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CHARACTERISTICS OF SOILS FROM THE AREA OF XANTHI - NORTHERN GREECE FOR GROWING VINEYARDS AND KIWI

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Abstract

Due to the hot subtropical climate, agriculture in Greece specializes in growing various heat-loving crops - rice, cotton, olives, third in the world after Spain and Italy, citrus fruits, sesame, vines, special varieties of raisins and more. The aim of the present work is to determine to what extent the soils in the Xanthi region are suitable for growing kiwis and vineyards. Some soil indicators were determined such as particle size composition with FRITISH photosedimentograph, pH, humus content, total and active carbonates and digestible forms of N, P and K. It was found that the soils in the study area were developed on carbonate clays. In terms of particle size composition and their physico-chemical and agro-chemical properties, these soils prove to be suitable for growing kiwis and vines.

Key words*: soil properties, vineyards, Xanthi.*

INTRODUCTION

Greece specializes in the cultivation of citrus crops: oranges, tangerines, lemons, olives, perennials - vines, walnuts, almonds. About 1/3 of the production is exported. Large quantities of these fruits are processed into juices and are offered on the international market in original packaging.

Favorable soil and climatic conditions in Greece contribute to the cultivation of vineyards, which occupy 2.5 million acres of land. Wine and dessert grape varieties grow here. Seedless varieties for the production of raisins are also grown. Greece is the largest producer and exporter of raisins in the world.

Fruit growing is also well developed - grapes, melons, peaches and oranges are popular goods exported from Greece to European markets.

The country has a Mediterranean climate, mild and pleasant in winter, hot and dry in summer. Temperatures rarely fall below zero, but in the northern parts of the country, in the valleys of Struma and Mesta, cold air masses often come. Summer temperatures often exceed 40^0C, and in July and August sometimes the rains are completely absent. It is said that here the sun shines 3000 hours a year (Διευθυνση Γεωργιας Ξανθης).

In economic and geographical terms, the country is divided into 5 regions - central, northern, southern, western and eastern.

Northern Greece encompasses Aegean Macedonia and Aegean Thrace. It is forming as the second most important economic region of the country on the basis of the coal reserves in its western part, the are deposits in the Halkidiki peninsula and the agricultural raw materials: cotton, cereals and perennials in the coastal lowlands and fields.

The object of the present study is to assess the suitability of soils for the establishment of vines and kiwis in terms of soil and climatic factors characteristic of Xanthi located in the region of Northern Greece, region of Aegean Thrace.

MATERIALS AND METHODS

For the purpose of this thesis, 2 soil profiles were taken from the region of Xanthi. The soils are air-dried and prepared for analysis. The laboratory study includes preparation of soil samples for analysis, study of some soil and agrochemical properties of soils, in order to assess the suitability of the area for growing kiwis and vines.

The analyzes of the collected soil samples from the two profiles - № 1 kiwi, № 2 vineyards were performed by the following methods (Trendafilov et al., 2017):

- Particle size composition with FRITISH photosedimentograph;
- pH in H_2O - potentiometrically;
- The content of organic matter according to the method of Turin;
- Determination of total carbonates according to Scheibler;
- Determination of active carbonates by the Druino-Gale method;
- Assimilable K is determined in hydrochloric acid extract of 2n HCL;
- Mobile phosphates are determined by the double-lactate method of Egner-Reim;
- Ammonium and nitrate N in extract of 1% KCL.

Figure 1. Cromic-eutric cambisols

RESULTS AND DISCUSSIONS

Xanthi or Skecha (Greek: Ξάνθη, Xanthi, Turkish: İskeçe, Iskeche) is a city in northeastern Greece, in the region of Eastern Macedonia and Thrace, the center of dem Xanthi. It is located in White Sea Thrace, at the foot of Ruen Mountain (part of the southern slopes of the Rhodopes), /Soil Atlas, 2005/.

It is located in the western part of Thrace and borders on the north with Bulgaria - Rhodopes, on the west with Drama and on the southwest with Kavala on the west with the Rhodopes and on the south with the Thracian Sea. The region is characterized by a transitional Mediterranean climate, mild winters, warm and dry summers. Very low winter (- 7^0C, - 10^0C and less often - 12^0C) and very high summer temperatures (42^0C, and more often 37 and 38^0C) are observed for a short time. In winter there is a strong north-east wind (60-80 km/h). Annual rainfall is in the range of 800 to 900 mm/m^2, unevenly distributed, and sometimes for 4-5 months fall only 50-60 mm/m^2 (Οδηγος Ανατολικης Μακεδονιας και Θρακης).

