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INSTITUTO DA VINHA E DO VINHO

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✓ Prémios "Distinção CNOIV" 2022

Atribuídos nas áreas:

- Enologia
- Nutrição e Saúde
- Viticultura

✓ Prémio "Inovação CNOIV" 2022

Prémio “Distinção CNOIV Enologia”

- ✓ Artigo científico publicado em 2021 na revista científica “Foods” :**“Effect of Barrel-to-Barrel Variation on Color and Phenolic Composition of a Red Wine"** de um coletivo de autores representado por Sofia Catarino.


foods

Article

Effect of Barrel-to-Barrel Variation on Color and Phenolic Composition of a Red Wine

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Abstract: Tangible variation of sensory characteristics is often observed in wine aged in similar barrels. Barrel-to-barrel variation in barrel-aged wines was investigated in respect of the most important phenolic compounds of oenological interest. A red wine was aged in 49 medium-toasted oak (*Quercus petraea*) barrels, from four cooperages, for 12 months. The resulting wines were evaluated for chromatic characteristics, anthocyanin-related parameters, total phenols, flavonoids and non-flavonoids phenols, flavanol monomers, and oligomeric and polymeric proanthocyanidins. PCA and ANOVA were applied to investigate the relationships between barrels and to assess cooperage and individual barrel effect. Three cooperages influenced the wine similarly during aging. Anthocyanin-related parameters showed the highest variation, 25–37%, other phenolics varied 3–8.5%, and with two exceptions, chromatic characteristics changed 1.7–3%. The relationship between the number of barrels and the expected variation for each analytical parameter was calculated, as reference for future measurements involving barrel lots, either in wine production or experimental design.

Keywords: red wine; oak barrel aging; cooperage; barrel-to-barrel variation; phenolic composition

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1. Introduction

Wine aging in oak barrels is a traditional and widespread practice in winemaking worldwide. Alternative containers such as stainless-steel tanks, concrete vessels, or polyethylene tanks surpass barrels in some respects, such as price, hygiene, and material homogeneity. Nevertheless, barrels are still firmly established in quality wine production and that is due to their positive influence on the organoleptic quality and complexity of wine [1]. Various phenomena related to physical and chemical characteristics of the oak are directly responsible for these effects. First, the water and ethanol non-negligible evaporation due to the porosity of the wood [2] and some wine absorption by the wood (especially in new barrels). Second, the transfer of extractable compounds such as ellagitannins and volatile substances such as guaiacol, eugenol, and ethyl- and vinyl phenols as well as oak lactones (β-methyl-γ-octalactone) and furfural (-derivates) [3]. The total amount though is limited and quickly reduced by the extraction process into wine [4]. The extracted substances influence sensations such as astringency and mouthfeel and increasing the aroma intensity and complexity. Third, the oxygen moderate permeation and diffusion through the wood promotes different reactions of oxidation, polymerization, copigmentation, and condensation involving anthocyanins and proanthocyanins which stabilize the color and reduce the astringency. Finally, the storage in barrels accelerates the natural sedimentation of unstable colloidal matter, thus contributing to wine stability and limpidity [1].

Phenolic changes during wine aging are a dynamic process yielding a huge variety of colorless products and pigments [5]. Their relative quantity depends on many factors [6].

Prémio “Distinção CNOIV Nutrição e Saúde”

- ✓ **Artigo científico publicado em 2021 na revista científica “Molecules”: "Valorization of Winemaking By-Products as a Novel Source of Antibacterial Properties: New Strategies to Fight Antibiotic Resistance" de um coletivo de autores representado por Patricia Poeta.**

molecules

MDPI

Review

Valorization of Winemaking By-Products as a Novel Source of Antibacterial Properties: New Strategies to Fight Antibiotic Resistance

Adriana Silva [1,2,3,4], Vanessa Silva [1,2,3,4], Gilberto Igrejas [2,3], Isabel Gaivão [5,6], Alfredo Aires [4], Naouel Klibi [7], Maria de Lurdes Enes Dapkevicius [8,9,*], Patrícia Valentão [10], Virgilio Falco [11] and Patrícia Poeta [1,6,*]

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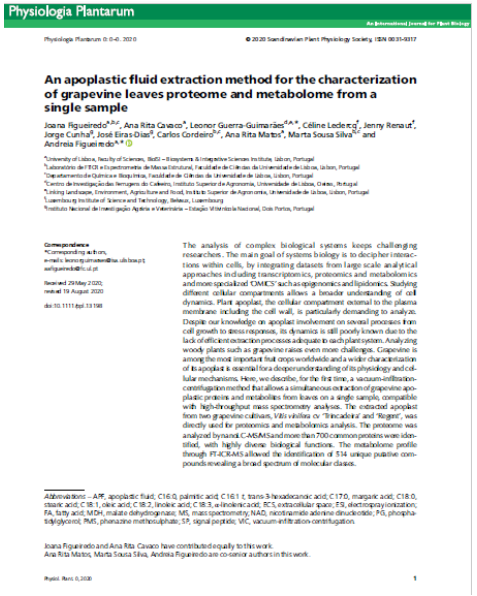
Abstract: The emergence of antibiotic-resistance in bacteria has limited the ability to treat bacterial infections, besides increasing their morbidity and mortality at the global scale. The need for alternative solutions to deal with this problem is urgent and has brought about a renewed interest in natural products as sources of potential antimicrobials. The wine industry is responsible for the production of vast amounts of waste and by-products, with associated environmental problems. These residues are rich in bioactive secondary metabolites, especially phenolic compounds. Some phenolics are bacteriostatic/bactericidal against several pathogenic bacteria and may have a synergistic action towards antibiotics, mitigating or reverting bacterial resistance to these drugs. Complex phenolic mixtures, such as those present in winemaking residues (pomace, skins, stalks, leaves, and especially seeds), are even more effective as antimicrobials and could be used in combined therapy, thereby contributing to management of the antibiotic resistance crisis. This review focuses on the potentialities of winemaking by-products, their extracts, and constituents as chemotherapeutic antibacterial agents.

