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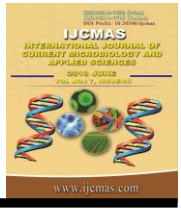

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Periwinkle (*Catharanthus roseus*) Leaves and Lemongrass (*Cympoogon citratus*): An Analysis of Their Nutritional Composition, Anti-Nutritional Factors and Antioxidant Content

Duarah Radali[1*] and Gupta Alka[2]

[1]Department of Food Science and Nutrition, Assam Agricultural University, Assam, India
[2]Department of Foods and Nutrition, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, India

**Corresponding author*

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A B S T R A C T

The present study was carried out to analyze the nutritional and anti-nutritional composition and antioxidant content of the dehydrated periwinkle leaves and lemon grass, From proximate analysis it was found that dehydrated periwinkle (*Catharanthus roseus*) leaves and lemon grass (*Cymbopogon citratus*) are rich source of many nutrients. The moisture level of the dehydrated periwinkle and lemon grass leaves was found to be 8.71% and 8.56%. Ash content of periwinkle leaves was found to be 4.56 g/100g and in lemon grass 6 g/100g. The crude fibre obtained for periwinkle leaves was found 2.4 g/100 g and in lemon grass is 4.5g/100 g. The crude fat found in periwinkle leaves is 3.3 g/100 g, in lemon grass leaves it is 4.1 g/100 g. The crude protein content of periwinkle and lemongrass leaves is 5.2g/100g and 6.5g/100g respectively. The carbohydrate content of periwinkle leaves is 76 g/100 g and in lemon grass is 70 g/100 g. The caloric value of the sample for periwinkle is 354 kcal/100g and lemongrass is 344 kcal/100 g. The iron content for periwinkle was found to be 27 mg/100g and calcium content of periwinkle was found 320 mg/100g, whereas in lemon grass iron content was found 22 mg/100g and calcium content was found 200 mg/100g. The vitamin C content of periwinkle and lemon grass was found to be 0.015/100 g and 2 mg/100 g.

Introduction

Medicinal plants, since time immemorial, have been used in virtually all cultures as a source of medicine. The widespread use of herbal remedies and healthcare preparations, as those described in ancient texts such as the Vedas and the Bible, are obtained from commonly used traditional herbs and medicinal plants. Medicinal plant products could prove useful in minimizing the adverse effects of various chemotherapeutic agents as well as in prolonging longevity and attaining positive general health.

Lemon grass (*Cymbopogon citratus*) is an aromatic perennial tall grass with rhizomes and densely tufted fibrous root. It has short underground stems with ringed segments, coarse, green slightly leathery leaves in dense

clusters (Figueirinha *et al.,* 2008). The leaves of Lemongrass *(Cymbopogon Citratus)* present lemony characteristic flavour due to its main content, citral which present great importance to the industry. Citral, a combination of neral and geranial isomers, is used as a raw material for the production of ionone, vitamin A and beta-carotene (Carlson *et al.,* 2001).

Catharanthus roseus, the Madagascar periwinkle or rosy periwinkle, is an attractive small sub shrub with graceful pink or white salver form flowers. Madagascar periwinkle was used in traditional medicine, the periwinkle has been used for relieving muscle pain, depression of the central nervous system, also used for applying to wasp stings and to heal wounds. Its application ranges widely from the prevention of diabetes to treatment of stomach ache. (Gajalakshmi *et al.,* 2013). Alkaloids isolated from *C. roseus* are hypotensive, sedative and have tranquilising properties and are anti-cancerous. Traditionally it is used for relieving muscle pain, depression of central nervous system and wasps stings. Its application ranges from prevention of cancer, cancer treatment, anti-diabetic, stomachic, reduces high blood pressure, externally against nose bleeding, sore throat and mouth ulcer. (Nammi *et al.,* 2003).

Materials and Methods

The experiment was conducted in the Nutritional Research Laboratory, Department of Foods and Nutrition, Ethelind School of Home Science, Sam Higginbottom University of Agriculture, Technology and Sciences (Deemed to be University) Allahabad, U.P.

The details of the materials, experimental procedure and techniques to be adopted during the course of the investigation were as follows:

Experimental site

The present investigation was carried out in the Nutrition Research Laboratory, Foods and Nutrition, Ethelind School of Home Science, SHUATS, Allahabad.

