Misr J. Ag . Eng., 22 (2): 498 - 512

PHYSICAL AND ENGINEERING CHARACTERISTICS, AND OIL EXTRACTION FOR SOME OLIVE FRUITS VARIETIES

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ABSTRACT

Physical and engineering properties for four olive fruits varieties (Picual, Coratina, Arbequina, and Koroneiki) and their pits as well as the best harvesting time, effect of storage and methods of olive oil extraction were determine. Results showed that Picual variety had the highest fruits length, diameter, flesh thickness, weight, volume, flesh/fruit percentage and flesh/pit ratio followed by Coratina, Arbequina and Koroneiki. It was found that the fruit length, diameter and weight were directly proportional to its pit for the investigated varieties.

The weight of olive fruits for each variety were daily decreased as storage time increased. And the less weight fruits (Koroneiki) lost more during storage than others. It was found that no changes in the percentage of oil extracted during storage period. However acidity peroxide values were increased as storage increased. Results showed that the oil became unacceptable after storage of fruits for three days in all varieties and consequently should be processed before that time.

On the basis of oil yield and quality it was found that the best harvesting time for Picual, Coratina, and Koroneiki was at over maturity stage which for Arbequina it was at full maturity stage.

Results also avowed that centrifugal process is much better for olive oil extraction than pressing in which it gave a high yield and high quality oil.

Keywords: physical, engineering, varieties, olive, Picual, Coratina, Arbequina, Koroneiki, storage, harvesting time, oil extraction, methods.

INTRODUCTION

In Egypt there is a big gab between consumption and production of oils. The total production of oil represents about 10 - 15 % of the total oil requirements, while 90 – 85 % are imported from different countries. Olive trees are considered one of the most important crops which grown in desert land for their superior ability to cope (antagonize) the deserts conditions like dryness, hard climate and shortage in water supply. Also they can grow in

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all kinds of land, antagonize to acrimony the nature and climate, and sometimes for the neglecting of human.

The original zones of olives trees are in the countries around the Mediterranean Sea. The total production of these countries are more than 94 % of olive fruits and 98 % of olive oil from the world production. Therefore both the olive fruits and olive oil play an important roles for supporting the economics situation of many countries. In Egypt, the planted area of olive trees has increased from 44.5 thousand feddans in 1990 to about 117.9 thousand feddans in 2002. The production of oil was increase from 934 ton in 1990 to 4399 ton in 2001 **(M A L R 1990-2002).**

Henderson and Perry (1981) mentioned that cleaning, sorting, and partial or perhaps final grading or classifying of the products are based upon the material: size, shape, specific gravity, and surface characteristics.

Klenin et al. (1985) showed that the agricultural product is cleaned and graded according to various criteria such as geometric size of each particles, their aerodynamic properties, the shape and state of the surface, density and specific weight, electric conductivity and color.

Ibrahim (1992) indicated that the processed materials vary considerably in their physical properties such as size, shape, density, volume, specific gravity, porosity, and surface texture. These characteristics are very important in many problems associated with design or development of a specific machine, analysis of the behavior of the product, handling and stress distribution in the material under load.

Mohsenin (1984) indicated that in certain applications where both shape (sh) and size (s) affect the process, the relationship can be expressed by a single, two dimensional system as follows: $I = f(sh, s)$, where "I" may be a function of not only shape and size but also of such other parameters as orientation "O", packing "P", firmness "F",.................etc., as follows:

$$I = f(sh, s, O, P, F)$$

Davies and Albrigo (1994) found that fruit size is a function of several factors including cultivator, rootstock, crop load and cultural practices such as irrigation and nutrition.

Chakraverty (1987) difined the sphericity as the ratio of surface area of sphere having same volume as that of the particle to the surface area of the particle. Sphericity (S) is defined as:

$$S = d_l / d_o$$

Where:

d_l = diameter of largest inscibed circle;

d_o = diameter of smallest circumscribed circle of the particle.

Blahovec et al. (1994) classified the most important, four cultivars of olive grown in Egypt at harvest as unripe, ripe or overripe. The detachment force required for single olives was measured using the force-sensing element of the Hacker FPZ 10/01 universal-testing machine. Detached olives were then subjected to compression tests between 2 plates. Mean values of the obtained results showed that the ripening of olives is connected with decreasing firmness and/or detachment force and with increasing diameter and mass.

Kiritsakis (1991) indicated that ideally, to extract the oil after harvesting of the olive without delay. This would secure the highest yield and the best quality oil.

