



Comparative studies on 'Nucellar', 'Sathgudi' and 'Local' sweet orange (*mosambi*) (*Citrus sinensis* Osbeck.) under Marathwada conditions

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ABSTRACT

The present investigation was conducted during *Ambia bahar* season in the year 2011-12. The experiment was laid out in randomized block design with three treatments and seven replications. The variety 'Nucellar' recorded maximum average height of plant, spread of tree, stem girth, number of branches per tree, was early to mature, had highest yield, fruit size, number of segments per fruit, weight of fruit, peel weight, peel thickness of fruit, TSS, and pH, while, the variety 'Sathgudi' recorded maximum juice weight, with low peel-to-juice ratio. The taste of fruits of Local *mosambi* was sweeter, with less acidity than the other two varieties. Maximum number of seeds per fruit was recorded in Local *mosambi*. Highest average pH and ascorbic acid content in fruit juice was recorded in cv. Nucellar. Therefore, on the basis of results obtained in the present investigation, it is suggested that of the three varieties studied, 'Nucellar' is the best in yield and other parameters, with 'Sathgudi' being the second best.

Key words: Nucellar, Sathgudi, *mosambi*, fruit size

INTRODUCTION

India, especially Maharashtra has wide variety of climate and soil on which a large number of horticultural crops such as fruits, vegetables, ornamental crops, etc. are grown. Citrus is one of the most delicious fruits of par excellence and belongs to the family Rutaceae. It is one of the popular and choicest fruits of the country. Their wholesome nature, multifold nutritional and medicinal values have made them very important. The excellent natural sugar:acid ratio of juice in the fruits attracts the consumers (Chadha, 2001). In India, citrus comprises the third largest fruit industry next to mango and banana in production and second in area after mango which occupies about 10% of the total area under fruit crops. Citrus fruits have good nutritive value, which are regarded as a guaranteed source of Vitamin C (ascorbic acid) and having high amount of sugar content and minerals like calcium, phosphorus, iron etc.

The major sweet orange producing states in India are Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka, Madhya Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Uttar Pradesh, Punjab and Haryana. In India, about 34.63 lakh ha area under sweet orange cultivation produces 388.42

lakh tonnes of fruit. In Maharashtra, sweet orange is grown in Jalna, Aurangabad, Parbhani, Nanded, Nagpur, Amaravati, Ahmednagar districts. It is cultivated on an area of 10.81 lakh ha with the production of 73.20 lakh tonnes of fruits. The highest productivity is reported in Karnataka and lowest in Himachal Pradesh. In Jalna district, 'Nucellar', 'Sathgudi', 'Rajapimpri', 'Mosambi' and 'Local' are the major cultivars of sweet orange. Hence, it is necessary to study the feasibility and suitability for cultivation of these varieties in the region. Therefore, at present, some physical aspects like height and spread of tree, stem girth, number of branches per tree, number of fruits, fruit size, peel to juice ratio, number of seeds per fruit, etc., and chemical aspects like TSS, acidity, pH and ascorbic acid content of fruit juice of 'Nucellar' *mosambi* and Sathgudi have been compared with Local sweet orange.

MATERIAL AND METHODS

The present experiment was conducted on the field of farmer at Shelgaon Post, Taluq Badnapur, Dist. Jalna, Maharashtra, during *Ambia bahar* season in the year 2011-12. The experimental site categorized as semi arid tropics and the soil used for the experiment was uniform with gentle slope. The soil was medium black with uniform in texture,

colour and having good drainage. Irrigation channels were made for easy supply of water. The field consisted of 580 trees of Nucellar, 220 plants of Sathgudi and 20 trees of Local cultivar of sweet orange which were planted in the year 2003 at a spacing of 6x6 m². Seven uniform, healthy trees were selected each from Nucellar, Sathgudi and Local cultivar of sweet orange for the experiment. Fifty fruits from a single tree were selected to study the physical and chemical composition of all three varieties. The experiment was laid out in Randomized Block Design (RBD). Spread of the tree was measured in both the directions, i.e. North-South and East-West, and their mean was recorded. The length and breadth of fruit was measured in cm. with the help of vernier caliper. TSS of the freshly extracted juice was measured using a hand-held refractometer (0-28⁰B). Ascorbic acid content in the juice was analyzed by 2,6-Dichlorophenol indophenol visual titration method. 2,6-Dichlorophenol dye was titrated against the sample juice using 3% Metaphosphoric acid as a stabilizing agent.

RESULTS AND DISCUSSION

Physical characteristics of Nucellar, Sathgudi and Local cultivar of sweet orange

Among the data recorded on physical parameters, maximum tree height (3.87m) was recorded in 'Nucellar'. Patil (2004) recorded maximum height (4.09m) in cv. Nucellar. Maximum spread of the tree (3.20 and 3.12m) East-West and North-South was recorded in 'Nucellar'.

Suresh Kumar *et al* (2010) noticed that the difference in spread of sweet orange cultivar in different directions. The girth of stem was recorded maximum in Nucellar (41.40cm). Malhotra *et al* (1982) compared the girth of stem of various rootstocks of citrus. Number of branches recorded per tree was highest (6.42) in Nucellar compared to that in Sathgudi (5.57) and Local (5.28). Highest number of fruits per tree (363.57) was recorded in Nucellar compared to that in Sathgudi (304.80) or Local (184.85).

