Preliminary Phytochemical Investigation and Elemental Analysis of *Morindacitrifolia*L.(Ye`-Yo) Fruits and Fresh Fruit Juices

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Abstract

*Morindacitrifolia*L. (Ye`-Yo) is one of the most important traditional medicinal plants. Different parts of plant contain important minerals and other phytonutrients and vitamins. Because of the nutrients the noni fruit possess, it is used to treat a variety of health problems including high blood pressure, arthritis, diabetes, cancer, hypertensions, pain relief, inflammation, burns and joint problems. In this study the physicochemical properties, elemental analysis and phytochemical investigation were carried out. According to phytochemical results, noni (Ye`-Yo) fruit and fruit juices contain alkaloids, α-amino acids, carbohydrates, flavonoid, glycoside, reducing sugars, phenolic compounds, tannins and organic acids were present which are responsible for pharmacological properties. Saponin are absent in sample 1 and 2. Starch and cyanogenic glycosides are absent in all samples. It was found to be containing as moisture (16.24 %) in green fruit, (17.54 %) in ripe fruit, (76.70 %) in green fruit juice and (88.64 %) in ripe fruit juice. From the literature and phytochemical results *Morindacitrifolia*L. (Ye`-Yo) juices are rich in antioxidant properties .So *Morindacitrifolia*L. (Ye`-Yo) fruits and fresh fruit juices can also be used as nutritional food as well as medicinal herb for people.

Keywords:*Morindacitrifolia*L. ,nutritional food, physicochemical properties

Introduction

Description of *Morindacitrifolia*Linn. (Ye`-Yo)

Morindacitrifolia L. is a small evergreen shrub or tree, usually less than 10 feet high, occasionally up to 20 feet. The conspicuous large dark green shiny leaves are generally paired, except where forming fruit. Thick and oval in shape, they are deep veined, short-stemmed and 8 inches or longer. The flowers are bisexual fragrant with funnel-shape corolla-about an inches long and bearing many small white flowers. The flower heads grow to become mature fruit, 3 to 4 inches in diameter. The noni fruit begins, green and when ripen they change to creamish white in colour. The fruits are fleshy, very uneven drupes; more or less oblong in shape (Krauss, 1993).

Classification of *Morindacitrifolia*Linn

Scientific Classification

Botanical	:	*Morindacitrifolia*Linn.
Myanmar name	:	Yè-Yo
English name	:	Indian Mulberry, cheesefruit
Family	:	Rubiaceae
Parts used	:	fruits

Medical Uses of *Morindacitrifolia*L.

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All parts of plants are used for a variety of illness. Leaves are also consumed raw or cooked. The dried leaves used externally for infections, children's chest colds, inflammation and internally for boils, pleurisy, inflamed gums and arthritic pain. The fresh leaves used externally for burns and internally for fevers, hemorrhage, bacterial, infections and inflammations. The root is used for oral ulceration, fevers and cancerous swellings. The flowers are applied for sore or irritated eyes, styes, conjunctivitis and coughs. The root yield is used for a red dye whereasbark for a yellow dye.

The unripe fruit is used for mouth sores, gingivitis, toothaches, abscesses and ripen noni fruit for internal ailments. Like grape juice, noni juice contains a whole slew of cancer fighting nutrients, it kills cancer cell, and it stops the spread of cancer, it stimulates the white blood cells and other parts of the immune system and takes part in a process that enlarges cell membrane they can better absorb nutrients (Blanco,2006).

Noni juice reduced inflammation due to the presence of flavonoids, coumarins, iridoids and vitamin C. Flavonoid with anthroguine and other alkaloid also help to treat HIV and AIDS.

Nutritional Value and Warning of Taking Juice

Yè-Yo (Noni) contains manyvitamins, minerals, enzymes and beneficial alkaloids. It contains a very important alkaline, Yeronine. The taste and smell of noni ripe fruit is terrible and sugars and juices are added to make it acceptable. Noni must be taken on an empty stomach because stomach-acid destroys its properties. Noni is less effective when taken with coffee, tobacco or alcohol and concomitant use of these with noni may result in some unexpected side effects.

