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Proximate Analysis and Mineral Content Estimation of *Syzygiumaromaticum*, *Syzygiumcumini* and *Pimentadioica* Leaves.

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Abstract

Syzygiumaromaticum,*Syzygiumcumini* and *Pimentadioica* are the highly medicinal trees that have numerous medicinal properties which can work against cancer, microbes, and cardiac diseases. They also show properties like anti-inflammatory, anti-oxidant and so on. The leaves of these three trees were chosen for the proximate analysis and mineral content estimation in relative to the parts of the tree that has many different beneficial values. The leaves were collected, processed and the extraction were prepared and stored for further analysis. In the proximate analysis, the percentage of moisture content, total ash, crude fibre, crude protein and crude carbohydrate were obtained. The mineral content estimation was also done for different minerals like iron, copper, magnesium, manganese, lead, sodium, potassium etc. using ICP-MS. The results of the analysis and estimation indicate that the sample has good amount minerals in it. They have high carbohydrate and moisture content while comparing the protein, ash and fibre. Thus this study reveals that the leaves of these trees can be used as energy supplement.

Keywords:*Syzygiumaromaticum*,*Syzygiumcumini*,*Pimentadioica*, mineral, leaves

Introduction

Syzygiumaromaticum belongs to the family Myrtaceae that is commonly known as clove. Commercially they are used for many medicinal and perfume industry. Because of their antioxidant and antimicrobial properties, they are used as preservatives in many foods, especially in meat processing, replace chemical preservatives [1]. Its main volatile constituent is eugenol, revealing pharmacological properties such as anaesthetic and analgesic effects, antimicrobial, antioxidant, anti-inflammatory, anticonvulsant, anticarcinogenic, antimutagenic, repellent and antifumigant activities[2]. *Syzygiumcumini* also belongs to the Myrtaceae family common name includes Malabar plum, java plum, black plum, Jamun and Jambolana. This is a tropical evergreen flowering tree they are chosen for its fruit, timber and ornamental value. The tree is an herbal medicine due to its properties like antihyperglycemic, hypolipemiant, anti-inflammatory, cardioprotective, and antioxidant activities[3]. *Pimentadioica* comes under the family Myrtaceae is a slow-growing evergreen tree commonly called allspice. The volatile oils of this allspice work as a rubefacient, anti-inflammatory, carminative, antioxidant and anti-flatulent agent. The leaf of this plant shows therapeutic properties like antibacterial, antifungal and reducing capacity[4]. Because of the high medicinal properties of these three tropical trees from the same family Myrtaceae the leaves of these trees were chosen and the proximate analysis and mineral content estimation was undergone.

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Materials and Methods

The leaves of the three trees *Syzygiumaromaticum*,*Syzygiumcumini* and *Pimentadioica* were collected and made into powdered after the removal of moisture content.

Proximate analysis

Moisture content

The water content in the sample was analysed by the Karl Fischer titration method. For the titration, primary alcohol (methanol) was used as the solvent and a base (pyridine) as the buffering agent. The water factor was determined then 2g of sample was added to the methanol. Then it was titrated with Karl Fischer reagent using automatic titrator to find out the endpoint. The moisture content was calculated by

Water factor = Wt. of the water taken (mL) / burette reading

Moisture content = burette reading × water factor × 100 / wt. of the sample in mg

Total ash

In a crucible, 2g of sample was added and heat up to 600℃ for about 2 hours. Then cool it in a desiccator at room temperature and weigh the crucible. The final ash content was calculated based on the formulae.

Ash content (%) = Final weight with ash - Empty crucible X 100

Crucible with sample - Empty crucible

Crude fibre

The crude fibre was estimation according to the procedure [5] on Biofib apparatus (Techno reach India, Chennai). 2g of sample was weighed in a crucible and then subjected for acid and alkali wash using 1.25% H_2SO_4 and 1.25% NaOH respectively. Then the crucible was heated to 100℃ till the complete removal of moisture and allowed to cool. The percentage Crude fibre was calculated.

Crude protein

Protein estimation was determined based on the Kjeldahl method[6]. About 0.3 – 0.4 gm of the sample were weighed and transferred to the Kjeldahl flask with 2.5gm of digestion mixture (prepared by adding 1g of selenium oxide, 40g of potassium sulphate, 8g of copper sulphate), and 10ml of concentrated H_2SO_4 was added to it. The Kjeldahl flask was kept in the digestion 80 assemblies. The assembly was heated to 420℃ and the sample was digested till all the fumes of SO_2 were exhumed. The flask was cooled and transferred to the distillation assembly. About 50ml of 40% NaOH were added and distillation was started. During the distillation process ammonia liberates and absorbed in a conical flask containing 25 ml of 3% boric acid solution. About 3-4 drops of mixed indicator (0.1% Bromocresol green and 0.1% methyl red in 95% alcohol) were added to it and it was titrated against 0.116N HCl till a pink colour endpoint was obtained. The titre value was noted and per cent nitrogen in the sample was calculated and from the result, protein content was calculated.

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Percentage of nitrogen = (Sample titre - Blank titre) × Normality of HCl × 14 × 100 /

Weight of sample × 100

Percentage of protein = 6.25 × percentage of nitrogen

Crude carbohydrate

The Carbohydrate content of the sample can be calculated by subtraction of the sum of the crude protein, total fat, moisture and ash in a serving from the total weight of the food (i.e., total carbohydrate is determined by difference).

