SCIENZE A SISTEMA PER LA SOSTENIBILITÀ
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Wine industry by-products and their application for human health

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Introduction

Unfermented grape pomace and grape seeds are agro-industrial by-products, the inadequate treatment of which generates socioeconomic and environmental concerns. Nevertheless, it is possible to valorize them by extracting their bioactive compounds, such as phenolics. ViVitapharma, an innovative startup of Sapienza University, has chosen to produce and commercialize natural products, to favor the use of environmentally sustainable active ingredients and excipients, and to adopt a consumption and business model aimed at reducing environmental impact. VITINIX® is a patented extract from a grape cultivar produced in ViVita's laboratories which is extremely rich in polyphenols, oligomeric and polymeric proanthocyanidins.

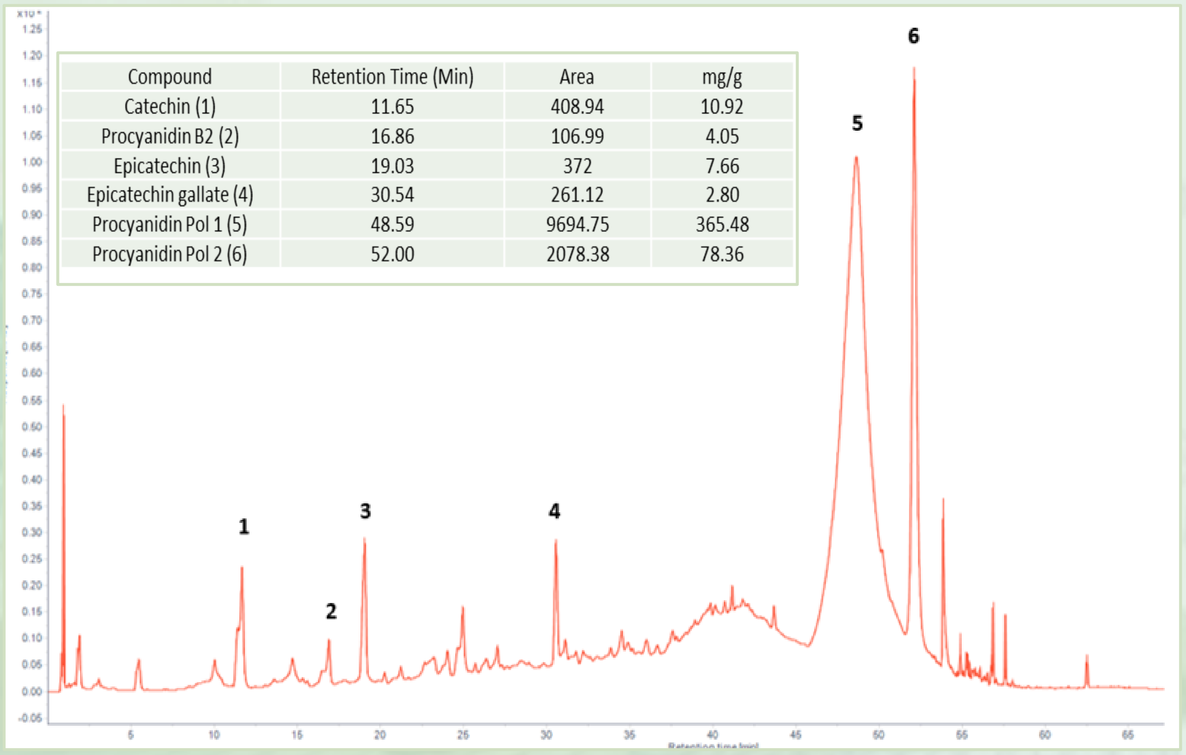
Extraction process

The unfermented grape pomace was dried and sieved, and seeds were recovered. Non-toxic solvents for humans were used. The instrumentation was able to recover and re-use the hydroalcoholic extraction mixture multiple times, thus reducing production costs and making the process more sustainable from a circular economy perspective. The desired bioactive compounds were extracted using solid-liquid extraction and subjected to phytochemical analysis to characterize and quantify them as well as to an evaluation of their possible applications in dermocosmetics. The dry extracts are free of excipients, solvents and toxic residues.

