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THE STUDY OF THE OENOLOGICAL POTENTIAL OF THE TĂMÂIOASĂ ROMÂNEASCĂ GRAPE VARIETY CULTIVATED AT BANU MĂRĂCINE – CRAIOVA

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ABSTRACT

The studies were conducted in the vineyard at the Banu Mărăcine Teaching Station of the University of Craiova and in the vineyard belonging to the Research and Development Station for Viticulture and Vinification in Drăgășani, located on the Olt Hill, where the Romanian Tămâioasă variety has made it possible to produce high-quality aromatic wines. Cultivated at Banu Mărăcine, the Romanian Tămâioasă variety, with its accumulations of sugars and acidity, as well as its richness in aromatic substances, provides the opportunity to obtain high-quality aromatic wines with the right to bear the designation of origin "Banu Mărăcine."

INTRODUCTION

It is universally acknowledged that among all categories of wines, aromatic ones (tămâioasă or muscat) represent the touchstone of the winemaking potential in countries where viticulture is an important branch of production. Their finesse requires not only the finest quality grapes, which are the result of exceptionally favorable natural conditions, but also a true art in guiding the technological process of winemaking. Therefore, they can only be produced in certain wine regions, from a very limited number of grape varieties and in favorable vintages, from a climatic point of view. In connection with the vast oenological potential of the Tămâioasă românească variety, some research has been undertaken (Teodorescu et al., 1960; Macici, et al., 1973; Iliescu et al., 1961; Tomescu, et al., 1961; Popa, 1974; Popa, 2020; Teodorescu et al., 2021; Stoica, 2008; Teodorescu, 1986) works that had the purpose of signaling the possibility for Romania, through this category of wines, to strengthen its identity within the wine world. Unfortunately, in none of the wine regions of the country have studies been conducted to identify wine areas where this variety could be cultivated and produce grape yields from which good quality aromatic wines could be made. As a result, within our research program, we aimed to study the potential of the Tămâioasă românească variety cultivated at Banu Mărăcine, comparing the results obtained with those observed at Drăgășani – Dealul Olt, an area that has become famous for the wines that can be produced here.

MATERIAL AND METHODS

The research conducted in the two wine-growing areas (Drăgășani and Banu Mărăcine) focused on: the duration of the vegetation phases, determining the

main composition parameters of the grapes at harvest (veraison, full maturity, and technological maturity), assessing the overall terpene potential of the grapes (veraison, full maturity, and technological maturity), and establishing productivity and yield parameters.Laboratory analyses were carried out at the winemaking laboratory of the Drăgășani Research Station and that of the Banu Mărăcine Research Station, using methods recommended by the International Organisation of Vine and Wine.

RESULTS AND DISCUSSIONS

The results obtained regarding the development phases of the Romanian Tămâioasă variety are presented in Table 1.

Table 1

Vegetation phases of the Romanian incense variety in the areas studied

Wine-growing area	Start date of vegetation phenophases (extreme)				Vegetation period	Total: 01.04 – 31.10		
	Bud break	Flowering	First fruits	Full maturity		Active temperature (C)	Effective hours of sunshine	Precipitation (mm)
Drăgășani - Dealul Olt	07.IV – 29.IV	31.V – 12.VI	27.VIII – 08.VIII	11.IX – 26.IX	IV – X	3956,50 – 4055,16	1740,50 – 1797,59	400,28 – 472,41
Banu Mărăcine	09.IV – 25.IV	29.V – 02.VI	24.VIII – 05.VIII	29.VIII – 26.IX	IV – X	3952,51 – 3961,60	1740,53 – 2542,30	422,21 – 330,36

At Banu Mărăcine, unlike the Drăgășani – Dealul Olt area, the budding of the grapevine started on April 9 and April 25 respectively; the flowering phase begins on May 29 or June 2. The ripening phase started on July 24 and August 5 respectively. The full maturity of the grapes was observed between August 29 and September 26. Throughout the entire growing period (from budding to full maturity), the sum of temperature degrees fluctuates between 3952.57 °C and 3961.60 °C, the duration of sunshine is between 1740.53 hours and 2542.3 hours, and the total precipitation ranges from 412.21 mm to 330.36 mm. In Banu Mărăcine, we record a shorter period of time from budding to full maturity compared to the area of Drăgășani; as a consequence of the sum of temperature degrees and the hours of sunshine recorded in the two wine-growing areas. Analyzing the obtained results regarding the main parameters of grape composition at full maturity (Table 2).

We note that at Banu Mărăcine, the highest amount of carbohydrates accumulates in the grape berry, averaging 227 g/l, with quantities ranging from 219 g/l to 224 g/l, while the total acidity content does not drop below 5.17 g/l (H2SO4). Of this content, 63.06 % is represented by tartaric acid. Total polyphenols ranged from 2.56 to 2.78 g/kg of berries, while tannin recorded 2.46 – 2.56 g/kg of berries. It is noted that from this perspective there are no significant differences between the two areas.

