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Metabolic characterisation of main Albanian grape cultivars

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Introduction

Albania, located at the heart of the Mediterranean, has a millennial viticultural tradition and a wide germplasm to be valorised. Among this rich germplasm, four cultivars for winemaking have been mostly valued and commercialised in Albania. However, there is a need for further characterisation and evaluation, especially in terms of metabolic and enological characterisation.

Material and Methods

The study was conducted during 2009 - 2010 on must and wine samples of representative clusters collected during their technological maturity (soluble solids %/titratable acidity ratio stable) and belonging to grapevine collection located at the Agricultural Technology Transfer Centre of Vlora. Clusters between 1 m and 20 cm above the soil were chosen. Titrable acidity, pH and sugar content were measured in musts of the grape varieties under study. Two replicates of 500 g of berries for each variety were frozen at -18°C until polyphenol extraction. Polyphenol extraction was based on Mattivi method, as it is able to extract polyphenols from grape skins and seeds, simulating the maceration process of red winemaking. Spectrophotometric determinations were carried out on the extracts according to the methods of Di Stefano et al. (1989).

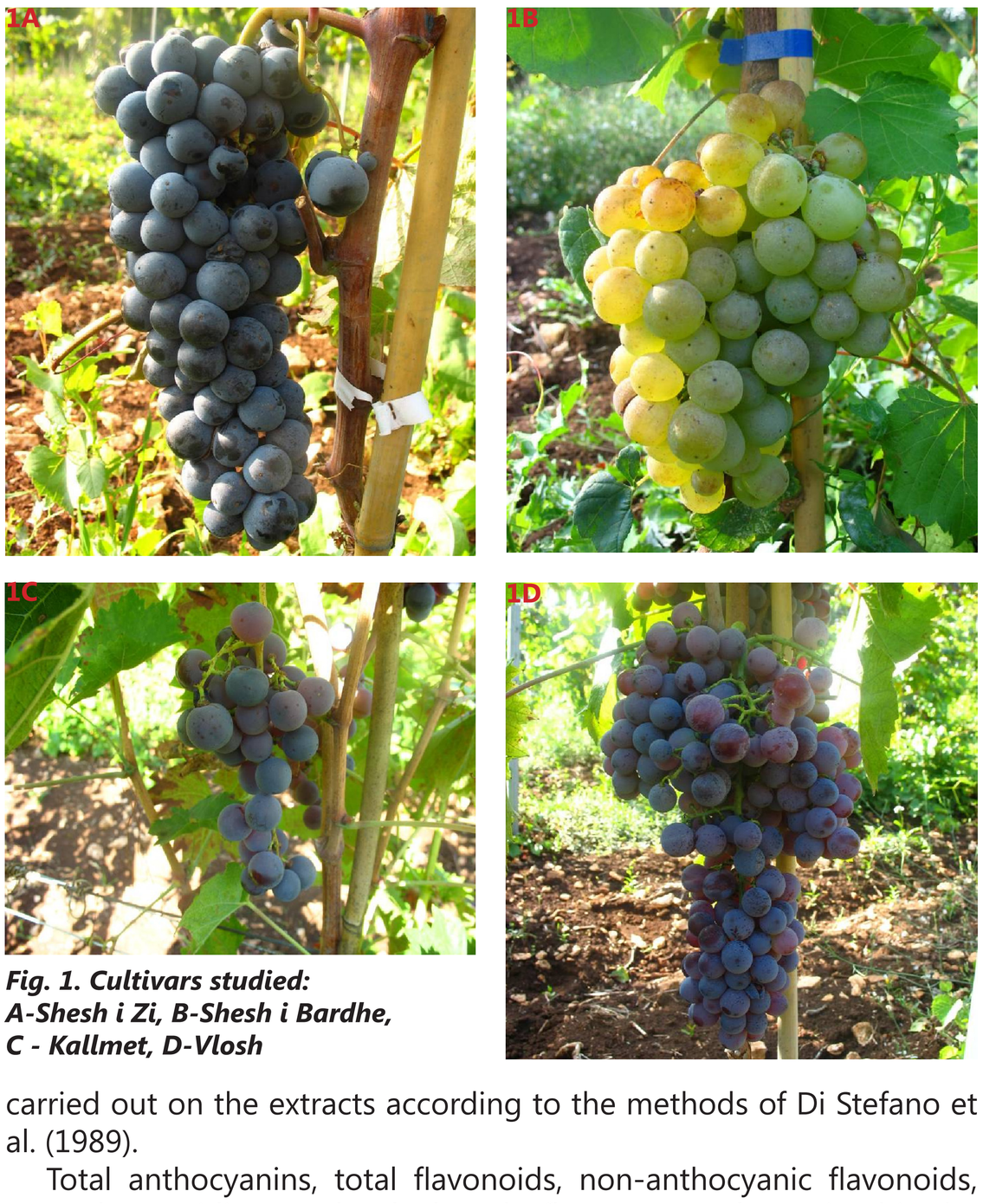

Fig. 1. Cultivars studied:
A-Shesh i Zi, B-Shesh i Bardhe,
C - Kallmet, D-Vlosh

Total anthocyanins, total flavonoids, non-anthocyanic flavonoids, proanthocyanidins, total polyphenols, flavans were determined in the extracts of the grape skins and seeds. Hydroxycinnamic acid was extracted from the flesh.