Agar et al. (1998) and **Agar et al. (1999)** reported that the oil content remained unchanged in the four cultivars of olive during storage at 5 °C. Black-ripe Ascolano and Sevillano olives contained 28.5 and 28.8% oil (on a dry mass basis), respectively, whereas Manzanillo and Mission olives contained 33.3 and 37.7 %, respectively. Oil content of black-ripe Manzanillo and Ascolano olives stored at 20 °C for 2 week was 29.9 and 26.5 %, respectively, which was lower than the initial values and those of olives stored at 5 °C, whereas oil content of the other cultivars remained unchanged.

Garcia et al. (1996), Garcia et al. (1996), Agar et al. (1998) and **Agar et al. (1999)** reported that the increase in titratable acidity and peroxide values of the oils is the main effect of fruit decay. In general, the first action of a parasitic microorganism in an oil-rich tissue is the development of hydrolytic activity of lipases. As a consequence, after their extraction, the oils showed a titratable acidity value in direct proportion with the percentage of decay of the fruits from which they were extracted.

Raina et al. (1986) reported that cv. Coratina had the highest oil content 43.4 %. In addition, **Kumar and Goswami (1986)** showed that cv. leccino gave the highest oil percentage 40 % when compared with the Ascoiterna, Frantoio, Cornicobra and Pendolino.

Kaynas et al. (1992) found that oil content of fresh fruits varied from 8.07 % in cv. Haramijrsedsu to 21.80 % in cv. Gemlik.

Kiritsakis (1991) reported that the main constituents of olive paste are: olive oil, small pieces of the kernel, water cellular debris of crushed olives. Pressure, centrifugation or a combination process may be applied for the separation of oil from the other constituents.

Michael et al. (1999) concluded that because the method of extraction is such an integral part of an oil's quality, nutritional value, flavor, and color, its processing method is addressed.

Di Giovacchino (1989) summarzed the advantages and disadvantages of the pressing process as follow:

Advantages: Simple, reliablle machineries, limited investment, low water and oil content in the olive pomace with small quantity of waste water.

However the disadvantages: Contamination of the filter cloths, labor intensive and discontinuous process.

Therefore the present study was carried out to evaluate the physical and engineering characteristics of some olive fruits as well as best harvesting time and maximum storage period after harvesting. Two methods (i.e centrifugal process and press process) of oil extraction were also evaluated.

MATERIAL AND METHODS

Olive fruits varieties (Picual, Coratina, Arbequina and Koroneiki) were supplied by El-Rabie Company in Wadi El- Faregh Kilo 62 Cairo, Alex. Desert road during months (October, November, December of 2002, 2003, 2004).

physical and engineering properties of olive fruits:

Physical properties:

Physical properties (Shape index, Volume, Flesh / fruit % and flesh / pit ratio) of the olive fruits were determined as follow:

Shape index: A random sample of one hundreds ripened olive fruits from each variety for three seasons (from October 2002 to December 2004) were used. Shape index or Sphericity of the measured samples was calculated according to **(Buyanov and Voronyuk 1985)** as follows:

$$I = l / d$$

Where:

- **I** = The shape index,
- **l** = Length of fruit, mm;
- **d** = Diameter of fruit at the middle of its length, mm .

Volume: The theoretical volumes of fruit were calculated by the following equation **(Mohsenin, 1984):**

$$V = (\pi / 6) * L * D^2$$

Were:

- **V**= Theoretical volume of individual fruit, mm^3;
- **L** = Length of the olive fruit, mm;
- **D**= Diameter of the olive fruit, mm.

Flesh / fruit % and flesh / pit ratio:

These percentages or ratios were calculated for the individual fruit using the weight of fruits and its pit according to **(Mohsenin, 1984)** as follows:

$$\text{Flesh / fruit \%} = (W_F - W_P) * 100 / W_F$$

$$\text{Flesh / pit ratio} = ((W_F - W_P) / W_P$$

Where:

W_F= Weight of the individual olive fruit, g;
W_P= Weight of pit for the same olive fruit, g.

