

## VINE VARIETIES FOR WHITE WINES IN THE CLIMATE CONTEXT OF THE ODOBESTI VINEYARD, ROMANIA

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**ABSTRACT.** Odobesti Vineyard is one of the most famous and oldest Romanian vineyards, with a focus on white wines. To improve the existing assortment of varieties over time at the Research and Development Station for Viticulture and Vinification, Odobesti (RDSVV, Odobesti), four vine varieties were obtained and approved: 'Șarba' (1972), 'Băbească gri' (1975), 'Miorița' (1980) and 'Vrancea' (2018), with superior quality and productive potential and a high capacity to capitalise on the edaphoclimatic conditions specific to this viticultural area. This study presents the behaviour of these varieties of vines in the climatic conditions of the Odobesti Vineyard in the period 2017–2021. The following parameters were studied and determined: the phenological spectrum of the vine, fertility

and productivity (% fertile shoots, fertility coefficients, productivity indices), quantity and quality of grape production (grapes/vine, average bunch weight, grape production/vine, sugar content, total acidity and glucoacidimetric index). The data obtained were compared with the 'Sauvignon Blanc' variety, which is widely grown in this area. The evolution of the vegetation phenophases was conditioned by the climatic factors during the study period. There was a tendency to shorten them due to the increase in air temperature values. The variety 'Vrancea' presented a high fertility potential (89.5% fertile shoots), the varieties 'Băbească gri' and 'Miorița' showed a higher productive potential than the control variety 'Sauvignon Blanc' (6.06–6.12 kg/vine), and the variety 'Șarba' recorded the highest



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accumulations in sugars (230.5 g/L). In the climatic context of the Odobești Vineyard, the white wine varieties 'Șarba', 'Băbească gri', 'Miorița' and 'Vrancea' have demonstrated a valuable agrobiological and technological potential, comparable to that of the 'Sauvignon Blanc' variety.

**Keywords:** climatic conditions; fertility; vineyard; productivity; wine grapevine varieties.

## INTRODUCTION

Given the fact that the Odobești Vineyard, one of the oldest Romanian vineyards, is considered a wine-growing area with a focus on white wines (Teodorescu *et al.*, 1987; Oșlobeanu *et al.*, 1991; Cotea *et al.*, 2000), the creation of new varieties for this area is essential (Popescu *et al.*, 1960; Oancea *et al.*, 1999; Sestraș, 2004). The Odobești Vineyard currently occupies an area of approximately 6,000 hectares of vineyards in which there are Romanian varieties such as 'Galbenă de Odobești', 'Plăvaie', 'Fetească albă' and 'Fetească regală', for white wines and 'Băbească neagră' and 'Fetească neagră', for red wines, but also foreign varieties of value ('Italian Riesling', 'Sauvignon', 'Aligote', 'Traminer' and 'Merlot'). The quality of the obtained wines is mainly due to the climatic conditions in this area and impresses with freshness and an extremely pleasant taste sensation. This research aimed to evaluate the agrobiological and technological value of four varieties of white wines created and approved over time at RDSVV, Odobesti ('Șarba', 'Băbească gri', 'Miorița', 'Vrancea'), to highlight the most valuable, compared to those existing in culture (Dobrei *et al.*, 2015; Popescu *et al.*, 1974; Pușcalău *et al.*, 2017, 2021) and adapted to the

constantly changing climatic conditions (Van Leeuwen and Darriet, 2016; Ollat *et al.*, 2019; Nistor *et al.*, 2019; Santos *et al.*, 2020). Thus, this article presents the behaviour of these varieties to the ecoclimatic conditions of the Odobesti Vineyard in the period 2017–2021 regarding the phenology of vine varieties, fertility and productivity, resistance to biotic and abiotic factors, quantity and quality of production compared to 'Sauvignon Blanc' a variety widespread in this wine-growing area.

