INFLUENCE OF *LACTIPLANTIBACILLUS PLANTARUM* AND *OENOCOCCUS OENI* STRAINS ON SENSORY PROFILE OF SICILIAN NERO D'AVOLA WINE AFTER MALOLACTIC FERMENTATION

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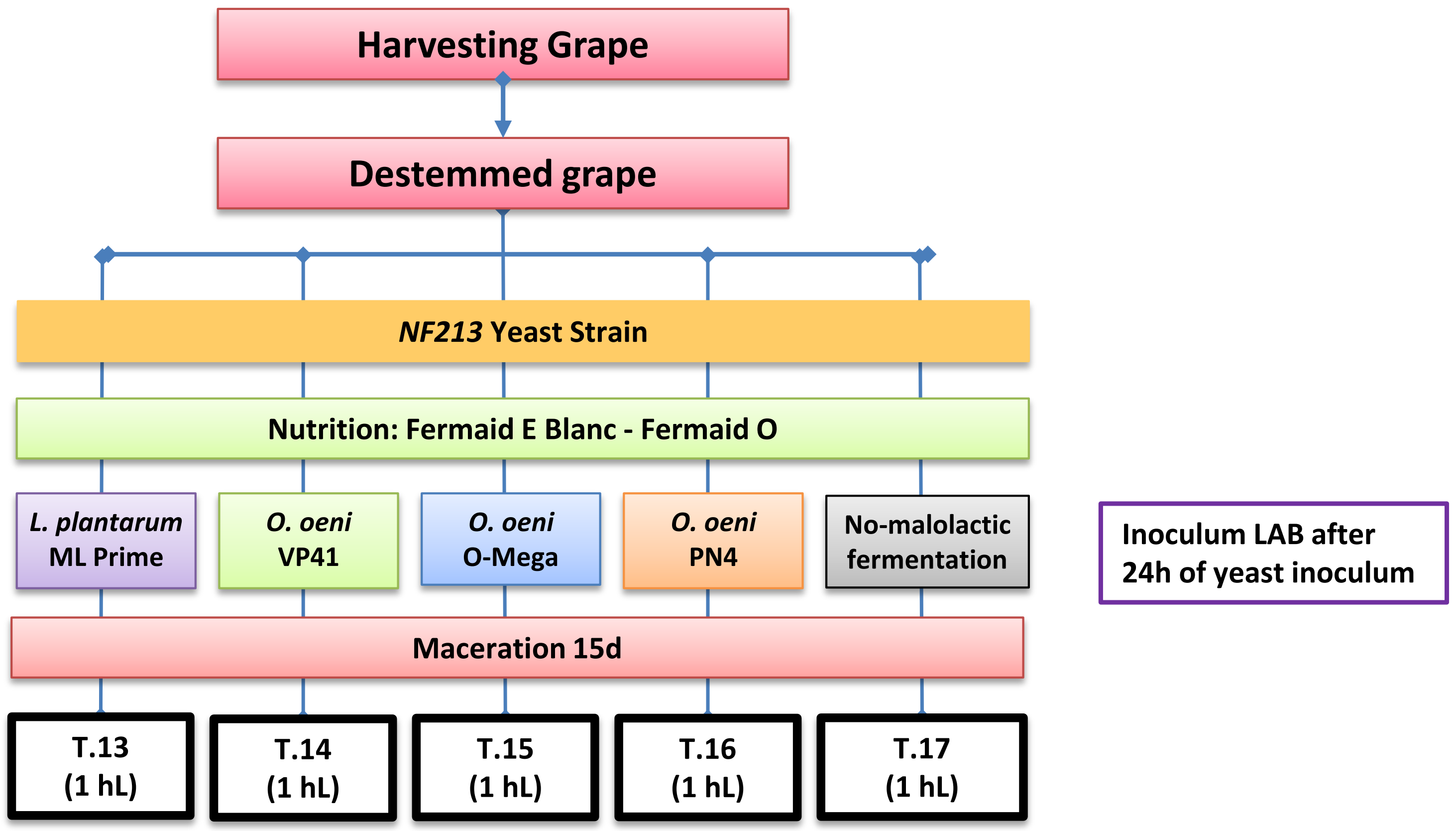
INTRODUCTION One of the main problems to be faced after the end of alcoholic fermentation is represented by wine's biological stability. At the end of alcoholic fermentation, wine is microbiologically unstable and without proper preventive measures, the chances of alterations developing are very high [1]. The chances of a wine's aging and keeping depend not only on certain components naturally present, but also on its biological stability [2]. One of the processes that certainly improves wine's biological stability is represented by malolactic fermentation (MF), also known as secondary fermentation. Obviously, the impact is also on the sensorial profile of wines. Lactic acid bacteria, by means of their metabolism, release substances that determine an improvement of aromatic characteristics [3]. For this purpose, it is important that MF is guided by selected LAB starters.

