



Short communication

Performance of mosambi sweet orange on different rootstocks grown in laterite soil in West Bengal

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ABSTRACT

A rootstock trial was laid out on sweet orange cultivar 'Mosambi' budded on five rootstocks viz., Jambhiri, Karna Khatta, Kichili, Rangpur lime and Sour orange. Tree growth was maximum on Jambhiri and minimum on Rangpur lime. Fruit yield (both in number and weight) was highest on Karna Khatta, rootstock followed by Rangpur lime while, fruit size and juice content were maximum on Rangpur lime. Total soluble solids and ascorbic acid content were highest in Karna Khatta, while T.S.S. to acid ratio was maximum in Rangpur lime. Foliar nitrogen content was highest in Karna Khatta followed by Rangpur lime. On the basis of four seasons data in respect of yield and fruit quality, Karna Khatta and Rangpur lime were the observed as suitable rootstocks for 'Mosambi' sweet orange grown on laterite soil of West Bengal.

Key words : Mosambi Sweet orange, rootstock, rainfed, laterite soil

In the western part of West Bengal, the soil is red and laterite and climate is somewhat semi-arid, where mosambi sweet orange is performing well under rainfed condition (Ghosh and Chattopadhyay, 1998). To harness beneficial effect of rootstock, the sweet orange was grown on different rootstocks which were standardized suitable for other regions in the country (Kumar Ram and Ganapathy, 1992; Sharma *et al*, 2002; Kusuma Grace *et al*, 2005). For successful cultivation of sweet orange, standardization of suitable rootstock for a locality is of utmost need. Because, a combination which is satisfied under one set of agro-climatic condition, may or may not fail entirely in other condition. Information about suitable rootstock for any sweet orange variety is unavailable for West Bengal, particularly for red lateritic zone, which is emerging as potential area for 'Mosambi' cultivation. Hence, an investigation was undertaken with five rootstocks to find out the suitable rootstock using scion of 'Mosambi' sweet orange.

The trial was laid out (planted) at Regional Research Station, Jhargram (of Bidhan Chandra Krishi Viswavidyalaya) during 1997, in randomized block design with four replications having four plants each. The experimental site was laterite having pH 5.6, available

nitrogen 300.0 kg/ha, available phosphorus 30.6 kg/ha and available potassium 101.0 kg/ha. The five rootstocks employed for 'Mosambi' sweet orange were Jambhiri, Karna Khatta, Kichili, Rangpur lime and Sour orange maintaining row-to-row and plant-to-plant distance of 5.0 m apart. Uniform cultural practices were given to all the plants maintained under rainfed condition. The data on growth parameters such as plant height, basal girth of scion and spread of the tree were recorded 7 years after planting. The yield and fruit quality characteristics like fruit weight, juice percentage, T.S.S., acidity and ascorbic acid content were studied for four years (2003 to 2006). The observations on yield and physico-chemical characteristics of fruits were recorded at maturity. The leaves collected in September (Bhargava, 1999) were subjected to analysis of nitrogen following Kjeldahl method (Jackson, 1973), phosphorus by vanadomolybdo phosphoric acid method and potassium by flame photometer (Jackson, 1973).

Growth parameters, viz., height and basal girth significantly varied in Mosambi on different rootstocks (Table 1) measured 7 years after planting. Mosambi on Jambhiri rootstock produced vigorous tree, having maximum height and spread, while on Karna Khatta, it was

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Table 1. Effect of rootstocks on plant growth and fruit yield of Mosambi sweet orange

Rootstock	Plant growth 7 year after planting				Number of fruits/plant					Average yield/plant (kg)
	Height (cm)	Basal girth (cm)	Plant spread (cm)		2003	2004	2005	2006	Average	
			East-West	North-South						
Jambhiri	240	20	208	215	3	15	79	83	45	6.6
Karna Khatta	238	19	202	173	75	50	125	113	91	11.7
Kichili	233	20	207	210	13	0	37	51	25	3.2
Rangpur lime	220	20	176	170	22	32	115	83	63	10.3
Sour Orange	226	19	184	179	23	4	39	0	17	2.4
C.D. ($P=0.05$)	4.1	N.S.	3.8	3.9	5.4	3.2	8.8	6.2	5.8	0.7

semi-vigorous and on Rangpur lime, the growth was minimum. Growth of sweet orange tree was maximum on Jambhiri (Jatti Khatti) followed by Karna Khatta while on Rangpur lime rootstock, growth was minimum. Similar observations were made by Mehrotra *et al* (1984) in Punjab.

Fruit production in 'Mosambi' significantly varied on different rootstocks (Table 1). The fruit yield in most of the combinations increased like a tide with one year more followed by less in next year. Maximum number of fruits per tree were produced by 'Mosambi' trees on Karna Khatta irrespective of the years with an average of 91 fruits/tree followed by Rangpur lime (63 fruits/tree). Mosambi on Kichili and sour orange rootstock showed less fruit production. Results from the rootstock trial conducted at various locations, indicated that sweet orange tree on jatti khatti rootstock produced maximum yield (Kumar Ram and Ganapathy, 1992; Sharma *et al*, 2002), while in the present investigation Karna Khatta resulted highest yield constantly. Like number of fruits, fruit yield in 'Mosambi' was highest on Karna Khatta rootstock (11.7 kg/tree) followed by Rangpur lime (10.3 kg/tree) and minimum on sour orange (2.4 kg/tree) and Kichili (3.2 kg/tree).

