

PDF - PROXIMATE ANALYSIS OF SEED AND COAT OF VELVET BEAN (*Mucuna Pruriens*) AND CAMWOOD - researchcub.info

CHAPTER ONE

1.0 INTRODUCTION

Seed and coat of *Mucuna pruriens*, known as velvet beans or cowitch has scientific classification as shown below;

Kingdom	<i>Plantae</i>
Division	<i>Magnoliophyta</i>
Class	<i>Magnoliopsida</i>
Order	<i>Fabales</i>
Family	<i>Fabaiceae</i>
Sub-Family	<i>Faboideae</i>
Type	<i>Phaseoleae</i>
Genus	<i>Mucuna</i>
Specie	<i>M. pruriens</i>

Velvet bans (*Mucuna pruriens*) is an excellent cover crop and soil improver[1,2]. In addition, it commonly produces 200 to 600kg of seeds per hectare which are very rich in protein. However, the regular use of velvet beans ,for soil fertility enhancement is hampered by the lack of appropriate processing techniques of the seeds[3].

Velvet beans has a long history of traditional use in Brazil and India as an aphrodisiac. Clinical studies in India have validated that the plant does indeed have aphrodisiac activities[4]. Velvet beans is an annual climbing vine that grows 3-18m in height. It is indigenous to tropical regions, especially African, Indian and the West Indies. Its flowers are white to dark purple and hang in long clusters. The plant also produces clusters of pods which contain seeds known as *Mucuna* beans. The seed pods are covered with reddish orange hairs that are readily dislodged and can cause intense irritation to the skin. The species name “*pruriens*” (from the latin, 'itching sensation") refers to the result of itching when someone comes in contact with seed pod hairs.[5]

Velvet beans has been gaining in popularity over the last few years in the natural product market especially the sports nutrition industries. With its documented ability to increase testosterone and stimulate growth hormone (thereby increasing muscles mass). Several companies have launched new products using *mucuna* beans including several which are standardized to the L-poda content. It is also showing up as an ingredient in various weight loss, libido, brain/memory, anti-aging and body builder formulars[6].

Baphia nitida

Baphina Nutida belongs to the family of *Leguminosae-papilionaceae*, Common name – camwood.

The seed is very nutritious for man consumption, a part from its nutritive contents, the roots of *Baphina nitida* yields a red dye that was used locally untill recently, to dye raffia and cotton textiles.

The name camwood is derived from Serra Leone Tamne. It was exported on a large scale to Europe from the 17th century and to North America from the 18th century as one of the main “red wood” dyes for wood cotton and silk. Basically, the total dry matter content of leaves in Nigeria has nutrients such as crude protein, ether extract ash, crude fibre, lignin cellulose.

More recently, the tree is used as an interesting timber and often serve as an ornamental shade tree or as fence or hedge[7].

1.1 OBJECTIVE OF THE RESEARCH

In carrying out this research, the researcher have in mind the following objectives;

To identify the quantity of nutrients contained in (i) Seed and coat of velvet seed (*Mucuna pruriens*) and (ii) seed and coat of camwood (*Baphia nitida*).

1.2 LITERATURE REVIEW

1.2.1 *Mucuna pruriens*

Mucuna pruriens bears white lavenders and purple flowers. The seed pods are covered with hairs that cause severe itch when it comes in contact with the skin[5].

The seeds of velvet beans are high in protein, carbohydrates, lipids, fibre and minerals. They also are rich in novel alkaloids, saponins and steroids. The seeds of all *Mucuna* species contain a high concentration of L-poda concentration of sarotonin also have been found in the pod, leaf and fruit [8].

Mucuna pruriens seed can be eaten by human when boiled and soaked for several times with water. Both the green pods and matured beans were boiled and eaten. The soaking of the seed should be within 30 to 48 minutes and the water must be changed severally, to leach out the laevodopa present, since otherwise, the plant can be toxic to human.

Mucuna pruriens is a widespread folder plant in the tropics, to that end it is fed to animal as silage, dried hay or dried seeds. *Mucuna pririens* silage contain 11-23% crude fibre, 20-35% crude protein.

Mucuna pruriens bears white lavender or purple flowers. Its seed pods are about 10cm long[9] and are covered in loose orange hairs that cause a severe itch when it comes in contact with the skin. The chemical components responsible for the itch are a protein, Mucunian[9]. The seeds are shiny black or brown drift seeds. It is found in tropical Africa, India and the Caribbean[9].

