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MINERAL COMPOSITION OF RIPE AND UNRIPE SELECTED EDIBLE FRUITS

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ABSTRACT

The mineral compositions of the 3 edible fruits were *Murraya koenigii* (L.) Spreng, *Mukia maderspantana* (L.) M. Roem and *Psidium guajava* (L.) of ripe and unripe stages were investigated. The five major minerals are sodium, potassium, magnesium, calcium and phosphorus. Zinc and iron are trace elements. Among all the minerals, *Mukia Maderspantana* ripe fruits is rich in sodium (164.28 ± 0.02 mg/100g) whereas magnesium content is more in unripe fruits of *Mukia maderspantana* (255.6 ± 0.78mg/100g). Calcium (326.5 ± 0.55mg/100g) and phosphorous (462.5 ± 0.35mg/100g) were found large quantity in *Murraya koenigii* unripe fruits. *Mukia Maderspantana* ripe (512.17 ± 0. 12mg/100g) and unripe fruits (511.76 ± 0.65mg/100g) contain the highest amount of potassium. *Murraya koenigii* unripe fruits contain more amount of iron (12.2 ± 0.24mg/100g).

KEYWORDS

Edible fruits, Minerals, *Murraya koenigii*, *Mukia maderspantana* and *Psidium guajava*.

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INTRODUCTION

Human nutrition, fruits play an important role for balanced diet. Fruits are the cheapest source of natural nutritive foods which help in building resistance against diseases (Ravindran *et al.*, 2004)[1]. Minerals are vital to health such as vitamins and amino acids, minerals are essential for regulating and building the trillions of living cells which makes up the body. Some like calcium, phosphorus, and magnesium are important constituents of bones and teeth. As soluble salts, mineral elements like sodium, chloride, potassium, magnesium and phosphorus help to control the composition of body fluid and cells. Required amounts of these elements must be in human diet to pursue good healthy life (San, 2009)[2].

The content of mineral elements in plants depends to a high degree on the soils abundance, including the intensity of fertilization (Kruczek, 2005)[3]. In this study, the main objective is to determine the mineral composition in selected edible fruits.

MATERIAL AND METHODS

Collection and preparation of plant material

The *Murraya koenigii*, *Mukia maderspantana* and *Psidium guajava* of ripe and unripe fruits were collected from Coimbatore district, Tamil Nadu state, India. The fruits were cut into pieces and shade dried. The dried samples were pounded into powder using mortar and pestle. The powder obtained was kept in the laboratory and used for mineral elements analysis during the period of the research.

MINERAL ELEMENT ANALYSIS

Determination of mineral elements

Finely ground (5g) of sample was oven dried at 60°C and was weighed into crucible. The sample was ignited into a muffle furnace for 6-8 hours at a temperature between 450°C and not exceeding 500°C, a grayish white ash was obtained. The sample was cooled on asbestos sheet and 5 cm^3 1N HNO3 solutions was added to it. It was evaporated to dryness on a steam bath or a hot plate at a low heat of 400°C for 15 min. until a perfectly white or grayish white ash is obtained.

The sample was later cooled on asbestos sheet and 10cm^3 1N HCl was added and the solution filtered into 50cm3 volumetric flask. The crucible and filter paper were washed with additional 10cm3 portion of 0.1N HCl three times to make up to the volume with 0.1N HCl solution. The filtrate was stored for Na, P, K, Ca, Mg, Fe and Zn determination using Atomic Absorption Spectrophotometer (AOAC 1990)[4].

Statistical analysis

Descriptive statistics were performed by using Microsoft Excel 2007 to calculate mean and standard errors for mineral contents of fruit sample.

RESULTS AND DISCUSSION

The mineral composition in ripe and unripeselected edible fruits were *Murraya koenigii*, *Mukia maderspantana Psidium guajava* shown in Table No.1 and Graph No.1. High concentrations of sodium (Na) were present in *Mukia maderspantana* ripe fruits (164.28 ± 0.02mg/100g). The sodium levels of some commercial fruits vary between 6 - 28mg/100g (Table No.2) (Gopalan *et al.,* 2004)[5]. The potassium (K) content was higher in the *M. maderspantana* ripe (512.17 ± 0. 12mg/100g) and unripe fruits (511.76 ± 0.65 mg/100g) and least in *Psidium guajava* ripe fruits (7.6 ±0.12 mg/100g). Na and K take part in ionic balance of the human body and maintain tissue excitability. Na plays an important role in the transport of metabolities and K is important for its diuretic nature. The ratio of K/Na in any food is an important factor in prevention of hypertension and arteriosclerosis, with K depresses and Na enhances blood pressure (Saupi *et al.,* 2009)[6]. The ratio of K/Na were significant in the fruits of 12.43mg/100g in *M.koengii* ripe fruits. Therefore consumption of these fruits would probably reduce high blood pressure diseases because their K/Na is greater than one (FND 2002)[7].

The calcium (Ca) content is highest in the fruits of *Murraya koenigii* unripe fruits (589.7 ± 0.65 mg/100g) followed by *Murraya koenigii* ripe fruits (326.5 ± 0.55mg/100g), *M.maderspantana* unripe (230.03 ± 0.65mg/100g) and ripe fruits (180.2 ± 0.98 mg/100g). An appreciable amount of calcium is present in the fruits of *M.koenigii* and in *M.maderspantana.* The calcium levels of some commercial fruits vary between 10.0 - 23.0mg/100g (Table No.2) (Gopalan *et al.,* 2004). So intake of these fruits are very much required for the normal functioning of the cardiac muscles, blood coagulation, milk clotting and the regulation of cell permeability.

