

in tamarind. Similar findings were obtained by Reddy and Melanta (1988) in mango, Gowda and Gowda (1989) in champaka. The present studies also revealed that the average number of sprouts produced were non-significant at all the stages of observation (Table 2). A greater number of sprouts (3.85) were continued to be maintained in 10 months old rootstock, while the lower number of sprouts (3.01) were observed in 7 month old rootstocks at 90 DAG.

The sprout length recorded was found to be significant at all stages of observation. After 30 days the highest sprout length (2.85 cm) was observed in 10 month old ( $T_7$ ) rootstock age group, while it was significantly higher than all other rootstock age groups. The lowest sprout length (0.99cm) was recorded in 5 month ( $T_7$ ) old root stage group. A higher sprout length in  $T_7$  may be due to the thicker scion shoots used for the grafting as they may have reserve food material for the better development of the sprouts. The average sprout length recorded

was continued to be the highest in 10 month old rootstock followed by 9 month old rootstock while all other age rootstocks were found on par with others (Table 3).

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## Research Notes

# Performance of certain sweet orange varieties in Andhra Pradesh

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In recent years, sweet orange crop is grown extensively in Andhra Pradesh. Among the sweet orange varieties, only two varieties viz. Sathgudi and Mosambi are the promising

Table 1. Plant growth and yield parameters of certain sweet orange varieties

Sl. No.	Name of the variety	Plant height (m)	Plant volume (cu.m)	Yield/tree 1-1-01 to 31-12-01	Cumulative yield/tree from December 1998		
					No. weight (kg)	No. weight (kg)	No. weight (kg)
1.	Kodur sathgudi	3.44	68.02	235.50	43.28	670.50	123.88
2.	Mosambi	3.57	63.01	185.22	35.14	573.32	104.61
3.	Blood red malta	2.41	19.40	24.00	4.12	29.10	4.95
4.	Jaffa	4.28	81.76	198.38	37.99	549.78	105.50
5.	Hamlin	3.88	76.60	261.13	43.05	415.38	105.13
5.	Valencia	3.76	74.01	295.80	58.52	566.56	93.95
7.	Valencia late	3.43	59.37	372.30	58.61	560.35	94.63
	CV (%)	9.72	17.62	17.76	11.20	2.77	4.27
	CD 5%	0.61	19.86	70.96	7.76	23.63	6.89

cultivars of Andhra Pradesh. While others like Blood Red Malta, Valencia, Valencia Late, Jaffa and Hamlin are performing well in North India. These varieties of sweet orange are yet to be tried in Andhra Pradesh as there is no information on their performance. Hence, the present study was conducted to study their adaptability and performance in this region.

The study was initiated in the year 1991 at AICRP on Tropical Fruits (Citrus), Tirupati. Seven varieties namely Kodur Sathgudi, Blood Red Malta, Mosambi, Jaffa, Hamlin, Valencia and Valencia Late budded on Rangpur lime were planted in a randomized block design replicated thrice. All the trees were given uniform cultural operations. Observations on tree growth, fruit yield and quality was recorded. Visual observations were made on the tree health based on the die-back of branches, yellowing of leaves and the survival of the trees was also recorded. The volume of trees were calculated based on data on the plant spread and height according to the formula  $(3/4 \pi r^2 h)$  suggested by Castle (1983). Data in respect of fruit yield per tree was recorded from each tree every year from 1998. At the time of harvest, 10 matured fruits were picked at random from all sides of the tree for estimation of physico-chemical characteristics.

The data presented in Table 1 and 2 reveal that all the varieties differed significantly in growth, yield and fruit quality. Jaffa produced the highest plant height (4.28m) and plant volume (81.76cu.m) followed by Hamlin (3.88m of height and 76.60 cu.m of plant volume).

Blood red malta declined due to profuse gumming and dry root rot. At the same time, this variety also recorded minimum plant height (2.41m) and volume (19.40 cu.m) when compared to the other varieties. During the year 2001 Valencia late variety produced the highest number of fruits (372.3) and fruit weight (58.61kg) per plant followed by Valencia with 295.80 number of fruits and 58.52 kg fruit weight. While the highest cumulative yield from 1998 was produced by Kodur Sathgudi (670.50 fruit and 123.88 kg weight) followed by Mosambi (573.32 fruits and 104.61 kg weight). This might be due to the precocious nature of Kodur Sathgudi.

