

A Study on Phytochemical Investigation, Nutritional Values and Elemental Analysis of *Moringa oleifera* Lam. (Dant-dalun) Seed

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Abstract

This research deals with a comparative study concerning the phytochemical investigation, nutritional values and elemental analysis of Green Moringa Seed (GMS) and Dried Moringa Seed (DMS) samples. These samples were collected from Twantay Township, Yangon Region. Phytochemical investigations of both samples were done. In both moringa seed samples, the bioactive compound such as alkaloids, α -amino acids, carbohydrate, flavonoids, glycosides, phenolic compound, reducing sugar, saponin, starch, terpenoides and tannin were present. But cyanogenic glycoside was absent in both samples. The nutritional value of both moringa seed samples was determined by AOAC method. The protein content was determined by protein analyser. The moisture content (18.65%, 8.87 %), the ash content (2.21%, 2.63%), the fiber content (3.16%, 9.05%), the fat content (1.42%, 1.96%), the protein content (3.36%, 3.52%) and the carbohydrate content (71.20%, 73.97%) of samples were found in GMS and DMS samples. It was observed that moisture content of GMS was higher than DMS. The ash, fiber, fat, protein and carbohydrate contents of DMS were higher than in that of GMS. Elemental analysis of moringa seed samples were determined by Energy Dispersive X-Ray Fluorescence (EDXRF) spectrometer. According to elemental analysis, the green and dried moringa seed samples were found that organic material (96.429%, 95.604%) as major content and the essential minerals such as K(1.893%,1.251%), S(1.172%,2.062%), P(0.377%,0.915%), Ca(0.104%,0.147%) and Fe(0.014%,0.013%). Moreover, the green and dried moringa seed samples were found that Zn, Mn, and Cu as trace elements. The green moringa seed sample was found that Rb but the dried moringa seed sample was not found Rb.

Keywords : *Moringa oleifera* Lam., phytochemical investigation, nutritional values,

EDXRF method

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1. Introduction

1.1 *Moringa oleifera* Lam.

The drumstick tree is native in India. Also known as the Horseradish tree or Tree of life originated in India and has spread in popularity to many parts of Asia, Central and South America, Africa and the Pacific. It is one of the most common household plants in South India and like many Indian plants is not only used for food but medicine as well (Gopalan, *et.al.*, 1989).



Figure 1.1 Plant, pod, leaves, seed and flowers of *Moringa oleifera* Lam.

1.2 Classification of *Moringa oleifera* Lam.

Family	: Moringaceae
Genus	: <i>Moringa</i>
Species	: <i>M. oleifera</i>
Botanical name	: <i>Moringa oleifera</i> Lam.
English name	: Drumstick tree
Myanmar name	: Dant-dalun

1.3 *Moringa* Health Benefits and Medicinal Uses

Moringa oleifera has an impressive range of medicinal uses with high nutritional value and medicinal benefits. Different parts of *Moringa* contain a profile of important minerals and are a good source of protein, vitamin, beta-carotene, amino acids and various phenolics. *Moringa* provides a rich and rare combination of zeatin (Mercola, 2015).

Moringa seeds are used for arthritis, rheumatism, gout, cramp. The seeds are roasted, pounded, mixed with coconut oil and applied to the problem area. *Moringa* seeds are effective against skin-infecting bacteria *Staphylococcus aureus* and *Pseudomonas aeruginosa*. They contain the potent antibiotic and fungicide terygospermin. The anti-carcinogenic effects of *Moringa* seeds are also quite well known. They can stop the growth and development of cancer

cells by accelerating their death count. Morniga is high in fiber. Fiber is also a key component in maintaining a healthy cardiovascular system (Anwar, *et.al.*, 2007).

Moringa seeds are a potentially incredible find, with antioxidant, anti-inflammatory, blood and cholesterol-lowering effects listed among some of their benefits. Moringa seeds also offer many nutritional benefits. They contain seven times more vitamin C than oranges, four times more calcium than milk, three times more potassium than bananas, and two times more protein than yogurt (Faizi, 1994).

