

A COMPARATIVE STUDY OF FIVE LOQUAT GENOTYPES AT TRET, MURREE, PAKISTAN

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Abstract

Five loquat genotypes were studied at Horticultural Research Sub-station Tret, Murree, Pakistan. Randomized Complete block Design was used and data was analysed statistically. Significant differences were observed among the genotypes in terms of fruit length, fruit width, width length index, fruit weight, flesh seed ratio, number of fruits / bunch, days from full bloom to maturity, number of seeds / fruit, individual seed weight and seed content / fruit. Tret4 was observed to be the best genotype having largest fruit (38.77g), highest flesh seed ratio (2.80) and yield / plant (54.93 kg). Tret5 remained at bottom with reference to flesh seed ratio of 2.11 and 33.71 kg yield / plant.

Introduction

Loquat (*Eriobotrya japonica* Lindl.) is a sub-tropical evergreen fruit tree having its origin in China. Presently, it is being cultivated in China, Japan, India, Pakistan, Madagascar, Mauritius, Mediterranean countries, United States, Brazil and Australia (Hussain *et al.*, 2007). Generally, it is grown between latitudes 20° and 35° north and south (Polat & Caliskan, 2007). In Pakistan, its production is 10,688 tonnes, 98% of which comes from Punjab and Khyber Pakhtunkhwa (Hussain *et al.*, 2009). Mainly loquat is used as fresh fruit. Besides having a sweet taste and juicy texture, loquat is highly nutritious. It contains vitamins (A, B, and C), minerals (phosphorus and calcium), and sugars (Karadeniz, 2003). Loquat has also certain medicinal properties. Its leaves have been used in the medicines to treat skin diseases, as well as to relieve inflammation, cough and pain (Nishioka *et al.*, 2002).

Loquat fruit comes in the market during the months of March / April in Pakistan, when temperate fruits are not yet available. Loquat fruit has been grown in specific areas of Pakistan where canal and spring water is abundantly available (Khan, 2003). It is consumed mostly in the local markets or short distant markets. Identification and cultivation of superior genotypes may help to increase the production, hence increasing its availability for the domestic market as well as for export.

Tret is a mountainous place on way from Islamabad to Murree between longitude 73° 17' 00" E and latitude 33° 50' 00" N, having an elevation of 1040 m. Loquat cultivation is quite successful in some pockets of this area.

Materials and Methods

The study was conducted at the Horticultural Research Sub Station Tret (Murree). Experiment was laid out in Randomized Complete Block Design (RCBD) with three replications, each replication having one tree / genotype, while there were five genotypes in total i.e., Tret1, Tret2, Tret3, Tret4 and Tret5.

Fruit characteristics at mature stage were recorded from 20 fruits randomly selected from different sides at middle of canopy. Parameters included length of fruit, width of fruit, width / length index, fruit weight, flesh to seed ratio. Number of fruits / bunch was calculated by taking the average of 10 bunches from each tree randomly selected on the four sides at the middle of canopy. Fruit yield / plant were recorded in kg. The period from full bloom to maturity was also recorded. The time when the

greenness of the fruits completely disappeared was considered as the mature stage (Badenes *et al.*, 2000).

Fruit length and fruit width were recorded with the help of 'vernier calipers'. Fruit width / length index was measured by dividing fruit width by fruit length. Fruit weight was measured with the help of an electric balance having a precision scale of ± 0.01 g.

Flesh to seed ratio was calculated with the help of following formula:

$$\text{Flesh to seed ratio} = \frac{(\text{Fruit weight} - \text{Seeds weight})}{\text{Seeds weight}}$$

Seeds from 20 berries randomly selected from middle of plant canopy were used to observe the seed characteristics including number of seeds / fruit, weight of individual seed and seed content / fruit.

Number of seeds / fruit was calculated by counting the total seeds contained by 20 berries and then taking the average. Individual seed weight was noted by dividing the total seeds' weight by the total number of seeds. Seed content / fruit was worked out by the following formula:

$$\text{Seed content / fruit} = \frac{\text{Total seeds' weight of 20 berries}}{20}$$

Statistical analysis of was carried out using MSTATC, 1999 package and the means were compared by Duncan's Multiple Range test at 5% level of significance (Gomez & Gomez, 1984).

Results and Discussion

Significant differences were observed among the different genotypes with reference to fruit characteristics (Table 1). Highest fruit length was recorded in Tret4 (5.09 cm) followed by Tret2 (4.06 cm) with a significant difference. It was lowest in Tret5 (2.95 cm). Fruit width was also highest in Tret4 (4.06 cm) followed by Tret2 (3.10 cm) and lowest in Tret5 (2.70 cm). Width length index was highest in Tret5 (0.91). It was followed with a significant difference by Tret1 (0.86) and Tret3 (0.86), latter two being at par. Width length index was least in Tret2 (0.76). Fruit weight was maximum in Tret4 (38.77 g) followed by Tret2 (20.04 g) with a significant difference. Minimum fruit weight was recorded in Tret1 (12.73 g).

Table 1. Fruit characteristics of 5 loquat genotypes at Tret.

