

CONFIGURING OF AGRICULTURAL PARCELS IN VINEYARDS WITH A VIEW TO SETTING UP A DEPENDING ON THE CONDITIONS OF THE RELIEF OF THE AREA

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Abstract: *The correct evaluation of the ecological factors in achieving a qualitative cadastre of a vineyard, which are to be set up in an area with temperate climate, is the basic condition for the economic success of the plantation, regarding the quantity and quality of the wines of the assortment of varieties chosen for planting. Taking into account the requirements of the European noble varieties grown, it can be concluded that a geographic area has vineyard potential, if it allows getting productions from year to year, primarily qualitative, to varieties from at least one direction of wine production (grape for consumption or for wine).*

Keywords: *Ecological factors for culture of vine, topographical-cadastral plan, slope and exhibition of agricultural parcels areas.*

1. Introduction

The ecology studies, in the case of vine, both ecological factors from the vineyard area, as well as its reaction to their influence [2].

Ecological factors which define the geographic range and influence, by their values, growth and fruiting of vine are: *climatic factors*: the average annual temperature of the air, the average annual rainfall, solar radiation, sunstroke, atmospheric humidity and the wind; *geomorphologics/orographis factors*: the shape of relief, the slope of the land, slopes exposition and terrain altitude; *edaphic factors*: temperature, water and air in the soil, physical and chemical properties of soil and *biotic factors*, include the interaction of living organisms and human intervention.

In order to get large and quality productions every year, man has created fertile vine ecosystems, through the emplacement of vineyards, thus eliminating the factors with total restriction, in the same time with choosing the site of the plantation, and those with partial restriction were improved through technological interventions.

Adaptation to factors whose influence cannot be improved, such as heliothermic regime, depends on the ecological plasticity of varieties and vary depending on the origin of the varieties and of the living environment conditions in which they were formed. From this point of view, can be divided into: varieties with high ecological plasticity, which carries out quality productions even in less favorable conditions (Cabernet Sauvignon, Pinot noir, etc.); varieties with reduced ecological plasticity, which carries out quality productions only under very favorable environment (Busuioacă de Bohotin, Cardinal, Sultanină, etc.).

Because ecological factors are influencing the quality of grape yields, choosing the emplacement of vineyards involves also the acceptance of compromises, because each area may be required by or through a favorable environment for the vine. For this reason, in order to make a correct assessment of the ecological favorability for vine crops, it requires a complex approach, which takes into account both the environmental particularities of geographic areas, as well as the qualities of the grapes of the varieties of the vine [3].

The reduced ecological suitability of an area may determine obtaining productions of poor quality and quantity, respectively uneconomical vineyard plantation exploitation by untimely hubs loss. Sometimes, these losses are the consequences of faulty location of vineyards or inappropriate choice of varieties of vines, but may be due also to climatic accidents, technological deficiencies or by pests and diseases attacks.

The difficulty in the correct assessment of ecological favorability for the culture of the vine from areas with temperate climate, is because the vineyard plantations shall be established, in priority, in areas with hilly relief, characterized by a significant local variation of environmental factors [1].

2. Material and method

For the purpose of replanting an area of 13.2172 hectares with vine in the Didactic Resort V. Adamachi, Farm of University of Agricultural Sciences and Veterinary Medicine of Iasi, was realized a project of establishing a vineyard plantation with European funds, through the Agency for Payments and Intervention in Agriculture. The reason for the abolition of the former vineyard was due to the fact that the plantation of noble vines, intended for the production of wine for consumption, had a lifespan of more than 30 years.

The organization of the proposed emplacement, presented on a cadastral plan at 1:2 000, is correlated with all the elements to combat soil erosion, and also with ensuring conditions for mechanized works (Fig. 1).

In the preparation of documentation for the emplacement proposed to be replanted with vine has been taken in account: getting a vineyard with productive varieties, superior quality, resistance to diseases and frost, required both domestically and for export; the main pedoclimatic conditions of the area, which offers a good degree of favorability for the species to be planted; judicious use of the land fund, at a cost-efficient and effective potential.

