RESULTS AND DISCUSSION

Fig. (2) : Leaf and fruit characteristics of grafted loquat trees.

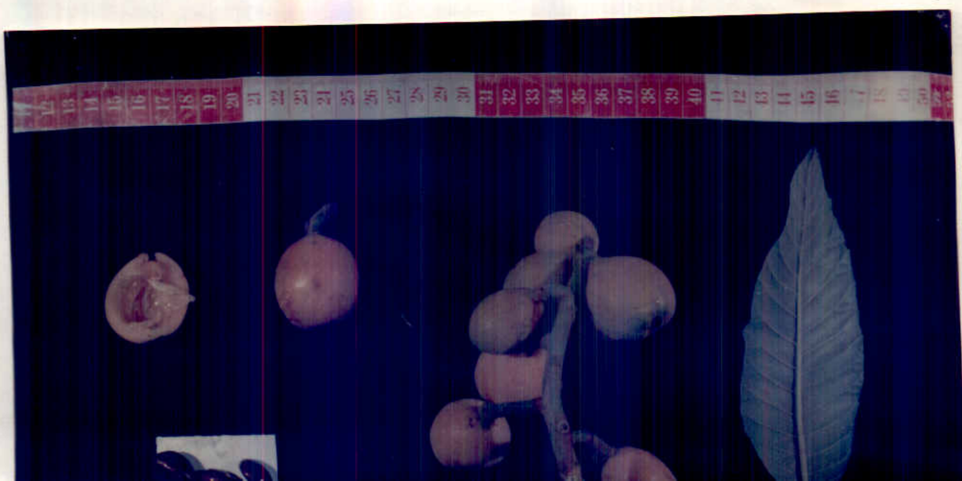


Fig. (4) : Leaf and fruit characteristics of tree No. (2-2)

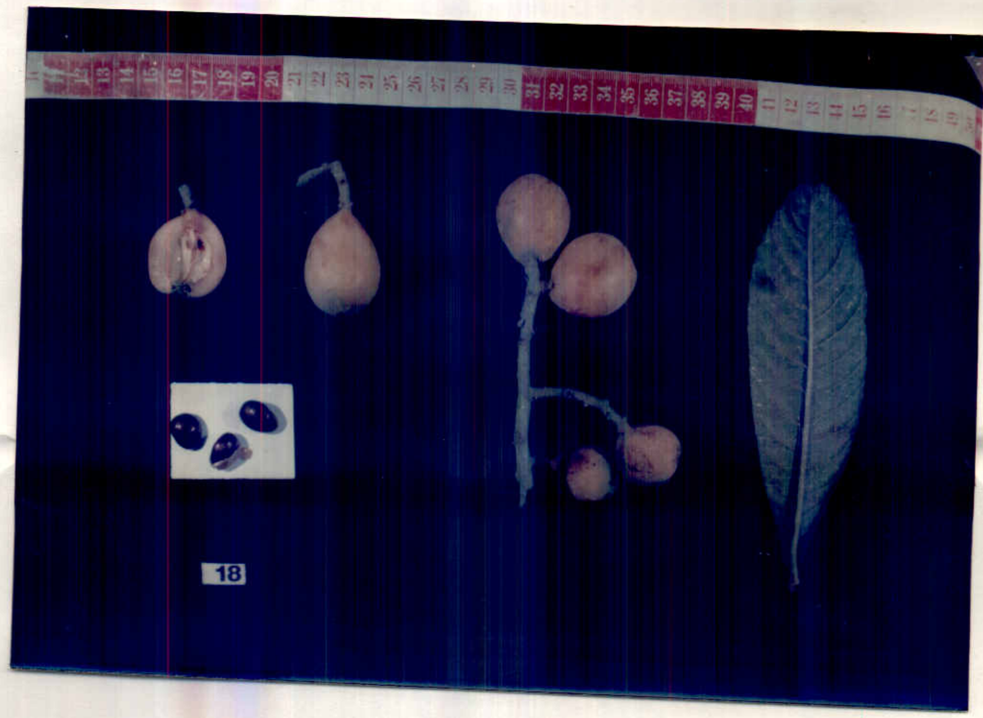


Fig. (5) : Leaf and fruit characteristics of tree No. (2-4)

Fig. (6) : Leaf and fruit characteristics of tree No. (3-2)

Fig. (7) : Leaf and fruit characteristics of tree No. (3-3).

Fig. (8) : Leaf and fruit characteristics of tree No. (3-4)

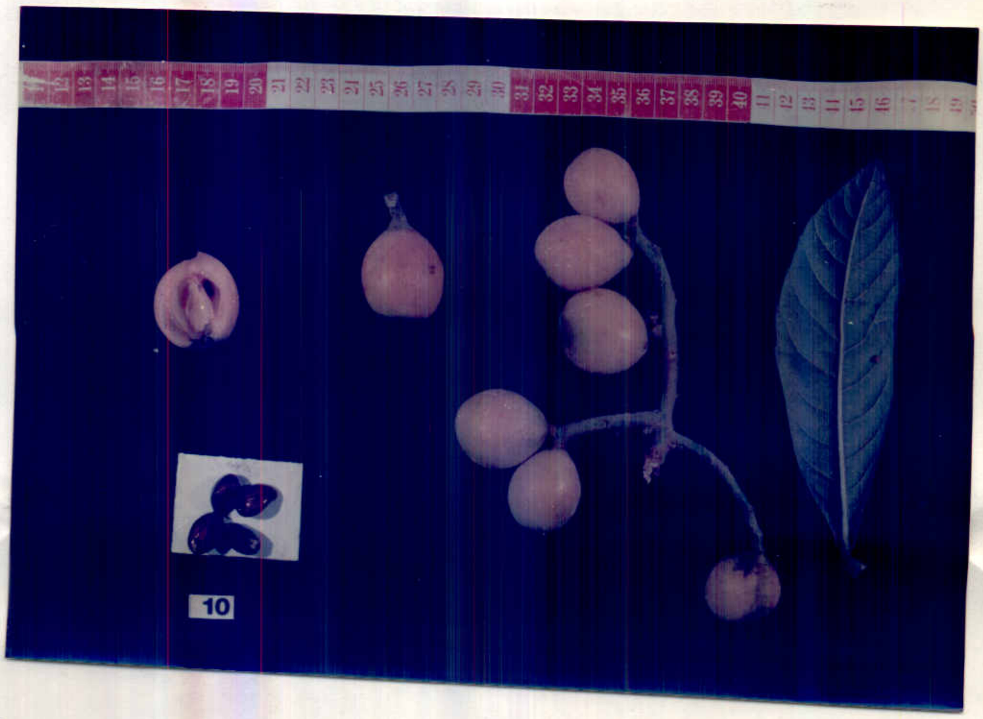


Fig. (9) : Leaf and fruit characteristics of tree No. (3-11).

