FLEURTAI, SORELI AND TOCAI FRIULANO: PERSPECTIVES FOR QUALITY INTEGRATION OF WINE TOGETHER WITH PROTECTION OF THE DOCG LISON CLASSICO APPELLATION

Authors: Emilio CELOTTI *, Rebecca VALENT, Giovanni MIAN, Andrea NATOLINO

DI4A (Department of Agricultural, Food, Environmental and Animal Sciences), 206 Via delle Scienze, 33100 Udine, Italy

*Corresponding author: *emilio.celotti@uniud.it*

Context and purpose of the study - In modern viticulture, sustainability must be considered not only into the winery, but in the vineyard as well, being that with the most attentive interventions in order to protect the environment. In this context, the new "fungi resistant" varieties represent a valid option for reducing the negative environmental impact of agrochemicals used in viticulture, including those ones used in organic farming (given the copper accumulation into soils). Several application studies have demonstrated the enological validity of many resistant varieties, both in price and as a blend. Also, under the production point of view, the feasibility and economical sustainability of the new resistant varieties was verified. The aim of this work was to deepen the knowledge on the organoleptic characteristics of wines obtained from the Fleurtai and Soreli varieties and to compare them with the wine obtained from Tocai Friulano, the mother variety in the area destined for the production of the Lison Classico DOCG appellation. The purpose of the work is then to verify the possibility of introducing resistant varieties into the DOCG while maintaining the wine name of the appellation linked to the territory.

Material and methods – To compare wines, a sensorial approach was applied using descriptive and ranking tests. The group of wines analysed is made up of 12 Lison Classico from representative companies of the Lison Pramaggiore area, and 7 wines from resistant varieties obtained both from microvinifications and cellar trials yet analysed in different sensory analysis sessions by a panel of expert judges. The sensory panel, made up exclusively of local enologist technicians, was trained using wines from Tocai Friulano grapes produced in the area. Following appropriate training, a sensory card was drawn up and used in the sensory tests relating to the trials. For data analysis, the Friedmann ranking test and the ONE-WAY analysis of variance were used.

Results – This research confirms that Fleurtai and Soreli varieties can be elaborated alone or in blends, to give a product with qualitative characteristics equivalent to the variety Tocai Friulano. Therefore, these resistant varieties could be gradually introduced into the production area of the DOCG Lison Classico denomination, without changing its organoleptic typicality. The good enological aptitude of these resistant varieties could be useful in a hypothetical blend with Tocai Friulano grapes capable of producing Lison Classico, further increasing the freshness and longevity of wine. From this point of view, the denomination that identifies the territory would remain, regardless the cultivated varieties, that will be defined in a fair compromise between tradition and innovation, to protect the environment and the final consumer. At any rate, to reach this compromise, winemaker needs the introduction of Soreli and Fleurtai in the production regulations of the Lison Classico DOCG area. The results confirm the possibility of using the new resistant varieties together with the traditional one for a low-impact viticulture.

Keywords: resistant vines, Tocai grape, viticulture, sustainability, wine quality, low impact viticulture

1. Introduction

The production of new resistant grape varieties undoubtedly benefits vine growers who are interested in sustainability and organic farming (Barker, 2017; Possamai et al., 2020; Bellin et al., 2009; Di Gaspero et al., 2013). In this new viticultural context, it will be necessary to evaluate whether a compromise can exist between innovative and traditional grape varieties. New resistant varieties resulting from interspecific crossings have been widely studied in different parts of the world, and several scientific works highlight their productive potential (Testolin et al., 2018; Atak et al., 2022). Recently, some interesting studies have been carried out to evaluate the response of the consumer to the wines from new resistant varieties (Vecchio et al., 2022; Montaigne et al., 2016; Mian et al., 2023; Sillani et al., 2022; Borrello et al., 2021). Scientific research is evaluating the production of new resistant clones using new genetic techniques such as genome editing and cisgenesis (Intrieri, 2022; Intrieri, 2023). However, these techniques are still considered genetically modified organisms (GMOs), and therefore, in the short to medium term, it will be necessary to exploit the enological potential of some of the resistant varieties resulting from interspecific crossings (Pedneault and Provost, 2016). The objective of this study was to deepen knowledge about the organoleptic characteristics of wines obtained from resistant varieties resulting from Tocai Friulano and to investigate how these wines compare to those obtained from the same variety of grapes, elaborated as Lison Classico wine obtained from traditional Tocai Friulano grapes. The Lison Pramaggiore area was chosen, historically linked to vineyards and wine, to evaluate the possible introduction of the new resistant grape varieties Fleurtai and Soreli, obtained from the noble parent Tocai Friulano, into the DOCG Lison Classico obtained from Tocai Friulano grape (Celotti, 2008; Celotti et al., 2020).

