

Abstract

Discrimination between Shiraz wines from different Australian regions: the role of spectroscopy and chemometrics

Roberto Riovanto^{1,2}, Nevil Shah², Wies Cynkar², Paolo Berzaghi¹ and Daniel Cozzolino^{2*}

¹Animal Science Department, Padua University, Agripolis, Viale dell'Università, 16, 35020 Legnaro (PD), Italy

²The Australian Wine Research Institute, P.O. Box 197, Glen Osmond, Adelaide SA 5064, Australia

*Corresponding author: Daniel.Cozzolino@awri.com.au

Introduction

Geographical denomination of foods and beverages bring many advantages to producers and consumers, such as protecting these products from possible fraud, guarantee high product quality standards, define strict production protocols, regulations and policies for production and are useful to preserve the environment. This is because the quality and composition of a given product is strictly linked with the production environment and traditions. This study reports the use of UV-VIS, NIR and MIR spectroscopy combined with chemometrics to discriminate among Shiraz wines produced in five Australian regions.

Materials and Methods

Commercial Shiraz samples ($n = 98$) were analysed using UV-VIS (280–400 nm), NIR (1100–2500 nm) and MIR (2500–25000 nm) wavelength regions in transmission. Spectral data were analysed using PCA, LDA and SIMCA to classify the wine samples according to region. Wines were sourced from 4 South Australian wine regions namely McLaren Vale ($n = 28 + 1$), Barossa Valley ($n = 18 + 1$), Clare Valley ($n = 16 + 1$) and Coonawarra ($n = 22 + 1$), and from one region of Western Australia ($n = 10$), representing 47 commercial brands.

Results and Discussion

The best LDA classification rates were obtained using the MIR spectra (correct classification of 73%), while individual correct classification rates were obtained for wines sourced from Western Australia (100%) and Coonawarra (86.96%). The poorest classification rates (lower than 50%) were obtained using the UV region, indicating that neither colour nor phenolic compounds alone explained the separation among wines related to their geographical origin. Intermediate correct classification rates (60%) were obtained using either VIS or NIR wavelength regions.

Conclusions

Classification rates using either NIR or MIR spectroscopy varies according to the classification technique applied (LDA or SIMCA). It was also observed that wine samples from similar soil types were clustered together, indicating some influence of both soil chemical and physical characteristics on the fingerprint of the wine.

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