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ASSESSMENT OF SOME HYBRID ELITES OF TABLE GRAPES OBTAINED AT INCDBH STEFANESTI-ARGES WITHIN THE ROMANIAN BREEDING PROGRAM

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Abstract

This paper presents two new genotypes obtained at INCDBH Ştefăneşti-Argeş through controlled hybridization of Muscat de Pölöskei x Victoria (coded RVC 24) and Coarnă neagră x Victoria (VMD 24) varieties. Both the hybrid elites studied and the control Victoria were characterized and evaluated according to standardized international methodology. Phenotypic, agro-biological, and technological determinations were carried out throughout the years 2020-2023, following the 'OIV Descriptor list for grapevine varieties and Vitis species'. The RVC 24 genotype stood out for its superior agro-biological and technological potential compared to the control: high fertility at 67%, absolute and relative fertility coefficients (1.2 and 0.76, respectively), average grape weight of 476.24 g, absolute and relative productivity indices: 555 and 364 respectively, sugar content of 157 g/l. The VMD 24 genotype was notable for its high to very high fertility at 78%, average grape weight of 443.30 g, absolute and relative productivity indices: of 474 and 373 respectively, and sugar content of 155 g/l. The results obtained were correlated with the climatic data recorded during the study period, which showed significant fluctuations from one year to another.

Key words*: genotypes, genetic resources, vine, ampelographic descriptors.*

INTRODUCTION

The objectives of the national program for improving the assortment of table grape varieties have been aimed at creating new genotypes with superior agro-biological and technological potential: different ripening epochs to ensure consumption in fresh condition over a longer period of time, stenospermocarpy and parthenocarpy, increased ecological plasticity, high adaptability to different biotope conditions, resistance to major diseases, pests, or critical climatic conditions.

It is appreciated that the success of any breeding program is largely determined by the genetic variability sources available to the breeder (Savatti et al., 2004).

Understanding the ontogenetic and phylogenetic aspects of the material used, as well as a profound theoretical basis, represents the basic premises for breeders to efficiently carry out practical work aimed at obtaining new competitive varieties.

The criteria for choosing suitable parents are, consequently, diverse, considering phenotypic, biochemical, physiological, ecological, or genetic aspects. Without diminishing the importance of other aspects, genetic factors are fundamental in assessing the value of initial breeding material as accurately as possible.

The more abundant and diversified the germplasm sources are, the greater the possibility that, following thorough studies, the forms containing the most valuable genes can be retained, whose accumulation is targeted in the new organisms created (Leonte C., 2011).

In obtaining valuable hybrid descendants, from which elite plants have been selected, an important role has been attributed to the choice of parents. In plant breeding, it is a requirement for the initial material to exhibit a sufficiently large variability to identify and multiply those genotypes with new characteristics or traits, which truly allow the creation of new varieties. Variability is defined by the total differences between the characters and traits of individuals within a specific population. Characters encompass all morphological, physiological, and biochemical characteristics and can be grouped according to the parameters used for

their expression into qualitative and quantitative traits (Denisa Mihaela Coman, 2010).

MATERIALS AND METHODS

The initial material used for the hybridization work consisted of the following grape varieties: *Muscat de Pölöskei* (R 10), *Victoria*, and *Coarnă neagră*, all part of the Grape Germplasm Collection at the National Research and Development Institute for Biotechnologies in Horticulture Ştefăneşti-Argeş.

The intraspecific hybridizations carried out at the National Research and Development Institute for Biotechnologies in Horticulture Ştefăneşti-Argeş, within the *Vitis vinifera* species, aimed at transmitting and fixing in offspring intermediate characters between parents (quantity - quality), the type of blended inheritance (grape color), and the sex conversion with a pronounced heterozygous characteristic. The following scheme was applied: **E1 x E2 → F1 (E1 E2) - selection of hybrids in F1.**

