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The impact of different types of harvesting systems on olive trees in relation to the changes of soil characteristics, Vlora.

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Abstract: The objective of our study was to change the chemical characteristics of the soil in Vlora, Albania according to the different conditions of the land use: Arable land, Non-Arable land and Barely (Hordeum Vulgaris). The experiment was held during 2013-2014 in Shamogjin, Vlore, the experimental area for the Frantoio cultivar, which is 250 m^2. The analyzed elements were: pH, OM, N, P, K, Ca, Mg, Fe, Cu, Mn and Zn. The chemical analyzes of the soil and leaves were analyzed in the Transfer Center of Technologies in Fushe-Kruje. The data analysis was made by using the SPSS program, version 23.0. According to the results there was no clear superiority of the ways how to use the soil despite of the significant differences in the data found for the analyzed elements. It is advisable that these experiments should be repeated for a long period of time with the aim to choose appropriately the best system of the usage of the olive soil.

Keywords - chemical characteristics, soil, Frantoio cultivar, Olea Europea, Systems of the soil management,

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I. INTRODUCTION

The annual distribution of pluviometry in Albania, is seasonal, with a long period of drought July-September and a long period of moisture October-March, [2]

The rain period is also accompanied by low temperatures and low cover crop activity. Olives get their hydrous needs from the water reserves accumulated during the raining season. In order to meet the needs for water, it is necessary the conservation of water, the reduction of the water consumption from the weeds which might be very important in a certain time, [10]

The cultivation system has a great importance when it comes to the optimization of the water usage and the conservation of the feeding elements, Erosion is one of the main problems of the olive groves in those areas which are deforested. Most of the studies have shown big loses of land circa 80 tons/Ha annually [1], [4] which are more intense in the lands with greater slopes (Laguna 1989), and take away even the feed nourishments.

There are no precise researches held in Albania related to the estimation of the land loss caused by erosion in the olive soils. The adoption of the special practices of the olive cultivation might reduce the erosion and the loss of the feed nourishments if they would be achieved collectively and in a coordinated way, [9]. The agricultural practices, as this study shows, have influenced decisively in the precipitation of the erosive processes, [3]. The plough is not a natural way of using the land, because by doing so we dissolve the particles and destroy the natural coverage. It is the cultivation system which produces the greatest losses of the soil.

The alternative systems such as non-arable land, the minimal arable or barely (*Hordeum Vulgaris*) might influence the global reduction of the land loss and the feed nourishments. The usage of Barely reduce erosion in olive groves (it means that it reduces the feed nourishments), but it needs additive manuring from the normal cultivation. These needs are calculated in 50 kg/Ha nitrogen [7]. This practice is really important because the permanent blocking of nitrogen might be a deficiency problem for the plants at the beginning of spring, meanwhile the plant is at this phase, and it has greater needs of it.

During the last years, it is discussed a lot the fact that which system is more appropriate for the cultivation of the olives, where different authors keep the non-arable cultivation system, meanwhile the farmers preserve the idea to plough it. Taking into consideration the importance of the determination of the best way of the soil usage in the olive groves in order to preserve their quality, we have chosen to undertake this study which objective is the assessment of the influence of the cultivation systems of olives on the chemical characteristics of the soil.

II. MATERIAL AND METHODS

The modification of the habitual system of the culture, in a short and long period of time leads to the changes of the soil, which affect the physical and chemical characteristics of the soil, the production of the plants, the susceptibility towards erosion and the costs of cultivation.

The experiment held during 2013 and 2014 in Shamogjin, Vlore, for Franotio cultivar. The treatments were: Arable, Non-Arable and Barely (*Hordeum Vulgaris*), in an area 250 m^2.

The analyzed elements were: pH, Organic Materia, organic nitrogen, phosphorus, potassium, calcium, Mg, Fe, Cu, Mn and Zn. The chemical analyses are held according to the methodology of [5], for the analyses of the chemical elements in the Center of Technology Transfer in Fushe-Kruje. To interpret the data it is used the SPSS, version 23.

III. RESULTS

After three years of applying the barely, it is observed a significate grow in the composition of the organic Matter in the most surface part of it (0-2 cm), in the center of the spaces between lines, compared to the other systems of cultivation, and to keep the non-arable land defoliated, without observing significant differences between the systems of cultivation in huge depth. The application of the technique "non-arable bare land" didn't bring a significant reduction during three years of the structure of the organic Matter in comparison with the traditional cultivation.

