

RESEARCH ARTICLE

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Study of agricultural, morphological and molecular characteristics of grapevine cultivar “Serinë e bardhë”

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Abstract

During 2010-2012 vegetation periods in an vineyard at Qilarisht village through a multidisciplinary approach including the comparizon of morphological and agrobiological characters and analisis of genetic profile have been described and characterized one of the indigenous white grape wine cultivars “Serinë e bardhë”. It is wide spread in the South East part of Albania. The study confirms that cv. “Serinë e bardhë” presents distinctive morphological and molecular characteristics. The characters are estimated in numbers that will be used for making passportization of variety in a new way. The identification of this cultivar it is important for the selection as well as for the wider spread of his cultivation. The wine that would be secured will be no doubt interesting for producing. This cultivar is also appropriate to give particular positive characteristics to traditional white wines of zone.

Key words: grapevine, cultivar, morphological, genetic resources.

1. Introduction

The South East part of Albania has a long history of viticulture and possess a great diversity of local wine grape cultivars such as ‘Debinë e bardhë’, ‘Debinë e zezë’, ‘Serinë e bardhë’, ‘Serinë e zezë’, ‘Kotekë e bardhë’, ‘Kotekë e zezë’[9]. Ampelographic study is the first step in identifying, recognizing, solving the problem of homonymy and synonymy that might exist and for preventing genetic resources erosion as well as the loss of local oenological products linked to territory tradition [6]. Through ampelographic studies make possible the define of agrobiological features and technological characters of a grapevine cultivar also the report that it

occupied in a specific ecosystem with the other cultivars, contributing on the zonation of viticulture [5].

Based on the principles for a sustainable usage of grapevine biodiversity in our country and with the aim to protect and to evaluate by agronomist interest our local grape cultivar, it is undertaken during the years 2010-2012 the study of an old cultivar for white wine “Serinë e bardhë” spreaded in the south east part of Albania through a multidisciplinary approach includingthemorphological, agrobiologicalcharacterization and analisis of genetic profile.

2. Material and methods

The study is realized during the years 2010-2012 at Qilarisht village. Thirty vines were selected for studywith three repetitive analyses of 10 vines. The vines were 20 years old and cultivated under the same growing conditions with the spaces 2.5 x 1.2 m, loaded with 20 buds (2x2+2x8).The morphological and agricultural

evaluation was carried out during vegetation period, according the descriptor list of grapevine [1]. Observation on the shoot tips were made when the shoots were 10-30 cm long. The young leaves were investigated on the first 4 distal unfolded leaves. Observations on the shoot were made in the middle third of the shoot.

Observations on mature leaves were made between berry set and beginning of berry maturity on the leaves on the middle third of the shoot, just above the raceme. Bunches and berries were investigated when matured. Berry measurements were made at harvest using 100 berries, from 10 bunches.

The following agronomic variables were recorded: yield (kg for vine), weight of bunch, number of bunches per shoot, number of bunches for vine, sugar and total acids amount of the must. The sugar content was evaluated by using

3. Results and discussion

The morphological characterization shows that cultivar 'Serinë e bardhë' is a good cultivar for white wine, with medium production and high level of sugar content. Table 1 indicates the results of the observations of the main descriptive characters obtained during three years that were transformed to numerical scales according to international descriptors.[1]

The phonological date recorded shows that bud burst were during 20-30 March, flowering time during 15-27 May, maturation during 15-30 September and leaf fall during 20-30 November.

Table 2 indicates the date production of the cultivar 'Serinë e bardhë' including yield for vine, yield for unit area (ha), sugar and total acids content of the must. The yield for vine ranges from 4.2 kg (2011) to 4.7 kg (2012) and the years of study shows insignificant variation of 1.04. The average of the yield/ ha is 187 quintals/ha. The maximum sugar content in must is accumulated at year 2010 (23.6 %). The chemical analysis have indicated a good ratio of sugar with the acidity that secures a good taste of the grape and make it very precious to wine producers. The quality of the juice ranks it at wine grape group with high quality appropriate to give particular

the refract-to-meter and the total acid content of must was determined by volumetric method using 0.025 mol/ l solution of NaOH. In total were evaluated 106 morphological, phonological, and agricultural characters.