Total carbohydrate percentage = 100 - percentage of moisture + ash + crude protein + crude fat

Mineral analysis

Mineral analysis of the three leaf sample was done by ICP-MS (Inductively Coupled Mass spectroscopy). Minerals like Fe, Cu, Mg, Ca, Zn, and so on was measured from the three samples using this spectroscopy and the results were recorded.

Results and Discussion

The results of the proximate analysis for the three samples *Syzygiumaromaticum*, *Syzygiumcumini*and *Pimentadioica* leaves showed the percentage level of the moisture content, total ash, crude fibre, crude protein and crude carbohydrate were seen. The moisture content of the dried leaves of *S. aromaticum*showed 32.50 ± 1.25 per cent. The total ash content of the sample showed 5.92 ± 0.72 per cent. The total fibre content of the leaf showed 14.36 ± 0.75 per cent, the protein content of the leaf showed 2.96 ± 1.11 per cent. The Carbohydrate percentage of the leaves showed the maximum in our analysis such as 35.6 ± 0.96 per cent. Dried leaves of *S. cumini* showed moisture content of 30.25 ± 1.77 per cent. The total ash content of the sample showed 7.52 ± 0.85 per cent. The total fibre content of the leaf showed 6.78 ± 1.62 per cent, the protein content of the leaf showed 1.12 ± 1.20 per cent. The Carbohydrate percentage of the leaves showed the maximum in our analysis such as 25.9 ± 1.27 per cent. The moisture content of the dried leaves of *P. dioica* showed 40.50 ± 1.2 per cent. The total ash content of the sample showed 6.52 ± 0.95 per cent. The total fibre content of the leaf showed 19.76 ± 0.88 per cent, the protein content of the leaf showed 5.23 ± 1.14per cent. The Carbohydrate percentage of the leaves showed the maximum in our analysis such as 22.50 ± 1.96 per cent.The level of minerals in the leaves of *P. dioica* showed maximum occurrence of calcium followed by magnesium, ferrous, zinc, chromium, copper, manganese and cadmium. Nutritionally important trace elements present in the leaves of *S. aromaticum*showed major element as magnesium (196.8 mg/100 g), followed by calcium, manganese, iron, chromium, zinc and copper. Minimum or negligible amount of cadmium was present in the leaves.The amount of mineral constituents from leaves of *S. cumini* showedpresence of magnesium as a major element followed by copper, calcium, manganese, iron, chromium and cadmium. The results obtained in mg per 100g of leaves were tabulated in table 2.

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Table 1: Proximate analysis of the sample

Components	***Syzygiumaromaticum***	***Syzygiumcumini***	***Pimentadioica***
Moisture content (%)	32.50 ± 1.25	30.25 ± 1.77	40.50 ± 1.2
Total Ash (%)	5.92 ± 0.72	7.52 ± 0.85	6.52 ± 0.95
Crude fibre (%)	14.36 ± 0.75	6.78 ± 1.62	19.76 ± 0.88
Crude protein (%)	2.96 ± 1.11	1.12 ± 1.20	5.23 ± 1.14
Crude carbohydrate(%)	35.6 ± 0.96	25.9 ± 1.27	22.50 ± 1.96

Table 2: Mineral content of the samples

Samples	**Minerals mg/100gm**															
	Fe	**Mg**	**Ca**	**Zn**	**Cu**	**Mn**	**Cr**	**Cd**	**Ar**	**Bo**	**Co**	**Pb**	**Ni**	**P**	**K**	**Na**
P. dioica	77.5 ± 0.12	1107.2 ± 0.22	3295 ± 0.52	7.56 ± 1.2	1.57 ± 0.95	2.26 ± 0.73	3.59 ± 0.88	0.15 ± 0.39	0.07 ± 1.11	1.29 ± 2.05	0.15 ± 1.55	0.11 ± 0.59	1.21 ± 0.98	10.26 ± 0.88	62.38 ± 0.29	15.16 ± 1.07
S. aromaticum	8.3 ± 1.20	196.8 ± 0.95	117.5 ± 0.82	1.4 ± 0.66	0.4 ± 1.23	20.9 ± 1.95	2.21 ± 1.55	0.05 ± 2.01	0.010 ± 1.69	2.23 ± 1.51	0.11 ± 0.98	0.085 ± 0.87	0.063 ± 0.29	137.21 ± 0.92	1126 ± 0.76	21.22 ± 0.53
S. cumini	4.55 ± 0.93	26.85 ± 1.11	6.53 ± 0.87	2.93 ±1.19	7.21 ± 0.28	5.22 ± 0.38	1.95 ± 0.91	0.12 ± 0.49	0.035 ± 0.53	1.73 ± 0.88	0.09 ± 0.24	0.78 ± 1.31	1.02 ± 0.78	11.53 ± 0.65	60.5 ± 0.71	12.32 ± 0.39

Conclusion

The study on the *Syzygiumaromaticum*, *Syzygiumcumini*and *Pimentadioica* leaf by the proximate analysis and the mineral content estimation show that not only the fruit of these trees have good mineral content but also the leaves of these three trees have the mineral content in it so that they can also be used as mineral substituents in the food or any mineral requiring product formation.

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