

Influence of short-time skin maceration combined with enzyme treatment on the volatile composition of musts from fresh and withered Fiano winegrapes

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Introduction and Aims

Short-time skin contact combined with the use of exogenous enzymes can facilitate the release of volatile organic compounds (VOCs) into the grape must. In this study, the effect of eight enzyme preparations with different single activity was investigated during short-term prefermentative maceration of fresh and withered Fiano winegrapes, with the aim of knowing if the grape dehydration can influence the enzyme effect. Free VOCs and odorless glycosidically-bound aroma precursors were determined. The latter are of particular importance for non-aromatic grape varieties [1,2]. Chromatic traits of the musts obtained were also evaluated.

Material and Methods

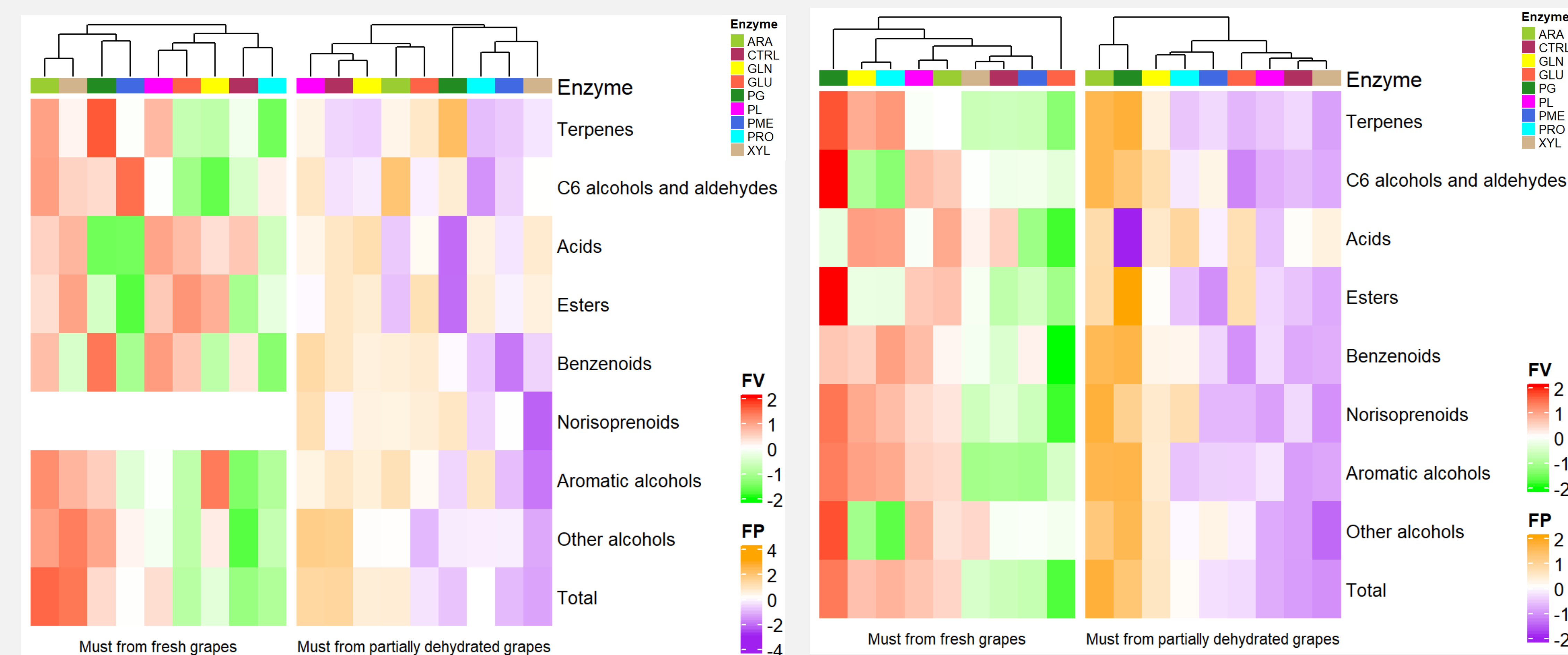
- The study was carried out on fresh (FV) and partially dehydrated (20% of weight loss, FP) *Vitis vinifera* L. cv. 'Fiano' white winegrapes from Campania region (southern Italy).
- Different grape berry sets of 500 g each were randomly selected and crushed in presence of 10 mg/kg of potassium metabisulphite.
- For each sample and treatment, three berry sets were untreated (CTRL) or individually treated with pectin lyase (PL), polygalacturonase (PG), pectin methylesterase (PME), xylanase (XYL), arabinase (ARA), protease (PRO), β -glucanase (GLN), or β -glucosidase (GLU) single activity enzymes at a dose of 10 mg/kg, and then subjected to prefermentative maceration for 13 h at 12 °C.
- The musts obtained were analyzed for CIELab color coordinates [3].
- Free and glycosylated VOCs were determined using solid-phase extraction followed by GC-MS analysis [3].