Wines of the cv. under study were collected from different areas like Durres, Berat, Tirana, Mirdita, Lezha, Delvina and Vlora regions.

Results

The series of tables below shows the parameters measured. Results show a high inter- and intra- variability between the cultivars under study. This could also be due to the lack of proper homologation of these cultivars to maintain their genetic true-to-type.

Table 1. Phenolic profiles in the skin and seeds (2009 - 2010)*

Berry part analysed	*Indices*	*Year*	*SHZ*	*SHB*	*KLL*	*VLO*
SKIN	Total anthocyanins (mg/kg)	2009	1271.84	0	819.69	288.69
		2010	1125.72	0	n.m	752.39
	Total flavonoids (mg/l)	2009	2873.16	504.16	1756.42	954.11
		2010	2468.32	1125.64	n.m	919.28
	Non-anthocyanic flavonoids (mg/l)	2009	n.m	n.m.	n.m.	n.s.
		2010	1375.93	1125.64	n.m.	576.73
	Proanthocyanidins (mg/kg)	2009	2084.80	788.00	1644.80	1111.5
		2010	1117.09	1223.92	n.m.	1290.57
	Total polyphenols (mg/kg)	2009	3584.59	1429.90	3274.75	2330.63
	Total polyphenols (mg/l)	2010	1717.67	1316.69	n.m.	932.50
	Flavans (mg/l)	2009	518.25	355.62	1192.63	624.51
		2010	670.09	1435.53	n.m.	388.46
SEEDS	Total flavonoids (mg/l)	2009	518.25	355.62	1192.63	624.51
		2010	670.09	1435.53	n.m.	388.46
	Proanthocyanidins (mg/kg)	2009	1050.56	592.23	2228.85	1330.97
		2010	421.09	811.44	n.m.	396.29
	Total polyphenols (mg/kg)	2009	2237.70	994.1	4831.1	2724.2
		2010	417.76	747.87	n.m.	272.29
	Flavans (mg/kg)	2009	1824.30	1102.13	5069.7	2378.0
		2010	29.80	32.15	n.m.	72.70
FLESH	Hydroxycinnamic	2009	70.78	32.15	42.67	34.50
		2010	54.11	74.87	n.m.	72.70

