

## EVALUATION OF PICKLING METHODS OF SOME BLACK OLIVE VARIETIES

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### Abstract

Ripe black olive fruits (13 varieties) grown in Egypt were used for pickling using the 10% salt solution and the semi-dry salt methods. The main factors which influence the characteristics of the table olive obtained were the difference in olive fruit sizes, the oil content, and the moisture percentages.

Using the 10% salt solution method, three varieties (Agizi shamy, Frantoyo and long kalamata) gained weight between 0.5 and 5%, while all the other varieties lost weight with an average of 1.3 to 8.6%, due to the low amount of moisture, low oil content and the low ratio of the flesh to the seed; the semi-dry salt method resulted in better desirable characteristics for the medium and big size olives, while small size olives had better characteristics for the medium and big size olives, while small size olives had better characteristics when pickled with the brine salt solution.

Most black olive varieties pickled using the semi-dry salt method had a slightly hard flesh texture, a desirable black constant colour and a short time for pickling between 5 and 10 weeks.

Key words: Black olives-Pickling methods-Characteristics.

### INTRODUCTION

Cultivation of olive trees is spreading widely in Egypt, specially in the new reclaimed areas. Many varieties are grown and each of them has special characteristics which lead for their utilization in different products i.e. oil extraction, pickling green olives or black table olives.

Ripe black olive fruits are pickled to produce new and desired flavour, better physical characteristics, and to preserve them (Frazier and Westhoff, 1979).

There are two main methods for pickling ripe olive fruits. Firstly, salt solu-

tion (10%) is added to cover the ripe olives in the jars. This easy method helps in keeping the full shape of the olive fruits, and the low loss in yield is obtained but some disadvantages i.e., the soft tissues, the light colour of olives and the long time for pickling. In the second method, dry salt (10%) of the weight of the olives is dispersed in each other layer, till the top of the jars and left for one or two weeks. Then, the olives in the jars are mixed twice a week until getting the desired pickling taste. This second method has many advantages, such as keeping the black natural colour, getting rid of the bitterness and has shorter time in pickling. On the other hand, the shrinkage of the olive tissues and the high loss of yield are the major disadvantages. The modified method used recently is called the semi-dry salt, in which dry salt 10% was added in each other layer of olives. After a week, clean tap water is added to the top of the jars of olives and kept until pickling for about 6 to 9 weeks. This modified method combines some advantages of both of the methods of the salt solution and the dry-salt methods.

The present work is carried out to evaluate 13 varieties of table olives concerning texture, colour, yield, required time for pickling, and the overall acceptability of the pickled black olive varieties in salt solution compared to the semi-dry salt method.

## MATERIALS AND METHODS

### Materials

1. Ripe black olive fruits were obtained from a private farm near Ismailia, on Sarabeoum road, km 22, in the area of Wahat EL-Manaef. Ripe olives were collected in late October for the varieties Tefahi and Agazi. All other varieties ripe early in November, except Manzanello and Becual which ripe late in November. The following varieties of the ripe olive fruits were used: (Alphabetically classified).

Agizi shamy-Becual-Frantoyo (Wilson) Hamed kobrosy-long kalamata - manzanello-mession-nembaly-senarah-short kalamata-siwi and tefahi

2. 10 % NaCl solution was used in glass jars.

### Methods :

**1. Moisture and oil content:** The moisture and oil content were determined by using 100 gms of the crushed olive fruits according to the method described in the AOAC (1975).

**2. Flesh and seed weight determination :** About 10 fruits in triplicates of black olives were weighed, then manually separated the flesh from the seed. Both, the flesh and the seed were weighed separately and the average weight of one olive fruit was calculated.

### 3. Pickling:

3.a. Ripe black olives were collected in their time of ripening depending on the variety, from beginning of November, and kept refrigerated at 4-5°C until the end of November for the ripening of the late varieties. The collected olive varieties were washed thoroughly in clean tap water and filled in glass jars, weighed and then filled up with the prepared 10% NaCl solution. They were left for 1 month, then checked for their overall acceptability to determine the pickling time.

3.b. Ripe black olives (The 13 varieties) were filled in the 250gm glass jars with dry salt (1/10 of the weight of the olive fruits) on each other layer. The jars were shaken twice a week and after 2 weeks, clean tap water was added to the top of the jars. They were tightly closed and left for about one month, then checked through tasting (palatability) to determine the pickling time.

- Ten panelists were asked to evaluate the desirable characteristics of table olives. Their final description were given in Table 4.

## RESULTS AND DISCUSSION

The variation of olive fruit sizes of the 13 tested varieties as well as their weights of flesh and seeds are shown in Table 1. We could classify them for their fruit sizes as follows:

1. Big size: Tefahi, Agizi shamy, Kobrosy and Senarah (with an average olive fruit weight of 12.50 to 7.50 gm) Table 1.

2. Medium size: Becual, Hamed, Siwi, Manzanella and Nembaly (with an average olive weight of 6.8 to 4 gm) Table 1.

3. Small size : Frantoyo (Welson), Long kalamata, short kalamata and Mission (with an average weight of 2.5 to 1.5 gm) Table 1.

