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Leaf Protein Juice Extraction - Review

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ABSTRACT
The rate of malnutrition in the developing countries is increasing as a result of increasing population, poverty, and lack of awareness on appropriate nutrition. Leaf protein in spite of its observed similarities with animal protein, is the least tapped of all protein sources. This study presents the review for importance and extraction of protein juice from a highly proteinous leaf Moringa oleifera. It has many medicinal uses of its very wide vital antioxidants, antibiotics and nutrients include vitamin and minerals. This mini - review elaborates the importance and extraction of protein juice from Moringa oleifera leaf
Keywords- *Moringa oleifera, leaf, extraction, protein and antibiotics*

1. INTRODUCTION

Moringa oleifera is one of the widely distributed and naturalised species of a monogenetic family Moringaceae [1] which includes 13 species of trees and shrubs distributed in sub-Himalayan ranges of India, Sri Lanka, Africa and Arabia [2]. The tree ranges in height from 5 to 10m [3] and is found wild and cultivated throughout the plains especially in hedges and in house yards.

Proteins are nitrogen-containing organic compounds, which are essential constituents of all living cells. They often occur in foods in physical or chemical combination with carbohydrates or lipids. Protein has been extracted from leaves of more than a hundred different species of temperate tropical plants [3].

Leaves are potentially the most abundant source of edible protein, which has helped to prevent malnutrition in African societies. The protein content in leaves is said to be as high as that found in soybeans or milk, and is considered an appropriate supplement to animal protein. The extracts are also used as traditional medicine, popularly called agbo (a herbal concoction mixed with water) and agunmu (a liquid extracted from powder or milled dried leaf) among the Yoruba in Nigeria [2].

The extraction of protein from leaf process is accomplished by squeezing for tissue disintegration [2]. In most developing countries, the extraction of leaf protein is still based on traditional procedures, involving squeezing or rubbing the leaves by hand to obtain the juice. These traditional methods are unhygienic, tedious and time consuming [3, 4]. This study a preliminary work aims to design and fabricate an easy-to operate, affordable and effective machine that can extract leaf juice from which the leaf protein can be obtained by sedimentation, settling or centrifugation.

2. CHEMICAL CONSTITUENTS OF MORINGA OLEIFERA

The chemical constituents of the methanolic extract of Moringa oleifera leaves and seeds were investigated using Gas chromatography-mass spectrometry. The result shows that the leaf extract has more chemical constituents than seeds. These relatively diverse chemical constituents may be responsible for the medicinal properties of Moringa oleifera leaves [15]. Table 1 shows the chemical constituents of Moringa oleifera Leaf.

Table 1: Chemical Constituents of Moringa oleifera Leaf

Methanolic Extract Leaf extract of Moringa oleifera	
9-octadecenoic acid	20.89%
L-(+) -ascorbic acid- 2, 6dihexa decanoate	19.66%
14–methyl-8-hexadecenal	8.11%
4-hydroxyl-4-methyl-2-pentanone	7.01%
3-ethyl-2, 4-dimethyl-pentane	6.14%
Phytol	4.24%
octadecamethyl-cyclononasiloxane	1.23%
1, 2-benzene dicarboxylic acid	2.46%
3, 4-epoxy-ethanone comprising	1.78%
N-(-1-methyl ethyllidene)-benzeneethanamine	1.54%
4, 8, 12, 16-tetramethylheptadecan-4-olide	2.77%
3-5-bis (1, 1-dimethylethyl)-phenol	2.55%
1-hexadecanol	1.23%
3, 7, 11, 15-tetramethyl-2 hexadecene-1-ol	1.17%
Hexadecanoic acid	2.03%
1, 2, 3-propanetriyl ester-9octadecenoic acid	1.23%

3. LITERATURE SURVEY

Moringa oleifera has many applications in all fields especially in medicinal and agricultural field. The table 2 shows the applications of Moringa oleifera in the agricultural field. An amount of 20 g of young moringa leaves was mixed with 675 ml of 80 % ethanol as suggested by (Makker and Becker, 1996). An amount of 25 ml (application rate) of the solution was applied per plant in the greenhouse. From the result, Moringa leaf extract increases growth and yields of tomatoes [4].