## MATERIALS AND METHODS

### Description of the study site

Odobesti Vineyard is one of the oldest and most famous in Romania. The beginnings of the vine culture in these lands are lost in the mists of time and can hardly be specified as being related to a Dacian heritage and then to a Roman one. In support of the statements made, we also note the clarifications of Prof. I.C. Teodorescu in his work *The Vine and the Wine Over the Centuries*: "The vine was at home in the Carpathian regions, not only in the wild, common form but even in an evolved one, from which the European noble vine of today is derived...". The oldest documents mentioning the vineyards and wines of Odobești, as reported by the historian C.C. Giurescu, in the work "The history of Odobești Vineyard", dating from the beginning of the 16th century. The vineyard is located between the high hills and the plain and is sheltered by the highest hill, Măgura Odobeștilor (996 m). The wine center is framed by the parallel 45° 46" and the meridian 27° 40" at an altitude of 150 m.

### Climatic conditions

The main climatic factors that characterise the Odobesti vineyard are presented in *Figure 1* (multiannual values: 1946–2016).

The evolution of the main climatic indicators during the study period (2017–2021) is presented in *Figure 2*. The research period was characterised by very high heliothermic availability of 2394.1 sunlight hours, with a maximum of 2303.0 hours in 2019 and a minimum of 2536.3 hours in 2017, of which 1672.6 hours was during the vegetation period. The average annual

temperature varied between 11.3–13.0 °C, with the average of the period being 12.2 °C, and during the vegetation period, it had a value of 19.4 °C. The rainfall regime was slightly deficient in the study period (534.2 mm) with values between 421.6 mm in 2020 and 655.2 mm in 2017 and in the vegetation period of 337.8 mm. The sum of the useful temperature degrees was 1765 °C.

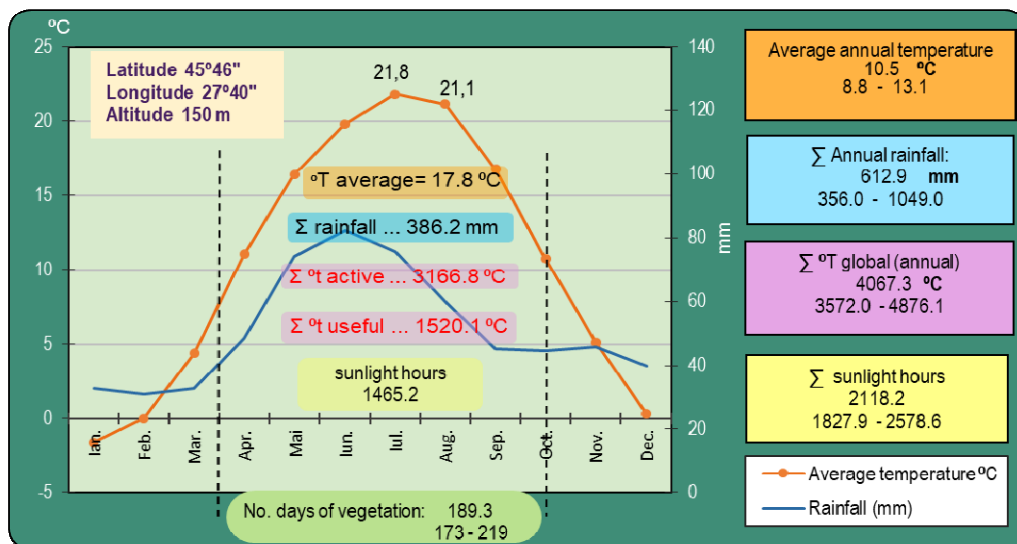


Figure 1 - Climatogram of Odobești vineyard (1946-2016)

