

A New High Acid Content Tomato cv. DMT-2 for North Karnataka

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Abstract: Investigations on development of high acid content cv. DMT-2 tomato were carried out during the years 2002-2005 at Olericulture Unit, Department of Horticulture, University of Agricultural Sciences, Dharwad. Series of experiments on DMT-2 revealed that the superiority over the Pusa Ruby and Megha. The fruit yields were found superior (26.74 t/ha) than the Pusa Ruby (11.45 t/ha) and Megha (22.71 t/ha). It had high acid content (0.94%) and thin pericarp and it also recorded higher fruit weight (65.07 g) and higher yield per plant (3.87 kg). The farm trials and multilocation trials over two years in different districts of North Karnataka revealed 13.62 to 18.87 per cent increase yield over Megha; where as over Pusa Ruby increase yield was noticed upto 50 percent.

Key words : Acid content, DMT-2, fruit weight, pericarp

Introduction

Tomato (*Lycopersicon esculentum* Mill) is one of the major vegetable crops grown in many parts of the world. It is a favorite vegetable crop which is mainly cultivated in Kitchen garden, Market gardening and in Truck gardening on 11,000 ha in northern districts of Karnataka. Hitherto Pusa Ruby was a popular variety because of its high acid content, thin pericarp and it is popularly called as Jawari variety in Northern Karnataka. Owing to its susceptible to diseases, smaller fruits and low yield, tomato growers are switching over to F1 hybrids. But F1 hybrids needs intensive management, involve high cost and are not within the reach of common farmer. Hence there is a urgent need to develop a new cultivar of tomato with high acid content and yield that could replace Pusa Ruby and yield well under low management practices with high degree of resistance to diseases and have better size and attractive fruit qualities.

Material and Methods

Number of experiments were conducted on cv. DMT-2 tomato, a derivative of the cross CA-1 x 20/6 Alcobasa developed for high acid content, better fruit quality and resistance bacterial wilt at the Olericulture Unit, Department of Horticulture, UAS, Dharwad. Initial yield evaluation for yield and quality characters was conducted with advance breeding lines and with released varieties during 2002 to 2005.

The advance breeding lines and released varieties were evaluated in a randomized block design with four replications under epiphytatic conditions. Observations on five plants for number of fruits per plant, fruit yield per plant, average fruit weight, yield per ha and quality parameters of fruits were recorded. The data was subjected to statistical analysis as suggested by the Cochran and Cox (1965). Large scale demonstrations and multiplication trials were conducted using Megha (L-15) and Pusa Ruby as checks.

Results and Discussion

The results of the advance breeding lines revealed that (Table 1) among 10 genotypes DMT-5 was recorded higher yield 27.99 tons/ha compared to check Megha (22.71 tons/ha) followed by DMT-4 and DMT-2. Although fruit yield of DMT-4 and DMT-5 was significantly more but the shape of the fruit is oblong in both the varieties. The fruit shape of cv. DMT-2 is like Pusa Ruby. Therefore more weightage is given to DMT-2 for further study. The yield of cv. DMT-2 (26.74 tons/ha) was significantly superior than the check variety Megha (22.71 tons) during all the years and it was also recorded significantly more of fruits per plant (59.09) (Table 2) compare to Megha (55.61), however significantly highest number of fruits per plant was recorded in DMT-3 (72.63). The average fruit per weight of DMT-2 (65.07 gm) was significantly superior than Megha (56.77 gm). Whereas among all entries DMT-3 was recorded maximum fruit weight (74.10 gm) (Table 3). Similarly fruit yield per plant was significantly more in DMT-2 (3.87 kg/plant) compare to check variety Megha (3.24 kg/plant) (Table 4). These results are in accordance with Madalageri & Dharmatti (1991) and Dharmatti *et al.* (1996) have recorded higher fruit yield per plant in tomato.

The cv. DMT-2 variety was tested with released tomato varieties and the results indicated (Table 5) that DMT-2 variety was recorded significantly higher fruit yield of 25.3 and 26.70 tons per ha during 2003 and 2004 respectively, whereas ruling variety Pusa Ruby was recorded fruit yield of 10.5 and 12.40 tons per ha during 2003 and 2004 respectively. Similar findings were reported by Madalageri and Dharmatti (1991) in Megha tomato variety.

The quality parameters revealed that (Table 6) DMT-2 variety was recorded significantly lesser T.S.S. (3.90%) compared to other genotypes. Number of locules also significantly more (5.33) than the check variety Megha (L-15). In the contrary shelf life of fruit is very short (5.00 days) compare to Megha.

