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RESEARCH ON THE VARIABILITY OF YIELD COMPONENTS IN SOME GRAPEVINE VARIETIES FOR RED WINES

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Abstract
Research was conducted during two growing seasons (2017-2018) in Miniş-Măderat vineyard. The study aimed to evaluate the variability of several red wine grape varieties in order to highlight their main qualitative and quantitative parameters. In the research were involved the morphological parameters: the number of bunches on the vine, the bunch weight, the number of berries in the bunch and the grape yield on the vine. The highest bunches number /vine registered Merlot variety (30.24), while Burgund variety recorded the lowest values (17.76). Burgund variety recorded the highest bunch average weight (119.57 g) while Pinot Noir recorded the lowest value (87.18 g).Merlot variety recorded the highest number of berries/bunch,(111.36) and the lower value was recorded by the Pinot Noir (82.36).The Merlot variety achieved a significantly higher production than the other varieties during both growing seasons (3600.87g). The conditions of 2018 growing season had a very significant positive influence on the grape yield/ vine.

Keywords: grapevine, quantitative parameters, variability.

1. INTRODUCTION

Grapevine (*Vitis vinifera*) is one of the most economically important fruit crops and a productive drought stress-adapted plant (Zörb et al., 2014). At first, the cultivation of vines and the production of wine were an identity element of European civilization, then followed the "universalization" of wine, so that today wine is a criterion for assessing the quality of life, almost everywhere in the world. (Stoica, 2016). Production of quality grapes suitable for wine-making depends on numerous factors (Gerendás et al., 2013). Productivity is a complex trait, conditioned by the hereditary basis of the genotype and to a certain extent by the pedo-climatic conditions or the applied agrotechnics. Genetic dowry is crucial in achieving the characteristics of fruiting, and agrotechnics and pedo-climatic conditions regulate the fruiting load and partially the size and number of fruiting (Madosa,2004). The size of the bunches is a variety character, polygenically determined, based on phenotypic realization, additivity effects. However, environmental conditions and applied agrotechnics can influence it. In conditions of drought and a large number of bunches on the stump, the size of the bunches will be reduced. As the size of the bunch decreases, so does the size of the

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grains. The control of this feature can also be achieved through special care work. (Kuhn et al., 2014).

The vine was influenced by climatic factors in all stages of development, but extreme temperatures are those that can cause irreversible damage (Dobrei et.al., 2014). During ripening, high temperatures are beneficial for accumulating sugars, flavors, anthocyanins, acidity, while low temperatures in early bud-break time can cause great damage to viticulture or in variationharvest season when the yield and quality of grapes and wine are influenced (Jardao et.al., 2015; Nistor et.al, 2017). Each grape variety has a distinct characteristic and a series of flavors and tastes customized by the growing area and the applied technology. Each factor that influences the aroma and quality of the grapes is reflected in the wine glass (Jukes, 2015).Different geography and climate lead to wines with different tastes from one region to another, even if they are obtained from the same grape variety. The differences can appear even in the same wine region, depending on the variations of the relief, the composition of the soil and the microclimate, here intervening the term "terroir." (Old Marnie, 2016)

2. MATERIALS AND METHODS

The biological material were represented by Four grape varieties for red wines: Pinot Noir, Burgund, Merlot, Cabernet Sauvignon. The study was carried out during two years (2017-2018) on the Pâncota locality area, Arad County, in the pedo-climatic conditions from the Miniş-Măderat vineyard. The precipitation and air temperature were recorded during the research, by using data from the Meteobot®Pro weather station installed in the vineyard**.** There were also dry periods such as July 2017, or September 2018. In both growing seasons, the lowest temperatures were recorded in January and the highest in August. The experiment was organised in randomized block design with three replications. The researches and observations were carried out following the application of the technology specific to the conventional grapevine growing.

