

The influence of the systems on maintaining the soil upon the quality of the olive oil of Cv. Frantoio, Vlorë, Albania

*** Arsen Rexha, Uran Abazi²**

¹*Agricultural University of Tirana, Faculty of Agriculture and Environment, Department of Plant Production, , Tirana, Albania.*

²*Agricultural University of Tirana, Faculty of Agriculture an Environment, Department of Agro-Environment & Ecology, Tirana, Albania*

*Corresponding Author: *Arsen Rexha*

ABSTRACT:- The main objective of this study was the evaluation of the influence of the systems of maintaining the soil related to the quality of the olive oil of Cv. Frantoio, Vlorë, Albania. The experiment is held during 2013-2014 in Vlora. The experiment is attained in four systems of maintaining the soil: (i) Arable land, (ii) Non-Arable land, (iii) Barely (*Hordeum Vulgaris*) and (iv) Mulcherin System. The samples were taken during November-December. The analysed indicators were the oil content in percentage and the acidity. The content of fat is attained through the Soxhlet method. The analytical laboratories are analysed in the Institution of Food Control, Tirane, Albania. According to the results it is shown that a higher per cent: the systems of maintaining the soil, Cv. Frantoio, the oil content, the oil quality ncentage of oil in the first approach is 22%, followed by the approach (iv) in 21.8%. The lowest contain of oil is found in the ii variant, in having the soil Non-Arable (21.5%). In the second year of the study, according to the results, it was shown a higher percentage of oil in maintaining the mulcherin system and barely containing 22.5% and 23% of the oil. To interpret the data it used the SPSS method, version 23.0.

Repetition of the experiment in the coming years, taking into account other factors that affect the quality of the oil, would provide in the future better advice to the area's farmers.

Keywords:- the systems of maintaining the soil, Cv. Frantoio, the oil content, the oil quality.

I. INTRODUCTION

The olive is a very important culture for the agricultural economy of Albania. During the last years there were held a lot of isolated studies upon the influence of the soil management and the quality of oil (Abazi et al., 2012; Rexha et al., 2017). The olive is the most consumed olive in the Mediterranean places, where is localized 98.8% of the world surface of the olive. The maturation of the olive fruit varies between varieties, geographical area, temperature and cultural practices (Pastor et al., 1990). The final content depends from the interaction between the environment conditions in which is grown and is developed the plant and the genetic potential of the variety. The content of humidity of fruit at the moment of picking, it is a very important factor in the quality of olive. The level of humidity of the fruit are related to the aspects of environment (the the rainfall, evaporation, the type of the soil) but even the management of the culture according to the watering (Pastor et al., 2005) and the salinisation of the plants (Mailer et al., 2005).

The traditional oil in Albania has a reduced production because it is planted most of the time in poor soils, with erosion, distributed plants, and mainly without agronomic services. However, during the last decade, the plantations of the oil are getting bigger and with new cultivations, and the intensive plantation, phytosanitary plantation, the appropriate phytosanitary approaches and the techniques of the cultivation include the localized watering and the fertirrigation. According to the studies held from (Tous, J, et al. 1998), the higher humidity at the moment of picking reduces the content of olive oil in fruit. The level of fat in fruit and their content depends from the climatic conditions and the system of soil management (Conde et al., 2008). The influence of the vegetation cover is studied according to the influence they have in the quality indicators of the grape (Colmenero et al., 2011; Lopes et al., 2008). Very few studies are held as far as the systems of the soil management are concerned upon the olive oil and there are not many studies in the influence of the vegetation cover in the organoleptic characteristics and the indicators of the oil quality (Gucci et al., 2012; Caruso et al., 2011). The main aim of our study was the influence of the systems of maintaing the soil in the indicators of the quality of the olive oil.

