STUDY ON THE CARTOGRAPHY AND ECOPEDOCLIMATIC CONDITIONS OF CARASU VALLEY

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ABSTRACT

This paper presents the medieval and contemporary cartographic study and the ecopedoclimatic conditions of the Carasu Valley, located in southern Dobrogea, between the Danube and Black Sea. The Carasu Valley delimits the northern plateaus from the southern ones, of Constanta County. Is the only valley that crosses the Medgidia Plateau almost entirely On the both sides of the Carasu Valley is sprending a single vineyard, the Murfatlar vineyard with its wine centers. Also, the paper presents the ecopedoclimatic conditions of this area, conditions that influence the cultivation of vines. Here are the richest heliothermal resources (up to 3,5), with beneficial effects on the grapes maturation, and the presence of the Black Sea makes the sum of effective brightness hours of the sunshine to be the longest in the country, but the volume of precipitation is low.

INTRODUCTION

The name of Carasu Valley comes from the Turkish language "Cara-su" and it is a geographical formation that belongs to the plateau of South Dobrogea, included in the territory of Constanța County (Popescu N., Ielenicz M., 2003) . In 1862, it was considered to be the most important area in Dobrogea because it connected the Danube with the Black Sea and connected the east with western Europe. On the railway built on the Carasu Valley (1895) passed all the passengers who left Austria passed through Constanta and went to Constantinople, bypassing the Danube delta which was considered dangerous (M.D. Ionescu, 1904). Over time, the viticulture developed on both sides of the Carasu Valley and the Murfatlar vineyard was born, with the Murfatlar, Medgidia and Cernavoda wine centers. The most famous small lands are: Basarabi, Valu Roman, Castelu, Poarta Albă, Nazarcea (Murfatlar vine center); Valea Dacilor, Satu Nou, Peştera, Siliştea (Medgidia vine center); Rasova, Cochirleni, Seimeni (Cernavoda vine center). In the whole Murfatlar vineyard there are plantations with grape varieties for table and for wine. Because the heliothermal resources that were found here are rich, the grapes get their overripe, so that the Murfatlar vineyard is known especially for its table grapes and sweet wines (Oșlobeanu M., et al, 1991), but not only.

MATERIAL AND METHOD

It was done: - a documentary study on the medieval and contemporary cartography of Carasu Valley (Panait & Stefanescu, 1984);

-the soils characterization of the Carasu Valley area was performed by the specialized laboratory of County Office for Pedological and Agrochemical Studies[*];

-and the climatic data for a period of ten years (2009-2018)[***] have been centralized and interpreted in terms of resources (water, thermal, et al.) for the vine and synthetic ecoclimatic indicators were calculated: real heliothermal index (IHr), hydrothermal coefficient (CH),

bioclimatic index (I_{bcv}) and oenological aptitude index (I AOe).

implicitly in the Murfatlar vineyard there were identified the following types of soil (figure 3): balan soils (kastanoziom, 61% from the total surface of this viticultural area), with good fertility situated at north and south of Valley; chernozems (10%), with very good fertility, in the areas of Murfatlar, Poarta Albă and Siminoc; rendzinas (2%), with medium fertility; colluvisols (3%), with relatively low fertility; vertisols (1%), with low fertility; regosols (1%), with low fertility; unclogged anthropogenic soils (21%), with satisfactory to good fertility; anthropic protosols (1%), with satisfactory to good fertility.

RESULTS AND DISCUSSIONS

In the maps drawn up in the XVII-XIX centuries, the Carasu Valley appears under different names and forms, housing in the northern and southern part of it, several localities. Cartographers frequently use the name "Lake of Carasu", this name we find in the maps of Gerardus Valk, 1678 (fig. 1); followed by the map of Nicolas de Fer, 1688 and that of Guillaume de l'Isle in 1700 (all of them cited by Panait & Stefanescu, 1984).

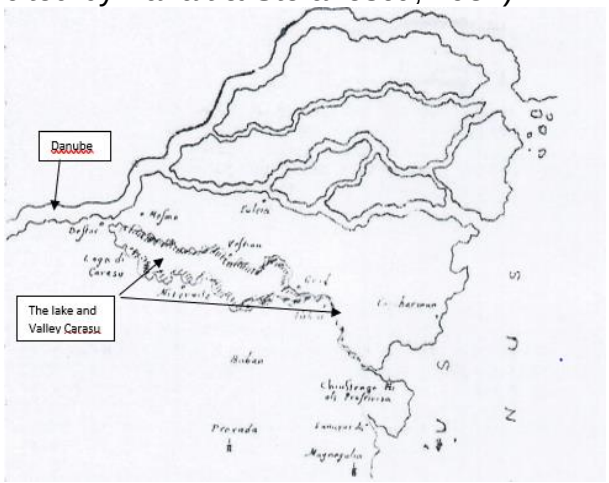

Figure 1. Dobrogea and Lago de Carasu in the maps of Gerardus Valk, 1678

Later, along the Carasu Valley, the Danube-Black Sea channel was designed and built (1973-1984). The channel is detached from the Danube at Cernavoda (at 300-th km along the river), follows the Carasu Valley and enters at 40-th km in the Dobrogea plateau and crosses in the direction of Basarabi -Valley Seaca - Straja, then north of Lake Agigea, until the port of Constanța. On the both sides of the Carasu Valley it is sprending a single vineyard, the Murfatlar vineyard with its vine centers: Cernavoda, Medgidia si Murfatlar (Constantinescu Gherasim, 1966, fig. 2).