The oil extracted from the seeds contains almost 30 antioxidants. The skin absorbs the oil well and can receive these nourishing antioxidant easily. The oil can be used as a moisturizer and antiseptic. Oil of Ben is used for hysteria, scurvy, prostate problems and bladder troubles. Villagers in Omen use Moringa oil to treat stomach disorders. They also use it in perfume and hair oil (Mercola, 2015).

2. Materials and Methods

Moringa seed samples were collected from Twantay Township, Yangon Region. The components assayed consist of green and dried moringa seeds. The seeds were air-dried in the room temperature. Then, the both dried samples were powdered by electric blender and stored in the air-tight container. Preliminary phytochemical investigation of moringa seed was carried out by Test Tube method. The nutritional values of moringa seed sample were determined by AOAC method (AOAC, 2000). Then, semi-quantitative elemental analysis of moringa seed was performed by EDXRF method.

3. Results and Discussion

3.1 Preliminary Phytochemical Investigation on *Moringa oleifera* Lam. (Dant-dalun) Seed

Sample by Test Tube Method

Phytochemical constituent of moringa seed samples was studied at Chemistry Laboratory, Department of Chemistry, West Yangon University.

According to phytochemical investigation, the moringa seed samples were found that the bioactive compound such as alkaloids, α -amino acids, carbohydrate, flavonoids, glycosides, phenolic compound, reducing sugar, saponin, starch, terpenoides and tannin were present. But cyanogenic glycoside was absent in both samples. The *Moringa oleifera* Lam. has an impressive range of medicinal uses with high nutritional value and medicinal benefits. The results obtained are reported in Table (3.1).

3.2 Determination of Nutritional Values of *Moringa oleifera* Lam. (Dant-dalun) Seed Sample

The nutritional values of green moringa seed (GMS) and dried moringa seed (DMS) samples were determined by AOAC method. The results obtained are reported in Table (3.2).

The protein content was determined by protein analyser (VELP SCIENTIFICA). The moisture content (18.65 %, 8.87 %), the ash content (2.21%, 2.63%), the fiber content (3.16%, 9.05%), the fat content (1.42%, 1.96%), the protein content (3.36%, 3.52%) and the carbohydrate content of samples were found (71.20%, 73.97%) in green moringa seed (GMS) and dried moringa seed (DMS) samples. It was observed that moisture content of GMS was higher than DMS. The ash, fiber, fat, protein and carbohydrate contents of DMS were higher than in that of GMS.

So, from the nutritional point of view, it may be suggested that DMS is more suitable for human health than GMS.

Table . 3.1 Results of Preliminary Phytochemical Investigation of *Moringa oleifera* Lam. (Dant-dalun) Seed Sample

No.	Type of compound	Extract	Test reagent	Observation	GMS	DMS
1	Alkaloids	1% HCl	Dragendorff's reagent	Orange ppt	+	+
			Mayer's reagent	White ppt	+	+
			Sodium picrate sol:	Yellow ppt	+	+
2	α -amino acids	H ₂ O	Ninhydrin reagent	Violet spot	+	+
3	Carbohydrate	H ₂ O	10 % α -naphthol, Conc:H ₂ SO ₄	Red ring	+	+
4	Flavonoids	EtOH	Mg ribbon, Conc: HCl	Pink colour	+	+
5	Glycosides	H ₂ O	10 % Lead acetate sol:	White ppt	+	+
6	Phenolic compound	H ₂ O	1 % FeCl ₃ sol:, K ₃ Fe(CN) ₆ sol:	Deep blue Colouration	+	+
7	Reducing Sugars	H ₂ O	Benedict's sol;	Brick red ppt	+	+
8	Saponins	H ₂ O	Distilled water	Frothing	+	+
9	Terpenoids	EtOAc	Acetic anhydride, Conc:H ₂ SO ₄	pink colour	+	+
10	Starch	H ₂ O	I ₂ solution	Blue colour	+	+
11	Cyanogenic glycoside	H ₂ O	Sodium picrate sol:	No colouration	-	-
12	Tannins	EtOH	5 % FeCl ₃ sol:	Blue ppt	+	+
			(+) present	Green Moringa Seed (GMS)		
			(-) absent	Dried Moringa Seed (DMS)		