No. (2-2) and grafted trees in descending order. Moreover, trees No. (3-3) and (3-2) ranked the fourth and fifth, respectively. Shoots of tree No. (3-11), on the other hand have larger number of nodes than either tree No. (2-1) or tree No. (2-4), which produced the least number of nodes per shoot.

Referring to leaf length, it is interesting to notice that tree No. (2-1) and grafted trees gave the longest leaves as compared to all other trees under study Fig. (3).No significant difference was obtained between the two previous trees. Meanwhile, leaves of the grafted trees and those of tree No. (3-2) are nearly statistically similar in their values. On the other hand, trees No. (3-2), (3-3), (2-2) and (2-4) have similar values of leaf length, but they are still longer than the analogous ones of both trees No. (3-4) and (3-11), hence they developed the shortest leaves.

Considering leaf width, it is found that the widest leaves were remarked on grafted trees, whereas, leaf width values of trees No. (3-2) and (3-11) were the least Figs. (6 & 9). Other trees were in between in this respect, since differences between these trees were not enough to be significant.

With respect to leaf index, it is quite clear that the highest values of leaf index were noticed with trees No. (3-2) and (2-1), whereas, tree No. (3-4) has the lowest value. Such result indicate that leaves of the trees (3-2) and (2-1) were more oblong in their shape than the corresponding ones of other trees. Generally, differences between values of the studied trees were insignificant.

As leaf area was concerned, it is found that leaves of tree No. (2-1) as well as those of grafted trees have the largest surface area with minor differences between them. In addition, values of leaf area of grafted trees did not differ appreciably from those of seedling tree No. (3-3). On the other hand, leaf surface area of trees No. (3-2) and (2-2) were similar, but higher than those of trees No. (2-4) and (3-4) which were in turn insignificant. Meanwhile, the least leaf surface area was found in tree No. (3-11).

Furthermore, it is easy to notice that all studied loquat trees showed a noticeable relationship between leaf area and its length and width. Constant factors of 0.73 for seedling trees and 0.68 for grafted ones were obtained from this relationship.

Accordingly, it is easy to mention the following formula for estimating leaf area of seedling loquat trees :-

Leaf area $(cm.)^2$ = 0.73 X leaf length (cm) X leaf width (cm.) Whereas, for grafted trees it was :-

Leaf area $(cm.)^2$ = 0.68 X leaf length (cm.) X leaf width (cm.).

Similar formula for measuring leaf area was suggested by Chau (1966) on Citrus and Khamis (1974) on seedling guava trees.

With respect to leaf petiole length, it is worthy to notice that, all studied trees differed statistically in their leaf petiole length. In this respect, leaves of tree No. (2-2) have the longest petiole. On the contrary, trees No. (3-3) and (2-1) took the other may around. On the other hand, values of leaf petiole length of other trees lie in between. Accordingly, leaf petiole length of trees could be arranged in descending order as follow : tree No. (3-4) > (3-11) > grafted trees > (2-4) > (2-3).

Differences in growth characteristics between seedling as well as grafted trees, are in close conformity with previous findings of Papeone (1920) Chandler (1958), Chandler (1965), Mowary <u>et al</u> (1965) and Wickson (1982).

4.2. Tree flowering

Flowering of loquat trees expressed as blooming period, (i.e. initiation, end and duration), number of flowers per branch and pollen grain properties is tabulated in Tables (2,3,4) and illustrated in Figs. (10-19).

4.2.1. Blooming period and number of flowers per branch.

Concerning blooming period, tabulated data declare that grafted trees as well as both trees No. (2-1) and (3-4) bloomed earlier than the other studied trees, since they started to bloom on September 20th. and October 10th. in the first and second season, respectively. On the contrary, trees No. (2-2), (2-4), (3-2), (3-3) and (3-11) started to bloom later on October, 1st. in 1983 and October, 20th. in 1984. On the other hand, all studied trees ended their blooming period in the first season (1983) in November, 20th. Moreover, in the second season, grafted trees and trees No. (2-1) and (3-4) terminated their blooming earlier than all other trees, since they finished their blooming on December, 5th. as compared to trees No. (2-2), (2-4), (3-2), (3-3) and (3-11) which ended flowering on December 10th. Consequently, one can conclude that blooming duration for grafted trees as well as trees No. (2-1) and (3-4) lasted 60 and 56 days in the first and

Table (2) Flowering of grafted and seedling loquat trees during 1983 and 1984 seasons.

Character / Tree No.	(1983)				(1984)			
	Blooming Date			Flowers No./ branch	Blooming Date			Flowers No./ branch
	initiation	end	duration (days)		initiation	end	duration (days)	
Grafted	20-9	20-11	60	85.66 c	10-10	5-12	56	75.33 d
(2-1)	20-9	20-11	60	91.33 b	10-10	5-12	56	92.00 b
(2-2)	1-10	20-11	50	118.00 a	20-10	10-12	51	98.00 a
(2-4)	1-10	20-11	50	79.00 d	20-10	10-12	51	65.00 e
(3-2)	1-10	20-11	50	57.66 e	20-10	10-12	51	97.00 ab
(3-3)	1-10	20-11	50	74.33 d	20-10	10-12	51	84.66 c
(3-4)	20-9	20-11	60	75.33 d	10-10	5-12	56	92.66 ab
(3-11)	1-10	20-11	50	91.66 b	20-10	10-12	51	93.00 b

Means followed by same letter (s) within each column are not significantly different from each other at 5 % level.

second season, respectively, whereas, it was 50 days in 1983 and 51 days in 1984 for trees No. (2-2), (2-4) (3-2), (3-3) and (3-11). This result is in line with that mentioned by El Wakeel et al (1977).

