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CHARACTERISTICS OF OIL OBTAINED FROM GRAPE SEEDS SEPARATED FROM DRIED AND FRESH MARC

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Abstract. In this study, oil was extracted from seeds separated from dried and fresh marc, in controlled conditions, marc being a residue from homemade wine manufacturing process. The organoleptic and physico-chemical characteristics show that this oil belongs among vegetable food oils. Also, marc, considered to be a waste product from wine manufacturing, can be an alternative source for making edible oil.

Keywords: marc; oil; grape seeds.

1. Introduction

Vine is one of the most widespread horticultural crops, having great economic consequences. The researchers are constantly focused on the composition, but especially on the uses of *Vitis vinifera* varieties in order to improve the plant protection and its uses in the pharmaceutical and cosmetic industries.

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The history of grapes - the fruit of the vine - is closely related to that of the wine. They are sought after and appreciated for thousands of years, being harvested for both their medicinal and nutritional properties.

Each year, both winemaking enterprises and the households accumulate important quantities of grape marc - a residue obtained from wine production. From it, grape seeds could be separated, that can be dried and further processed for different purposes. For example, in some developed countries, the seeds are collected after the primary conditioning and are used for the extraction of oils and tannins (Dorobanțu and Beceanu, 2007).

The main ingredient of grape seeds is the oil. It has been showed that from 100 kg of dry marc 15-25 kg of seeds could be obtained, from which 1.5-3 litres of oil are extracted. According to literature data, grape seeds separated from fermented and distilled marc have a 6-10% oil content that has a very high value for the free acidity. It has been found that the seeds of some varieties, separated from fermented marc, have an oil content of 9-12%. In order to prevent the damage of grape seeds, which leads to a decreasing in the content and quality of the oil, it has been established that, after being separated from the marc, they should be dried to a moisture content of approx. 6-7% (Dorobanțu and Beceanu, 2007).

The grape seed oil could be obtained by pressing, extraction or distillation. In the case of extraction by solvent, the resulting material is submitted to separation for the oil to be finally refined (Dorobanțu and Beceanu, 2007). As for the chemical composition, the grape seed oil is rich in linolenic (70-75% in the extracted oil and 60-62% in the filtered oil) and oleic acid (13-28% of total fatty acids) and tocopherols, vitamins C, D. In this connection, Fernandes *et al*. (2013) have studied the chemical composition of grape seed oil and pointed out its importance for the supply of tocopherols (85.5-244 mg/kg) as well as certain acids: linoleic, oleic, palmitic and stearic. The seed oil is also a rich source of poly-unsaturated (63.64-73.53%), the mono-unsaturated and saturated fatty acids being in much lower amounts of 14.19-21.29% and 11.64-14.94% respectively (Chair *et al*., 2012).

Moreover, it has been found that the properties of grape seed oil are due to the content of proanthocyanidins, which are part of the polyphenols class and are antioxidant agents that are 50 times more active than vitamin E and 20 times bigger than vitamin C (Joshi *et al.*, 2001; Nakamura *et al*., 2003; Yilmaz and Toledo, 2006).

Due to all these components, the grape seed oil can be used especially for treating the ageing skin, since the oil penetrates quickly the epidermis with no sensation of fatty skin, reduces the water loss and restores the skin elasticity. It is extremely efficient in preventing and reducing wrinkles, especially those around the eyes. Due to its properties the oil is also used for hair masks, as an

ingredient in various cosmetic creams (in proportion of 5-90%) and for preparing massage oils, along with other essential oils (Chair *et al.*, 2012; Vicanova *et al*., 2006; Yamakoshi *et al*., 2003).

According to the literature, in order to obtain a high oil content, with low free acidity, the grape seeds must be separated from the marc before it ferments, and then dried to reduce the moisture. So, in the present study we decided to obtain dried grape seed oil, after the marc was dried under controlled conditions. At the same time, the oil was obtained from fresh grape seeds separated from the marc. Moreover, this study emphasizes the possibility of capitalizing the marc, which is considered a waste in wine manufacturing.

2. Experimental

In this study, both fresh and dried grape seeds have been used, separated from the marc resulted from pressing fresh grapes intended for wine production in October 2015. The grapes belong to several varieties of vines and hybrids such as Fetească Neagră, Fetească Regală, Fetească Albă and Aligote.

In order to obtain grape seed oil, the cold pressing method have been used. For this purpose, firstly the marc, obtained by pressing fresh grapes, was subjected to a drying process at room temperature, the material being placed in a thin layer on a sheet of paper.

In order to quickly and uniformly evaporate the water, as well as to avoid the growth of bacteria and fungi in the wet layer, the mass of marc was periodically aerated by palletizing.

After drying, the separation of seeds from the marc was performed manually. The separated seeds were dried in a thin layer, on a sheet of clean paper, in a well-ventilated place.