Over all the quality parameters of DMT-2 fruits are inferior to Megha (L-15). This might be due to higher acid content of the fruits leads to lesser T.S.S. and less rind thickness of the fruit and more ridges on fruit leads more number of locules. Therefore more number of locules, lesser T.S.S. rind thickness will shorten the shelf life of fruits. The comparative performance study was conducted on DMT-2, L-15 (Megha) and Pusa Ruby (Table 7)

Table 1. Performance of superior genotypes of tomato yield (t/ha)

Variety	Fruit yield (t/ha)				
	2002	2003	2004	2005	Pooled mean
DMT-4	25.29	25.73	27.36	27.35	26.43
DMT-3	27.03	25.67	27.01	27.97	26.92
DMT-2	26.47	25.90	26.96	27.66	26.74
DMT-1	24.03	26.11	25.83	26.13	25.26
DMT-5	28.42	27.16	28.30	28.07	27.99
DMT-6	26.07	26.33	26.72	26.55	26.32
DMT-7	26.90	26.00	26.96	26.07	26.48
L-40	23.97	23.00	23.96	23.70	23.65
L-41	22.00	22.10	22.73	22.60	22.35
Megha	21.07	22.17	24.17	23.44	22.71
S.Em ±	0.58	0.62	0.45	0.55	0.45
C.D. at 5%	1.72	1.85	1.36	1.63	1.27

Table 2. Average no. of fruits per plant in different cultivars of tomato

Variety	No. of fruits per plant				
	2002	2003	2004	2005	Pooled mean
DMT-4	65.42	64.23	62.27	63.43	63.84
DMT-3	71.83	70.43	68.90	79.33	72.63
DMT-2	61.91	59.30	58.37	56.83	59.09
DMT-1	62.09	62.72	63.47	62.10	62.59
DMT-5	90.73	85.00	82.87	78.37	84.24
DMT-6	64.34	60.33	59.87	66.17	62.68
DMT-7	80.61	79.30	74.87	75.67	77.61
L-40	79.03	77.60	74.60	72.50	75.93
L-41	62.20	60.83	60.17	59.83	60.76
Megha	57.56	56.40	54.73	53.83	55.61
S.Em ±	0.87	1.32	1.53	1.64	1.79
C.D. at 5%	2.59	3.93	4.56	4.93	3.43

Table 3. Mean weight of tomato fruit (g) in different cultivars of tomato during the years 2002 to 2005.

Variety	Mean weight (g)				
	2002	2003	2004	2005	Pooled mean (g)
DMT-4	71.57	74.75	70.30	71.10	71.93
DMT-3	73.83	75.38	73.37	73.83	74.10
DMT-2	64.53	65.88	64.67	65.20	65.07
DMT-1	64.13	65.22	62.43	61.87	63.41
DMT-5	55.93	56.80	56.70	55.33	56.19
DMT-6	74.83	75.33	73.40	71.50	73.77
DMT-7	60.53	61.20	60.47	59.50	60.43
L-40	63.71	65.04	62.93	62.27	63.49
L-41	52.83	53.91	52.40	52.50	52.91
Megha	56.76	57.99	56.33	56.00	56.77
S.Em ±	1.87	1.93	1.81	1.28	1.78
C.D. at 5%	5.54	5.74	5.39	3.80	3.53

during 2004 and 2005. The data indicates that DMT-2 variety was recorded higher values for growth, yield and quality parameters compare to Megha (L-15) and Pusa Ruby varieties. Ascorbic acid content was more (42.53 mg / 100g) in DMT-2 variety, where as Megha (L-15) and Pusa Ruby recorded 31.38 mg and 40.20 mg/100g respectively. Acid content (Titrable acidity) was maximum in DMT-2 (0.94%) while Megha and Pusa

Table 4. Fruit yield per plant on weight basis in different cultivars of tomato during years 2002 to 2005

Variety	Fruit yield (kg)				
	2002	2003	2004	2005	Pooled mean (kg)
DMT-4	4.08	3.96	3.70	3.90	3.73
DMT-3	4.51	4.23	4.07	3.82	4.16
DMT-2	4.13	3.90	3.67	3.80	3.87
DMT-1	4.02	3.91	4.17	3.65	3.94
DMT-5	4.67	4.30	4.00	3.83	4.20
DMT-6	4.29	3.81	4.03	4.30	4.12
DMT-7	3.97	3.63	3.80	4.13	3.88
L-40	4.15	3.87	4.10	4.03	4.04
L-41	4.03	3.91	3.68	4.10	3.93
Megha	3.17	3.27	3.06	3.47	3.24
S.Em ±	0.12	0.14	0.11	0.16	0.14
C.D. at 5%	0.34	0.39	0.33	0.49	0.43

Table 5. Yield of different tomato varieties (t/ha) at UAS, Dharwad

Variety	Yield (t/ha)		Pooled Mean (t/ha)
	2003	2004	
Red Supreme	18.5	17.5	18.00
Megha (L-15)	22.2	24.0	23.10
Pusa Ruby	10.5	12.4	11.45
Arka Saurab	28.9	27.3	28.10
Supreme mangalore	21.9	20.5	21.20
Pusa early dwarf	22.1	19.8	20.95
DMT-2	25.3	26.70	26.00
Erimson globe	19.1	17.2	18.15
CO-1	18.5	22.5	20.50
PKM-1	21.0	19.6	20.30
Money maker	18.3	15.7	17.00
S.Em ±	1.5	1.3	1.40
CD at 5%	4.6	3.9	4.30