Procurement of raw materials

Periwinkle (*Catharanthus roseus*) leaves and Lemongrass (*Cymbopogon citrates*) were collected from the field of Department of Horticulture, Sam Higgingottom University of Agriculture, Technology and Sciences.

Leaves were washed with the help of clean water so as to remove the dirt and other disease causing organisms.

Dehydration process of periwinkle and lemongrass leaves

Periwinkle/lemon grass leaves, after washed and trimmed, were spread on flat wooden trays and allowed to dry for 15 hours at 60^{O} - 65^{O} C. Dehydration process was continued till the moisture becomes 6-8%. Then these leaves were ground into powder form and packed in air tight containers.

Nutritional Composition of lemongrass and periwinkle leaves powder

Proximate analysis

Chemical estimation of moisture, ash, protein, fat and fibre content was done by AOAC, using standard procedure.

Methods described by AOAC, was used for determination of chemical composition of selected product, this included estimation of moisture, ash, crude fat, protein, crude fiber and carbohydrate was calculated by difference method and energy was estimated by calculation method.

Minerals content

Iron and calcium was estimated by using standard procedures**.**

Vitamin C

Vitamin C was estimated using standard procedures.

Antioxidant composition

Determination of Total Phenol Content by (Singleton *et al.,*) and Determination of Radical scavenging Activity by DPPH Radical Scavenging Method (Brand *et al.*,1995)

Antinutritional composition

Phytate was estimated by calorimetric methods as describe by Sadasivam (1996) and the total Oxalate in the form of oxalic acid was estimated by the method of Gupta (2007).

Results and Discussion

Table 1 shows the proximate composition, mineral and vitamin content of the dehydrated periwinkle leaves and lemon grass leaves. The moisture level of the dehydrated periwinkle and lemon grass leaves was found to be 8.71% and 8.56%. Moisture content is among the most vital and mostly used measurement in the processing, preservation and storage of food. So the results supports the practice of storage of the leaves in dehydrated form as the low moisture content of these leaves will prevent microbial attack and allows high storage capacity.

Ash content is generally taken to be a measure of the mineral content of the original food. The high value of ash content of periwinkle leaves (4.56 g/100g) and lemon grass (6 g/100g) leaves were indicative of high mineral (especially the macro-minerals) content of these leaves. The ash content of the periwinkle leaves sample was slightly higher than those reported by Choudhary *et al.,* (2014) i.e 3.89g/100 g; ash content of lemon grass was found slightly lower as than those reported by Asaolu *et al.,* (2009) i.e 7.83g/100 g.

Crude fibre in food or plant is an indication of the level of non-digestible carbohydrate and lignin. The crude fibre obtained for periwinkle leaves was found 2.4 g/100 g, which is slightly lower than those reported by Choudhary *et al.,* (2014) i.e 1.04 g /100 g. The crude fibre obtained from lemon grass is 4.5g/100 g, which is also found comparatively lower than those reported by Asaolu *et al.,* (2009) i.e 9.28 g/ 100 g. High fibre content in diets have been reported to result in increased removal of carcinogens, potential mutagens, steroids, bile acids and xenobiotics by binding or absorbing to dietary fibre components and be rapidly excreted, hence these wastes will have health promoting benefits for the ruminants and non-ruminants (Ayoola and Adeyeye, 2009).Crude fat determines the free fatty lipids of a product. This property can be used as the basis in determining processing temperatures as well as auto-oxidation which can lead to rancidity (affect flavour of food). The crude fat found in periwinkle leaves is 3.3 g/100 g which is comparatively lower than those reported by Choudhary *et al.,* (2014) i.e 19.68g/100 g whereas fat found in lemon grass leaves is 4.1 g/100 g which is comparatively similar to those reported by Asaolu *et al.,* (2009) i.e 5.10 g /100 g. The low content of fat of both the medicinal leaves indicate enhancement of storage life due to reduction in chance of developing rancid flavour.

The crude protein content of periwinkle and lemongrass leaves is 5.2g/100g and 6.5g/100g respectively, which is found similar to the findings by Choudhary *et al.,* (2014) i.e 7.05g/100g and Asaolu *et al.,* (2009) i.e 4.56 g/100 g.