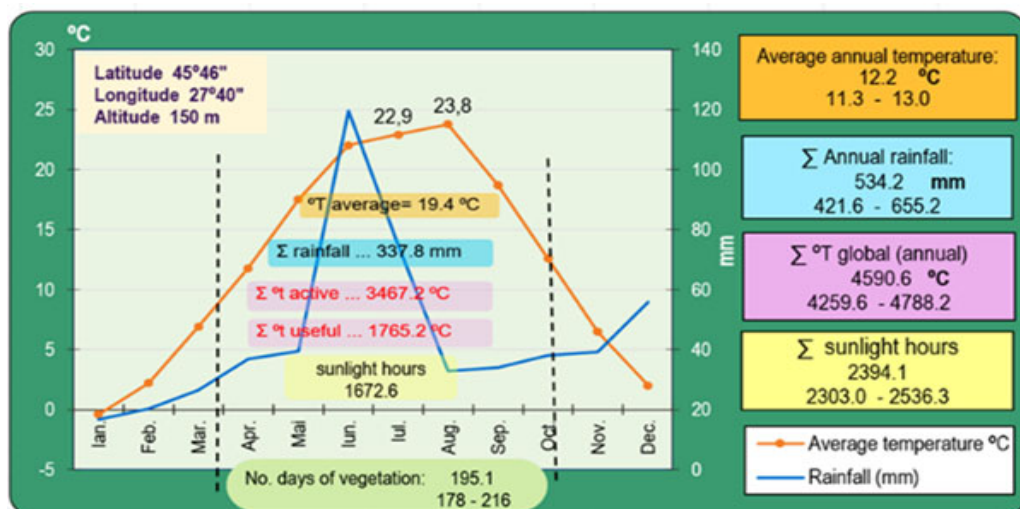


Figure 2 - Climatogram of Odobești Vineyard (2017–2021)

### Biological material

The sampling represented four grape varieties for white wines created over time at RDSVV, Odobești ('Șarba', 'Băbească gri', 'Miorița' and 'Vrancea'). The first two varieties are widely spread in the Odobești Vineyard, but also in other wine-growing areas. The main ampelographic characters of the varieties are presented below.

The 'Șarba' variety (*Figure 3*) was created by free fertilisation of the 'Italian Riesling' variety; authors Popescu *et al.* approved it in 1972. Type of vine of end IV-e time (10–15 September): at budburst, the growth tip is semi-open, slightly fluffy, greenish-whitish-yellow, with brown reflections on the edge, with an adult leaf of medium to large size, pentalobate or trilobate (rarely), with prominent ribs and a medium density of bristles between the ribs. The leaf blade is yellowish green, slightly corrugated, the middle teeth sharp, the sinuses on the upper sides closed and ovoid and the petiole sinus in the shape of a lyre. The flower is a normal hermaphrodite on type 5–6, with fertile pollen. The grapes are medium to large (175–265 g), truncated-winged with thick berries. The berries are medium in size (2.25–2.48 g/grain), round in shape, with thick, greenish-yellow skin. The flesh is juicy and white-yellow, with an aromatic taste.

The 'Băbească gri' variety (*Figure 4*) is a genetic mutation of the 'Băbească neagră' variety, fixed by vegetative propagation, authors Popescu *et al.*, the homologation of the type of vine took place in 1975. Type of vine of VI-e time (1–15 October): at budburst the growth tip is wide open, reddish-green and slightly fluffy. with adult leaves of medium size, orbicular-reniform, pentalobate, slightly asymmetrical; the limb green, intensely glossy, slightly grafted, glabrous on the upper part, hairy on the lower part, with the edges usually bent downwards; the upper lateral sinuses are closed, ovoid, sometimes provided at the base with a tooth; the lower sinuses are open in a U-shape; the petiolar sinus is open in the form of a pound that tends to close; the ribs

are intensely reddish, covered with short hairs on the underside. The flower is a normal hermaphrodite with fertile pollen. The grapes are medium to large (184–270 g), conical in shape, branched, with a little flexible spine, and with the berries loosely placed on the clusters. The berries are medium in size (1.8–2.5 g), discoidal in shape, with thick, smoky grey skin, intensely covered with prunes with unflavoured juicy pulp having a sour taste.

