

The study of the Bican roz 6 Mf clone in the climate conditions of the murfatlar vineyard

Anamaria Negraru (Tănase)^{1,2*}, M. Botu², Aurora Ranca¹, T. Ș. Cosma¹,
Ionica Dina¹, G. V. Beleniuc³

¹Murfatlar Viticulture and Vinification Research and Development Station

²University of Craiova, 13 Street A.I. Cuza, Faculty of Horticulture, Craiova, România

³Ovidius University, 124 Mamaia Blvd, Faculty of Horticulture, Constanța, România

Abstract

At SCDVV Murfatlar, in the period 2018 – 2022, a study was carried out on 5 clonal elites of the 'Bican roz' cultivar, selected from existing trunks in the ampelographic collection of the research station. In all 5 years of studies and observations, the clonal elite 80/10/6 was superior to the other elites, being approved under the name Bican roz 6 Mf in 2022, following testing at ISTIS (State Institute for Testing and Registration Varieties).

During the research period, average annual temperatures were 2-3°C higher in comparison with the multiannual average, while precipitation values were situated below the multiannual average (406 mm, average during the study period, compared to 522.6 mm, the multiannual average).

For all 5 clonal elites, the agrobiological properties, as well as the technological and agro-economic characteristics were compared to those of the original variety. Bican roz 6 Mf is a table grape clone with high growth vigor and 79% fertility. It is a productive clone, with an average grape bunch weight of 714 g, compared to 403 g, the average grape weight for the original variety, and with yields of 10.76 kg/trunk, respectively 24 t/ha and commodity production of 75 – 80%.

Keywords: table grapes, clonal elites, grapevine, resistance, quality

1. Introduction

Grapevine is a light and heat loving plant [11,15] of great socio-economic importance that uses the energy resources offered by the environment rationally and efficiently, but at the same time conditions the dynamics of its growth and development according to how they comply with its vegetation requirements [6,7,13].

The climate changes that are currently happening condition the creation of plant genotypes that will be able to develop and ensure increased productivity in the new pedoclimatic conditions and at the same time will contribute to mitigating desertification processes [1].

The expansion of the grapevine plantations or the introduction of new varieties in a certain area requires the assessment of the ecological favorability of the space allocated for this purpose [4].

The grape breeding achievements obtained thus far, such as clones selected from populations of older varieties, natural mutants and newly created varieties with superior traits, have ensured increased grape production, of superior and relatively constant quality from one year to another [3].

The ecoclimate of the Murfatlar vineyard is characterized by a relatively short period of vegetation, during which a large amount of global radiation and a large heliothermal reserve accumulate, creating favorable conditions for the growth and development of the grapevine.

In ampelographic collections, in addition to the conservation of genetic resources, the aim is to carry out detailed research in order to describe the existing genotypes and the perspective elites that have appeared within the population, which by their characteristics lend themselves to testing in order to

obtain valuable clones, these being tested and approved by ISTIS, in order to multiply and establish plantations.

2. Material and method

The team of researchers from SCDVV Murfatlar carried out a study during the period 2018-2022 on 5 clonal elites of the 'Bican roz' cultivar, selected from existing trunks in the ampelographic collection of the research station. In this study, the botanical characters and agrobiological properties were established, and the technological and agro-economic characterization was also carried out.

The choice of clonal elites was made in two stages:

- a) in the first stage, field observations were made regarding the vigor, the phytosanitary condition, some morphological components and the production capacity;
- b) in the second stage, at the selected clonal elites, determinations were made regarding the quality and quantity of the grapes, the size of the bunches, the number of berries per bunch, but also the quantity of must obtained.

As a result of the observations made, five elite trunks were marked, from which the top elite will be chosen that corresponds to all the criteria chosen by the breeder: consistent production and quality, as well as good resistance to diseases and pests.

