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Microbiological and physicochemical changes of industrially fermented green olives by the Spanish method

Tzamourani A.[1], Bonatsou S.[1], Economou-Petrovits G.[2], Panagiotidis S.[2], Nychas G.-J.E.[1], Panagou Z.E.[1*]

[1]Laboratory of Microbiology and Biotechnology of Foods, Department of Food Science and Human Nutrition, Agricultural University of Athens, Iera Odos 75, 11855 Athens, Greece, *e-mail: stathispanagou@aua.gr

[2]PELOPAC S.A., Block 38, NB1A Street, Thessaloniki Industrial Area, Sindos 57022, Greece

Green olives of the varieties Conservolea and Halkidiki were fermented according to the Spanish-style. Microbial populations of the dominant microorganisms namely, lactic acid bacteria (LAB), yeasts, and *Enterobacteriaceae* were monitored. Analyses for the determination of pH, titratable acidity, salt content as well as changes in color and texture of the olives were assessed. Results showed the dominance of LAB followed by yeasts indicating normal fermentation process. For cv. Conservolea, LAB reached 7.3 $\log_{10}$ CFU/mL and 5.5 $\log_{10}$ CFU/g, while yeasts ranged between 5.6 $\log_{10}$ CFU/mL and 5.1 $\log_{10}$ CFU/g in the brines and olives, respectively. For cv. Halkidiki, LAB counts were 6.8 $\log_{10}$ CFU/mL and 6.9 $\log_{10}$ CFU/g, while yeasts were enumerated close to 4.5 $\log_{10}$ CFU/mL and 5.6 $\log_{10}$ CFU/g in brines and olives, respectively. Acidity was close to 0.6% (cv. Halkidiki) and 0.7 % (cv. Conservolea) (w/v) lactic acid, while pH was approximately 3.5-3.6 for brines and 3.9 for olives in both cultivars. Texture analysis for cv. Halkidiki showed a decrease in Break Force (F*break*) which is related to hardness from 13.5N to 5.8N during the first 15 days of fermentation followed by a gradual increase up to 11.7N until the end of the process due to salt absorption. For cv. Conservolea F*break* was close to 12.6N and remained at this level throughout fermentation. An increase in the lightness coordinate (L^*) was observed indicating the increase in luminosity (brightness) of the color in both cultivars. The attribute a^* corresponding to green color was decreased (negative values) during the process for cv. Halkidiki, whereas it increased (positive values) for cv. Conservolea after the first 30 days. The values of the parameter b* were maintained positive during the process with small changes indicating the prevalence of yellow color. This was also confirmed by the values of parameter h^* (hue) which ranged between 85-90° corresponding to yellow hues.

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