The 'Miorița' variety (*Figure 5*) obtained by free pollination of the 'Coarnă albă' variety: authors Popescu *et al.* approved it in 1980. Type of vine of V-VI-e time (25 September–15 October): at budburst, the growth tip is dark, whitish, fluffy, with middle adult leaves, pentalobate, with superficial upper lateral sinuses, open V-shaped; petiolar sinus open in pound with sharp base. The limb of the leaf is dark green, thick, rough and slightly fluffy on the underside. The main nerves are lighter in colour than the tongue and are obvious on both sides. The flower is a normal hermaphrodite with fertile pollen. The grapes are medium to large (200–215 g), cylindrical, rarely cylindrical-conical, sometimes winged, with the berries often placed in clusters. The berries are medium (2.2–2.5 g), ovoid in shape, with thick, greenish-yellow skin, with golden hues on the sunny side, covered with a thick layer of plum, with a persistent pistillary point; juicy, semi-crunchy, unflavoured pulp.

The 'Vrancea' variety (*Figure 6*) was obtained from the hybrid combination of the types of vines: ('Traminer' × 'Armaș') × 'Fetească regală'; authors Mișu *et al.* approved it in 2018. The type of vine of V-e time (15–30 September): at budburst, the growth tip is fluffy and green. The flower is hermaphroditic, on type 5. The grapes are small to medium in size (141–155 g) and have a cylindrical shape, uniaxial and sometimes double-winged. The berries are small to medium (1.7–1.9 g).



**Figure 3** - 'Șarba' (shoot tip, grape, adult leaf)



**Figure 4** - 'Băbească gri' (shoot tip, grape, adult leaf)



**Figure 5** - 'Miorița' (shoot tip, grape, adult leaf)

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**Figure 6** - 'Vrancea' (shoot tip, grape, adult leaf)

The control variety was 'Sauvignon Blanc', grown on large areas in the Odobești Vineyard.

### Experimental procedures

The genotypes were studied in three repetitions, with five vines each. Each variety was grafted on the rootstock *Berladieri* × *Riparia Selection Oppenheim 4*, clone 4. The planting distances were 2.2 × 1.2 m and the pruning system *Dr Guyot*, maintaining between 38 and 44 fruit buds. In each year of study, the phenological spectrum was monitored by recording the development of vegetation phenophases (budburst, flowering, veraison, physiological maturity and fall of leaves). Observations and determinations were made regarding the fertility and productivity of the varieties by calculating the percentage of fertile shoots (FS%) of the fertility coefficients (Cfa and Cfr), as well as the productivity indices (Ipa and Ipr) by the following Equations 1-5:

$$FS (\%) = \frac{\text{No. fertile shoots}}{\text{No. total shoots}} \times 100 \quad (1)$$

$$Cfa = \frac{\text{No. inflorescences}}{\text{No. fertile shoots}} \geq 1 \quad (2)$$

$$Cfr = \frac{\text{No. inflorescences}}{\text{No. total shoots}} \quad (3)$$

$$Ipa = Cfa \times g \quad (4)$$

$$Ipr = Cfr \times g \quad (5)$$

where g = average grape weight at full maturity

To establish the technological potential of the varieties, analyses and determinations were carried out regarding the quantity and quality of grape production: the average number of grapes per vine, the average weight of a bunch, the production of grapes per vine and per hectare, (kg/vine, t/ha), sugar content (g/L) and total acidity (g/L tartaric acid). To determine the time of full ripeness of the grapes, the gluco-acidimetric index (IGA) was calculated, which represents the value of the ratio between the sugar content and the total acidity of the must:

$$IGA = \frac{\text{sugars (g/L)}}{\text{total acidity (g/L tartaric acid)}} \quad (6)$$

The observations and determinations made were also following the specifications in the methodology developed by OIV, UPOV and IBPRG (1984). Specific methods currently practiced in the research network were used to evaluate the technological potential of the varieties.