3. Results and Discussions

During the study period, research was carried out for the creation of varieties and the identification of clonal elites superior to the original 'Bican roz' (Figure 1), a cultivar for table grapes, which, along with good quality and productivity, possesses properties of resistance to biotic and abiotic environmental factors, and which requires a minimum of phytosanitary treatments, helping to reduce the pollution of the viticultural ecosystem as well as the final products.

The climate of the Murfatlar vineyard is continental, with hot summers and moderate winters, creating the most favorable natural conditions for the cultivation of grapevine.

Climatic indices express the interaction of several elements of the climate (temperature, precipitation, relative air humidity, real insolation, etc.) and are used to characterize the viticultural potential at the macroclimatic level [10].

In table no. 1, a series of climatic elements are analyzed, as well as a series of climatic indices that are used worldwide, such as: Huglin heliothermic index [9] and cool night index [16].

Analyzing the data from table no. 1 we can see an increase in thermal balances: global, active and useful, in comparison to the multiannual average. The sum of real insolation during the growing season (1401 hours), is lower than the multi-annual average (1708.4 hours); the sum of the annual precipitation (383.7 mm) is lower compared to the multi-annual average (559.7 mm); the sum of the precipitation during the growing season (206.7 mm, is significantly smaller (367.6 mm), whereas the cool night index (12.8) has slightly increased (12.9 in 2022).

Due to climate changes, the number of days with maximum temperatures $> 30^{\circ}\text{C}$ increased (64 days) compared to the multiannual average (51 days) and the Huglin heliothermic index (IH) increased (3976.9) compared to the multi-annual average 3130, 1 (Table 1).

Grapevine fertility represents the ability of the plant to form fruiting organs every year as the initial basis for the grape harvest and can be appreciated under two aspects: potential and actual fertility. In the climatic conditions of the last year of observations on the elites taken in the study, the fertility values recorded for each elite were close to normal or even higher, compared to the initial variety (Table 2).

Pruning the vine is one of the most important works applied during the rest period, by which a large part of the wood grown on the trunk (80–85%) is removed annually [5].

The total amount of annual and multi-annual wood that is removed during the fruiting cut depends on the planned production, the load of fruit on the trunk and the vigor of growth on each elite in the previous year. In this case, the elite that has the higher amounts of annual and multi-annual wood in comparison with the initial variety, is the clonal elite 80/10/6 (Table 3).

During the 5 years of observations, the clonal elite 80/10/6 was remarked, which after being tested by ISTIS was approved as Bican roz 6 Mf in 2022 (Figure 2).

Table 1. Climatic indicators for the Murfatlar Wine Center

Analyzed climatic elements	Multi-Annual average	2018	2019	2020	2021	2022
Global thermal balance, $\Sigma t^{\circ}g, ^{\circ}C$	5203.5	5,379.6	5534.4	4999.6	4396.8	5053.3
Active thermal balance, $\Sigma t^{\circ}g, ^{\circ}C$	4689.8	4,815.5	5061.8	4500.5	3693.3	4573.8
Useful thermal balance, $\Sigma t^{\circ}g, ^{\circ}C$	2538.7	2,427.2	2811.8	2270.5	1850.1	2228.8
Absolute minimum air temperature, $^{\circ}C$	-15.6	-12.8	-10.5	-13.9	-13.1	-10.6
Average annual temperature $^{\circ}C$	12.3	14.6	14.8	14.9	13.8	13.9
Maximum air temperature, $^{\circ}C$	37.8	37.4	39	33.9	39.5	36.0
Σ annual precipitation, mm	559.7	696.2	311.4	267.9	661	383.7
Σ active period precipitation, mm	367.6	364.3	180.4	161.7	339.3	206.7
Σ real active period insolation, (h)	1708.4	1453.9	1329.7	1574.6	1300.6	1401
No. of days with max. temperatures $> 30^{\circ}C$	51	78	98	57	44	64
Active period, days	192	202	206	213	213	198
Real heliothermic index (IHr)	4.5	3,4	4.5	5.7	3	4.5
Hydrothermic coefficient (CH)	0.9	0.8	0.4	0.4	0.9	0.6
Bioclimatic index (Ibcv)	12.8	8.7	22.6	20.3	6.4	12.3
Oenoclimatic aptitude index (IAOe)	5492.7	5,125.0	5847.5	5457	4700.3	5250.7
Huglin heliothermic index (IH)	3130.1	3280	4583.7	4584	2856.3	3976.9
Cool night index (IF)	12.8	14.1	14.4	14.5	10.4	12.9