2. Materials and methods

The study focuses on the traditional grape variety of the Lison Pramaggiore area (near Venice), Tocai Friulano, from which Lison Classico and its corresponding resistant varieties, Soreli and Fleurtai, are obtained. Fleurtai and Soreli resistant varieties were obtained after crossing Tocai Friulano × Kozma 20-3 by University of Udine and IGA (Institute of Applied Genomics).
The sensory evaluation of the three types of wines compared was useful in understanding how the products from resistant varieties, which represent innovation, are identified among the traditional Lison Classico of the area and if they maintain their typical characteristics. The investigation was carried out through several sessions of sensory analysis where judges expressed their evaluations in anonymous tastings that included traditional Lison Classicos and wines from new resistant varieties. The group of wines analysed consists of 12 traditional Lison Classico from local wineries and 7 wines from resistant varieties obtained both through microvinifications and real tests in cellar conditions, and were analysed in three sessions of sensory analysis by a panel of expert judges. The applied sensory methodology involved the use of a non-structured sheet with descriptors identified by the panellists themselves in training sessions, and finally, a preference test was also carried out on the main descriptors characterizing the products. For the statistical treatment of the data, we used the Friedman ranking test according to Barillere and Benard, 1986. Furthermore, for data analysis, one-way ANOVA was used as univariate method, and correspondence analysis was used as a multivariate method to identify the relationships between dependent and independent variables.

3. Results and discussion

A statistically significant difference was found for all descriptors except for "clearness", "dried fruit", "bitterness", and "bitter almond". This is a positive result for the study since bitter almond is a typical after-taste descriptor for Tocai Friulano, and dried fruit is a typical smell descriptor. It is evident that there are no differences between Tocai Friulano and the new varieties for these important descriptors, which remain unchanged regardless of the winemaking technique and genetic of the cultivar (Fig. 1). From the ANOVA results, interesting observations can be made about the different descriptors. However, at least one sample obtained from resistant varieties does not show significant differences from Lison Classico sample (Fig. 2). This is the most important result because it highlights that the resistant varieties Fleurtai and Soreli have in general the same sensory appreciation as the wine or tradition obtained solely from Vitis Vinifera. Using correspondence analysis, associations between descriptors (dependent variable) and analysed wines (independent variable) can be identified. In the Figure 3, Lison Classico samples are indicated as LC and

the samples from resistant varieties are S.F., F.V.A, F.VCR, S.VCR, S.V.A. Fleurtai and Soreli wines are located in adjacent quadrants, which is a positive factor since they maintain the common characteristics of wines from resistant varieties, despite being produced by different companies in Lison Pramaggiore area. Looking at the data, it can be hypothesized that wines from new resistant varieties support acidity to a blend with a Lison Classico of pronounced softness and floral intensity. The results related to the bitter almond note, which is considered typical of Tocai Friulano, are also interesting.

Preference tests were carried out for the descriptors Color, Smell, Taste, After-taste and Typicality, using three combinations of wines in order to obtain reliable data for all samples under examination. In all analysis sessions, samples obtained from Fleurtai and Soreli, either pure or blended, were found to be indistinguishable from Lison Classico, or even preferred for some descriptors. This result confirms the sensory validity of the new resistant varieties compared to the noble parent Tocai Friulano. From the statistical analysis, it can therefore be stated that wines from resistant varieties not only maintain their characteristics over time but also improve in quality and in particular the acidity. Wines from resistant varieties received positive feedback from expert judges for all descriptors. Therefore, it is necessary to seriously consider partially replacing traditional grape varieties with these new varieties, promoting sustainability and healthiness without sacrificing the typicality of the products and the DOCG Lison Classico appellation, including the resistant varieties Soreli and Fleurtai. The results were encouraging and can be used to define the criteria for the diffusion of these new resistant varieties.