### Statistical procedures

The results were interpreted using the FoxPro Monofactorial 2.0 software, by analysing the variance, compared to the control variety 'Sauvignon Blanc'. For the climatic characterisation of the study period, the following parameters were calculated: average annual temperature and vegetation period (°T average), amount of annual precipitation and vegetation period ( $\Sigma$

rainfall), the amount of heatstroke ( $\Sigma$  sunlight), amount of degrees global temperature ( $\Sigma$  °tg), amount degrees active temperature ( $\Sigma$  °ta), amount degrees useful temperature ( $\Sigma$  °tu), where:

$\Sigma$  °t g = Sum of positive daily average temperatures recorded during the year;

$\Sigma$  °t a = Sum of average daily temperatures, above 10 °C, during the growing season;

$\Sigma$  °t u = Average daily temperatures during the growing season exceeding 10 °C.

## RESULTS

### Phenological spectrum

The phenology of the studied genotypes is presented in *Table 1*. In the climatic conditions specific to the study period (2017–2021), the bud break began at the earliest in the second 10-day period of April (April 12–14) and at the latest at the beginning of May (May 1–4), with 2–4 days later in the 'Miorița' variety compared to the control variety. The phenological observations from the study period show that the flowering phase took place at the earliest on May 22 in the 'Vrancea' variety, three days earlier than in the control variety and at the latest on June 14 in the 'Băbească gri' and 'Miorița' varieties. The veraison was registered at the earliest in the third 10-day period of July for the 'Vrancea' and 'Șarba' varieties (July 22–24), 12–14 days earlier than the control variety and, at the latest, was registered in the second 10-day period of August for the 'Miorița' and 'Băbească gri' varieties (August 18–19), as well as the control variety 'Sauvignon Blanc'.

The complete ripening of the grapes took place between September 5 and 17 for the 'Vrancea' and 'Șarba' varieties, three to nine days earlier compared to the 'Sauvignon Blanc' variety and between September 11 and

29 for the 'Miorița' and 'Băbească gri' varieties, two to five days later than the control variety. The duration of the vegetative period was between 175 and 217 days.

### Fertility and productivity characteristics

The average values recorded for fertility varied between 63.6% of fertile shoots of the 'Șarba' variety and 89.3% of fertile shoots of the 'Vrancea' variety. The difference from the control variety 'Sauvignon Blanc' was statistically assured as being significantly lower for the 'Șarba' and 'Băbească gri' varieties, insignificant for the 'Miorița' variety and significantly positive for the 'Vrancea' variety (*Table 2*).

The fertility coefficients recorded higher values in the 'Vrancea' variety (Cfa = 1.50; Cfr = 1.30) compared to the control variety 'Sauvignon Blanc' (Cfa = 1.4; Cfr = 1.20). The varieties 'Șarba', 'Băbească gri' and 'Miorița' showed average values of lower fertility coefficients compared to the control. For the varieties 'Băbească gri', 'Miorița' and 'Șarba', the absolute productivity index (Ipa) registered average values higher than the control variety.

### Quantity and quality of production

During the study period (2017–2021), the number of grapes/vine had average values between 20.0 for the 'Șarba' variety and 38.8 for the 'Vrancea' variety. The average weight of a grape was 267.1 g ('Băbească gri'), 260.2 g ('Șarba'), 247.3 g ('Miorița') and 150.6 g for the 'Vrancea' variety. The average grape production per vine for the four varieties analysed had values between 5.21 kg ('Șarba') and 6.12 kg ('Băbească gri') (*Table 3*).

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Regarding the production of grapes, it was found that the varieties 'Băbeasca gri' and 'Miorița' are very significantly positively differentiated in terms of the average weight of the grapes in relation to the control variety 'Sauvignon Blanc'. A significantly small difference from the control was shown by the 'Vrancea' variety for the average weight of the grapes, where the difference for the average production of grapes on the vine

was insignificant. The technological potential is complemented by the quality of grape, expressed by the sugar content, the total acidity and the gluco-acidimetric or the maturation index of the must (Table 4). Of the four varieties studied, the highest sugar content was recorded in the 'Șarba' variety, with an average of 230.53 g/L sugars under a total acidity of 6.15 g/L tartaric acid.