Noni juice provides so many benefits as it stimulates the production of nitric oxide. Nitric oxide reduces tumor growth and increase the immune response against the radical replication of cells (Fong,2001).

Noni juice contains good concentration of potassium which may interfere with various drug used for curing high blood pressure such as potassium sparing diuretic and anglotensin receptor blockers. These two results in very high level of potassium giving rise to symptoms like nausea and cardiac arrhythmia. Basic of above reason noni juice should not be taken by already combating with kidney problem and people with potassium restricted diet should avoid eating noni due to liver and heart problem. Dosage of 30 to 750 mL/ day and dosing 500 mg extract is nontoxic.

Figure 1.1 Green fruit of *Morinda citrifolia* L. (Yè-Yo)

Figure 1.2 Ripe fruit of *Morinda citrifolia* L. (Yè-Yo)

Figure 1.3 Green fruit juices of *Morinda citrifolia* L. (Yè-Yo)

Figure 1.4 Ripe fruit juice of *Morinda citrifolia* L. (Yè-

Chemical Constituents of *Morindacitrifolia*L. (Yè-Yo)

About 160 phytochemicals have been identified in the noni plant, including phenolic compounds, organic acids and alkaloids. Chemical composition differs according to the part of the plant. The fruit contain 90 % water and the main component of the dry matter appears to be soluble solids, dietary fibers and proteins. Minerals are mainly potassium, sulphur, calcium and phosphorus with trace of selenium in the juice. About 51 volatile compounds have been identified in the ripe fruit, including organic acid, alcohols, esters, ketones and lactones. Unfermented noni juice contains 10 % of dry matter mainly of glucose and fructose and lipids. The potassium content is relatively high. Ripe fruit contain n-caproic acid responsible for distinctive odor (Krauss,1993).

Materials and Methods

The selected medicinal plant studied in the present research is *Morindacitrifolia*L. (Ye`-Yo) fruit and fruit juice. The plant sample were collected from Tontay Township during the month of June, Yangon Region. The scientific name of the plant was identified by authorized Botanist of the Department of Botany, West Yangon University.The collected samples were cleaned up and air dried, followed by making into powder using grinding machine. The dried powdered samples were stored in airtight container so as to prevent moisture and other contamination. The juice samples were prepared freshly when we need to used.

The fruit and fruit juice samples were screened for the presence of various bioactive principle. Preliminary phytochemical investigation was carried out by Test Tube method for testing different chemical groups such as alkaloid, glycosides, carbohydrates, phenolic compounds, saponin, tannins, α amino acids, reducing sugars, flavonoids, starch, cyanogenic glycosides and organic acids. After treating the test solution with the specific reagents, the tests were detected by visual observation of colour change or precipitate formation. The elemental analysis of the *Morindacitrifolia*L. (Ye`-Yo) fruit and fruit juices were performed by EDXRF method (EDX-8000,Shimadzu,Japan).

Results and Discussion

Preliminary Phytochemical Investigation of *Morindacitrifolia*L.(Ye-Yo) Fruit and Fruit Juices

Preliminary phytochemical analyses were performedin order to know different types of chemical constituents present in Ye`-Yo fruits and fruits juices. These tests were carried out according to standard procedures. The results are shown in Table 3.1. According to phytochemical results, *Morindacitrifolia*L. (Ye`-Yo) fruit and fruit juice were found that alkaloid, flavonoids, carbohydrates, glycosides, phenolic com, pounds, α amino acids, carbohydrates, reducing sugar and tannin are present in all sample.Saponin are absent in sample 1 and 2. Starch and cyanogenic glycosides are absent in all samples.