Table 2

The main parameters of the composition of Tămâioasă românească grapes in the areas studied – at full maturity

Wine-growing area	Vintage	Carbohy-drates g/l	Total acidity g/l (H2SO4)	Tartaric acid		Other acids		Total polyphe-nols g/kg berries	Tannin g/kg berries
				g/l	%	g/l	%		
Drăgășani – Dealul Olt	2022	198,7	5,31	3,16	59,3	2,15	40,48	2,94	2,69
	2023	208,4	5,22	3,18	60,9	2,04	39,08	2,80	2,67
	2024	199,4	5,39	3,36	62,3	2,03	37,66	2,89	2,60
	Means	202,16	5,30	3,23	60,83	2,07	39,07	2,87	2,65
Banu Mărăcine	2022	220	5,25	3,20	60,95	2,05	39,04	2,56	2,56
	2023	219	5,00	3,18	63,60	1,82	36,40	2,70	2,49
	2024	224	5,26	3,40	64,63	1,86	35,36	2,78	2,52
	Means	221	5,17	3,26	63,06	1,91	36,93	2,68	2.52

For grapevine sources intended for quality wines, grape harvesting is done when the grapes have reached technological maturity, often taking place after full maturity, when the content of the grape berry's components ensures the desired type of wine can be produced. Consequently, in Table 3, we present the results obtained regarding the accumulation level of the main chemical components in the grape berry at technological maturity.

Table 3

The main parameters of the composition of Tămâioasă românească grapes in the areas studied – at technological maturity

Wine-growing area	Vintage	Carbohy-drates g/l	Total acidity g/l (H2SO4)	Tartaric acid		Other acids		Total polyphenols g/kg berries	Tannin g/kg berries
				g/l	%	g/l	%		
Drăgășani – Dealul Olt	2022	225	4,62	2,83	61,59	1,77	38,31	2,73	2,55
	2023	228	4,54	2,99	65,85	1,60	35,24	2,61	2,49
	2024	226	4,35	2,79	64,13	1,59	35,55	2,55	2,47
	Means	*226,3*	*4,50*	*2,87*	*63,85*	*1,65*	*36,70*	*2,63*	*2,50*
Banu Mărăcine	2022	230	4,50	2,79	62,00	1,71	38,00	2,79	2,58
	2023	229	4,37	2,65	60,64	1,72	39,35	2,64	2,57
	2024	228	4,30	2,82	65,58	1,48	34,41	2,62	2,49
	Means	*229*	*4,39*	*2,75*	*62,66*	*1,63*	*37,25*	*2,68*	*2,54*

It is noted that from full maturity to harvest (technological), the Tămâioasă românească grape variety accumulates large amounts of sugars while the organic acid content shows no significant changes, with considerable proportions of tartaric acid and sufficient quantities of polyphenols and tannins. The highest sugar accumulations occur at Banu Mărăcine, averaging 229 g/l compared to 226 g/l at Drăgășani. In contrast, at Banu Mărăcine, the combustion of organic acids is more evident. In both areas, the main chemical components of the grape berry allow us to obtain high-quality grapes. The formation and accumulation of aromatic substances in grapes have proven to be more dependent on climate than that of sugars. The physical properties indicate a particular sensitivity of many of them (those with a low boiling point, primarily) to the conditions of a very hot climate in which they can form and then quickly lose through volatilization. Preferably, the areas where climatic

conditions, along with the appropriate amount of sugars, can ensure the maintenance of a sufficiently high proportion of acidity in the grapes and, at the same time, the synthesis and preservation of their aromatic components until harvest. Based on these considerations, I monitored the level of general terpene aromatic potential and its evolution in Tămâioasă românească grapes in the two areas, from veraison to grape harvest (technological maturity). Table 4 presents the results of the analyses regarding the general terpene aromatic potential of Tămâioasă Românească grapes when they entered the veraison phase.

Table 4

Overall terpenic aromatic potential of Tămâioasă românească grapes in the areas studied – at harvest

Wine-growing area	Vintage	Harvest				
		Total terpenes	Free terpenes	Bound terpenes	Free terpenes	Bound terpenes
		mg/kg berries	mg/kg berries	%	mg/kg berries	%
Drăgășani – Dealul Olt	2022	3440	1814	52,73	1640,5	47,68
	2023	3550	1862,4	52,46	1644,4	49,32
	2024	3490	1930,9	52,46	1643,7	47,34
	Means	3493	1835,7	52,55	1642,8	48,11
Banu Mărăcine	2022	3520	1914	54,37	1690,4	48,02
	2023	3580	1875	52,37	1700,0	47,48
	2024	3542	1953	55,13	1689,2	47,69
	Means	3547,33	1914	53,95	1693,2	47,73