**Table 1** - Phenological spectrum of the varieties studied (Odobești, 2017-2021)

Variety	Phenological phases					Leaf-on days
	Budburst	Flowering	Veraison	Physiological maturity	Leaf fall	
'Șarba'	13 Apr– 1 May	25 May– 11 Jun	24 Jul– 12 Aug	6–17 Sep	26 Oct– 16 Nov	178–217
'Băbească gri'	12 Apr– 2 May	24 May– 14 Jun	6–18 Aug	13–29 Sep	26 Oct– 16 Nov	181–215
'Miorița'	14 Apr– 4 May	23 May– 14 Jun	3–19 Aug	11–28 Sep	26 Oct– 16 Nov	175–216
'Vrancea'	13 Apr– 2 May	22 May– 11 Jun	22 Jul– 10 Aug	5–15 Sep	26 Oct– 16 Nov	177–217
'Sauvignon Blanc' (control)	10 Apr– 2 May	25 May– 13 Jun	5 19 Aug	9–24 Sep	26 Oct– 16 Nov	177–215

**Table 2** - Fertility and yield assessment indices of the studied varieties (Odobești 2017–2021)

Variety	Fertile shoots (%)			Fertility coefficients		Productivity indices	
	%	Dif. control	Significance	Cfa	Cfr	lpa	lpr
'Șarba'	63.6	-13.8	<sup>0</sup>	1.07	0.68	278	177
'Băbească gri'	64.2	-13.2	<sup>0</sup>	1.12	0.72	299	192
'Miorița'	67.5	-9.9	ns	1.17	0.77	289	190
'Vrancea'	89.3	11.8	*	1.50	1.30	226	196
'Sauvignon Blanc' (control)	77.5	0.0	-	1.40	1.20	238	204

DL 5% = 11.86%  
DL 1% = 16.64%  
DL 0,1% = 23.51%

Legend: Cfa- absolute fertility coefficient; Cfr-relative fertility coefficient; lpa- absolute productivity index; lpr- relative productivity index; DL- limit difference for the probability of 5%, 1% and 0.1%; ns - P >5% (insignificant); <sup>0</sup> - P = 1% to 5 % (significantly lower); \* - P = 1% to 5 % (significantly positive)



**Table 3** - Grape harvest appreciation indices (Odobești, 2017–2021)

Variety	No. grapes/ vine	The average weight of a bunch			Grape production			t/ha
		(g)	Difference	Signifi- cance	(kg/vine)	Difference	Signifi- cance	
'Șarba'	20.0	260.2	+89.75	***	5.21	+0.16	ns	19.73
'Băbească gri'	22.9	267.1	+96.75	***	6.12	+1.07	*	23.19
'Miorița'	24.5	247.3	+76.88	***	6.06	+1.01	*	22.95
'Vrancea'	38.8	150.6	-19.87	<sup>0</sup>	5.83	+0.78	ns	22.10
'Sauvignon Blanc' (control)	29.7	170.4	0.00	-	5.05	0.00	-	19.12
DL 5% = 15.7920					DL 5% = 0.7813			
DL 1% = 22.1668					DL 1% = 1.0967			
DL 0.1% = 31.2943					DL 0.1% = 1.5482			

ns - P >5% (insignificant); <sup>0</sup> - P=1% to 5 % (significantly lower); \* - P=1% to 5 % (significantly positive);  
\*\*\*- P<0.1% (very significantly positively)