Regarding number of flowers per branch, it is clear that, in both seasons, branches of tree No. (2-2) had the highest number of flowers in respect of all other studied trees. Comparing other trees, it is quite evident that trees No. (2-1) and (3-11) had larger number of flowers per branch than the corresponding ones of trees No. (2-4), (3-3) and (3-4) in both seasons. However, grafted trees were in between in this respect. This result was reported earlier by Popeone (1920) and El Wakeel et al (1977).

4.2.2. Pollen grains

4.2.2.1 Pollen morphology

a- General appearance

It is noticed that the fresh pollen grains, in mass, looked light yellow dust to the naked eye, while under microscope they appeared brownish.

Table (3) : Pollen grains size and shape of different loquat trees.

Character / Tree No.	Range of size μ.		Average of size μ.		Range of P/E. 100 value	Shape
	Equatorial axis	Polar axis	Equatorial axis	Polar axis		
Grafted	18-25.2	28.8-36	22.3	34.6	142-200	Prolate
(2-2)	18-25.2	36-43.2	20.7	36.8	167-220	Prolate-Preprolate
(3-2)	18-25.2	32.4-39.6	25.9	34.4	150-220	Prolate-Preprolate
(3-3)	18-21.6	36-39.6	20.9	38.9	183-200	Prolate
(3-4)	18-21.6	36-39-6	22.9	38.9	167-220	Prolate-Preprolate
(3-11)	12-21.6	36-43.2	19.4	40.7	200-220	Prolate-Preprolate

Where :

P = Polar axis

E = Equatorial axis

Fig (10) Pollen grain size and shape of different loquat trees.

Fig (11) Photomicrograph of Loquat pollen in methyl green glycerine jelly showing sexine and nexine.

b- Polarity and symmetry :

Morphological studies concerning pollen grain polarity and symmetry show that pollen grains were radio - symmetric, isopolar and aperturate. In polar view, they presented three uniformity lobed structure. However, in equatorial view, they looked elliptical to oblong with single or two furrows Fig (10).

c- General furrows and germ pores

The pollen grains were found to be tricolpate with spherical germ pores located at the center of each calpi . The furrows were placed equidistantly and met at both poles of the pollen grain.

d- sexine and nexine pattern :

The nexine was found to be thick or slightly thicker than nexine Fig. (10). However, the sexine was thinner at the germ pores and was observed to have straight type of granulation on it scarbate.

d- Pollen grain size

The data of present study concerning pollen grain size of loquat trees are given in Table (3). According to pollen grain size based on the length of the longest polar axis (Erdtman, 1952), no difference in pollen size between different trees under investigation was noticed. Pollen grains were always of medium size, with the exception of trees No. (3-11), (3-2) and (3-3) as they had very few number of small pollen grains (could be neglected as they represented about 0.1%) such small pol[illegible] show average polar axis of 18-21.6 µ . These results go in harmony with the findings of Prafulla (1962) who found variations in pollen grain size of nine loquat varieties in India. Similarly, Hamdy (1982) recorded variations in fresh pollen grains of three date palm varieties grown in Egypt. In addition, Moore and Webb (1983) reported similar observations on pollen grains of different plants.

e- Pollen grain shape

Data presented in Table (3) show pollen grain shape of grafted and seedling loquat trees. According to Erdtman's equation (1952), pollen grain shape was prolate for grafted trees and tree No. (3-3), and ranged between prolate and preprolate for trees No. (2-3), (3-2), (3-4) and (3-11). Furthermore, it was observed that tree No. (3-2), (3-3) and (3-11) had small pollen grains with the shape ranged between subprolate to prolate.

Generally, the morphological characters of pollen grains of different studied loquat trees are in agreement with the findings of Rajput (1961) and Prafulla (1962).

4.2.2.2. Viability Test.

All fresh pollen grains of different loquat trees under study stained properly with acetocarmin showing 100% of viability even the small pollen grains which were observed in some trees. This indicated that all pollen grains of different trees were viable.

On the other hand, pollen germination of different loquat trees used *in vitro* culture are presented in Table (4) and Figs. (12-19). It is clear that pollen germination ranged between 73-100% for different loquat trees. The lowest value was recorded by tree No. (3-4), while the highest value was noticed with trees No. (2-2) and (2-1). The other trees gave satisfactory values and came in between. Nevertheless, it is worthy to notice that small grains failed to germinate, although they were

Table (4) : Germination percent and tube length of pollen grains of different loquat trees.

Character / Tree No.	Germination %	Range of tube length μ	Average of tube length μ
Grafted	98	288-720	468
(2-1)	100	360-855	612
(2-2)	100	405-900	648
(2-4)	98	270-540	405
(3-2)	94	405-765	558
(3-3)	96	405-864	612
(3-4)	73	90-585	387
(3-11)	92	270-648	432

Fig. (12) : Pollen grains germination of grafted trees.

Fig. (13) : Pollen grains germination of tree No. (2-1).

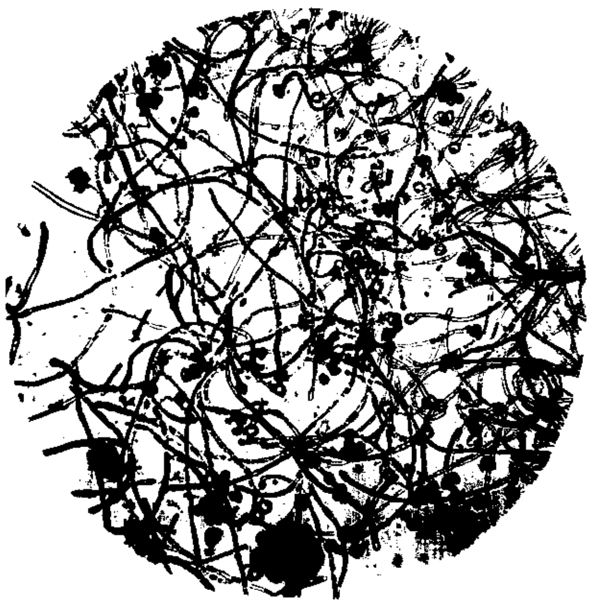


Fig. (14): Pollen grains germination of tree No. (2-2).

