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INFLUENCE OF DIFFERENT FOREST TREE SPECIES ON QUANTITATIVE CHARACTERS OF FRUITS OF COORG MANDARIN

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ABSTRACT

Fruits harvested from the mandarin trees, planted alone (control) were found superior as manifested by higher amount of sugars and lower amount of acidity in their juice, as compared to those fruits harvested from mandarin trees planted with different forest tree species under horti-silvicultural system. Casuarina and Silveroak were suitable for horti-silvicultural system as compared to Eucalyptus.

INTRODUCTION

Integrated land use system like agroforestry in general and horti-silvicultural in particular, are gaining importance in view of rising costs of land and need of supplemental income. Cultivation of mandarin in combination with forest tree species were studied and qualitative characters of fruits were analysed to understand the effect of different forest species on fruit quality of mandarin.

MATERIAL AND METHODS

Studies were conducted at the Forest Research Station, Prabhunagar, UAS, Dharwad (Karnataka), on eight year old Coorg mandarin. The mandarin trees were planted 6m x 6m apart in the triangular system. Between two rows of mandarin budded on different rootstock, forest tree species viz., Casuarina, Eucalyptus and Silveroak were planted keeping 2 m distance between rows and in between the trees. However, the distance between the row of forest tree species and mandarin was maintained at 2 m apart. Mandarin plants were also grown without tree species as control. Forest tree species were taken as main plot treatment. Two rootstocks—Trifoliate orange and Troyer citrange were taken as sub-plot treatments and were laid out in split plot design with six replications. T.S.S. was measured with the help of a Hand refractometer (0-32% range), titrable acidity, ascorbic acid and sugars were determined according to A.O.A.C. (1970).

RESULTS AND DISCUSSION

Soluble solids and sugars : The highest T.S.S. (9.34%) and sugars (reducing 3.83% and non-reducing 2.34%) were in the fruits of mandarin (control) while

Eucalyptus had adversely affected the quality of mandarin fruits manifested by lower amount of T.S.S. (6.95%) and sugars (reducing 2.32% and non-reducing 1.31%). The fruits harvested from Casuarina and Silveroak stand were found to be better than those fruits obtained from Eucalyptus stand (Table 1). More T.S.S. and sugars in the fruits of mandarin plants alone, may be due to higher availability of nutrients and metabolites and competition free environment enjoyed by mandarin trees planted alone.

The fruits harvested from mandarin plants budded on Troyer citrange had higher amount of sugars and T.S.S. compared to fruits of mandarin plants buddeds Trifoliate orange. These findings are similar with the findings of Banfi and Benatena (1952) in mandarin and Elazzouni and Ebarkouk (1961) in Faba orange, when grown as sole crop. The treatment combination control x Troyer citrange tend to produce more sugars and T.S.S. This may be attributed to the integrated beneficial effects of Troyer citrange rootstock and control.

Acidity and ascorbic acid : The mandarin fruits harvested from Eucalyptus stand were found to be inferior as reflected by higher amount of acidity (0.35%) and ascorbic acid (33.43 mg%) coupled with lower amount of sugars. This may be due to deliterious effects of Eucalyptus and inherent characters of Trifoliate orange to accumulate less amouut of sugars. In citrus fruits like sweet orange and mandarin orange higher amount of sugars coupled with lower amount of acid is appreciated as desirable quality. However, the interaction effects of forest tree species and rootstock was non-significant on percentage of acidity and ascorbic acid.

T.S.S.-acid ratio: Higher T.S.S. acid ratio was observed in the fruits of mandarin trees grown alone (control), while lowest was observed in the fruits of mandarin from Eucalyptus stand. Between two root stocks Troyer citrange performed better as exhibited by high T.S.S. acid ratio. In general control x Troyer citrange treatment combination produced fruits of better quality as indicated by higher T.S.S. acid ratio. The treatment combination Eucalyptus x Trifoliate orange adversely affected the quality of fruits.

Soils from Eucalyptus stand was poor in nutrients when compared to other forest stands (Table 2). For production of maximum biomass (Table 2) Eucalyptus must have exploited large amount of soil nutrients, water and sunlight at the cost of development thus affecting growth and quality of fruits. The fruits harvested from Casuarina and silveroak stand were qualitatively better than those obtained from Eucalyptus stand and in general they were satisfactory. Mandarin trees grown in combination with Casuarina might have benefitted by virtue of its nitrogen fixing ability (Nair et al. 1985) and positive interaction with mycorrhizal association

Table 1. Influence of different forest tree species on qualitative characters of fruits of Coorg mandarin budded on different rootstocks.

Forest tree species	Total soluble Solids (%)			Acidity (%)			Reducing sugars (%)			Non-reducing sugars (%)			Ascrobic acid (mg%)			TSS - acid ratio		
	S1	S2	Mean	S1	S2	Mean	S1	S2	Mean	S1	S2	Mean	S1	S2	Mean	S1	S2	Mean
M1 (Silveroak)	8.53	8.19	8.36	0.27	0.27	0.27	2.50	2.62	2.56	1.70	1.75	1.72	30.01	30.01	30.01	32.12	29.49	30.80
M2(Eucalyptus)	6.50	7.41	6.95	0.25	0.36	0.35	2.48	2.16	2.32	1.56	1.68	1.31	33.41	33.45	33.43	20.91	20.23	20.57
M3 (Casuarina)	8.23	8.29	8.26	0.29	0.28	0.28	2.28	2.52	2.40	1.26	1.62	1.44	31.28	31.05	31.17	27.63	29.12	28.38
M 4 (control)	9.42	9.25	9.34	0.25	0.20	0.22	3.77	3.98	3.83	2.19	2.48	2.34	27.60	28.60	28.10	34.49	43.70	39.13
Mean	8.17	8.29	—	0.29	0.28	—	2.76	2.80	—	1.68	1.82	—	30.57	30.78	—	28.79	30.65	
C D 5%																		
Forest tree species		0.78			0.011			0.072			0.05			6.71			4.91	
Root stock		NS			0.006			0.042			0.46			NS			2.00	

S1 = Trifoliate orange, S2 = Troyer citrange NS = Non-significant

Table 2. Soil nutrient status of experimental site due to introduction of mandarin and forest tree species

Treatment	Organic carbon (%)	Available phosphorus (kg/ha)	Available potash (kg/ha)	Magnesium (kg/ha)	Calcium (kg/ha)	Av. ht. of forest tree species (m)	Av. stem girth of forest tree species (cm)	Moisture (%)
M_1S_1	3.00	22	36	300	1900	9.15	9.28	12.0
M_1S_2	2.90	23	40	300	1500	9.30	9.80	12.4
M_2S_1	1.78	38	131	480	2000	14.00	18.70	8.7
M_2S_2	1.78	38	150	420	1900	15.25	21.91	9.2
M_3S_1	3.15	70	45	660	1800	11.62	10.08	11.5
M_3S_2	3.05	77	42	480	1900	10.40	9.9	11.2
M_4S_1	3.40	17	50	660	2000	—	—	13.5
M_4S_2	3.69	18	50	900	1950	—	—	13.2
Average	2 85	37	126.5	520	1862	—	—	—

M_1—Silveroak, M_2—Eucalyptus, M_3—Casuarina, M_4—Control
S_1—Trifoliate orange, S_2—Troyer citrange

(Dafi and El-Giahmi 1976). Silveroak too has not exerted detrimental effects. Huxley (1983) described silveroak as widely adapted tree species for agroforestry.

Experimental results obviously revealed the superiority of Casuarina and silveroak. Troyer citrange was considered as best rootstock.

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