Table 3.2 Nutritional Values of *Moringa oleifera* Lam. (Dant-dalun) Seed Sample

No.	Nutrient	Green moringa seed (GMS)	Dried moringa seed (DMS)
1	Fat (%)	1.42	1.96
2	Fiber (%)	3.16	9.05
3	Ash (%)	2.21	2.63
4	Moisture (%)	18.65	8.87
5	Protein (%)	3.36	3.52
6	Carbohydrate (%)	71.20	73.97
7	Energy value (kcal/100g)	311.02	327.60

3.3 Elemental Analysis of *Moringa oleifera* Lam. (Dant-dalun) Seed Sample

The elemental contents of the green moringa seed (GMS) and dried moringa seed (DMS) samples were studied by Energy Dispersive X- ray Fluorescence (EDXRF) spectrometer. The results are reported in Table (3.3).

According to elemental analysis, the green and dried moringa seed samples were found that organic material (96.429%, 95.604%) as major content and the essential minerals such as K (1.893%, 1.251%), S (1.172%, 2.062%), P (0.377%, 0.915%), Ca(0.104%, 0.147%) and Fe(0.014%, 0.013%). Moreover, the green and dried moringa seed samples were found that Zn (0.005%, 0.004%), Mn (0.002%, 0.002%) and Cu (0.002%, 0.002%) as trace elements. The green moringa seed sample was found that Rb but the dried moringa seed sample was not found Rb. The relative abundance of some elements present in the samples is shown in Figure 3.1 and 3.2.

From these observations, K content in green moringa seed sample is higher than dried moringa seed sample. Ca, P and S content in dried moringa seed sample is higher than green moringa seed sample. Since the absence of toxic elements in both samples. It was revealed that the contents of K and Ca are prominent in both samples. K is an important component of cell and body fluids that helps control heart rate and blood pressure. Fe is essential for red blood cell production and as a co-factor for cytochrome oxidases enzymes. Moreover, green and dried moringa seed samples contain many important minerals for human health.

These elements that contain in both samples help the metabolism of human body.

Table 3.3 Elemental Contents of *Moringa oleifera* Lam. (Dant-dalun) Seed Sample

No.	Element	Content in green moringa seed (%)	Content in dried moringa seed (%)
1	K	1.893	1.251
2	Ca	0.104	0.147
3	P	0.377	0.915
4	S	1.172	2.062
5	Fe	0.014	0.013
6	Zn	0.005	0.004
7	Mn	0.002	0.002
8	Cu	0.002	0.002
9	Rb	0.001	-
10	COH	96.429	95.604