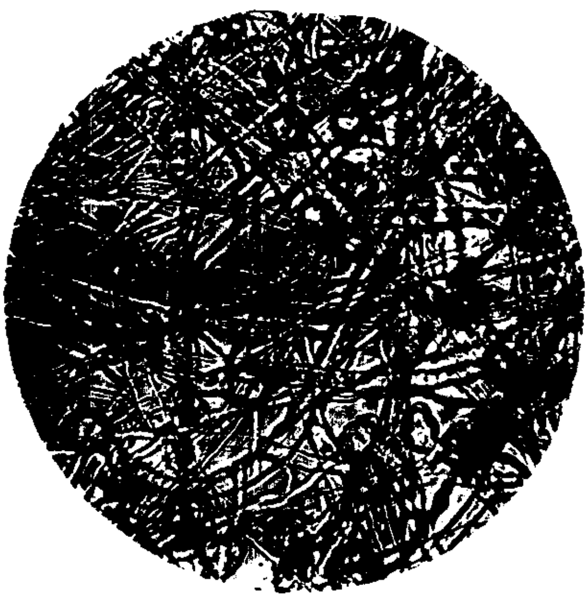


Fig. (15) : Pollen grains germination of tree No. (2-4).

Fig. (16) : Pollen grains germination of tree No. (3-2).

Fig. (17): Pollen grains germination of tree No. (3-3).

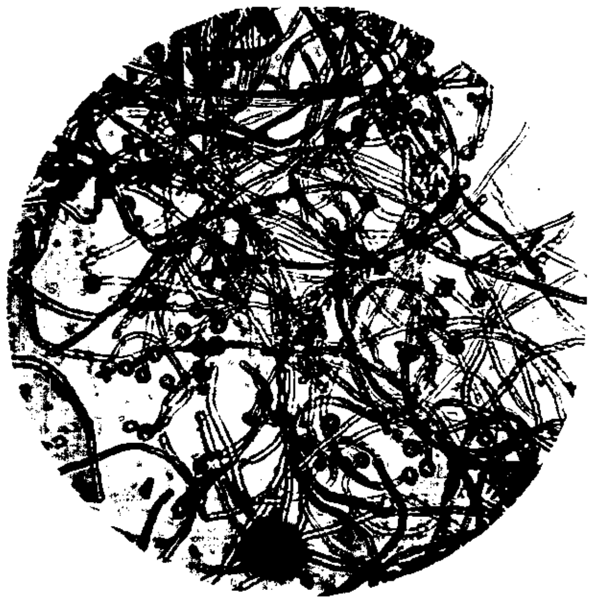


Fig. (18) : Pollen grains germination of tree No. (3-4).

Fig. (19): Pollen grains germination of tree No. (3-11).

stained properly by acetocarmin. As regard to the rate of pollen tube elongation of different loquat trees, data in Table (4) disclosed that pollen tube length varied not only between trees, but also within the tree itself. Generally, pollen tube length ranged from 90-900 μ. The lowest average (387 μ) was noticed in tree No. (3-4) while the optimum average (648 μ) was found with tree No. (2-2) followed by trees No. (2-1) and (3-3) which gave satisfactory average tube enlongation (612 μ). However, other trees gave the average between (405-558 μ). No abnormality of pollen tube was observed for different loquat trees, where pollen tubes were straight.

The aforementioned results of pollen germination and tube elongation are in agreement with Addicot (1943) and Hamdy (1966) who reported that germination of pollen grain tubes and subsequent growth of pollen tubes are not necessarily related phenomena. They can be stimulated independently by growth substances.

Furthermore, the results of loquat pollen germination were in agreement with the findings of Prafulla (1961) who reported that the maximum germination of loquat pollen grains was at 5.15% sucrose solution. The percent ranged between 48.62 to 60 for the different nine loquat varieties grown in India. In addition, Hamdy (1966) mentioned that germination percent of fresh pomegranate pollen grains varied between 73.80-91.47 in vitro culture containing sucrose and boron. The length of pollen tubes ranged between 334 -584 μ. Moreover, in other study (1982), she obtained good pollen germination and pollen tube elongation of three different date palm varieties, when she used 10 ppm sucrose + 15 ppm. boron solution.

Concerning early stages of flowering of different studied loquat trees, it is clear that, although most flowers were opened, others remained completely closed and did not shed pollens. Nevertheless, shed pollen gave low percent of pollen germination which did not reach 50%, whereas they showed 100% viability in aceto-carmin test. Such results go in line with that mentioned by Visal (1960), Singh (1960), and Hamdy (1966). They all indicated that pollen germination in vitro gave reasonable indication of viability, whereas stainability test may not always prove reliable. Furthermore, tubes of such pollen were so small and not straight enough to be measured. Moreover, some of the pollen tubes burst at the tip that induced abnormality in tube growth. These results are in conjuction with the findings of both Singh (1943) and Hamdy (1982), who reported that variations in pollen germination and pollen tube elongation was observed unless special attention was considered to the selection of pollen. They also added that pollens from different anthers of the same flowers might give different responses.

4.3. Tree fruiting

Fruiting of loquat trees expressed as fruit set and fruiting percentages, yield in kg. per tree, number of fruits per tree, kg. per cm^2 of trunk-cross sectional area and harvesting duration are presented in Table (5).

As for fruit set percentage, it is obvious that in the first season, the highest value of fruit set percentage was noticed with tree No. (3-11), whereas, in the second season, it was observed with tree No. (2-4). In addition, in the first season, values of fruit set percentage of trees No. (3-2), (3-3) and (3-4) were not statistically different, but they were higher than the corresponding ones of grafted trees and both trees No. (2-1) and (2-2). Differences between these two groups of trees were so small to reach the significant level. This result confirm that reported by Chandler (1958), Badr (1976) and El Wakeel et al (1977).

Referring to fruiting percentage, it is obvious from Table (5) that tree No. (3-11) had the highest percentage of fruiting in the first season and noticeably low value in the second season as compared with other trees. Moreover, tree No. (3-3) had the least value of fruiting percentage in the first season and considerably low value in the second one.