Within the boundaries of the studied object, the soil difference according to the FAO classification (Boyadzhiev, 1994a; Boyadzhiev, 1994b) are Leached cinnamon forest soils (Cromic-eutric cambisols - Figure 1).

Climatic conditions in White Sea Thrace provide a long growing season and a long process of weathering and soil formation in the direction of fersialitization. Fersialitization weathering and soil formation in the past (during the Pliocene and the Old Quaternary), when these soils were mainly formed, was much more intense. At that time, the climate was better expressed in the Mediterranean, and the red colored materials on which the cinnamon forest soils are formed were mainly formed and deposited at that time (Yaranov, 1938).

Figure 2 shows the mechanical composition of the two soil profiles depending on the content of physical clay. It varies from medium sandy-clayey to clayey-sandy in profile 1 kiwi and heavy sandy-clayey in profile 2 vineyard. The heavy Particle size composition is explained by the presence of larger amounts of three-layer clay (Gyurov & Artinova, 2001).

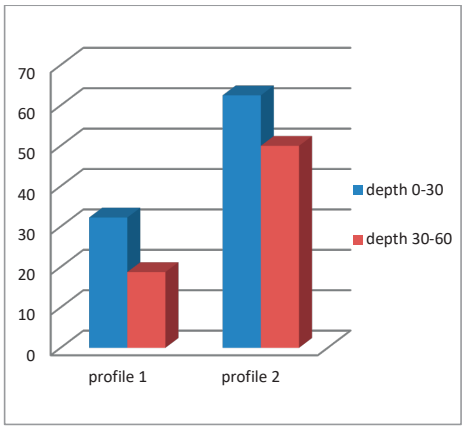

Figure 2. Mechanical composition (<0.01 mm, %) of soil profiles

In Figure 3 shows the reaction of the soil in both profiles. It is characterized as slightly alkaline in profile 1 and moderately alkaline in profile 2. Higher pH values in vineyard profile 2 are explained by the presence of $CaCO_3$.

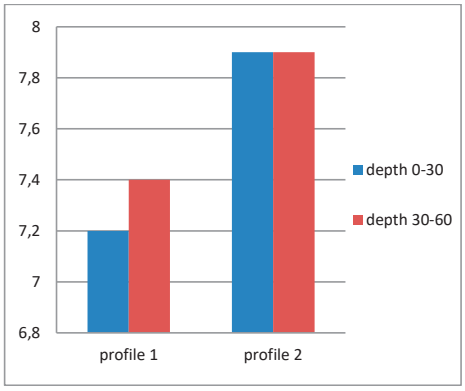

Figure 3. Soil reaction, pH (H_2O)

The high percentage of total and active carbonates is characteristic of this type of soils, as they are formed on carbonate soil-forming materials combined with the factors of weathering and soil formation (Figure 4) (Atanasov, 1987).

Figure 5 shows the organic matter content in%. The graph shows that according to the accepted classification for the stock of soils with humus, the studied soils of the two profiles are characterized by low to medium stock.

The content of digestible forms of nitrogen, phosphorus and potassium is presented in Figure 6. The studied soils in both profiles are weakly to medium stocked with nitrogen, poorly stocked with phosphorus and well stocked with potassium due to the presence of illite minerals.