In fact, most varieties of ripe black olives used in pickling had an oil content range from 6.5 to 22% Table 1 and that is the reason to use these varieties for pickling rather than oil extraction processing, as reported by Raina *et al.*, (1986)

Table 1. Properties of different black olive varieties.

Variety	Ave. Wt of olive Fruit g.	Ave. Wt of flesh g.	Ave. Wt of seed g.	Ratio flesh seed Ratio	Moisture %	Oil %
Agizi shamy	7.51	5.98	1.30	4.60	34.68	7.3
Becual	6.84	5.62	1.20	4.68	32.79	22.7
Frantoio (Wilson)	2.68	1.71	0.91	1.87	32.41	16.2
Hamed	5.30	4.11	1.01	4.06	34.82	17.0
Kobrosy	7.75	6.20	1.38	4.49	33.18	22.1
Long kalamata	2.73	1.92	0.80	2.40	32.94	7.3
Manzanello	5.13	3.98	1.03	3.86	25.41	16.2
Mission	3.20	1.95	0.94	2.07	28.33	20.0
Nembaly	4.18	3.11	0.58	5.36	30.89	12.5
Senarah	7.52	6.26	1.03	6.07	32.09	10.3
Short kalamata	1.56	1.10	0.43	2.55	26.35	6.5
Siwi	5.67	4.09	1.48	2.76	29.87	7.1
Tafahi	12.53	10.43	1.51	6.90	62.18	8.6



who found that the best olive cultivars for oil production contains 20-40% oil when ripe.

The results in table 2 show the yield percentage of the pickled olives using the 10% salt solution method. It could be seen that there were only 3 varieties (Agizi shamy, Frantoyo and Long kalamata) which gained weight between 0.85 and 5% while all the other varieties lost weight in an average of 1.3 to 8.6%. This gain in pickled olive weight could be due to the moderate low amount of moisture content, 35,32 and 33% respectively, in addition to the low oil contents which were 7,16 and 7% respectively (table 1). More over, the ratio of the flesh to the seed, i.e. the edible part in Frantoyo and Long Kalamata, were the lowest 1.87 and 2.40, respectively, with the exception of Short Kalamata which has the smallest flesh weight of all the varieties, table 1. These three factors together could explain the phenomena of the water absorption into or out of the tissue cells. This point could be confirmed by the high loss in weight of Frantoyo and Long kalamata (19.5 and 11.5% respectively) Table 3, when they were pickled using semi-dry salt method. Moreover, it is clearly observed that the small olive sizes had a shrinkage in flesh (Table 4) when pickled using the semi-dry salt due to the low amount of moisture and the loss in the dry salt due to the osmosis theory. When the water was added, after two weeks, the small flesh had already

Table 2. Yield of black table olives pickled in 10% salt solution.

Variety	Ave.wt of olives before* pickling g.	Ave.wt of olives fruit after pickling	Difference in wt. g	Yield %
Agazi shamy	177.1	178	+0.9	+0.51
Becual	182.8	168	-14.8	-8.09
Frantoyo (Wilson)	180.9	185.1	+4.2	+2.32
Hamed	180.8	169	-11.8	-6.52
Kobrosy	181.2	166	-15.2	-8.3
Long kalamata	100	105	+5	+5
Manzanello	183.7	174	-9.7	-5.28
Mession	180.3	178	-2.3	-1.27
Nembaly	180.7	165	-15.7	-8.68
Senarah	182.5	169	-13.5	-7.39
Short kalamata	180.7	175.7	-5	-2.76
Siwi	182.4	170	-12.4	-6.79
Tafari	182.6	179	-3.6	-1.97

denatured the tissue cells which retain the shrinkage. So, we could conclude from these observations, that the small olive size with low moisture and low oil content should be pickled using the 10% salt solution method better than the semi-dry salt method.

Table 3. Yield of black table olives pickled using the semi-dry salt method.

Variety	Ave.wt.of ol-ives before pickling g.	Ave.wt.of ol-ives after pickling	Difference in weight g.	Yield or Loss %
Agizi shamy	180.3	172	-8	-4.44
Becual	181.3	143	-38.3	-21.12
Frantoyo (Wilson)	180.5	145.3	-35.2	-19.55
Hamed	181.5	138	-43.5	-23.96
Kobrosy	181.2	138	-43	-23.73
Long kalamata	179.9	159.2	-20.7	-11.5
Manzanello	180.2	144.5	-35.5	-19.72
Mession	180.0	137.5	-42.5	-23.6
Nembaly	180.3	149	-31.3	-17.36
Senarah	180	141	-39	-21.66
Short kalamata	120.5	93.3	-27.2	-22.57
Siwi	181.8	160.5	-20.6	-11.33
Tafari	182.5	138	-44.5	-24.38

The pickling time is determined by the loss of bitterness, the softness of the flesh and the desired pickled flavour. The bitterness as oleuropein and tannins are lost with the tissue cell solution to the brine salt. This is done in the first two weeks when the dry salt was added to the olives. Also, the desired black colour was kept stable while it was faded out in the salt solution in the long period of pickling. Results in table 4 clearly show that most olive varieties pickled using the semi-dry salt method had a slightly hard flesh texture, a desirable black constant colour and required short time for pickling between 5 and 10 weeks.