Table (5) : Fruiting of grafted as well as seedling loquat trees during 1983 and 1984 seasons

Character / Tree No.	(1983) fruit set (%)	(1983) fruiting (%)	(1983) yield kg./tree	(1983) No. of fruits/ tree	(1983) yield kg/ cm^2 of trunk area	(1983) Harvesting duration (days)	(1984) fruit set (%)	(1984) fruiting (%)	(1984) yield kg/ tree	(1984) No. of fruits/ tree	(1984) yield kg/ cm^2 of trunk area	(1984) Harvesting duration (days)	Mean of yield for two seasons
Grafted	14.59c	72.99	9.48	388	0.002	29	13.46b	63.83	10.63	689	0.002	26	10.05
(2-1)	12.79c	70.95	11.04	543	0.001	26	15.88b	75.00	29.43	1518	0.002	21	20.24
(2-2)	13.29c	75.99	12.63	550	0.001	26	12.91b	71.42	34.73	2067	0.003	21	23.66
(2-4)	12.77c	67.84	11.62	450	0.001	26	13.83a	77.27	32.03	1533	0.002	21	21.82
(3-2)	17.46b	82.10	21.03	993	0.001	26	13.26b	76.92	17.93	766	0.001	21	19.48
(3-3)	19.54b	66.64	7.10	356	0.001	26	12.58b	69.23	4.83	307	0.001	21	5.96
(3-4)	19.02b	72.09	5.13	306	0.001	29	13.97b	76.92	32.03	1027	0.003	26	18.58
(3-11)	23.18a	82.42	13.30	660	0.001	26	14.55b	68.75	27.76	1533	0.002	21	20.53

Means follwed by same letter (s) within each column are not significantly different from each other at

In addition, fruiting percentage of tree No. (2-4) was markedly low in the first season, but the picture was completely changed in the second one. Meanwhile, fruiting percentage values of other studied trees came in between in both seasons.

Generally, one can conclude that the picture of fruiting percentage was not clear due to the fluctuation of the trend of fruit drop percentage which lead to invisible trend of tree fruiting percentage in both seasons. These results are in agreement with that recorded by Iwasaki (1967) and Badr (1976).

Regarding yield as kg. per tree, data reported in Table (5) show clearly that, in the first season, tree No. (3-2) was the most promising tree in producing higher yield, whereas the reverse was true for trees No. (3-4), (3-3) and grafted trees. On the other hand, trees No. (3-11), (2-2), (2-4) and (2-1) gave considerably moderate yields in relation to other studied trees. Nevertheless, in the second season, trees No. (2-2), (2-4) and (3-4) yielded the highest values.
On the contrary, tree No. (3-3) produced markedly the least yield, followed by grafted trees, in an ascending order. Tree No. (3-2) developed relatively lower yield as compared with trees No. (2-1) and (3-11) which were in

between. This result was early reported by Badr (1976) and El Wakeel et al (1977).

As for number of fruits per tree, data declare that, this character followed nearly the same pattern of yield as kg. per tree for the different trees. Generally, in the first season, number of fruits per tree for the studied trees could be arranged in descending order as follows : tree No. (3-2) > (3-11) > (2-2) and (2-1) > (2-4) > grafted trees > (3-3) > (3-4). Consequently, the highest number of fruits per tree was produced by tree No. (3-2), whereas, the least value was noticed with tree No. (3-4). On the other hand, in the second season, tree No. (2-2) recorded the highest values in this concern, while, trees No. (2-4), (3-11) and (2-1) gave same number of fruits per tree. Moreover, tree No. (3-4) had greater number of fruits as compared to tree No. (3-2). In this concern, the least number of fruits per tree was obtained from grafted trees as well as tree No. (3-3). Nevertheless, the lowest number of fruits was obtained from the latter tree. These results are in line with that mentioned by Badr (1976) and El Wakeel et al (1977).

Regarding yield as kg. per cm^2 of trunk-cross sectional area, it is evident that in the first season, grafted trees have the highest value in this respect.

No differences were observed between other trees. Meanwhile, in the second season, trees No. (2-2) and (3-4) showed the highest value in this respect, followed by grafted trees as well as trees No. (2-1), (2-4) and (3-11). The least values in this concern were noticed with trees No. (3-2) and (3-3), which were in turn similar in their values.

Concerning harvesting duration, tabulated data show clearly that in 1983 and 1984 seasons, harvesting duration of trees No. (2-1), (2-2), (2-4), (3-2), (3-3) and (3-11) were similar. Meanwhile, fruits of grafted trees as well as those of tree No. (3-4) not only take longer harvesting duration, but also have similar values in this respect.

Table (6) Fruit physical properties of grafted and seedling loquat trees during 1983 and 1984.

Character / Tree No.	(1983)								(1984)								AVERAGE OF TWO SEASONS							
	Fruit				Pulp		Seed		Fruit				Pulp		Seed		Fruit				Pulp		Seed	
	weight (gm)	length (mm.)	diameter (mm.)	index (L/D)	(%)	thickness (cm.)	No./ fruit	weight (gm.)	weight (gm)	length (mm.)	diameter (mm.)	index (L/D)	(%)	thickness (cm.)	No./ fruit	weight (gm)	weight (gm)	length (mm.)	diameter (mm.)	index (L/D)	(%)	thickness (cm.)	No./ fruit	weight (gm)
Grafted	24	38	32	1.18	79.16	0.76	3	1.7	22	36	28	1.28	77.27	0.79	3	1.7	23.0	37	30.0	1.23	78.21	0.77	3	1.7
(2-1)	21	38	30	1.26	80.95	0.67	5	0.8	20	36	27	1.33	70.00	0.72	5	1.2	20.5	37	28.5	1.29	75.47	0.69	5	1.0
(2-2)	23	39	35	1.11	73.91	0.73	5	1.2	21	37	32	1.15	66.66	0.76	5	1.4	22.0	38	33.5	1.13	70.25	0.74	5	1.3
(2-4)	27	39	34	1.14	81.48	0.83	3	1.7	23	37	31	1.19	82.60	0.80	3	1.3	25.0	38	32.5	1.16	82.04	0.81	3	1.5
(3-2)	21	38	30	1.26	80.95	0.73	3	1.3	21	36	27	1.33	66.66	0.77	3	1.3	21.0	37	28.5	1.29	73.80	0.75	3	1.3
(3-3)	21	38	32	1.18	80.95	0.84	6	0.7	20	36	28	1.28	70.00	0.81	6	1.0	20.5	37	30.0	1.23	75.47	0.82	6	0.8
(3-4)	16	49	28	1.75	81.25	0.68	3	1.0	17	40	26	1.53	76.47	0.74	3	1.3	16.5	44	27.0	1.64	78.86	0.71	3	1.1
(3-11)	21	37	30	1.23	80.10	0.55	4	1.0	21	35	27	1.30	66.66	0-59	4	1.7	21.0	36	28.5	1.26	73.38	0.57	4	1.3

4.4. Fruit quality

4.4.1. Fruit physical properties

Data reported in Table (6) and illustrated photographically in Figs (2-9 and 20) show the fruit physical properties of loquat trees expressed as fruit weight, fruit length, fruit diameter, index, pulp percentage, pulp thickness as well as number of seeds per fruit, seed weight and fruit colour.

