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1.1 = Characterization of the phenolic content of leaves and green pruning residues of *Vitis vinifera* L.

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Vitis vinifera L., commonly known as grapevine, is a woody perennial plant belonging to the Vitaceae family. Mankind has benefited from vine since ancient times. Initially wild species were used and, subsequently, with the domestication of the plant, men cultivated vine to obtain grapes that could be eaten fresh or dried (raisins), or used to produce wine. Nowadays, grape crops are one of the main and most widespread agro-economic activities in the world. A large proportion of the grape's production is used in vinification processes. Unfortunately, viticulture and wine production generate huge amounts of residues, which are destined mainly to composting or discarded in open areas, potentially causing environmental issues. Hence, the need to find solutions in order to reduce the amount of waste on landfill sites, such as reuse, recycling and recovery of resources (1).

Although numerous studies have been conducted on the chemical composition of several grapevine by-products (i.e. grape seeds and skins) (2, 3), little information is available on that of the leaves and even less on the green pruning residues (GPR) generated by the annual pruning of vineyards (Fig. 1) (4, 5). The aim of the present study is therefore to determine the phenolic content of leaves and GPR from *V. vinifera* L., to establish whether they could be a valid source of antioxidants with nutritional properties and biological potential, thus increasing their economic value and, at the same time, limiting their waste and impact on the environment.

For this purpose extracts of leaf and GPR samples from 16 cultivars of *V. vinifera*, harvested in Piedmont and used to produce some of the most prestigious wines, were evaluated.

The phenolic compounds were extracted using ultrasound-assisted extraction method (UAE), a simpler, faster, more efficient and cost-effective system than the conventional extraction techniques that entailed a greater consumption of time, energy and polluting solvents. The extraction conditions were optimized using an experimental design that ensures that the highest yield is obtained reliably, quickly and efficiently.

The extracts were then subjected to High Performance Liquid Chromatography (HPLC) analysis combined with UV and triple quadrupole MS detection for the qualitative and quantitative analysis.

On the basis of the data obtained, GPR and leaves phenolic contents of the various cultivars were compared and the similarities and differences were evaluated using unsupervised chemometrics techniques (Fig. 2).

Results show that, even though leaves and GPR can be discriminated using statistical tools, the qualitative and quantitative results of the two by-products are comparable. Since GPR, are the most widely available residues, they may be further investigated in order to evaluate an effective potential antioxidant activity..



Fig. 1. *V. vinifera* green pruning residues

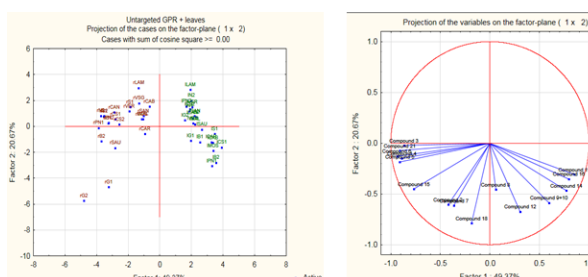


Fig. 2. Score and loading plot obtained by PCA of analysis results

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