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# Some compositional characteristics of capers (*Capparis spp.*) seed and oil

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**RESUMEN**

**Características en la composición de aceite y semilla de alcaparras (*Capers spp.*).**

Se han evaluado semillas *Capparis spinosa* L. var. *spinosa* y *Capparis ovata* Desf. var. *canescens* por peso, tamaño, humedad, ceniza, proteína cruda, aceite crudo, energía y fibra cruda. Se determinaron en los aceites la densidad relativa, índice de refracción, ácidos grasos libres, índice de peróxido, índice de iodo, índice de saponificación, insaponificables y cera. Los principales ácidos grasos identificados por cromatografía gaseosa fueron los ácidos palmítico, oleíco y linoleíco. Las semillas fueron ricas en proteínas, aceite y fibra y mostraron composiciones similares entre ellas con un alto contenido en ácidos grasos insaturados, sugiriendo que pueden ser utilizadas para usos alimentarios.

*PALABRAS-CLAVE: Aceite — Alcaparra — Propiedades físicas — Propiedades químicas — Semilla.*

**SUMMARY**

**Some compositional characteristics of capers (*Capers spp.*) seed and oil.**

*Capparis spinosa* L. var. *spinosa* and *Capparis ovata* Desf. var. *canescens* seeds were evaluated for weight, sizes, moisture, ash, crude protein, crude oil, energy and crude fiber. The relative density, refractive index, free fatty acids, peroxide value, iodine value, saponification value, unsaponifiables and wax were determined in the seed oils. The main fatty acids identified by gas chromatography were palmitic, oleic and linoleic acids. The seeds were rich in protein, oil, and fiber and showed similar composition between then with a high content in unsaturated fatty acids, suggesting that they may be valuable for food uses.

*KEY-WORDS: Caper — Chemical properties — Oil — Physical properties — Seed.*

## 1. INTRODUCTION

At various regions of the world, different organs of capers species are profited for several purposes. Young shoot, flower bud, fruit and seed is used for nutrition.

The most of researches connected with capers were made on bud composition and pickling product (Kanthamani *et al.*, 1960; Ahmed *et al.*, 1972; Rakhimova *et al.,* 1978; Aktan *et al.*, 1981; Katiyar *et al.*, 1989; Nosti Vega and Castro Ramos 1987; Ahmad *et al.*, 1989; Alvarruiz *et al.*, 1990; Barbera 1991; Brevard *et al.*, 1992; Rodrigo *et al.*, 1992; Özcan and Akgül 1995; Özcan 1996), medical properties (Hegi 1982; Chiej 1982; Singh *et al.*, 1983; Al-Said *et al.*, 1988; Shah *et al.*, 1989; Tanira *et al.*, 1989; Vena *et al.*, 1990; Angelini *et al.,* 1991). Some researchs on fruit were randomized, too (Khurdiya and Kumar 1969a; Khurdiya and Kumar 1969b; Sushila 1987; Sánchez *et al.*, 1992). Publications connected with composition and oil of seed had been limited (Gupta and Chakrabarty 1964)]. Gupta and Chakrabarty (1964) determined that seeds had contained approximately 30% oil and oleic, palmitic and linoleic as main fatty acids, respectively. Zhong *et al.*, (1989) pointed out that the seed of *C.masaikai* grown in Chine had been used as both medicinal and chew for contained sweet protein-with probably a decrease at the raw material production like sunflower and cotton seed. Edible oil production in Turkey is continuously under the risk. Much raw oil import for along time is confirm this anxiety. Whereas, Turkey has climate and soil conditions that conformable several oil seed product. The product various is need to prevent fluctuates could be arise on edible oil production.

The aim of the present study was to investigate for composition and fatty acids, and their raw material properties as new and different a food material the two different capers seeds.

## 2. EXPERIMENTAL PART

**Materials:** The flower buds of *Capparis spinosa* L. var. *spinosa* and *Capparis ovata* Desf. var. *canescens* (Coss.) Heywood respectively were collected from Icel (Büyükeceli-Gülnar) and Konya (Selcuklu) in September 1997. Cleaned and dried seeds were ground. Samples were kept in colour bottles until analyzed.

**Methods:** Physical and chemical properties of seed and oil obtained via extraction process (Dogan and Basoglu 1985) were analyzed according to AOAC (1984). Fatty acids were derivatized by using the boronitrifluoride method as described by Hisil (1988).

