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Detection of corn oil in adulterated olive and soybean oil by carbon stable isotope

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The production of olive oil and soybean oil is expensive and time-consuming, and the products have high commercial value. These make the products highly susceptible to economically motivated adulteration, especially on the Chinese market. The study was performed to elucidate the possible detection of varying adulteration levels of corn oil in olive and soybean oil using the carbon isotope technique. An elemental analyzer, which was connected to an isotope ratio mass spectrometer and operated in the continuous flow mode was utilized. Statistical analysis was performed using descriptive statistics and one-way ANOVA. The results showed that the samples of olive and soybean oil had lower $\delta13C$ values relative to corn oil samples irrespective of the origin of production. The standard error (SE) of the mean on $\delta13C$ value of olive oil, soybean and corn oil was -29.26 ± 0.14; -28.90 ± 0.35 and -15.84 ± 0.08‰, respectively. The difference in $\delta13C$ values of both olive oil and soybean oil adulterated with corn oil samples at different adulteration content (25, 50, 75, and 95%) were statistically significant ($p<0.05$). The $\delta13C$ values of olive and soybean oil increased gradually as the corn oil adulterated levels raised, with $R^2>0.97$ for both products. Therefore, the carbon stable isotope technique is a good tool for detecting both complete and partial substitution of pure olive oil and soybean oil with corn oil.

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Page 59