MATERIALS_AND_METHODS Experimental winemaking and sample collection The experimental winemaking was carried out by fermentative maceration for Nero d'Avola (**Fig.1**).



Microbiological counts of yeast and LAB and strain typing Must samples collected during fermentation was subjected to microbiological analysis following the protocol described by [4]. In order to verify the dominance of the starter *Saccharomyces cerevisiae* NF213 during AF, all isolates were characterized by Interdelta analysis[5]. Dominance of LAB strains, added in the trials, has been verified during fermentation by random amplification of polymorphic DNA-PCR (RAPD-PCR) analysis in 25µL reaction mix using primer M13 [6].

Volatile organic compound composition by GC-MS To determinate the volatile components the protocol proposed by [9] was performed. The individual peaks were analysed using the GCMSolution package, Version 2.72. Identification of compounds was carried out using Adams, NIST 11, Wiley 9 and FFNSC 2 mass spectral database.

RESULTS Microbial count of yeasts during fermentation are shown in **Fig. 2**. In must before inoculation, LAB populations reached higher values in MRS (**Fig. 3a**), while cell density in MRS+MA (**Fig. 3b**).

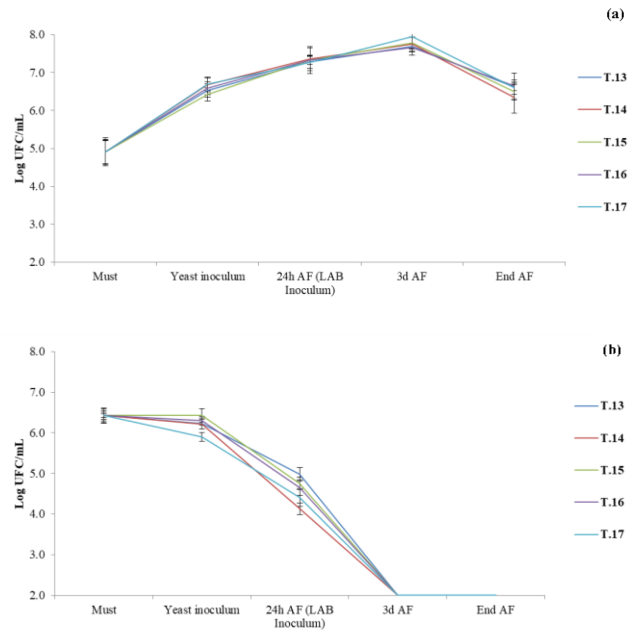


Fig. 2. Microbiological concentration (Log CFU/mL) of samples during alcoholic fermentation of Nero d'Avola: **(a)** Presumptive *Saccharomyces*; **(b)** non-*Saccharomyces*.

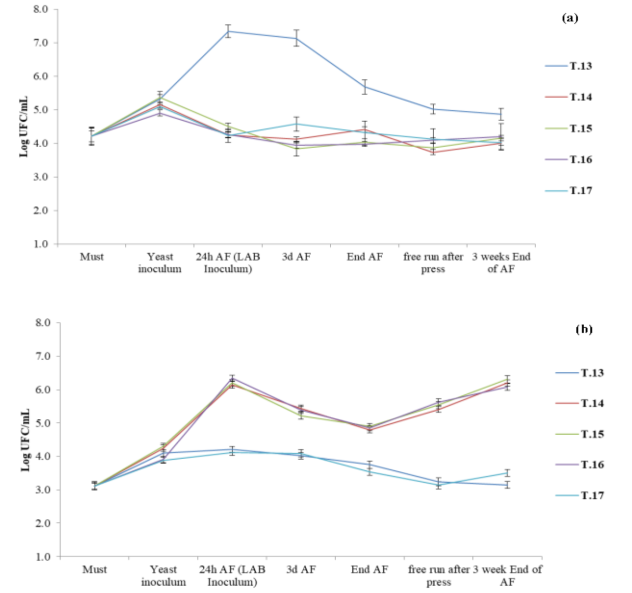


Fig. 3. Microbiological concentration (Log CFU/mL) of samples during alcoholic fermentation of Nero d'Avola: presumptive *Lactiplantibacillus* spp. on MRS medium **(a)**; *Oenococcus* spp. on MRS+malic acid **(b).**

Molecular analysis All isolates belonging to the species *S. cerevisiae* were genetically typed. The direct comparison of the Interdelta profiles showed that *S. cerevisiae* NF213 were the strains most frequently (>97%) isolated. Through the RAPD profiles, it was possible to demonstrate the dominance of the LAB starter strains during the MF.

