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THE BEHAVIOR OF SOME VINE VARIETIES WITH WHITE GRAPES IN THE AMPELOGRAPHIC COLLECTION OF SCDCPN DĂBULENI

Băjenaru Maria-Florentina[1*], Diaconu Aurelia[1], Nanu Ștefan[1], Bîrsoghe Cristina[1], Paraschiv Alina[1], Sfârloagă Loredana[1], Dima Milica[1], Rățoi Iulian[1]
[1-]Research – Development Station for Plant Culture on Sands Dabuleni, Petre Bniță Street, 217, Calarasi.
[*]*Correspondence author*: e-mail: mariaciuca92@yahoo.ro

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ABSTRACT

The research followed the behaviour of white grape vine varieties in the ampelographic collection over a ten-year period (2012-2021). The fertility of the shoots, recorded different values depending on the variety and climatic conditions. The relative fertility coefficient recorded both subunit and superunit values depending on the year, with one exception, the variety Fetească regală Cl. 21 Bl., where the values were only superunitary (1.13-1.67), while the maximum value of the absolute fertility coefficient was recorded for the variety Blasius, ranging from 1.23 to 2.10. In terms of average grape production, for the period 2013-2021, the varieties Brumariu stood out with a production value of 15828 kg/ha and Selena with 13729 kg/ha. At the opposite end of the scale were Columna (8095 kg/ha) and Donaris (7764 kg/ha). Total sugar content values at harvest maturity varied from variety to variety and from year to year. In this respect, the Selena variety came first, with an average total sugar content of 210 g/l. Columna had the lowest average total sugar content (167 g/l).

INTRODUCTION

Grapevines have been used since ancient times as a plant that fixes mobile sands and as a plant that makes economic use of this category of poor soils. The eco-pedological conditions on unimproved sands were and are quite harsh. Precipitation is low, summer temperatures are high and hygroscopicity quite low. The old variety grown on sands has been very limited, consisting of varieties resistant to the ecopedological conditions of the sands. In the course of time, winegrowers have chosen the varieties most resistant to the ecopedological conditions of the sands. The old assortment on the dry sands of southern Oltenia consisted of *Roșioară, Berbecel* and *Parmac* for white and rosé wines (Dvornic V., 1955; Dvornic V. et al., 1964; Oprean M., 1964 and Constantinescu Gh. et al., 1972). The introduction of new varieties and clones into cultivation must possess, in addition to quality characteristics, the ability to adapt to local conditions and especially to constantly changing climatic factors (Liliana Rotaru, 2005; Popa Camelia et al., 2009). Grapevines are now cultivated all over the world, in both hemispheres of the Earth. Europe has the highest percentage, 51% of the global area under vine, followed by Asia, America and Africa (Gonçalves da Silva et al., 2008). The area under vine in Romania has been decreasing since the 1990s, and currently ranks fifth in Europe after Spain, Italy, France and Portugal, so that in 2013 Romania had

an area of 229 000 hectares planted with vines (Bora et al., 2015). Favourable ecoclimatic conditions for growing vines can be divided into two categories: vital conditions and critical conditions. Vital conditions (solar radiation, temperature and humidity) are important and directly influence vine growth and fruiting. Critical conditions (frost, persistent fog, wandering frost, spring frosts) negatively influence vine growth and fruiting, leading to a decrease in production in terms of both quantity and quality (Webb et al., 2007; Pop, 2010; Camps and Ramos, 2011; Santos et al., 2012).

MATERIAL AND METHODS

The experience was refined in 2010. The planting density was 3787 stumps/hectare, which was based on planting distances of 2.2/1.2 m.

The following varieties were planted: *Columna, Donaris*, *Fetească abă Cl. 1 Od., Fetească regală Cl. 21 Bl, Riesling italian, Alb aromat, Brumăriu, Blasius, Selena*. The *Riesling italian*, a variety that has adapted well to the sandy soils of the southern part of the country, was used to compare the results.

The study consisted of observations and experimental determinations on the phenology of the stumps, shoot fertility, grape production and grape quality (weight of 100 berries, total sugar content and total titratable acidity).

RESULTS AND DISCUSSIONS

Relatively favourable conditions for vine growing were observed from 2012 to 2021 (Table 1). In terms of minimum temperatures harmful to vines, in four years out of the ten analysed, the recorded temperature values caused shoot losses. In three of the ten years, the phenomenon of scorching occurred, with temperatures exceeding 40 ºC.