Engineering properties:

Engineering properties (repose angle, hardness and shear force) of the olive fruits were determined as follow:

Fruit repose angle: A known weight of olive fruits around 40 – 50 kg were poured under gravity from a suitable height into repose angle apparatus. The rectangular box was kept in the vertical position and the free surface of the fruits was leveled. The box was gradually tilted into the horizontal position. The free surface of the olive fruits then makes an acute angle (α) with respect to the horizontal. By using the simple construction of a wooden protractor with the wooden parallelogram, the formed angle was measured. The angle between the free surface of the fruits and the horizontal plan was recorded to represent repose angle of the fruits. The recorded angle was the average of five replicates.

Hardness:

Flesh hardness: fifty olive fruits were used for flesh measurements by using digital hardness meter.

Pit hardness: fifty olive pits were used hardness measurements by using Penetro meter.

Vernier caliper: Digital vernier caliber with an accuracy of 0.01 mm was used to measure the different dimensions of fruits and its pits: length (L), diameter (D), flesh thickness (T_f) for each olive fruit of the studied varieties.

Determination of best harvesting time:

Olive fruits were harvested daily at different periods: (1) at full size without color. (2) full size and begging of coloring (after 15 days). (3) full size and full coloring (after 15 days). (4) over maturity (after 7 days). The ripeness index of all harvest fruits was calculated according to **Garcia, et al. (1996)** by equation:

$$\textbf{Ripeness index} = \Sigma\,(i n_i)\,/\,100$$

Where i is the number of the group, and n_i, the number of olives in it.

Storage of olive fruits:

Olive fruits were harvested then directly stored for 7 days at temperature (29-33 C°) and relative humidity 79-89 %. Acidity, peroxide value, oil yield, and change in fruits weight for the stored fruits were daily determined during the storage period.

Method of oil extraction:

Two methods of oil extraction, namely: centrifugal process [by using TOSCANE Hourly working capacity 1200 kg. and power requirement 44 kW/h], and press process (by using ENOAGRICOLA ROSSI) were applied hourly working capacity 250 kg. ·with 1 press and 2 trolleys. Power requirement 15 kW/h.

RESULTS AND AISCUSSIN

Physical properties of the investigated fruits and their pits:

Physical properties (length, diameter, flesh thickness, sphericity, weight, and volume) of Egyptian olive fruit varieties (Picual, Coratina, Arbequina, and Koroneiki) were determined as shown in tables (1 and 2).

Table (1): Physical properties for the investigated varieties of olive fruits and their pits.

Property	Variety	Average X̄	Range, Min - max
Fruit Length, (mm)	Picual	25.374	20.000 - 30.100
	Coratina	22.368	17.000 - 27.400
	Arbequina	16.926	14.000 - 19.000
	Koroneiki	17.760	14.300 - 20.200
Fruit Diameter, (mm)	Picual	20.914	18.000 - 24.700
	Coratina	17.654	15.100 - 20.800
	Arbequina	15.436	13.300 - 17.400
	Koroneiki	12.562	10.300 - 18.000
Pit Length, (mm)	Picual	17.166	14.500 - 20.500
	Coratina	17.593	14.800 - 20.000
	Arbequina	11.464	10.500 - 13.000
	Koroneiki	12.220	10.700 - 14.600
Pit Diameter, (mm)	Picual	9.366	8.000 - 11.000
	Coratina	9.173	7.500 - 10.000
	Arbequina	7.571	6.800 - 8.200
	Koroneiki	5.926	5.300 - 6.900
Flesh Thickness, (mm).	Picual	5.316	4.500 - 6.625
	Coratina	3.875	2.925 - 4.425
	Arbequina	3.344	3.050 - 3.725
	Koroneiki	3.221	2.725 - 3.775
Sphericity, (or shape Index)	Picual	1.213	1.076 - 1.436
	Coratina	1.265	1.121 - 1.459
	Arbequina	1.078	1.006 - 1.149
	Koroneiki	1.419	1.116 - 1.631

Table(2):Physical properties for the investigated varieties of olive fruits.

Property	Variety	Average X⁻	Range, Min - max
Fruit Weight, g	Picual	6.330	3.630 - 9.810
	Coratina	4.167	2.530 - 6.530
	Arbequina	2.420	1.570 - 3.580
	Koroneiki	1.506	0.870 - 2.120
Pit Weight, g	Picual	0.607	0.380 - 0.790
	Coratina	0.604	0.350 - 0.910
	Arbequina	0.378	0.240 - 0.560
	Koroneiki	0.221	0.150 - 0.260
Volume, Cm^3	Picual	5.903	3.394 - 9.233
	Coratina	3.715	1.950 - 6.209
	Arbequina	2.101	1.408 - 3.013
	Koroneiki	1.499	0.794 - 3.411
Flesh/fruit Percentage	Picual	89.004	87.804 - 90.458
	Coratina	85.289	83.333 - 88.782
	Arbequina	84.084	80.392 - 87.444
	Koroneiki	83.843	79.310 - 87.500
Flesh/Pit Ratio.	Picual	8.183	7.285 - 9.480
	Coratina	5.813	5.319 - 7.914
	Arbequina	5.348	4.100 - 6.965
	Koroneiki	5.271	3.833 - 7.000

