CIÊNCIA E TÉCNICA VITIVINÍCOLA

Ciência Téc. Vitiv. 36(2) 173-175. 2021

Article

NEW INSIGHTS INTO VITICULTURE, ENOLOGY AND VITIVINICULTURAL ECONOMY: *CIÊNCIA E TÉCNICA VITIVINÍCOLA* 2021

NOVOS CONHECIMENTOS NOS DOMÍNIOS DA VITICULTURA, ENOLOGIA E ECONOMIA VITIVINÍCOLA: *CIÊNCIA E TÉCNICA VITIVINÍCOLA* 2021

Jorge Cunha, Ilda Caldeira, Sara Canas

Instituto Nacional de Investigação Agrária e Veterinária, Pólo de Dois Portos/Estação Vitivinícola Nacional, Quinta de Almoinha, 2565-191 Dois Portos, Portugal.

SUMMARY

New insights into Viticulture, Enology and Vitivinicultural Economy arise from the fourteen articles published by the *Ciência e Técnica Vitivinícola* in 2021. Research carried out by several international teams covered a wide range of topics that seek to respond to current main challenges: chemical, morphological and anatomical features of the grapevine cultivars explored to withstand biotic and abiotic stresses; seaweed foliar application to grapevines as an innovative and integrated vineyard management technique; nutritional management of grapevine cultivars under cold climate conditions and under water constraint scenarios; viability and cost-effectiveness of photovoltaic solar energy for wineries; viticultural technologies and the food safety of wine; characterization of grapes and methods for juice production; chemical composition of grape seeds; development of analytical and sensory methodologies; portrait of the wine spirits sector in Portugal and its recent evolution.

RESUMO

Novos conhecimentos nos domínios da Viticultura, Enologia e Economia Vitivinícola emergem dos catorze artigos publicados pela *Ciência e Técnica Vitivinícola* em 2021. Procurando responder aos principais desafios da atualidade, a investigação realizada por diversas equipas internacionais contemplou um vasto leque de temas: exploração de características químicas, morfológicas e anatómicas das cultivares de videira visando a resistência a stresses bióticos e abióticos; aplicação foliar de algas marinhas em videiras como uma técnica de gestão inovadora e integrada; gestão nutricional de cultivares de videira em climas frios e em cenários de restrição hídrica; viabilidade e custo/benefício da energia solar fotovoltaica para adegas; tecnologias vitícolas e segurança alimentar do vinho; caracterização de uvas e métodos para a produção de sumo; composição química de grainhas de uva; desenvolvimento de metodologias analíticas e sensoriais; retrato do sector das aguardentes vínicas em Portugal e da sua evolução recente.

Keywords: Viticulture, enology, vitivinicultural economy.
Palavras-chave: Viticultura, enologia, economia vitivinícola.

The use of more robust analytical techniques (including sensory analysis) and new viticultural and oenological technologies, as well as the more efficient use of natural resources/circular economy, mark the research in the fields of Viticulture, Enology and Vitivinicultural Economy on a worldwide scale. Strategies and responses are sought to overcome the constraints arising from climate change and decline of biodiversity, and challenges imposed by the growing demand from producers, consumers and regulatory bodies of the wine sector in terms of quality, health effects, food safety and differentiation of wines and other vitivinicultural products (OIV, 2019).

These trends are reflected in the fourteen articles published by the *Ciência e Técnica Vitivinícola* throughout 2021.

A metabolomics approach combined with Van Krevelen diagrams and compositional space plots was used by Maia *et al.* (2021) to examine the chemical diversity of two *Vitis* species in order to understand their intrinsic resistance/susceptibility to pathogens. This technical note reveals that metabolome of *V. rotundifolia* (resistant to pathogens) is more complex than that of *V. Vinifera* cv. 'Cabernet Sauvignon' (susceptible to pathogens), showing higher density of compounds from lipids, polyketides and carbohydrates groups. These

findings are of great significance to improve the management of phytosanitary risks in vineyards focusing on low environmental impact measures.

Besides chemical diversity, specific morphological, anatomical and physiological features of the grapevine cultivars may be involved in their ability to withstand biotic and abiotic stresses. Recent advances on the adaptation of grapevine leaf morphoanatomical features and hydraulic architecture to abiotic stresses (mainly water and heat stress), mostly induced by climate changes, were addressed by MacMillan *et al.* (2021) in a review article. The information provided can be used to preserve cultivars under this scenario, to select the most suitable cultivar(s) for a *terroir* and to adopt proper management strategies as well.