Table 2. Observations and determinations on the fertility of clonal elites

Variety	Clonal elites	Total Buds/trunk	Dead buds/trunk	Total shoots /trunk	Fertile shoots	Sterile shoots	Inflorescence primordia /trunk	Fertility %
'BICAN ROZ'	80/2/7	27	6	21	16	5	18	85
	79/5/3	26	7	19	12	7	18	90
	79/2/5	29	9	21	14	7	17	83
	80/5/2	27	8	19	14	5	17	87
	80/10/6	32	5	27	22	5	25	94
	Average	28	7	21	16	6	19	88
'Bican roz' initial variety		25	10	15	8	7	12	53



Figure 1. 'Bican roz' initial variety



Figure 2. Bican roz 6 Mf

Main features:

- The budburst is medium, the rosette is green with rare trichomes. The clonal elite has good fertility (79%) and great vigor. The young shoot is green in colour, with very rare trichomes, the positions is semi-erect and the tendrils are very long. The color of the adaxial side of the young leaf is green with anthocyanin areas, with soft hairs between the main ribs, which are dense on the abaxial side. The shoot has a green and red color of the dorsal part of the internode, the red on the ventral part.
- The adult leaf has a slightly shorter petiole than the median rib, pentagonal limb of medium size, green with red, medium embossed on the superior side, soft dense hairs between main ribs on lower side. The upper lateral sinuses are deep, with five slightly overlapping lobes, the teeth are medium size, the tooth length/width ratio is medium; rectilinear shape, the petiolar sinus presents semi-open lobes.
- The flower has fully developed stamens and gynoecium. The bunch has a cylindrical-conical shape, long, yellow color, very large, peduncle long, compactness and ripening are medium.
- The berry is troncovoid, large, pink, with a fairly easy pedicel detachment. The berry is also

characterized by high epidermal thickness, semi-crunchy pulp, moderately firm skin, absent or very weak anthocyanin pigmentation, with a different taste and fully formed seeds.

The development of vegetation phenophases is specific to the ecoclimate of the Murfatlar vineyard, and differs depending on the variety.

The active vegetation period begins with the budburst and ends in autumn when the leaves fall. Bican roz 6 Mf buds in the second half of April, blooms in early June, starsts the version in the second half of August and ripening in the second decade of September, having a vegetation period of 199 days, compared to the initial variety that has 206 days (Table 4).

In order to appreciate the quality of the production and to recognize table varieties, a series of grape characters specific to each variety are used [8,12].

According to table no. 5, the values of the absolute and relative fertility coefficients, as well as the values of the absolute and relative productivity indices are higher compared to those of the initial variety. For table grapes, the winter bud is affected by temperatures of -18 ± 3 °C, depending on the biological particularities of the varieties. The clone Bican roz 6 Mf has a weak resistance to frost (-18°C), like the initial variety [2] (Table 5).

Table 4. Phenological data of Bican roz 6 Mf clone, compared to the initial variety

Variety	Year	Calendaristic dates						No. Of days vegetation period
		Budburst	Flowering	Veraison	Full maturity	Harvest	Leaf fall	Budburst – Leaf fall
Bican roz 80/10/6	2018	19.04	05.06	14.08	11.09	17.09	30.10	202
	2019	26.04	04.06	08.08	20.09	24.09	26.10	201
	2020	27.04	12.06	12.08	10.09	14.09	11.11	201
	2021	24.04	08.06	17.08	17.09	23.09	04.11	195
	2022	22.04	06.06	10.08	12.09	18.09	10.11	196
Average Bican roz 6 Mf		19-17.04	04-12.06	08-17.08	10-20.09	14-24.09	30-11.11	199
'Bican roz' initial variety		28.04	15.06	20.08	25.09	28.09	12.11	206

