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Comparative Studies on Nutritional Composition of Four Melon Seeds Varieties

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Abstract: This study evaluates four Cucurbit species in Iree, Osun state, Nigeria. The species used were *Cucumeropsis manni* (Naudin), *Cucumis sativus*, *Leganaria siceraria* and *Cucumeropsis edulis* (Hook). Proximate and mineral analyses were carried out on the shelled Cucurbit species. Protein, fat, ash, crude fibre, moisture and carbohydrate content ranged from 33.80-39.96%, 40.26-45.21%, 3.35-4.89%, 1.66-2.16%, 4.78-5.21 and 7.08-14.15% respectively. There were significant difference ($p \leq 0.05$) in the values obtained in protein, fat, ash moisture content and carbohydrate. But there was no significant difference ($p \leq 0.05$) in crude fibre values for *Cucumeropsis edulis* and *Cucumis sativus*. *Cucumis sativus* had higher calcium content (2.03%) while *Cucumeropsis manni* had higher values in Mg (8.87%), Na (162.76 ppm), Mn (107.72 ppm) and Fe (39.71 ppm) contents. *Leganaria siceraria* also had higher values in K (5.43%), Cu (5.09 ppm) and Zn (19.75 ppm). Acid value ranged from 3.13-4.22 mgKOH/g, free fatty acid ranged from 3.4-3.9%. Saponification and peroxide values of 188-193 mg KOH/g and 9.7-11.6 Meq/kg were obtained for the melon seeds oils. Also, iodine values for the melon seeds ranged from 95.5-98.2 Wijs. All the seeds serve as good sources of protein, fat and minerals.

Key words: Cucurbit species, saponification, peroxide, nutritional composition, proximate

INTRODUCTION

Melon is a cucurbit crop that belongs to the *Cucurbitaceae* family with fibrous and shallow root system. It is a tendril climber or crawling annual crop, mostly grown as a subsidiary crop interplanted with early maize and yam in some savannah belt of Nigeria. Melons are major food crops with several varieties which serves as a major food sources (Mabalaha *et al*., 2007). *Cucurbit* sp. are among the economically most important vegetable crops worldwide and are grown in both temperate and tropical regions (Pitrat *et al*., 1999; Paris, 2001). Melon seed kernels are major soup ingredients and they are used as a thickener and flavour component of soups. Melon seeds are less expensive and widely distributed. They can contribute substantially towards obtaining a balanced diet (Fokou, *et al*., 2004). Melon seeds are generally a rich source of oil. Oil seeds are generally processed to yield condiments such as 'ogiri'. *Cucurbita* spp comprises of overlapping groups of cultivars that yield seed or edible fruit. In West Africa, they are called egusi derived from Yoruba language; the seeds are considered a delicacy. Despite extensive research on melon seeds in many part of West Africa (Loukou *et al*., 2007; Fokou *et al*., 2004; Onyeike and Acheru, 2002; Badifu and Ogunsua, 1991), there is a dearth of studies in our locality. Therefore, the research work evaluates the nutritional composition of four melon seeds in Iree, Osun State, Nigeria.

MATERIALS AND METHODS

Melon seeds (*Cucumeropsis manni* (Naudin), *Cucumis sativus, Leganaria siceraria and Cucumeropsis edulis* (Hook) were bought at the local market in Iree, Osun State, Nigeria. The melon seeds (except *Leganaria siceraria*) were shelled and kept in airtight container for analysis.

Proximate analysis were carried out with the method of AOAC (1990) while the mineral contents were determined using the method of Novozamsky *et al*. (1983). The oils were extracted using Soxhlet extractor and the physico-chemical properties (saponification value, acid value, peroxide value, smoke point, iodine value and free fatty acid) of the oil were carried out using the method described by AOAC (1990). All analyses were carried out in triplicates and the data were evaluated for significant differences in their means with Analysis of Variance (ANOVA) ($p \leq 0.05$). Differences between the means were separated using turkey's test as packaged by SPSS 11.0 software.