Under the coronet of the plants it is observed a significant contain of higher organic matter than in the center of the space between the lines in all the cultivation systems which was in greater amounts in the system of keeping the non-arable land (non-arable bare land and Barely). This fact is explained more likely with the accumulation of the olive leaves in the land surface during the years and the partial humidity which cannot be incorporated in the depth of the land through the works.

Table 1. The containment of the chemical elements in the olive leaves taken in different systems of the usage of P (the arable land), (Non-arable land and MV- Barely). It is appeared in the two last lines the considered levels as normal and non-normal proposed from [5].

Treatments	**N %**	**P %**	**K%**	**Ca %**	**Mg%**
		2013			
Arable Land	1.70	0.15	0.95	1.20	0.15
Non-Arable Land	1.74	0.14	0.99	1.40	0.16
Barely	1.68	0.13	0.93	1.17	0.14
		2014			
Arable land	1.40	0.11	0.75	1.50	0.15
Non-Arable Land	1.52	0.12	0.91	1.45	0.13
Barely	1.60	0.12	0.88	1.66	0.16
Normal level	1.5-2	>0.08	>0.8	>1	>0.1
Deficit level	<1.4	<0.05	<0.4	<0.3	<0.08

The highest assimilated values are observed in the cases of the barely usage in the land surface (0-2 cm) and in the center of the spaces between the lines, a fact which comes as a result of the dissolution of the cover crop year after year on land, and this happens basically because those plants which can be covered can also absorb this nutrient into the surface. In the 0-15 cm surface in the non-arable land there are observed the highest values of phosphorus, in the plants coronet.

The values found on the leaves have resulted in an adequate level [6] for N, K, Ca and Mg (Table 1) for both years of study. The highest values of N were observed in cover crop soil for the two years of study. The same trend was observed for Mg (Table 1). The opposite occurred with Ca, the maximum values of its content are found in the soil (Table 1). Potassium has resulted in higher content in Arable Land in the first year of study while the opposite happened with the second year where its highest value was found in Non-Arable Land. Found results have demonstrated the value of Cu, Mn and Zn at appropriate levels, (the required value, Freeman et al., 1994) in both years of the study.

The maximum value of Fe has resulted 29 pmm in arable land (Table 2), while it has resulted in the same value in the other two types of land management. This trend has also followed by Mn in the first year of study 2013, while Cu has resulted in higher value on land holding with cover crop. This trend has not been observed in the second year of study where Fe, Cu, Mn and Zn have higher content in soil holding with cover

crop respectively at 47, 110, 38 and 22 pmm (Table 2). The results of the second year demonstrate a slight superiority of soil holding with cover crop over two other arable and natural planting systems.

Table 2. The containment of the chemical elements in the olive leaves taken in different systems of the usage of P (the arable land), (Non-arable land and MV- Barely).

	2013				2014			
Treatments	Fe ppm	Cu ppm	Mn	Zn ppm	Fe ppm	Cu ppm	Mn ppm	Zn ppm
Arable Land	29	15	28	23	35	71	30	21
Non-Arable Land	27	14	27	22	38	77	33	20
Barely	27	16	24	22	47	110	38	22

Even though there are observed other clear differences in the chemical characteristics of the soil as a result of the application of the different systems of using soil, these modifications don't seem to have affected the nutritive stat of the olive plantations. Even though any of the nutritive elements during the years which are observed demonstrate significant differences, which can be observed in table 1, these differences don't seem to be relevant, because these values are higher than the values considered as appropriate [5] in principle it isn't expected to have an important effect on the production of olive.

IV. CONCLUSION

Based on the achieved results of this study, we come to the conclusion that there are significant changes in the indicative values analyzed during two years where the system of the barely land is easier than the other ways of keeping the olive grove. The higher content of organic matter and N_2 is observed in the case of keeping the olive groves barely cultivated, which demonstrates the superiority of this way of cultivation. According to all the changes of the chemical elements in the soil, the results showed nutritive elements and other elements in the optimal contain in the plant leaves, a fact which shows that really can't be expected big changes in the efficiency of plants. The repetition of the experiment for a long period of time and the measurement of other physical indicators will enable more clear conclusions.

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