Table.1 Proximate analysis, minerals and vitamin content of dehydrated periwinkle leaves and lemon grass leaves (per 100g)

Nutrients	Periwinkle leaves (Nutritive Value)	Lemongrass leaves (Nutritive Value)
Moisture (%)	8.71	8.56
Ash (g)	4.5	6
Carbohydrate (g)	76	70.4
Protein (g)	5.2	6.5
Fat (g)	3.3	4
Crude fiber (g)	2.4	4.5
Energy (Kcal)	354	344
Calcium (mg)	340	300
Iron (mg)	27	22
Vitamin C (mg)	0.02	2

Antioxidant and Anti nutritional composition of dehydrated periwinkle and lemon grass leaves (per 100g)

Nutrients	Periwinkle leaves powder (Nutritive value)	Lemongrass leaves powder (Nutritive value)
Poly phenols (mg)	139	112
DPPH (%)	45	41
Oxalate(mg)	3.2	2.5
Phytate (mg)	0.8	4.8

The high carbohydrate content of both periwinkle leaves (76 g/100 g) and lemon grass leaves (70 g/100 g) shows that both leaves are very good source of energy which is found higher than those reported by Choudhary *et al.,* (2014) i.e 46.02 g/100g and Asaolu *et al.,* (2009) i.e 55 g/100g.

The caloric value of the sample for periwinkle (354 kcal/100g) and lemongrass (344kcal/100 g) is found slightly lower when compared with those reported by Choudhary *et al.,* (2014) i.e 369.37 kcal/100 g and Asaolu *et al.,* (2009) i.e 360.55kcal /100 g.

The iron content for periwinkle was found to be 27 mg/100g which is found much lower than those reported by Choudhary *et al.,* (2014) i.e 154.39 mg/100g and calcium content of periwinkle was found 320 mg/100g, which is found higher than those reported by Choudhary *et al.,* (2014) i.e 232.90 mg/100g whereas for lemon grass iron content was found 22 mg/100g which is lower than those reported by Asaolu *et al.,* (2009) i.e 43 mg/100g.

The calcium content of lemon grass was found 200 mg/100g which is slightly lower than the findings of Asaolu *et al.,* (2009) i.e 242 mg/100g.Calcium is essential for bone and teeth formation and development, blood clotting and for normal functioning of heart, nervous system and muscles. Calcium deficiency can lead to ricket, osteomalacia and tooth decay Michael (2006). The vitamin C content of periwinkle and lemon grass was found to be 0.015/100 g and 2 mg/100 g.

Table 4.1.2 shows the antioxidant and anti-nutritional composition of periwinkle and lemon grass leaves. Antioxidant found in dehydrated periwinkle leaves (per 100 grams) obtained by chemical analysis- here polyphenols is found to be 139 mg which is lower than those reported by Srivastava *et al.*, (2013) i.e 163.02 mg and DPPH radical scavenging activity was found to be 45.18 % which is similar to those reported by Bhutkar and Bhise (2011) i.e 65%.

Polyphenol found in lemon grass is 112.4 mg/100g which is supported by findings of Tangkanakul (2009) i.e 120.57 mg/100g and DPPH radical scavenging activity was found 41 % which is supported by the findings of Garg *et al.*, (2012) i.e.51.4 %.

Besides the nutritional importance of plants, they also contain certain anti nutritional factors such as phytate and oxalate. It is suffice to say that these anti nutrients reduce the bioavailability of nutrients in the food and plants (Akindahunsi and Salawu, 2005). Oxalate and Phytate found in periwinkle is 3.2mg /100g and 0.8mg/100g. The level of Phytate found in leaves has no known toxicity and is not known to cause mutagenic activity. It may have more therapeutic value when added to water rather than when naturally absorbed in foods as it is difficult to free from fibres. Oxalate and Phytate present in lemon grass found to be 2.5 mg/100g and 4.5mg/100g respectively. The low levels of Phytate and oxalate is of nutritional significance because it may allow bioavailability of many essential minerals and therapeutic effects of the leaves (Akindahunsi and Salawu, 2005).

It is concluded that dehydrated composite leaves powder of periwinkle and lemon grass are rich source of iron, calcium, carbohydrate, energy etc. these are also rich source of antioxidants anti nutritional factors which proves to be beneficial for our body and it can be can be successfully incorporated in the preparation of the food products. Incorporation of dehydrated medicinal leaves powder mixture will enhance the nutritive value of traditional recipes improving their micronutrient content, antioxidant content and radical scavenging activity

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