Seaweed foliar application to grapevines, as an innovative and integrated vineyard management technique, was the core of a review article (Gutiérrez-Gamboa *et al.*, 2021). An overview of its effects as a fertilizer but also as an elicitor is presented, highlighting the improvement of grapevine productivity and enhancement of grape and wine quality, mostly in terms of phenolic composition, and the induction of grapevine's natural defence mechanisms against biotic and abiotic stresses.

Diez-Zamudio *et al.* (2021) investigated the influence of nutritional management on the yield and must composition of several interspecific hybrids and *V. vinifera* varieties ('Chardonnay', 'Riesling', 'Pinot Noir') cultivated under cold climate conditions (Nova Scotia, Canada). Considering the emergence of vineyards in colder areas as a consequence of climate changes, the results on the adaptation of grapevine varieties from warmer regions together with viticultural practices are of utmost importance.

In the same scope, the article of Candar *et al.* (2021) focused on the variability of plant nutrition under different water constraint scenarios using eight grapevine cultivars submitted to five irrigation treatments. The outcomes reinforce that the ability of grapevine cultivars to cope with the water deficit should be assessed in adaptation strategies developed to make viticulture sustainable under the effects of the climate crisis.

Perdigones *et al.* (2021), devoting their research to the viability and cost-effectiveness of grid-connected photovoltaic solar energy for wineries located in the Mediterranean area, based on the European TESLA and European SCOoPE projects, revealed the main factors involved in the optimization and profitability of the use of this renewable energy source. Findings on the consumption and cost of electrical energy covered by photovoltaic energy were also emphasized.

Implication of viticultural technologies on the wine mineral composition was the topic of one article (Botelho *et al.,* 2021). The interaction of mechanized pruning systems and soil organic amendment was studied in 'Syrah' vineyards using two field trials during two harvests. Specific effects on each mineral element were observed but all the wines complied with the legal and technical limits, and therefore the interaction of these practices does not seem to be an issue in terms of food safety of the wines produced.

The characterization of phenolic composition and antioxidant activity of 'Isabel Precoce' grapes used for juice production, growing under different trellis systems and rootstocks in semi-Arid conditions in Brazil was carried out by Costa *et al.* (2021). Trellis systems, rootstocks, harvest seasons and their interactions affected the characteristics of the grapes; the overhead trellis system, regardless of the rootstock used, stood out as the best solution to ensure the quality of the grapes and their products in successive harvests.

Still regarding grape juice production, Nardello *et al*. (2021) examined the influence of two juice extractions methods (integral juicer *versus* adapted heat exchanger) using grapes from eight cultivars. A positive differentiation of the juice obtained through the integral juicer for the majority of grape cultivars, based on the physicochemical composition and antioxidant activity, was pointed out. This research may have a remarkable social and economic impact since the integral juicer was developed for the elaboration of grape juice in micro and small wine-growing properties.

Increasing importance has been given to grape and wine by-products as sources of oil and bioactive compounds. In this context, the article of Guler and Turgut (2021) provided innovative information on the oil content, fatty acid composition, phenolic composition and antioxidant activities of seeds from nine grape cultivars widely grown in Turkey. In spite of the differences between cultivars, a noticeable richness of these grape seeds in unsaturated fatty acids and phenolic compounds was observed.

In the analytical field, Neves *et al*. (2021) reported the development and validation of an analytical method to detect and quantify some of the most used sweeteners (potassium acesulfame, aspartame, sodium cyclamate, saccharin, sucralose and stevioside), whose addition to wine is an unauthorized oenological practice. Liquid chromatography coupled with mass spectrometry (LC-MS) was used to analyse wine samples previously submitted to a minimal preparation step, and to quantify simultaneously the six sweeteners, in a concentration range from 50 µg/L to 1000 µg/L, with a good performance. This new tool is of great interest for quality control laboratories.

Concerning the development of sensory analysis, Pinto (2021) applied a new methodology to estimate the uncertainty of sensory data generated during the wine certification process for the Portuguese Designation of Origin "Dão". Evidence on the suitability of this procedure supports its further use by other wine-producing regions in order to improve the reliability of sensory compliance assessments.

On the other hand, Vitorino *et al.* (2021) highlighted the individual variation in sensory responses of trained tasters to stimuli resulting from several sensory active compounds added to water solutions and white wine at different concentrations. This study revealed high variability among individuals regarding taste, mouthfeel and flavour perceptions, pointing to the advantage of grouping tasters with different chemosensory sensitivities to understand cross-modal sensory interactions during wine tasting.