1.2.2 *Baphia nitida*

Camwood occur wild from Senegal to Gabon. It is often cultivated near villages formerly as a dye wood especially in Sierra Leone and Liberia. Now more often as an ornamental shade tree or as fence or hedge.

In Nigeria, the seeds are eaten by Igbo people and the twigs are used by Igbo people as chewing sticks[10]. Up to about 1950's, there was considerable export of camwood particularly from Sierra Leone and Liberia to Europe and the United States, both as dye for woods forming and cabinet making[10]. The dye is found in the heartwood which often is of small size. It is present in varying concentrations up to 23%. The dye is soluble in alkali and alcohols much less so in water[11]. The heart wood is pale brown when fresh turning rapidly to dark red or orange upon exposure. This wood is extremely hard, heavy and durable, close-grained and of fine texture.

Baphia nitida often grow as an under storey tree in wetter parts of coastal regions, in rain forest, and in abandoned farm land[12]. Camwood is very easy to cultivate and can be propagated by seed and cuttings. For best results, cutting should be often taken from rather young plants.

In Nigeria, the nutrient content of leaves per 100 of dry matter was approximately crude protein 19g, ether extracts 2.5g, ash 4.3g, crude fibre 23g, N-free extract 51g, acid-detergent fibre 57g, lignin 13g, cellulose 29g, Ca 0.4g, mg 0.2g, K 1g,P 0.2g, Fe 23g, Mg, Cu 20mg and Zn 5mg. Camwood seed can serve as food for man and livestock [13,14].

The principal dye substance in camwood are isoflavonoid- flavonoid dimmers, santalin A and B and

santarubin A, B, C. Also baphic acid and baphin, deoxy santarubin, homopterocarptin, pterocarpin also contribute in the colouring property[11]

1.3 ORIGIN AND DISTRIBUTION OF VELVET BEANS (*Mucuna pruriens*)

Velvet bean was introduced in planes de Hicaque near Tela. A Handuran brother-in-law of theirs is credited with introducing the seed into Sanfrancisco de Saco. It grooved wild there, unnoticed for a number of years. A few farmers observed the plant's ability to control weeds and improve maize yield in fields where it dominates.

In the 1920s, Nigeria grew *Mucuna spp* as an improved fallow and as a relay crop, with a view to intensify small-scale shifting agriculture system. Velvet bean seed was sold by seed companies in the state under the name 'banana field bean' and was later distributed as velvet bean through out the tropics by the USDA. The plant was probably introduced as a forage crop in Mesoamerica in 1920s. some species are used in Malawi as manure for maize and tobacco. In India, it is used as cover crops in Punjab in particular.

1.3.1 *Baphia nitida*

Baphia nitida occurs wild from Senegal to Gabon. Cultivated in Sierra Leone and Liberia as dye wood. The tree occurs in countries like Ghana, Nigeria, Cote d'Ivoire, Cameroon. In Nigeria, TIV people colour the inside of the gourd prepared as a beehive with the red dye to attract a swarm to settle there and Yoruba honey-hunters rub their body with the dye paste to prevent bee stings. In Sierra Leone, a bark decoction is drunk to cure cardiac pain and bark and leaves are prepared as an enema to treat constipation. In Nigeria and Ghana, the pounded dried root, mixed with water and oil is applied to a ringworm-like fungus attacking the feet. In Cote d'Ivoire, a leaf extract of camwood is drunk against asthma. The export was mainly in the shape of logs cut into short lengths rather than in the form of powder or extract, allegedly to facilitate quality control.

1.4 MORPHOLOGICAL ASPECTS OF VELVET BEAN (*Mucuna pruriens*)

The plant is an annual climbing shrub with long vines that can reach over 15m in length. When the plant is young, it is almost completely covered with fuzzy hairs, but when older, it is almost completely free of hairs. The leaves are tripinnate, ovate, reverse ovate, rhombus shaped or widely ovate. The sides of the leaves are often heavily grooved and the tips are pointy. In young *Mucuna pruriens* plant, both sides of the leaves have hairs. The stem of the leaves are two to three millimeter long. Additional adjacent leaves are present and are about 5mm long.

The flower heads take the form of asexual arranged pericarp. They are 15 to 32 cm long and have two to three or many flowers. The accompanying leaves are about 12.5mm long, the flower stalk axes are from 2.5 to 5mm. The petal is 7.5 to 9mm long and silky. The sepals are longer or of the same length as the petals. The crown is purplish or white. The flag is 1.5mm long. The wings are 2.5 to 3.8cm long. In the fruit ripening state, 4 to 13cm long, 1 to 2cm wide, unwinged leguminous fruits develop. There is a ridge along the length of the fruit. The husk is very hairy and carries up to seven seeds. The seeds are flattened uniform eclipsed, 1-1.9cm long, 0.8-1.3cm wide and 4-6.5cm thick. The Hilum, the base of the funiculus (connection between placenta and plant seeds) is surrounded by a significant arillus (fleshy seeds shell).