The effect of Moringa oleifera leaf extract with water as a emulsifier at various concentrations increase the morphological and physiological characteristics of cassava, and the efficacy of M. oleifera leaf extract in controlling zonocerus variegatus infestation on cassava [10].

Table 2: Application of Moringa oleifera in crop growth

Crop	Experimental Methods	Ref.,
Tomato	Five treatments: Only water was added (M0),Ethanol 80 % was added (ME), Moringa extract applied once at 2 weeks from emergence (M1), Moringa extract applied at 2 and 4 weeks from emergence (M2) and Moringa extract applied every 2 weeks to maturity, starting from two weeks from germination (M3).	[4]
	Result	
	Moringa leaf extract increases growth and yields of tomatoes. The study recommends the application of extract at M3.	
Cassava	Experimental Methods	[10]
	The spraying duration: 8 weeks between April and June at the onset of regular rainfall.	
	Best combination	
	Dimethoate plus cypermethrin and M.oleifera leaf extract	
	Enhanced the morphological growth (stem height and number of leaves) of the plants treated with dimethoate plus cypermethrin	

The leaves of the Moringa oleifera tree have been reported to demonstrate antioxidant activity due to its high amount of polyphones. Moringa oleifera extracts of both mature and tender leaves exhibit strong antioxidant activity against free radicals, prevent oxidative damage to major bimolecular, and give significant protection against oxidative damage. The table 3 shows the applications of Moringa oleifera in Medicinal field [8].

Table 3: Application of Moringa oleifera in Medicinal field

Form of Moringa Leaf	Outcome	Ref.,
Moringa oleifera tablets	Moringa powder with 3 binders- Maize Starch, Gelatin and Micro-crystalline Cellulose (MCC); Best binder: Gelatin	[1]
Soluble Extract from Moringa oleifera	Greater cytotoxicity for tumor cells & an ideal anticancer therapeutic candidate to cancer cells	[6]
Antioxidant and anticancer activities of Moringa oleifera leaves	M. oleifera dichloromethane extract shows high antioxidant activity, potent cancer cell antiproliferation, induction of quinone reductase	[7]
Moringa oleifera leaf extracts	Water soluble MOL extract may be a novel and promising natural anticancer drug candidate.	[20]

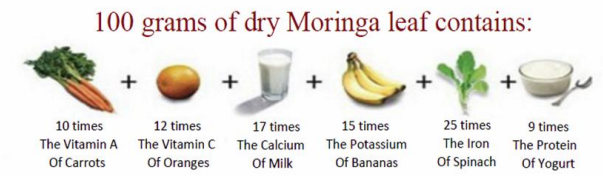

Fig. 1 Nutritional content in Moringa oleifera

Leaves are also rich in copper, manganese, zinc, selenium, and magnesium, folates, vitamin-B6 (pyridoxine), thiamin (vitamin B-1), riboflavin, pantothenic acid, and niacin. It contains 0% cholesterol [8]. It gives following health benefits:

Very helpful in management of Cardiac diseases. It contains 0% cholesterol and also beneficial for patients suffering from Hypertention.

Taking leaves regularly as a part of diet reduces chances of cancer to 80%. It is also recommended as a diet of Cancer patients for healthy and quick healing.

Rich in Beta-carotene and Vitamin A, it improves Eye vision and also prevent Ageing Macular Degeneration.

It should be included in diet chart of Diabetics as beneficial in managing Sugar level.

Soup prepared from leaves is helpful in treating Menstrual cramps.

Cooked leaves if taken daily for 3 weeks removes or flushes out all the toxins from the body. It also improves immunity.

Leaf paste gently fried in castor oil can be applied over inflammations and swellings.

Rich in Calcium, very good to improve bone density. To improve bone health of kids, about 1 teaspoon of leaf juice should be mixed with milk and given twice daily.

Pregnant ladies should be given cooked leaves especially in last trimester for easy delivery.It also reduces post delivery complication and increases milk secretion in lactating women.

4. CONCLUSIONS

Moringa oleifera has many medicinal and agricultural applications. This study is preliminary work to fabricate a family-sized machine capable of extracting leaf juice with a maximum efficiency in commercial scale. Its ability to be motorized or powered manually makes it suitable for the developing countries.

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