

## Microbial dynamics during green Sicilian table olive fermentations

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The production of green table olives is traditionally a spontaneous fermentation carried out by indigenous microflora. Variability of microbial raw material may result in changes in the qualitative aspects of final products (Silvestri *et al.*, 2009).

Table olives of five different green table olive cultivars (four Sicilian Brandofino, Castriciana, Nocellara del Belice and Passalunara and the Spanish Manzanilla) were produced according to a semi-industrial technology, in which lactic acid bacteria (LAB) role is partially replaced by lactic acid addition. Transformation processes were studied by a combined strategy consisting of chemical, microbiological and sensory analyses. Yeasts harboured on the drupe surface of all the cultivars were found at concentrations of about 2.0 log CFU/g, while at the end of the fermentation process they were in the range 5.5-6.5 log CFU g<sup>-1</sup>, with the highest cell count level showed by Brandofino variety. Surprisingly, LAB and other contaminant microorganisms were not found. ITS-RFLP analysis was used to group the 81 yeast strains isolated throughout the manufacturing and it revealed the presence of barely three different combined profiles. Species identification was achieved by sequencing of the D1/D2 region of the 26S rRNA gene of a representative number of strains per group. The dominant yeasts (88%) were ascribed to the species *Pichia kluyveri*. *Candida parapsilosis* and *Pichia guilliermondii* were also detected before fermentation on drupes from Brandofino cultivar. Strains have been tested for some technological features to investigate their contribution to the development of the organoleptic characteristics of the final product.

Nocellara del Belice cultivar was then chosen to perform a study on the evolution of microbial populations during olive transformation by Spanish-style production process (Sivigliano). Yeasts and LAB were isolated during the whole period of fermentation. Ninety-five presumptive LAB isolates were subjected to a molecular typing consisting of RAPD-PCR and rep-PCR which showed the presence of 14 different strains. Species identification was carried out by restriction analysis and sequencing of hsp60 gene which recognized nine strains of *Lactobacillus plantarum*, four *Lactobacillus coryniformis* and one *Leuconostoc mesenteroides* subsp. *mesenteroides*. All the strains were evaluated for their biochemical traits with technological interest in olive production. Majority of strains was able to growth at 15 °C and all the strains were resistant to increasing concentrations of NaCl. Only *L. coryniformis* showed  $\beta$ -glucosydase activity. Lipolytic activity was spread among the 14 strains, while none was found to produce biogenic amines. Resistance to phenolic compound was variable among strains with higher MIC detected for *L. coryniformis*. No strain showed polysaccharolytic, proteolytic activities, as well as production of H<sub>2</sub>S and extracellular xilanases. Experimental fermentations have been carried out with some chosen strains: one with *L. plantarum* at 107 CFU/g of brine; one as before with a previous lysozyme; one with *L. plantarum* and *L. coryniformis* both at 107 CFU/g. A spontaneous fermentation was performed as control. Microbial counts and strain monitoring showed a persistence of *L. plantarum*, while *L. coryniformis* progressively disappeared.

**Keywords:** fermentation, green Sicilian table olives, *Lactobacillus plantarum*, *Lactobacillus coryniformis*, yeasts.

### References:

Silvestri V., Francesca N., Settanni L., Moschetti G. (2009). Industrie Alimentari, in press.