Using *Muscat de Pölöskei* (R 10) x *Victoria* as the parental forms, the aim was to obtain genotypes with large, crunchy berries and increased tolerance to biotic and abiotic factors. Muscat de Pölöskei is a variety recognized as belonging to the group of resistant varieties. Its main qualities include highly fertile pollen, a favorable ratio between sugar content and acidity, pleasant grape flavor, crunchy berries, and suitability for winter storage. It is resistant to powdery mildew and gray mold, moderately resistant to downy mildew. The Victoria variety was chosen as the parent in this combination due to its outstanding qualitative characterristics: large grapes, large berries, pleasing commercial appearance, and medium ripening time. The hybrid *RVC 24* was obtained as a result of these hybrid combinations (Figure 1). Using the black *Coarnă neagră* variety as the maternal donor, it was aimed at its very good resistance to drought and frost (-20... -22°C), to gray mold of grapes, grape moths, as well as good tolerance to downy mildew, powdery mildew, and phylloxera. As a result of hybridizing the *Coarnă neagră* x *Victoria* varieties, the hybrid *VMD 24* was obtained (Figure 2). According to the 'OIV Descriptor list for grapevine varieties and *Vitis* species', phenotypic, agro-biological, and technological determinations were carried out throughout the years 2020-2023. ***The main phenological descriptors used in*** describing the genus *Vitis* are budburst, flowering, veraison, and full grape ripening. ***The main agro-biological descriptors*** evaluated were: shoot growth vigor, percentage of fertile shoots, fertility coefficients: absolute and relative, and productivity index: absolute and relative. ***The main technological descriptors*** are: cluster weight, berry weight, weight of 100 berries, grape production per hectare, yield, must sugar content and acidity.

The results obtained from the analyses and determinations were correlated with the climatological data recorded by the institute's own iMetos 3.3 station, within the institute - the Fitotron Complex.

Figure 1 - RVC 24 hybrid elite

Figure 2 - VMD 24 hybrid elite

RESULTS AND DISCUSSIONS

Under the climatic aspect, the Vine growing Center Ştefăneşti-Argeş belongs to the moderately warm-semi-humid Zone II. Within this zone, the territory occupies the IV th subzone and the class of weakly excess hydroclimatic balance. The pedoclimatic characteristics of the Vine growing Center Ştefăneşti are specific to soils with umbrisol, with loamy-sandy and loamy-clayey textures, without gravel. In the climatic conditions of this area, the average annual temperature ranges between 9.8°C and 10.1°C. The average temperature per season is 22.2°C in summer, 11.4°C in autumn, 9.5°C in spring, and -0.9°C in winter. The absolute maximum temperature is 39.2°C in July, and the absolute minimum is -27.6°C in January. The duration of the interval with temperatures above 10°C is 186-192 days, and the sum of active daily average temperatures is 3164°C in the western zone and 3364°C in the eastern zone. The average sunshine duration sums up to

approximately 2177 hours/year. The length of the vegetation period is approximately 183 days. Analyzing the length of the vegetation period over a long period, years (1960-1990), we observe a very large variation, ranging from 162 days to 215 days in 1989. Regarding the water regime, the area is characterized by average annual precipitation between 450-700 mm. As can be seen from Table 1, in 2020, high temperature values were recorded compared to 2021, 2022, and the multi-year average, both in terms of the overall thermal balance, active and useful, as well as the average minimum temperature with a value of 7.7. The vegetation period lasted 193 days compared to 2021 (167 days) and 2022 (186 days) (Table 1).

Table 1. Synthesis of the main climatic elements in the Vine growing Ştefăneşti Center

Climatic elements analyzed	Multi-year average**	2020	2021	2022
Global thermal balance, ∑t°g, °C*	**3285.6**	3516.6	3347.6	3495.1
Active thermal balance, ∑t°a, °C*	**3198.3**	3775.2	3225.4	3393.7
Useful thermal balance, ∑t°u, °C*	**1454.0**	1754.1	1633.4	1690.3
Average monthly temperature, °C	**10.6**	14.6	13.3	13.9
Average temperature in vegetation period, °C	**17.6**	19.5	18.6	19.4
Minimum temperature, °C	**6.2**	7.7	0.3	7.1
Maximum temperature, °C	**16.3**	23.7	30.2	22.1
∑ annual rainfall (mm)	**689.6**	415.2	544.4	559.9
∑ rainfall in active period (mm)	**416.9**	122.4	356.8	508.7
Active period (no. days)	-	193	167	186
Hydrothermic coefficient, CH	**3.0**	3.2	5.1	3.3
Real heliothermic index, IHr	**2.32**	2.51	2.40	2.66
Viticultural bioclimatic index, Ibcv	**8.0**	8.6	7.7	8.2
Oenoclimatic aptitude index, IAOe	**4655.2**	4780.1	4573.2	4736.1

As observed in Table 2, the number of days with temperatures exceeding 32°C is significantly increasing from year to year, particularly during the summer months. Much higher temperatures than the normal and multi-year average are also recorded in the months of September-October, characterized by a dry climate. Additionally, the hydrological regime recorded during the winter is deficient, with precipitation in recent years occurring in the form of rain and sleet but in much lower quantities than the multi-year averages.