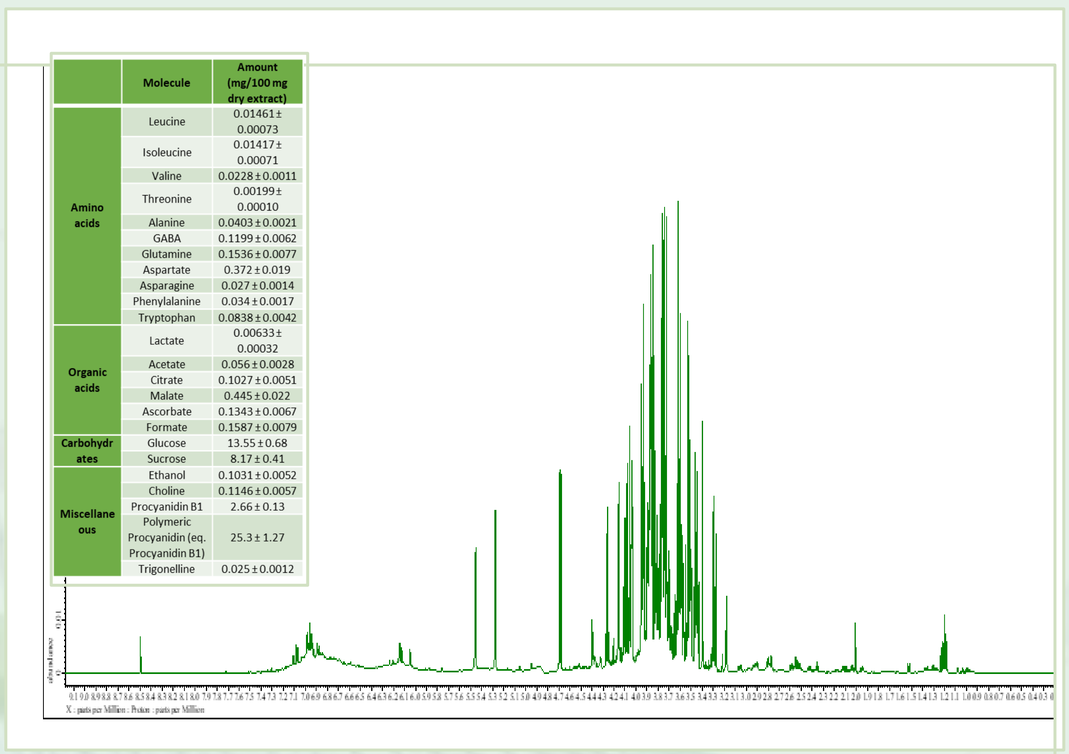
Chemical analyses

HPLC-DAD analysis revealed a 70% content of total procyanidins in the extracts. From the ^{1}H-NMR spectrum, it was possible to identify and quantify 24 further metabolites classified as amino acids, organic acids, carbohydrates, and miscellaneous. Among them, it is interesting to notice the presence of ascorbate, procyanidin B1 and polymeric procyanidins.

Compound	Retention Time (Min)	Area	mg/g
Catechin (1)	11.65	408.94	10.92
Procyanidin B2 (2)	16.86	106.99	4.05
Epicatechin (3)	19.03	372	7.66
Epicatechin gallate (4)	30.54	261.12	2.80
Procyanidin Pol 1 (5)	48.59	9694.75	365.48
Procyanidin Pol 2 (6)	52.00	2078.38	78.36



	Molecule	Amount (mg/100 mg dry extract)
Amino acids	Leucine	0.01461 ± 0.00073
	Isoleucine	0.01417 ± 0.00071
	Valine	0.0228 ± 0.0011
	Threonine	0.00199 ± 0.00010
	Alanine	0.0403 ± 0.0021
	GABA	0.1199 ± 0.0062
	Glutamine	0.1536 ± 0.0077
	Aspartate	0.372 ± 0.019
	Asparagine	0.027 ± 0.0014
	Phenylalanine	0.034 ± 0.0017
	Tryptophan	0.0838 ± 0.0042
Organic acids	Lactate	0.00633 ± 0.00032
	Acetate	0.056 ± 0.0028
	Citrate	0.1027 ± 0.0051
	Malate	0.445 ± 0.022
	Ascorbate	0.1343 ± 0.0067
	Formate	0.1587 ± 0.0079
Carbohydrates	Glucose	13.55 ± 0.68
	Sucrose	8.17 ± 0.41
Miscellaneous	Ethanol	0.1031 ± 0.0052
	Choline	0.1146 ± 0.0057
	Procyanidin B1	2.66 ± 0.13
	Polymeric Procyanidin (eq. Procyanidin B1)	25.3 ± 1.27
	Trigonelline	0.025 ± 0.0012



Results

The results obtained by the research and development team at the Sapienza laboratories demonstrated that grape seed extracts have effect on *Malassezia* and *Candida*, dermatophytes that cause or are exacerbating factors of various forms of dermatitis such as the atopic and seborroic dermatitis and psoriasis (Patent application, (0001407378). Pasqua, G., Simonetti, G., D'Auria, F. D., Santamaria, A. R., & Antonacci, D. (2014), assignment to ViVita). Grape seed extract has also the ability to rebalance the scalp microbiota and is effective in combating dandruff. Clinical trials (Abich company) were performed on a group of patients. Various dermocosmetics products were formulated containing 4% of active ingredient and supplemented with other natural extracts such as mauve, chamomile, aloe gel and various vegetable essential oils such as EVO, avocado and jojoba. A formulation was specifically prepared for children, including infants. This was more delicate and effective for maintaining an adequate level of moisture and balancing sensitive skin with an atopic tendency. It was also excellent for diaper rash in children and elderly people.

ViVita contributes to human wellbeing with alternative products to synthetic drugs that promote a longer and healthier life and embraces the principles of 'One Health' paradigm, a model which is based on the integration of different disciplines and the recognition that human, animal and ecosystem health are inextricably linked. This work is a clear example of this.

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