Because it has taken into account the existing slope limits, roads and access ways were designed in accordance with the antierosional arrangements. Thus, secondary roads were designed on the long side of the agricultural parcels, and the main ones (in terms of technological importance), upstream towards downstream, with slopes of less than 10%, trying to obtain agricultural plots worked mechanized, as close as possible to the rectangular geometric form. At the ends of agricultural parcels were provided roads also for turning area [5].

According to observations recorded at the meteorological station of Iasi, annual average air temperature is 9.5°C, solar radiation is between 114 and 128 kcal/cm², average precipitation of multiannual is 580 mm, of which in April-October range 421.4 mm (73% of the total), with a deficit in the interval total of 223 mm, and the annual index of aridity is 29.7 [6]. These parameters allow us to appreciate that the location proposed fall into climate zone "II half-wet -warm moderate".

Highlighting the relief of the proposed emplacement through level curves, with normal equidistance of 2.5 m, was made in order to calculate average slope and to establish the exhibition of each agricultural parcel, resulting from the vineyard emplacement organization, based on software of processing data obtained from topographical measurements and drawing programs.

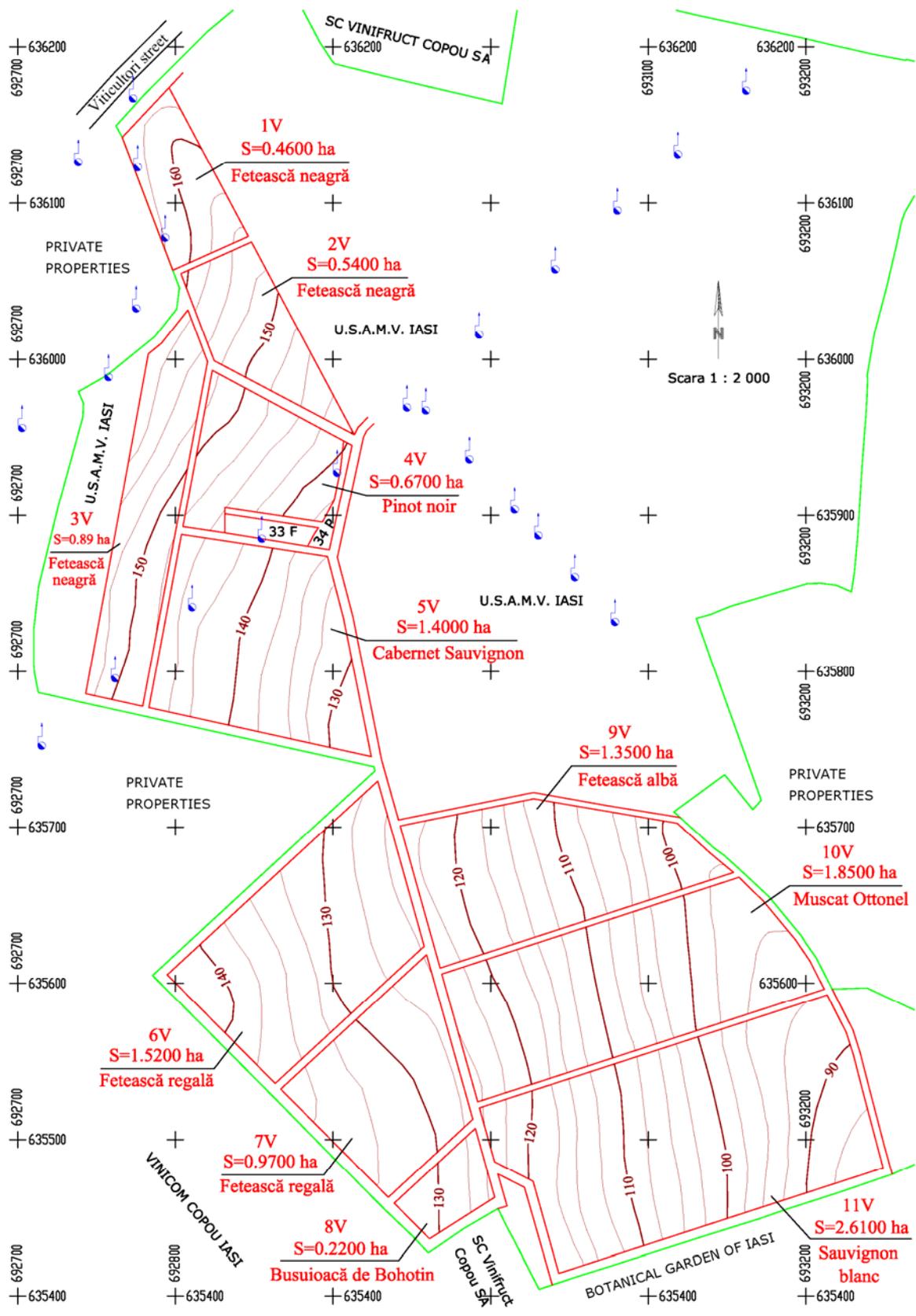


Fig. 1. Setting up agricultural parcels proposed at the establishment of a vineyard plantation, depending on the relief conditions of the emplacement

3. Results and discussions

From the organization project of the proposed emplacement resulted the actual occupied with vine area of 12.4800 hectares, composed of 11 parcels, where will be grown 4 varieties to produce white wines, and 4 varieties for red wines.

In table 1 it shows the occupation degree of vine varieties, grouped by color of wine, on the entire vine emplacement, from where results that 4 varieties for white wines, will be planted on the surface of 8.3000 ha (66.51%) of 5 parcels, and 4 varieties for red wines, will be planted on the surface of 4.1800 ha (33.49%) of 6 plots. Varieties are presented in table 1 in the order of the occupied surface.

