INTERNATIONAL RESEARCH JOURNAL OF PHARMACY **ISSN 2230 – 8407**
Available online http://www.irjponline.com
Research Article

NUTRITIONAL VALUES OF LESSER UTILIZED AROMATIC MEDICINAL PLANTS

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Article Received on: 15/11/10 Revised on: 30/11/10 Approved for publication: 10/12/10

ABSTRACT
Lesser utilised rhizomes of *Kaempferia galangal* , *Curmuma gedoria* and *Zingiber zerumbet* were analyzed to determined its proximate chemical composition .The rhizomes have high level of moisture, appreciable amount of carbohydrate, protein, crude fibre, and negligible amount of lipid. The micro and macronutrients analysis raveled that the rhizomes to be potential source of potassium, sodium, calcium and magnesium and vitamin-C. Overall, these plants represented a potential food sources with good nutritive values.

KEYWORDS: Chemical composition, rhizome , *Kaempferia galangal , Curmuma gedoria* and *Zingiber zerumbet*

INTRODUCTION
Plants are one of the most important resources of human foods and medicines. Rapidly increasing knowledge on nutrition, medicine, and plant biotechnology has dramatically changed the concepts about food, health and agriculture, and brought in a revolution on them[1].
Obtaining adequate nutrients from various foods plays a vital role in maintaining normal function of the human body. With recent advances in medical and nutrition sciences, natural products and health-promoting foods have received extensive attention from both health professionals and the common population[2,3,4].
These functional or medicinal foods and phytonutrients or phytomedicines play positive roles in maintaining well being, enhancing health, and modulating immune function to prevent specific diseases. They also hold great promise in clinical therapy, due to their potential to reduce side effects associated with chemotherapy or radiotherapy and significant advantages in reducing the health care cost[5,6].
In Bangladesh many plants are consumed as vegetables or are used in food preparations only by certain ethnic communities such as hill tracts tribal people.
Since knowledge of their use in usually transmitted by personal communication. Three plants species known to fall into this category of lesser utilized vegetables or spices are *Kaempferia galangal , Curmuma gedoria,* and *Zingiber zerumbet* .
These plants, which are occasionally sold in the market, are also cultivated in home gardens for personal consumption. In Malaysia and Indonesia, the use of these plants as a food source by ethenic communities has been documented[7,5,8].
Although these plants are eaten as vegetables and spices, their food values have been assessed. In order to promote their use as food sources, information on their nutritional value is desired.
In this study was designed to provide some analytical information on the rhizomes *Kaempferia galangal , Curmuma gedoria* and *Zingiber zerumbet* to increase the interest of people to use as food material .

MATERIALS AND METHODS

The rhizome of *Kaempferia galangal, Curmuma gedoria* and *Zingiber zerumbet were* selected for the investigation. Rhizome of plants were collected from the hilly areas of Chittagong and identified by a taxonomist Dr. Mohammed Yusuf BCSIR Chittagong Laboratory, Bangladesh. All experiments were conducted at three replications.

Moisture, ash, lipid and dietary fibre contents were all determined according to the method[9].Crude protein and water-soluble protein content of rhizomes were determined followed by the method of Micro-kjeldahl[10,11].

Soluble sugar and starch content of rhizomes were determined calorimetrically by the anthrone method[12]. Reducing sugar content of all rhizome were determined by dinitrosalicylic acid method[13].Vitamin- C content of all rhizomes were determined by the titremetric method[14].

Minerals component were determined from ash samples by the AOAC method [15]. Ca, Mg, Fe, Mn, Zn, and Cu were estimated by atomic absorption spectrophotometer (model Spectra AA 55B, Varin, USA) K and Na using flame photometry (model SPCORD 205, Analyticjena, Germany), and P and B by a spectrophotometer (model PFP-7, Jenway, UK).

For all statical analyses, the mean and standard deviation were calculated.

RESULTS

The proximate composition and the mineral content of the rhizome of *Z. zerumbet, C. zedoaria* and *K. galanga* are given in Table 1. Moisture content formed the bulk of tissue weight and plays an important role in the growth of plants. Highest moisture content was observed in *K. galanga* 81.65 %*,* followed by *Z. zerumbet* and *C. zedoaria* .

Ash content ranged from 09- 1.44 %. Where as Zingiber *officinal* contained 0.77% ash. The crude protein content was highest in *K. galanga* (8.12%) compared to *C. zedoaria* and *Z. zerumbet*. Lipid content on an average 0.96 % for all three rhizomes and also similar amount was observed in *Z. officinal*. Amount of total soluble sugar was nearly the same for all three rhizomes and also similar to *Zingiber officinal* and *Curcuma longa*.