Table 2. Frequency occurrence of abiotic stress factors in the period 2020-2022

Stress factor	2020			2021			2022		
	Month	No. days	F %	Month	No. days	F %	Month	No. days	F %
Winter frost average min. T < -15°C	-	-	-	-	-	-	-	-	-
Spring frost average min. T< -2°C	-	-	-	III	5	16	III	4	13
	-	-	-	IV	3	10	-	-	-
Drought Abs. max. T .> 30°C	V	7	23	-	-	-	V	8	26
	VI	18	60	VI	10	33	VI	23	77
	VII	27	87	VII	31	100	VII	18	58
	VIII	29	94	VIII	27	87	VIII	18	58

***RVC 24* Hybrid Elite**

Morphological characterization

The **rosette** is hairy and scaly, with a greenish-white color (Figures 3, 4). **The tip of the shoot** is completely open, without anthocyanin pigmentation, and the density of fine hairs is moderate (Figure 5). **The flower** is a normal hermaphrodite, type 5, with fully developed stamens and pistils (Figure 6). **Young leaves** are green on the upper side, and the density of long hairs on the lower side, between veins, is moderate (Figure 7). The shoot is smooth, and green with red streaks on the sunny side. The nodes are long, bifurcated, yellowish-green in

color, and their distribution is discontinuous. **The mature leaf** is large, wedge-shaped, and pentagonal. **The teeth** are long with straight edges. The color of the blade is dark green, moderately embossed, with a straight profile in cross-section. The upper lateral sinuses are open, with highly overlapping lobes, U-shaped, and the lower sinuses are deep. The petiolar sinus is open in a U shape (Figure 8). **The bunches** are large, averaging 192 mm in length, with variations ranging between 179 and 201 mm. In terms of compactness, it is lax or very lax (degree of expression 1-3), with very visible pedicels. **The shape** of the grape is cylindrical-conical, uniaxial, with an average of 3-4 wings (degree of expression 3). **The grape** has an average weight of 434.49 g. **The peduncle** is long, averaging 86 mm.

The berry is large, averaging 22 mm, with variations ranging between 21 and 24 mm. The weight of a berry is 4.8-5.4 g. The shape is elongated elliptical (degree of expression 4), with a greenish-yellow color, and the skin is lightly pruinose. The pulp does not exhibit anthocyanin coloration, being very firm. The berries are difficult to separate from the pedicel. On average, they contain 3 - 4 seeds. **The weight of the grape**: 457.80-483.70 g, 100 berries: 487-546 g, must concentration in sugars: 155-160 g/l, acidity 3.4-3.9 g/l H_2SO_4 (Figure 9).

Figure 3 - Bud BBCH 00

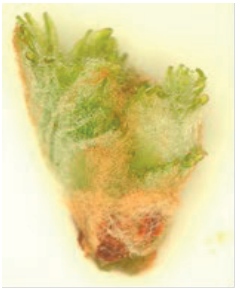


Figure 4 - Rosette

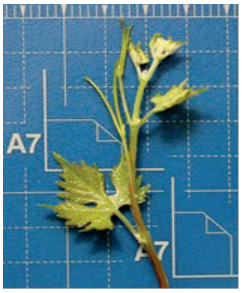
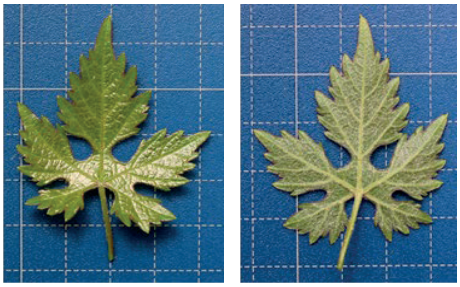


Figure 5 - Young shoot

Figure 6 – Inflorescence



a. b.