Results in tables (1 and 2) show that Picual variety had the highest fruits length, diameter, flesh thickness, weight, volume, flesh/fruit percentage and flesh/pit ratio followed by Coratina, Arbequina and Koroneiki.

Results also showed that Picual pits variety had the highest diameter and weight followed by Coratina, Arbequina and Koroneiki. It was found that Coratina had the highest pit length followed by Picual, Arbequina and Koroneiki.

The relationship between fruit length, diameter and weight and their corresponding pits:

The obtained results in figs. (1, 2 and 3) showed that the fruit length, diameter and weight were directly proportional to their pits length, diameter and weight. These parameters were fitted for each variety and a linear functions had been drawn using the Microsoft Excel Program as follow:

$$y = 1.4051\,X + 0.857$$

The independent parameter (X) is the pit length (mm) and dependent parameter (y) is the fruit length (mm) and correlation factor (R^2)was 0.8199.

$$y = 2.3439\ X - 0.896$$

The independent parameter (X) is the pit diameter (mm) and dependent parameter (y) is the fruit diameter (mm) and correlation factor (R^2) was 0.7224.

$$y = 8.5475\ X - 0.52$$

The independent parameter (X) is the pit weight (g) and dependent parameter (y) is the fruit weight (g) and correlation factor (R2) was 0.865.

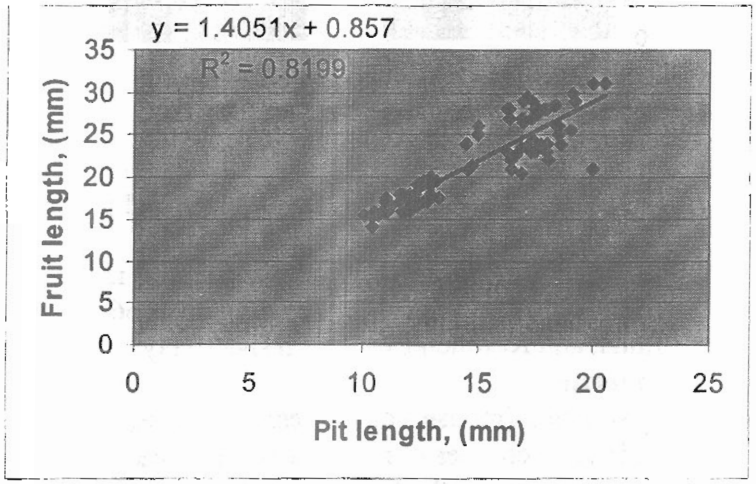

Fig. (1): The relationship between fruit length and its pit length.

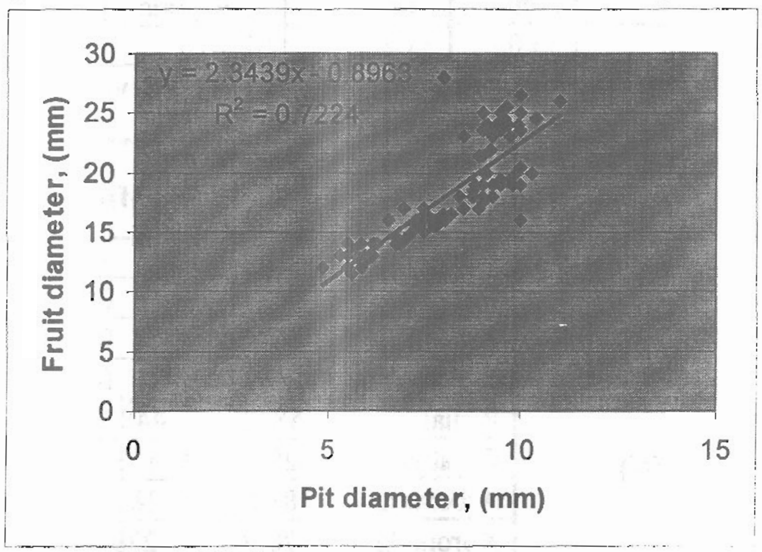

Fig. (2): The relationship between fruit diameter and its pit diameter.