Considering, fruit weight, it is found that in both seasons, tree No. (2-4) gave the heaviest fruits mainly in the first season as compared with the other studied trees. On the contrary, the Lightest fruits were produced from tree No. (3-4). In addition, fruits of grafted trees showed relatively high value and followed tree No. (2-4) in fruit weight. Meanwhile, other trees showed more or less similar values.

As for fruit length, data reported in Table (6) and presented photographically in Figs (2-9) disclosed that in both seasons, tree No. (3-4) gave comparatively the tallest fruits as compared with those of other trees. Nevertheless, tree No. (3-11) gave relatively short fruits. On the other hand, no remarkable differences were noticed among other trees.

Regarding fruit diameter, it is noticeable that in both seasons, the widest fruits were produced from trees No. (2-2) and (2-4). In addition, grafted trees as well as tree No. (3-3) gave not only fruits similar in their diameter, but also wider than the analogous ones of trees No. (2-1), (3-2) and (3-11). Moreover, fruits of tree No. (3-4) showed relatively the lowest value in this respect.

Concerning fruit index (L/D) data clearly showed that all studied trees developed oblong fruits in both seasons. However, tree No. (3-4) gave comparatively the highest fruit index value, followed by those of trees No. (2-1) and (3-2), which showed similar values in this respect. Meanwhile, tree No. (2-2) gave the least value.

In addition, values of grafted trees were higher than those of tree No. (2-4), but similar to those of tree No. (3-3).

With respect to pulp percentage, it is quite evident that, in the first season, the lowest value of pulp percentage was noticed with tree No. (2-2). On the other hand, in the second season, the highest value of pulp percentage was observed with tree No. (2-4), followed by the grafted trees and tree No. (3-4). In addition, trees No. (2-1) and (3-3) gave more or less similar values which were higher than those of trees No. (2-2), (3-2) and (3-11). However, the latter trees were nearly similar in their values. Generally, tree No. (2-4) surpassed all other trees in pulp percentage (as an average of two seasons) whereas, tree No. (2-2) took the other way around. In spite of that both grafted trees and tree No. (3-4) gave higher percentage of fruit pulp, but they were still lower than those of tree No. (2-4).

In regard to pulp thickness, it is clear from tabulated data and photographs that in both seasons, fruits of both trees No. (3-3) and (2-4) had relatively the highest pulp thickness, followed by those of grafted trees. Meanwhile, pulp thickness of trees No. (2-2) and (3-2) were not only similar but also higher than the corresponding ones of trees No. (2-1) and (3-4), which were in the meantime similar in their values. On the other hand, pulp thickness of tree No. (3-4) was relatively low as compared with other trees, but higher than those of tree No. (3-11) which showed comparatively the least pulp thickness in both seasons.

With respect to number of seeds per fruit, it is clear that in 1983 and 1984 seasons, the greatest number of seeds per fruit was produced from tree No. (3-3), Table (6) and Fig (7) ,the picture was changed to the reverse, with trees No. (2-4), (3-2), (3-4) and grafted trees which gave also similar values in this respect. Moreover, fruits of trees No. (2-1) and (2-2) contain similar No. of seeds, which were higher than analogous ones of tree No. (3-11).

Considering seed weight, data showed that, the least value of seed weight was noticed with tree No. (3-3). On the contrary, the highest seed weight was obtained with grafted trees, In addition, seed weight of tree No. (2-4) was higher than those of tree No. (2-2), (3-2) and (3-11) which were in general similar in their values. Moreover, differences in seed weight values between tree No. (2-1) and (3-4) were not so high to be remarkable.

As regard to fruit colouration.

data illustrated in Fig (20) show clearly that, fruits of all studied trees varied greatly in their colouration. The fruit colouration ranged from yellow, yellow orange to orange, with different numbers of the Colour Chart. Accordingly, fruits of different loquat trees could be arranged according to the range of colour (i.e. from yellow to orange) as follows :-

Fruits of tree No. (2-4) were yellow in colour (2-A)

Fruits of tree No. (2-2) were yellow with somewhat orange colour (12-B).

Fruits of tree No. (2-1) were yellow orange in colour (15-D).

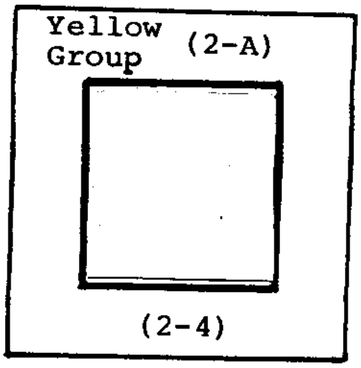
Fruits of tree (3-4) were yellow orange in colour (20-A).

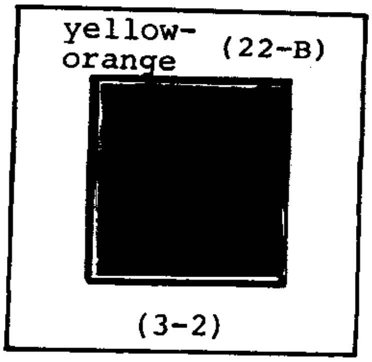
Fruits of tree No. (3-2) were yellow-orange in colour (22-B).

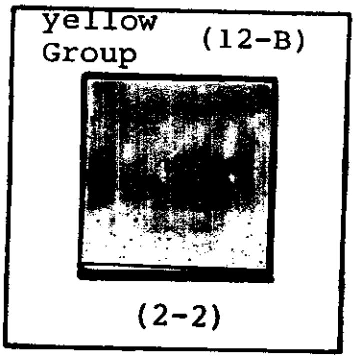
Fruits of grafted trees were yellow-orange in colour (22-A).