Table 5. Agrobiological characterization of the Bican roz 6 Mf clone, compared to the initial variety

Clones	Year	Fertility, fertile shoots %	Absolute fertility coefficient	Relative fertility coefficient	Absolute production index	Relative production index	Growth vigour	Cold resistance, %viable buds
Bican roz 80/10/6	2018	75	1,2	0.8	680	453	big	78
	2019	86	1.4	0.9	1173	838	big	73
	2020	68	1.3	0.9	996	689	big	72
	2021	76	1.0	0.4	794	325	big	70
	2022	90	1.1	0.5	642	295	big	84
Average Bican roz 6 Mf		79	1,2	0.7	857	520	big	75
'Bican roz' initial variety		56	1.1	0.6	443	242	big	60

Table 6. Technological characterization of the clone Bican roz 6 Mf, compared to the initial variety

Clones	Year	Average bunch weight, g	Weight of 100 berries, g	Average berry weight, g	Must sugar content, g/l	Must total acidity g/l H ₂ SO ₄	Grape production kg/trunk	Grape production t/ha
Bican roz 80/10/6	2018	567	264	2.64	162.0	7.0	10.44	24
	2019	838	260	2.60	185.0	3.4	11.6	24
	2020	766	170	1.70	197.0	2.6	12.76	24
	2021	794	172	1.72	159.8	5.9	9.72	24
	2022	605	269	2.59	166.2	5.1	9.28	24
Average Bican roz 6 Mf		714	225	2.25	174.0	4.8	10.76	24
'Bican roz' initial variety		403	165	1.65	148.0	5.8	7.96	19

The Bican roz 6 Mf is superior to the initial variety in terms of the quality and quantity of the grapes, in that the start of veraison is faster, the thickness of the epidermal is medium and the grape is large and long, compared to the initial variety, where the epidermal is thin and the grape is medium (Table 6).

The grape is par excellence a noble fruit, which possesses a history and a culture. The elegance of its shape and appearance (visual and tactile sensory) together with the organoleptic properties (gustatory sensory) and the high energy value make it a

prestigious and generous product, particularly appreciated by the consumer [14].

The grapes and berries of the clone Bican roz 6 Mf have a greater weight than those of the initial variety (Figure 3).

Regarding the sugar content, the Bican roz 6 Mf clone differed significantly from the initial variety, having an average of 174 g/l compared to 148 g/l, the value of the initial variety (Figure 4).

Grape yield reported as kg/trunk and t/ha is clearly higher for the clone (Figure 5).