Work conditions of gas chromatography:

| | |
|---|---|
| Instrument: | Varian, model 2100 |
| Constant phase: | 10 % DEGS (diethylene Glycol Succinate) + 1% $H_3PO_4$ |
| Support matter: | Chromosorb G (100/120 mesh) |
| Column: | internal diameter (2 mm) and stainless steel (190 cm) |
| Detector: | FID (Flame Ionization Detector) |
| Temperature | |
| Column: | 200 °C |
| Injector: | 225 °C |
| Detector: | 225 °C |
| Flow rate | |
| Carrier gas ($N_2$): | 6 ml/min. |
| Burnt gas ($H_2$): | 40ml/min. |
| Dry gas | 60 ml/min. |
| Injection amount: | 5µl |

Commercial mixtures of fatty acid methyl esters were used as reference data for the relative retention times (Anonymous 1990). The results are mean values of two replicates.

## 3. RESULTS AND DISCUSSION

### 3.1. Physical and chemical properties of capers seed

Analysis results of seeds are given in Table I. Seeds are rich due to protein, oil and fiber. *C. ovata* seeds are smaller, but because of composition is similar to that of *C. spinosa.*

Gupta and Chakrabarty (1964) had established that the seeds of different a capers species grown in India contained 30% oil.

Table I
**Physical and chemical properties of capers seed***

| Plant species | 1000 seeds (g) | Diameter (mm) | Water (%) | Crude protein** (%) | Crude oil (%) | Crude fiber (%) | Ash (%) | Energy (kcal) |
|---|---|---|---|---|---|---|---|---|
| *C. spinosa* | 10.83 | 0.25 | 6.48 | 22.77 | 35.22 | 27.49 | 1.8513 | 605.1 |
| *C. ovata* | 6.53 | 0.22 | 6.73 | 23.05 | 36.74 | 27.20 | 1.7681 | 607.4 |

* Kurumaddede

** N x 6.25

### 3.2. Physical and chemical properties of capers seed oil

Their physical and chemical properties of seed oil are in Table II. Properties of oils, except for peroxide value, is partly different. While oil colour of *C. spinosa* is yellowness-red, *C. ovata* is yellowness-dark red. It was thought that the relative density of both oils had high due to raw and more pureless. Also, more unsaturated fatty acids were pointed out that iodine value of *C. spinosa* was high. Literary values connected with physical and chemical properties of capers seed oils had not been found.

Table II
**Physical and chemical properties of seed oil**

| Plant species | Relative density ($d_{20}^{20}$) | Refractive index ($n_D^{20}$) | Free oil acidity (%, oleic) | Peroxide value (meq/kg) | Iodine value (wijs) | Saponification value | Unsaponification matter (g) | Waxes (ppm) |
|---|---|---|---|---|---|---|---|---|
| *C. spinosa* | 1.1045 | 1.4625 | 5.48 | 4.4 | 154 | 122.02 | 1.13 | 209 |
| *C. ovata* | 1.0840 | 1.4735 | 6.90 | 4.4 | 102 | 103.79 | 1.21 | 221 |

### 3.3. Fatty acids compositions of capers seed oil

Results are given in Table III. Important fatty acids are palmitic, oleic and linoleic. Capric, lauric, myristic, arachidic, gadoleic, behenic and lignoceric acids are also trace amounts. Fatty acid that the most determined in both species was oleic. Saturated fatty acids (mainly palmitic and stearic) were approximately 15% of total fatty acids.Gupta and Chakrabarty (1964) pointed out that mainly fatty acids of capers seed oil were 21% palmitic, 57% oleic and 11% linoleic. According to this, except for linoleic acid, our results are lower than literary values. Fatty acid composition of vegetable oils are affected by species, variety, breed, growth conditions, harvest and postharvest (Iiisulu 1973).

Table III
**Fatty acid compositions of capers seed oil**

| Plant species | Palmitic (16:0) | Palmitoleic (16:1) | Stearic (18:0) | Oleic (18:1) | Linoleic (18:2) | (Linolenic) (18:3) |
|---|---|---|---|---|---|---|
| *C. spinosa* | 13.2 | 4.6 | 3.2 | 49.87 | 25.2 | 1.0 |
| *C. ovata* | 11.3 | 1.8 | 2.7 | 34.66 | 24.5 | 0.3 |

## CONCLUSIONS

Seed composition, physical and chemical properties of oil and fatty acid composition of capers species have been obtained. Protein and oil-rich seeds can be utilized in several forms for food and feed. Oils had a high content of oleic and linoleic and they had a healthy composition for nutrition. By cultivation and breeding of capers plants regularly, a more productive and quality raw matter would be obtained.

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