* Values are the means of two replicates for each extraction
n.m. – not measured

Table 2. Results of spectrophotometric determinations from the wine

Wine code	*Polyphenols (mg/l)*	*Total flavonoids (mg/l)*	*Total anthocyanins (mg/l)*	*Flavans (mg/l)*	*Proanthocyanidins (mg/l)*	*T/A*
SHZV1	252.9	1843.2	270.8	442.9	688.3	2.5419
SHZV2	149.0	2710.5	356.2	896.4	1529.3	4.2929
SHZV3	110.0	1680.5	242.8	444.7	1413.2	5.8206
SHBV4	32.4	623.4	0.0	121.4	192.7	0
KVLV5	199.4	3184.9	701.4	1093.6	278.4	0.3969
KLLV6	138.3	2751.2	252.4	753.6	1810.7	7.175
KLLV7	46.9	2341.9	221.9	555.4	122.4	0.6
KLLV8	137.3	2580.4	296.0	879.9	1786.3	6.0349
KLLV9	1801.6	959.2	136.4	680.48	2597.3	19.1
KLLV10	2237.4	2181.0	159.6		2783.9	17.4
CERV11	12.6	563.8	20.0	26.3	0.0	0
ZADV12	1063.1	1565.2	96.4	304.4	1257.6	13.0
MERV13	129.9	1821.5	314.7	536.8	645.5	2.0513
MERV14	113.6	1973.3	322.9	655.2	931.5	2.8847
RIEV15	31.1	195.2	36.1	80.6	51.4	1.4233
RIEV16	24.6	493.3	23.5	90.1	91.8	3.8986

Discussions and Conclusions

The high variation in polyphenolic content between cultivars (Table 1) is due to the grape composition whilst it is assumed that changes between wines of the same cultivar (Table 2) are related to the oenological practices. The results show a similar level of colour intensity (Table 2) between wines from 'Kallmet' and 'Sheshi i Zi' (1.6 ± 0.21) but when Kallmet is mixed with Vlosh, the value increases to 2.7.

Kallmet and Sheshi i Zi produce wines suitable for ageing because they contain more phenolic compounds, especially anthocyanins and tannins with a low degree of polymerisation, able to be transformed into proanthocyanidins or condensed tannins during storage.

These autochthonous cultivars, with great wine potential represent a valuable instrument for improving the local economies.

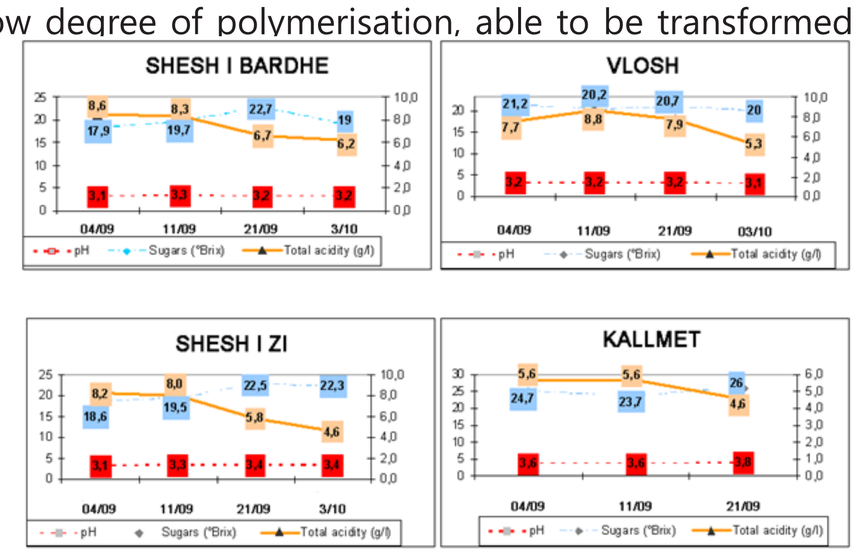

Fig. 1. Ripening curves of showing the dynamics of pH, sugars and total acidity (average values 2009 – 2010)