**Table 4** - Quality assessment indices of the grape harvest (Odobești, 2017-2021)

Variety	Sugar content			Total acidity			Maturation index
	(g/l)	Difference (±g/L)	Signifi- cance	(g/L tartaric acid)	Difference (±g/L)	Signifi- cance	
'Șarba'	230.53	+10.90	ns	6.15	+0.25	ns	58
'Băbească gri'	217.10	-2.53	ns	8.13	+2.50	***	41
'Miorița'	177.75	-41.88	<sup>000</sup>	7.08	+1.45	*	39
'Vrancea'	203.05	-16.58	ns	5.53	-0.10	ns	57
'Sauvignon Blanc' (control)	219.63	0.00	-	6.50	0.00	-	60
DL 5% = 18.5746				DL5% = 1.2567			
DL 1% = 26.0725				DL1% = 1.7639			
DL 0,1% = 36.8083				DL0.1% = 2.4903			

ns - P >5% (insignificant); \* - P=1% to 5 % (significantly positive); <sup>000</sup>- P<0,1% (very significantly low);  
\*\*\*- P<0,1% (very significantly positively)

The lowest sugar content was recorded for the 'Miorița' variety with an average of 177.75 g/L of sugars and a total acidity of 7.08 g/L tartaric acid. The 'Băbească gri' and 'Vrancea' varieties recorded average values of the sugar content of 217.10 and 203.05 g/L sugars, respectively, and for total acidity, 8.13 g/L tartaric acid and 5.53 g/L tartaric acid, respectively. In terms of the total acidity of the must, the

differences from the control were statistically very significantly positive for the 'Băbească gri' variety, significantly positive for the 'Miorița' variety and insignificant for the 'Șarba' and 'Vrancea' varieties. The maturation index had values between 39 for the 'Miorița' variety and 58 for the 'Șarba' variety, which were values below the control variety (60).

## DISCUSSION

During the study period in the Odobesti Vineyard, the average annual temperature was 12.2 °C, 1.7 °C above the multiannual value (10.5 °C) and 19.4 °C during the vegetation period, 1.6 °C above the multiannual value (17.8 °C). In addition, the average temperature of the warmest month (July) increased to 22.9 °C compared to the multiannual value (21.8 °C). The amount of precipitation annually and during the vegetation period was decreasing compared to the multiannual averages, but with the accentuation of their unbalanced distribution.

The development of vegetation phenophases of vines is directly related to climatic factors (Burzo, 2014). Phenological observations made between 2017 and 2021, for the varieties studied, showed that the evolution of vegetation phenophases was conditioned by the level and action of climatic factors, but also by the genetic characteristics of the varieties. The budding took place at the earliest in the second 10-day period of April (2020) and at the latest in early May (2021). Because of the increase in the air temperature values, in the last years, there was a tendency to advance the moment of budding and a shortening of the period of its development. Thus, in dry years, implicitly for those with milder winters, budburst took place in the first 10-day period of April. The flowering was recorded at the earliest in the third 10-day period of May (2018) and at the latest in the second 10-day period of June (2021). For the flowering to start, the vine varieties need a certain amount of heat; the minimum level at

which the flowers open is 15 °C, and the optimum is 25–26 °C. High temperatures above 30 °C around the flowering period determine the development of this phenophase in an accelerated rhythm over a short period, considerably reducing the gap between varieties (varieties bloom simultaneously). Lower temperatures stagger flowering over a longer period, extending the duration of the phenophase (Tomasi *et al.*, 2011; Biasi *et al.*, 2019). The veraison is the beginning of the ripening of the grapes and is a process that appears suddenly, marked by the accumulation of sugars in the berries; the epicarp changes colour, and the berry becomes transparent and begins to soften. In our study, this phenophase took place at the earliest in the third 10-day period of July (2018) for the 'Vrancea' and 'Şarba' varieties and at the latest in the second 10-day period of August (2021) for the 'Băbească gri' and 'Mioriţa' varieties. During the analysed period, the studied varieties reached full maturity at the earliest in the first 10-day period of September ('Vrancea' and 'Şarba') and at the latest at the end of September ('Băbească gri' and 'Mioriţa'). This phenophase has a tendency to shorten (2–3 weeks) due to the increase in air temperature values.

