

Life D3 ENV/GR/000223

DIONYSOS

Development

of an economically viable process for the integrated management via utility

of winemaking industry wastes:

Production

of high added value natural products

and organic fertilizer



Agricultural University of Athens



of Athens





Central Cooperative Union of Viticultural products



TERRA NOVA Ltd.

Grape pomace: an unexploited source of bioactive compounds, in Greece



Grape pomace is an agricultural waste produced in huge amounts during the wine making procedure. In Greece, about 500.000 tn of grapes are used annually for vinification in about 400 wineries. Grape pomace consists the 17% of the grape biomass that is used for wine production. It is a very rich source of bioactive compounds and especially stilbenoids, phenolic acids and flavonoids.

Under the framework of the **Life-Environment Programme** "DIONYSOS" we designed and developed at pilot scale a system for the treatment of grape pomace with the aim to:

recover the contained stilbenoids/polyphenols and

reduce the environmental problems.

Procedure

The treatment procedure consists of the following four main successive individual sections:



EXTRACTION-FILTRATION

The first section of the treatment system includes the collection, air-drying, pulverization and extraction of grape pomace with EtOH with mechanical stirring for 12 h. Then the extract is separated from the powder and diluted with ten volumes of water and filtered.



SELECTIVE ADSORPTION OF POLYPHENOLS

The second section of the treatment procedure includes the pass of the filtered water-alcohol extract through a series of specialised adsorbent resins in order to achieve the decolourisation and the removal/ recovery of the polyphenols content.

Afterwards the resins are regenerated with ethanol and are ready to be used again

The water-alcohol grape pomace waste after its pass from the previous stages is an odourless, light yellow coloured liquid, which does not contain any polyphenolic substances. All contained polyphenols have been successfully adsorbed.



THERMAL TREATMENT-SOLVENT RECOVERY

The third section of the treatment procedure aims at the recovery of the organic solvents mixture, which has been used in section B of the system and the obtainment of the dry enriched polyphenolic extracts.

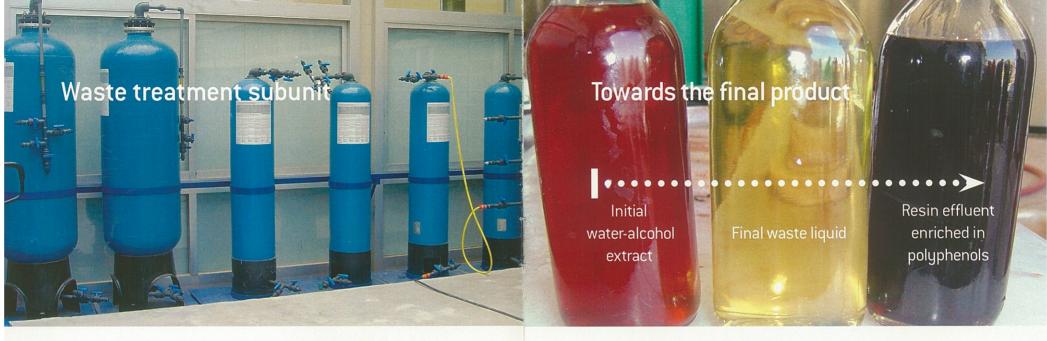


PURIFICATION OF RESVERATROL BY FCPC

The fourth section aims at the purification of resveratrol and other polyphenols contained in the enriched extract coming from section C, using FCPC chromatography.

The final outcome of the whole precedure is:

- an extract enriched in stilbenoids and polyphenols with high antioxidant activity and high added value (1 kg per 100 kg of dry grape pomace)
- pure resveratrol (1 gr per 100 Kg of dry grape pomace)
- an odorless yellowish wastewater with a 99.5% reduced content in polyphenols
- an extract containing the coloring substances of the grape skin



Adsorption Resin Columns



In the laboratory of Pharmacognosy & C.N.P. of U.A. has been installed a prototype grape pomace treatment unit.



The obtained extract, after the resin treatment, is a semisolid product that cannot be easily handled. For this purpose the extract is mixed with maltodextrin diluted in water and submitted to spray-drying. The final product is a red fine powder that can be easily consumed after dilution in a glass of water. Based on the quantity of the contained resveratrol in the extract and the corresponding grapes, consumption of approx. 600 mg of the extract is equivalent with the consumption of 1 Kg of grapes. The extract in collaboration with the Department of Cardiology, University General Hospital, ATTIKON was administered to patients with coronary disease and found to improve greatly the endothelial function.

Enriched red grape pomace extract

Evaporation Unit



The winemaking industry wastes are being used by two separate subunits installed in the premises of A.U.A. to produce:

- organic fertilizer by composting
- animal food



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