

THE WINE ROAD IN VRANCEA COUNTY

Slave Camelia¹ 

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Abstract: Nowadays, G.I.S. is widely used in the traditional cultivation of vines. The vineyard cultivation in Vrancea County is a traditional activity specific to this hilly area. G.I.S. provides tools and information on how the vineyard is cultivated, depending on the environmental factors that influence it: climate, soil, geological substrate through created maps using the ArcMap 10.5 program. G.I.S. is a tool that can be used to analyse and improve vineyard management decisions, and is also a powerful tool in collection, analysis and monitoring data.

This article aims to show that different spatial analysis tools used nowadays can play an important role in monitoring vine plantations and implicitly in increasing the production of grapes that will end up as obtained quality wines. To create the slope map and the solar radiation map, it was used a DEM (digital elevation model) with a resolution of 30m. With the help of the created maps, it is possible to make a spatial analysis of the resources within Vrancea County.

Keywords: Geographical Information Systems (GIS), Geology, Slope, Solar radiation, Viticulture.

1. INTRODUCTION

Vrancea County is located outside the Curvature Carpathians, with an area of 4,857 km² (2.04% of the country's surface) has the following neighbours: to the north Bacău County, to the northeast Vaslui County, to the east Galați County, to the southeast Brăila County, to the south and southwest Buzău County and to the west Covasna County. Vrancea is a link between the great areas of the Eastern and Southern Carpathians, the Siret Plain and the Danube Plain, because is located at a geographical crossroads.

From the physical-geographical point of view in Vrancea County, the following areas of the South-East region can be identified:

1. The Bărăgan Plain area, which includes parts of Vrancea, Buzău and Brăila counties,
2. The Southern Moldova area, which includes parts of Galați and Vrancea counties areas,
3. The Curvature Subcarpathians area, which includes the mountainous area from Vrancea and Buzău counties.

The agricultural lands of Vrancea County stretch on an area between the right bank of the Siret and the downhill of the Sub-Carpathian Hills of the Vrancea Mountains. The climate is suitable for field crops, and especially for vineyard cultivation of (9.95% of Romania's vineyards) and wine production. Vrancea County, being the largest wine-growing county in the country, is an exporter to Europe, America and Japan.

The agricultural county area represents over 52% of the total area of the county, and the arable area represents 58.06% of the total agricultural area.

¹ University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, Bucharest, Romania

Vrancea County had in 2012 an agricultural area of 255,232 ha; most of the agricultural area are arable (148,176 ha), followed by pastures and hayfields (pastures: 43,708 ha, hayfields: 32,904 ha), wine and vineyards (26,752 ha), orchards and fruit nurseries: 3,692 ha. Forests and other forest vegetation comprise 193,326 ha.

Wine sector: Five wine-growing areas have been established in the European Union: A, B, C I, C II and C III.

The viticultural regions and the vineyards of our country fall into the following viticultural areas:

- Zone B – includes the viticultural region of the Transylvanian Plateau;
- Zone C I – includes the regions of the Moldavian Hills, the Banat Hills, the Crișana and Maramureș Hills, the Muntenia and Oltenia Hills – Ștefănești-Argeș Vineyards, Sâmburești, Drăgășani and the Craiova Hills;
- Zone C II – includes the regions: Muntenia and Oltenia Hills – Buzău Hills, Dealu Mare, Severin and Drancei Plains Vineyards, Dobrogea Hills, Danube Terraces; Sands and other favourable lands in the southern part of the country.

These national wine regions levels generally overlap with the Romanian historically provinces formed, namely:

- The viticultural region of the Transylvanian Plateau,
- The viticultural region of the Moldavian Hills.