RESULTS AND DISCUSSION

The proximate composition of the four melon seeds are shown in Table 1. The protein content ranged from 33.80-39.96% with *Leganaria siceraria* having the highest value which was significantly different ($p \leq 0.05$) from other samples. The values obtained for these seeds were in agreement with the finding of Fokou *et al*. (2004) who reported a range of 24.3-41.6% for protein content in five melon seeds. The values were higher than the values (23.7-30.68%) reported by (Olaofe *et al*., 1994) for melon, pumpkin and gourd seeds. The samples are rich in crude protein content and could be used to enrich food products.

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Table 1: Proximate composition of melon seeds varieties

Composition	*Cucumeropsis manni* (Naudin)	*Cucumeropsis edulis* (Hook)	*Leganaria siceraria*	*Cucumis sativus*
Protein	34.86c	35.31b	39.96a	33.80d
Fat	42.29b	40.26d	40.86c	45.21a
Moisture	5.13b	4.78d	5.21a	4.88c
Ash	3.51c	3.35d	4.89a	3.75b
Crude fibre	1.66c	2.00b	2.16a	2.03b
Carbohydrate	12.55b	14.15a	7.08d	10.33c

Value with the same letter along the row are not significantly different ($p \leq 0.05$) from each other

The fat content ranged from 40.26-45.21%. *Cucumis sativus* had higher fat value which was significantly different ($p \leq 0.05$) from the other three samples. These values were higher than the value (23.1%) reported by Kamel *et al*. (1985) for water melon seed oil. The fat values reported by Fokou *et al*. (2004) for *C. manni* (42.9%) and *Cucumis sativus* (57.3%) were higher than the values obtained. This could be due to the cultivars used. Mabalaha *et al*. (2007) also reported oil yields of seeds ranging from 24.8-30.0% in *Citrillus lanatus* and *C. colocynth* species respectively while Madaan and Lai (1984) recorded oil content values of 41.0-56.6% in melon seeds. The values of lipid obtained for the four varieties of melon seeds were within these values. Melon seeds have high fat contents, thus the seeds are classified as excellent sources of dietary oil (Nwokolo and Sim, 1987).

Moisture contents of the melon seeds ranged from 4.78-5.21%. *Leganaria siceraria* had higher value while *Cucumeropsis edulis* had the lowest value (4.78%). The samples used had lower moisture content values. Moisture content of 4.33% in *Cucumis sativus* and 7.26 (*Cucurbita moschata*) were reported by Fokou *et al*. (2004). The ash content ranged from 3.35-4.89%. *Leganaria s*iceraria seeds had higher value in ash content and were significantly different ($p \leq 0.05$) from other samples. Fokou *et al*. (2004) also reported a range of 2.82-5.0% in the melon seeds. The results showed that the samples have significant amount of ash which are important sources of minerals.

Crude fibre ranged from 1.66-2.16%. *Leganaria siceraria* was significant different ($p \leq 0.05$) from other samples due to the high value in crude fibre. But there were no significant difference ($p \leq 0.05$) in the crude fibre values of *Cucumeropsis edulis* and *Cucumis sativus*. Crude fibre contents of 0.90-1.63% were reported by Fokou *et al*. (2004) while Madaan and Lai (1984) and Loukou *et al*. (2007) reported crude fibre of 1.25-2.60% and 2.30-2.94% respectively. The crude fibre contains indigestible materials which can reduce constipation by increasing bowel movement. Carbohydrate content ranged from 7.08-14.15%. The highest value was in *Cucumeropsis edulis* while the least was in *Leganaria siceraria*. These values were higher than the values recorded by Fokou *et al*. (2004) but were within the range of values recorded for *C. lanatus* (9.87%), *C. manni* (13.86%) *and C. melo* (23.18%) by Loukou *et al*. (2007).

Table 2 showed the mineral composition of the four melon seeds. *Cucumis sativus* had higher Ca content (2.03%) than the other samples while *Cucumeropsis manni* had higher values in Mg (8.87%), Na (162.76 ppm), Mn (107.72 ppm) and Fe (39.71 ppm). These values were significantly different ($p = 0.05$) from other melon seeds analyzed. *Leganaria siceraria* also had higher values in K (5.43%), Cu (5.09 ppm) and Zn (19.75 ppm). Calcium level of 129.7-269.7 mg/100 g d.w was recorded by Fokou *et al*. (2004). The samples were rich in mineral contents which aid in digestion, formation of strong bone and teeth and hemoglobin formation. The variation in mineral composition could be due to the climate, species, soil type, water and the cultural practices adopted during planting (Steven *et al*., 1985).

