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# RESEARCH ON THE AGROBIOLOGICAL AND TECHNOLOGICAL POTENTIAL OF SOME HYBRID ELITE WITH BIOLOGICAL RESISTANCE OBTAINED AT R.D.S.V.V. ODOBEŞTI

**Marioara PUŞCALĂU[1], Ionica BOSOI[2], Camelia-Alina DÎRLOMAN[1]**

[1]Research and Development Station for Viticulture and Vinification Odobeşti,
61 Ştefan cel Mare Street, 625300, Odobeşti, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Iaşi,
3 Mihail Sadoveanu Alley, Iaşi, 700490, Romania

Corresponding author email: mioara_bosoi@yahoo.com

***Abstract***

*The practice of sustainable viticulture by reducing the quantities of pesticides applied by phytosanitary treatments and capitalizing on the ecopedoclimatic conditions specific to each wine-growing area, involves obtaining and promoting vine varieties with complex biological resistance, with high potential for adaptation to changes caused by climate change and valuable agrobiological and technological potential. In response to this, at R.D.S.V.V. Odobeşti were studied in order to evaluate the agrobiological and technological potential three hybrid elites with biological resistance: hybrid elite 10-1-6 (Traminer roz x Isabella), hybrid elite 2-5 (Galbenă de Odobeşti x Lydia) and hybrid elite 10-18 (Riesling italian x Siebel 6720). This paper presents the ampelographic description and the agrobiological and technological potential of the elites studied during the years 2020-2021. The results obtained from this study showed that these hybrid elites have high productive and qualitative potential, show high biological resistance to the main diseases of the vine, and can be proposed for approval in order to improve the national assortment, in the context of sustainable viticulture*

***Key words****: agrobiological and technological potential, biological resistance, hybrid elite.*

## INTRODUCTION

Practicing sustainable viticulture in tandem with environmental and health concerns is currently one of the most important goals of the wine world. That also involves the diversification of genetic resources by creating new varieties has an important role in protecting the environment, being known that native varieties have genes with tolerance and resistance to disease and pests, ensuring its sustainable development at national, regional and local level (Fregoni, 1998, Mestre et al., 2018, De Nardi et al., 2019, Giacomelli et al., 2019). Community regulations only recognize grape varieties of the European species *Vitis vinifera* L. for the production of wines with a name, while grape varieties resistant to disease come from crosses between *Vitis vinifera* L. and other *Vitis* species (American and/or Asian, which carries resistance genes). In this context, the research programs in renowned wine research centers in Europe and America have resulted in the creation of new varieties to control disease and weather challenges (Ilnitskaya et al., 2019, Ollat et al., 2019, Guimier et al., 2019). The varieties that emerge from these programs are typically crosses between so-called European vinifera, and others native to North America and Asia, like *V. riparia*, *V. labrusca* and *V. rotondifolia.*

Moreover, various professional associations of winegrowers and winemakers in both Europe and America have also considered the so-called "return of hybrids".

To control the cryptogamic diseases in vines is currently based on the application of chemical treatments. The most promising option to reduce the need for fungicides in viticulture is the use of resistant cultivars (Riaz et al., 2019, Bavaresco, 2019). This is why a new breeding programme called INRA-ResDur was launched in 2000 to create cultivars with durable resistance to downy and powdery mildews and with berry quality suitable for the production of high-quality wines (Merdinoglu D., 2018, Schneider C. et al., 2019). Thus, developed by the French National Research Institute for

Agriculture and the Environment (INRAE), the first four French vine varieties resistant to fungal diseases (Artaban, Floreal, Vidoc and Voltis) have been affiliated to the *Vitis vinifera* L. botanical taxon by the Community Plant Variety Office (CPVO).

In this context, the research conducted in the last four decades in our country has led to the creation of several genotypes of vines with increased tolerance to disease and resistance to stressors (frost, drought), and the results were expressed by creating a base with genetic material valuable and homologation of many varieties (Damian et al., 2012, Culcea et al., 2004, Puşcalău et al., 2018, Bosoi and Puşcalău, 2020).

Thus, this article presents a study on the agrobiological and technological potential of three hybrid elites with biological resistance obtained at SCDVV Odobești.

## MATERIALS AND METHODS

The research was carried out in a plantation of over 30 years established on a leached chernozem type soil, located in the biological field of the Research and Development Station for Viticulture and Vinification (RDSVO) Odobești, with geographical coordinates 45º45′ north latitude, 27º06′ east length, and an altitude of 150 m. The study was conducted during the years 2020-2021.

