

# **Study of spatial variation of nutrients in olive orchards (Case study-Etka olive orchards)**

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Olive is one of the most important horticultural products in our country. Although olive is a plant that adapts to different types of soils, especially calcareous soils, and is compatible with a wide range of soil fertility levels, But for the production of a good and economical product, the presence of soils with a depth, texture, and proper quality and optimal nutrition is necessary with the use of appropriate nutrients. The use of a deviation method the optimal percentage is considered in determining the nutrient level in olive. This research was carried out to investigate the spatial variations of nutrient elements in olive groves (case study, Garden of Etka). The study area is located in the south of the city of Manjil and between the cities of Loshan and Rudbar, in Guilan province, with total area of 198.5 hectares. 50 leaf samples were collected in July and August 2012 and were determined the concentration of nitrogen, phosphorus, potassium, calcium, magnesium, manganese, copper, zinc and boron in the laboratory. The optimal deviation method (DOP) was used to determine the nutritional value of olive trees. Using experimental data and interpolating between sampling points, mapping each of the nutrients in the leaves, using the Inverse Distance Weighting method was developed. Concurrent with the sampling of leaves, 50 soil samples depths of 30-0 and 60-30 cm soil samples were taken and analyzed. Also geographic locations of the points were recorded by a GPS device. Using this information, maps of soil distribution and soil characteristics were sampled at two depths, provided with ArcGIS software. The results showed that most of the samples were loam soil and some clay loam. The average salinity at the soil level was not significantly different the depth (salinity in surface and low depths was 4.9 and 4.8 dS/m respectively). The saltiness of this garden should be taken seriously. The pH of the soils was 7 to 7.4 and in a relatively neutral region. The amount of gypsum and lime in soils was also very low, and the problem with these two

characteristics did not threaten soils. The amount of organic carbon, phosphorus and potassium absorbed by soils were very low, and the poverty of these substances and nutrients in the soils of this complex were cultivated. Due to soil texture characteristics and the results of physical and chemical tests of soils, paying attention to the correct fertilization of the studied soils should be placed in the top priority of the management plan. The index of deviation the optimum level was calculated with average concentration of nutrients in the leaves of high yield olive trees, as well as using the global reference and global numbers. Observations and results show that the uses of global reference numbers are more consistent with the realities of the region. Accordingly, the order of the food requirement was obtained as -Cu> -Zn> -N, -K> Mg> P> B> Ca> Mn. According to the results, there were shortage of nutrients in copper, zinc, nitrogen and potassium, and were more manganese, calcium, boron, phosphorus and magnesium in the trees.

**Keywords :** Olives, Deviation optimal level, Nutritional balance, Etkā garden

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