Table 1

The main climate data from 2012-2021

Year	Temperature (°C)		Precipitations (mm)		Snow layer thickness (cm)
	Minimum	Maximum	Annual	April – September period	
2012	-24,3	42,6	383,5	230,8	25
2013	-18,1	38,4	451,5	307,8	15
2014	-14,1	37,6	994,0	640,7	25
2015	-25,1	39,2	735,4	398,0	30
2016	-23,4	38,0	718,5	297,4	30
2017	-23,4	41,2	742,0	326,6	40
2018	-17,6	35,7	923,9	510,1	25
2019	-14,9	38,4	530,8	122,7	30
2020	-9,4	37,3	583,2	310,4	15
2021	-10,6	41,2	544,6	173,6	10

In the period 2012-2021, rainfall was both below and above the multiannual average of around 550 mm. Higher precipitation values were recorded in 2014 (994 mm), and 2018 (923.9 mm), and precipitation values well below the multiannual limit were recorded in 2012 (383.5 mm). During the growing season, (April - September),

in the year 2014, the recorded precipitation amounted to the highest amount, 640.7 mm, and in the year 2021 the lowest amount of precipitation 173.6 mm was recorded. The snow cover thickness recorded the highest value in the year 2017 of 40 cm and the lowest value was recorded in the year 2021 of 10 cm.

From the data recorded over a period of 10 years (2012-2021), it resulted that the onset of the budbreak phenophase occurred in the period 04.04-01.05 (Table 2). *Columna, Donaris* and *Blasius* varieties budded the earliest. The ripening process of the grapes took place towards the end of July, the beginning of August, and the ripening of the grapes in the first and second decade of September.

Table 2

The main phenological observations in some grape varieties with white grapes for white wines in the period 2012-2021

Variety	Entry into vegetation	Beginning of the ripening	Grapes maturation
Riesling italian	06.04-01.05	27.07-09.08	6-17.09
Columna	04-30.04	24.07-01.08	5-17.09
Donaris	04-30.04	25.07-01.08	5-17.09
Fetească albă Cl. 1 Od.	05-28.04	20.07-01.08	5-17.09
Fetească regală Cl. 21 Bl.	07-28.04	22.07-09.08	6-19.09
Alb aromat	06-30.04	19.07-29.08	1-17.09
Brumăriu	05-27.04	18.07-09.08	8-21.09
Blasius	04-30.04	22-31.07	5-18.09
Selena	06-27.04	25.07-04.08	6-21.09

Shoot fertility, showed different values depending on variety and climatic conditions (Table 3).

The relative fertility coefficient registered, depending on the year, both subunit and superunit values, with one exception, the variety *Fetească regală Cl. 21 Bl*., in which the values were only above unit (1.13-1.67) and the maximum value of the absolute fertility coefficient was recorded in the *Blasius* variety, between 1.23 and 2.10.

Table 3

Fertility of shoots in grape varieties with grapes for white wines in the period 2012-2021

Variety	Fertility coefficient	
	relative	absolute
Riesling italian	0,94-1,16	1,36-1,56
Columna	0,83-1,20	1,33-1,80
Donaris	0,85-1,24	1,31-1,44
Fetească albă Cl. 1 Od.	0,83-1,28	1,25-1,60
Fetească regală Cl. 21 Bl.	1,13-1,67	1,62-1,93
Alb aromat	0,64-1,24	1,27-1,53
Brumăriu	0,90-1,66	1,54-1,78
Blasius	0,97-1,41	1,23-2,10
Selena	0,96-1,55	1,44-1,70

In 2013, most varieties recorded the maximum grape production of this period (2012-2021). The variety *Selena* achieved the highest production, of 35986

kg/ha, followed at a short distance by the variety *Brumăriu* (34849 kg/ha), (table 4). From the point of view of average grape production, during the period 2013-2021, the *Brumăriu* varieties stood out, with a production value of 15828 kg/ha and *Selena* with 13729 kg/ha. Good results were also recorded by the varieties *Blasius* (12798 kg/ha), *Fetească regală Cl. 21 Bl*. (12640 kg/ha). All these varieties exceeded the grape production achieved by the control variety, *Riesling italian* (10586 kg/ha). The lowest average weight was recorded in the varieties *Donaris* (7764 kg/ha) and *Columna* (8095 kg/ha).

Table 4

Grape production (kg/ha) of some grape varieties with white wine grapes in the period 2012-2021

Variety	Years					Production limits during the period2013-2021	Average
	2013	2014	2019	2020	2021		
Riesling italian	16667	7574	14749	14769	8999	757-16667	10586
Columna	7954	7195	11740	10982	9941	757-11740	8095
Donaris	10227	3030	10603	10982	10982	757-10982	7764
Fetească albă Cl. 1 Od.	21212	7903	14769	11739	12686	3029-21212	11890
Fetească regală Cl. 21 Bl.	21212	10224	15148	14390	14485	378-15148	12640
Alb aromat	29167	8331	2272	7195	9181	4166-29167	10052
Brumăriu	34849	10603	15526	14390	15432	4166-34849	15828
Blasius	29925	8710	14390	9089	10130	4544-29925	12798
Selena	35986	6438	14011	11740	13444	757-35986	13729

Quality analyzes consisted of determinations of 100 grains weight, total sugar content, and total titratable acidity at harvest (Table 5).