4. Conclusions

This study confirms that the resistant varieties Fleurtai and Soreli can be gradually introduced into the production area of Lison Classico without changing the organoleptic typicity of the DOCG appellation that has always characterized the viticultural area. However, since they are not authorized for the production of DOC or DOCG appellation wines, many winemakers are reluctant to convert their vineyards to resistant varieties. A fair compromise could be to plant these resistant varieties in the most sensitive areas, such as vineyards next to schools, residential areas, bike paths, or homes, to avoid pesticide products coming into close contact with persons. With this study, the good winemaking aptitude of these resistant varieties has been verified: this could be useful in a hypothetical blend with Tocai Friulano grapes to still produce Lison Classico and increase the freshness and longevity of the wine. In this case, the denomination that identifies the area would remain, regardless of the cultivated varieties, which would be defined in a compromise between tradition and innovation to protect the environment and consumers. This study may be a useful resolution to the disputes of the European Community and regional authorities regarding the introduction of resistant varieties in the different appellations, and an invitation for further studies to compare other traditional grape varieties with new resistant ones. The results confirm the possibility of using the new resistant varieties Fleurtai and Soreli together with the traditional Tocai for a low-impact viticulture.

5. Acknowledgments

We thank Borgo Stajnbech, Le carline, La frassina, Mosole, Mazzolada, Ornella Bellia, Ai Galli, Savian Vini, Molin di Mezzo, La Frassinella and Piazza Vini for providing us with wines of Lison Classic, together with Vivai Cooperativi Rauscedo and Veneto Agricoltura for wines from resistant vines. A special thanks to dr. Elisabetta Bellantuono for their helpful collaboration.

6. Literature cited

Atak A., Göksel Z., Tunçkal C., Yılmaz Y, 2022. Comparison of Important Quality Characteristics of Some Fungal Disease resistance/Tolerance Grapes Dried with Energy-Saving Heat Pump Dryer, Agronomy, 12, 909.
Barillere J.M., Benard P., 1986. Exemples d'interpretation de resultats de degustation. Connaissance Vigne Vin, *20* (3), 137-154.
Barker, J., 2017. Law and innovation in new resistant grapevine varieties. Wine Econ. Policy, 6, 165–169.

Bellin, D., Peressotti, E., Merdinoglu, D., Wiedemann-Merdinoglu, S., Adam-Blondon, A.-F., Cipriani, G., Morgante, M., Testolin R., Di Gaspero R., 2009. Resistance to Plasmopara viticola in grapevine 'Bianca' is controlled by a major dominant gene causing localised necrosis at the infection site. Theor. Appl. Genet., 120, 163–176.
Borrello, M.; Cembalo, L.; Vecchio, R., 2021. Role of information in consumers' preferences for eco-sustainable genetic improvements in plant breeding. PLoS ONE, 16, e0255130.
Celotti, E., 2008. Studio delle potenzialità enologiche del Tocai dell'area doc Lison-Pramaggiore. In Il risveglio del Tocai. Ed. Boatto V., Franco Angeli s.r.l., Milano, Italia; pp 69-95.
Celotti E., Valent R., Bellantuono E., 2020. Varietà resistenti e Tocai Friulano, incontro (possibile) fra tradizione e innovazione: Caso studio della DOCG Lison Classico, Il Corriere Vinicolo, 2020, 33, 19 ottobre 2020, 16-17.
Di Gaspero, G., Morgante, M., Peterlunger, E., Castellarin, S. D., Cipriani, G., Testolin, R., 2013. Dall'Università di Udine nuove varietà di vite resistenti alle malattie. Frutticultura., 12, pp 24-29.
Intrieri C., 2023. Cloni di *Vitis Vinifera* resistenti e Vitigni ibridi resistenti, L'Enologo, 59 (1/2), 60-65.
Intrieri, C. Considerazioni sulla "viticoltura resistente" in Italia. Georg. INFO. Available online: https://www.georgofili.info/contenuti/considerazioni-sulla-viticoltura-resistente-in-italia/15421 (accessed on 4 November 2022).
Mian G., Nassivera F., Sillani S., Iseppi L., 2023. Grapevine Resistant Cultivars: A Story Review and the Importance on the RelatedWine Consumption Inclination, Sustainability, 15, 390. https://doi.org/10.3390/su15010390
Montaigne E, Coelho A, Khefifi L., 2016. Economic issues and perspectives on innovation in new resistant grapevine varieties in France. Wine Econ Policy. 5(2): 73–77.
Pedneault K., Provost C., 2016. Fungus resistant grape varieties as a suitable alternative for organic wine production: Benefits, limits, and challenges. Sci Hortic (Amsterdam). 208: 57–77.
Possamai, T., Migliaro, D., Gardiman, M., Velasco, R., De Nardi, B., 2020. Rpv Mediated Defense Responses in Grapevine Offspring Resistant to Plasmopara viticola. Plants, 9, 781.
Sillani S., Marangon F., Gallenti G, Troiano S, Nassivera F., Carzedda M., 2022. Designation and Certification Strategies for Fungus-Resistant Grape Wines: An Exploratory Study in Italy, Sustainability, 14, 14871. https://doi.org/10.3390/su142214871.
Teissedre, P.L., 2018. Composition of grape and wine from resistant vines varieties. OENO One, 52, 197.
Testolin, R., Peterlunger, E., Collovini, S., Castellarin, S., Di Gaspero, G., Anaclerio, F.,Colautti, M., De Candido, M., De Luca, E., Khafizova, A., Sartori, E., 2018. Le varietà resistenti alle malattie in Quaderni tecnici VCR, terza edizione. Ed. Vivai Cooperativi Rauscedo, (PN) Italia.
Vecchio, R.; Pomarici, E.; Giampietri, E.; Borrello, M., 2022. Consumer acceptance of fungus-resistant grape wines: Evidence from Italy, the UK, and the USA. PLoS ONE, 17(4), e0267198.