Figure 7 - Young leaf (a. upper side; b. lower side)

Figure 8 - Mature leaf

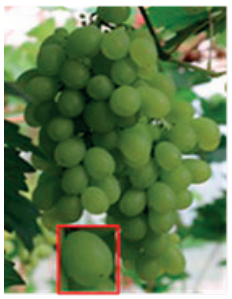


Figure 9 - Bunch

***VMD 24* Hybrid elite**

Morphological characterization

It buds through a green **rosette** with very sparse hairs (Figures 10, 11). **The tip of the shoot** is semi-open, with very sparse long hairs (Figure 12). **The shoot** is green with red stripes, with meristems covered with sparse fine hairs. **The inflorescence** is cylindro-conical, medium-sized (Figure 13). The **young leaves** are green, glabrous on both the upper and lower surfaces, without anthocyanin pigmentation (Figure 14).

The mature leaf is medium-sized, wedge-truncated, pentalobed, green, and glabrous. **The petiolar sinus** is open in the shape of a U or lyre, and the **upper lateral sinuses** are slightly overlapping with the base in a V shape. **The teeth** are short and have one concave and one convex edge. **The leaf blade** has medium undulation, with generalized waviness, and the cross-section profile is revolute.

The petiole is shorter than the length of the main vein (figure 15).

The grapes are large, with an average length of 202 mm, ranging between 193 and 212 mm. In terms of compactness, they are loose to very loose (expression grade 3-5), with very visible pedicels. **The shape** of the bunch is cylindrical-conical, uniaxial, with an average of 3-4 wings (expression grade 3). **The bunch** has an average weight of 443.30 g. **The peduncle** is long, with an average length of 99 mm (Figure 16).

The berry is medium to large-sized, with an average diameter of 21 mm, ranging between 18 and 23 mm, unevenly. The weight of a berry is 4.2-4.5 g. **The weight of the bunch** ranges from 411.10 to 487.22 g, 100 berries weigh between 405.30 and 427.81 g, the must concentration in sugars ranges from 153 to 157 g/l, acidity is between 3.4 and 3.9 g/l H_2SO_4.

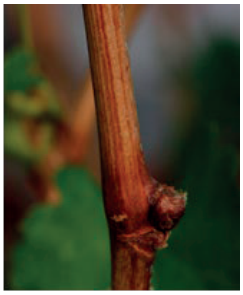


Figure 10 - Bud BBCH 00

Figure 11 - Rosette

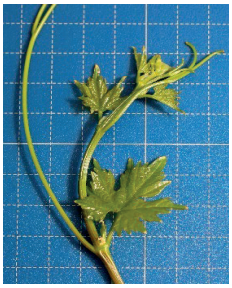


Figure 12 - Young shoot

Figure 13 - Inflorescence

a.

b.

Figure 14 - Young leaf (a. upper side; b. lower side)

Figure 15 - Mature leaf

Figure 16 - Bunch

As indicated in Table 3, in the year 2020, due to the high temperatures in the months of February, March, and April, the four studied phenological stages occurred earlier compared to the year 2022, with significant deviations from the year 2022. In the year 2021, both bud burst, veraison, and grape ripening were much delayed compared to the year 2020, with a significant deviation of 46 days (veraison) and 26 days (full ripening).

Evaluation of agro-biological descriptors during the period 2020-2022

Based on the obtained results, it was observed that both the fertility of the studied genotype, which recorded an average value of 67% (medium to high), and the values of AFA and RFA (Table 4) were above unity with an average of 1.2 and 0.76, respectively compared to the control variety which recorded lower values (Figure 17).

Table 3. Monitorization of the phenological spectrum of the RVC 24 hybrid elite during 2020-2022

	Year	Budburst OIV 301		Full bloom OIV 302		Veraison OIV 303		Full maturity 304	
		Date	UTB (ºC)	Date	UTB (ºC)	Date	UTB (ºC)	Date	UTB (ºC)
***RVC 24* hybrid elite**	2020	08 - 11.04	78.0	09 - 13.06	396,7	17 - 20 .07	431.4	01 - 05.09	220.3
	2021	26 - 29.04	25.0	10 - 14.06	303.1	31.08 - 03.09	429.6	05 - 08.10	212.2
	2022	15 - 18.04	61.2	15 - 18.06	374.6	21 - 25.07	401.8	09 - 12.09	191.8
***Victoria* control**		19 - 21.04	61.2	13 - 18.06	374.6	27 - 31.08	401.8	14 - 18.08	191.8

Table 4. Evaluation of the fertility characteristics of the RVC 24 hybrid elite in the period 2020-2022

