INTRODUCTION
A consistent part of Volatile Organic Compounds (VOCs) responsible for wine aroma quality, belong to yeast metabolic activities. The model organism for Alcoholic Fermentation (AF) in wine is Saccharomyces cerevisiae and the most part of commercial starter culture for AF in wine are designed on the basis of well characterized strains belonging to this species. However, an increasing interest has been deserved to non-Saccharomyces yeasts used in combination with S. cerevisiae strains in order to differentiate the quality of final wines (Capozzi et al. 2015). The interactions among microbial resources in wine are among the main lever susceptible to influence the content of VOCs associated with fermentations (Li et al. 2016). PTR-ToF-MS analysis of VOCs associated with wine headspace has been recently optimized for experimental setup in order to reduce fragmentation and formation of ethanol clusters (Campbell-Sills et al. 2016). In this study, we used this analytical approach to explore the interactions among two Saccharomyces strains (one commercial isolate and one autochthonous Apulian biotype) and two non-Saccharomyces strains (two commercial isolates belonging to the species Metschnikowia pulcherrima and Torulaspora delbrueckii).

MATERIAL AND METHODS

Figure 1: Nano-vinifications were performed in the vials using commercial red grape juice (Vitafit) and red grape must from Apulian autochthonous grape varieties (ph 3.5, 18% babo). Nitrogen flux in the vial headspace assured the maintaining the conditions comparable with those present in vinification. Commercial grape juice was sterilized. The must was not sterilized. When present in the same experimental mode, yeasts were co-inoculated in the juice/must.

Table 1. Number corresponding to the different yeast managements we tested in this study. The letters correspond to the yeast species/strains reported in Figure 1. The trial number 15 corresponds to the uninoculated samples (control).

RESULTS

Figure 2: Score plot (A) and loading plot (B) of principal component analysis of VOC emission evolution associated with the first three days of alcoholic fermentation for each experimental modes we tested in this study. Data are logarithmically transformed and centered. Different colors indicate different yeast management, medium and blank samples. The size of points grows with time of measurements.

In this study, we on-line monitored for three days the VOCs (more than 70 mass peaks) associated with all the possible different combinations (of enological significance) of the four yeast strains, when inoculated in both commercial grape juice and grape must. Our results: i) underlined the presence of different behaviors on grape juice and on must, respectively; ii) highlighted differences among the single yeast strains ‘volatileomes’; iii) provided interesting information important to select combinations of Saccharomyces/non-Saccharomyces strains susceptible to maximize the content of desired VOCs in wine and minimize the presence of those undesired.

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