The vineyard soils are almost uniform, with profiles of different thicknesses and similar morphological, physical, hydrophysical and chemical characteristics. Along the Carasu Valley,

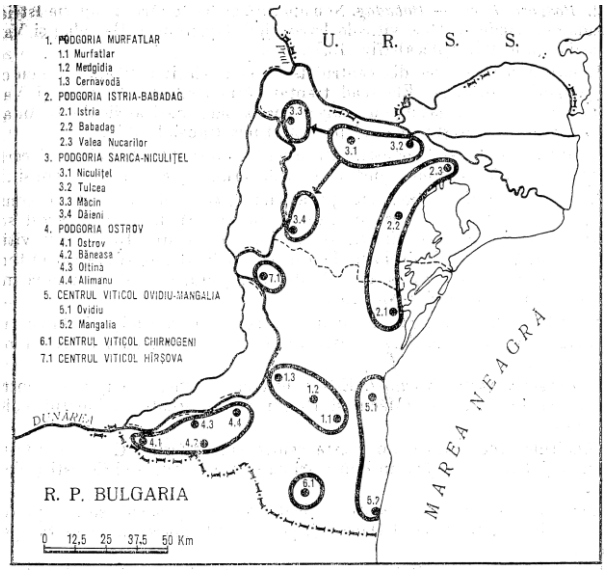

Figure 2. The Murfatlar vineyard with its vine centers: Cernavoda, Medgidia si Murfatlar (Constantinescu G., 1966)

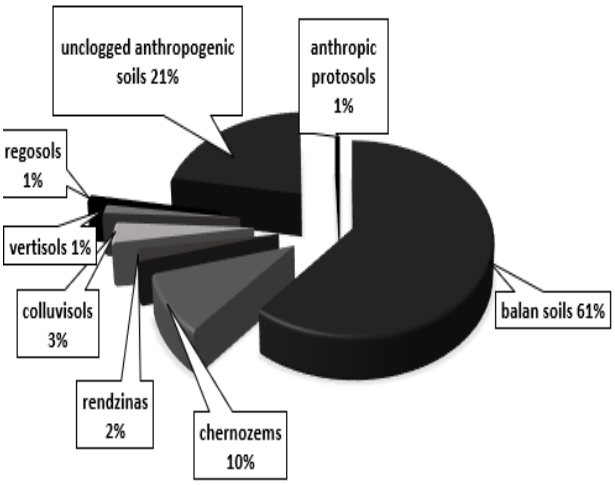

Figure 3. Soils types along the Carasu Valley

Table 1, presents the lithological and ecopedological data of the soils for the vines cultivation from the Murfatlar vineyard, the Cernavoda, Medgidia and Murfatlar vine centres (analyzes taken and performed by the laboratory of the Office for Pedological and Agrochemical Studies, Constanta). According to table 1, there are no significant differences between the soils of the three vine centers from the Murfatlar vineyard, in terms of: humus content, total nitrogen content, phosphorus and mobile potassium, cation exchange capacity, degree of saturation in bases, pH , active calcium carbonate and chlorosis power index.

In the table 2, the climatic elements specific to the Murfatlar vineyard are calculated and at the end of the table a short characterization of the respective vine year was made. The characterization of the 2009-2018 vine years from the end of table 2, shows that the climatic conditions were different, so that: the years 2009, 2012, 2015, 2016, 2017, registered optimal values for the vine; in 2010, 2014 and 2018 years there was an excess of humidity; and in 2011 was a deficit of precipitation (326.8 mm/year and 239.9 mm/during the vegetation period).

CONCLUSIONS

The Carasu Valley is the only valley that crosses the Medgidia plateau almost entirely. Along the Carasu Valley there are Cernavoda, Medgidia and Murfatlar vine centers which together formed the Murfatlar vineyard.

The soils of this viticultural area have good properties for the vine cultivation.

The climatic characterization of the period 2009-2018, shows that the climatic conditions were different, in terms of optimal conditions for the vine. From the analysis of the climatic elements performed for a period of 10 years (2009-2018) there is an increase in temperatures during years, so the four seasons can’t be well defined.

