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Short Communication

Evaluation of some quality attributes of soybean oils in Ibadan

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Soybean oil is popularly used for the processing of margarine, shortenings and soaps, but there is limited information about some quality attributes of the oil. soybean oil was processed from four popular varieties and evaluated for chemical indexes (saponification, Acid, peroxide and iodine values) and sensory characteristics by untrained male and female adults TGX 1440-1E had the lowest saponification value of (96.78 mgKOH/g) and Samsoy 2 had lower acid (2.79%), peroxide (0.03 Meq/g) and iodine (9.89wigs).Samsoy 2 was best preferred with reference to colour, taste, flavour and texture. Samsoy 2 has better quality attributes and could be recommended to soybean oil consuming areas

Keywords: Oil, varieties, peroxide, soybean.

INTRODUCTION

Soybean oil obtained from the extraction of oil from its seed is fairly rich in glycerides of the unsaturated fatty acids particularly linoleic and linolenic with few oleic fatty acids, which do not oxidize readily because they contain natural antioxidants (Naz et al., 2005; Naz et al., 2004). Soybean oil readily absorb oxygen on exposure to air and could form in some cases a tough elastic, but resistant film used as solvents for pigments in paints and vanish Indus-tries (Karabulut et al., 2002; Leonard, 1987; Kochhar, 1986). According to the Soybean Research Advisory Institute, (1984) one-fourth of the world's supply of oil comes from soybeans. The oil content of soybeans is around 20% dry basis. Soybeans are the world's largest oilseed crop, with about 13 million tons of oil produced per year (Patterson, 1989). Soybeans are in high demand due to their high protein and oil content. (Erickson et al., 1980).

Soybean oil has gained popularity in the manufacture of margarines, shortenings, soaps, insecticides and disinfectant. (Erickson et al., 1980). It is also prominen-tly used for packing sardines, tuna and other kinds of fish (Gillies, 1974).

Soybean oil has a small share of the African edible oil market in West Africa. Palm oil at the village level is the most popular cooking oil followed by groundnut oil which is frequently manufactured at home and at commercial levels (International Institute for Tropical Agriculture, (IITA) 1987). Much work has been done on soybean oil with reference to intermolecular interactions (González et al., 2006) and selective hydrolysis by lipases (Kiatsimkul et al., 2006).But there is little information about its quality parameters with reference to stability and acceptability in Ibadan, Nigeria (Naz et al., 2004).Therefore there is a need to evaluate the quality attributes of the soybean oil in order to ascertain its present nutritional status.

Hence, the objective of this project is aimed at evaluating the chemical indexes and organoleptic characteristics of soybean oil from four popular soybean varieties.cultivated in Ibadan, Nigeria.

MATERIALS AND METHODS

Four popular soybean varieties namely TGX928-2E, TGX1440-1E, TGX1681-3F and Samsoy 2 were collected from the Institute of Agriculture Research and Training, Ibadan.
Nigeria

Chemical analysis

Oil extraction was carried out by Soxhlet method (AOAC, 1980)

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Table 1. Chemical composition of soybean oil.

	Saponification value (mgKOH/g)	Acid value (%)	Peroxide value (Meq/g)	Iodine value (wigs)
TGX 923-2E	108.00^{ab}	9.75^{c}	0.05^{ab}	26.94^{c}
TGX 1440-1E	28.05^{c}	16.06^{b}	0.06^{a}	36.86^{b}
TGX 1681-3F	96.78^{ab}	18.01^{a}	0.03^{bc}	41.85^{a}
Samsoy 2	111.36^{a}	2.79^{d}	0.03^{bc}	9.89^{d}

Mean in the same column followed by the same letter are not significantly different from each other at p<0.05

Table 2. Organoleptic evaluation of soybean oil.

	Colour	Taste	Flavour	Texture	General Acceptability
TGX 923-2E	7.8^{abc}	2.4^{c}	4.0^{bc}	6.8^{ab}	4.4^{abc}
TGX 1440-1E	8.0^{ab}	3.0^{bc}	3.6^{bc}	6.6^{ab}	4.2^{abc}
TGX 1681-3F	7.4^{abc}	6.0^{a}	4.4^{ab}	6.6^{ab}	6.4^{a}
Samsoy 2	8.4^{a}	6.0^{a}	7.0^{a}	7.8^{a}	6.2^{ab}

Mean in the same column followed by the same letter are not significantly different from each other at p<0.05

Acid value

Acid value was determined by titremetric method of Pearson, 1970. 5 g of the oil was weighed and 50 ml of hot neutral alcohol was added with a few drops of phenolphthalein. The mixture was shaken vigorously and titrated with 0.5 N NaOH solution with constant shaking until the pink colouration remains permanent.

Iodine value

Iodine value was determined by the titremetric method of Pearson, 1970. The oil sample 1 g was weighed into a dry glass stoppered bottle of 250 ml capacity and 10 ml of carbon tetrachloride was added to the oil. About 20 ml of Wijs solution was then added and allowed to stand in the dark for 30 min. After which 15 ml of (10%) Potassium Iodide and 100ml of water was added and then titrated with 0.1N thiosulphate solution using starch as indicator just before the end point. A blank was also prepared alongside the oil samples.

Peroxide value

Peroxide value was determined by the titremetric method of Pearson, 1970. The oil sample 1g was weighed into a tube and 1g of powdered potassium iodide with 20 ml of solvent mixture (Glacial acetic acid and chloroform) were added. This was then placed in boiling water for 30 sec. The content was then poured into a flask containing 20 ml of 5% iodide solution. The tube was then washed out with 25 ml of distilled water and titrated with 0.002 N sodium thiosulphate solution using starch as indicator. A blank was also prepared alongside the oil samples.

Saponification value

Saponification value was determined by the titremetric method of Pearson, 1970. The oil sample 2 g was weighed into a conical flask and 25 ml of alcoholic potassium hydroxide was added. Heat the solution in boiling water for one hour. Add 1 ml of 1% phenolphthalein and titrate with 0.5 N hydrochloric acid. A blank was also prepared alongside the oil samples.

Organoleptic Evaluation

Organoleptic properties were conducted using a ten member panel comprising of untrained male and female adults. The panellist were provided with clean water to rinse their mouth after tasting each oil sample and the samples already placed in separate booths were labelled in such a way that the panellist will not be able to identify them. Oil samples were evaluated using a nine point hedonic scale basis (1=dislike extremely and 9=like extremely).(Larmond, 1977).

Statistical analysis

Data obtained were subjected to analysis of variance and the means were separated by Duncan Multiple range test (Duncan, 1955), to establish differences between the means.

RESULT AND DISCUSSION

Table 1 shows the results of chemical analysis of soybean oils. The saponification value of Samsoy 2 was significantly different from other oil samples at p<0.05, with TGX1440-1E having the least value. TGX1440- 1E could contain higher saturated fatty acids than other oil samples. With reference to acid, peroxide and iodine values, Samsoy 2 had lower values. These values are however lower than that reported by (Naz et al., 2004). It showed that Samsoy 2 has better quality attributes most especially with reference to stability (Kochhar, 1986).It is also noteworthy that the saponification, peroxide, acid and iodine values of the oils were within stipulated international standards (Guinn, 2002; Branson et al., 2004)

In Table 2, Samsoy 2 was significantly higher than other oil samples in colour, flavour and mouthfeel but not

significantly different from TGX1681-3F in taste. However, high general acceptability score was given to Samsoy 2 sample.

It can be concluded that oil processed from Samsoy 2 variety can be recommended to soybean oil consuming areas because of its better quality attributes.

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