RVC 24 hybrid elite	Year	Total no. of shoots	No fertile shoots	Coefficient of fertile shoots (LF) %	No. inflorescences	Fertility coefficients	
						AFC	RFC
	2020	24	13	54	16	1.2	0.66
	2021	28	20	71	23	1.2	0.82
	2022	27	20	74	22	1.1	0.81
Average		**26**	**18**	**67**	**20**	**1.2**	**0.76**
***Victoria* control**		**23**	**14**	**60**	**16**	**1.1**	**0.69**

Table 5. Evaluation of the productivity characteristics of the studied hybrid elite

RVC 24 hybrid elite	Year	Fertility coefficients		Average weight of bunch at full maturity (g)	Productivity index	
		AFC	RFC		API	RPI
	2020	1.2	0.66	457.80	549	302
	2021	1.2	0.82	483.70	580	396
	2021	1.1	0.81	487.22	536	394
Average		**1.2**	**0.76**	**476.24**	**555**	**364**
***Victoria* control**		**1.1**	**0.69**	**420.33**	**462**	**290**

The results included in Table 5 reveal the high to very high productivity potential of the *RVC 24* hybrid, with absolute productivity index values ranging between 536 and 580, and 302-394 for the relative productivity index.

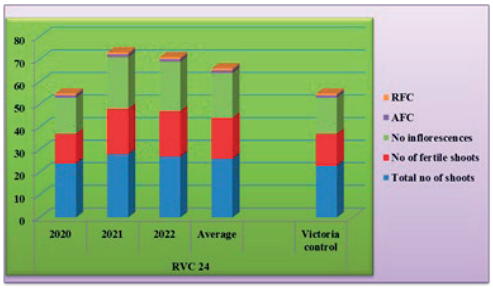


Figure 17 - Fertility descriptors of the new genotype and the control variety

The values recorded by the control variety are lower compared to those obtained by the studied genotype (Figure 17).

In the eco-pedoclimatic conditions of the years 2020-2022, it was observed that at the time of measurements (during flowering), the vegetative growth based on the number of buds sprouted showed higher values in 2020, with an average value of 21.8 cm compared to 2022 when the average value of shoot growth was 14.5 cm. According to descriptor OIV 351, the average value was 17.9 cm, receiving a score of 7, indicating high vigor.

The *Victoria* variety also exhibited high growth vigor with an average of 15.5 cm, also scored 7 (Table 6). The vigor of the varieties is expressed by the amount of wood removed during pruning and the length of the vegetative growth per vine (OIV 351).

In the climatic conditions of the years 2020-2022, the assessment of the biological potential of the analyzed genotype as well as the control variety was carried out according to the OIV Descriptor List for Grapes, 2009 edition. Regarding the studied period, the winters were mild with minimum temperatures above normal averages. As a result, the buds were not affected, and their viability was 100%, representing a very high resistance level for both the hybrid and the control variety (Table 7).

Relative to the climatic conditions of the years 2020-2022, a period characterized by dry summers, the hybrid elite *RVC 24* exhibited high and very high tolerance (rating 7 and 9, respectively). The control variety also showed a high level of tolerance. Even though the precipitation during the growing season was deficient and unevenly distributed, the studied hybrid did not exhibit specific symptoms of water stress (Table 8).

Table 6. Biometric determinations of the studied genotype (length of shoot growth on the trunk)

	Year	No shoot/trunk	Length of shoot (cm)			Vigor of shoot growth (OIV 351)
			maximum	minimum	average	
***RVC 24* hybrid elite**	2020	24	29.5	14.2	21.8	9
	2021	28	22.8	11.9	17.4	7
	2022	27	17.6	11.5	14.5	7
Average		**26**	**23.3**	**12.6**	**17.9**	**7**
***Victoria* control**		**21**	**22.7**	**12.8**	**15.5**	**7**

Table 7. Evaluation of the biological potential of the hybrid elite regarding frost

	Year	Viable buds %	Degree of resistance
***RVC 24* hybrid elite**	2020	100	9
	2021	100	9
	2022	100	9
Average		**100**	**9**
***Victoria* control**		**100**	**9**

Table 8. Evaluation of the biological potential of the hybrid elite regarding drought tolerance (OIV 403)

	Year	Codex OIV 403	Expression level
***RVC 24* hybrid elite**	**2020**	7	High
	2021	9	Very high
	2022	9	Very high
Average		**7-9**	**High - Very high**
***Victoria* control**		**7**	**High**

Evaluation of technological descriptors during the period 2020-2022

The values of the analyses and determinations are presented in the table below (Table 9). As can be seen, the new genotype stood out compared to the control variety through the descriptors of the average weight of a bunch, with values that varied between 457.80 and 487.22 g and the weight of 100 grains where *RVC 24* recorded values between 513.12 and 546.01 g. Figure 18 reveals the fact that in terms of the sugar content of the must, the hybrid was superior to the control with an average value of 157 g/l.

