

GROWTH, YIELD AND FRUIT QUALITY PERFORMANCE OF SWEET ORANGE VARIETIES IN SARGODHA

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Abstract

Evaluation of five sweet orange varieties namely Navelina, Newhall, Salustiana, Washington navel and Valencia late imported from Spain, were done at citrus research station sargodha during 1996 to 2000 under similar cultural practices. Preliminary observations on plant height, spread, stem girth, yield and physical characters depicted that in the prevailing condition of Sargodha Salustiana (seedless, more productive and juicy) excelled over all other varieties. Valencia late (less than 10-seeded, late variety) occupied the second position.

INTRODUCTION

Citrus is one of the most important fruit crops and is consumed mostly as fresh produce or juice. Fresh fruits are rich in vitamin C, which play a vital role in prevention of scurvy. After extraction of the juice, the skin and fruit pulp can be used as livestock feed or for making compost while rind oil is an expensive commodity in international trade. Furthermore, citrus seeds are known to contain sweetening agents, which are currently being evaluated as an alternative for sugar.

Citrus is being grown on more than 5 lac acres in Pakistan which is more than any other fruit. Total production is 20 million metric ton. Out of total area 1.5 lac acres are only in distt Sargodha. Thus Sargodha Distt is the main citrus growing area in Punjab (Pakistan). Climatically it is subtropical and citrus grows well here due to most fertile soil and favorable condition.

At present most of citrus growers are getting uneconomical yield of poor quality from the citrus varieties having more number of seeds. Such a situation

is due to lack of adopting modern production technology and non-adoption of good varieties according to international demand.

In the early days of independence of Pakistan, only some seeded orange varieties were popular. Varieties like musambi, blood red and Valencia late were mostly cultivated. With the passage of time, these popular varieties created some constraint like more seeds, early declining problem, low yield etc. Besides this export agencies also demanded for seedless varieties especially for European countries.

Keeping in view above mentioned facts, sweet orange varieties i.e. Navelina, Newhall, Salustiana, Washington navel and Valencia late were imported from Spain and their performance was studied at Citrus Research Station Sargodha for their environmental adaptability so that most suitable variety may be recommended for planting on commercial scale.

MATERIALS AND METHODS

The research work was conducted at Horticultural Research substation

Sargodha during 1996 to 2000. Plants used in this study imported from Spain, were planted at 22x22 feet distance. The plants remained under similar management regime. This experiment was laid out in accordance to randomized complete block designed. To get optimum degree of accuracy in collection of data, experiment was replicated six times, As a whole thirty plants were used in this experiment. Data on height, spread was taken with meter rod and stem girth data was collected with steel tape. Yield data was taken by counting the number of fruits per plant. Fruit weight, fruit juice and peel percentage were taken by weighing each on triple beam balance and percentage was calculated by using the mathematic formula. Similarly fruit size, peel thickness, six fruit sample was measured with vernier caliper and T.S.S. with hand refractometer. Number of seed was counted simply by counting. Data were collected annually on all aspects and all data except no. of seed were subjected to analysis of variance and means separated by Duncan's multiple range test.

RESULTS AND DISCUSSION

The results of preliminary findings are elaborated here one by one.

Height, spread, stems girth, yield, fruit size and fruit weight

The height among varieties was significant. The significant height of plants was recorded in Salustiana followed by Valencia late. Newhall variety attained the minimum height. Above result showed that prevailing circumstances proved best for Salustiana and Valencia late varieties in respect to growth. Similarly a significant difference was observed in spread. Salustiana variety attained the maximum spread and Newhall variety attained the minimum spread. Similarly results of stem girth were significantly different. Salustiana variety attained the maximum stem girth and minimum stem girth was recorded in Newhall. It can be concluded from the above results that Salustiana variety, performed best in the prevailing circumstances and has faster growth rate than other four varieties. These differences may be attributed due to different potential of each variety. In the light of above results it is concluded that Salustiana sweet orange has good potential of growth rate than other varieties.