Table 1. Occupancy degree of vine varieties for the proposed emplacement

No. crt.	Vine varieties	Plots number	Area of occupancy (ha)	Percentage of occupancy (%)
<i>Varieties intended for the production of white wines</i>				
1	Sauvignon blanc	1	2.6100	20.91
2	Fetească regală	2	2.4900	19.95
3	Muscat Ottonel	1	1.8500	14.83
4	Fetească albă	1	1.3500	10.82
Total varieties for white wines		5	8.3000	66.51
<i>Varieties intended for the production of red wines</i>				
1	Fetească neagră	3	1.8900	15.14
2	Cabernet Sauvignon	1	1.4000	11.22
3	Pinot noir	1	0.6700	5.37
4	Busuioacă de Bohotin	1	0.2200	1.76
Total varieties for red wines		6	4.1800	33.49
Agricultural total		8	11	12.4800
				100.00

From the distribution by classes of exhibition is observed that agricultural parcels with South-eastern exhibition (half-sunny), for which it opt the cultivation of varieties intended for the production of red wines (31.73%) are advantaged as compared to agricultural parcels with Eastern exhibition (half-shadowed), for which it opt the cultivation of varieties intended for the production of white wines, thanks to the exhibition of land towards the direction of the sun (Table 2).

Table 2. Distribution and degree of occupancy of the agricultural parcels by class of exhibition of the land towards the direction of the sun

Exhibition classes of land from sunlight	Plots number	Area (ha)	Percentage of occupancy (%)
N – NE (shadowed)	-	-	-
E – NV (half-shadowed)	6	8.5200	68.27
S – SW (sunny)	-	-	-
W – SE (half-sunny)	5	3.9600	31.73
Agricultural total	11	12.4800	100.00

From the organization of the proposed emplacement, the majority of agricultural parcels have slopes ranging from 11.77% end 15.34% exception being the agricultural parcel

no. 7 with 9.19% slope, with the area of 0.9700 ha, respectively the number 3 with 17.67% slope, with the area of 0.8900 ha (Table 3).