The biological material was represented by three hybrid elites with biological resistance: H.E. 10-1-6 (Traminer roz x Isabelle), H.E. 2-5 (Galbenă de Odobeşti x Lydia) and H.E. 10-18 (Riesling italian x Siebel 6720). Each genotype was represented in this study by three replications with 5 vines each. The hibrid elites studied were grafted on to the rootstock Kobber 5 BB. The pruning system practiced was the Dr. Guyot system, with a fruit load between 38-44 buds/vine, distributed on 8-9 buds per fruiting cane with 2 buds per spur, and a semi-high driving shape. For control the pathogens (*Plasmopara viticola, Uncinula necator, Botrytis cinerea*, etc.), were applied six phytosanitary treatments.

The three hybrid elites studied were characterized ampelographically and the phenological spectrum was monitored. In order to establish the agrobiological potential, observations and determinations were made regarding: the vigor of growth by measurements of the shoots during the period of intense growth; elements of fertility and productivity by calculating the percentage of fertile shoots (FS%), fertility coefficients (Cfa and Cfr) and productivity indices (Ipa and Ipr); the behavior to the main diseases of the vine and stressors (frost, drought) by grading from 1 to 9 depending on the scale of resistance developed by the OIV (2009). To determine the technological potential, determinations were made regarding the quantity (kg/vine, t/ha) and the quality of grape production (g/l sugars, g/l $H_2SO_4$ acidity). The results were statistically interpreted using the FoxPro Monofactorial 2.0 software, by analyzing the variance, using the average of the three hybrid elites as control.

Climatic data for the study period were provided by the AgroExpert weather station and the multiannual climate database of the R.D.S.V.V. Odobești.

## RESULTS AND DISCUSSIONS

**Climatic conditions**. The evolution of the thermal regime and of the precipitations in the viticultural ecosystem of the Odobești vineyard during the study is presented in Table 1. Global warming, a phenomenon that has strongly characterized the last decades, has considerably influenced the evolution of the annual thermal regime and during the growing season. From a thermal point of view, the two years of study were different, 2020 being considered one of the driest years. The values recorded in 2020 for the average air temperature during the vegetation period (19.7°C), respectively the active thermal balance (3543.5°C) and the useful thermal balance (1793.4°C) were much higher than the multiannual values for this period. The values recorded for the minimum average (13.3°C) and the maximum average (27.0°C) air temperatures were much higher than the multiannual values for these elements (8.2°C, respectively 24.5°C).

**Precipitation regime**. The precipitation regime was deficient during the growing season, the amount of precipitations recorded during this period, respectively 218.6 mm in 2020 and 289.6 mm in 2021 representing 56%, respectively 74% of the multiannual value for

this period (391.3 mm). In the two years of study, except for June, which recorded an amount of precipitation higher than the multiannual value, the months of April, May, July, August and September had values lower than the multiannual values for these months.

Table 1. The climatic conditions during the growing season (SCDVV Odobeşti, 2020 - 2021)

