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Grape pomace as a resource for sustainable utilization: characterization of the amino acid profile

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Introduction

The wine industry generates substantial quantities of by-products, among which grape pomace represents a complex matrix rich in valuable bioactive compounds and other constituents of technological interest. Its chemical characterization is essential for identifying potential valorization pathways and promoting its sustainable utilization, thereby contributing to resource efficiency and the implementation of circular economy principles [1]. A comprehensive understanding of the nutritional and chemical composition of this by-product may facilitate the identification of novel valorization opportunities across a range of industrial sectors [2].











Aim

The aim of this study was to characterize the total amino acid profile in grape pomace samples from different Portuguese grape varieties and wine-growing regions (Touriga Nacional from the Douro Cima Corgo (TN-CC) and from Lisbon (TN-L), Aragonês/Tinta Roriz from Lisbon (TR-L), and Vinhão/Sousão from the Vinhos Verdes region (V-VV)).

Material and method

Grape pomace samples



Samples ground before analysis

Hydrolysis



Acid hydrolysis

HCl, 6M; 110 ˚C; 24 h

Alkaline hydrolysis

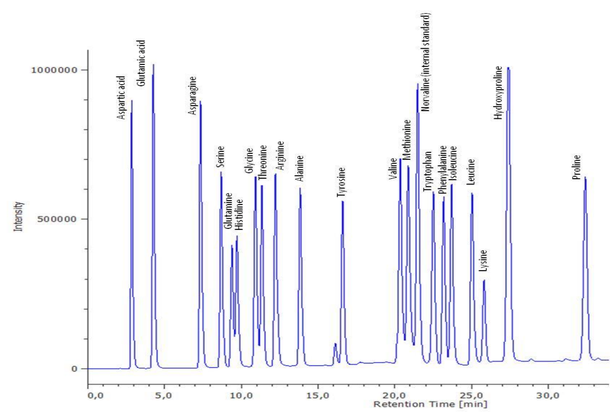
KOH, 4M; 110 ˚C; 4 h

RP-HPLC-FLD



Online pre-column derivatization with OPA/3-MPA and FMOC, followed by RP-HPLC-FLD analysis [3].

Amino acid identification and quantification



Results and discussions

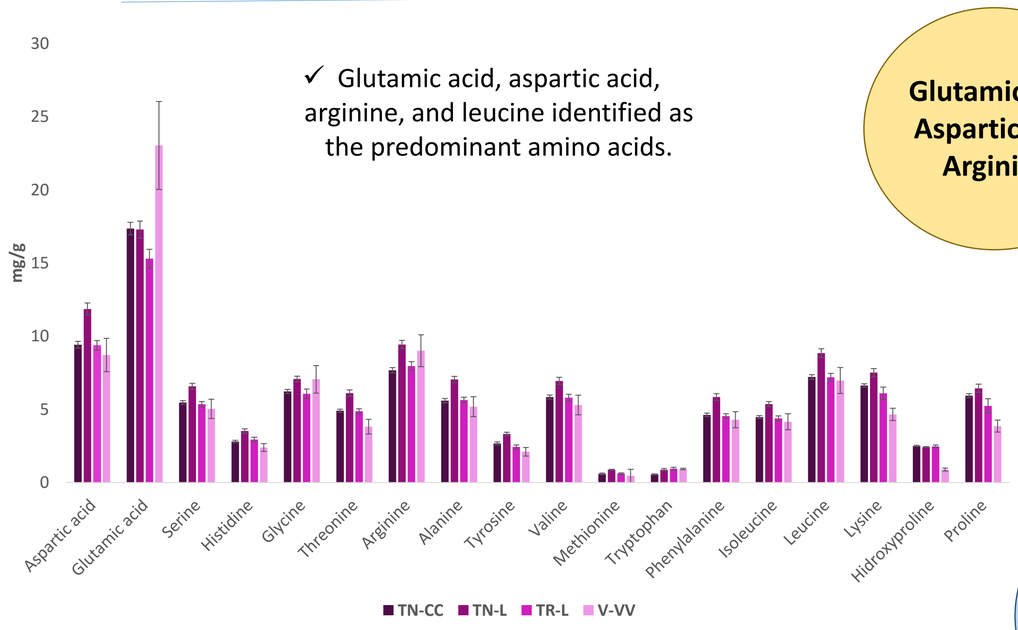


Figure 1. Amino acid profile (mg/g) of grape pomace samples from different grape varieties and wine-growing regions.

✓ Glutamic acid, aspartic acid, arginine, and leucine identified as the predominant amino acids.

Glutamic acid
Aspartic acid
Arginine

Cosmetic formulation potential:
- Relevant for amino acid-based ingredients
- Potential for functional formulations

Serine
Glycine
Alanine

Skin hydration:
- Contribute to water retention
- Support *stratum corneum* hydration

Proline
Hydroxyproline

Skin protein structure:
- Associated with collagen struture
- Interest for skin-care ingredient research

✓ The Touriga Nacional sample from Lisbon exhibited the highest total amino acid content;

✓ The pomace from the Lisbon region exhibited an approximately 17% higher total amino acid content than that from the Cima Corgo subregion of the Douro.

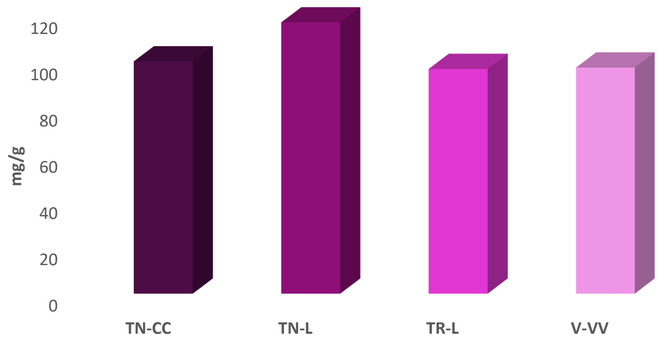


Figure 2. Total amino acid content (mg/g) of grape pomace samples from different grape varieties and wine-growing regions.

Conclusions

These results reinforce the interest in adding value to this by-product, exploring new opportunities for its utilization, namely as a raw material for the development of ingredients for the cosmetics industry.

References

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