

Chemical composition of nutmeg and mace (*Myristica fragrans* Houtt.) from Tellicherry and Kannur regions, Kerala

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Abstract

The chemical composition of nutmeg and mace of *Myristica fragrans* collected from Tellicherry and Kannur areas (North Kerala) was studied. The study indicated that the nutmeg and mace obtained from these areas is comparable in quality (with minor variations) to that reported from other areas.

Keywords: chemical composition, mace, *Myristica fragrans*, nutmeg.

The chemical composition and quality of nutmeg (*Myristica fragrans* Houtt.) grown in major producing areas of the world have been reported to vary widely (Ehlers *et al.* 1998); (Chag Yen *et al.* 1996). The variation in chemical composition may be due to the geographic, climatic and maturity conditions. A chemical evaluation of this tree spice grown in southern Kerala has been made by Gopalakrishnan (1992). In this paper, studies on chemical composition of nutmeg and mace cultivated in Tellicherry and Kannur areas in Kerala are compared with the information available in literature.

Sixteen samples of nutmeg and mace collected from Tellicherry and Kannur areas were powdered well separately and the oil was extracted by hot and cold extraction processes. The studies were conducted during summer season. Hot extraction was carried out by Soxhlet extraction method using petroleum ether as solvent. The extracted oil was analysed by gas chromatography. The

Iodine value and saponification value of nutmeg oil was also determined. Carbohydrate, starch, reducing sugars, protein, phenol and fat were determined by methods described in Sadasivam & Manickam (1992). Total free amino acids were estimated by Ninhydrin method of Yapinlee & Takahashi (1966).

Fatty acids present in nutmeg and mace were extracted by incubating in NaOH-methanol at 70°C for 2 h. Free fatty acids were converted to fatty acid methyl esters for GLC analysis by incubating in methanol-HCl (Hennessey *et al.* 1983). Methyl esters of fatty acids were separated in a Perkin-Elmer Autosystem gas chromatograph equipped with PE Nelson 1022 GC plus integrator. The detector used was FID. FID temperature was 300°C and that of the injection port was 200°C. The column used was carbowax 20 M. The column oven temperature was programmed at 80-190°C @ 24°C min⁻¹ with initial holding time of 1 min. Minerals were estimated by dry ashing as

described by Tandon (2001). Phosphorus was estimated as described by Tandon (2001).

The chemical components of nutmeg and mace estimated in the present study are given in Tables 1 & 2. The carbohydrate content in nutmeg and mace is reported to be 28.5% and 47.8%, respectively (Gopalan *et al.* 1981). The starch content of nutmeg has been reported

Table 1. Chemical components of nutmeg and mace from Tellicherry and Kannur areas

Component	Nutmeg (%)	Mace (%)
Carbohydrate	32.40	45.70
Starch	28.20	38.10
Reducing sugars	0.19	0.31
Protein	8.30	6.10
Phenol	2.80	0.50
Fat	33.80	26.40
<i>Fatty acid composition</i>		
Lauric acid	8.00	1.31
Myristic acid	55.10	8.11
Palmitic acid	14.87	52.26
Stearic acid	7.30	7.98
Unidentified components	2.52	-

Table 2. Mineral content and essential oil constituents of nutmeg and mace from Tellicherry and Kannur areas

Component	Nutmeg	Mace
K (%)	0.62	0.88
Ca (%)	0.12	0.11
Fe (ppm)	98	111
Cu (ppm)	13	21
Zn (ppm)	16	15
Mn (ppm)	41	23
P (ppm)	150	112
Essential oil (%)	8.7	15.8
<i>Major essential oil constituents</i>		
α -pinene (%)	9.3	10.0
Sabinene (%)	37.1	19.7
Safrole (%)	4.8	3.3
Myristicin (%)	12.5	22.0
Elemicin (%)	27.2	30.2

to be between 14.6% and 24.2% (Pruthi 1976) whereas that of mace is reported as 44.5% (Gopalakrishnan 1992). The values obtained in the present study are little higher in the case of nutmeg. Gopalakrishnan (1992) has reported the amount of reducing sugar as 0.17% and 0.27% in nutmeg and mace, respectively. The values obtained in the present study are slightly higher than the reported values. Varghese (2000) reported a protein content of 7.5% in nutmeg and 6.5% in mace. The protein content reported by Gopalakrishnan (1992) is 7.16% and 9.91%, respectively. The results obtained in the present study are agreeable, in case of nutmeg whereas it is lower in the case of mace. Varghese (2000) reported a total mineral content of 1.7 g in nutmeg and 1.6 g in mace. The present study indicated that nutmeg and mace contained 0.11% of calcium. The iron and phosphorous contents were reported as 4.6% and 12.6% and 0.14% and 0.1% respectively, in nutmeg and mace. These values were 98 ppm and 111 ppm and 0.62% and 0.88%, respectively in nutmeg and mace, in the present study.

The saponification value was very high (185.27) indicating the presence of free fatty acids. The low iodine value obtained (63.5) shows the few unsaturated compounds present in it. Myristic acid was the predominant fatty acid in nutmeg followed by palmitic acid (54% and 15%). In case of mace, palmitic acid was the dominant one followed by an unidentified fatty acid (52% and 27%).

The essential oil from the dried and powdered nutmeg and mace are given in Table 2. The present study indicated the high level of sabinene in the oils.

The study revealed that the nutmeg and mace obtained from North Kerala is comparable in quality (with minor variations) to that reported from other areas.

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