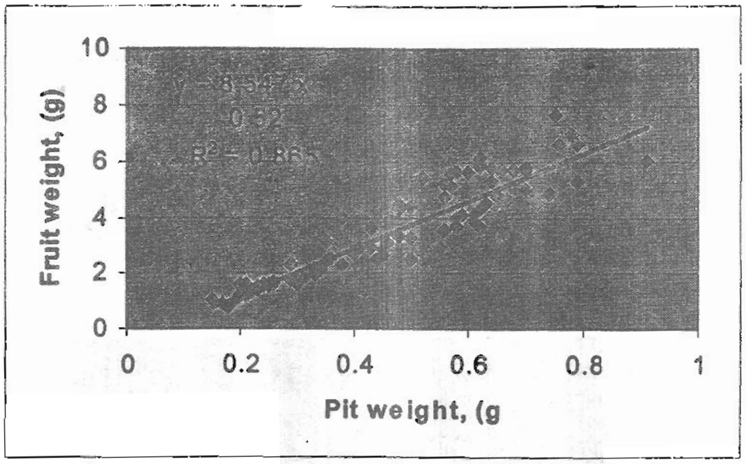

Fig. (3): The relationship between fruit weight and pit weight.

Number of fruits per kilogram:

The number of fruits per kilogram were generally measured for the investigated varieties 157.98, 239.98, 413.22, and 664.01 for Picual, Coratina, Arbequina, and Koroneiki variety, respectively.

Engineering properties:

Engineering properties (repose angle, flesh hardness, and Pit hardness) for the studied varieties were measured as shown in tables (3 and 4).

Table (3): Repose angle for the investigated varieties of olive fruits.

Variety	Picual	Coratina	Arbequina	Koroneiki
Repose angle	33.04	34.22	32.18	36.86

Table (4): Flesh hardness and pit hardness for the investigated olive varieties.

Property	**Variety**	**Average X‾**	**Range, Min - max**
Flesh Hardness, (kg/cm^2)	Picual	1.80	1.1 - 2.6
	Coratina	1.34	0.6 - 2.0
	Arbequina	1.24	0.7 - 2.0
	Koroneiki	1.32	0.6 - 1.8
Pit Hardness, (N)	Picual	558.22*	448.10 - 592.60*
	Coratina	429.80	515.60 - 550.50
	Arbequina	381.01	282.60 - 475.70
	Koroneiki	270.93	239.50 - 332.60

Results in table (3) showed that no difference in the repose angle between the studied varieties. However a clear difference between the studied variety in fruit weight flesh hardness and pit hardness were obtained (Table 4). This indicates that increasing fruit and pit weight increased the flesh hardness and also pit hardness and consequently increased the force used for fruit crushing during oil extraction. The obtained results are in agreement with **Kiritsakis (1991)**.

Effect of storage olive fruits after harvesting on oil yield and quality:

In this studies the effect of storage time after harvesting for investigated olive varieties on the daily percentage of the fruit weight, oil yield, acidity and peroxide values were determined as shown in table(5).

Table (5): Effect of storage olive fruits after harvesting on oil yield and quality.

Day	Variety	Temp. C°	R. H., %	P. D.(1)	Properties of oil		
					Oil yield	Aci.	Per.V.
1	Picual	29 - 33	79 - 89	-	14.21	0.32	9.67
	Coratina			-	22.00	0.38	9.35
	Arbequina			-	21.46	0.24	7.12
	Koroneiki			-	22.26	0.34	9.27
2	Picual			2.00	14.42	0.70	11.25
	Coratina			2.70	22.20	0.66	11.58
	Arbequina			3.00	21.51	0.53	11.95
	Koroneiki			3.78	22.30	0.68	13.84
3	Picual			1.63	14.43	1.20	16.66
	Coratina			2.68	22.24	1.65	15.90
	Arbequina			2.64	21.53	1.81	15.28
	Koroneiki			3.00	22.32	1.97	17.46
4	Picual			2.75	14.40	2.73	21.84
	Coratina			3.01	22.25	2.85	20.92
	Arbequina			3.46	21.53	2.94	21.25
	Koroneiki			4.62	22.36	2.99	22.10
5	Picual			1.64	14.42	3.47	-
	Coratina			2.63	22.25	3.61	-
	Arbequina			2.57	21.50	3.82	-
	Koroneiki			3.23	22.35	3.84	-
6	Picual			1.36	14.44	-	-
	Coratina			2.14	22.23	-	-
	Arbequina			2.26	21.52	-	-
	Koroneiki			2.64	22.34	-	-
7	Picual			1.22	14.36	-	-
	Coratina			1.89	22.24	-	-
	Arbequina			2.11	21.50	-	-
	Koroneiki			2.34	22.33	-	-