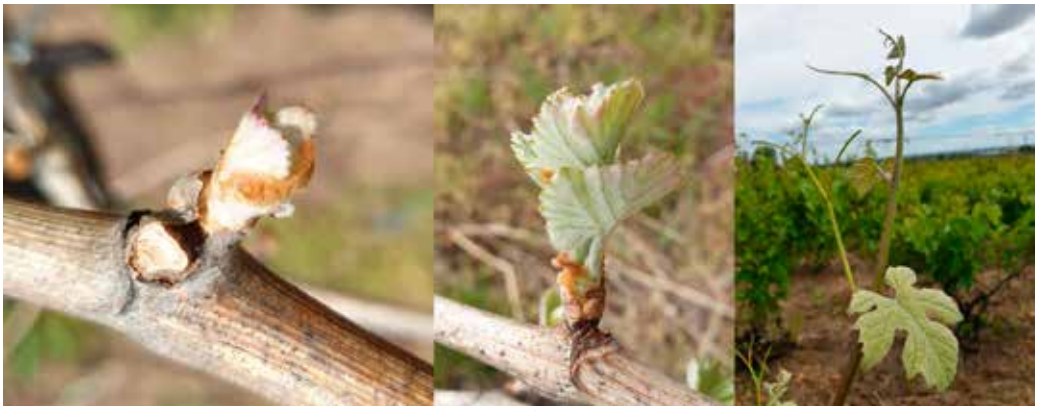
| Month | Average temperatures (ºC) | | | Extreme temperatures (ºC) | | | | Temperatures sum -Σºt (ºC) | | | | Rainfall sum (mm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | multi-annual | 2020 | 2021 | 2020 | | 2021 | | 2020 | | 2021 | | multi-annual | 2020 | 2021 |
| | | | | min. | max. | min. | max. | active (Σºta) | useful (Σºtu) | active (Σºta) | useful (Σºtu) | | | |
| April | 11.2 | 12.2 | 8.9 | 5.3 | 19.2 | 3.8 | 14.5 | 302.2 | 82.1 | 105.3 | 15.3 | 49.1 | 5.2 | 41.0 |
| May | 16.8 | 15.8 | 16.5 | 10.0 | 22.7 | 10.7 | 22.7 | 489.6 | 179.6 | 510.5 | 200.5 | 73.4 | 55.6 | 22.8 |
| June | 20.2 | 21.8 | 20.3 | 15.3 | 29.4 | 15.6 | 26.2 | 653.3 | 353.3 | 609.0 | 309.0 | 85.2 | 85.2 | 134.6 |
| July | 22.1 | 23.5 | 24.3 | 17.0 | 31.2 | 18.4 | 31.3 | 729.1 | 419.1 | 753.5 | 443.5 | 77.9 | 28.2 | 40.0 |
| Aug. | 21.7 | 24.3 | 22.9 | 17.6 | 31.8 | 16.6 | 30.4 | 751.8 | 441.8 | 708.6 | 398.6 | 59.7 | 13.0 | 45.0 |
| Sept. | 17.1 | 20.6 | 16.7 | 14.6 | 27.7 | 11.0 | 23.9 | 617.5 | 317.5 | 499.8 | 199.8 | 45.7 | 31.4 | 6.2 |
| Average/ sum | 18.2 | 19.7 | 18.3 | 13.3 | 27.0 | 12.7 | 24.8 | 3543.5 | 1793.4 | 3186.7 | 1566.7 | 391.3 | 218.6 | 289.6 |

**Ampelographic characterization.**

**Hybrid elite 10-1-6.** At budding, the rosette is whitish to fluffy, whitish green (Figure 1). The shoot is glabrous and has a slightly intense anthocyanin coloration on the sunny side.

The adult leaf is medium in size, intensely green, pentagonal to orbicular, pentalobate (Figure 2). The upper lateral sinuses are closed with slightly overlapping lobes, rarely open, in the shape of a lyre with a rounded base, and the lower sinuses completely open. The petiolar sinus is closed, V-shaped. The flower is a normal hermaphrodite, on type 5.

The grapes are of medium to high size (254 g), have a conical shape, rarely cylindrical, with an average of two wings, with dense berry, very little mobile (Figure 3). The berries are medium in size, spherical in shape, with a more intense pink skin on the sunny side. The pulp is not anthocyanin in color, it is juicy, with low firmnes.



a) b) c)

Figure 1. Hybrid elite 10-1-6:
a) budding; b) rosette; c) shoot tip

a) b) c)

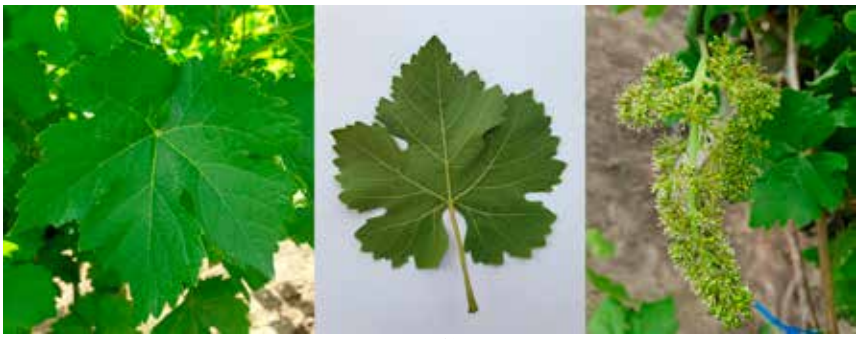
Figure 2. Hybrid elite 10-1-6: a) mature leaf - upper side; b) mature leaf - lower side; c) inflorescence