Keywords: grape by-products; antibacterial activity; antibiotic resistance; phenolic compounds

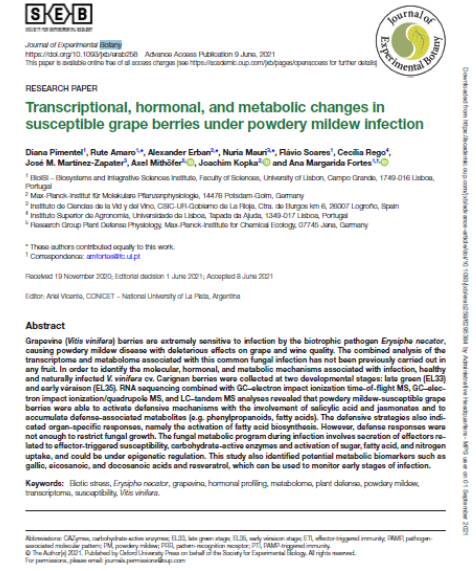
Prémios “Distinção CNOIV Viticultura”

- ✓ Artigo Científico publicado em 2020 no “Physiologia Plantarum” journal”:"**An apoplastic fluid extraction method for the characterization of grapevine leaves proteome and metabolome from a single sample**" de um coletivo de autores representado por Joana Figueiredo;

- ✓ Artigo Científico publicado em 2021 no “Journal of Experimental Botany”:“**Transcriptional, hormonal, and metabolic changes in susceptible grape berries under powdery mildew infection**” de um coletivo de autores representado por Ana Margarida Fortes.


Physiologia Plantarum

An apoplastic fluid extraction method for the characterization of grapevine leaves proteome and metabolome from a single sample


Journal of Experimental Botany

RESEARCH PAPER

Transcriptional, hormonal, and metabolic changes in susceptible grape berries under powdery mildew infection

Prémio “Inovação CNOIV”

- ✓ Artigo Científico publicado em 2020 na revista da especialidade “Scientific Reports”:"**Integrating metabolomics and targeted gene expression to uncover potential biomarkers of fungal/oomycetes associated disease susceptibility in grapevine**" de um coletivo de autores representado por Marisa Maia;

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Integrating metabolomics and targeted gene expression to uncover potential biomarkers of fungal/oomycetes-associated disease susceptibility in grapevine

Marisa Maia[1,2], António E. N. Ferreira[1], Rui Nascimento[2], Filipa Monteiro[3,4], Francisco Traqueta[2], Ana P. Marques[2], Jorge Cunha[4], José E. Eiras-Dias[4], Carlos Cordeiro[1], Andreia Figueiredo[1,4,5] & Marta Sousa Silva[1,4,5]

Vitis vinifera, one of the most cultivated fruit crops, is susceptible to several diseases particularly caused by fungus and oomycete pathogens. In contrast, other *Vitis* species (American, Asian) display different degrees of tolerance/resistance to these pathogens, being widely used in breeding programs to introgress resistance traits in elite *V. vinifera* cultivars. Secondary metabolites are important players in plant defence responses. Therefore, the characterization of the metabolic profiles associated with disease resistance and susceptibility traits in grapevine is a promising approach to identify trait-related biomarkers. In this work, the leaf metabolic composition of eleven *Vitis* genotypes was analysed using an untargeted metabolomics approach. A total of 190 putative metabolites were found to discriminate resistant/partial resistant from susceptible genotypes. The biological relevance of discriminative compounds was assessed by pathway analysis. Several compounds were selected as promising biomarkers and the expression of genes coding for enzymes associated with their metabolic pathways was analysed. Reference genes for these grapevine genotypes were established for normalization of candidate gene expression. The leucoanthocyanidin reductase 2 gene (*LAR2*) presented a significant increase of expression in susceptible genotypes, in accordance with catechin accumulation in this analysis group. Up to our knowledge this is the first time that metabolic constitutive biomarkers are proposed, opening new insights into plant selection on breeding programs.

Grapevine (*Vitis vinifera* L.) is one of the most cultivated fruit plants in the world, with an important economic impact in wine and table grape industries. Of the 80 known and globally distributed *Vitis* species[1,2], *Vitis vinifera* L. is the mostly used in viticulture. As a result of its easy cultivation, vineyards longevity and numerous applications, in 2018, the global surface area for grapevine production was 7.4 Mha[3]. Grapevine cultivation requires preventive applications of agrochemicals to control several diseases, such as downy mildew [*Plasmopara viticola* (Berk. & Curt.) Berl. & de Toni) Berl. et de Toni], powdery mildew [(*Erysiphe necator* syn. *Uncinula necator* (Schweinf.) Burrill), gray mold (*Botrytis cinerea* Pers.) and black rot (*Guignardia bidwellii* (Ellis) Viala & Ravaz),

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