Color analysis

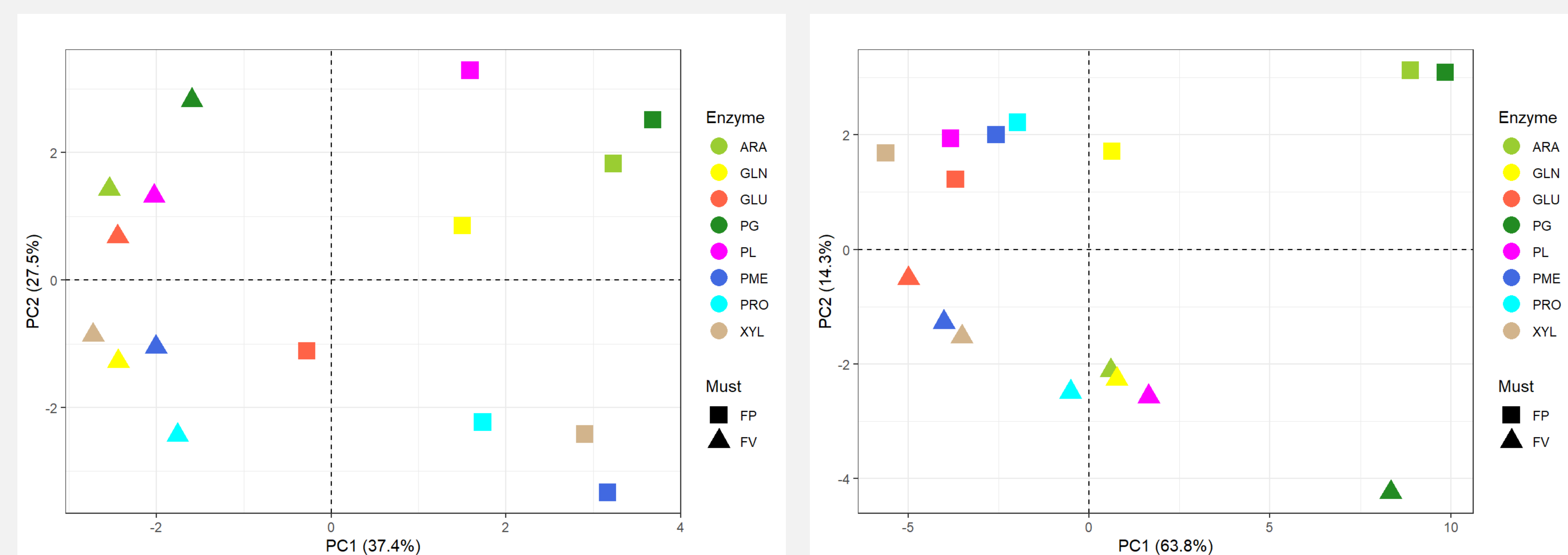
Must from fresh grapes								Must from partially dehydrated grapes							
Control								Control							
GLU	PL	PG	PME	XYL	ARA	PRO	GLN	GLU	PL	PG	PME	XYL	ARA	PRO	GLN
3.3	8.1	18.0	13.0	1.8	8.1	0.7	0.7	5.5	14.6	30.2	5.4	0.2	14.1	2.2	3.5

The color of the grape musts obtained at the end of treatment was visualized from CIELab coordinates (here reported to RGB values). The value for each enzyme treatment indicates the calculated ΔE^* with respect to control.

VOCs characterization



Multivariate analysis



Principal component analysis of free and glycosylated VOCs at the end of treatment (scores plot) allows to compare the enzyme effect on fresh and withered grapes but minimizing the influence of the different VOCs composition. For this, each value of treated samples was subtracted to the value of the control samples and then normalized as z-scores.

Results

Main findings

- Short-term prefermentative maceration with exogenous enzymes allowed a visible improvement of color, reducing browning for musts from fresh and withered grapes. PL, PG, PME and ARA enzymes determined an overall color difference (ΔE^*) greater than 5 (able to be visually perceived), with respect to the control sample, particularly for PG.
- Regarding free VOCs, the higher release of most of compounds occurred with the use of ARA and XYL from fresh grapes but treatments seemed less efficient in withered grapes when compared to the control sample.
- The addition of PG, GLN, PRO and ARA enzymes resulted in increased glycosylated VOCs for musts obtained from fresh and withered grapes.
- The effect of the different single enzyme activities studied on free VOCs depended strongly on grape dehydration whereas it was more similar on glycosylated forms for fresh and withered grapes.
- PG seems to be one of the most performing enzymes for the extraction of VOCs from non-aromatic 'Fiano' grapes, which could enhance the sensory perceived aroma of the resulting wines reducing in turn browning reactions.

References:

- [1] Rusjan, D.; Strlic, M.; Kosmerl, T.; Prosen, H. Contribution of enzyme preparations to the linalool content of wines made from the non-aromatic grapevine variety "Furmint" (*Vitis vinifera* L.). *OENO One* 2012, 46, 139–143.
- [2] Genovese, A.; Gambuti, A.; Piombino, P.; Moio, L. Sensory properties and aroma compounds of sweet Fiano wine. *Food Chem.* 2007, 103, 1228–1236.
- [3] Rolle, L., et al. CIEL*a*b* parameters of white dehydrated grapes as quality markers according to chemical composition, volatile profile and mechanical properties. *Anal. Chim. Acta* 2012, 732, 105–113.



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