Regarding yield evaluation, according to the data in Table 10, the *RVC 24* genotype recorded higher values compared to the control for grape quantity per vine expressed in kg/trunk as well as for grape yield expressed in t/ha. The average yield was 5.3 kg/trunk and 23 t/ha, respectively. Marketable yield ranged between 82 and 87%.

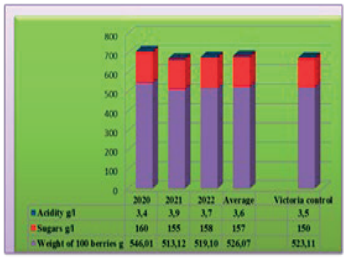


Figure 18 - Quality descriptors of *RVC 24* compared to the Victoria control

Table 9. Evaluation of the quality of the harvest for the period 2020-2022

	Year	Average weight of the bunch (g)	Weight of 100 berries (g)	Sugars g/l	Acidity g/l	*Ripening index
***RVC 24* hybrid elite**	2020	457.80	546.01	160	3.4	4
	2021	483.70	513.12	155	3.9	3
	2022	487.22	519.10	158	3.7	4
Average		**476.24**	**526.07**	**157**	**3.6**	**4**
***Victoria* control**		**420.33**	**523.11**	**150**	**3.5**	**4**

*De Cillis ripening index. Its value ranges from 1 to 1.5 at veraison and from 3 to 6 at full grape ripening.

Table 10. Evaluation of the harvest during 2020-2022

RVC 24 hybrid elite	Year	Harvest		Productivity index		
		Kg/trunk	t/ha	API	RPI	Yield Goods %
	2020	5,5	24	549	302	87
	2021	5,0	22	580	396	82
	2022	5,1	23	536	394	86
Average		**5,3**	**23**	**555**	**364**	**85**
***Victoria* control**		**4,6**	**21**	**462**	**290**	**87**

VMD 24 Hybride elite

Evaluation of elite phenological descriptors during the period 2020-2022

According to the data from Table 11, the year 2020 recorded values above normal averages in the months of February, March, and April. The budburst phase occurred earlier compared to the years 2021 and 2022, with a deviation of 20 days. Also, regarding flowering, it started 15 days earlier compared to the other years. The ripening of the grapes was much delayed in 2021 and 2022 compared to the year 2020, with a significant deviation of 27 days.

Evaluation of agrobiological descriptors during the period 2020-2022

Following the obtained results, it was found that both the fertility of the studied *VMD 24 hybrid*, which recorded an average value of 78% (high), and the CFR value (with an average of 0.84), were above standard compared to the control variety, which recorded lower values (Table 12 and Figure 19).

The results included in the table below reveal the high productive potential of the *VMD 24* hybrid, with absolute productivity index values ranging between 411 and 536, and relative productivity index values between 362 and 395 (Figure 20). The values recorded for the control variety are lower compared to those obtained by the studied genotype (Table 13).

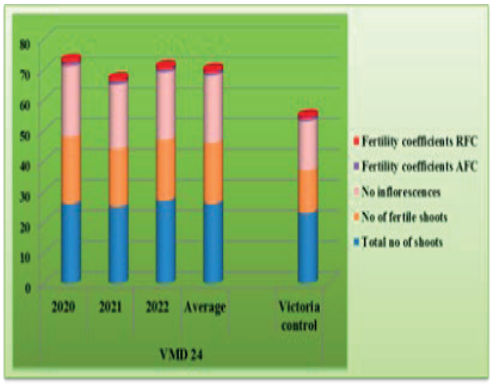


Figure 19 - Fertility coefficients of *VMD 24* compared to the control variety

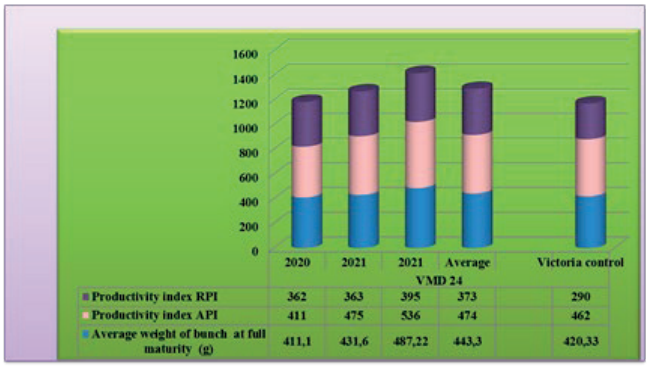


Figure 20 - Productivity descriptors of the new genotype and the control variety

Table 11. Monitorization of the phenological spectrum of the *VMD 24* hybrid elite during 2020-2022

