



Study by Fourier Transform Infrared Spectroscopy of the Avocado Oils of the Varieties Hass, Criollo and Fuerte

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Abstract: Edible oils are obtained by two procedures: by pressing the fruit and with organic solvents. However, there are reports that indicate that the use of solvents affect the quality of the fatty acids inducing the formation of *trans* isomers, which are banned in many countries because these consumed in large quantities are cause of cardiovascular diseases and increase the cholesterol. The purpose of this work is to apply FTIR to study the *trans* fatty acids in the avocado oils of the varieties Hass, Fuerte and Criollo extracted by centrifugation (AHC, AFC and ACC, respectively) and with hexane (AHH, ACH and AFH, respectively). The Infrared spectra were obtained with Fourier Transform Infrared (FTIR) in the mid region ($4000\text{--}600\text{ cm}^{-1}$). The AHC, AFC and ACC Oils IR spectra show a very intensity band at the frequency 723 cm^{-1} , which corresponds to the functional group *cis* with a bending vibration mode. For the AFH the *trans* functional group was identified in the band sited at 968 cm^{-1} with a strong intensity. The centrifuge method is an alternative for obtaining avocado oil, because the degradation of the fatty acids is minimum and the green color is maintained.

Key words: Avocado oil, infrared spectroscopy, *trans* fatty acids.

1. Introduction

The Mexican avocado is a fruit recognized world-wide level due to the high quality of its nutrients [1]. The main problem of the producers is the short time of maturation and oxidation that presents this fruit, because of it has been demonstrated that the visual appearance a product is the first impact that takes the consumer to acquire it [2].

The avocado in Mexico has begun to industrialize in products such as paste and oil. The main avocado variety cultivated is the Hass, but other varieties such as the Fuerte and Criollo are also important, the last one is in danger of extinction because of it is being replaced in most of orchards by the variety Hass [3]. Various researchers have reported that avocado oil is similar to olive oil in many chemical compounds; however, the

avocado oil has a higher content of β -sitosterol (1-0.45%), vitamin E (130-200 mg/Kg) and chlorophyll (40-60 ppm) [4]. However, the high levels of chlorophyll in the avocado oil affect its stability and quality causing a rapid formation of oxidation products by means of singlet oxygen [5]. The green color in the oil has been identified by the consumers as desirable because it retains almost all the natural components of fruit.

Several investigations are focused on the extraction of oil, with the purpose of minimizing the adverse effects and to obtain a suitable product for the consumers. Generally, edible oils are extracted by drying, mechanical pressure at high temperatures and organic solvents. The use of organic solvents in a commercial scale has been discussed due to air pollution problems. In addition, the solvents affect the quality of the unsaturated fatty acids inducing the formation of *trans* isomers [6], which are banned in

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