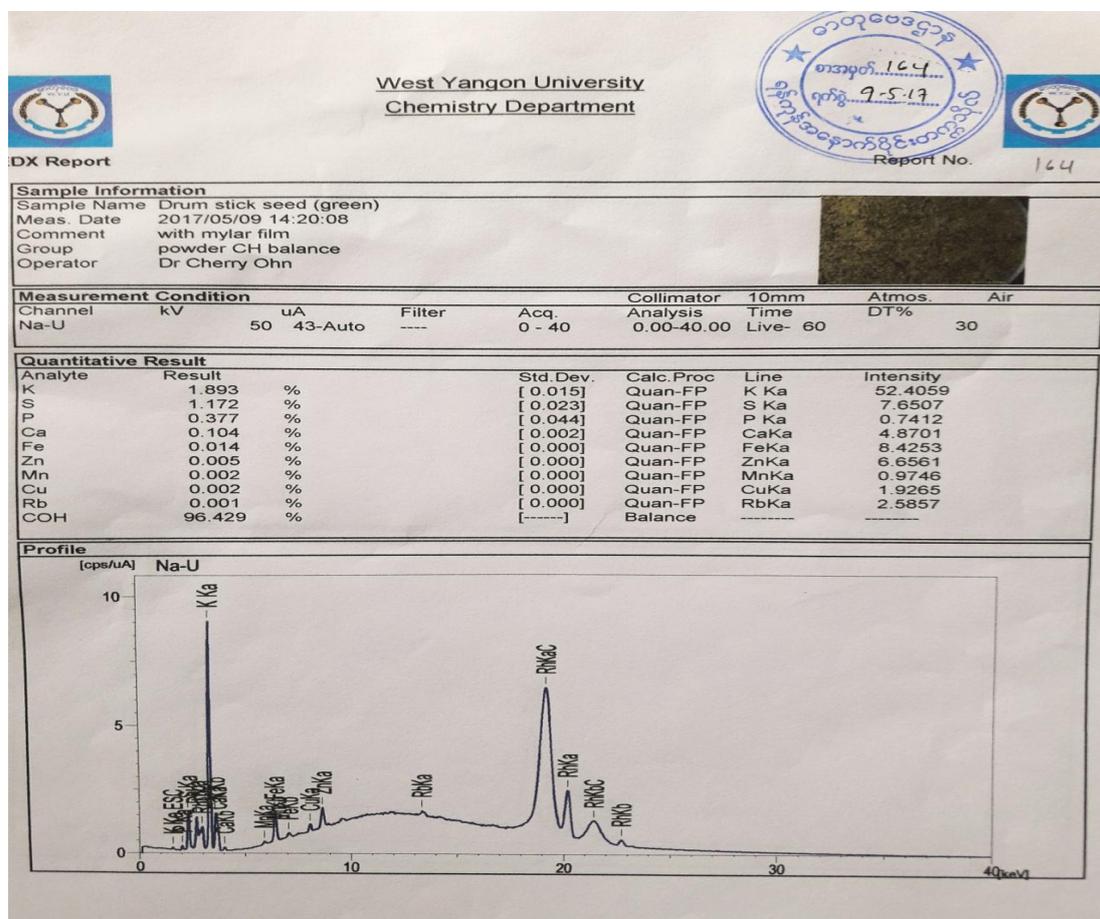


Figure 3.1 EDXRF spectrum of green moringa seed (GMS) sample

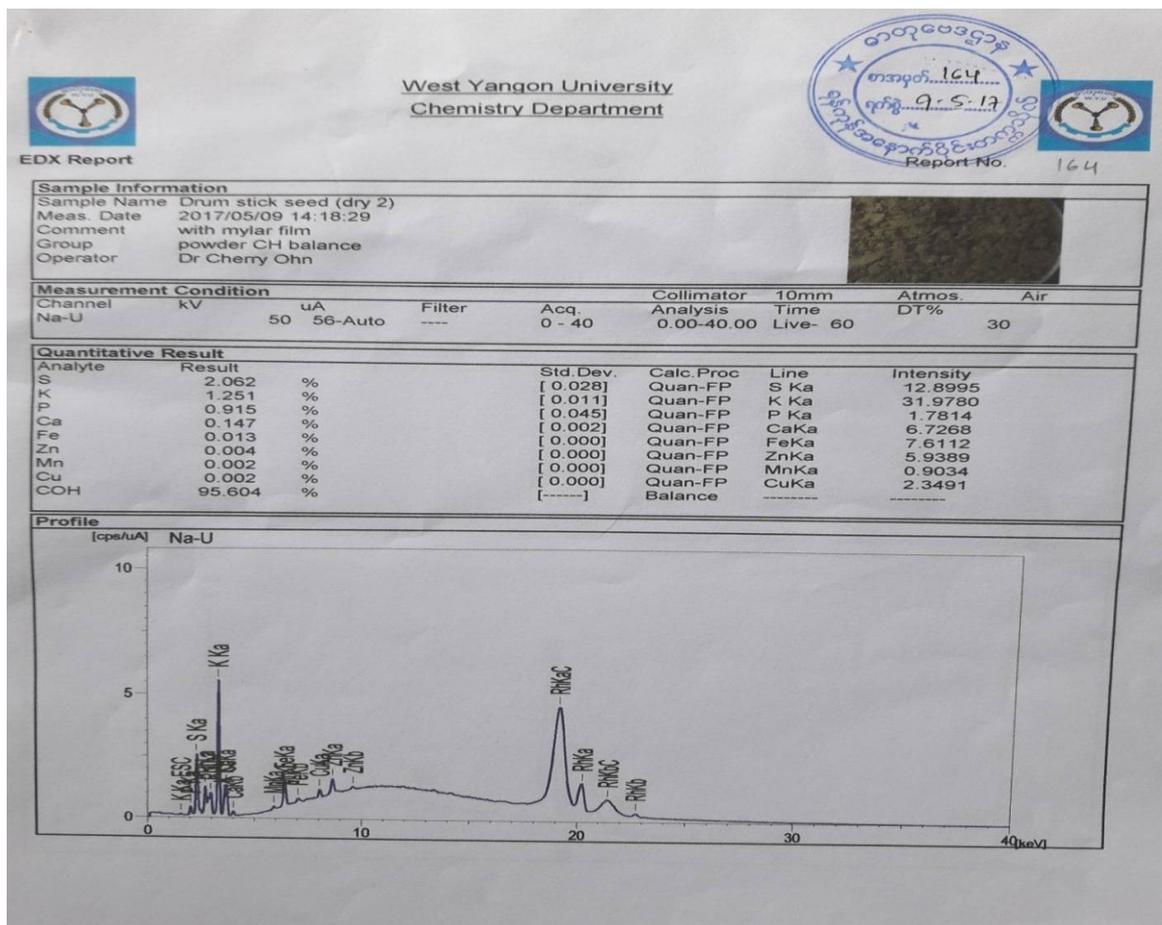


Figure 3.2 EDXRF spectrum of dried moringa seed (DMS) sample

4. Conclusion

In this research, the phytochemical investigation, nutritional values and elemental analysis of green moringa seed (GMS) and dried moringa seed (DMS) samples were investigated. From these observations of moringa seed samples in Twantay Township, the following conclusion may be made.

Phytochemical Investigation

From these studies, in both green moringa seed (GMS) and dried moringa seed (DMS) samples, the bioactive compound such as alkaloids, flavonoids, saponins, phenolic compounds, glycosides, reducing sugar, α -amino acids, starch, tannins, carbohydrate and terpenoids were present. But cyanogenic glycoside was absent.

The moringa seed contains various biologically active compounds, which are responsible for its bioactivities, medicinal and folk medicinal use.

Nutritional Values

From the investigation of nutritional values, the moisture content (18.65%, 8.87%), the ash content (2.21%, 2.63%), the fiber content (3.16%, 9.05%), the fat content (1.42%, 1.96%), the protein content (3.36%, 3.52%) and the carbohydrate content (71.20%, 73.97%) of samples were found in green moringa seed (GMS) and dried moringa seed (DMS) samples. It was observed that moisture content of GMS was higher than DMS. The ash, fiber, fat, protein and

carbohydrate contents of DMS were higher than in that of GMS. So, from the nutritional point of view, it may be suggested that DMS is more suitable for human health than GMS.

Elemental Analysis

A total of nine elements such as K, Ca, P, S, Fe, Zn, Mn, Cu and Rb were detected in green moringa seed (GMS) sample. Among them, the amount of K (1.893%), S (1.172%), P (0.377%), Ca (0.104 %) and Fe (0.014%) were high. There were determined altogether five kinds of elements such as K, S, P, Ca and Fe in dried moringa seed (DMS) sample. The highest content of elements were K (1.251%), S (2.062%), P (0.915%), Ca (0.147 %) and Fe (0.013%) in dried moringa seed sample (DMS). Therefore, it may be said that moringa seed sample is one of the K and Ca rich seeds. These elements are important minerals for human health. So, both moringa seed samples can be used as valuable sources of minerals for human and animal consumption.

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