II. MATERIAL AND METHODS

The plants of the cultivar Frantoio served as a material to conduct the experiment, plants which are more than 40 years old, a cultivar designed only for oil production, planted in a distance 7x7m. The chosen

approaches were: (i) the arable land, (ii) Non-Arable Land, (iii) a permanent vegetation cover *Hordeum Vulgaris* and (iv) Mulchering of the soil, with five repetition for each approach. The size of the variant is 245m² with 25 plants/variant.

The experiment is attained in hills, and the percentage of the slope is 4-5% and upon the sea level is 30-35m, with an average indicator of natural fertility, a medium mechanical argil content, and organic substance in a low level up to a medium level. The main analyzed indicators were: the content in percentage of the oil and the contain of acidity. It is made possible the gathering of the samples, 10 and 30 kinds of fruit of 180. The content of oil is attained through the Soxhlet method of extractation according to the official methodology (Shahidi, 2001). The statistical process of data is made possible through the SPSS statistical method, version 23.0.

III. RESULTS

According to the literature, more than 95% of the oil is located in the pulp and it is designed according to the basis of aridness and humidity. The content of humidity in a fruit is influenced from the environmental conditions, as it was mentioned in the theoretical part, mainly it is higher in the pase of maturation M1, by having a tendence of decrease, a tendence which might be significative as the maturation advances. The content of the oil with a dry basis is related to the similar evolution. The lowest values are in fruit less matured in November of each year. The detailed results and the values of the indicators analyzed in the study are shown in the tables 1-2, while their display is achieved in the figures 1-2. The Results have shown a high content of the oils analysed in November in the system of the arable land in 22% and in (Mulchering System) with a value 21.8%. The lowest value of the content of the oil is found in the maintenance of the non arable olive grooves in the II approach 21.5%

Table 1. The oil content in November-December (2013-2014), in different scshemes of the olive grooves for Cv. Frantoio

The approach	The Oil Content in %			
	November 2013	December 2013	November 2014	December 2014
(I) Arable land	22	22.5	21.5	22
(II) Non-Arable land	21.5	22	20	21.8
(III) <i>Hordeum Vulgaris</i>	21.7	23	21.2	22.5
(IV) Mulcherim land	21.8	22.5	21	22
Aciditeti në %				
(I) Arable land	1.1	0.9	1	0.9
(II) Non-Arable land	1.2	1	1.1	1
(III) <i>Hordeum Vulgaris</i>	1.2	0.97	1.1	0.89
(IV) Mulcherim land	1.1	1	1	0.9

The tendency of the raise of the percentage of oil one year later has shown almost the same tendency by resulting in a higher content in the III approach (maintaing the soil with *Hordeum Vulgaris*) with 23% followed by the I variant arable land 22.5% and in the Mulchering System with 22.5%. In the second year of the study, according to the results it was shown a lower percentage of the oil during the two months of study. During the same period of a year after is observed a higher content of the oil percentage in the first variant (21.5%) and the lowest value is found in the second approach (Non-Arable land, 20%)

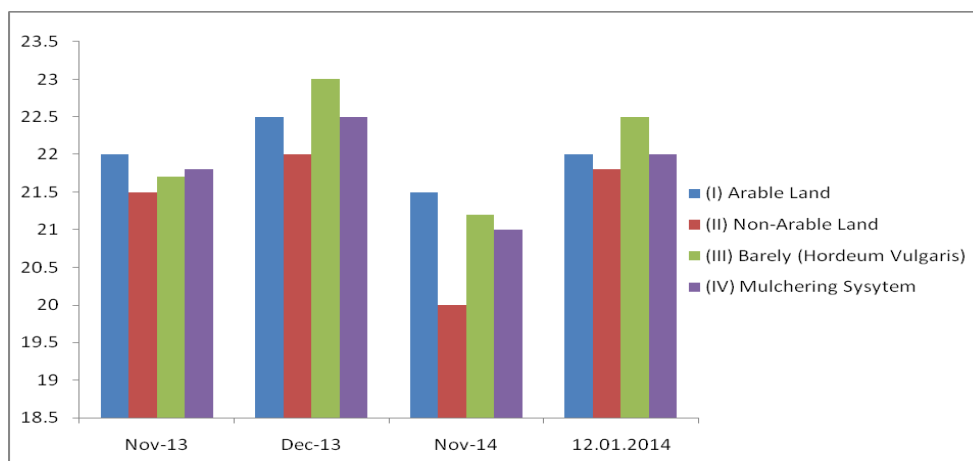


Figure 1. The oil content in % for Cv. Frantoio during the two years of study 2013-2014 in