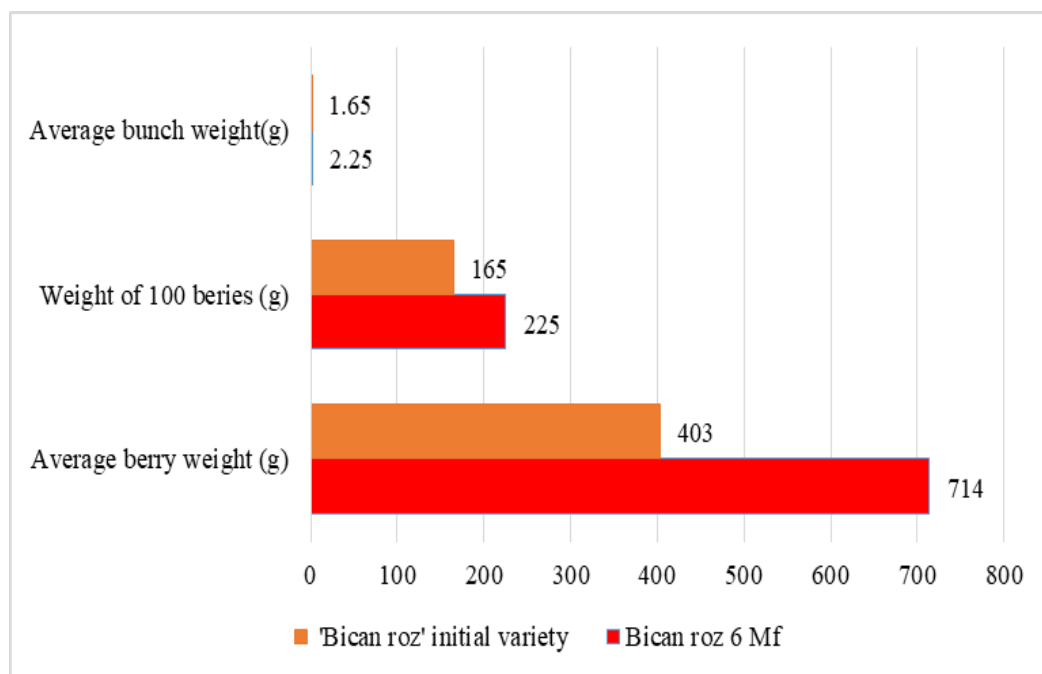


Figure 3. Average berry and grape weights of the Bican roz 6 Mf clone, compared to the initial variety

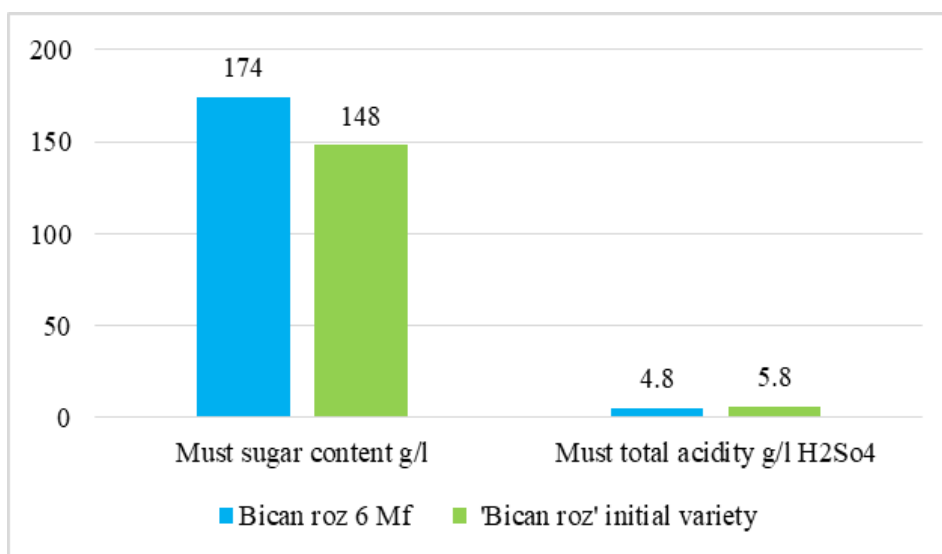


Figure 4. Total acidity and sugar content of the Bican roz 6 Mf clone compared to the initial variety

