

# Adaptability study of 5 cv.s olive in warm climate conditions

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# Abstract

*Olea europaea L.* has high adaptation to different climate conditions, especially in Mediterranean basin. This tree is high percentage of oil.

We studied and did research on adaptability of Roghani, Mission, kailet, kronoki & Fuji cv.s which are cultivated in the climate conditions of Khuzestan.

Results showed that, the cv.s studied, the highest adaptability was belonging to Roghani and Mission. The quantity measurement of oil amounts and fatty acids of one made it clear that in terms of the two mentioned before has the highest of oil amount. It seems their better adaptability with this conditions comparison with others related to the proportion of saturated fatty acids to unsaturated ones has soared up. Therefore this fact shows that the adaptability of these cvs in warm climates is better.

# Introduction

The olive is a native to Mediterranean regions, tropical & central Asia and various parts of Africa. This tree requires a long, hot growing season to properly ripen fruit.

In recent year in Iran pay attention to cultivation this tree. Follow this progress, in southern west of Iran, Khuzestan, are cultivated olive.

Changes of fatty acids in 5 cv.s were studied in ripening fruit. As far as we know in this investigation was performed for the first time on these cv.s in warm weather in Khuzestan in Iran.

To show this cv.s have the highest adaptability to this condition, Total lipids were determined and amount of fatty acids was measured by GC.

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# Materials & Methods

Fruit samples of olive cv collected from herbarium garden Chamran university in Khuzestan province of Iran at 2007. The samples were prepared at black maturation.

Then they were lyophilized for 48h, powdered in omni mixer & maintained at -200C( 4).

Average weight of olive fruit was determined by weighting. For flesh separation, fruit were cut in half horizontally with a stainless-steel knife and seed were removed and weighting. The flesh content was calculated by subtracting the seed weight from the whole fruit weight. The flesh to seeds of the fruits weight ratio ( F/ S) was determined by dividing the flesh weight by the seed weight ( 9).

For lipid extraction folch method was used ( 5). Derivation from lipid obtained by 5 cc methanolic Naoh 2% and 1 cc standard with 2 mg/cc solution (7). In this method hexane is used. GC by derivate form was perform on BPX70 capillary column was used under the following program condition, by 20 oC \ min to 180 oC for 9 min by by 20 oC \ min to 190 oC for 1 min. Detector and injection 350 oC and 300 oC respectively. Carrier gas was helium.

# Results

Table 1: Changes of fruit weighting

Cultivar	Size of Length 1000 grain	Size of Width 1000 grain	Weight of Wet flesh(g) 1000 grain	Weight of Wet seed(g) 1000 grain	Weight of Dry flesh(g) 1000 grain	Weight of Dry seed(g) 1000 grain	Percent of seed Water	Percent of Flesh Water
Roghani	20933.33	10333.33	1477.92	771.54	387.19	493.81	56.24	73.80
Fuji	18166.67	8400	861.78	523.28	188.06	300.78	73.97	78.18
Kroniki	15400	9500	425.22	302	100.44	190.67	58.39	76.38
Mission	18233.33	13233.33	1410.44	670.11	320.28	420.50	59.36	77.29
Kailet	16250	10600	753.75	683.17	161.83	487.33	40.18	78.53

## Table2:Fruit total Oil

Cultivar	Roghani	Fuji	Kroniki	Mission	Ksilet
Percent of total Oil	24.75	18.98	21	21.37	20

## Table3:Percent of fatty acid in 5 cv

Cultivar	Fuji	Roghani	Kroniki	kailat	Mission
C16:0	17.54	21.52	16.14	10.49	23.19
C16:1	1.80	2.63	2.05	1.28	4.25
C18:0	2.46	3.01	2.74	1.77	2.24
C18(1n-9)	55.11	42.07	54	25.93	50.32
C18:2(n-6)	19.86	26.69	16.71	10.99	16.75
C18:3(n-3)	1.89	2.20	1.52	0.83	1.96
C20	0.61	0.52	0.62	0.37	0.51
C20:1	0.31	0.27	0.48	0.18	0.14
C24:1	0.41	0.07	0.44	0.11	0.28

## **Table4: Percent of ratio of saturated fatty Acid to un saturated ones**

<b>Ciltivar</b>	<b>Fuji</b>	<b>Roghani</b>	<b>Kroniki</b>	<b>Kailet</b>	<b>Mission</b>
<b>Ratio</b>	<b>25.97</b>	<b>33.89</b>	<b>25.94</b>	<b>32.11</b>	<b>35.46</b>

# Discussion

- Table 1 show that between the studied cv largest of dry flesh related to Roghani & Mission (387.19, 320.28 )
- Also comparison percent of total 5 cv together, the largest amount of oil related to Roghani & Mission (24.75, 21.37 ). As two cv mentioned have highest dry weight we can expect the highest oil percent for them (table 2).
- Table 3 show the percent of fatty acids of 5 cv, saturated fatty acids are palmitic, stearic, arachidic & unsaturated fatty acids are oleic, linoleic, palmitoleic, linolenic , eozotic & neronic
- Study proportion of saturated fatty acid to unsaturated ones clear that Mission & Roghani have the highest this content (35.64, 33.89 respectively).
- Study these results from analysis 5 cv & component fatty acid show that in warm climate with increasing temperature proportion of saturated to unsaturated increasing too.
- The ratio of lipid component in plant organs affected by environmental factors specially temperature (1).
- Davy shown that increasing temperature cause to decreased un saturated fatty acid and this decreasing will compensate with increasing saturated fatty acid (2).

# Discussion

- At 32 °C in compare with 25 °C decreased oil content, moreover fatty acid components affected by temperature ( 11).
- At the membrane level, a number of changes related to lipid content and / or lipid metabolism have been reported according to the growth temperature (8).
- In plants submitted to a change of the environmental temperature, changes in fatty acid desaturase activities (6).
- Also there is relation between environmental temperature and fatty acid component. So temperature increasing cause decreased oleic acid and increased palmitic and stearic acid.
- On this basis Guan reported a shift from 25 °C to 35 °C induced a decrease in un saturated fatty acids content (3).
- Temperature effect on Atriplex studied by Robert et al, show that with increasing temperature, saturated fatty acids increasing too and linoleic acid decreased (10).
- So from this experiment we can conclude that in these two cv.s, with increasing ratio fatty acids saturated to unsaturated can better adaptability with warm climate.