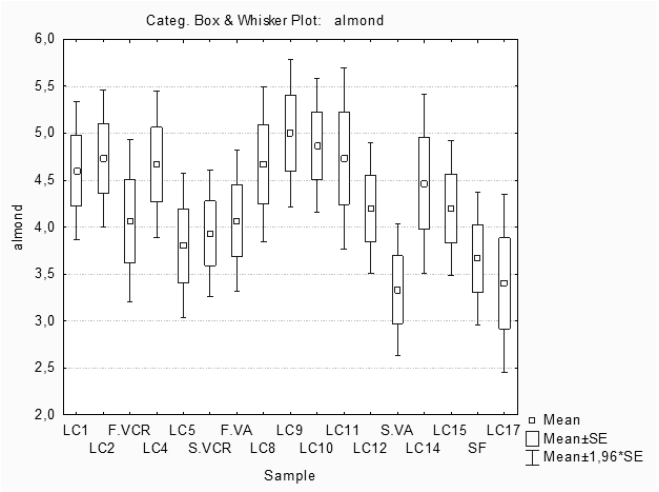

Figure 1. Results of One-Way ANOVA for the bitter almond descriptor. No significant differences ($p < 0.05$).

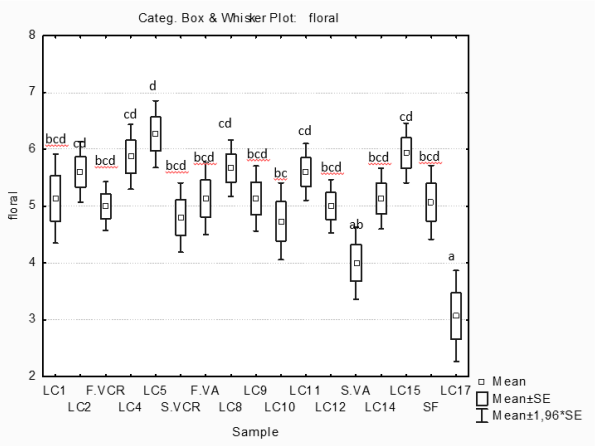

Figure 2. Results of One-Way ANOVA for the floral descriptor. Values with different letter indicate significative differences ($p < 0.05$).

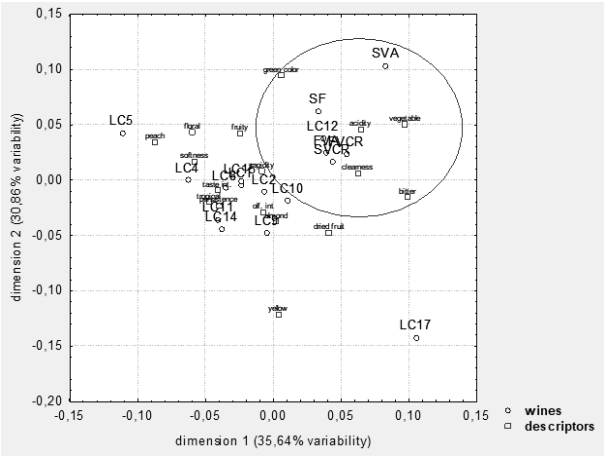

Figure 3. Multivariate correspondence analysis applied to dependent (descriptors) and independent (samples) variables.