Table 3.1 Results of Phytochemical Constituents of *Morindacitrifolia*L. (Ye`-Yo) Fruits and Fruit Juices

Sr. No	Tests	Extracts	Test Reagents	Observation	Remark			
					S1	S2	S3	S4
1.	Alkaloid	1% HCl	Wagner's reagent	Brown ppt.	+	+	+	+
			Mayer's reagent	White ppt.	+	+	+	+
			Dragendroff's reagent	Orange red ppt.	+	+	+	+
2.	Flavonoid	EtOH	Mg ribbon and conc: HCl	Pink	+	+	+	+
3.	Glycosides	H_2O	10% lead acetate	White ppt	+	+	+	+
4.	Phenolic compounds	EtOH	1 % $FeCl_3$ solution	Golden yellow solution	+	+	+	+
5.	α-amino acids	H_2O	Ninhydrin reagent	Pink colour	+	+	+	+
6.	Saponin	H_2O	Distilled water	No frothing/ frothing	-	-	+	+
7.	Carbohydrates	H_2O	10 % α-naphthol, H_2SO_4 (conc:)	Red ring	+	+	+	+
8.	Reducing sugar	H_2SO_4	Benedicts solution	Brick red ppt.	+	+	+	+
9.	Cyanogenic glycosides	H_2O	Sodium picrate paper	No brick red ppt.	-	-	-	-
10.	Starch	H_2O	Iodine solution	No deep blue colour	-	-	-	-
11.	Tannin	H_2O	1 % gelatin solution	White ppt.	+	+	+	+

(+) Present (-) Absent

Sample 1 powdered sample of green fruit Sample 3 green fruit juice

Sample 2 powdered sample of ripe fruit Sample 4 ripe fruit juice

Physicochemical Parameters of *Morindacitrifolia*Linn. (Ye`-Yo) Fruit and Fruit Juices

Moisture content was determined by moisture analyzer .The moisture content were16.24 % in sample 1, 17.54 % in sample 2, 76.70 % in sample and 88.64 % in sample 4. The results are described in Table 3.2.

Table 3.2 Moisture Content of *Morindacitrifolia*Linn. (Ye`-Yo)

Sr. No	Sample	Moisture (%)
1.	Powdered sample of green fruit	16.24
2.	Powdered sample of ripe fruit	17.54
3.	Green fruit juice	76.70
4.	Ripe fruit Juice	88.64

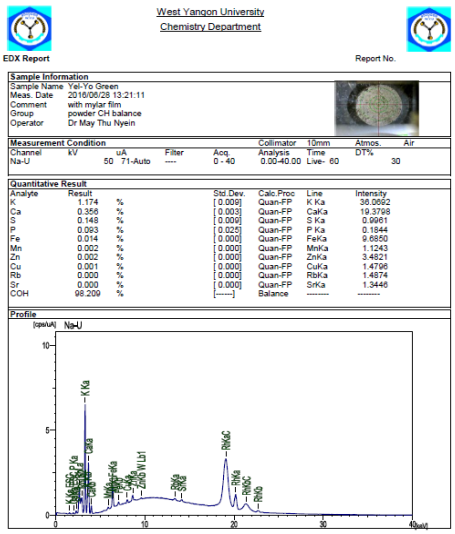

Figure 3.1 EDXRF spectrum of Ye`-Yo Raw (Green)

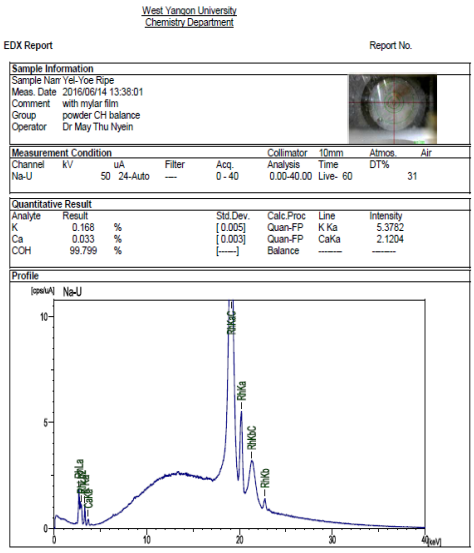

Figure 3.2 EDXRF spectrum of Ye`-Yo (Ripe)

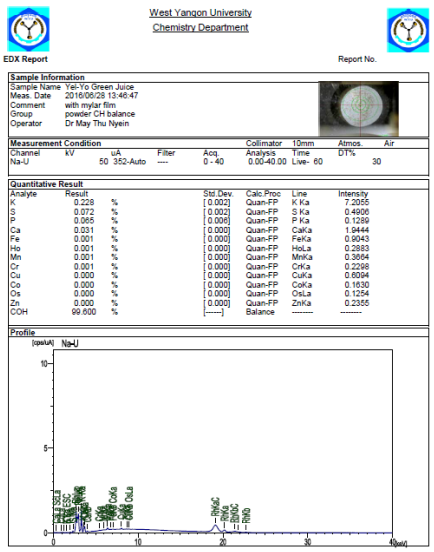

Figure 3.3 EDXRF spectrum of Ye`-Yo Juice (Green)