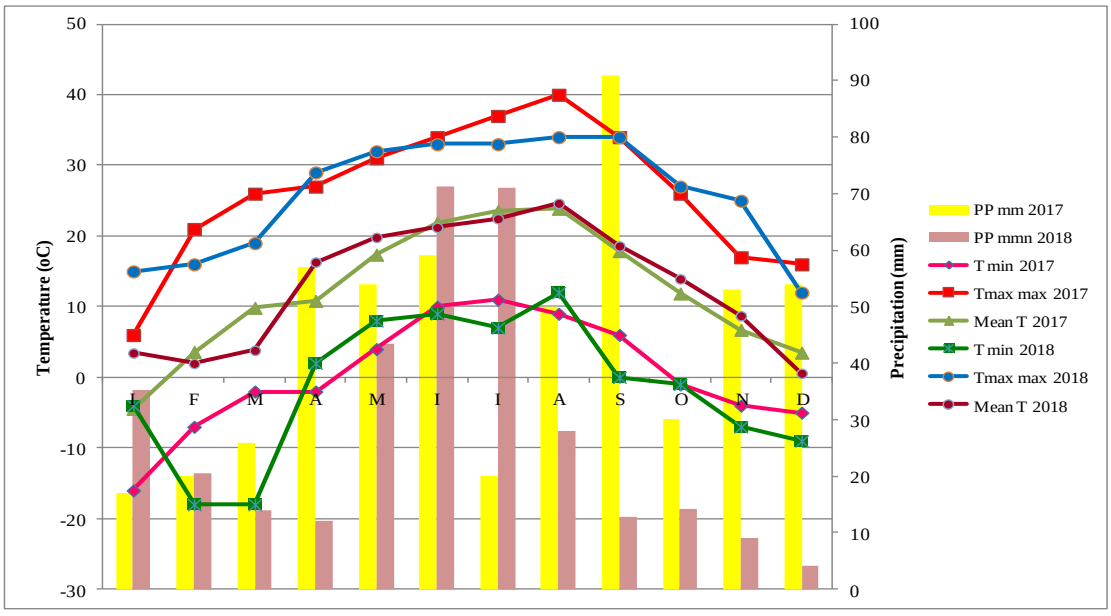

Figure 1. Temperature and precipitations during growing seasons (2017-2018)

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The morphological parameters involved in the research were: the number of bunches / vine, the bunch weight, the number of berries / bunch and the yield of bunches on vine.
Data were statistically analysed. The significance of differences between the varieties was noted with symbols (*, 0) (Ciulca, 2006).

3. RESULTS AND DISCUSSIONS

From the data presented in (table 1) it could observe that conditions of years had influence on number of bunches/vine to genotypes studied. The number of bunches/vine, registered value between (25.21 bunches /vine) in 2018 year and (23.87 bunches /vine) in conditions of the year 2017.

Table 1. The effect of the climatic conditions during research on the bunch number /vine

Growing season	Average (g)		Relative value%	Difference	Statistical significance
2018- 2017	25.213	23.873	105.617	1.341	-
			LSD 5%	LSD 1%	LSD 0.1%
			8.587	13.003	20.888

Merlot variety recorded the highest number of bunches /vine (30.242) and Burgund variety recorded the lowest values of this character (17.767) (Table 2). Merlot and Cabernet sauvignon registered a significant differences compared with Burgund variety.

Table 2. The effect of grapevine varieties on the bunch number /vine

Varieties	Average (number of bunch/vine)		Relative value%	Difference	Statistical significance
Burgund -Pinot Noir	17.767	20.280	87.607	-2.513	
Merlot - Pinot Noir	30.242	20.280	149.121	9.962	**
Cabernet Sauvignon - Pinot Noir	29.883	20.280	147.354	9.603	**
Merlot - Burgund	30.242	17.767	170.216	12.475	***
Cabernet Sauvignon - Burgund	29.883	17.767	168.199	12.117	***
Cabernet Sauvignon - Merlot	29.883	30.242	98.815	-0.358	
		LSD 5%	LSD 1%	LSD 0.1%	
		5.762	7.936	10.925	

In (table 3) are summarized the results regarding the effect of climatic conditions during research on the bunch weight for the red grape varieties analysed. The bunch weight recorded values between 88.43 (g) in 2017 and 119.77g in 2018. Results confirm that the bunch weight was lower during 2017 growing season.

Table 3. The effect of climate during growing seasons on the bunch weight

Growing season	Average (g)		Relative value%	Difference	Statistical significance
2018- 2017	119.771	88.438	135.429	31.333	-
		LSD 5%	LSD 1%	LSD 0.1%	
		38.192	57.834	92.909	

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In the vineyard the average weight of grapes is a very important character, which constitutes both an element of quality and an element of productivity (Tardea et al., 1995; Sestras, 2004).
Different bunch weight showed all varieties analysed; Burgund recorded the highest bunch average weight (119.57 g) followed by Merlot (115.30 g) while Pinot Noir recorded the lowest value (87.18 g) (table 4).

