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QUANTIFICATION OF POLAR COMPOUND FRACTIONS AS A RELIABLE AND OBJECTIVE METHOD TO GAUGE OIL DEGRADATION DURING EXCESSIVE FRYING

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Measurement of total polar compounds (TPC) is recognised as one of the indicator used to determine the thermal stability of oils when exposed to heat treatments. Nevertheless, dependency on TPC alone in judging oil quality and thus on safety is often deceptive, primarily for oils that contain higher level of natural diacylglycerols (DAG). Hence, this study investigates the levels of polar compound fractions in various oils when subjected to extended frying conditions. Four individual oils, i.e. palm olein (POO), soybean oil (SBO), canola oil (CAN) and sunflower oil (SFO), three binary blends of POO with SBO, CAN and SFO, respectively, and one tertiary blend containing POO, SBO and CAN were subjected to 144 frying cycles over 72 h of heating (8 h day-1 for 9 days). Polar compounds were initially separated gravimetrically through two elution steps before being introduced to the High Performance Liquid Chromatography (HPLC) – Size Exclusion Chromatography with Evaporative Light Scattering Detector (ELSD). It is much anticipated that the initial content of TPC in POO is considerably higher because of diacylglcerols (DAG) content of almost 7% when compared to other liquid oils that contained lesser amount of DAG (2%). After 9 days of frying, the TPC content in SFO reached 32% while other oils fell within 24 and 29%. Regardless to oil compositions, the levels of oxidised triacylglycerols (OxTAG) were ranged between 8 and 10%. The formation of polymerised triacylglycerols (PTAG) was more prominent when POO exhibited much lower PTAG (8%) as opposed to CAN (13%), SBO (17%) and SFO (19%). This study indicates that oils with higher unsaturation are prone to thermal degradation as a result of tertiary oxidation and/or thermal alteration of TAG molecules. Of course, blending liquid oils with POO provides the opportunity to moderate the level of PTAG when oils are heated at frying temperatures.

Biography

Azmil Haizam Ahmad Tarmizi is a Senior Research Officer at the Malaysian Palm Oil Board. He joined the organisation in 2004 after obtaining his Master's Degree in Bioprocess Engineering from the Universiti Teknologi Malaysia. He earned his Doctorate's Degree in Food and Nutritional Sciences from the University of Reading UK in 2012 and awarded with a Master's degree in Business Administration from Anglia Ruskin University UK in 2017. His major research areas are on the frying process and technology, quality and safety of oils and fats, palm oil processing, and palm based reference materials. He has published more than 20 peer reviewed and technical papers, and presented many papers in local and international conferences. He is also a member of the International Standardisation – Malaysia Mirror Committee on ISO/TC34/SC11: Animal and Vegetable Fats and Oils, and the Industry Standard Committee on Food Products and Food Safety (ISC U).

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