

Vitis 54 (Special Issue), 163–164 (2015)

Research Note

Agricultural and biological characteristics of Georgian grapevine varieties

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Key words: South Caucasus; ampelography; anthocyanins; polyphenols; phenology.

Introduction: Caucasus, and in particular Georgia, is recognized as one of the first domestication site of Eurasian grapevine *Vitis vinifera* (VAVILOV 1926, 1931). In different ethnographic areas of the country researchers have described 525 autochthonous *Vitis vinifera* varieties (KETS KHOVELI *et al.* 1960, TSERTSVADZE, 1998, RAMISHVILI 2001).

Nowadays investigation of Georgian grapevine genetic resources, such as identification of synonyms and homonyms, germplasm mobilization and preservation, is considered a high priority issue. At the same time, the variability in botanical, agricultural and technological characters of Georgian grapevine is not yet clarified. Thus, further knowledge could valorize the role of Georgian cultivars in breeding programs.

The aims of this investigation were: i) to study several agricultural and biological characteristics of some Georgian grapevine varieties; ii) to select the best varieties; and iii) to propose recommendations for wine-makers and breeders.

Material and Methods: The investigations took place in the collection vineyard of the Scientific-Research Center of Agriculture (the FAO code is GEO038) located in Mtskheta district of Kartli Province, Georgia. 32 grapevine varieties, originated from different ethno-geographic areas of Georgia, were used in this study. All of them were phenotypically different. In the collection, each considered accession is represented by 20 vines. The varieties were investigated based on the COST protocols suggested for ampelographic traits (49 descriptors, OIV 2007), phenological characterization (MEIER 2001, RUSTIONI *et al.* 2014a) and biochemical characteristics (RUSTIONI *et al.* 2014b). The observations were done in the vegetative years 2012 and 2013.

Results and Discussion: Ampelographic characterization: The cultivar ampelographic descriptions (OIV, 2007) demonstrated that among the in-

vestigated varieties only the rose grape variety 'Tavkveri' showed functionally female flowers. The longest bunches – approximately 290 mm in length – were found in 'Chitistvala Bodburi', while 'Kundza' had the shortest ones - approximately 103 mm in length. The most dense bunches were recorded in the varieties 'Tavkveri' and 'Kundza'. The investigated cultivars were characterized by one or two shoulder per bunch. All varieties presented well-developed seeds in berries.

Phenological characterization: Phenological data were recorded and the main phenophases dates appeared in the following periods. Budding begun from April 10th-19th. First leaf development started from April 19th-29th. 14th leaf development begun approximately from June 1st and lasted until June 16th. In that period, the medium air temperature reached 19.7 °C. Flowering begun approximately from June 1st-16th and finished approximately by June 14th-26th. Berry ripening (beginning coloration) started in the interval of August 8th-30th. Harvesting started from September 21st and lasted until October 9th. Leaf coloration begun September 16th and lasted until October 15th. Fall of the leaves begun September 30th and lasted until November 28th.

Biochemical characterization: In the skins and seeds of red grape varieties total anthocyanins and total polyphenols were determined (Table, Figure). Recorded polyphenol contents in skins were: 'Otskhanuri Sapere' - 3389,44 mg·kg⁻¹; 'Ojaleshi' - 2645,70 mg·kg⁻¹; 'Usakhelouri' - 2468,01 mg·kg⁻¹, and 'Saperavi' - 2395,81 mg·kg⁻¹ of grapes (Table). Total polyphenol contents in seeds were: 'Aleksandrouli' - 451,68 mg·kg⁻¹; 'Satsuravi' - 438,82 mg·kg⁻¹; 'Otskhanuri sapere' - 362,91 mg·kg⁻¹ and 'Saperavi' - 298,86 mg·kg⁻¹ of grapes.

High levels of total anthocyanin accumulation were recorded in the following varieties: 'Otskhanuri Sapere' - 2896,27 mg·kg⁻¹; 'Saperavi' - 1448,81 mg·kg⁻¹; 'Ojaleshi' - 1449,27 mg·kg⁻¹, and 'Dzelshavi' - 859,65 mg·kg⁻¹ of grape (Figure).

Conclusions: Thirty two native Georgian grapevine varieties were studied by using descriptors for morphological, compositional and phenological traits. The botanical, agricultural, technological, quantitative and qualitative characters have been coded and numerically estimated. This work will become a useful basis for further researches and in future breeding programs.

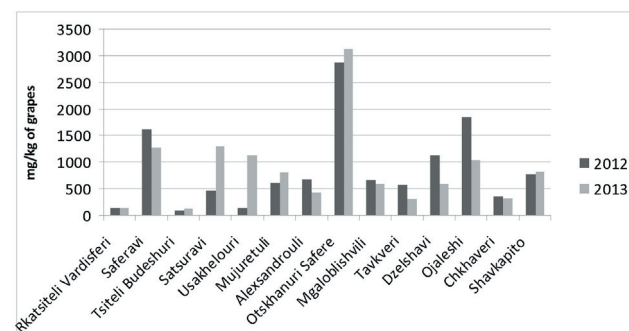


Figure: Total anthocyanin concentrations in Georgian cultivars.

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Table

Total polyphenol concentrations in Georgian cultivars

Variety name	Skin	Seed	Total	Total phenols (mg per berry)
	phenols	phenols	phenols	
	(mg·kg ⁻¹ of grapes)			
Saperavi	1048.0	298.9	2395.8	5.5
Tsiteli Budeshuri	754.4	227.7	1189.3	3.7
Satsuravi	1570.3	438.8	2004.1	3.9
Mujuretuli	3319.6	250.3	1914.1	3.19
Ojaleshi	2373.0	275.6	2645.7	6.0
Dzelshavi	1243.1	211.7	1678.9	4.5
Usakhelouri	2065.4	403.2	2468.0	4.8
Chkhaveri	1691.2	323.2	2014.4	3.2
Shavkapito	1648.52	365.95	2014.44	4.1
Rkatsiteli Vardisperi	863.7	200.0	1064.0	2.6
Mgaloblishvili	1163.2	239.1	1402.3	3.8
Tavkveri	1392.1	175.3	1884.8	5.2
Otskhanuri Sapere	3026.5	362.9	3389.4	4.8
Aleksandrouli	1524.5	451.7	1996.2	3.1

Joint publication of the COST Action FA1003 "East-West Collaboration for Grapevine Diversity Exploration and Mobilization of Adaptive Traits for Breeding".

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