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MINERALOGICAL COMPOSITION OF GAJNJAČA SOIL IN KRNJEVO VITICULTURE AREA

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INTRODUCTION

Gajnjača or Eutric Cambisol occupies around 700,000 ha of the Republic of Serbia and presents soil type most suitable for fruit and vine production. Krnjevo viticulture area is characterized by vast area of Gajnjača soil which gives specific tone to grapes and wine itself. Soil survey was performed within vineyard of winery famous for its high quality wines. Our goal was to reveal mineralogical composition that, along with winemaker devotion and eagern provides characteristic flavour of wines produced in Krnjevo. In order to re mineralogical composition of soil and to define one of the pieces that g wine specific scent, we performed soil survey of Gajnjača and X-ray diffrac (XRD) of soil genetic horizons samples.

MATERIALS AND METHODS

Four soil profiles were positioned at the central area of the vineyard. description confirmed our hypothesis that it was Gajnjača soil. We took samples from each genetic horizon, and performed standard soil labora analysis to determine the most important physical and chemical propertie the soil. In order to determine mineralogical composition, we performed X analysis. Diffractograms were recorded on a Philips PW1710 diffractome operating at 36 kV and 18 mA. Recording started at 4Θ, speeds 10/min; F 4/2. XRD patterns of the bulk sample, oriented sample, sample saturated ethylene glycole (EG) and sample heated at 550°C (clay fraction) w recorded.

RESULTS

Profiles of Gajnjača soil in Krnjevo viticulture area have A-(B)-C sequence.

A horizon is 30-47 cm thick, gray-brown to reddish-brown. The content of organic carbon in the humus horizon ranged from 1.32% to 2.14%, with an average value of 1.72%. Content of organic matter decreased within depth of profile, and in C horizon it was 0.53% to 0.94%, which is a consequence of deep penetration of the vine roots. Active acidity of the surface horizon ranged from 5.61 to 7.03, and exchangeable acidity from 4.46 to 5.48. These values are relatively uniform along the depth of the profile of the examined soil, while they increase sharply in the C horizon, where they reach pH values of more than 8, as a consequence of the presence of calcium-carbonate.

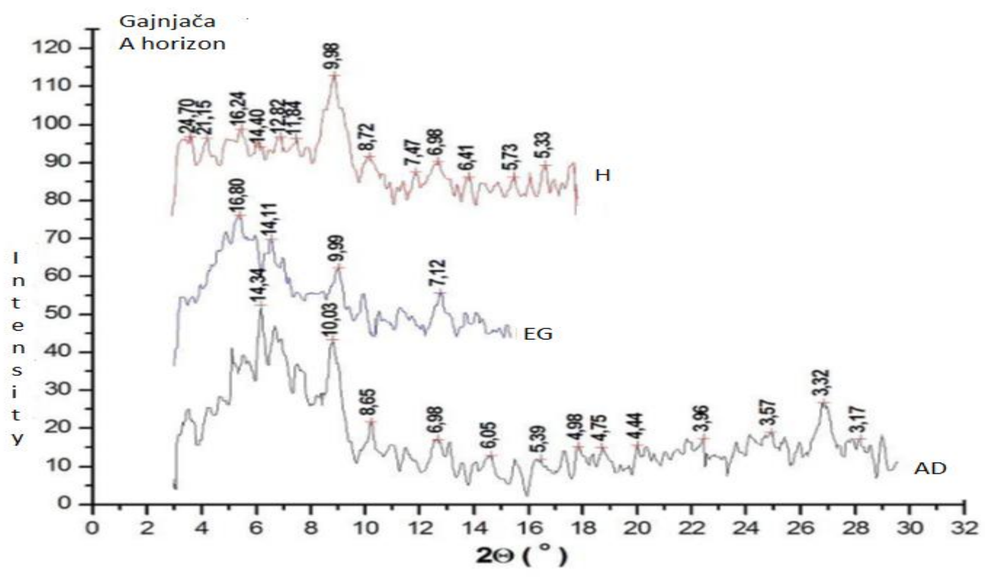

Figure 1: Diffractogram of clay from A horizon (AD - air dry sample, EG – ehthylene glycol treated, H – heated at 550 ° C

Cambic horizon - (B) - is 43-70 cm thick, with a characteristic reddish-brown colour and a heavier mechanical composition than the surface horizon. Soil peds are prismatic.

Texture of Gajnjača is silty-clay loam. Clay-size particles are the most abundant in the central part of the profile (in cambic horizon) and texture of this zone is transiting to silty clays. This is typical for Gajnjača, since genesis of Gajnjača is characterized by the process of clay minerals formation in the central part of the soil profile.

Precisely, content of clay-size partilces in the surface horizon and in the parent material is lower than in the cambic horizon. It ranges from 34.16% to 38.61% in A horizon, and from 30.66% to 32.53 % in C horizon, while in (B) horizon it reaches 34.38% to 40.14%. This indicates argilogenesis in the horizon itself.