Table 6. Quality parameters of superior genotypes of tomato

Genotypes	Quality parameters		
	T.S.S. (%)	No. of locules	Shelf life (days)
DMT-4	4.20	3.00	11.00
DMT-3	4.10	4.00	8.33
DMT-2	3.90	5.33	5.00
DMT-1	4.10	3.33	11.33
DMT-5	5.00	2.33	13.00
DMT-6	4.57	4.00	14.33
DMT-7	4.63	5.00	7.67
L-40	4.23	3.00	5.67
L-41	3.73	3.00	12.37
Megha (check)	4.27	3.00	7.33
S.Em +	0.124	0.161	0.341
C.D. at 0.5%	0.369	0.478	1.012

Ruby recorded 0.58 and 0.73 percent respectively. The multilocation trials conducted at UAS research stations indicated that (Table-8) the superiority of DMT-2 over L-15 (Megha). Highest yields were noticed in all the research stations of UAS, Dharwad, especially at College of Horticulture, Arabhavi recorded 28.5 tons/ha. Similar findings were noticed by Madalageri (1991) in tomato. Large scale trials (one acre) conducted at farmers field indicated (Table-9) that the superiority of DMT-2 over Megha and PKM-1. Extension Education Unit UAS Dharwad conducted farm trials during 2003 to 2005 noticed that (Table-10) the increased yield of DMT-2 was recorded from 13.62 per cent to 18.87 percents over Megha (L-15) variety in the farmers field. Summing up the over all results of investigations it could be concluded that the new variety DMT-2 was recorded higher yield and quality parameters than the Megha (L-15) and Pusa Ruby varieties. Therefore DMT-2 variety will certainly replace the old varieties (Megha and Pusa Ruby) of tomato and farmers of Northern Karnataka will be benefited by growing this new variety.

Table 7. Comparative performance of DMT-2, L-15 and Pusa Ruby

Character	DMT-2	L-15	Pusa Ruby
Plant height (cm)	55.60	39.40	45.60
Number of branches	7.40	3.80	6.80
Plant spread (cm)	65x65	61.20x60.60	62 x 62
Leaf area (cm ²) (terminal leaflet)	48.00	50.00	12.00
Seedling establishment (%)	80-85	95-100	60-68
Number of fruits / plant	64.30	58.00	44.30
Average fruit weight (g)	60.00	80.00	48.50
Yield (t/ha)	26.74	22.71	11.45
Locules / fruit	5-6	2-3	5-6
Seeds/fruit	100-120	90-98	140-150
Rind Thickness (mm)	3.0	7.0	1.50
TSS	3.8	4.2	3.40
PH	4.0	4.1	4.0
Storage life (days after ripening)	5-7	12-14	4-5
Fruit surface	Ribbed	Smooth	Ribbed
Ascorbic Acid mg/100g	42.53	31.38	40.20
Acidity (%) (Titrable acidity)	0.94	0.58	0.73

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Table 8. Tomato yield of DMT-2 and L-15 (t/ha) at different multilocation places.

Year	Place	DMT-2	L-15
2003	Hanumanamatti	28.5	23.6
2003	Dharwad	26.5	21.4
2004	Hanumanamatti	25.8	24.5
2004	Dharwad	27.3	22.6
2004	KRCCH, Arabhavi	34.2	28.5

Table 9. Yield (t/ha) of different cultivars of tomato on large scale trials conducted in farmers field

Year	Name of the farmer	DMT-2	PKM-1/L-15
2003-04	Mahadeva R. Nibalakar, Mudhol	22.5	20.3 (PKM-1)
2003-04	Fakirappa Bevinkaie, H.matti	24.8	22.3
2003-04	Madiwalappa C.Gullashetti, Narendra	23.2	21.5
2003-04	Gopal Kashetti, Angarolli	22.4	21.6
2003-04	Kiran Patil, Kittur	20.75	19.00
2004-05	Laxman Kanabargi, Garga	24.5	21.5
2004-05	Virupaxappa Miraji, Hubli	25.6	21.14
2005-06	Raju Pagad, Lokur	26.8	22.70

Table 10. Yield capacity of DMT-2 (t/ha) in different farm trials at EEU, Dharwad with Megha as check

Year	Name of the farmer	DMT-2	Megha	% increase
2003-04	1) Shivananda Vakkund, Kurubagatti	24.1	20.2	18.87
2003-04	2) Virupaxappa Guddappanavar, Mangalgatti	22.5	19.00	18.42
2004-05	1) Mallikarjun Patil, Mangalagatti	24.8	22.5	12.22
2004-05	2) Channappa Gokavi, Tirmalakoppa(H)	23.20	20.6	13.62