Figure 3. Hybrid elite 10-1-6 (grape, berry)

**Hybrid elite 10-18.** At budding, the rosette is with prostrate hairs, green with a slight anthocyanin coloration (Figure 4). The shoot is glabrous, green, with a faint anthocyanin coloration on the sunny side. The mature leaf is medium in size, wedge-shaped to pentagonal, pentalobate (Figure 5). The upper lateral sinuses are closed with slightly overlapping, lyre-shaped lobes with a sharp base, and the lower sinuses completely open. The petiolar sinus is open, sometimes slightly closed, V-shaped. The flower is a normal hermaphrodite, on type 5. The grapes are of medium size (189 g), have a conical shape, rarely cylindrical with dense and semi-mobile berry. The grains are medium in size, spherical in shape, with greenish-yellow skin, with rust spots on the sunny side. The pulp does not show anthocyanin coloration, it is juicy, soft to slightly firm (Figure 6).

a) b) c)

Figure 4. Hybrid elite 10-18: a) budding: b) rosette; c) shoot tip



a) b) c)

Figure 5. Hybrid elite 10-18: a) mature leaf - upper side; b) mature leaf - lower side; c) inflorescence

Figure 6. Hybrid elite 10-18 (grape, berry)

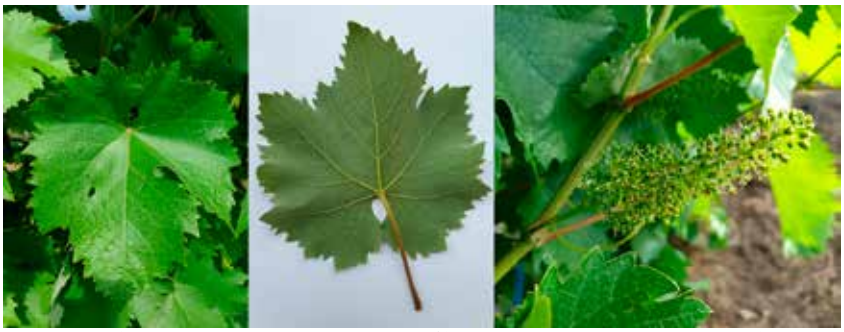
**Hybrid elite 2-5.** At budding, the rosette is with prostrate hairs, white-green with a slight anthocyanin coloration. The shoot is green with red streaks on the sunny side, with slight traces of lint (Figure 7).

The adult leaf is medium to large, dark green, wedge-shaped to pentagonal, trilobate, rarely pentalobate, with high perosity on the underside. The upper lateral sinuses are closed with slightly overlapping, lyre-shaped lobes with a slightly rounded base, and the lower sinuses are slightly sketched. The petiolar sinus is closed, V-shaped, with overlapping lobes. The flower is a normal hermaphrodite, on type 5 (Figure 8).

The grapes are of medium size (192 g), have a conical or cylindrical-conical shape, with dense and semi-mobile berry. The berries are medium in size, spherical in shape, with yellow-green skin, more intense on the sunny side. The pulp is not anthocyanin in color, it is juicy and soft to slightly firm (Figure 9).

a) b) c)

Figure 7. Hybrid elite 2-5: a) budding; b) rosette; c) shoot tip



a) b) c)

Figure 8. Hybrid elite 2-5: a) mature leaf - upper side; b) mature leaf - lower side; c) inflorescence

Figure 9. Hybrid elite 2-5 (grape, berry)

**Phenological spectrum**. Under the climatic conditions of the growing season 2020, the hybrid elites taken into the study the buds break has begun April 13-14 (Table 2). In 2021, due to the low temperatures recorded in April, the start of vegetation of the vine was delayed by more than two weeks, the phenophase of the buds break being recorded between April 29 and May 2. The earliest proved to be the 10-1-6 hybrid elite.

The flowering phase took place between June 3-5, in 2021, and about a week later, in 2021. The earliest proved to be the 2-5 hybrid elite. Determined by the climatic conditions during the vegetation period in 2020, the veraison was recorded early (between 2 and 6 August) and more than a week later in 2021 (between 9 and 15 August). The earliest proved to be the 10-18 hybrid elite.

The full ripening of the grapes took place in the second decade of September (10-5 IX) in 2020 and later 5-7 days in 2021 (16-20 IX). The hybrid elite 10-18 proved to be the earliest, and the hybrid elite 2-5 the latest.