The reducing sugar was an averaged 0.31 %. Starch content was higher in *C. zedoaria* (4.1 %) in compared to *K. galanga* (3.6 %) and *Z. zerumbet* (1.8 %). All the samples were good sources of carbohydrates .

Higher dietary fibre content found in *C. zedoaria* (3.66%) but *K. galanga* and *Z. zerumbet* showed the same amount (2%). Whereas, *P. sarmentosum* (1.9%), *A. nemorum M. arvensts* have 2.5% dietary fibre.

Highest vitamin C content was observed in *Zingiber zerumbet* rhizome and also much higher than that of *Zingiber officinal* and *Curcuma longa* .

The rhizome of *C. zedoaria* exhibited the highest magnesium (0.195 %), sodium (0.23 %), sulfur (0.54 %), boron (166 ppm), copper (52 ppm), iron (348 ppm), manganese (2220 ppm) and zinc (108 ppm) while the K. *galanga* were rich in potassium (1.105 %), calcium (0.30 %) and phosphorus (0.326 %). *Z. zerumbet* also contain the reasonable amount of minerals (Potassium 0.495 %, Magnesium 0.165 %, Sodium 0.115 %, Iron 180 ppm, and Manganese 660 ppm) but lower than that of *C. zedoaria* and *K. galanga*.

DISCUSSION

Nutrient contents of the rhizome of *Z. zerumbet, C. zedoaria* and *K. galanga* were compared with *Zingiber officinal* and *Curcuma longa*[16,17].

It must be recognize that meaningful comparison of the data presented here with those previously reported for other plants may be difficult because of different procedure used in the analyses and that agronomic practice and environmental conditions can also influence the cellular contents of the plants[19,20].Nonetheless, it is noteworthy, that the values obtained for the different parameters for any of the common used vegetables, and in some cases they are on the higher end of the scale [21, 22, 23, 24, 25].

From the nutritional analysis it evidence that the plant *Zingiber zerumbet* Linn. is a good source of total protein, carbohydrate and dietary fibre . It contents significant amounts of potassium, manganese, iron and moderate amount of vitamin-C according to World's Healthiest Foods Rating.

Z. zerumbet Linn. is used in baking and to enhance the flavor of meat and fish. Specially used as a spice in Thai food. Generally *Z. zerumbet* and *C. zedoaria* are used as a spice in Indo-Malayan area. From the nutrient value, *Z. zerumbet, C. zedoaria* and *K. galanga* these plant could be used as a food supplement as well as vegetable.

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Table 1: Proximate chemical and mineral content of the rhizome of three aromatic medicinal plants

Composition (%)	*Z. Zerumbet*	*C. Zedoaria*	*K. Galanga*
Moisture	79.05 ± 0.028	73.11 ± 0.014	81.65 ± 0.028
Ash	1.44 ± 0.056	1.12 ± 0.011	0.09±0.011
Total protein	1.66 ± 0.035	8.12 ± 0.028	2.0±0.014
Soluble protein	0.69 ± 0.014	1.12 ± 0.014	1.5 ± 0.014
Lipid	0.90 ± 0.028	0.80 ± 0.056	1.2 ± 0.011
Soluble sugar	2.812 ± 0.011	2.025 ± 0.002	2.175 ± 0.004
Reducing Sugar	0.3466 ±0 .002	0.3636 ± 0.007	0.266 ± 0.002
Starch	1.8 ± 0.014	4.1 ± 0.021	3.6 ± 0.014
Sucrose	2.342 ± 0.045	1.578 ± 0.019	1.8135 ± 0.001
Carbohydrate, by difference	16.95±0.014	16.85±0.011	15.06±0.002
Dietary Fibre	2±0.011	3.66±0.004	2±0.011
Composition (mg/100g)			
Vit- C	31.55 ± 0.042	24.55 ± 0.011	29.8 ± 0.039
Minerals (%)			
K	0.495±0.004	1.07±0.007	1.105±0.002
Ca	0.13±0.001	0.30±0.004	0.30±0.004
Mg	0.165±0.002	0.195±0.001	0.135±0.005
Na	0.115±0.001	0.23±0.002	0.115±0.001
P	0.113±0.001	0.293±0.004	0.326±0.002
S	0.48±0.007	0.54±0.007	0.43±0.005
Minerals(ppm)			
B	114±1.414	166±2.828	78±2.282
Cu	2±0.000	52±1.414	20±1.414
Fe	180±2.828	348±2.121	192±4.242
Mn	660±4.242	2220±5.656	68±1.414
Zn	40±1.414	108±2.828	12±0.000

Source of support: Nil, Conflict of interest: None Declared