Comparative analysis of the physico-chemical, thermal, and oxidative properties of winged bean and soybean oils

Abstract

To explore possible food applications, the oxidative stability, antioxidants contents (tocopherols and tocotrienols), thermal properties, and solid fat content of winged bean oil were investigated along with soybean oil for comparison. Results showed that winged bean oil was significantly ($p < 0.05$) resistant to oxidation (27 h) compared to soybean oil (9 h) heated at 110^{o}C for 32 h, due presumably to the presence of alpha tocotrienol and the high behemic acid content. The high content of tocopherols, 230 mg/100 g in soybean oil did not contribute much to its oxidation stability. At around 25^{o}C, winged bean oil contained about 15% solid fat content with <1% in soybean oil. Soybean oil, however, had better levels of the omega-3 and omega-6 fatty acids with a ratio of 7.6:1, falling within the range of 5:1 and 10:1 recommended by the Food and Agriculture Organization/World Health Organization, when compared to winged bean oil having a ratio of 34.4:1. The positional fatty acids esterified as stearoyl, palmitoyl, behemoyl or lignoceroyl triacylglycerides species, PSP, PPP, PLB, POB and SSlg+PBP overwhelmed the unsaturated FAs of winged bean oil for free radical reaction and also conferred it high thermal conductivity. The high oxidative stability, solid fat content, and thermal conductivity of winged bean oil coupled with its crystalization characteristics confirmed it to be good material for frying and for making zero-trans-fat margarines and spreads.

Keyword: Winged bean oil; Solid fat content; DSC; Physicochemical properties; Antioxidants