

Randomness test of fatty acids distribution in triacylglycerol molecules of palm oil

ABSTRACT

For food purposes, the palm oil is generally fractionated to solid (stearin) and liquid (olein) fractions. Distribution of fatty acids in triacylglycerols of palm oil determines the fate of fractionation in terms of yield and quality of the products, specifically the liquid fraction or olein. The more trisaturated and triunsaturated and the less mono- and disaturated will yield higher and better quality olein. There are six types of fatty acids found in the palm oil, but only 14 combinations are found in the triacylglycerols. In this study, such combinations were statistically tested to determine whether or not the fatty acids are randomly distributed, and if it was not, toward which direction the regulatory agent works. The distribution of fatty acids in the palm oil triacylglycerols was found to be nonrandomly distributed. Unfortunately, the palm tended to form 11.98% higher disaturated triacylglycerols, -7.4% less triunsaturated, and -4.25% less trisaturated compared to when the arrangement was random. If manipulation could be induced in such a way that the synthesis of triacylglycerols becomes random, the triunsaturated and trisaturated triacylglycerol proportion expectedly would increase to 12.57% and 12.43%, respectively. Such manipulation can be done in the plant through genetic engineering, or in the harvested fruit through application of stimulant, or in the oil through chemical or enzymatic transesterification.

Keyword: Fatty acids; Palm oil; Triacylglycerol molecules; Randomness test