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**Weather data register of the meteo stations from Murfatlar vineyard.

Table 1

Lithological and ecopedological data of soils from the vine centres of Murfatlar vineyard

Soils data / Vine centre	Murfatlar	Medgidia	Cernavoda
Representative soil types	Chernozems/ Balan	Balan/ chernozems	Balan/ chernozems
Parenting material	Loess	Loess	Loess
The relief	Platform	Platform; slops	Platform; slops
Clay <0.002 mm	25-36	25-36	25-36
Humus %	1,8-3,8	1,8-3,8	1,8-3,8
Total nitrogen%	0,09-0,20	0,09-0,20	0,09-0,20
Mobile phosphorus (ppm)	55-274	55-274	55-274
Mobile potassium (ppm)	136-962	162-820	77-874
T *m.e.	20-36	20-36	20-36
Degree of saturation in bases V%)	95-100	95-100	95-100
pH (in water)	7,6-8,3	7,6-8,3	7,6-8,3
Active $CaCO_3$ %	0-18	0-18	0-18
Chlorosis power index	0-86	0-86	0-86

* - cation exchange capacity (T m.e.)

Table 2

Climatic elements from the Murfatlar vineyard during 2009-2018

Year / Climatic elements	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Global thermic balance(Σt°g)	5291,6	5348,8	4953,8	5075,6	5373,8	5476,0	5500,9	5757,8	5303,8	5379,6
Active thermic balance (Σt°a)	4614,1	5033,1	4509,1	4737,4	4810,0	4938,5	4864,9	5216,1	4826,9	4815,5
Useful thermic balance (Σt°u)	2364,1	2533,1	2299,1	2527,4	2617,5	2508,5	2600,2	2676,1	2515	2427,2
July average temperature, ° C	26,2	25,4	26,6	28	27,2	26,6	28,3	28,3	27,1	26,4
August, average temperature, ° C	24,2	29,6	25	26,1	27,3	27,1	27,3	27,3	27,8	26,9
Sept. Average temperature, ° C	21,9	23,2	22,5	20,7	20,3	21	23,1	23,1	23	21,7
Temp. min. absolute in air, ° C	-14,5	-20,6	-11,0	-22,0	-14,0	-19,5	-14,5	-15,0	-15	-12,8
Temp. min. abs. at the soil surface,° C	-16,2	-21,5	-13	-23,3	-14,8	-19,8	-18,8	-15,6	15,8	-10,1
Average annual temperature ° C	14,4	14,6	13,5	13,5	14,6	14,9	15,0	16,4	14,5	14,6
Maximum air temperature, ° C	38,0	36,4	37,0	39,8	39,5	38,6	40,9	28,2	40,5	37,4
Σ of annual rainfall, mm	565,0	710,3	326,8	450,8	727,1	629,9	567,5	492,0	483,6	696,2
The amount of precipit. during the veget.period, mm	373,0	447,8	239,9	296,3	554,4	500,5	209,3	283,8	333,2	364,3
Σ of the hours of insolation per. vegetation, hours	1723,5	1546,9	1708,2	1780,6	1710,9	1435,1	1762,5	1714,8	1527,2	1453,9
Average max. of temperatures in	28,8	32,4	30,3	31,6	32,6	32,7	32,5	32,8	39,8	37,4

August, ° C										
Average temperat. in I-st and II-nd decades of June	24,8	23,6	24,2	24,5	25,5	24,1	25,8	25,1	23,9	24,1
Days with temp. maximum> 30 ° C	29	57	67	69	80	76	87	94	84	78
Duration of the bio active period, days	179	195	189	212	197	196	194	201	200	202
Real heliothermal index (IHr)	3,9	3,8	3,7	7,0	4,4	3,4	4,4	4,4	3,7	3,4
Hydrothermal coefficient (CH)	0,9	1,0	0,6	0,7	1,2	1,1	0,5	0,6	0,7	0,8
Bioclimatic index (Ibcv)	10,7	8,4	15,3	23,7	7,6	6,8	19,2	15,1	11,1	8,7
Oenoclimatic index (IAOe)	5472,0	5451,7	5350,8	5840,0	5549,2	5214,1	5995,0	5836,6	5332,8	5125,0
Heliothermicl Index (IH)	3158	3321	3230	3513	3562	3292	3675	3800	3637	3280
Night Cooling Index (IF)	12,9	15,7	17,6	12,7	13,8	13,9	16,6	13,8	15,6	14,1
Characterization of the year	Year with optimal values for the Vine	Year with excess of humidity	Vine year with rainfall deficit	Year with rich helio-thermal resources	Year with optimal values for the Vine	Year with excess of humidity	Year with optimal values for the Vine and rich heliothermal resources	Year with rich helio-thermal resources	Year with optimal values for the Vine	Viticultural year with excces of humidity