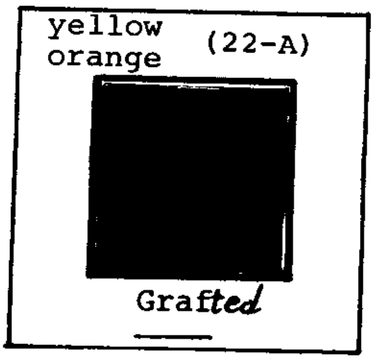
Fruits of tree No. (3-11) were orange in colour (26-B).

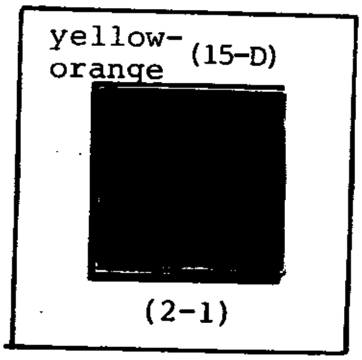
Fruits of tree No. (3-3) were orange in colour (26-A).

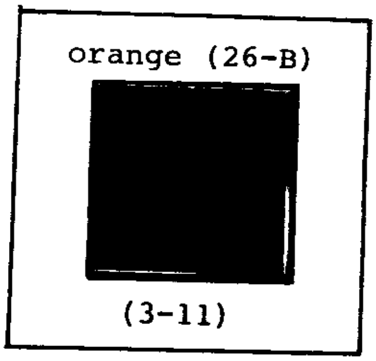

Yellow
Group
(2-A)
(2-4)

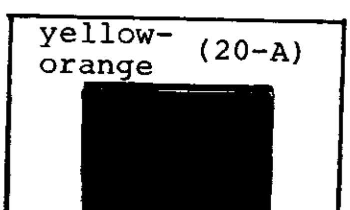

yellow-
orange
(22-B)
(3-2)

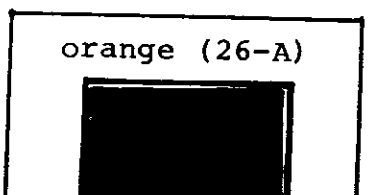

yellow
Group
(12-B)
(2-2)


yellow
orange
(22-A)
Grafted


yellow-
orange
(15-D)
(2-1)


orange (26-B)
(3-11)


yellow-
orange
(20-A)


orange (26-A)

Generally, differences in fruit physical properties between seedling as well as grafted trees confirm the previous findings of Badr (1976), Hussein (1977), El Wakeel *et al* (1977) and Ezzat *et al* (1977).

4.4.2. Fruit chemical properties

Fruit chemical properties of loquat trees expressed as total soluble solids percentage, total acidity, total soluble solids : acid ratio as well as ascorbic acid are shown in Table (7).

As for total soluble solids percentage of loquat fruits, data clearly show that, in both seasons, the highest percentages of total soluble solids were obtained from fruits of tree No. (3-3), followed by tree No. (2-4). Moreover, grafted trees had fruits, containing considerably higher percentage of T.S.S. in the first season but in the second season, they ranked the second. In addition, fruits of trees No. (2-1), (3-2) and (2-2) had nearly more or less similar values in this respect in both seasons. On the other hand, fruits of tree No. (3-11) had relatively lower value of total soluble solids as compared to all other studied trees with exception of tree No. (3-4) which showed the least values.

These results are in harmony with the findings of Badr (1976), El Wakeel et al (1977), Hussien (1977) and Ezzat et al (1977).

Concerning total fruit acidity, it is obvious that in both seasons, tree No. (3-3) had considerably the most acid fruits as compared to all other trees.

Table (7) : Fruit chemical properties of grafted as well as seedling loquat trees during 1983 and 1984 seasons.

Character / Tree No.	1983				1984				AVERAGE OF TWO SEASONS			
	T.S.S. (%)	Total acidity (%)	T.S.S./acid ratio	Ascorbic acid mg/100 ml. juice	T.S.S. (%)	Total acidity (%)	T.S.S./acid ratio	Ascorbic acid mg/100 ml. juice	T.S.S. (%)	Acidity (%)	T.S.S./acid ratio	Ascorbic acid mg/100 ml. juice
Grafted	13.87	1.04	13.33	0.68	13.20	0.92	14.34	0.67	13.53	0.98	13.81	0.67
(2-1)	12.33	0.83	14.85	0.65	9.66	0.75	12.88	0.64	10.99	0.79	13.91	0.64
(2-2)	12.03	0.92	13.07	0.55	9.66	0.85	11.36	0.54	10.84	0.88	12.32	0.54
(2-4)	14.50	0.99	14.64	0.55	13.26	0.89	14.90	0.56	13.88	0.94	14.76	0.55
(3-2)	12.03	0.72	16.70	0.52	10.06	0.69	14.57	0.55	11.04	0.70	15.13	0.53
(3-3)	14.73	1.33	11.08	0.51	13.33	1.01	13.20	0.56	14.03	1.17	11.99	0.53
(3-4)	8.30	0.75	11.06	0.63	8.10	0.69	11.73	0.61	8.20	0.72	11.39	0.62
(3-11)	9.26	0.29	31.93	0.82	9.06	0.32	28.31	0.75	9.32	0.30	31.07	0.78

On the contrary, fruits of tree No. (3-11) seemed to be the least in this concern. Moreover, grafted trees ranked the second, followed by trees No. (2-2) and (2-4) in a descending order. On the other hand, values of total fruit acidity of trees No. (2-1), (3-4) and (3-2) were in between. Badr (1976), El Wakeel et al (1977), Hussein (1977) and Ezzat et al (1977) reached somewhat similar results.

As T.S.S./acid ratio was concerned, it is quite evident from Table (7) that in both 1983 and 1984 seasons, the highest ratio of T.S.S./acid was marked with fruits of tree No. (3-11), in spite of the low level of its total soluble solids percentage, but this was compensated by the distinct low percentage of total fruit acidity. On the contrary, the least value of T.S.S./acid ratio was obtained from fruits of tree No. (3-4). Nevertheless, fruits of trees No. (3-2) and (2-4) showed considerably high values in this respect, in both seasons. On the other hand, trees No. (2-2) and (3-3) showed nearly similar values of T.S.S./ acid ratio, but variance was only with respect to the season. Moreover, fruits of trees No. (2-1) and (3-2) had nearly in between values. Generally, in both seasons, tree No. (3-11) gave the earliest matured fruits, whereas the opposite was true when tree No.

