Chemical Compositions and Nutritional Values of Two Local Condiments: *Monodora myristica* and *Monodora tenuifolia* Seeds

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Abstract

Seeds and ether extracts of Monodora myristica and Monodora tenuifolia were analysed to investigate their chemical compositions and nutritional values. Analysis of the seeds showed the following compositions for M. myristica: fats and oil (27%), crude protein (3.2%) and ash (2.8%), and for M. tenuifolia: fats and oil (26.2%), crude protein (4.1%), ash (2.5%). The results of analysis of M. myristica oil are as follows: iodine value (190), peroxide value (6.5), saponification value (120), unsaponifiable matter (12.6); and for M. tenuifolia oil: iodine value (192), peroxide value (11.5), saponification value (116), and unsaponifiable matter (8.0). The mineral content was generally very low, except for manganese. Nevertheless, the seeds have good nutritional qualities as condiments. The quality of their oils conform to the recommendation in the Codex Alimentarius standard for edible oils and with 26-27% fat content, the two seeds could serve as good sources of high quality cooking oils to enhance food flavour as a result of their nice taste and fragrance.

Keywords: Condiments, Food flavour, Food value enhancement

Introduction

Most Nigerian foods are richly seasoned with sweet smelling spices to enhance the flavour. The Igbos of the South-East use a variety of leafy vegetables and seeds as condiments. Among the common condiments are the seeds of *Monodora myristica*, which is called "eruru" or "ehuru" in Igbo language, and *Monodora tenuifolia*, known as efu (Enwere, 1998). Many Igbo delicacies such as the popular "isi ewu," a sumptuous meal prepared with goat head parts; "abacha-ncha", a tapioca salad; and "ose-orji", a groundnut paste for serving kola nuts, may be considered incomplete without "eruru" or "efu" or both. Traditionally, the two seeds are believed to have medicinal effects, and are very prominently used in seasoning foods, especially soup prepared for mothers under post-natal care.

Furthermore, the crude ether extract of *M. myristca* has been found to have insecticidal property, protecting legumes in storage from damage by *Callosobruchus maculatus* (F) for up to two years (Ofuya et al, 1992). In the present study, the chemical analysis of *M. myristica* and *M. tenuifolia* seeds and oils were carried out to investigate their chemical compositions and nutritional properties.

Materials and Methods

Collection of Seeds: Dry seeds of *M. myristica* and *M. tenuifolia* were bought from Nsukka Market and deshelved. Some were pulverised and ground in an electric grinder, and some meant for metal analysis, were pulverised and ground in a wooden mortar with pestle. The powdered seeds were stored in polythene bags and preserved by refrigeration.

Extraction and analysis of fat: Extraction of fat was done with a soxhlet extractor using petroleum ether (40 – 60°C) as solvent. Protein analysis was done by the Kjeldahl method and ash content by gravimetry after ashing at 500°C for 3 hrs (AOAC, 1980).

Analyses of the crude ether extract included the determination of specific gravity, viscosity, refractive index, iodine value, peroxide value, saponification value and unsaponifiable matter, using various standard methods (AOAC, 1980; Hamilton *et al* 1992). Specific gravity was determined using a 50ml specific gravity bottle, viscosity by a Ferranti portable viscometer, and refractive index with an Abbes refractometer. Iodine value was determined by Wijs method, and peroxide value by the Wheeler method as described by Hamilton *et al* (1992). Saponification value was determined by titrimetry using 0.5M hydrochloric acid and unsaponifiable matter by gravimetry of the dried residue obtained after determination of saponification value.

Metal analysis: About 2g of the powdered seeds were ashed at 500°C for 3 hrs. The ash was made into a 100ml solution for the determination of Na, K, Ca, Fe, Ni, Co, Mn, Cd, and Cu. For the determination of Mg and As, wet oxidation was applied in preparing the samples (Abson and Lipscomb, 1957). Na and K were determined by flame photometry, Ca and Mg by EDTA titration, and others by atomic absorption spectrophotometry, using air-acetylene flame, except for As, which required oxy-acetylene flame.

Results and Discussion

The average results of three determinations are presented in Tables 1 and 2, in comparison with some literature data on groundnuts. Proximate analysis (Table 1) shows that the two seeds have lower content of fats and oil than groundnuts. They are also low in protein, but their ash contents compared favourably with that of groundnuts.

