTL-16, NTL-17, NTL-19, NTL-21, NTL-31 and NTL- 98 against *A. solani* and fifteen were found resistant *viz,* GT-2 NTL-12, NTL-20, NTL-22, NTL-24, NTL-32, NTL- 33, NTL- 34, NTL- 39 NTL- 71, NTL-72, NTL-73, NTL-74, NTL 76 and NTL-97 against *A. solani.* None of the genotype was showing highly susceptible reaction.

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