Molecular characterization: DNA has been extracted from young leaves [2]. Analysis was performed using nine microsatellite loci: VVS2 [11], VVMD5, VVMD7, VVMD25, VVMD2, VVMD28, VVMD32 [4][3], Vr-ZAG62 and VrZAG7[8].

positive characteristics to traditional white wines of the zone.

Table 3 shows the main date of the bunch and berry. The bunch weight ranges from 287g (2012) to 360g (2010) that belong to medium size bunch cultivar. The averages of the maximum width and length of the bunch were 10.6 cm and 21cm, respectively. The number of berries in the bunch range from 84 to 89 and the coefficient of variation is 13.2.

Field observation indicated that cv. 'Serinë e bardhë' had a low susceptibility to powdery and downy mildews, an important characteristic for the selection as well as for the wider spread of his cultivation.

Table 4 shows the allele profiles obtained for cv. 'Serinë e bardhë'. The set of microsatellite loci used as the standard set for screening of grapevine collections [10] is polymorphic and informative enough to discriminate this cultivar [7]. The result of comparison of the obtained genetic fingerprints with those recorded in various databases in the web shown that it is a unique genotype.



Table 1.Mean value of expression level of ampelographic characters of cv ‘Serinë e bardhë’ during the years 2010-2012.

OIV CODE	Exspression level	OIV CODE	Exspression level	OIV CODE	Exspression level	OIV CODE	Exspression level
1	7	56	3	89	1	220	5
2	3	65	7	90	3	221	5
3	3	66	7	91	1	222	2
4	5	67	4	92	7	223	3
5	3	68	3	93	3	224	2
6	3	69	7	101	1	225	1
7	2	70	3	102	3	226	2
8	2	71	5	103	2	227	5
9	3	72	9	104	3	228	7
10	3	73	2	105	3	230	1
11	1	74	5	106	3	232	2
12	1	75	5	151	2	234	1
13	3	76	1	152	2	235	3
14	3	77	5	153	2	236	1
15	5	78	5	154	5	237	1
16	1	79	3	201	2	238	3
17	5	80	1	202	5	239	1
51	1	81	1	203	5	241	3
52	3	84	5	204	3/5	302	5
53	5	85	3	205	5	303	7
54	3	86	7	206	3	502	5
55	3	87	3	207	5	504	5

Table 2.Data production of cv ‘Serinë e bardhë’

Year	Yield for vine (kg)	Yield kv / ha	Sugar content %	Total acidity (g/l)
2010	4.6	186	23.6	4.6
2011	4.7	190	23.4	4.4
2012	4.2	172	23.0	4.8
10/12	4.4	178	23.2	4.7
cv% ^a	1.04		5.8	4.6

a= coefficient of variation

Table 3. The main data of bunch and berry

Year	Weight of bunch (g)	Length of bunch (cm)	Width of bunch (cm)	Raport length/ Width of bunch	Number of berries
2010	360	21.0	10.4	2.2	84
2011	344	20.3	10.6	1.8	88
2012	287	20.8	10.2	2.1	89
10/12	354	20.6	10.5	2.0	86
cv% ^a	8.3	12.3	11.8	18.0	13.2

a= coefficient of variation

Table4. Genetic profile of cv. ‘Serinë e bardhë’

Microsatellite loci	Allele sizes
ws2	141-149
md7	237-241
md27	177-177
zag62	187-187
zag79	254-256
md5	228-228
md25	253-261
md28	242-244
md32	262-272

4. Conclusion

Cultivar ‘Serinë e bardhë’ belongs to the group of medium yielding cultivar for wine grape. The quality of the juice ranks it at wine grape group with high quality appropriate to give particular positive characteristics to traditional white wines of the zone. Molecular characterization shown that it is a unique genotype. The morphological, agronomic and molecular study of cv ‘Serinë e

bardhë’ identifies it and help to know and to promote sustainable use of this old local grapevine cultivar. This study creates a significant data base for genetic improvement and to determine the level of scope of this cultivar in extensive production practice.