VMD 24 hybrid elite	Year	Budburst		Flowering		Veraison		Full maturity	
		Date	UTB (ºC)	Date	UTB (ºC)	Date	UTB (ºC)	Date	UTB (ºC)
	2020	03 - 06.04	78.0	30.05 - 03.06	396.7	21 - 26.07	431.4	28.08 - 05.09	220.3
	2021	20 – 24.04	25.0	11 - 14.06	303.1	23 - 26.07	429.6	23 - 26.09	212.2
	2022	23 - 26. 04	61.2	14 - 17.06	374.6	26 - 29.07	401.8	22 - 27.09	191.8
***Victoria* control**									

Table 12. Evaluation of the fertility characteristics of the *VMD 24* hybrid elite in the period 2020-2022

VMD 24 hybrid elite	Year	Total no of shoots	No. fertile shoots	Coefficient of fertile shoots (LF) %	No. inflorescence	Fertility coefficients	
						AFC	RFC
	2020	26	22	84	23	1.0	0.88
	2021	25	19	76	21	1.1	0.84
	2022	27	20	74	22	1.1	0.81
Average		**26**	**20**	**78**	**22**	**1.1**	**0.84**
Victoria control		**23**	**14**	**60**	**16**	**1.1**	**0.69**

Table 13. Evaluation of the productivity characteristics of the studied hybrid elite

VMD 24 hybrid Elite	Year	Fertility coefficients		Average weight of bunch at full maturity (g)	Productivity index	
		AFC	RFC		API	RPI
	2020	1.0	0.88	411.10	411	362
	2021	1.1	0.84	431.60	475	363
	2022	1.1	0.81	487.22	536	395
Average		**1.1**	**0.84**	**443.30**	**474**	**373**
***Victoria* control**		**1.1**	**0.69**	**420.33**	**462**	**290**

In the eco-pedoclimatic conditions of the years 2020-2022, it was observed that at the time of measurements (during flowering), the vegetative growth was higher in 2020 with an average value of 23.0 cm compared to the year 2022 when the average value of shoot growth was 14.1 cm. According to descriptor OIV 351, the average value was 17.7 cm, receiving a score of 7, which represents high vigor. The Victoria variety also exhibited high growth vigor with an average of 15.5 cm, receiving a score of 7 (Table 14). In the climatic conditions of the years 2020-2022, the assessment of the biological potential of the analysed hybrid elite was conducted according to the Descriptor List for Grapes by OIV, 2009 edition.

Regarding the studied period, winters were mild, with the minimum temperatures above normal averages. As a result, the buds were not affected, and their viability was 100%, representing a very high level of resistance both in the studied genotype and in the control variety (Table 15). In the vegetation period, the studied hybrid elite showed fluctuating drought tolerance, exhibiting specific manifestations of water stress (Table 16) during the grapevine growth period and berry dropping during the veraison - maturation period. The negative effects related to soil moisture are caused by both water deficit and excess moisture.

Table 14. Biometric determinations of the studied genotype (length of shoot growth on the trunk)

VMD 24 hybrid elite	Year	No shoot/trunk	Length of shoot (cm)			Vigor of shoot growth (OIV 351)
			maximum	minimum	average	
	2020	26	32.0	14.1	23.0	9
	2021	25	21.9	11.5	16.0	7
	2022	27	17.1	11.1	14.1	7
Average		**26**	**23.6**	**12.2**	**17.7**	**7**
***Victoria* control**		**21**	**22.7**	**12.8**	**15.5**	**7**

Table 15. Evaluation of the biological potential of the hybrid elite regarding frost

	Year	Viable buds %	Degree of resistance
***VMD 24* hybrid elite**	2020	100	9
	2021	100	9
	2022	100	9
Average		**100**	**9**
***Victoria* control**		**100**	**9**

Table 16. Evaluation of the biological potential of the hybrid elite regarding drought tolerance (OIV 403)

	Year	Codex OIV 403	Expression level
***VMD 24* hybrid Elite**	2020	5	Medium
	2021	5	Medium
	2022	5	Medium
Average		**5**	**Medium**
***Victoria* control**		**7**	**High**

*According to the OIV descriptor list for grape varieties and *Vitis* species, 2nd edition, 2009.