(3-4) was concerned. Meanwhile, fruit maturity of studied trees could be arranged in descending order as follow : Tree No. (3-11), (3-2), (2-4), grafted trees, (2-1), (2-2), (3-3) and (3-4). These results are in agreement with that reported by Badr (1976) , El Wakeel et al., (1977) and Hussein (1977).

Regarding ascorbic acid content, it is worthy to notice that, in both seasons, the richest fruits in ascorbic acid content were obtained from tree No. (3-11). Moreover, fruits of grafted trees as well as those of trees No. (2-1) and (3-4) were nearly similar in their values and in the same time moderate in their ascorbic acid content. On the other hand, fruits of trees No. (2-2), (2-4), (3-2) and (3-3) were not only similar in their ascorbic acid content but also gave the least values as compared to those of other trees. Similar findings were reported earlier by El Wakeel et al (1977) and Hussein (1977).

Generally, the average of two seasons, showed that higher percentage of T.S.S. existed in fruits of tree No. (3-3). On the contrary, the lowest percentages of T.S.S. were obtained from fruits of trees No. (3-4) and (3-11). Other studied trees were in between in this respect.

Moreover, fruits of tree No. (3-3) were more acid in their taste, due to their higher content of acidity. On the other hand, tree No. (3-11) developed fruits with the lowest value of acidity. Other trees were in between in this respect.

Furthermore, T.S.S./acid ratio of fruits of studied trees, indicated that the highest value was observed for tree No. (3-11), where this tree gave fruits with the lowest T.S.S. and acidity content, simultaneously. Consequently, this tree matured their fruits earlier than other trees. In addition, tree No. (3-3) gave late maturing fruits. This tree gave fruits with relatively the lowest value in T.S.S./acid ratio. This result may be contributed to the lowest content of T.S.S. on one hand and the highest content of fruit acidity on the other.

Meanwhile, fruits of tree No. (3-11) contained the highest amount of ascorbic acid, whereas the reverse was true when trees No. (2-2), (2-4), (3-2) and (2-1) and (3-4) were in between and could be arranged in descending order.

4.5. Evaluation of the loquat trees

Loquat trees under this study were evaluated through two directions :

1- Fruit quality 2- Tree yield

1- Fruit quality

Concerning data reported in Table (6 & 7) and illustrated in Figs (2 - 9), it could be mentioned that the studied loquat trees varied greatly in their fruit properties. Accordingly, each of the evaluated trees might be considered as a cultivar initial. For instance, the fruit shape varied between the studied trees from pyriform to oblong.

For the comparison between the different investigated trees and the selection of some clones, the general average ($\bar{X}'$) and its confidence limits (upper and lower limits were calculated for each character.

The fruit weight, pulp percentage and the reduction of seeds number per fruit were recommended as the most effective characters taken in consideration for the clonal or varietal selection of loquat (Bailey, 1958) The percentages of total soluble solids and total acidity came next, in this respect, because the loquat fruits can be utilized in several ways, trees of sweety , well balanced-taste fruits are favoured for the fresh consumption, meanwhile, trees of the acid fruits are usually of value for making loquat pies and jellies (Bailey, 1958 and Chandler, 1958).

As for fruit weight, it ranged from 16.5 to 25 g. with a general average of 20.75 g. In this respect, four trees were of actual superiority in fruit weight, though tree No. (2-4) was considered as the first tree followed by grafted trees, trees No. (2-2), (3-2) and (3-11) in a descending order.

Regarding pulp percentage, values of the studied trees varied between 70.25 and 82.04% with a general average of 76.15%. Consequently, tree No. (2-4) came first, followed by tree No. (3-3) and grafted trees in descending order which were of actual superiority in the average percentage of fruit pulp.

Concerning, the average number of seeds per fruit, values of the evaluated trees ranged from 3 to 6 seeds per fruit with a general average of 4.5 seeds. Accordingly, four trees were actually having the least number of seeds per fruit. Thus, tree No. (2-4), followed by grafted trees, trees No. (3-2) and (3-4) were more superior in this respect.

Furthermore, it appears from Table (7) that the evaluated trees were of considerable variability as they compared through their ultimate percentages of the total soluble solids. Values of the studied trees varied between 8.20 and 14.03 with a general average of 11.12%. Consequently, three trees were of actual superiority in this respect. From this stand point, these trees could be arranged in descending order according to their actual superiority in this respect as follow : Tree No. (3-3), (2-4) and grafted trees.

As for titeratable acidity, Selim et al (1975) evaluated some seedling loquat trees. They mentioned that titeratable acidity of the most studied trees were higher than the general average, owing to the great variability among the studied trees. They added that, total acidity could be omitted and substituted by T.T.S./ acid ratio.

Henceforth, it could be concluded that fruits of trees No. (2-4), grafted trees and tree No. (3-2) are the preferable ones for the fresh consumption.

As to first tree No. (2-4), its fruit were superior both in weight (25 g.), pulp percentage (82.04%), number of seeds per fruit (3), T.S.S. value (13.88%). however, it was within limits of population average in T.S.S./ acid ratio (14.76:1).

The second tree, grafted trees were of actual superiority in average fruit weight (23 g.), pulp percentage (78.21%) seed number (3), T.S.S. value (13.53) and it was within the limits of population in T.S.S./acid ratio (13.81:1).

Superiority of the third tree No. (3-2) showed in fruit weight (21 g.), reduction in seed number per fruit (3) and T.S.S./acid ratio (15.13:1). Moreover, pulp percentage and T.S.S. were within limits of population.

2- Tree yield

Evaluation of loquat trees through tree productivity (i.e. yield kg./tree, as an average of the two seasons), Table (5). From this standpoint, the studied trees could be arranged in descending order according to their actual superiority in this respect as follow :-
Tree No. (2-2), (2-4), (3-11), (2-1), (3-2) and (3-4).
However, differences between trees No. (3-11) and (2-1) as well as trees No. (3-2) and (3-4) were so small to be considered.