November and December

The acidity content is presented table 2. Its highest values are found in II and III approaches in November, 2013, meanwhile in the same year in December its maximum values are attained in the II and IV approach. The same tendency is observed in November 2014 where the value of the acid resulted to be 1.1% in the II and III variants. In December the value of acidity has decreased, but in a low percentage. The lowest value of acidity is found in the system of maintaining the soil with a vegetative cover with *Hordeum Vulgaris* in 2014 (0.89%), and this is superior to the other ways of maintaining the soil.

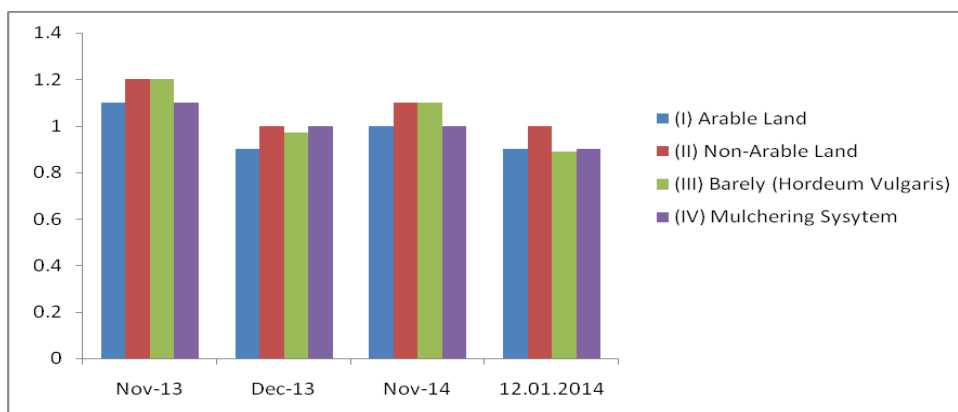


Figure 2. The Graphic presentation of the percentage of acidity for Cv. Frantoio during the two years of study 2013-2014 in November and December

According to the attained results in this study for the found values of the acidity, we estimate that the olive oil belongs to the Ist content, Virgen Extra (CE n°2568/91, modified from the CE N° 656/95). This evaluation is based only on the agroecological environment, which basically has a certain influence, upon the acidic content of the oil of the same cultivar. The variation is higher in different cultivars, each of which is influenced basically from this environment, (Cimato et al., 1991; Tous et Romero, 1994; Uceda et al., 1994). In order to have an exact estimation of the quality of the olive oil which is used from the people should take into consideration even other factors such as the way of picking, the conditions of maintenance before the manufacture, the technology of production and the conditions of the maintenance after production.

IV. CONCLUSIONS

According to the found results we can come to the conclusion that the best system for the maintenance of the olive grove, for the cultivar Frantoio, is the system of Barely (*Hordeum Vulgaris*) dhe Mulchering System, these systems have shown to be superior to the two other systems for the oil content and the lowest values of acidity. The lowest values of acidity in December (the month of picking) have classified the oil in the Ist category, Virgen Extra. It is necessary to continue the research related to the other factors which influence the oil quality, especially the factors after the picking and the consulting of the agriculors for the best systems which influence in the content and quality of oil.