Evaluation of technological descriptors during the period 2020-2022

The results obtained from the analyses and determinations reveal that the genotype *VMD 24* recorded higher values compared to the control variety *Victoria* regarding the technological descriptors: average weight of the bunch, sugars g/l, acidity g/l but not for the weight of 100 berries g (Table 17 and Figure 21).

Regarding the production evaluation, the *VMD 24* genotype recorded a slightly higher value than the control for the average grape yield, 4.6 and respectively 4.7 kg/trunk.

As concerns the harvest per hectare as well as the marketable yield, expressed in percentage, both the new genotype and the control presented similar values, respectively 21 t/ha and 87% (Table 18).

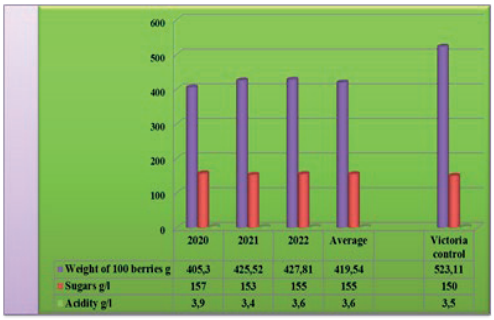


Figure 21 - Quality descriptors of *VMD 24* compared to the Victoria control

Table 17. Evaluation of the harvest during 2020-2022

	Year	Average weight of the bunch g	Weight of 100 berries g	Sugars g/l	Acidity g/l	*Ripening index
***RVC 24* hybrid elite**	2020	457.80	546.01	160	3.4	4
	2021	483.70	513.12	155	3.9	3
	2022	487.22	519.10	158	3.7	4
Average		**476.24**	**526.07**	**157**	**3.6**	**4**
***Victoria* control**		**420.33**	**523.11**	**150**	**3.5**	**4**

*De Cillis ripening index. Its value ranges from 1 to 1.5 at veraison and from 3 to 6 at full grape ripening.

Table 18. Evaluation of the harvest during 2020-2022

	Year	Harvest		Productivity index		
		Kg/trunk	t/ha	API	RPI	Yield Goods %
***VMD 24* hybrid elite**	2020	4.8	22	411	362	88
	2021	4.5	20	475	363	85
	2022	4.7	21	536	395	87
Average		**4.7**	**21**	**474**	**373**	**87**
***Victoria* control**		**4.6**	**21**	**462**	**290**	**87**

CONCLUSIONS

The objective pursued through the respective hybridizations was to obtain new genotypes for table grapes with resilience capacity, remarkable agro-biological and technological characteristics (clusters with large berries and desirable appearance, resistance to transportation, resistance to skin cracking, different ripening periods, high tolerance to major fungal diseases, extreme climatic conditions).

The new genotypes obtained at INCDBH Ştefăneşti - Argeş are highlighted by relevant biological and economic characteristics and traits.

Selection criteria for *RVC 24* genotype were: the weight of the bunch: 457.80-483.70 g; the berry is large, averaging 22 mm, with variations ranging between 21 and 24 mm the weight of a berry is 4.8-5.4 g, the pulp is very firm; 100 berries: 487-546 g, must concentration in sugars: 155-160 g/l, acidity 3.4-3.9 g/l H_2SO_4 and the harvest is high between 5.0-5.5 kg/trunk; the harvest per hectare is very high between 22-24 t.

The elite stood out for the size of the cluster and its berries, which gives it a particularly pleasant commercial appearance, and high tolerance to stress factors (frost and drought), high powdery mildew and downy mildew.

Selection criteria for *VMD 24* genotype were: large bunches, with an average length of 202 mm, ranging between 193 and 212 mm. It is loose to very loose with very visible pedicels. The bunch has an average weight of 443.30 g; the must concentration in sugars is high with values between 153-157 g/l; the color of skin berry is rose - red, slightly pruinose, and very attractive; the harvest is 4.5-4.8 kg/trunk; the harvest per hectare is between 20 and 22 t.

The elite stood out for the size of the cluster, as well as their color, which gives it a particularly pleasant commercial appearance, earliness, and good resistance to stress factors (frost and drought).

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