Chemical composition The trend in malic acid and lactic acid concentrations is shown in **Fig. 4**. All other parameters monitored (sugars, ethanol, volatile acidity, total acidity, glycerol) showed a trend typical of regular AF.

Volatile organic compounds All results from GC analysis were conducted in two separate laboratory to confirm identification of compounds. The detailed results are reported in **Fig. 5**.

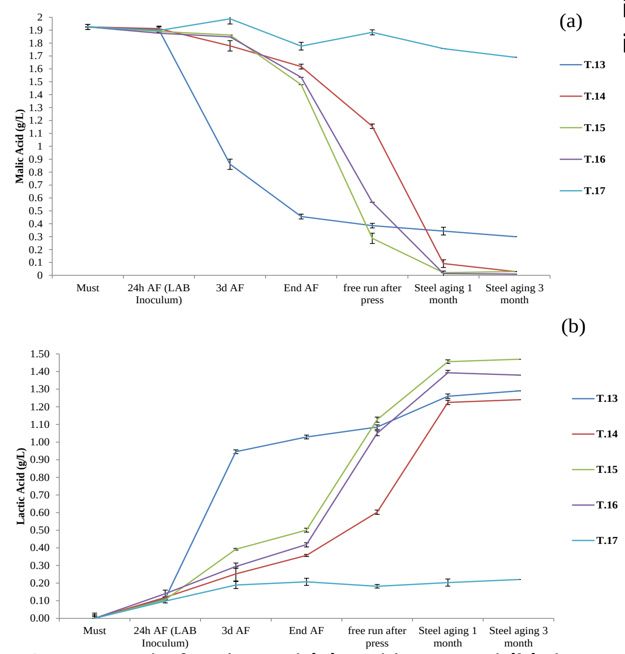


Fig. 4. Trend of malic acid **(a)** and lactic acid **(b)** during the different stages of Nero d'Avola vinification.

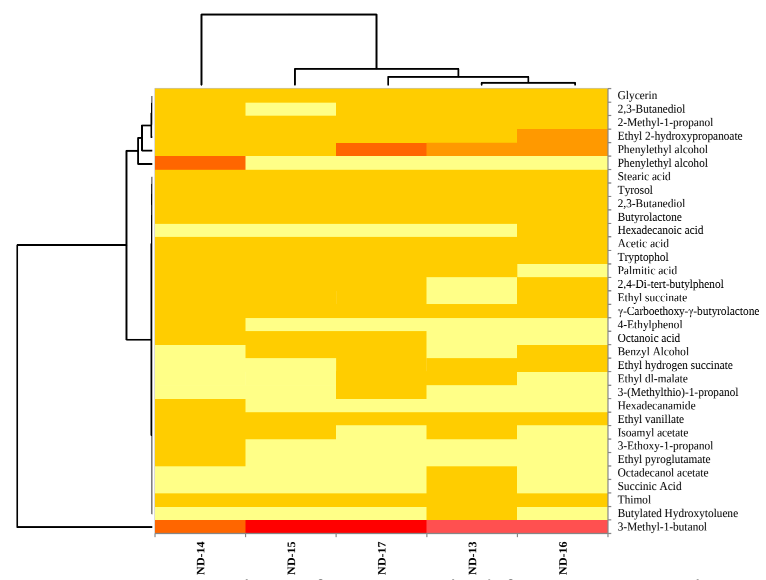


Fig. 5. Heat-map analysis of VOCs resulted from GC-MS analysis of Nero d'Avola wines.

CONCLUSIONS The use of ML Prime™ resulted in a rapid degradation of malic acid, already after 3 days of alcoholic fermentation. The aroma profiles derived from the distribution of VOC concentrations determined similarities with trial 16, inoculated with *O. oeni* PN4®. In relation to the results obtained, *L. plantarum* was found to be a valid alternative as a starter for the MF of Nero d'Avola wines.

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