Effect of Star Fruit (*Averrhoa carambola*) Peel Extract on Oxidative Stability of Sesame (*Sesamum indicum*) Oil during Storage

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Abstract

Edible plant oils such as sesame (*Sesamum indicum*) oil with a high content of polyunsaturated fatty acids are susceptible to oxidation during storage. Recently, following evidences on the adverse effects of synthetic antioxidants on human health, there is a growing interest in the use of plant sources as natural antioxidants in edible oils. This study investigated the effect of addition of star fruit (*Averrhoa carambola*) peel extract on oxidative stability of sesame oil during storage. Antioxidants present in the peel were extracted by using acetone and antioxidant properties of the extract were determined. Oil samples were purchased directly from a mill ensuring that the oil is not adulterated and does not have any added antioxidants. Initial value of Free Fatty acid content (FFA) and Peroxide Value (PV) were 2.64±0.35 g oleic acid /100g and 0.26±0.06 meq /kg of sample, respectively. Samples were prepared separately in glass bottles by adding 1000 ppm of star fruit peel extract (treatment) and 200 ppm of butylated hydroxytoluene (BHT) (positive control) and without adding antioxidant (negative control). Glass bottles were filled up to the top with the respective oils, hermetically sealed and kept at ambient conditions in a dry and cold place. Two sets of experiments, one set exposed to sunlight and other without exposing to sunlight, were carried out. The level of oxidation was determined by FFA, PV, *p*-anisidine value (AV), TOTOX value, conjugated diene (CD) and conjugated triene (CT) values after one month and two months of storage. All parameters of non-exposed samples were significantly lower ($p<0.05$) than the respective exposed samples. TOTOX values of negative control, positive control and treatment in non-exposed samples after two months of storage were significantly lower (4.11±0.03, 3.55±0.1 and 2.31±0.18, respectively) than exposed samples (10.99±0.35, 7.84±0.08 and 5.79±0.15, respectively). PV, AV and CD and CT values of treatment samples in exposed and non-exposed samples (1.55±0.11 and 0.46±0.13 meq/kg, 2.69±0.06 and 1.4±0.08, 0.96±0.008 and 0.90±0.001, 0.89±0.01 and 0.85±0.01, respectively) were significantly lower ($p<0.05$) than the values of corresponding positive controls (2.39±0.07 and 0.57±0.02 meq/kg, 2.98±0.13 and 2.42±0.06, 0.97±0.001 and 0.94±0.05, 0.91±0.00 and 0.90±0.00, respectively). In conclusion, star fruit peel extract at 1000 ppm significantly reduced the oxidation of sesame oil exposed to light up to two months of storage and its effectiveness was higher than BHT. Thus, star fruit peel extract could be used as a green alternative to synthetic antioxidants in edible oils.

Keywords: Acetonic extract, Antioxidants, Peroxide value, Photo oxidation

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