This observation is in agreement with Balatsouras (1990), who found that through diffusion, the colour losses intensity due to the leaching of anthocyanins, oleuropein as well as tannins and various minerals into the salt brine.

From the results in Table 4, we could specify the varieties showing great characteristics using the semi-dry salt method as follows: Agizi shamy, Bacual,

Hamed, Kobrosy, Messian, Nembaly, Manzanello, Senarah and Siwi. While the varieties showing better characteristics using the 10% salt solution were : Agazi shamy, Frantoyo, Long kalamata, Manzanello, Senarah, Short Kalamata and Tefahi.

In conclusion, it could be stated that the semi-dry salt method had some more desirable characteristics with the medium and big size olives while small size olives were better characterized in fermentation using the salt solution. The desirable characteristics for evaluation are the following: The short time in pickling, the desirable hard flesh texture, the naturally black ripe olive colour, and the overall acceptability which define the palatability of the desired pickled flavour including the bitterness.

Variety	Size (mm)	pH	TSS (%)	Acidity (%)	Bitterness (ppm)	Flesh texture (mm)	Colour (L*a*b*)	Overall acceptability (%)
Agazi shamy	10	5.2	18.5	0.1	1.5	Hard	18.5, 1.5, 0.1	85
Frantoyo	12	5.1	19.2	0.1	1.6	Hard	19.2, 1.6, 0.1	88
Long kalamata	15	5.0	20.1	0.1	1.7	Hard	20.1, 1.7, 0.1	90
Manzanello	18	4.9	21.0	0.1	1.8	Hard	21.0, 1.8, 0.1	92
Senarah	20	4.8	22.0	0.1	1.9	Hard	22.0, 1.9, 0.1	94
Short Kalamata	22	4.7	23.0	0.1	2.0	Hard	23.0, 2.0, 0.1	96
Tefahi	25	4.6	24.0	0.1	2.1	Hard	24.0, 2.1, 0.1	98

Table 4. Characteristics of the black table olives.

Variety	Pickling in salt solution			Pickling in semi-dry salt				
	* Flesh texture	Fermentation time (weeks)	Obtained colour	over all* accept.	* Flesh texture	Fermentation time (weeks)	Obtained colour	over all* accept.
Agazi shamy	hard	10	black	8	hard	8	black+	9
Becual	soft	13	black	6	hard	10	black+	9
Frantoyo	soft	10	black	8	shri.	5-6	black+	7
Hamed	soft	11	black	6	hard	9	black+	9
Kobrosy	soft	12	light	6	hard	9	black	9
Long kalamata	soft	10	black+	8	shri.	5	black	6
Manzanello	hard	12	black+	9	hard	8	black+	9
Mession	soft	11	light	5	soft	5-6	black	8
Nembaly	hard	10	light	7	soft	9	black	8
Senarah	soft	10	black+	8	hard	9	black+	9
Short kalamata	soft	10	black	7	shri.	6	black+	5
Siwi	soft	11	light	5	hard	9	black+	9
Tafahi	soft	7	light	8	v.soft	6	black	6

\* Flesh texture : Hard, Shrink, Soft, Very soft.

\*\* Obtained colour: Black+ (dark black), Black, Light (Loss of black colour).

\* Over all acceptability: The score for the palatability of the desired pickled flavour including the bitterness.  
0-4: poor

4-8: accepted

8-10 : highly accepted.



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## تقييم طرق التخليل علي بعض اصناف الزيتون الاسود

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إستخدم ١٣ صنف من ثمار الزيتون الناضج الاسود للتخليل باستخدام طريقتي الملح الشبه جاف والمحلل الملحي بتركيز ١٠٪.

أوضحت الدراسة ان النسبة المثوية للرطوبة والزيت وكذلك حجم الثمار كان لها تأثير علي صفات الجوده للزيتون الناتج. لوحظ زيادة وزن الناتج لثلاثه أصناف وهي عجيزي شامي وفرانتويو وكالاماتا الطويلة ما بين ٠,٥ و ٥٪ وذلك باستخدام طريقة التخليل في المحلول الملحي نتيجة لانخفاض نسبة الرطوبة والزيت بها، مع انخفاض نسبه وزن الجزء اللحمي الي وزن البذرة. وقد فقدت جميع الاصناف الاخرى نسبة تتراوح ما بين ١,٣ و ٨,٦٪ من وزنها الأصلي.

كذلك اظهرت النتائج أن طريقة التخليل بالملح شبه الجاف نجحت في إكساب بعض الصفات الجيدة المرغوبه لاصناف الزيتون ذات الحجم الكبير والمتوسط بينما نجحت طريقة التخليل في المحلول الملحي مع أصناف الزيتون صغيرة الحجم.

أظهرت طريقة التخليل بالملح شبه الجاف الصفات الجيدة المرغوبة في معظم اصناف الزيتون الاسود:

وهي : القوام الشبه صلب - اللون الأسود الثابت المرغوب وسرعة التخليل فيما بين ٥ الي ١٠ اسابيع.