(1) Percent of daily change in weight

Results in table (5) show that the weight of olive fruits for each variety were daily decreased as storage time increased. The maximum reduction in weight (after 7 days of storage) was (19.61%, 16.04%, 15.05% and 10.6%) for Koroneiki, Arbequina, Coratina and Picual variety, respectively. This indicates that less weight olive fruits (Koroneiki) lost more during storage than other olive varieties.

Results also show no changes in the percentage of oil extracted during storage period (7 days). However increasing the storage period showed an increase in oil acidity and peroxide value for all studied varieties.

It was found that acidity was increased from (0.24 – 0.38 to 1.2 – 1.97 %) and the oil changed from extra virgin to virgin after 2 days of storage . The quality and grade of oil were continually decreased as the storage period increased till the maximum (3.3 % as not accepted) in fourth days for all varieties.

Results also showed that peroxide value was also increased as storage period increased till the maximum (20 meq/kg oil) after the third day of storage.

This indicated that the oil became unacceptable after storage of fruits for three days in all varieties and consequently should be processed before that time.

Best harvesting time for the studied olive varieties:

The best harvesting time for the studied olive varieties was determined according to the ripeness index, oil yield, acidity and peroxide value as shown in the following table (6).

Table(6)The time of best harvesting which gives high oil yield and quality.

Time of Harv.	Olive Variety	Ripeness index	Oil yield, %	Acidity, %	Peroxide V. (meq/kg oil)
1/11 – 15/11	Picual	2.33	12.60	0.27	12.33
	Coratina	2.37	16.57	0.18	9.80
	Arbequina	2.72	15.82	0.24	5.80
	Koroneiki	2.45	16.00	0.26	11.19
16/11 – 30/11	Picual	2.85	13.53	0.32	12.19
	Coratina	2.82	18.07	0.25	9.76
	Arbequina	3.42	17.75	0.28	7.24
	Koroneiki	2.95	18.43	0.37	9.84
1/12 – 7/12	Picual	3.47	15.00	0.36	9.37
	Coratina	3.25	21.32	0.30	8.55
	Arbequina	3.64	21.46	0.21	7.74
	Koroneiki	3.34	21.78	0.35	9.46
7/12 - 15/12	Picual	3.70	16.21	0.34	9.26
	Coratina	3.57	23.00	0.24	7.83
	Arbequina	3.83	21.65	0.15	7.60
	Koroneiki	3.62	23.39	0.20	9.18

Above results (table 6) show that the oil yield and oil quality (acidity and peroxide value) were greatly varied according to ripening stage.

The oil yield and quality characters were greatly increased and maximized in the fourth stage of harvesting for all varieties.

This indicated that the best harvesting time for the three studied varieties (Picual, Coratina and Koroneiki) is from 7/12 – 15/12 and considered as the over maturity stage. However the best harvesting time for the Arbequina variety is from 1/12 – 7/12 and considered as full maturity stage. This results agreed with there obtained by **Garcia et al. (1996).**

Extraction of olive oil:

Two methods of extraction (press and centrifugal processes) were used and % oil yield, acidity and peroxide value were determined as shown in table (7) .

Table (7): Comparison between press process and centrifugal process for extraction of olive oil.

Extraction System	Variety	Oil yield, %	Acidity, %	Peroxide V. (meq/kg oil)
Press Process	Picual	11.48	0.95	10.96
	Coratina	19.80	0.73	9.34
	Arbequina	18.00	0.81	8.96
	Koroneiki	20.21	0.9	9.86
Centr. Process	Picual	16.21	0.32	9.67
	Coratina	23.00	0.38	9.35
	Arbequina	21.65	0.24	7.12
	Koroneiki	23.39	0.34	9.28

Results in table (7) shows that centrifugal process gave a high oil yield more than pressing process [41.2, 16.16, 20.28 and 15.73 % for Picual, Coratina, Arbequina and Koroneiki respectively]. Such centrifugal process also gave a highest quality oil (acidity range 0.24 – 0.38 % and peroxide values range 7.12 – 9.67 meq/kg oil), than for pressing process (acidity range 0.73 – 0.95 % and peroxide values range 8.96 – 10.96 meq/kg oil). This indicated that centrifugal process is much better for olive oil extraction than pressing in which it gave a high yield and high quality oil.