Table 2. The phenological spectrum (Odobești, 2020-2021)

| Hybrid elite | | H.E. 10-1-6 | | H.E. 10-18 | | H.E. 2-5 | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2021 | 2020 | 2021 | 2020 | 2021 |
| Phenological phase | Disbudding | 13. IV | 29. IV | 14. IV | 01. V | 13. IV | 02. V |
| | Flowering | 04. VI | 11. VI | 03. VI | 10. VI | 05. VI | 15. VI |
| | Veraison | 06. VIII | 15. VIII | 02. VIII | 09. VIII | 04. VIII | 12. VIII |
| | Physiologi-cal maturity | 11. IX | 18. IX | 10. IX | 16. IX | 15. IX | 20. IX |
| Vegetation period active | | IV-IX | IV-IX | IV-IX | V-IX | IV-IX | V-IX |

**Fertility and productivity characteristics.** The fertility and productivity characteristics of the studied hybrid elites were assessed by the percentage of fertile shoots, fertility coefficients (absolute and relative) and productivity indices (absolute and relative). The average values recorded for the percentage of fertile shoots varied between 65.8% in the hybrid elite 10-1-6 and 74.6%, respectively 74% in the hybrid elite 10-18, respectively the hybrid elite 2-5 (Table 3). The fertility coefficients (absolute and relative) recorded higher values in the hybrid

elite 10-18 (Cfa - 1.08; Cfr - 1.46) and lower in the hybrid elite 10-1-6 (Cfa 0.82; Cfr 1.24). Determined by the average weight of the grapes (245.3 g), the hybrid elite 10-1-6 recorded the highest values of the productivity indices.

Table 3. The fertility and productivity characteristics (Odobeşti, 2020-2021)

| Hybrid elite | | Fertile shoots (%) | Fertility coefficients | | Average weight of a bunch (g) | Productivity indices | |
|---|---|---|---|---|---|---|---|
| | | | Cfa | Cfr | | Ipr | Ipa |
| H.E.10-1-6 | 2020 | 61.7 | 0.75 | 1.20 | 254.0 | 191 | 310 |
| | 2021 | 69.9 | 0.89 | 1.27 | 236.5 | 210 | 300 |
| Average | | 65.8 | 0.82 | 1.24 | 245.3 | 201 | 305 |
| H.E. 10-18 | 2020 | 66.4 | 1.05 | 1.58 | 192.3 | 202 | 303 |
| | 2021 | 82.7 | 1.11 | 1.34 | 185.7 | 206 | 249 |
| Average | | 74.6 | 1.08 | 1.46 | 189.0 | 204 | 276 |
| H.E. 2-5 | 2020 | 66.5 | 1.07 | 1.60 | 172.4 | 184 | 276 |
| | 2021 | 81.5 | 0.97 | 1.18 | 211.7 | 205 | 250 |
| Average | | 74.0 | 1.02 | 1.39 | 192.1 | 195 | 263 |

Statistical interpretation of the data obtained shows that the hybrid elite 10-1-6 differs distinctly significantly lower for the percentage of fertile shoots and the relative fertility coefficient, and the elite 10-18 differs significantly positively for the relative fertility coefficient compared to the control - average of the three hybrid elites (Table 4).

Table 4. The statistical interpretation of fertility elements

| Hybrid elite | Fertile shoots (%) | | Relative fertility coefficients (Cfr) | |
|---|---|---|---|---|
| | 2020-2021 | Signifi-cance | 2020-2021 | Signifi-cance |
| H.E. 10-1-6 | 65.8 | 00 | 1.24 | 00 |
| H.E. 10-18 | 74.6 | - | 1.46 | * |
| H.E. 2-5 | 74.0 | - | 1.39 | - |
| Average -control | 71.5 | - | 1.36 | - |
| | DL 5%=3.55<br>DL 1%=5.38<br>DL 0.1%=8.64 | | DL 5%=0.10<br>DL 1%=0.15<br>DL 0.1%=0.24 | |

**Vegetative growth of shoots.** Climate conditions in 2020 have been less favorable, negatively affecting the physiological and metabolic processes that condition the growth and development of shoots. The analysis of the length of the shoots in 2020 showed for all three studied hybrid elites increases smaller by 28-60 cm compared to 2021, a year with values of climatic parameters close to the multiannual values (Table 5). According to the analysis of the growth of shoots during the vegetation period (2020–2021), the highest value was recorded in the hybrid elite 2-5 with the average length of the main shoots of 156.9 cm/shoot, followed by the hybrid elite 10-1-6 with 153.8 cm/shoot.