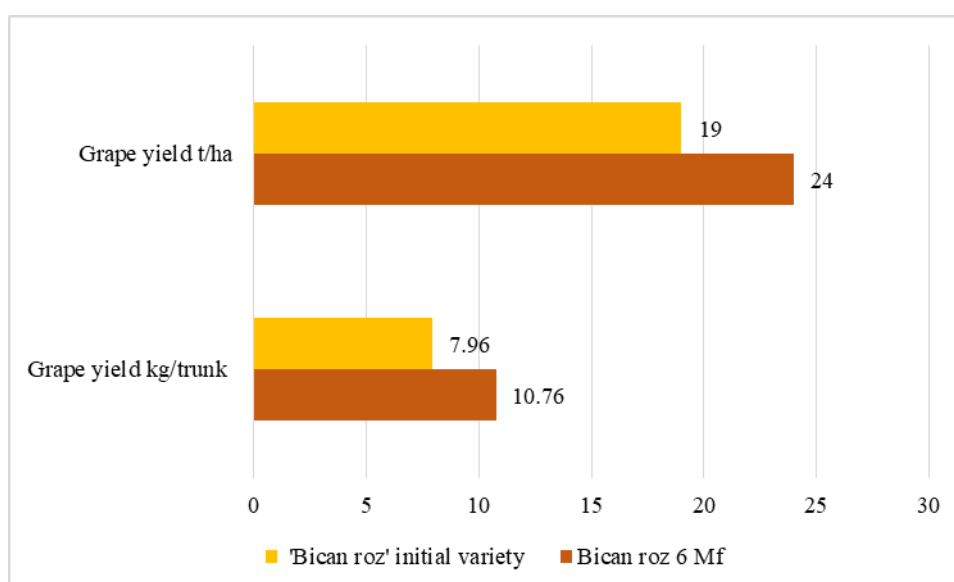


Figure 5. Average grape yields kg/trunk and t/ha of the Bican roz 6 Mf clone, compared to the initial variety

Table 7. Bican roz 6 Mf clone technological indices compared to the initial variety

Clones	Year	Berry index	Bunch structure index	Berry composition index	Yield index	No. berries/bunch	Peduncule length (cm)
Bican roz 80/10/6	2018	31	5.1	6.6	4.6	50	3.5
	2019	38	5.4	6,7	5.2	56	2.8
	2020	35	5,6	6,7	4.0	44	3.3
	2021	22	5.8	6,7	4.1	52	3.04
	2022	29	5.1	6.8	2.1	33	2.86
Average Bican roz 6 Mf		31	5.4	6,7	4.5	47	3.1
'Bican roz' initial variety		28	5.4	6,7	4.3	35	3.03

Table 8. Technological characteristics regarding commercial value, suitability for transport and storage

Clonal selection	Bunch size	Berry size and uniformity	Compactness	Shape and color	Pruine layer thickness	Skin adherence and elasticity	Pulp consistency	Presence of seeds	Taste	Aroma
Bican roz 6 Mf	Very Large	Large and uniform	Compact	Ovoid, Pink	Medium	Moderately Firm	Crisp	Fully Formed	Different taste	Unflavoured

The technological indices for the Bican roz 6 Mf clone are clearly higher, compared to the initial variety, the productive potential of the clone is highlighted and leads to the improvement of the assortment of varieties for table grapes in the Dobrogea area (Table 7).

The ripening is medium, the bunch has a cylindrical-conical shape, is long, with a pink color and of a very large size, the peduncle is long, with medium compactness and ripening. The berry is troncovoid, large, pink, with a fairly easy pedicel detachment. The berry is also characterized by high epidermal thickness, semi-crunchy pulp, moderately firm skin, absent or very weak anthocyanin pigmentation, with a different taste and fully formed seeds, it is recommended for consumption in fresh state (Table 8).

4. Conclusion

The team of researchers from SCDVV Murfatlar during the period 2018-2022 carried out a study on 5 clonal elites of the 'Bican roz' variety, selected from existing trunks in the ampelographic collection of the research station. In this study, the botanical characters and agrobiological properties were established, and the technological and agroeconomic characterization was also carried out.

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The clonal elite has good fertility (79%) and great vigor. The active vegetation period begins with the budburst and ends in autumn when the leaves fall. Bican roz 6 Mf buds in the second half of April, blooms in early June, starts the version in the second half of August and ripening in the second decade of September, having a vegetation period of 199 days, compared to the initial variety that has 206 days.

The grapes and berries of the clone Bican roz 6 Mf have a greater weight than those of the initial variety, and the grape yield reported as kg/trunk and t/ha is clearly higher for the clone.

The technological indices for the Bican roz 6 Mf clone are clearly higher, compared to the initial variety, the productive potential of the clone is highlighted and leads to the improvement of the assortment of varieties for table grapes in the Dobrogea area. It is recommended for fresh consumption.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human or animal subjects (if exist) respect the specific regulation and standards.

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