The viticultural region of the Moldavian Hills includes a number of 10 vineyards, namely: Cotnari, Iași, Huși, Zeletin, Tutovei Hills, Bujorului Hills, Nicorești, Ivești, Covurlui, Zeletin, Panciu, Odobești and Cotești. There are 34 wine centres in these vineyards. [3]

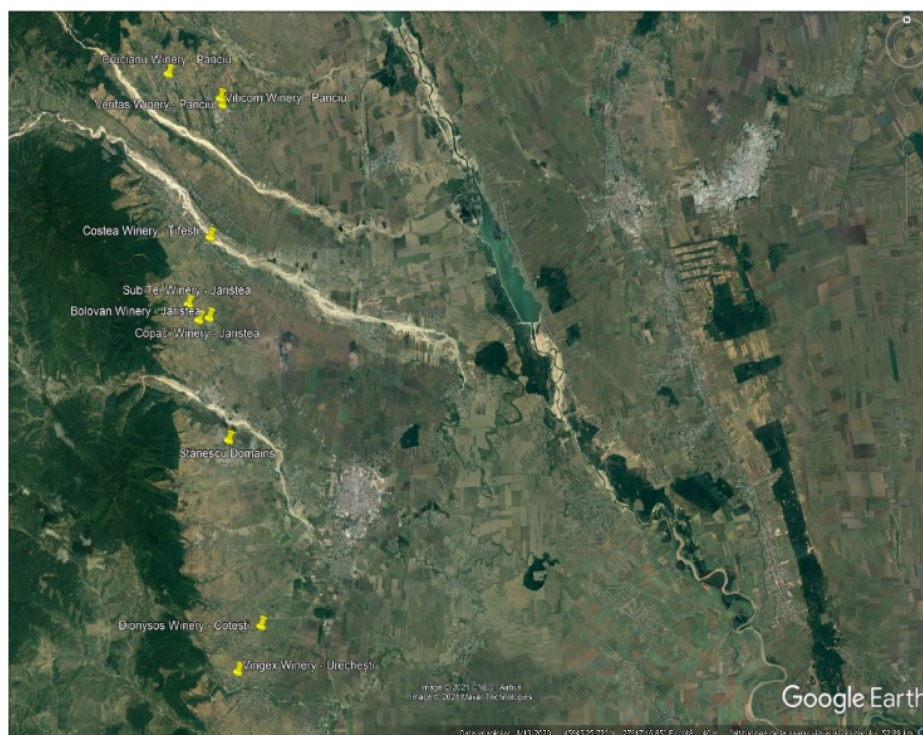


Figure 1. Geographical position of ten cellars on wine road (yellow pins)

Source: Clip from Google Earth, 2021

In figure 1 are presented the most important ten cellars on wine road: Vingex winery – Ureches-ti, Dionysos winery – Cotesti, Domeniile Stanescu winery, Sub Tei winery – Jaristea, Copaci winery – Jaristea, Bolovan winery – Tifesti, Veritas winery – Panciu, Viticom winery – Panciu, Crrucianu winery – Panciu.

The first place is the South-East region, in terms of vineyards by fruit area, holding about 40% of the country's vineyard area in recent years. The South-East region is recognized, both internally and externally, by the quality of wines from famous vineyards, which are found throughout the regions: Panciu, Odobești, Pietroasele, Nicorești, Niculițel, Murfatlar, Însurăței.

1.1. Study Area of Vrancea County

Vrancea County owns 14% of the country's viticultural area, which is part of this region and is divided into three representative vineyards: Panciu, Odobești and Cotești. [2]

Viticulture is a traditional activity, of great economic importance, benefiting from favourable natural conditions in Vrancea.

Panciu vineyard is the largest in Vrancea County (9,500 ha) and includes three wine centres of national importance: Panciu, Țifești and Păunești. Panciu Vineyard was and remains a permanent attraction for those who want to know the riches, beauties and vestiges of these places.

In the past, the wines were obtained from traditional varieties such as Plăvaie, Galbenă, Băbească neagră, Fetească albă and Fetească neagră. Later, other wines conquered the wine market, such as: Fetească regală, Riesling Italian, Sauvignon, Pinot Noir, Cabernet Sauvignon, which allowed to obtain wines with an origin designation and appearance of sparkling wines that raised the fame of the vineyard.