Table 5. Length of vegetative growth (Odobeşti, 2020-2021)

| Hybrid elite | Total shoots / vine | | | Shoot length, cm | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | minimum | | | maximum | | |
| | 2020 | 2021 | average | 2020 | 2021 | average | 2020 | 2021 | average |
| H.E. 10-1-6 | 43.1 | 42.3 | 42.7 | 57.5 | 39.6 | 48.6 | 222.0 | 296.4 | 259.2 |
| H. E. 10-18 | 42.3 | 41.7 | 42.0 | 33.8 | 37.6 | 35.7 | 135.4 | 215.8 | 175.6 |
| H.E. 2-5 | 30.4 | 41.3 | 35.8 | 42.9 | 75.8 | 59.3 | 210.8 | 298.3 | 254.5 |
| Average (control) | 38.6 | 41.7 | 40.1 | 44.7 | 51.0 | 47.8 | 189.4 | 270.1 | 229.7 |

These hybrid elites registering significant positive differences compared to the control - the average of the hybrid elites (Table 6).

Table 6. Average shoot length

| Hybrid elite | Average shoot length | | | |
|---|---|---|---|---|
| | 2020 – 2021 (cm) | % | Difference (+/-cm) | Signifi-cance |
| H.E. 10-1-6 | 153.83 | 110.84 | 15.05 | * |
| H.E. 10-18 | 105.63 | 76.11 | -33.15 | 000 |
| H.E. 2-5 | 156.93 | 113.08 | 18.15 | * |
| Average (control) | 138.78 | 100.00 | 0.00 | - |
| DL 5%<br>DL 1%<br>DL 0.1% | | | 13.11<br>19.85<br>31.88 | |

The hybrid elite 10-18 recorded the smallest increases (105.63 cm), which caused very significant negative differences compared to the average of the three elites - control.

**Biological resistance to major fungal diseases** was determined by calculating the degree of attack on leaves and grapes (Table 7).

Under the influence of climatic conditions during the growing season recorded in the two years of study, the values obtained for the degree of attack were subunit for the main pathogens of the vine. Determined by the different climatic conditions of the two years of study, higher values were recorded in 2021.

Table 7. Behavior at the main diseases of the vine (Odobeşti,2020 - 2021)

| Hybrid elite | Part of the plant | Degree of attack of the fungal disease (DA) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Downy mildew (*Plasmopara viticola*) | | Powdery mildew (*Uncinula necator*) | | Black rot (*Botritis cinerea*) | |
| | | 2020 | 2021 | 2020 | 2021 | 2020 | 2021 |
| H.E. 10-1-6 | Leaf | 0.00 | 0.19 | 0.00 | 0.04 | 0.00 | 0.00 |
| | Grape | 0.03 | 0.21 | 0.03 | 0.13 | 0.14 | 0.03 |
| H.E. 10-18 | Leaf | 0.00 | 0.23 | 0.00 | 0.10 | 0.00 | 0.00 |
| | Grape | 0.10 | 0.25 | 0.07 | 0.22 | 0.22 | 0.15 |
| H.E. 2-5 | Leaf | 0.00 | 0.26 | 0.00 | 0.07 | 0.00 | 0.00 |
| | Grape | 0.03 | 0.19 | 0.00 | 0.19 | 0.27 | 0.03 |

Depending on the degree of attack of the main vine pathogens, the resistance of the hybrid elites studied was evaluated according to the resistance scale developed by the O.I.V. (Table 8). The three hybrid elites studied demonstrated during the two years of study the high and very high resistance to the main diseases of the vine.

Table 8. Classification of hybrid elites studied for disease resistance, according to OIV descriptors

| Hybrid elite | Downy mildew (*Plasmopara viticola)* | | Powdery mildew *(Uncinula necator)* | | Black rot *(Botrytis cinerea)* | |
|---|---|---|---|---|---|---|
| | Leaf OIV 452 | Grape OIV 453 | Leaf OIV 455 | Grape OIV 456 | Leaf OIV 458 | Grape OIV 459 |
| H.E. 10-1-6 | 7-9 | 7-9 | 9 | 9 | 9 | 9 |
| H.E. 10-18 | 9 | 7-9 | 9 | 7-9 | 9 | 7-9 |
| H.E. 2-5 | 7-9 | 7-9 | 9 | 9 | 9 | 7-9 |

**Drought resistance** (OIV 403) - According to the OIV descriptor list for grape varieties and Vitis species, 2nd edition, 2009.