Table 4. The effect of grapevine varieties on the bunch weight

Varieties	Average of bunch weight (g)		Relative value%	Difference	Statistical significance
Burgund -Pinot Noir	119.578	87.183	137.157	32.395	*
Merlot - Pinot Noir	115.370	87.183	132.330	28.187	*
Cabernet Sauvignon - Pinot Noir	94.287	87.183	108.148	7.103	
Merlot - Burgund	115.370	119.578	96.481	-4.208	
Cabernet Sauvignon - Burgund	94.287	119.578	78.849	-25.292	
Cabernet Sauvignon - Merlot	94.287	115.370	81.725	-21.083	
		LSD 5%	LSD 1%	LSD 0.1%	
		26.725	36.810	50.676	

The climatic conditions in 2017 were less favourable for the berries number/bunch in red grape varieties (Table 5).

Table 5. The effects of climate conditions during growing seasons on the number of berries /bunch

Periods	Average (g)		Relative value%	Difference	Statistical significance
2018-2017	102.988	78.531	131.143	24.457	
			LDS 5%	**LDS 1%**	**LDS 0.1%**
			32.816	49.692	79.829

A very important role during the berry maturation, ripening, or development of physical as well as chemical characteristics of the berry quality such as: colour, size, aroma, berry growth and development, accumulation of anthocyanin, play climate. (Jackson, 1993).
A different number of berries per bunch showed all the varieties. The number of berries/bunch was smaller, on average 82.36 berries/bunch in the Pinot Noir variety and the maximum value of 111.73 berries/bunch on average in the Merlot variety. The number of berries per bunch is influenced by climate conditions during the flowering and/or fruit set (Iland et al., 2013, Velicevici et.al., 2020).
Regarding the influence of the climatic conditions during research growing seasons, on the grape yield/vine, it is found that the growing season conditions from 2018 had a very significant positive influence on the grape yield / vine in all analysed varieties. The higher level of rainfall in 2018 had a positive influence on the bunch weight/ vine in the harvest time.

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Table 6. The effect of grapevine varieties on the number of berries /bunches

Variants	Average (number of berries /bunches)		Relative value%	Difference	Statistical significance
Burgund -Pinot Noir	90.318	82.367	109.653	7.951	
Merlot - Pinot Noir	111.735	82.367	135.656	29.368	*
Cabernet Sauvignon - Pinot Noir	78.618	82.367	95.448	-3.749	
Merlot - Burgund	111.735	90.318	123.714	21.418	
Cabernet Sauvignon - Burgund	78.618	90.318	87.046	-11.700	
Cabernet Sauvignon - Merlot	78.618	111.735	70.361	-33.118	oo
			DL 5%	DL 1%	DL 0.1%
			23.569	32.463	44.693

Table 7. The effect of growing season on the grape yield/ vine

Growing season	Average (g)		Relative value%	Difference	Statistical significance
2018-2017	3111.529	2096.287	148.431	1015.243	***
			LDS 5%	**LDS 1%**	**LDS 0.1%**
			59.134	89.546	143.853

For red wine varieties the average values of yield / vine (Table 8) showed amplitude of 1463.87g, with limits from 2137.19 g. in Burgund to 3600.87 g in Merlot.
The Merlot variety achieved a significantly higher production than the other varieties during both growing seasons. Cabernet Sauvignon variety was also recorded a higher value of this parameter.

Table 8. The effect of grapevine varieties on the grape yield/ vine

Variants	Average(g)		Relative value%	Difference	Statistical significance
Burgund -Pinot Noir	2137.192	1938.500	110.250	198.692	***
Merlot - Pinot Noir	3600.873	1938.500	185.756	1662.373	***
Cabernet Sauvignon - Pinot Noir	2739.067	1938.500	141.298	800.567	***
Merlot - Burgund	3600.873	2137.192	168.486	1463.682	***
Cabernet Sauvignon - Burgund	2739.067	2137.192	128.162	601.875	***
Cabernet Sauvignon - Merlot	2739.067	3600.873	76.067	-861.807	ooo
			DL 5%	DL 1%	DL 0.1%
			51.438	70.848	97.538

Lower values of yield/ vine were recorded in the Pinot Noir variety, suggesting a special adaptation to less favourable environmental conditions.

4. CONCLUSIONS

The obtained results show that there are differences from one vegetation season to another for the analysed parameters. Merlot variety registered the highest number of bunches/vine (30.24), while

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Burgund variety recorded the lowest values (17.76). Burgund variety recorded the highest bunch average weight (119.57 g) followed by Merlot (115.30 g) while Pinot Noir recorded the lowest value (87.18 g). The Merlot variety achieved a significantly higher production than the other varieties during both growing seasons (3600.87g).
The conditions of 2018 growing season had a very significant positive influence on the grape yield/ vine.

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