Fruit characteristics	Tret1	Tret2	Tret3	Tret4	Tret5	CV %
Fruit length (cm)	3.17 d	4.06 b	3.39 c	5.09 a	2.95 e	2.20
Fruit width (cm)	2.73 d	3.10 b	2.89 c	4.06 a	2.70 d	3.36
Width length index	0.86 b	0.76 d	0.86 b	0.80 c	0.91 a	2.23
Fruit weight (g)	12.73 d	20.04 b	15.24 c	38.77 a	12.78 d	5.51
Flesh seed ratio	2.22 d	2.67 b	2.32 c	2.80 a	2.11 e	3.66
Fruits / bunch	14.70 a	13.85 b	13.68 b	14.12 ab	12.53 c	2.96
Days FB to M	117.50 b	121.00 a	121.50 a	113.83 c	112.83 c	1.12
Yield / tree (kg)	46.18 b	42.47 c	51.93 a	54.93 a	33.71 d	7.08

Days FB to M= Days from full bloom to maturity

Means not sharing a letter differ significantly at $p < 0.05$

Tret4 was at the top with reference to flesh seed ratio (2.80). It was followed by Tret2 having this ratios as 2.67. Tret5 was at the bottom with the lowest flesh seed ratio (2.11). Tret1 had the maximum number of fruits / bunch (14.70) followed by Tret4 (14.12) both being at par. Minimum number of fruits / bunch was observed in Tret5 (12.53), which was significantly low among all the five genotypes. Tret2 and Tret3 took maximum time from full bloom to maturity (121.00 and 121.50 days respectively), which was significantly high as compared with the other genotypes. On the other hand, Tret5 took the least time from full bloom to maturity (112.83 days).

Yield / tree was highest in Tret4 (54.93 kg) followed by Tret3 (51.93 kg) both being at par. Tret5 had the lowest yield / tree (33.71 kg). All the genotypes gave better yield as compared with that of 'Kanro' (24.50 kg / tree), while very low as compared with 'M. Marie' (69 kg / tree) and 'Champagne de Grasse' (70 kg / tree) as observed in Turkey (Karadeniz, 2003). This yield is also low as compared with that of 'Algerie' (74 kg / fruit) and 'Gold Nugget' (74 kg / fruit) observed in Spain (Hermoso & Farre, 2003).

Among the 5 genotypes, Tret4 was found to be the best one with reference to fruit weight, flesh seed ratio

and yield / tree. Its fruit weight (38.77 g) was much higher than that of 'Dr. Trabut' with an average fruit weight of 29.54 g (Durgac *et al.*, 2006) and 'Hanwuzhong' with a fruit weight of 30.97 g (He *et al.*, 2007). On the other hand, in Japan, leading loquat cultivars, 'Mogi', 'Nacasakiwase' and 'Tanaka' have average fruit weights of 50 g, 60 g and 70 g respectively (Durgac *et al.*, 2006).

Studies conducted in leading loquat countries indicate that most of the loquat cultivars grown over there have very high flesh seed ratios than those found in the genotypes of Tret. In Turkey, 'Baffico', 'Gold Nugget' and 'Kanro' were found to have a flesh seed ratio of 4.16, 3.83, and 5.42 respectively (Durgac *et al.*, 2006).

Significant differences were observed among the genotypes with respect to the seed characteristics studied (Table 2). Tret4 had the highest number of seeds / fruit (4.83) followed by Tret2 (4.23). Least number of seeds / fruit was observed in Tret1 (3.18). Maximum seed weight (2.11 g) as well as maximum seed content / fruit (10.19 g) was also recorded in Tret4. It was followed by Tret2 in these characteristics, having 1.29 g seed weight and 5.46 g seed content / fruit.

Table 2 Seed characteristics of 5 loquat genotypes at Tret.

Genotypes	Number of seeds / fruit	Individual seed weight (g)	Seed content / fruit (g)
Tret1	3.18 d	1.24 c	3.95 d
Tret2	4.23 b	1.29 b	5.46 b
Tret3	4.13 c	1.11 d	4.60 c
Tret4	4.83 a	2.11 a	10.19 a
Tret5	4.18 bc	0.98 e	4.11 d
CV %	1.60	2.81	3.39

Means not sharing a letter differ significantly at $p < 0.05$

Although Tret1 has been observed to have the lowest number of seeds / fruit as well as the lowest seed content / fruit, it is not so attractive due to its smallest size and a low flesh seed ratio. On the other hand, Tret4 is an outstanding genotype despite having the highest number of seeds as well as the seed content / fruit, because of its biggest fruit (38.77 g) and the highest flesh seed ratio among the five genotypes of Tret.

Seed content of two cultivars in Spain, 'Saval 2' and 'Peluches' has been reported to be 8.60 g and 11.20 g / fruit respectively (Llacer *et al.*, 2003) but they are considered excellent due to their larger fruits. In Turkey, 'Kanro' 'Baffico' and 'Gold Nugget' had 2.40, 2.62 and

3.00 seeds / fruit respectively (Durgac *et al.*, 2006). In China, 'Niuteibaisha' cultivar had 2.78 seeds / fruit (Feng *et al.*, 2007). 'White loquat' (Huang *et al.*, 2007) and 'Taicheng 4' (Xe *et al.*, 2007) were observed to have only 2 and 1.32 seeds / fruit respectively.

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