The fruit weight of Mosambi sweet orange on different rootstocks showed significant differences (Table 2). Fruit weight was maximum on Rangpur lime rootstock (164 g) followed by on jambhiri (146g). Fruit weight was minimum on Kichili and Karna Khatta (127-129 g). For

getting premium price, individual fruit weight in orange is considered to be one of the important criteria in West Bengal and other parts of the country. Kusuma Grace *et al* (2005) also recorded highest fruit weight of Sathgudi sweet orange on Rangpur lime rootstock, grown at Tirupati (Andhra Pradesh). Juice content of Mosambi fruit varied significantly on different rootstocks (Table 2). It was highest on Rangpur lime (58%) and lowest on Sour orange and Kharna Khatta (51%). Kusuma Grace *et al* (2005) recorded highest juice volume of Sathgudi fruit on Rangpur lime rootstock.

Total soluble solids (TSS) content of 'Mosambi' sweet orange on different rootstocks varied each other (Table 2). 'Mosambi' on Karna Khatta rootstock showed highest T.S.S. (9.7⁰B) and lowest on Jambhiri (8.2⁰B). Acidity content in Mosambi fruit was not differ significantly on different rootstock. T.S.S. : Acid ratio, which determine the organoleptic taste, was more in the fruits from Rangpur lime rootstock followed by Karna Khatta (31.3). However, T.S.S. : acid ratio was not varied so much among the fruits from different rootstocks. Ascorbic acid content in 'Mosambi' fruits greatly differ on different rootstocks. The fruits on Karna Khatta rootstock recorded highest amount of ascorbic acid (64.0 mg/100 ml juice) followed by on Kichili (60.8 mg/100 ml) and lowest on Sour orange (50.3 mg/100 ml).

Foliar phosphorus and potassium content in leaves of 'Mosambi' on different rootstocks were not significantly

Table 2. Effect of rootstocks on physico-chemical characteristics and foliar N, P and K status of Mosambi sweet orange.

Rootstock	Fruit weight (g)	Juice (%)	T.S.S. (⁰ B)	Acidity (%)	T.S.S./ Acid ratio	Ascorbic acid (mg/100ml juice)	Nitrogen	Phosphorus	Potassium
Jambhiri	146	53	8.2	0.29	28.3	57.6	2.18	0.21	1.0
Karna Khatta	129	51	9.7	0.31	31.3	64.0	2.94	0.15	0.8
Kichili	127	53	8.3	0.29	28.6	60.8	1.79	0.17	1.2
Rangpur lime	164	58	8.5	0.27	31.5	59.8	2.63	0.20	0.9
Sour Orange	141	51	8.8	0.31	28.4	50.3	1.68	0.15	0.9
C.D. ($P=0.05$)	4.5	1.3	0.2	N.S.	-	1.2	0.40	N.S.	N.S.

differ among themselves (Table 2). However, nitrogen content in leaves was significantly varied among the rootstocks and it was highest in 'Mosambi' on Karna Khatta (2.94%) rootstock which resulted maximum fruits production in every year. Foliar nitrogen content in 'Mosambi' was also higher on Rangpur lime rootstock which gave highest fruit weight with good fruit yield. Differential status of nitrogen in leaves of 'Mosambi' on different rootstocks may be due to differential absorbing ability of the rootstocks. Foliar nitrogen content was lowest in Sour orange (1.68%) followed by Kichili (1.79%), which resulted poor fruit production. It was interestingly noted that there was a direct relationship with the foliar N content and fruit production

REFERENCES

- Bhargava, B. S. 1999. Leaf analysis for diagnosing nutrients need in fruit crops. *Ind. Hort.*, **43**:6-8
- Ghosh, S. N. and Chattopadhyay, N. 1998. Performance of seven sweet orange cultivars under rainfed semi-arid region of West Bengal. *Haryana J. Hort. Sci.*, **27**:153-156
- Jackson, M. L. 1973. Soil chemical analysis. Prentice Hall of India Pvt. Ltd., New Delhi, Ed. 2, pp. 111-182
- Kumar Ram and Ganapathy, M. M. 1992. Performance of Mosambi on different rootstocks. *Ind. J. Hort.*, **49**:222-226
- Kusuma Grace, J., Ranganayakulu, C. and Seshadri, K. V. 2005. Effect of rootstocks on the fruit quality of Sathgudi sweet orange grown on different rootstocks. *Ind. J. Hort.*, **62**:300-302
- Mehrotra, N. K., Jawanda, J. S. and Vu, V. K. 1984. A comparative evaluation of rootstocks for Valencia orange under arid-irrigated conditions of Punjab. *Punjab Hort. J.*, **24**:19-26
- Sharma, J. N., Thatai, S. K. and Josan, J. S. 2002. Effect of different rootstock on tree vigour, yield and fruit quality of Campbell Valencia sweet orange. *Ind. J. Hort.*, **59**:135-39

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