Table 3. Distribution of agricultural parcels by the exhibition and the slope of surfaces

No. plot	Area of occupancy (ha)	Percentage of occupancy (%)	Plots slope (%)	Exhibition areas
1	0.4600	3.69	14.45	SE
2	0.5400	4.33	15.28	SE
3	0.8900	7.13	17.67	SE
4	0.6700	5.37	15.34	SE
5	1.4000	11.22	13.52	SE
6	1.5200	12.18	11.77	E
7	0.9700	7.77	9.19	E
8	0.2200	1.76	12.82	E
9	1.3500	10.82	14.44	E
10	1.8500	14.82	14.33	E
11	2.6100	20.91	15.21	E
Total	12.4800	100.00	14.00	-

The exception is the agricultural parcel no.7 with slope of 9.19%, with the area of 0.9700 ha (7.77%), fall into the category of slope with weak rugged relief, all the other agricultural plots in number of 10, with an average slope of 14.48% , with area of 11.5100 ha (92.23%), fall into the category of slope with moderate rugged relief, presents a lower suitability for vines due to the higher slope of the land, that fosters the process of erosion of the surface, by dripping water, thereby reducing the reserve of humus and nutrients (Table 4).

Table 4. The distribution of categories of slope on agricultural plots, their surface and the occupation percentage from agricultural total

Slope category (%)*	Plots no.	Area in hectares of slope category	Percentage of occupancy (%)	Landforms name
2.0 – 5.0	-	-	-	Corrugated relief
5.1 – 12.0	1	0.9700	7.77	Slightly injured relief
12.1 – 20.0	10	11.5100	92.23	Moderately injured relief
Agricultural total	11	12.4800	100.00	-

* According to the indicator no. 1 on the annex no. 3, from The Methodology of Elaboration of Soil Studies, 3rd Part, 1987

At the same time, by the realization of the map of slopes, can be easier to observe, how was organized the vineyard emplacement, respectively how agricultural plots are grouped according to the degree of inclination of the terrain.

In the perspective of enlargement, modernization and maintenance in good condition of vineyards and fruit trees plantations, especially those with a long tradition, the Managing Authority for the National Program for Rural Development published in 2013 a report regarding „*Social economic analysis in rural development perspective 2014-2020*”. This report argues the necessity of supporting the agricultural sector from Romania, found into a steady decline in the last 20 years, producing negative consequences not only on the economic development of the rural environment, but also on the quality of life of communities in the area.

As a response to this approach, re-establishing of 12.5 ha of vineyards, 3 ha of fruit trees plantations in the Didactic Resort V. Adamachi, Farm of University of Agricultural Sciences and Veterinary Medicine of Iasi, it is done in order to exploit the potential of this area, as well in order to continue the tradition of the Eastern and North-Eastern area of Romania.

4. Conclusions

The update of cadastral database, through topographic measurements, presents as advantage in the projects of re-establishment of vineyards/fruit trees plantations, a more efficient reconfiguration of the agricultural parcels proposed for re-establishing, depending on the conditions of relief, realizing a more durable re-evaluation of the potential of the area of study.

Increased interest from the part of farmers and institutions in the field of agriculture from Romania will have as a consequence, by drawing up viable projects, a sustainable development of agriculture and the continuation of the specific tradition of the Eastern and North-Eastern area of Romania.

5. References

1. *Hidalgo, L. – Tratado de viticultura general, 3^a edición. Ediciones Mundi-Prensa, Madrid, 2003*
2. *Irimia, L.M. – Biology, ecology end physiology of vine. “Ion Ionescu de la Brad” Publishing, Iasi, 2012*
3. *Irimia, L.M., Patriche, C.V. – The determination of spatial distribution of ecological favorability for the culture of the vine, by using Geographic Information Systems (GIS). Agricultural Research Magazine in Moldova, vol. XLIII, nr.1(141), p. 49-58, Publishing U.S.A.M.V. Iasi, 2010*
4. *Jordan, T.D., Pool, R.M, Zabadal, T.J., Tompkins, J.P. – Cultural practices for commercial vineyards: New York State College of Agriculture and Life Sciences. Miscellaneous Bulletin 111, p. 69, 1980*
5. *Savu P., Bucur D. - The Organization and Fitting of Agricultural Land with Works of Land Improvement, “Ion Ionescu de la Brad” Publishing, Iasi, 2002*
6. *The management program of air quality at Iasi’s agglomeration for PM10 indicator, the scrolling period 2009-2013, Agency for Environmental Protection Iasi, 2014*
7. *The Methodology of Elaboration of Soil Studies, 3rd Part – Ecopedologics Indicators, elaborated by Institute of Pedology and Agrochemistry Bucharest, 1987*