The fertility and productivity of the studied varieties were specific to the known biological potential of each variety, being influenced by the agrotechnical measures, but also by the climatic conditions of the study period. The percentage of fertile shoots had average values between 89.3% fertile shoots in the 'Vrancea' variety and 63.6% fertile shoots in the 'Şarba' variety.

The data on the quantity of grape production show that the highest production was recorded by the 'Băbească gri' variety, with an average of 6.12 kg/vine and 23.19 t/ha, respectively, followed by 'Miorița' variety, with 6.06 kg/vine and 22.95 t/ha. These results once again confirm the already known productive potential of the two varieties. The statistical interpretation shows that these varieties differ significantly positively from the control variety. The 'Vrancea' variety achieved an average production of 5.83 kg/vine or 22.10 t/ha, and the 'Șarba' variety produced 5.21 kg/vine or 19.73 t/ha, with the difference from the control being insignificant.

The climatic conditions of the study period had a decisive role in the accumulation of sugars in the berries and the level of total acidity in the must. The data on the quality of grape production show the highest sugar content was recorded for the 'Șarba' variety, with an average value of 230.5 g/L sugar, with a total acidity of 6.15 g/L tartaric acid. In this variety, the sugar content recorded during the study period was higher than the results obtained by Popescu *et al.* (1983); on the other hand, the total acidity of the must was lower.

High accumulations of sugars were also recorded in the 'Băbească gri' variety, a late maturing variety, with an average of 217.1 g/L sugar, accumulation superior to the results recorded by Popescu *et al.* (1974), with a very good total acidity of 8.13 g/L tartaric acid. The 'Vrancea' variety recorded an average of 203.1 g/L sugar, with a total acidity of 5.53 g/L tartaric acid. The lowest sugar content was registered for the 'Miorița' variety, with

an average of 177.7 g/L and a total acidity of 7.08 g/L tartaric acid.

The balance between sugars and acidity of the must is highlighted by the value of the gluco-acidimetric index, which in the study period (2017–2020) had high values between 39 for the 'Miorița' variety and 58 for the 'Șarba' variety, which ensures the obtaining of high-quality wines. In the current climatic context, the quality of grape production ensures the production of wines with higher alcoholic potential and a much richer extractive content ('Șarba' and 'Băbească gri'), but also with lower acidity ('Vrancea').

## CONCLUSION

In the Odobesti Vineyard, the average annual temperature recorded a surplus of 1.7 °C compared to the multiannual average (1946–2016), which confirms the phenomenon of global warming. The evolution of the vegetation phenophases was conditioned by the level and the action of the climatic factors from the study period, with them having a tendency to shorten due to the increase of the air temperature values, but also by the genetic characteristics of the varieties. The 'Vrancea' variety showed a higher fertility potential (89.5% fertile shoots) compared to the control variety 'Sauvignon Blanc' (77.5% fertile shoots). The studied varieties showed good and very good tolerance to the diseases. In the conditions of the severe drought of 2020, the varieties 'Băbească gri' and 'Miorița' stood out for their high resistance to soil water deficit and, respectively, low relative air humidity compared to the control. The 'Băbească

gri' and 'Miorița' varieties showed a higher productive potential than the control variety 'Sauvignon Blanc', with average grape yields of 6.12 kg/vine and 6.06 kg/vine, respectively. The data on the quality of grape production show that the highest sugar content was recorded in the 'Șarba' variety (230.5 g/L), and the lowest sugar accumulation was in the 'Miorița' variety (177.7 g/L). The 'Băbească gri' variety recorded the highest value of total acidity (8.13 g/L tartaric acid). In the conditions of climate change registered in the Odobesti vineyard, the varieties for white wines 'Șarba', 'Băbească gri', 'Miorița' and 'Vrancea' demonstrated a valuable agrobiological and technological potential comparable to that of the widespread variety 'Sauvignon Blanc'. The evaluation of the agrobiological and technological properties of some newly created varieties, to highlight the most valuable ones, is a necessity and a permanent concern of research in viticulture and winemaking, which open wide prospects for improving the assortment in different production directions.

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