Mucuna pruriens bears white or purple flowers, its seeds pods are about 10cm long [9] and are covered in long orange hairs that cause a severe itch, if they come in contact with the skin.

1.4.1 CAMWOOD (*Baphia nitida*)

Baphia nitida has many stemmed erect shrub or small tree up to 9m tall with glabrous to densely pubescent.

The leaves are alternate, simple and entire, petiole 1-4cm long, prominently thickened at the base and top: blade ovate, elliptically obovate or lanceolate, 5-21cm X 3-9cm, base rounded to cuneate apex acuminate. Slightly leathery, almost glabulous, pinnately veined. Flower in auxiliary fascicles 1-5 flowered, bisexual, papilionaceous. Pedicel slender, 3-17mm long, calyx spathaceous 8 – 10mm long, glabrous but with a tuft of brown hairs at apex; corolla with standard suborbicular, 1-2cm in diameter, white with a yellow centre, wings and keel white a pocket near the base; stamens 10, filament unequal, tube up to 7mm long; ovary superior, sessile, glabulous, sometimes with a row of silvery hairs along the dorsal margin, 1-celled, style curved filiform, stigma small. Fruit a compressed pod 8-16.5cm X 1-1.5cm. pointed at both ends, 1-4 seeded. Seeds almost circular in outline, 1-1.5cm in diameter, brown.

1.5 GENERAL USES AND IMPORTANCE OF VELVET BEANS (*Mucuna pruriens*)

Mucuna pruriens has many medicinal applications used to increase libido in both men and women due to its dopamine inducing properties. Dopamine has a profound influence on sexual function. *Mucuna pruriens* seeds have also been found to have antidepressant properties when consumed. The hair lining the seed pods contain 5-hydroxytryptamine (serotonin) used to prepare itching powder[5]. Levodopa cures Parkinson disease[15], *Mucuna pruriens* has been recognized to increase testosterone level, leading to deposition of protein in the muscle and increase muscle mass and strength[16]. The extract is also known to enhance mental alertness and improve coordination [17].

According to research foundation of Chennai traditional health care, uses of *Mucuna pruriens* in South India are as follows;

Abdominal discomfort

Grind the root of *Mucuna pruriens* to make a paste. Take this paste orally once a day for two days.

Cholera

Boil the root of *Mucuna pruriens* with four litres of water. Filter the decoction take one glass of this decoction orally with honey eight times

Diabetes

Grind together the following into powder 50g seeds of *Mucuna pruriens*, 50g of *Hygrophilia auricalata*, 50g tubers of *Ipomoea digitata*, 50g roots of *Urithania sonnifera*, 50g tuber of *Curculigo orchoides*. Take one ten spoon full orally with glass of water in which sugar candy is already dissolved, twice a day for a month

Infertility (in men)

Put 10g of *Mucuna pruriens* glass of cow milk after minutes the colour of this milk changes to black, take this glass of milk orally in the evening once a day for seven days.

v. Scorpion bite

Grind the seed of *Mucuna pruriens* with water to make a paste. Apply this paste on the affected area twice a day for four days

vi. Snake bite

Extract juice from the roots of *Mucuna pruriens*, take orally tea spoonful of this juice three to four times continuously just after snake bite.

vii. Toothache

Sundry the root of roots of *Mucuna pruriens* grind this dried root into powder. Apply this powder in the aching teeth.

vii. Worm Infection

Grind the root of roots of *Mucuna pruriens* with *Cassio occidentalis* to make a paste , take the paste orally with a glass of water once a day for days[18].

Apart from the medicinal application of *Mucuna pruriens*, it can also be used as forage, fallow and green manure crop [6]. since the plant is in the legume family, it, with the help of nitrogen fixing bacteria, takes nitrogen gas from the air and combines it with other gas from the air and combines it with other chemical compounds producing fertilizer and improving the soil. *Mucuna pruriens* is also fed to animals as silage, dried hay or dried seeds.

1.5.1 CAMWOOD (*Baphia nitida*)

The heartwood and roots of *Baphia nitida* yields a red dye. It was a major source of bright to dark red colours in the big European cotton printing industries. In the West Africa powdered heartwood is a familiar red body paint and the paste is much used as a cosmetic for the skin.