Maximum fruit size (8.80cm length and 8.51cm breadth) was recorded in 'Nucellar'. Dubey (2000) recorded maximum fruit size in 'Vanilla malta'. The maximum peel thickness (6.31cm) was recorded in Nucellar. Arora *et al* (2007) recorded the range of peel thickness in some citrus cultivars to be between 2.1mm and 8.4mm. Maximum fruit weight (194.56g) was recorded in Nucellar compared to that in Sathgudi (176.47g) or Local sweet orange. Rao *et al* (1971) recorded maximum fruit weight (204g) in Sathgudi. Highest pomace weight (63.77g) and peel weight (62.50g) was recorded in Nucellar. Patil (2004) recorded highest pomace weight (52.69g) and peel weight (42.51g) in Nucellar. The highest juice per fruit (71.50 ml) was recorded in Sathgudi, whereas, it was (67.86ml) in Nucellar and (56.37ml) in local cultivar. Similar observations were reported by Dubey (2000). Average peel-to-juice ratio in Nucellar was (0.92%), while it was 0.77% in Sathgudi and 0.91% in the Local cultivar.

Table 1. Physical characteristics of Nucellar, Sathgudi and Local cultivar of sweet orange

Sl. No.	Character	Nucellar	Sathgudi	Local Sweet orange	SE	CD (P=0.05)
1.	Tree height (m)	3.87	3.51	3.40	0.074	0.23
2.	Tree-spread (m)					
	East-West	3.20	3.05	2.70	0.056	0.178
	North-South	3.12	2.92	2.64	0.054	0.172
3.	Stem girth (cm)	41.40	40.44	39.80	0.66	2.04
4.	No. of branches/ tree	6.42	5.57	5.28	0.21	0.66
5.	No. of days to harvest from fruit-set	244.00	237.71	234.57	11.02	3.14
6.	No. of fruits/ tree	363.57	304.57	184.85	11.47	35.30
7.	Fruit size (cm)					
	Fruit length	8.80	8.10	6.80	0.08	0.25
	Fruit breadth	8.51	8.30	7.10	0.09	0.30
8.	Peel thickness (mm)	6.31	5.28	4.47	0.17	0.52
9.	Fruit weight (g)	194.56	176.47	151.30	5.03	15.49
10.	Pomace weight (g) (%)	63.77 (32.77%)	49.70 (28.16%)	41.50 (27.42%)	1.00	3.08
11.	Peel weight (g) (%)	62.50 (32.12%)	55.27 (31.31%)	51.38 (33.95%)	2.08	6.41
12.	Juice weight/ fruit (ml) (%)	67.86 (34.87%)	71.50 (40.51%)	56.37 (37.25%)	3.452	10.62
13.	Peel-to-juice ratio (%)	0.92	0.77	0.91	0.024	0.076
14.	No. of segments/ fruit	11.80	12.30	11.40	0.654	2.01
15.	No. of seeds/ fruit	17.71	17.14	26.14	3.452	10.62

Table 2. Chemical characteristics of Nucellar, Sathgudi and Local cultivars of sweet orange

Sl. No.	Character	Nucellar	Sathgudi	Local	SE Sweet orange	CD ($P=0.05$)
1.	TSS ($^{\circ}$ B)	11.42	11.27	11.30	0.94	NS
2.	Acidity (%)	0.47	0.58	0.40	0.029	0.089
3.	pH	5.29	5.24	5.25	0.79	NS
4.	Ascorbic acid (mg/100 g)	55.03	56.44	53.40	0.56	NS

NS= Non-significant

Maximum number of segments per fruit (12.30) was recorded in Sathgudi, whereas it was 11.80 in Nucellar and 11.40 in Local cultivar. Barkule (1995) recorded maximum in Sathgudi (11.81), followed by Nucellar (10.89). Maximum number of seeds per fruit (26.14) was recorded in Local cultivar compared to 17.71 in Nucellar and 17.14 in Sathgudi. Patil (2004) recorded an average of 20.49 seeds per fruit in Nucellar and 18.13 in Sathgudi, which confirms our results. Therefore, on the basis of results obtained in the present study, it is suggested that the variety Nucellar is good in yield and other physical parameters, with Sathgudi being the second best sweet orange among the varieties studied.

Chemical characteristics of Nucellar, Sathgudi and Local cultivars of sweet orange.

Among chemical characteristics, the highest TSS (11.42 $^{\circ}$ B) was recorded in Nucellar as compared to both Sathgudi and Local sweet orange. Sharma *et al* (1986) recorded the lowest TSS (8.0 $^{\circ}$ B) in Sathgudi. The lowest acidity of fruit juice was recorded (0.40%) in local cultivar as compared to Nucellar (0.47%) and Sathgudi (0.58%). Singh and Kaur (2009) compared physico-chemical characteristics of citrus, acidity, very less difference in pH of fruit juice it was recorded 5.29 in Nucellar, 5.24 in Sathgudi and 5.25 in Local cultivar of sweet orange. The highest ascorbic acid content 56.44mg per 100ml of juice was recorded in Sathgudi, Whereas, it was 55.44 mg in Nucellar and lowest (55.03mg) in Local cultivar. Patil (2004) recorded 43.80mg in Nucellar and 53.31mg per 100ml juice in 'Sathgudi'.

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