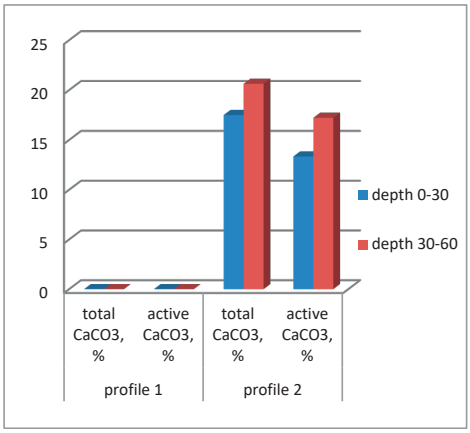

Figure 4. Wathering and soil formation factors

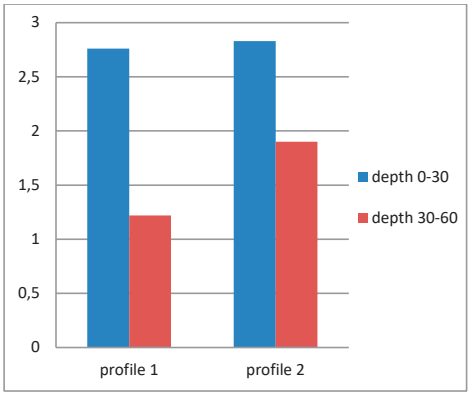

Figure 5. Organic matter (humus), %

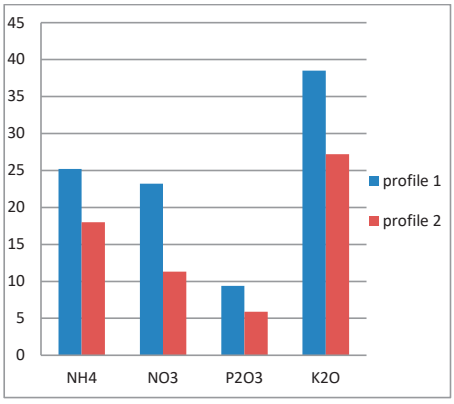

Figure 6. Digestible forms of nitrogen, phosphorus and potassium, mg/1000 g

Before the construction of the vineyard, storage and pre-planting fertilization must be performed. When young vines are stockpiled, they are not usually fertilized until they have started to bear fruit. However, if the vines have weak growth, they are fed with 8-10 kg of active substance nitrogen fertilizers per dka. In fruit-bearing vineyards, organic, phosphorus and potassium fertilizers are applied to the soil in autumn at the same time as deep plowing.

The main Greek vine varieties are:

Limino / Evros / - the cultivation of this variety is recommended on the territory of Evros, Xanthi, Drama, Serres, Kavala and Halkidiki, as well as in the region of Limnos, where the vines have a favorable climate.

Sefka / identical to the Bulgarian Shefka / is mainly grown in the region of Serres, very productive, resistant to diseases and drought.

Zoumiatiko or Damiatis / identical to the Bulgarian Dimyat /, distributed mainly in the area of Xanthi and Serres, a white variety of Balkan origin.

Pamidi identical to the Bulgarian Pamid, found in the region of Eastern Macedonia and Thrace. Pamida is easy to grow, very productive. Depending on the winemaking, white wines or rosettes are produced.

Mavroudi / identical to the Bulgarian Mavrud /. The name comes from the Greek word "black", derived from the deep, dark, ruby color of the grapes.

Keratsuda - red-green variety, common in northern Greece. It comes from an area near the Struma River in Bulgaria and Greece (Babrikov et al., 2005).

Actinidia (kiwi) originates from China, where there are natural habitats along rivers. A relatively new culture has recently spread to some Mediterranean countries.

Kiwi grows on fertile and moist soils. The plant is sown in spring and harvested in mid-October. Actinidia needs areas with mild winters and hot and humid summers to thrive. For this reason, it is cultivated in the Greek zone in Pieria, where it has been registered under the designation of origin (PGI) [2], since 2002 in the area of the Sperchios River in Phthiotis, where it is registered under the Protected Designation of Origin (PDO) (www.minagric.gr) and in Pella, Imathia, Mesolonghi, Chania, Rethymnon, Arta, Preveza and the delta of Pinios (Omolio, Pyrgetos, Aegean Sea). Kiwi fruit is rich in potassium, magnesium, phosphorus, fiber and trace elements. It also has more vitamin C than any other fruit. The presence of many vitamins makes kiwi the best means of protection against microbes. In addition, it eliminates the risk of clotting in the circulatory system and ensures proper digestion and proper bowel function. Finally, it helps improve vision thanks to the antioxidant lutein it contains.

Irrigation of the kiwi is extremely important. Although no strict scientific standards and deadlines for kiwi irrigation have been established, it can certainly be recommended that soil moisture be maintained at around 80-90% of FMC throughout the year. This can be achieved by watering the adult plants every 10-15 days at 50-60 l/m^2. Young plants are watered every few days with 5-10 liters of water. Mulching of the soil surface around the plants with well-decomposed manure or waste straw also gives a good effect (Lichev et al., 2020).

The use of organic and mineral fertilizers for kiwi fertilization supports the strong growth and nutrition of the rich fruit crop. In the case of fruit-bearing plants, manure is applied at once every 2-3 years in the autumn, spreading at a dose of 4-5 kg/m^2. At the same time it is fertilized with potassium and phosphorus fertilizers in doses of 30-40 g/m^2 and plowed with the autumn treatment. The plants are fed with nitrogen fertilizer in the spring, at a dose of 30-40 g/m^2 and again in July at a dose of 10-20 g/m^2.

CONCLUSIONS

Based on the study of soils in the region of Xanthi, northeastern Greece, as well as the climatic and soil-forming features characteristic of this region, we came to the following conclusions:

1. In terms of climate, the Xanthi region is suitable for growing kiwis and vineyards.

2. The soils in the area are developed on carbonate clays and limestones. With regard to the mechanical composition and their physico-chemical and agrochemical properties, these soils prove to be suitable for growing kiwis and vineyards by applying the necessary norms for

fertilization and agrotechnology of cultivation of the respective crops.

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