

Genotype-dependent effects on oil composition of post-harvest ethylene treatments on olives

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Ethylene is a key hormone responsible for ripening syndrome, growth development and storage life. The fruits can be exposed to endogenous or exogenous sources of ethylene, this can modify the compounds in the exposed fruit. Olive is classified as non-climacteric fruit, with the ripening process not associated to a peak of ethylene production. However, it has been reported that exogenous ethylene exposition can stimulate responses in non-climacteric fruits as well such as an increasing of polyphenols in grapes for wine production. Therefore, exogenous post-harvest ethylene treatment and its effect on fruit composition and oil quality have been analyzed in two *Olea europaea* L. cultivars (Leccino and Moraiolo). Fruit were treated with ethylene (1000 ppm in air) and with pure air (control) for 24 hours. At the end of the treatments, fruit were processed to make oil. The extraction runs were carried out using a micro oil mill equipped with a two-phase decanter (Spremioliva C30, Toscana Enologica Mori, Tavernelle Val Di Pesa, Florence, Italy), able to mill 25-35 kg of olives per hour. The malaxation machine was specifically modified, with hermetic closures and special valves for the injection of gas, to setup the desired gas composition. The volatile organic compounds (VOCs) profile has been analyzed in oil by HS-SPME-GC/MS approach. In addition, sensorial, merceological (free fatty acids, peroxide value, K_{232} , K_{270} and ΔK) and quality (total phenols, chlorophyll and carotenoids, antioxidant capacity and intensity of bitterness) parameters analysis have been performed. Furthermore, the treatment affected merceological parameters, VOCs content and sensory traits. A significant genotype related effect has been revealed. Indeed, ethylene and air treatment negatively affected the total antioxidant capacity in Moraiolo while it remained unaltered in Leccino. The bitter index after ethylene treatment was negatively affected in Leccino while the opposite trend was observed in Moraiolo. The statistical model indicated exogenous ethylene application, regardless of the cultivar, leads to oil associated with 1-Hexanol, Nonanal and acetic acid. These data suggest that the effects of exogenous ethylene on metabolic processes in harvested olives (and quality traits of the resulting oil) seem to be genotype dependent.

Keywords: *Olea europaea* L., VOCs, NMR, ethylene, ripening.