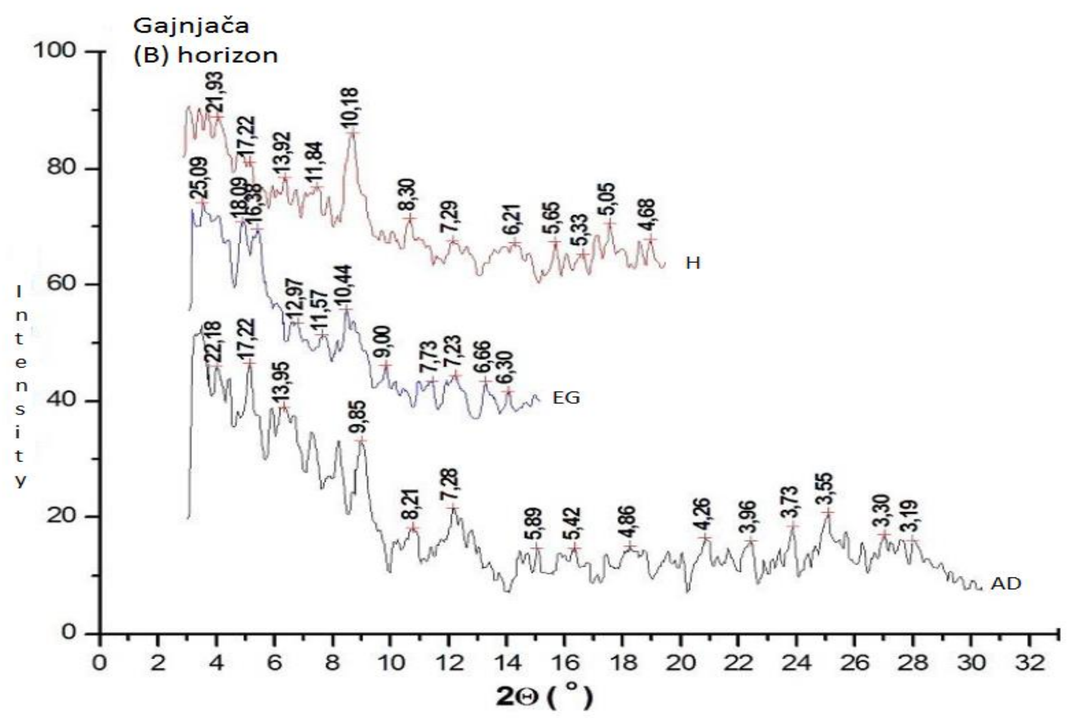

Figure 2: Diffractogram of clay from cambic horizon (AD - air dry sample, EG – ehthylene glycol treated, H – heated at 550 ° C)

The formation of clay minerals, apart from the texture, can also be observed on the basis of X-ray analysis of the mineralogical composition (XRD), shown on diffractograms of the analysed soil samples.

Diffratogram of the air-dry sample of the clay fraction of the soil from the A horizon showed a reflection at 14.34 Å. This reflection moves to 16.80 Å after ethylene glycol treatment, which indicates the presence of minerals from the smectite group. The reflection at 10.03 Å remains in a similar position after ethylene glycol treatment, which is an indicator of the presence of illite clays.The reflection at about 7 Å after treatment with ethylene glycol remains in a similar position, and after heating at 550 ° C it does not disappear, which indicates the presence of chlorite in the sample. Reflections at about 12 and 13 Å in the heated sample are second-order reflections of mixed-layered silicates. The X-ray diagram of the air-dry sample of the clay fraction of the soil from the (B) horizon showed a reflection at 13.95 Å. This reflection shifts to 16.38 Å after treatment with ethylene glycol, and to 10.18 Å after heating, which is an indicator of the presence of minerals from the smectite group. The reflection at 9.85Å remains in a similar position after ethylene glycol treatment and after heating, which is an indicator of the presence of illite. The increase in its intensity after heating is a consequence of the contribution of smectite reflection. The reflection at 7.28 Å after treatment with ethylene glycol remains in a similar position, and after heating at 550 ° C it does not disappear, which is an indication of the presence of chlorite in the sample. Reflections at 17.22Å and reflections at about 12 and 13 Å represent reflections of mixed layered silicates.

CONCLUSION

XRD analysis of Gajnjača A horizon revealed presence of quartz, feldspar and phyllosilicates (smectites, illite, chlorite). Similar mineralogical composition was determined in cambic - (B) horizon, but with a noticeable decrease in feldspar content. Lower feldspar content in the cambic horizon and the higher content of phyllosilicates compared to A horizon, reflects a more intensive transformation of feldspars into phyllosilicates during the formation of the cambic horizon, where the largest mass of vine root is found.