At harvest time, the highest total terpene content in the Tămâioasă românească grape berries is recorded at Banu Mărăcine (3547.33) compared to 3493 recorded at Drăgășani – Dealul Olt. A similar situation is observed for both free and bound terpenes, with free terpenes dominating at harvest (53.95 %) compared to 47.73 % for bound terpenes. When the Tămâioasă românească grapes reach full ripeness, the terpene content increases significantly (Table 5) – Total terpenes at Banu Mărăcine reach 11484 mg/kg of berries, while at Drăgășani, they reach 11220 mg/kg of berries.At full ripeness, bound terpenes dominate (58.83 % at Banu Mărăcine and 55.21 % at Drăgășani). The general aromatic terpene potential was also captured at the technological maturity of the grapes (Table 6). In both wine-growing areas, these contents are amplified but not at the same high rate recorded from veraison to full maturity. At Banu Mărăcine, the TămâioasărRomânească grapes have an average total terpene content of 11919 mg/kg of berries at harvest (technological maturity), compared to 11906 mg/kg of berries recorded at Drăgășani. At technological maturity, in both areas, bound terpenes predominate (66.64 % at Banu Mărăcine and 65.46 % at Drăgășani). The results obtained regarding productivity parameters and yield are presented in Table 7. It is noted that in both wine-growing areas, the Tămâioasă românească variety provides economically viable grape yields and a higher quality grade, allowing for the production of aromatic wines of superior quality with the right to bear the origin designation "Banu Mărăcine" and "Drăgășani".

Table 5

Overall terpenic aromatic potential of Tămâioasă românească grapes in the areas studied – at full maturity

Wine-growing area	Vintage	Harvest				
		Total terpenes mg/kg berries	Free terpenes	Bound terpenes	Free terpenes	Bound terpenes
			mg/kg berries	%	mg/kg berries	%
Drăgășani – Dealul Olt	2022	11060	4720,3	42,67	6340,2	57,35
	2023	11295	5126,0	45,38	6164,3	54,57
	2024	11305	5070,5	44,85	6241,5	55,21
	Means	11220	4972	44,30	6248	55,71
Banu Mărăcine	2022	11525	4772	41,40	6752	58,58
	2023	11404	5204	45,63	6200	54,36
	2024	11525	4200	35,44	7325	63,55
	Means	11484	4725	41,15	6759	58,83

Table 6

Overall terpenic aromatic potential of Tămâioasă românească grapes in the areas studied – at technological maturity

Wine-growing area	Vintage	Harvest				
		Total terpenes mg/kg berries	Free terpenes	Bound terpenes	Free terpenes	Bound terpenes
			mg/kg berries	%	mg/kg berries	%
Drăgășani – Dealul Olt	2022	11889	3401,5	28,61	7890,2	66,36
	2023	11927	4154,5	34,83	7776,4	65,19
	2024	11904	4192,8	35,22	7720,3	64,85
	Means	11906	3916	32,88	7795	65,46
Banu Mărăcine	2022	11900	3501	29,42	8399	70,57
	2023	11939	4164	34,87	7775	65,12
	2024	11920	4262	35,75	7658	64,24
	Means	11919	3977	33,34	7944	66,64

Table 7

Productivity and yield parameters of the Tămâioasă românească variety in the areas studied – at technological maturity

Wine-growing area	Vintage	Grape production kg/ha	Sugars g/l	Must yield l/100 kg grapes	Potential alcohol obtained through fermentation (vol%)
Drăgășani – Dealul Olt	2022	9980	225	70	13,23
	2023	9810	228	70,2	13,41
	2024	9540	226	69,9	13,29
	Means	9776	226,33	70,03	13,31
Banu Mărăcine	2022	9872	230	70	13,52
	2023	9904	229	69	13,47
	2024	9678	228	69	13,41
	Means	9807,33	229	69,33	13,46

CONCLUSIONS

The two wine regions, Drăgășani – Dealul Olt and Banu Mărăcine Craiova, although located at different latitudes and altitudes, do not differ much in terms of the climatic conditions required for the cultivation of the Tămâioasă românească grape variety. Drăgășani belongs to the A3 hilly oenoclimatic zone, while Banu Mărăcine belongs to the A3 hilly - southern zone.

In the environment of the two wine regions (Drăgășani – Dealul Olt and Banu Mărăcine – Craiova), the Tămâioasă românească variety accumulates sufficient carbohydrates, organic acids, polyphenols, tannins, and aromatic substances in the grape berry, allowing for the production of high-quality aromatic wines with a designation of origin.

The values of productivity parameters and yield achieved by the Tămâioasă românească variety in the two vineyard areas (Drăgășani and Banu Mărăcine) demonstrate that Tămâioasă românească not only produces high-quality grapes but also ensures a high degree of profitability.

It is necessary for the Tămâioasă Românească variety to be more consistently promoted in cultivation in these vineyard areas in the future, as it can lead to varieties that more effectively capitalize on the potential of the two vineyards.

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