Magnesium was higher in *M. maderspantana* unripe fruits (255.6 ± 0.78mg/100g) and *M.koenigii* ripe fruits (155.9 ± 0.29mg/100g). Mg plays a major role in relaxing muscles along the airway to the lung thus allowing asthma patients to breathe easier. The daily value for Mg is 400mg. It plays fundamental roles in most reactions involving phosphate transfer, believed to be essential in the structural stability of nucleic acid and intestinal absorption while deficiency of magnesium in man is responsible for severe diarrhoea, migraines, hyper-tension,

cardiomyopathy, arteriosclerosis and stroke (Bello *et al.*, 2008)[8].

High concentation of iron (Fe) were present in the *M.koenigii* unripe fruits (12.2 ± 0.24 mg/100g) whereas in *M.koenigii* ripe fruits (3.52 ± 0.65mg/100g) and followed by *M.maderspantana* ripe fruits (6.86 ± 0.31mg/100g) and in unripe fruits of *M.maderspantana* (3.8 ± 0.64mg/100g). An adequate level of Fe is required for haemoglobin formation in blood, while excessive intake can result in hemochromatosis. Iron containing enzymes and proteins participate in many oxidation and in transport.

Zinc in trace concentration is important for physiological functions of living tissues and regulates many biochemical processes (Berry 1998)[9]. The trace amount of zinc present in the three fruits. Similar in commercial fruits like apple (0.06 mg/100g) and Lichi (0.27mg/100g).

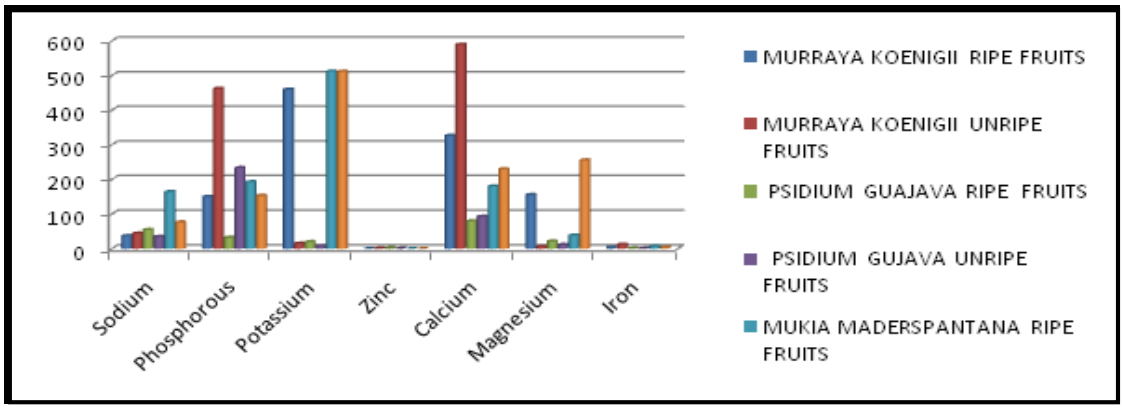
Table No.1: Mineral Profile of Selected Edible Fruits

S.No	Parameters	Mk ripe fruits	Mk unripe fruits	Pg ripe fruits	Pg unripe fruits	Mm ripe fruits	Mm unripe fruits
1	Sodium	37.1 ± 0.23	44.1 ± 0.43	54.6 ±0.32	34.6 ± 0.36	164.28 ± 0.02	76.5 ± 0.58
2	Phosphorous	150.2 ± 0.89	462.5 ± 0.35	32.06 ± 0.41	233.8 ± 0.41	192.83 ± 0.04	153.2 ± 0.41
3	Potassium	460 ± 0.45	14.7 ± 0.28	19.8 ± 0.84	7.6 ± 0.21	512.17 ± 0. 12	511.76 ± 0.65
4	Zinc	0.05 ±0.36	1.08 ± 0.78	1.67 ± 0.96	0.67 ± 0.87	0.05 ± 0.54	0.067 ± 0.89
5	Calcium	326.5 ± 0.55	589.7 ± 0.65	79.6 ± 0.78	92.5 ± 0.96	180.2 ± 0.98	230.03 ± 0.65
6	Magnesium	155.9 ± 0.29	6.1 ± 0.56	21.1 ± 0.11	11.2 ± 0.18	38.7 ± 0.21	255.6 ± 0.78
7	Iron	3.52 ± 0.65	12.2 ± 0.24	0.6 ± 0.52	0.6 ± 0.99	6.86 ± 0.31	3.8 ± 0.64

Mk - *Murraya Koengii*; Pg - *Psidium Guajava;* Mm - *Mukia Maderspantana*

Table No.2: Mineral contents in some commercial fruits

S.No	Fruits	Minerals Present (mg/100g)				
		Na	K	Ca	Fe	Zn
1	Almond	-	-	230	5.09	3.57
2	Apple	28	75	10	0.66	0.06
3	Cashe nut	-	-	50	5.81	5.99
4	Lichi	24.9	159	10	0.70	0.27
5	Mango ripe	26	205	14	1.30	-
6	Papaya ripe	6	069	17	0.50	2.32



Graph No.1: Mineral Profile of Selected Edible Fruits

CONCLUSION

These essential elements are needed for growth, production of bones, teeth, hair, blood, nerves, skin, vitamins, enzymes and hormones. The healthy function of nervous transmission, blood circulation, fluid regulation, cellular integrity, energy production and muscle contraction are influenced by essential elements and too little of any essential element can lead to deficiency disease and too much of it any can be toxic (Schauss, 1995)[10]. Compared with *Psidium guajava, Mukia maderspantana* and *Murraya koenigii* fruits contain high amount of minerals in both ripe and unripe stages. These fruits can be explored as an alternative food for malnutrition population in developing countries.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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