

CARBON ISOTOPE ANALYSIS OF INDIVIDUAL FATTY ACIDS OF EDIBLE OILS AS TRACER OF ENVIRONMENTAL CHANGES: AN EXAMPLE OF COMMON EDIBLE OILS CONSUMED IN THE MEDITERRANEAN AND ADRIATIC COUNTRIES

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The effects of environmental or physical factors on the carbon isotope composition of plant and trees have revealed long-term trends in global environmental changes including the increased atmospheric carbon dioxide excess. Products derived from plants having a close link between carbon dioxide assimilation and yield may record these changes. Here we present the chemical and isotopic composition of fatty acids of vegetable oils commonly consumed in Mediterranean and Adriatic countries. The isotopic composition of the bulk oils and major fatty acids from oils of olive, maize, rape and pumpkin were compared with those from Canada, Australia, and South Africa. The interpretation of the data is based on principal component analysis of the fatty acids concentrations and the carbon isotope ratios of the bulk and the palmitic, oleic and linoleic acids. The measured differences in the carbon isotope compositions are discussed in terms of biosynthesis of these acids in the plant tissues, and with regards to the admixture of distinct oils. The results demonstrate the importance of elucidating the metabolism and biosynthesis of the fatty acids which cause the stable carbon isotope discrimination observed in the individual lipids of the vegetable oils. An understanding of these processes will allow us to better utilize the isotopic ratios of genuine vegetable oils as indicators of large scale inter-continental changes in the atmospheric carbon dioxide excess and local greenhouse effects in highly polluted areas from the Mediterranean-Adriatic basins.