Odobești vineyard, with an area of approximately 7000 ha, is the oldest vineyard in our country, and in its portfolio are included the Odobești, Jariștea and Bolotești wine centres.

Odobești vineyard is being considered a Dacian vineyard. Profiled on the production of wines and especially the white ones, in Odobești is cultivated a great variety of vineyards.

Galbena de Odobești still exists in culture, is mentioned among those of local origin, and on smaller areas are cultivated Plăvaie and Mustoasă varieties.

Among the existing varieties of local origin that are still cultivated is Galbena de Odobești, and on smaller areas are cultivated Plăvaie and Mustoasă varieties.

Romanian varieties, such as Feteasca Albă, Feteasca Regală and Sârbă are also found on vineyards, and foreign variety, Aligote, Riesling Italian and Mușcat Ottonel are cultivated on relatively large areas. The black grape varieties group is represented by Băbească neagră and Pinot noir.

Odobești Vineyard also presents favourable conditions for table grapes production, from the assortment of which does not lack varieties, e.g. Chasselas and Coarnă accompanied by Hamburger and Cinsaut Muscat.

Cotești vineyard (6589 ha) is a continuation of the Odobești vineyard, benefiting from high heliothermal resources, and includes the viticultural centres: Cotești, Vîrteșcoiu, Cîrligele, Urechești, Tîmboiești and Dumbrăveni.

In all these wine centres there are production areas of white and red wines of current consumption from the varieties of Fetească regală, Aligote, Băbească neagră. High quality wines are obtained from the varieties: Fetească alba, Riesling Italian, Mușcat Ottonel, Cabernet Sauvignon, Fetească Neagră and Merlot.

The relief of Vrancea County is arranged in steps that decrease in altitude from west to east, and include: Vrancea Mountains (with the depressions Gresu and Lepsa), the Subcarpathian Hills and the Lower Siret Plain, bordered by the Moldavian Plateau (Tutovei Hills) to the northeast and the Plain Ramnicului to the southeast. The Vrancea Mountains are wrinkle mountains, made up of peaks that come from the fragmentation of the 1700 m erosion platform.

The spatial variability of the factors of relief, climate and soil is great, and the types of viticultural potential they determine are also numerous and very different. [4]

2. MATERIALS AND METHODS

To create the maps, it was used a DEM (Digital Elevation Model) with a resolution of 30m. A DEM is a raster representation of a continuous surface, usually referencing the surface of the earth. The accuracy of this data is determined primarily by the resolution (the distance between sample points).

From the point of view of the vineyard favourable cultivations, with the program ArcMap 10.5, the following maps resulted: slopes, solar radiation and geology. Generic data sets vector of Romania, (2009). [5], [6], [7]

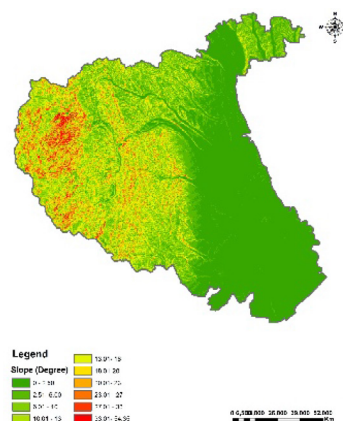


Figure 2. The slope map of the Vrancea Country

First DEM was used to represent the slope map (Figure 2). The slope represents a morphometric parameter that characterizes the deposition of the altitude steps inside the study area. The area is classified into ten slope angle categories, according to the International Union of Geography: 0-3° very slight slopes, 3-8° slight slopes, 8-13° moderate slopes, 13-20° and 20-30° steep slopes and over 30° very steep slopes. Analysing the slope map of the investigated area, it can be noticed that the 0-13° interval is dominant, representing over 50% of the area; continued by

the area between 13.01° - 23.00° , followed by a sloping area between 23.00° and 35.00° , which represents the limit up to which vineyard can be cultivated.