Perdigão and Canas (2021) portrayed the wine spirits sector in Portugal and its recent evolution resorting to official statistical data on production and market, interviews with representatives of the sector and a questionnaire for producers. This research work, identifying the specificities, the main constraints and opportunities in this sector and providing clues to its development, is of interest to all players.

ACKNOWLEDGEMENTS

The Editorial Board acknowledges the meaningful contribution of all authors and reviewers to the research works published by the *Ciência e Técnica Vitivinícola* over 2021. The Editorial Board also thanks EDP Sciences and Sponsors for the technical and financial support, respectively.

REFERENCES

Botelho M., Ribeiro H., Cruz A., Martins M., Khairnar K.S., Pardal R., Catarino S., Castro R., Ricardo-da-Silva J. (2021). Mechanical pruning and soil organic amendments in vineyards of 'Syrah': effects on wine mineral composition. *Ciência Téc. Vitiv*., **36**, 151-162.

Candar S., Açıkbaş B., Ekiz M., Zobar D., Korkutal I., Bahar E., 2021. Influence of water scarcity on macronutrients contents in young leaves of wine grape cultivars. *Ciência Téc. Vitiv*., **36**, 104-115.

Costa R.R., Ferreira T.O, Felix D.T., Lima M.A.C., 2021. Impact of trellis systems and rootstocks on global phenolic composition and antioxidant activity of 'Isabel Precoce' grapes produced during rainy seasons in semi-arid region of Brazil. *Ciência Téc. Vitiv*., **36**, 126-138.

Diez-Zamudio F., Laytte R., Grallert C., Gutiérrez-Gamboa G., 2021. Nutritional status differentially affect yield and must composition of hybrids and *V. vinifera* varieties established under cold climate conditions. *Ciência Téc. Vitiv*., **36**, 89-103.

Guler A., Turgut D.Y., 2021. Fatty acids, phenolic compounds and antioxidant capacity of the seeds from nine grape cultivars (*Vitis vinifera* L.). *Ciência Téc. Vitiv*., **36**, 116-125.

Gutiérrez-Gamboa G., Moreno-Simunovic Y., 2021. Seaweeds in viticulture: a review focused on grape quality. *Ciência Téc. Vitiv*., **36**, 9-21.

MacMillan P., Teixeira G., Lopes C.M., Monteiro A., 2021. The role of grapevine leaf morphoanatomical traits in determining capacity for coping with abiotic stresses: a review. *Ciência Téc. Vitiv*., **36**, 75-88.

Maia M., Ferreira A.E.N., Cunha J., Eiras-Dias J., Cordeiro C., Figueiredo A., Sousa Silva M., 2021. Comparison of the chemical diversity of *Vitis rotundifolia* and *Vitis vinifera* cv. 'Cabernet Sauvignon'. *Ciência Téc. Vitiv*., **36**, 1-8.

Nardello I.C., Bender A., Caliari V., Kulkamp de Souza A.L., Malgarim M.B., 2021. Quality of juices from different grape cultivars obtained by distinct extraction systems. *Ciência Téc. Vitiv*., **36**, 163-172.

Neves N., Ribeiro N., Esteves C., Barros P., 2021. Determination of sweeteners in wine by liquid chromatography coupled with mass spectrometry (LC/MS). *Ciência Téc. Vitiv*., **36**, 32-44.

OIV, 2019. The OIV 2020-2024 strategic plan. International Organisation of Vine and Wine. Available at: https://www.oiv.int/en/the-international-organisation-of-vine-and-wine/the-oiv-strategic-plan (accessed on 12.12.2021).

Perdigão J., Canas S., 2021. Portuguese aged wine spirits: production, marketing and characterization of the sector. *Ciência Téc. Vitiv.*, **36**, 55-74.

Perdigones A., García I., Javier Porras-Prieto C.J., Gómez-Villarino M.T., Baptista F., García J.L, 2021. Evaluation of the cost-effectiveness of grid-connected photovoltaic solar energy in wineries. *Ciência Téc. Vitiv*., **36**, 45-54.

Pinto M.M., 2021. Evaluating uncertainty in sensory analysis. A case study of the panel of tasters of the Dão Regional Wine Commission. *Ciência Téc. Vitiv*., **36**, 22-31.

Vitorino G., Mota M., Malfeito-Ferreira M., 2021. Characterization of sensory perceptions elicited by white wine spiked with different aroma, taste and mouth-feel active molecules. *Ciência Téc. Vitiv*., **36**, 139-150.