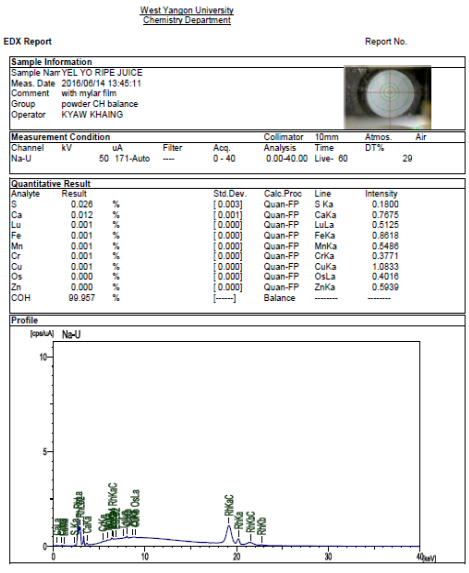

Figure 3.4 EDXRF spectrum of Ye`-Yo Juice (Ripe)

According to EDXRF report, ripe fruits do not contain heavy metal (Fe, Cu) compare with green fruit. Green fruits have trace amount of Fe and Cu (0.002 % and 0.001 %). So, ripe fruits are more suitable to eat than green fruits. Another comparison is potassium (K) content. In ripe fruit juice there is no potassium but in green fruit juice reasonable amount (0.228 %) of potassium was observed. So when we need to drink the juice, as the ripe fruit juice has lesser side effects for potassium restricted person and kidney problem.

Conclusion

Most of the plant parts possess innumerable health benefits and has the capacity of curing several diseases. The present work deals with the investigation of phytochemical constituents of *Morindacitrifolia*L. (Ye`-Yo) fruit and fruit juices. The preliminary phytochemical tests revealed the presence of alkaloids, flavonoids, glycosides, α-amino acid, carbohydrates, reducing sugar and terpenoid are present in all samples and saponin are absent in sample 1 and 2. Cyanogenic glycosides are absent in all samples.

According to the phytochemical results, the fruit and fruit juices of Ye`-Yo may be useful to treat a variety of health problems. Noni juice is effective in curing gout, boosts immune system, provide relief from arthritis, help to maintain health heart. The fruit juices are rich in antioxidant properties so to aid in reducing the type-2 diabetes, stimulates release of digestive enzymes. Noni juice is very effective in protecting against cancer and liver diseases. It is also used to treat high blood pressure, ulcers, depression, menstrual cramps, burns, fever, food poising, intestinal worms and many health problems. Therefore this miracle fruit has been used not only as traditional medicine but also for food in diet and used as a famine food due to the presence of many beneficial nutrients.

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References

Datmar, A., (1993). "*Morindacitrifolia*L.use in indigenous Samonan medicine".*Journal of Herbs of Species of Medicinal Plants,* Vol. 1, **3**, 77-92.

Blanco YC,Fabria V.,(2006) "A review of Agricultral research nutritional and therapeutic properties" *Journal of composition and Analysis*,Vol. 19,**6** ,645-654

Fong, S. T., Johnson, A. (2001). "Extracts of *Morindacitrifoia* (noni) exhibit selected anti-tumor activity against exhibit selective anti-tumor activity against breast and colon carcinoma cell lines".Honolula, Hawaii.

Krauss, B. H., (1993). "Medicine and medicinal herbs" in plants in Hawaii Culture, p-103, University of Hawaii Press.

Markham, K. R., (1982). "Techniques of Flavonoids Identification" Academic Press, London.

Potteral, O. and Hamburger, M. (2007). "Phytochemistry, Pharmacology, Safety", Vol. 73, **3**, 191-199.

William, F. R. and Mclean, S. (1992). "Journal of Natural Products".Canada,Vol 55 (3), 395-398.