Next, the seeds were ground in an electric apparatus to obtain grape seed powder. During the course of the study, both the seeds and the seed powder were stored in dark glass bottles.

In order to obtain the oil, 1000 grams of dry seed were weighed at the technical scale and placed in a manual oil press. Following this operation, approximately 100 mL of oil were obtained.

At the same time, oil was separated from fresh seeds from the fresh marc. For this purpose, the same amount of seeds were weighed and introduced into the manual press in order to yield about 150 mL of oil.

The two types of oils U1 (dried seed oil) and U2 (fresh seed oil), respectively, were subjected to organoleptic and physico-chemical analyses (refractive index, acidity index, iodine index and saponification index).

The refractive index was determined using the ABBE refractometer (Cernătescu and Cobzaru, 2014) and the acidity index (AV), the iodine index (IV) and the saponification index (SN) were calculated according to the literature (Bulancea, 2002).

Chemical reagents used to measure the acid value (AV), iodine value (IV) and saponification number (SN) for all samples were purchased from Merck.

3. Results and Discussions

Organoleptic characteristics are one of the most important factors in food analysis. In order to appreciate and compare the sensory properties (taste, odour, appearance, consistency), the two oil samples, U1 and U2, were evaluated at the score scale of 1-5 points, according to the method proposed by Banu, 2002. The resulting score for each quality index was entered in the individual sensory analysis sheet. Following the statistical processing of the grades, the quality of the two oil samples was appreciated. Table 1 shows the organoleptic characteristics of oil obtained from dried grapes (U1).

Table 1
Organoleptic Characteristics for the Dried Grape Seed Oil (U1)

Parameter	Description
appearance	Clear at room temperature
smell	No smell
taste	Pleasant, slightly sweet
consistency	Lightly viscous
colour	Yellowish greenish tint

The same organoleptic characteristics are also found for the oil obtained from the fresh grape seeds (U2).

Generally, the physico-chemical indices of vegetable oils play a very important role in food technology and are dependent on their chemical composition and structure. In order to establish the physico-chemical characteristics for the analysed oil samples, they were subjected to the methods described in the literature and mentioned above. The numerical values obtained were compared with the standard values. Quality indices were determined at room temperature, during storage for 12 months. Table 2 shows the arithmetic values for the physico-chemical indices for the two oil samples.

Acid value is a measure for the free fatty acids in oil. Normally, fatty acids are found in the triglyceride form, however, during processing, the fats may get hydrolysed into free fatty acids. The higher the acid value found, the higher the level of free fatty acids, which translates into a decreased oil quality.

As showed in Table 2, the acidity index values for the two oil samples are lower than the standard, which means they are suitable to be used as food oil.

Table 2
Physico-Chemical Characteristics for the Oil Samples

Parameter	Oil sample		Maximum limit (Codex-STAN 210-1999)
	U1	U2	
Refraction index	1.470	1.469	1.467-1.477
acidity index (mg KOH/g oil)	3.6	3.59	4.0 (unrefined)
saponification index (mg KOH/g oil)	193	192	188-194
iodine index, %	148	147.5	128-150

Saponification value is an indication of the molecular weight of triglycerides in oil and the significant value for saponification index suggests that this oil can be a good raw material for soap industries.

Muhammad *et al*. (2011) showed that higher saponification value indicates high proportion of lower fatty acids since saponification value is inversely proportional to the average molecular weight or chain length of the fatty acids. Furthemore, shorter the average chain length (C_4 - C_{12}) the higher is the saponification number (Tamzid *et al.*, 2007). The value obtained for the two oil samples during this study show that it contains amounts of short chain fatty acids (< C_{12}).

The iodine value is an indicator for the degree of unsaturation, a high iodine value indicate oil prone to oxidation. The unsaturated character affects the stability of oils and, as a result, leads to the appearance of degradation effects during storage. From the Table 2 can be seen that the studied oil is characterized by a high IV.

4. Conclusions

This study focused on obtaining a dry and a fresh seed oil from the marc obtained as a residue in the production of homemade wine. The oils obtained falls within the category of vegetable food oils. Also, grape seeds, regarded as waste when making wine, can be an alternative source for making edible oils.

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CARACTERISTICILE ULEIULUI OBŢINUT DIN SEMINŢELE DE STRUGURI SEPARATE DIN TESCOVINA PROASPĂTĂ ŞI USCATĂ

(Rezumat)

În acest studiu s-a obținut un ulei din semințe uscate și proaspete separate din tescovina uscată în condiții controlate și care este considerată un reziduu la fabricarea vinului de casă. Caracteristicile organoleptice și fizico - chimice au arătat că uleiul obținut se încadrează în categoria uleiurilor alimentare vegetale. De asemenea, tescovina considerată ca deșeu la obținerea vinului poate constitui o sursă alternativă pentru obținerea uleiului comestibil.