In the conditions of growing season 2020 considered based on climatic data recorded, one of the driest years in the Odobeşti vineyard, the hybrid elites 10-1-6 and 2-5 showed the high to very high tolerance to the phenomenon of atmospheric and pedological drought (Table 9). The hybrid elites studied did not show specific manifestations of thermal and water stress (withering of the tops of the shoots, yellowed leaves at the base of the trunk, withering of the grapes etc.).

Table 9. Behavior of hybrid elites studied at drought according to OIV descriptors (Odobești, 2020)

| Hybrid elite | OIV 403 | Expression level |
|---|---|---|
| H.E. 10-1-6 | 7-9 | High-Very high |
| H.E. 10-18 | 5 | Medium |
| H.E. 2-5 | 7-9 | High-Very high |

**Quantity and quality of production**. The study of the technological characteristics of the grape production completed the knowledge elements for the hybrid elites studied (Table 10). The main quantitative characteristics of grape production refer to the average weight of the grapes and the average production per vine and per hectare.

The average weight of the grapes in the two years of study was 189.0 g in the hybrid elite 10-18, 192.1 g in the hybrid elite 2-5 and 245.3 g in the hybrid elite 10-1-6.

Table 10. Quantitative characteristics of grape production (Odobeşti, 2020-2021)

| Hybrid elite | | Average weight of a bunch (g) | Grape production | |
|---|---|---|---|---|
| | | | kg/vine | t/ha |
| H.E. 10-1-6 | 2020 | 254.0 | 7.11 | 26.93 |
| | 2021 | 236.5 | 7.12 | 26.97 |
| Average | | 245.3 | 7.12 | 26.95 |
| H.E. 10-18 | 2020 | 192.3 | 6.73 | 25.49 |
| | 2021 | 185.7 | 6.85 | 25.95 |
| Average | | 189.0 | 6.79 | 25.72 |
| H.E. 2-5 | 2020 | 172.4 | 5.17 | 19.58 |
| | 2021 | 211.7 | 6.08 | 23.03 |
| Average | | 192.1 | 5.63 | 21.30 |

The average grape production on the vine had higher values in 2021 compared to 2020, with 0.01 kg (H.E. 10-1-6) to 0.91 kg (H.E. 2-5).

The statistical interpretation of the data obtained for the quantitative characteristics of grape production shows that the 10-1-6 hybrid elite differs significantly positively for the average weight of the grape and distinctly significantly positive for the average grape production per vine compared to the control - average hybrid elites (Table 11). A distinctly significant difference low compared to the control demonstrated the hybrid elite 2-5 for the average production of grapes per vine.

Table 11. The statistical interpretation for the quantitative characteristics of grape production

| Hybrid elite | Average weight of a bunch (g) | | Grape production (kg/vine) | |
|---|---|---|---|---|
| | 2020-2021 | Signifi-cance | 2020-2021 | Signifi-cance |
| H.E. 10-1-6 | 245.3 | * | 7.12 | ** |
| H.E. 10-18 | 189.0 | - | 6.79 | - |
| H.E. 2-5 | 192.1 | - | 5.63 | 00 |
| Average - control | 208.8 | - | 6.51 | - |
| | DL 5%=24.62<br>DL 1%=37.28<br>DL 0.1%=59.88 | | DL 5%=0.40<br>DL 1%=0.60<br>DL 0.1%=0.97 | |

The technological potential of a genotype is complemented by the quality of grape production, represented by the sugar content (g/l), the total acidity (g/l $H_2SO_4$) and the maturation index of the must (Table 12).