Table 2. Physico-chemical characters of fruits in certain sweet orange varieties

Sl. No.	Fruit characters	varieties	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Rind thickness (mm)	Rind (%)	Rag (%)	Seg-ments/fruit (No.)	Seeds/fruit (No.)	Seed weight (%)	Juice (%)	TSS (%)	Titra-ble acidity (%)	Brix/acid ratio
1.	Kodur sathgudi		183.78	6.5	6.61	6.61	29.75	23.58	10.41	13.30	3.53	42.85	9.83	0.98	10.0
2.	Mosambi		171.78	6.4	6.45	6.45	27.74	26.50	10.44	13.28	2.60	40.72	10.30	0.84	12.2
3.	Blood red malta		191.15	6.5	6.70	6.70	24.37	25.31	11.50	17.50	3.00	40.57	11.50	0.63	18.2
4.	Jaffa		191.55	6.75	6.75	6.75	28.27	24.61	10.40	2.60	0.16	42.95	10.93	0.88	12.4
5.	Hamlin		164.98	6.50	6.50	6.38	31.44	41.83	10.46	3.20	0.12	23.46	10.33	0.69	14.9
6.	Valencia		170.78	6.59	6.59	6.56	31.77	30.82	10.33	8.33	1.52	36.54	9.99	0.82	11.35
7.	Valencia late		157.46	6.34	6.30	6.31	30.96	27.95	10.00	6.50	2.51	37.09	11.22	0.85	13.20
	CV (%)		1.55	2.56	1.05	1.27	4.63	4.69	2.52	4.05	10.13	4.40	6.42	6.17	2.43
	CD @ 5%		4.86	0.30	0.12	0.15	2.40	2.40	0.47	0.67	0.37	2.90	1.21	0.09	0.57

A wide variation was observed in majority of the physico-chemical characters among the orange varieties (Table 2). The maximum fruit weight (191.55g), length (6.75cm), diameter (6.75cm) of the fruit, juice percentage (42.95%) and rind thickness (6.75mm) were recorded in Jaffa sweet orange, while maximum percentage of rind (31.77%) and rag (41.83%) were observed in Valencia and Hamlin respectively. Seed number per fruit was minimum in Jaffa (2.60) followed by Hamlin (3.20) and Valencia late (6.55). Kodur Sathgudi recorded maximum acidity (0.98%) whereas maximum brix/acid ratio was observed in Blood Red Malta (18.25) followed by Hamlin (14.97) and Valencia Late (13.20).

Jagtap *et al.* (2000) reported that the sweet orange cultivars namely Blood Red Malta, Blood Red Mutation, Hamlin, Jaffa, Kodur Sathgudi, Nucellar Mosambi, Valencia, Valencia Late adapted

well under agro-climatic conditions of Western Maharashtra. From an overall analysis of the performance of sweet orange varieties under study, it can be concluded that all the varieties of sweet orange performed well in Andhra Pradesh except Blood Red Malta.

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#### Research Notes

### Efficacy of fish oil rosin soap, neem oil and insecticides against onion thrips *Thrips tabaci* Lindeman

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Thrips, *Thrips tabaci* Lindeman, is the most destructive pest of onions. Several insecticides have earlier been tested for the control of this pest. We tested the efficacy of fish oil rosin soap (FORS) and neem oil in comparison with insecticides and the results of field experiments are presented in this article. Two field experiments were conducted during November 1996 and February 1997 at Agricultural College and Research Institute, Killikulam. Six treatments, including the untreated check, were compared in a randomized block design with four replications. Plots were three metres long and two metres wide in which ridges were formed 45 cm apart. The insecticide treatments were imposed 60 days after planting when the pest population was at its peak. Second spray was given seven days later. Thrips population, both nymphs and adults, and the damage caused by them were

assessed before the first round of spray and three days after each round from 10 plants selected at random. The population density was assessed in number per 10 plants and the per cent decrease in population after treatment was corrected by using Henderson and Tilton (1955) formula.

The extent of damage was assessed after the second spray in two ways from 10 random leaf samples drawn from each plot. The lacerated silvery patches were measured from a 2.5 cm long leaf bit cut from the middle sector of sample leaves. These tubular sample bits were cut open longitudinally before examination under a transparent graph sheet. The extent of laceration was measured in square centimeters. Since high variability was observed in the width of cut ends of the leaf bit samples, this value was