

PHYSICO-CHEMICAL CHARACTERISTICS AND FREE FATTY ACID CONTENTS OF OLIVE FRUITS STORED UNDER DIFFERENT CONDITIONS

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INTRODUCTION

The genus *Olea* of the plant family *Oleaceae* occurs both in the tropical and sub-tropical countries of the world. Two species, namely *Olea ferruginea* Royle (Ver. Zaitun) of Italian and *Olea glandulifera* Wall (Ver. Bara Kao) of French origin, have been introduced in Pakistan. Of these, *Olea ferruginea* Royle is widely distributed in Baluchistan, the Punjab, the North Western Frontier Province and territories of Azad Jammu Kashmir. On the average an olive tree yields about 10-15 kg fruit. [1]

The present study was undertaken first to determine the physico-chemical characteristics of the oil of Pakistani variety of olive fruits, and free fatty acid (FFA) contents of olive fruits stored under different conditions.

EXPERIMENTAL

Collection and Treatment of Olive Fruits and Extraction of the Oil. Fresh fruits were collected from Kharimurat plantation and divided into four parts for the following operations: (a) Fruits (1 kg) were extracted with hexane just after plucking from the plant. (b) Fruit (1 kg) were placed in hexane (2 L) at site and oil was recovered from them at different intervals for the study of free fatty acid formation. (c) Fruits (1 kg) were placed in olive oil (1.5 L) at site and the formation of free fatty acids in the fruits oil was studied at different intervals after extraction of oil. (d) Fruits (1 kg) were kept at room temperature (18-20°) for observing the formation of free fatty acids in the oil that was extracted with hexane, after different time intervals.

The oil extracted in all the above four operations was dried over sodium sulphate, filtered, freed from solvent and the recovered clear pale yellow oil from each was stored under nitrogen.

Physico-Chemical Characterisation. Physico-Chemical characterisation was carried out according to the procedure given by Cocks and Van Rede [2].

Table 1. Physico-chemical characteristics and fatty acid composition of olive oil.

1. Yield (% age)	27.6
2. Moisture (% age)	52.25
3. Iodine number	86.0
4. Saponification number	191.0
5. Non-Saponifiable matter (% age)	1.45
6. Acid value	3.66
7. Refractive index at 40°C	1.472
8. Colour by Lovibond Tintometer.	7.8 Unit of yellow 0.1 of blue and 0.7 of red.

Fatty acid	Area (%)
1. C ₁₀ :0	Traces
2. C ₁₂ :0	0.1
3. C ₁₄ :0	0.8
4. C ₁₆ :0	19.0
5. C ₁₆ :1	1.8
6. C ₁₈ :0	1.7
7. C ₁₈ :1	65.7
8. C ₁₈ :2	10.9

Table 2. Free fatty acid contents of olive fruits stored under different conditions.

Sr. No.	Time interval (days)	Blank (untreated) %	Fruits stored in	Fruits stored in	Olive oil extracted from fresh fruits %
			hexane (treated) %	olive oil (treated) %	
1.	55	13.5	5.2	1.2	13.0
2.	63	17.1	5.4	1.2	13.0
3.	70	21.5	5.4	1.2	13.0
4.	77	25.0	5.6	1.2	13.0
5.	84	30.1	5.7	1.3	13.2
6.	95	42.0	5.9	1.4	13.3
7.	102	48.3	6.0	1.4	13.4

Saponification, Methylation and Gas Liquid Chromatography. The fatty acid composition of the olive oil was determined by analysis of the methyl esters by GLC. Saponification of the fat and methylation of the fatty acids was carried out as described earlier [3]. The gas liquid chromatography was carried out using a column (152.4 cm x 0.95 cm) at 190° prepared by coating diethylene glycol succinate (10%) on diatomite 'C' (80-100 mesh), and a Pye Unicam 204 series gas liquid chromatography. Nitrogen was used as a carrier gas at a flow rate of 40 ml per minute.

RESULT AND DISCUSSION

Table 1 shows the physico-chemical characteristics and fatty acid composition of the Pakistani olive oil. The high iodine value (86) indicates a relative high unsaturated fatty acid content. The saponification value (191) give an idea of the mean chain length of the fatty acids which is compatible with the composition of the

fat due to the presence of the constituting acids having the chain length C_{16:0} and C_{18:0}.

The rate of free fatty acid formation in the oils extracted from treated and untreated fruits is given in Table 2. It is evident that the development of FFA is highest in the fruits kept at room temperature and lowest in those stored under olive oil. Thus to avoid FFA formation and to obtain quality olive oil, it is suggested that olive fruits should not be stored at room temperature without prior treatment.

REFERENCES

1. A.H.Khan, Pakistan. J. Forestry, **13**, 60 (1963).
2. *Laboratory Hand Book for Oils and Fats Analysis* by L.V. Cocks and C. Van Redes (Academic Press, London and New York, 1966).
3. *Oils, Fats and Fatty Foods*, by K. A. Williams (J & A Churchill Ltd., London 1966), fourth edition.