From the above results it could be concluded that the studied olive fruits varieties were varied in their physical and engineering characteristics. In addition oil yield and quality for these varieties were mainly affected by the harvesting time. It was also found that oil yield and quality of olive fruits were decreased as storage period increased and consequently it should be extracted directly after harvesting. The results also showed that centrifugal process is much better for olive oil extraction has pressing one.

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الملخص العربي

الخواص الطبيعية والهندسية واستخلاص الزيت لبعض أصناف الزيتون

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يزرع الزيتون في مصر في معظم المحافظات وقد زادت المساحة المنزرعة من خمسة آلاف فدان في نهاية السبعينات إلى أكثر من مائة ألف فدان في نهاية التسعينات وطبقا لإحصائيات قطاع الشئون الاقتصادية بوزارة الزراعة تبلغ المساحة المنزرعة عام 2002 م حوالي 117.9 ألف فدان. ويزداد الإقبال على زراعة الزيتون وبصفة خاصة في الأراضي الجديدة بسبب تحملة نسبة عالية من الملوحة 3000 – 5000 جزء في المليون.

وتعتبر صناعة زيت الزيتون في مصر هي الحل الأمثل للتغلب على مشكلة تسويق ثمار الزيتون والتوسع في زراعته والاستفادة من زيت الزيتون لما له من قيمة غذائية عالية وكذلك دخوله في العديد من الصناعات ومستحضرات التجميل.

ولهذا كان الاهتمام بدراسة بعض الخواص الطبيعية والهندسية لعدد أربع أصناف من الزيتون والمنتشر زراعتها فى مصر والمتخصصة فى انتاج الزيت.

وكذلك تحديد أفضل ميعاد لحصاد هذه الاصناف والذي يعطى أعلى جودة وأعلى انتاجية من الزيت.

كما تم أيضا دراسة أفضل ميعاد للاستخلاص بعد الجمع ولمدة أسبوع تحت ظروف الجو العادية مع تقدير نسبة التغير اليومى فى الوزن وتقدير خواص الزيت الناتج أثناء فترة التخزين.

وأجريت الدراسة على ثمار من شركة الربيع بوادي الفارغ كيلو 62 طريق مصر - اسكندرية الصحراوي وتم نقل الثمار بعد جمعها مباشرة الى شركة الخطاطبة للاستصلاح الزراعى حيث تمت عملية الاستخلاص بماكينة استخلاص من نوع الطرد المركزي ذو الثلاث مخارج.

كما تم عمل مقارنة بين نظامى الاستخلاص المستخدمين فى مصر وهما الاستخلاص بالطرد المركزي ذو الثلاث مخارج والاستخلاص بالمكابس الهيدروليكية.

<u>وقد أوضحت الدراسة ما يلى:</u>

- هناك فروق معنوية فى الخصائص الطبيعية والهندسية بين الاصناف موضع الدراسة (البيكوال – الكرواتينا – الاربكوين – الكروناكى).
- وجود تناسب طردي بين بعض خصائص الثمار والبذور (الطول – القطر – الوزن) ومن قيم المتوسطات تم تحديد ثوابت تختلف هذه الثوابت بإختلاف الصنف.
- يفضل أن يتم عصر الزيتون بعد الجمع مباشرة حيث أن التأخير فى العصر يؤدى الى الحصول على زيت منخفض الجودة كما لا توجد فروق معنوية في نسبة الاستخلاص على مدار فترة التخزين (7 أيام).
- أثناء فترة التخزين يقل الوزن تدريجيا ويسجل أعلى نسبة للتغير فى الوزن فى اليوم الرابع من أيام التخزين.
- أفضل ميعاد لحصاد أصناف البيكوال والكرواتينا والكروناكى فى الفترة من 12/8 – 12/15 أما صنف الاربكوين فأفضل ميعاد للحصاد 12/1 – 12/7.
- يفضل استخدام نظام العصر بالطرد المركزي حيث أعطي معدلات عالية في الاستخلاص وكذلك فى جودة الزيت الناتج.

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