Table 5

Grape quality of some white grape vine varieties for white wines in the period 2013-2021

Variety	Weight of 100 grains (g)	Total sugar content (g/l)	Total acidity titrable (g/l H_2SO_4)
Riesling italian	161	206	4,1
Columna	196	167	4,2
Donaris	214	181	3,8
Fetească albă Cl. 1 Od.	164	190	3,3
Fetească regală Cl. 21 Bl.	217	178	4,3
Alb aromat	283	190	3,3
Brumăriu	201	196	4,2
Blasius	265	181	5,0
Selena	196	210	4,3

From the point of view of the weight of 100 grains, the aromatic White variety recorded the highest value of 283 g, and the lowest value was recorded for the control variety *Riesling italian* 161 g.

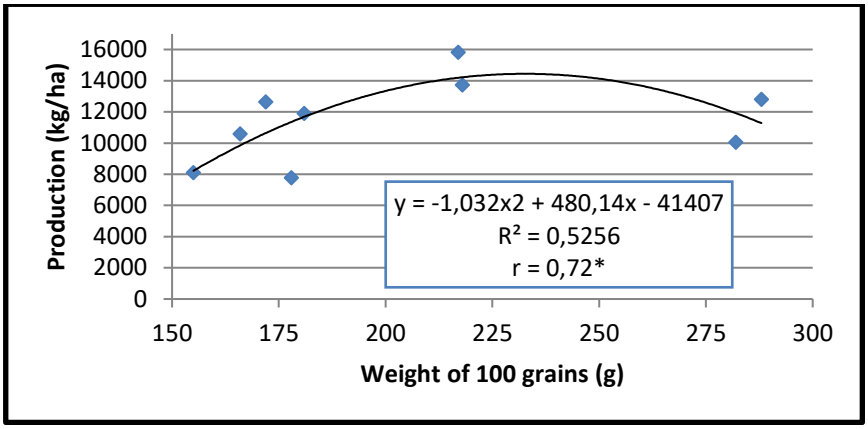

Figure 1. Correlation between yield (kg/ha) and weight of 100 grains (g)

The values of the content of total sugars, at harvest maturity, fluctuated from one variety to another but also from one year to another. From this point of view, the *Selena* variety was in first place, with an average amount of total sugars of 210 g/l. An average total sugar content, with the lowest value was obtained by the *Columna* variety (167 g/l).

Regarding the total titratable acidity, expressed in g/l H_2SO_4, the cultivars accumulated very different amounts from one cultivar to another, with values from 3.3 in the *Fetească albă Cl. 1 Od*. and *Alb aromat* variety, at 5.0 as recorded by the *Blasius* variety.

The weight of 100 grains influenced the production of grapes, the results obtained being represented by a correlation given by a polynomial equation, with a significant correlation factor (r = 0.72*), (Fig. 1).

CONCLUSIONS

In the period 2012-2021, the minimum temperatures harmful to vines were recorded in 4 of the 10 years studied. In three of the ten years, the phenomenon of heat was manifested, with temperatures exceeding the value of 40 ºC.

The desbudding of the varieties studied took place throughout April, the process of harvesting took place towards the end of July and the beginning of August, and the ripening of the grapes in the first and second decade of September.

Shoot fertility recorded different values depending on the variety and climatic conditions. The relative fertility coefficient registered, depending on the year, both subunit and superunit values, with one exception, the variety *Fetească regală Cl. 21 Bl*., in which the values were only above unity (1.13-1.67), and the maximum value of the absolute fertility coefficient was recorded in the *Blasius* variety, between 1.23 and 2.10.

From the point of view of average grape production, during the period 2013-2021, the *Brumăriu* varieties stood out, with a production value of 15828 kg/ha and *Selena* with 13729 kg/ha. At the opposite pole were the *Columna* (8095 kg/ha) and *Donaris* (7764 kg/ha) varieties.

The values of the content of total sugars, at harvest maturity, fluctuated from one variety to another but also from one year to another. From this point of view, the *Selena* variety was in first place, with an average amount of total sugars of 210 g/l. An average total sugar content, with the lowest value was obtained by the *Columna* variety (167 g/l).

Average grape production was significantly positively correlated with the weight of 100 grape seeds (r=0.71*).

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