The data regarding yield revealed that Salustiana sweet orange produced maximum number of fruits per plant minimum no. of fruits was recorded in Newhall. Second best variety in terms of fruit was Valencia late. Navelina and Navelate were in-between these.

The result regarding fruit size

	Plant height In meter	Plant spread in cm	plant stem girth in cm	yield fruit/plant	fruit size in cm	fruit weight in gms
Salustiana	2.73 a	2.46 a	30.30/30.76 a	383.33 a	4.09 d	257.50 a
Valencialate	2.48 a	2.00 b	28.36/29.03 b	306.66 b	3.48 e	198.13b
Navelina	2.10 b	1.70 c	26.83/27.70 c	263.33 c	5.94 a	158.22 c
Navelate	1.76 c	1.43 c	26.56/27.13 c	201.00d	5.16 b	159.30 d
Newhall	1.60 c	1.20 cd	25.62/26.20 d	211.66d	4.57 c	136.36 d

showed that Navelina variety produced largest size fruit. Navelina and Navelate occupied the 2nd and 3rd position while Newhall fruits were of smallest size. Salustiana and Valencia late fruit size were in-between these. On the other hand the sequence of rank in fruit weight was Salustiana, Valenciate, Navelina, Navelate and Newhall. Maximum fruit weight was recorded in Salustiana and minimum in Newhall. This indicate that Navelina fruit was puffy i.e. circumference/wt ratio was high, having large size but less firm fruit. Salustiana and Valencia late were the best in fruit size and fruit weight with the characteristic of firm fruit. Newhall fruit was very light in spite of somewhat better fruit size. Thus it can be concluded that Salustiana and Valencia late varieties gave better results in Sargodha.

Peel thickness, juice %age, rag %age, peel% age, T.s.s. and seed/fruit:

Data regarding peel thickness showed that maximum thickness was found in Navelate and Navelina varieties while minimum peel thickness was observed in Salustiana .On the other hand, fruit juice percentage was maximum in Salustiana and Valencia late respectively. Salustiana was outstanding in juice content. Minimum fruit juice was noticed in Navelate

Peel percentage and rag percentage data revealed that maximum result were observed in Navelate variety and minimum rag and peel percentage were notified in Salustiana. Total soluble solids were maximum in Salustiana and the reverse; relatively high acid and low solids were in Valencia late. All the varieties except Valencia late were seedless. Valencia late has less than 10-seeds/fruit. These findings affirm the findings of Singh *et al.* (1980) and ye-yein min and ye-ym (2000).

On the basis of these studies, it can be concluded that Salustiana proved the best in respect of growth rate and quality fruit. As all the varieties were budded on the same rootstock (Carrizo), so the difference is due to scion variety. Climatic adaptation of different varieties significantly varied from each other due to which these responded differently under the same cultural and environmental conditions. This is evident from this trial that Salustiana variety of sweet orange gave most encouraging results than other varieties even they were budded on same rootstock and kept under the same cultural and environmental conditions of Sargodha and may prove alternate of existing orange varieties like musambi, blood red, pine apple and jaffa etc. Other qualities of this variety are fast growth rate, seedlessness, more than fifty percent juice, thin peel, attractive round

	Peel thickness	juice% age	rag %age	peel %age	1.S.s	seed/fruit
Salustiana	1.97 d	54.63 a	21.76 d	23.36b	12.66 a	1.00
Valenciate	2.37 c	50.73 b	23.10 c	25.36 b	9.56 d	0.00
Navelina	4.03 b	44.23 c	24.40 b	31.26 a	10.23 c	0.00
Navelate	4.15 a	46.43 c	29.03 a	30.76 a	10.56 b	0.00
<i>Newhall</i>	2.46 c	40.20 d	23.70 c	24.96 b	10.50 b	0.00

shape, medium size and an early variety

.Hence Salustiana variety of sweet orange is seemed to be well suited to the agro climatic conditions of Sargodha

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