Table 3 showed the physico-chemical properties of melon seeds oil. Acid value ranged from 3.13-4.22 mgKOH/g. The acid values of *Cucumeropsis edulis* and *Cucumis sativus* were slightly higher than the Codex standard value for virgin vegetable oils. These values were within the range reported for water melon (3.41 mg/g) and melon seed (4.26 mg/g) (Ebuehi and Avwobobe, 2006). Free fatty acid ranged from 3.4-3.9%. Low free fatty acids indicate the stability of the oil. Saponification values of 188-193 mgKOH/g were obtained for the melon seeds oils. These were higher than water melon value (175.98 mg/g) and lower than that for melon seeds oil (201.15 mg/g) reported by Ebuehi and Avwobobe (2006). They were within the range (182.1-193.8 mgKOH/g) reported for *Curcubitatacea* seeds oil by Mabalaha *et al*. (2007).

Peroxide value of 9.7-11.6 Meq/kg were determined for the melon seeds oils while 19.54 m mol/g was reported for melon seeds oil by Ebuehi and Avwobobe (2006). The values were higher than the codex standard value (10 Meq/kg) for refined vegetable oil and lower than the maximum value (20 Meq/kg) allowed for unrefined olive oil (FAO/WHO, 1993). This implies that the melon seeds oil have lower degree of rancidity. This finding agrees with the report of Ebuehi and Avwobobe (2006).

Also, iodine values for the melon seeds ranged from 95.5-98.2 Wijs. Mabalaha *et al*. (2007) reported iodine values of 95.8 Wijs in Tsama melon to 124.0 Wijs in Desert melon. The values obtained were within the codex standard value for groundnut oil (80-106 Wijs). The lower iodine value signifies low degree of

Table 2: Mineral composition of melon seeds varieties

Composition	*Cucumeropsis manni* (Naudin)	*Cucumeropsis edulis* (Hook)	*Leganaria siceraria*	*Cucumis sativus*
Ca (%)	1.49c	1.19d	1.79b	2.03a
Mg (%)	8.87a	7.64d	8.13c	8.57b
K (%)	5.28b	4.83d	5.43a	5.14c
Na (ppm)	162.76a	62.26d	88.25b	79.24c
Mn (ppm)	107.72a	54.83d	80.67b	66.25c
Fe (ppm)	39.71a	20.16d	26.45b	21.43c
Cu (ppm)	3.37b	2.81d	5.09a	3.28c
Zn (ppm)	13.46c	16.54b	19.75a	11.66d

Value with the same letter along the row are not significantly different ($p \leq 0.05$) from each other

Table 3: Physico-chemical properties of melon seeds oil

Composition	*Cucumeropsis manni* (Naudin)	*Cucumeropsis edulis* (Hook)	*Leganaria siceraria*	*Cucumis sativus*
Acid value (mgKOH/g)	3.13c	4.22a	3.67b	4.1a
Free fatty acid % (AVx100/wt)	3.4c	3.9a	3.5bc	3.6b
Saponification value	188.0bc	193.0a	190.0ab	185.0c
Peroxide value (Meq/kg)	10.2b	11.6a	9.7c	10.4b
Iodine value (Wij's)	95.5b	98.0a	98.2a	97.6a
Moisture content (%)	1.4b	1.2c	1.9a	1.1c
Smoke point	225.0c	235.0a	228.0bc	230.0b

Value with the same letter along the row are not significantly different ($p \leq 0.05$) from each other

unsaturation and the lesser the liability of the oil to become rancid by oxidation.

Conclusion: From the results obtained, the melon seeds are good source of protein and fat. The seeds from the four varieties could be used to enrich soup and fortify other products in order to improve the protein content. *Cucumeropsis manni* (Naudin) and *Leganaria siceraria* were richer in mineral contents than other samples. The oil is very useful due to the stability of the oil and the physico-chemical properties could be improved by refining the oil.

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