Table 1: Proximate analysis of seeds of *M. myristica* and *M. tenuifolia* compared with data on groundnuts

	M. myristica	*M. tenuifolia*	Groundnuts*
Fats and oil (%)	27.0	26.2	57-75
Crude protein (%)	3.2	4.1	26.3
Ash (%)	2.8	2.5	2.3

* *Source: Kirk and Sawyer (1991)*

Table 2: Physical and Chemical Characteristics of *M. myristica* and *M. tenuifolia* seed oils in comparison with groundnut oil

	M. myristica	*M. tenuifolia*	Groundnuts*
Specific gravity	0.917-0.927	0.919-0.927	0.914-0.917
Viscosity	40.11	38.26	-
Refractive index	1.536	1.509	1.460-1.465
Iodine value (Wijs)	190	192	80-106
Saponification value (mg KOH/g)	120	116	187-196
Unsaponifiable matter (g/Kg)	12.6	8.0	10[+]
Peroxide value (mEq/Kg)	6.5	11.5	10[+]

* *Source: Kirk and Sawyer (1991);* [+] *Maximum values cited in literature*

Table 3: Metal Concentrations (mg/kg) in *M. myristica* and *M. tenuifolia* seeds Compared to Ranges in Nigerian Fruits

	M. myristica	*M. tenuifolia*	Range for Nigerian fruits*
Na	20.2	14.1	5-790
K	19.0	11.0	10-1,056
Mg	0.24	0.39	5-324
Ca	0.38	0.47	0.6-755
Cu	0.47	0.56	0.6-4.2
Cd	Nd	Nd	Nd
Co	Nd	Nd	Nd
Fe	0.18	0.17	1.8-11.8
Ni	Nd	Nd	1.4-3.9
Mn	28.1	131.8	1.9-4.0

* *Source: Okoye C. O. B. (2001)*

With reference to Table 2, the specific gravities and refractive indices of *M. myristica* and *M. tenuifolia* oils are very similar to that reported for groundnut oil and conform to the recommended Codex Alimentarius standards for edible vegetable oils (Kirk and Saywer 1991). Their iodine values are much higher than the value quoted for groundnut oil, indicating higher degrees of unsaturation in both oils than in groundnut oil.

Judging by saponification values, the two oils contain lower proportions of short chain (low molecular weight) fatty acids than groundnut oil. The values are moderate when compared with the range of 230-254 reported for palm kernel oil, or with 248-265 for coconut oil (Kirk and Sawyer 1991). *M. myristica* oil contains greater quantity of unsaponifiable matter (12.6g/Kg), than *M. tenuifolia* oil (8.0g/Kg). The maximum value reported for groundnut oils is 10g/Kg. Unsaponifiable matter is a measure of the amounts of hydrocarbons, higher alcohols, oil-soluble vitamins and sterols (phytosterols in this case). These are the unsaponifiable materials usually found in an oil. The recommended Codex standard for oils of normal purity is a maximum of 2% of unsaponifiable matter (Kirk and Sawyer 1991). The oils of *M. myristica* and *M. tenuifolia* as well as groundnut conform to this standard. Percent unsaponifiable matter contents are: 1.2% in *M. myristica* oil, 0.80% in *M. tenuifolia* oil and 1.00% in groundnut oil.

The peroxide value for *M. myristica* oil is very low, indicating high purity and freshness. Peroxide value is a measure of the peroxide content of an oil, and indirectly, a measure of the degree of rancidity. Fresh oils usually have values less than 10 mEq/Kg, and when this value is exceeded, it is an indication that rancidity has set in. However the value of 11.5mEq/Kg determined for *M. tenuifolia* oil is still below the critical level in the range of 20 to 40 mEq/Kg, when rancidity begins to be noticeable as foul odour and taste.

The physical and chemical data as well as other properties, show that *M. myristica* and *M. tenuifolia* oils conform to the recommended Codex Alimentarius standards for edible oils (Kirk and

Sawyer 1991). It is clear from the experimental data that both are high quality oils. Their low proportion of short chain fatty acids is compensated by higher degrees of unsaturation, making both oils liquids at room temperature.

The metal concentrations presented in Table 3 are compared with the range of values determined in Nigerian fruits (Okoye 2001), because no other literature data are available. Except manganese, all other metals are in very low concentrations in the two seeds. Cadmium and cobalt were not detectable either in the seeds or in Nigerian fruits, but nickel was detectable in Nigerian fruits. The two seeds (*M. myristica* and *M. tenuifolia)* are low in the nutritionally important metals, namely; calcium, copper and iron. Nevertheless, this does not impair their nutritional values as food condiments. With 26-27% fat content, the seeds in addition to their traditional uses as condiments, could be good sources of high quality cooking oils with very nice and aromatic flavour to add more value to foods by enhancing flavour.

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