1.5.1.0 MEDICAL APPLICATION OF CAMWOOD (*Baphia nitida*)

The leaves and leaf juice are applied against parasitic skin disease and a leaf infusion is drunk to cure arthritis and other gastrointestinal problems.

In Ghana, and Nigeria, the leaves are dark and considered haemeostaltics and anti-inflammatory and are used for healing sores and wounds. In Cot'd'Ivoire, the powdered leaves are taken with palm wine, or food to cure venereal diseases and the leaf soap is applied as eye drops against jaundice. In Nigeria, powdered heartwood is made into an ointment with shea butter which is applied against stiff and swollen joints sprains and rheumatic complaints. Also in Nigeria, the pounded dried roots mixed with water and oil is applied to a ringworm-like fungus attacking feet. In Benin, a decoction of the leaves is taken against jaundice and diabetes and also in treatment against female infertility and painful menstruation. In general, it can cure dysentery, oedema, chicken pox, small pox.

Other uses include, been used as chew sticks, foodwrappers, musical instruments, carpenter and related application, tattoos, inks, beehives, building materials, hedges and shade trees.

1.6 PROXIMATE COMPOSITION OF FOODS

Proximate analysis of food stuff describes the basic nutrient composition of foods in terms of protein, moisture, fat, ash and carbohydrates[19,20]. In this determination, estimation are made of nitrogen (as an index of protein) and carbohydrates is determined by differences after adding up protein, ash, fat, moisture and fibre and then subtracting the sum from 100. Proximate composition is usually carried out on representative samples. This means thorough grinding and mixing of the materials, before a sample of the mixture is used for analysis. In most cases, the analysis are carried out by dry sample. Except moisture determination. The result may be reported either on wet or dry matter basis. Analysis is normally carried out in triplicate or at least in duplicate and the average value is taken as the result.

1.7 NOTES ON FACTORS BEING DETERMINED

1.7.1 MOISTURE CONTENT

The amount of water found in a food sample is influenced by the type of food, age or maturity variety and geographical location. At harvest the moisture of the food item determines the storage potential of the food item. Moisture content determination gives an indication of the amount of water found in the food

substance. The keeping and storing characteristics of such food. True moisture content is not easily to be accurately determined as part of the water may be tightly bound. True moisture is determined by the Karl Fischer method[21].

1.7.2 ASH CONTENT

This represents the mineral or inorganic residue of a biological material. It may not represent the absolute content of inorganic matter because there may be volatility of some minerals. It however gives idea of the amount of total mineral content of the food material[22].

1.7.3 FAT CONTENT

Fat is a lipid component, constitutes a high source of energy when compared with protein and carbohydrates. Fat is generally described as the material soluble in organic solvents such as ether, hexane, etc. Some bound fats are however, not available for dissolution by ether, such fat is lipoproteins. When food material is treated with acid, the bound fat is liberated and becomes available for ether extraction[23].

1.7.4 CRUDE FIBRE

Crude fibre is the fraction of the nutrient which includes those materials in food that are of low digestibility. Crude fibre includes cellulose, certain hemicelluloses and some of the lignin. It is used in the analysis of various foods and food products to detect adulteration and to determine conformity to existing standards of quality and identity [24].

1.7.5 PROTEINS

Proteins are macromolecular polymers, composed of amino acids joined together by peptide linkages. They are essential components of all plants and animals. They contain essential elements such as carbon, hydrogen, oxygen and nitrogen. Many contain sulphur in addition, some phosphorus and other metallic elements such as iron, copper and zinc.

1.7.6 CARBOHYDRATES

In the determination of carbohydrates content of a foodstuff, it is regarded as the nitrogen free extract and is determined by adding up the percentage moisture content, ash, ether extract, crude fibre and subtracting their sum from 100[25].

1.8 NOTE ON OIL

1.8.1 OIL COMPOSITION

Vegetable, fat and oil are obtained from plants (seeds and fruits). They are different from animal fats and oil in that the latter occurs in the adipose tissue[23]. By definition, they are naturally occurring esters of glycerols and fatty acids. Fats and oil are triesters of fatty acids commonly called triglycerides or simply, glycerides, fats are solid at room temperature, while oils are liquid with general formula $(K_1OOC-CH_2-CCHOOR_2)CH_2OOR_3$.

Oils are water insoluble natural substances that are extracted from cells and organic tissues of plants and animals using a non-polar solvent such as petroleum ether, chloroform, benzene, hexane, etc.

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