REFERENCES

- [1]. Abazi U., Hodaj B., Rexha A., Ismaili H., 2012. Aspekte të kultivimit të ullirit dhe ndikimi i sistemeve teknologjike të prodhimit të vajit në Shqipwri. Konferenca IVt Shkencore Ndërkombwtare “Efiçienca dhe Konkureshmëria e Prodhimit në Sipërmarrjen e Agrobiznesit”. Proceedings: pp 274-282.
- [2]. Cimato, A., Moldi, G., Mattei, A., Niccolai, M., Alessandri, S. (1991). La caraterizzazione dell’olivo extravergine ‘Tipico Toscano’. Consorzio Regionale olive extra vergine di Oliva ‘Tipico Toscano’.
- [3]. Conde C., Delrot S., Gerós H. Physiological, biochemical and molecular changes occurring during olive development and ripening. *Journal of Plant Physiology*, 165: 1545-1562, 2008.
- [4]. C. M. Lopes, A. Monteiro, J. P. Machado, N. Fernandes, and A. Ara’ujo, “Cover cropping in a sloping non-irrigated vineyard: II—effects on vegetative growth, yield, berry and wine quality of ‘cabernet sauvignon’ grapevines,” *Ciencia e Técnica Vitivinícola*, vol. 23, no. 1, pp. 37–43, 2008
- [5]. G. Caruso, R. Gucci, and M. I. Sifola, “Soil management affects yield components of young olive trees under deficit irrigation”, *Acta Horticulturae*, vol. 924, pp. 219–224, 2011.
- [6]. Mailer, R., Conlan D., Ayton J. Olive harvest: Harvest timing for optimal olive oil quality. Rural Industries Research and Development Corporation, N° 05/013, 2005..

- [7]. M. Ruiz-Colmenero, R. Bienes, and M. J. Marques, "Soil and water conservation dilemmas associated with the use of green cover in steep vineyards," *Soil and Tillage Research*, vol. 117, pp. 211–223, 2011.
- [8]. Pastor, M., Guerrero, A., 1990. Influence of non-tillage on olive grove production. *Acta Horticulturae*, 286: 283-286.
- [9]. Pastor, M., 1991. Estudio de diversos métodos de manejo del suelo alternativos al laboreo en el cultivo del olivo. Instituto de Estudios Giennenses. Diputación Provincial de Jaén
- [10]. Pastor Muñoz – Cobo. M.; Macias. V; Moya. J; Glirona. J Influencia del riego sobre la calidad del aceite y sobre el comportamiento de la aceituna en el proceso industrial de extracción. En: Cultivo del olivo con riego localizado. PASTOR MUÑOZ-COBO, M. (ed.). Coedición Junta de Andalucía y Mundi-Prensa, Madrid. p. 165-184, 2005.
- [11]. R. Gucci, G. Caruso, C. Bertolla et al., "Changes of soil properties and tree performance induced by soil management in a high-density olive orchard," *European Journal of Agronomy*, vol. 41, pp. 18–27, 2012.
- [12]. Rexha A., Abazi U., 2017. The influence of land retention systems on the characteristics and production of Cv. Frantoio, Vlore, Albania. *International Journal of Engineering Science Invention*. Volume 6 Issue 10, pp: 24-26.
- [13]. Shahidi, F. D1.1.1. Basic Protocol 1. Solvent Extraction of oilseeds, nutmeg, and other foods using the Soxhlet method. *Current Protocols in Food Analytical Chemistry*. John Wiley & Sons, NY, 2001.
- [14]. Tous, J., Romero A., Plana. J. Comportamiento agronómico y comercial de cinco variedades de olivo en Terragona, *Invest. Agr.: Prod. Prot. Veg.* Vol. 13 (1-2), 1998.
- [15]. Tous, J., Romero A., 1994,. Aceites Catalanes. Denominaciones de Origen. En: *Olivicultura*. Fundación 'La Caixa' Agrolatino, S.L.
- [16]. Uceda, M., Hermoso, M., Frías L., 1994. Factores que influyen en la calidad de aceite de olive. I. Simposio Científico-Técnico. Expooliva -89, Jaén.

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