The Oxidation Stability of Extra Virgin Avocado Oil

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Abstract

Extra virgin avocado oil (EVAO) is extracted from avocado fruit with minimal processing. It contains a wide range of non-lipid compounds that have a profound affect on oil stability. The deterioration of oil quality is due to autoxidation and photooxidation reactions that occur during oil storage. The objectives of this research were to determine the effect of prooxidant factors (light, temperature, oxygen level) on oil oxidation and quality; make recommendations for oil processing and packaging procedures to minimise oxidation; predict the shelf life of the oil and to determine the effect of commercial antioxidants on oil oxidation.

An accelerated oxidation reactor was developed to test the effects of fluorescent light, elevated temperature and varying oxygen levels on the peroxide value (PV) (initially 0.96 ± 0.03 meq/kg oil) and chlorophyll content (initially 16.2 ± 0.1 ppm) of EVAO. The production and packaging processes of Olivado NZ were analysed for exposure to oxidation promoting factors. EVAO was exposed to dark storage at 50°C and 60°C in order to determine Q_{10} values for oil oxidation. Several commercial antioxidants were evaluated by examining their affect on EVAO using the Rancimat oil stability index analysis and hot air oven testing.

It was found that fluorescent light at 4500 lux and aeration with dry air strongly accelerated the oxidation (determined by PV) and reduced the chlorophyll content of EVAO. The average effect of 4500 lux fluorescent light compared to 0 lux over seven hours was a PV increase of 4.5 ± 1.4 meq/kg oil and decrease in chlorophyll content by 0.9 ± 0.3 ppm. The average effect of aerated EVAO compared to EVAO stored at ambient oxygen levels over seven hours was a PV increase of 3.5 ± 1.7 meq/kg oil and a chlorophyll content decrease of 0.3 ± 0.2 ppm. Exposure to an elevated temperature of 60°C for seven hours did not cause a significant increase in PV. Recommendations were made to minimise the exposure of the oil to light, aeration, water and fruit sediment during production and packaging in order to minimise oxidation of the oil. Due to the breakdown of natural antioxidants and alternative side reactions that occurred at elevated test temperatures but not at ambient temperatures, the shelf life of the oil could not be defined. EVAO containing ascorbyl palmitate at a level of 100 ppm had a peroxide value 80 % less than control EVAO with no antioxidants after 500 hours storage at 60°C. Ascorbyl palmitate has GRAS status and was concluded to be the most effective antioxidant of those tested in EVAO.

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