5. References

1. Anonymous, 1997. **Descriptors for Grapevine (Vitis spp.)**. International Plant Genetic Resources Institute, Rome. 62 pp.
2. Bacilieri, R.; This, P.; 2010: **GrapeGen06, an European project for the management and conservation of grapevine genetic resources**(<http://www1.montpellier.inra.fr/grapegen06/>).
3. Bowers, J. E.; Dangl, G. S; Meredith, C. P.;1999:**Development and characterization of additional**

microsatellite DNA markers for grape.

Am. J. Enol. Vitic. 50, 243-246

4. Bowers, J. E.; Dangl, G. S.; Vignani, R.; Meredith, C. P.; 1996: **Isolation and characterization of new polymorphic simple sequence repeat in loci in grape (*Vitis vinifera* L.)** Genome 39, 628-633.
5. Carka, F.; 2006: **Ampelografia e disa kultivareve autoktone te hardhise.** ADA, Tirane
6. Carka, F.; Cici, I.; Nako, R.; Vorpsi, V.; Papakroni, H.; 2010: **Albanian Grapevine Germplasm.** ISHS Acta Hortic. **827**, 123-124
7. Maul, E.; Sudharma, K. N.; Kecke, S.; Marx, G.; Müller, C.; Audeguin, L.; Boselli, M.; Boursiquot, J. M.; Bucchetti, B.; Cabello, F.; Carraro, R.; Crespan, M.; De ndr s, M. T.; Eiras Dias, J.; Ekhvaia, J.; Gaforio, L.; Gardiman, M.; Grando, S.; Agyropoulos, D.; Jandurova, O.; Kiss, E.; Kontic, J.; Kozma, P.; Lacombe, T.; Laucou, V.; Legrand, D.; Maghradze, D.; Marinoni, D.; Maletic, E.; Moreira, F.; Mu oz-Organero, G.; Nakhutsrishvili, G.; Pejic, I.; Peterlunger, E.; Pitsoli, D.; Pospisilova, D.; Preiner, D.; Raimondi, S.; Regner, F.; Savin, G.; Savvides, S.; Schneider, A.; Sereno, C.; Simon, S.; Staraz, M.; Zulini, L.; Bacilieri, R.; This, P.; 2012: **The European *Vitis* Database (www.eu-vitis.de) - A technical innovation through an on-line uploading and interactive modification system.** Vitis 51, 79-86.
8. Sefc, K. M.; Regner, F.; Turetschek, E.; Gl ssl, J.; Steinkellner, H.; 1999: **Identification of microsatellite sequences in *Vitis riparia* and their applicability for genotyping of different *Vitis* species.** Genome 42, 1-7
9. Sotiri, P.; Gjermani, T.; Nini, T.; 1973: **Vitikultura.** Tekst mesimor per Fakultetin e Agronomise. Instituti Larte Shteteror i Bujqesise, Tirane.
10. This, P.; Jung, A.; Boccacci, P.; Borrego, J.; Botta, R.; Costantini, L.; Crespan, M.; Dangl, G. S.; Eisenheld, C.; Ferreira-Monteiro, F.; Grando, S.; Ib  ez, J.; Lacombe, T.; Laucou, V.; Magalh es, R.; Meredith, C. P.; Milani, N.; Peterlunger, E.; Regner, F.; Zulini, L.; Maul, E.; 2004: **Development of a standard set of microsatellite references alleles for identification of grape cultivars.** Theor. Appl. Genet. 109, 1048-1058.
11. Thomas, M. R.; Scott, N. S.; 1993: **Microsatellite repeats in grapevine reveal DNA polymorphism when analysed as sequence-tagged sites (STSs).** Theor. Appl. Genet. 86, 985-990.