Solar radiation is a process that influences physical and biological growth and development of vineyard areas, and has a direct effect on the air and soil temperature, plants evaporation and transpiration, soil moisture and atmospheric humidity. [9]

For Vrancea County the solar radiation map (kcal/cm^2 March 1, 2020 - October 31, 2020) allows the analysis of the effects of the Sun on the geographical area for periods of (March 1, 2020 - October 31, 2020).

Also, the latitude and height of the place, the slope orientation and the daily and seasonal changes in the Sun angle have been taken into account.

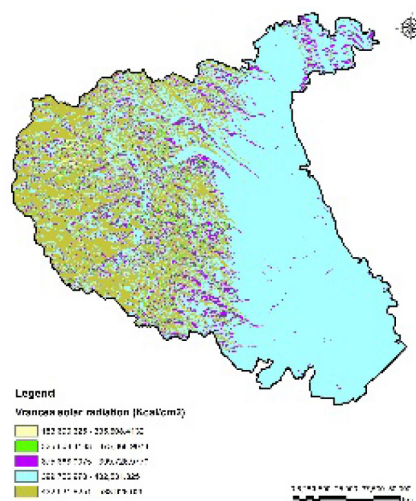


Figure 3. The solar radiation map of the Vrancea County

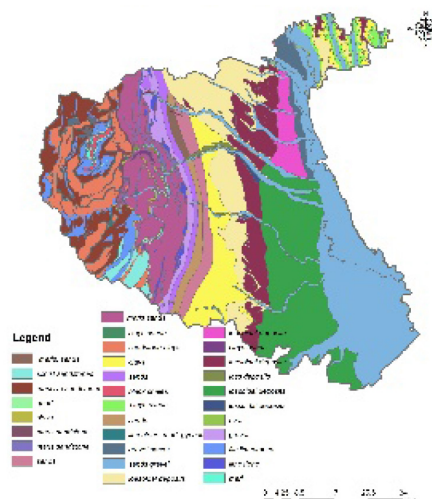


Figure 4. The geological map of the of Vrancea County

Figure 3 shows the solar radiation map in the study areas. DEM (digital elevation model) was used to create the map by the instrumentality of Spatial Analyst Tools – Solar Radiation – Area Solar Radiation. The highest amount of solar radiation is received in the South and South-East and it corresponds to the sub-Carpathian hills area ($399726, 978 - 432.531, 825 \text{ kcal}/\text{cm}^2$).

From the Geological Map of Romania at a scale of 1: 200,000 containing two layers: lithology and geological limits, the studied area was cut. (Figure 4). The geological map of the study area provides a data set needed to obtain information on the bedrock on which the soil layer is placed. It greatly influences the quality of obtained wines.

The “terroir” term represents the unique character of the wine in a certain area and includes first of all the pedogeological characteristics of the area, the location, the climate and the methods used to maintain the soil fertility. There is a wide variety of sandy, lossoid deposits and limestone areas, in Vrancea County. [4]

The climatic factors as: temperature, solar radiation, precipitation decisively influence the development of the vine, of the obtained grapes, and that will be later recognized in the wine quality.

3. CONCLUSION

Romania is an important wine country both in Europe and in the world. The total area with vineyards in 2019 was 182.6 thousand ha. In the Romanian viticultural regions, restructuring and reconversion processes took place, assisted with EU funds from the national support program allocated to Romania (i.e. 47.5 million Euros, annually, during the budget year 2014-2020). [8]

Vrancea represents a leader at a national level as a cultivated area with vineyards, as well as in grapes production. The vineyards have a high production potential, due to the natural favourable conditions. From economic point of view, viticulture represents an important branch of Vrancea County (30 - 40% of the value of the total agricultural production) and an activity in which a large part of the local population is involved. [2]

Vrancea has three important vineyards, respectively Panciu, Cotești and Odobești. Known as the “Land of Vine and Wine”, Vrancea is the county with the largest area cultivated by vineyards, with a viticultural heritage of 27,639 ha, of which 85% in the private sector, representing 11% of the total agricultural land of the county and about 10% of the viticultural area of Romania. Vrancea is a national leader, both in terms of area and in terms of grape production.

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