Table 12. Qualitative characteristics of grape production (Odobeşti, 2020 - 2021)

| Hybrid elite | | Quality of the juice | | |
|---|---|---|---|---|
| | | Sugars g/l | Total acidity g/l$H_2SO_4$ | Maturation index |
| H.E. 10-1-6 | 2020 | 235 | 3.92 | 60 |
| | 2021 | 214 | 5.08 | 42 |
| Average | | 225 | 4.50 | 51 |
| H.E. 10-18 | 2020 | 206 | 4.14 | 50 |
| | 2021 | 222 | 4.85 | 46 |
| Average | | 214 | 4,49 | 48 |
| H.E. 2-5 | 2020 | 183 | 4.51 | 41 |
| | 2021 | 193 | 4.55 | 42 |
| Average | | 188 | 4.53 | 42 |

In 2020, the lack of precipitation and the maximum temperatures higher than 30 ° C recorded for 55 days during the ripening, influenced the optimal development of the biochemical processes of accumulation of sugar in the berries.

Under these conditions, the three genotypes accumulated between 183 g/l sugars (H.E. 2-5) and 235 g/l sugars (H.E. 10-1-6), under conditions of a total acidity of 4.14 g/l $H_2SO_4$, respectively 3.92 g/l $H_2SO_4$. The maturation index had values between 41 in the 2-5 hybrid elite and 60 in the 10-1-6 hybrid elite.

In the climatic conditions of 2021, with a thermal regime close to the multi-annual values, but with a poor precipitation regime during the growing season, the hybrid elites studied accumulated between 193 g/l sugar (H.E. 2-5) and 222 g/l sugar (H.E. 10-18), under conditions of a total acidity of 4.55 g/l $H_2SO_4$ (H.E. 2-5) and 5.08 g/l $H_2SO_4$ (H.E. 10-1-6). The maturation index had values between 42 (H.E. 10-1-6 and H.E. 2-5) and 46 (H.E. 10-18).

Statistical interpretation of the data obtained for the sugar content of grapes (g/) shows that the hybrid elite 10-18 differs significantly low compared to the control - the average of the hybrid elites (Table 13).

Table 13. The statistical interpretation for the qualitative characteristics of grape production

| Hybrid elite | Sugar content (g/l) | | | |
|---|---|---|---|---|
| | 2020-2021 (cm) | % | Difference (+/-cm) | Signifi-cance |
| H.E. 10-1-6 | 225.50 | 107.51 | 15.68 | - |
| H.E. 10-18 | 214.00 | 102.48 | 5.18 | - |
| H.E. 2-5 | 188.00 | 90.03 | -20.82 | 0 |
| Average (control) | 208.82 | 100.00 | 0.00 | - |
| | DL 5%<br>DL 1%<br>DL 0.1% | | 13.11<br>19.85<br>31.88 | |

The agrobiological potential and the quantitative and qualitative characteristics of the grape production recommend the three genotypes studied for registration in the approval process, in order to be introduced into the culture to complete the assortment of varieties with biological resistance to major fungal diseases and stressors.

## CONCLUSIONS

The values of the main climatic parameters during the vegetation period varied significantly during the 2 years of study, with 2021 having values close to the multiannual average, while 2020 was extremely dry.

The hybrid elites studied showed a high fertility potential, the percentage of fertile shoots varies between 65.8% in the 10-1-6 hybrid elite and 74.6% in the 10-18 hybrid elite.

According to the analysis of the growth of shoots during the vegetation period (2020-2021), the most vigorous proved to be the hybrid elite 2-5 with the average length of the main shoots of 156.9 cm/shoot, followed

closely by the hybrid elite 10-1- 6 with 153.8 cm/shoot.

Depending on the degree of attack of the main pathogens of the vine, the studied hybrid elites demonstrated during the two years of study the high and very high resistance to the main diseases of the vine.

In the conditions of 2020, considered one of the driest years in the Odobeşti vineyard, the hybrid elites 10-1-6 and 2-5 showed great tolerance to very high tolerance to the phenomenon of atmospheric and pedological drought. The studied hybrid elites demonstrated a superior technological potential, achieving average grape yields between 5.63 kg/vine. in the hybrid elite 2-5 and 7.12 kg/vine in the hybrid elite 10-1-6, with a sugar content ranging from 188 g/l in the hybrid elite 2-5 to 225 g/l in the hybrid elite 10-1-6, under conditions of a total acidity between 4.49 g/l $H_2SO_4$ and 4.53 g/l H2$SO_4$.

The evaluation of the agrobiological and agroproductive potential of the hybrid elites 10-1-6, 10-18 and 2-5 is necessary for the promotion in cultivation and diversification of the assortment of varieties with biological resistance to the main diseases of the vine and tolerant to climate change.

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