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### The influence of vine growing area on grapes production for red wines with protected designation of origin



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**Abstract:** From ancient times, the grapevine and the wine have joined human existence. Along with bread and vegetable oil, they are part of the sacred triad of mankind. The use of wine is recorded in various sculpted, engraved, painted and drawn scenes and is mentioned in ancient writings - hieroglyphic, arrow-headed writing. With Romania's entry into the European Union, funds were granted through programs specifically designed for the development of wine-growing areas. Therefore, the expansion of areas cultivated with varieties for quality red wines is part of the trend of viticulture development in Romania, in line with increasing competitiveness, both nationally and internationally. Through research undertaken in three locations in North-West Romania (Lechința, Mica and Camăr), we bring a contribution to the development of viticulture in the area. The relaunch of the North Carpathian area for cultivation of vines, in this area in decline in recent decades, with grape varieties for red wines, is a result of the plant's adaptation to global climate change.

**Introduction:** Currently, the cultivation of grapevines in conditions of economic efficiency is possible in regions where the annual average temperature is between 9 and 20°C [2]. The areas cultivated with grapevines have an insular distribution [8], the largest areas being concentrated between the parallels of 35 and 51 degrees north latitude and those of 25 and 38 degrees south latitude [9]. The decrease in the area cultivated with grapevines in recent years was due to economic measures, which led to the deforestation of large areas of vineyards in European Union countries (Spain, France, Italy), social measures (Hungary, Romania), aspects seen on the other continents also [6]. Nowadays, on a continentals level, the majority of vineyards are in Europe 67.7%, followed by Asia and South America, the proportion being maintained in the cultivation of black grapes too [7, 4]. In Romania, the viticultural areas delimited for the production of quality wines with protected designation of origin, PDO, represent 15.1% of the total area cultivated with grapevines destined for wine production.

**Materials and methods:** To study the influence of cultivation area on the quality of varieties, a bifactorial experiment was organized. The experience was followed during two years (2016-2017). The production was analyzed in q/ha, and the statistical processing was performed with the ANOVA program.

Factor A with 3 graduations, three varieties:

a1 – *Merlot*

a2 – *Fetească neagră*

a3 – *Pinot noir*

Factor B with 3 graduations, location:

b1 – Lechința-Bistrița

b2 – Mica-Mureș

b3 – Camăr-Sălaj

For the classification of wines in the PDO, the standardization of the winegrapes load must be taken into account, not to exceed the rules specified in the specifications. Table 2 shows the limits for each variety and each PDO in the experimental locations.

**Results and discussion:** Analyzing the unilateral influence of the variety used in the experiment, it can be seen that both *Merlot* and *Fetească neagră* varieties registered a very significant deficit of wine grape production -3.10 q/ha and -0.55 compared to the average of the experience taken as witness. *Pinot noir* had an increase in grape production (3.65 q/ha) compared to the very significant average of the experiment (Table 3). The *Pinot noir* variety (2.28 kg/ grapevine plant) registers high values in other wine centers [5], 46.1 q/ ha, in Miniș [5]. For 2017, the results obtained in terms of the influence of the variety on wine grapes production (table 3), show the highest production for the *Merlot* variety of 95.5 q/ha, which recorded a very significant increase in production (12.53 q/ha), compared to the average of the experience considered as witness.

In Table 4 we analyzed the influence of location on wine grape production. The average wine grape production taken as witness was 76.49 q/ha. The conditions in Mica-Mureș and Camăr-Sălaj had a negative influence on the grapevine culture in 2016. A decrease in the average production of the yields in the two locations can be observed, being -16.75 q/ha, respectively -26.50 q/ha, these differences compared to the total average production which was considered as witness and was very significant negative. The place of vineyard establishment, recorded in Table 4, negatively influenced the wine grape production in 2017, only in Mica-Mureș where a harvest of 44.60 q/ha was obtained. In Lechința and Camăr, the wine grape yields were 119.52 q/ha, respectively 85.38 q/ha, and provided statistical differences compared to the average of the experience considered as witness, the significance being very significant for both locations.

In order to understand the influence of the experimental factors in the three years of experience, we used the Duncan test for processing the obtained data. The results were summarized in Table 5 where we can track the situation for each year and the combination of experimental factors. For the three years, there are statistically assured differences. In 2016, the Lechința-Bistrița location has high yields regardless of variety, but the best variant is Lechința/ *Pinot noir*, with the highest grape production 119.95 q/ha. The lowest values are obtained for the Camăr/ *Merlot* variant of 34.11 q/ha. Regarding 2017, the highest production is obtained in the Lechința/ *Pinot noir* variant, followed by Lechința/ *Fetească neagră* (119.93 q/ha, 119.77 q/ha), not being statistically assured values. The lowest were in Mica/ *Fetească neagră* 26.85 q/ha.

**Conclusions:** In 2016, the highest production of grapes per hectare for Lechința/*Pinot noir* variant was 119.95 q/ha and the smallest production was obtained for the Camăr/ *Merlot* variant with 34.11 q/ha. In 2017, the highest production was reached by the Lechința/ *Pinot noir* variant, of 119.93 q/ha, and the lowest value was in the Mica/ *Fetească neagră* variant, 26.85 q/ha.

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