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J B DevhadeDepartment of Chemistry,
Jijamata Mahavidyalaya,
Buldana (MS), India-443001**S S Kalwaghe**Department of Chemistry,
Jijamata Mahavidyalaya,
Buldana (MS), India-443001**M J Devade**Department of Chemistry,
Jijamata Mahavidyalaya,
Buldana (MS), India-443001

Mucuna nivea DC. A member of Fabaceae: Preliminary phytochemical analysis

J B Devhade, S S Kalwaghe, M J Devade

Abstract

The present work is aimed to carry out preliminary phytochemical screening of *Mucuna nivea* DC. Species which is rare and reported in flora of Buldana district (Maharashtra). This plant is used to cure various diseases. The phytochemical screening showed the presence of alkaloids, glycosides, phytosterols, saponins and tannins. The extracts of *Mucuna nivea* DC. Were done by using various solvents such as petroleum ether, benzene, chloroform, acetone, ethanol, and water. The present work has been done on the plant which is medicinally significant and its parts such as root, stem, leaves and seeds are used as crude drugs to cure different ailments by tribal people.

Keywords: *Mucuna nivea* DC, Alkaloids, Glycosides, Phytosterols, Saponins, Tannins.

1. Introduction

Herbal medicine has been improved in developing countries as an alternative solution to health problems and costs of pharmaceutical products. Plants used for traditional medicine contain a wide range of substances that are used to treat chronic as well as infectious diseases. [1] New complications in the health care system due to changed environmental conditions are very often in the people. The upcoming pharmaceutical industries all over the world are looking for the biological resources that may lead to finding of novel Phyto-chemical constituents to fight against various ailments. The scientist and clinical practitioners are in search of such wild plants and this has necessitated the sincere invention of wild medicinal plants and documentation of ethno-botanical information available with the ethnic communities.

The work presented here is an attempt made to analyse preliminary phytochemical constituents of *Mucuna nivea* DC. Species and its medicinal uses in the region of Buldana District. Buldhana district is a district in the Amravati division of Maharashtra state in Western India. It is situated at the westernmost border of Vidarbha region of Maharashtra and is 500 km from the state capital, Mumbai. It is bounded by Madhya Pradesh on the north, Akola, Was him, and Amravati districts on the east, Jalna district on the south, and Jalgaon and Aurangabad districts on the west. The genus *Mucuna nivea* DC. Is widely distributed in the regions of the world. This plant belongs to:

Family	-	Fabaceae
Botanical Name	-	<i>Mucuna nivea</i> DC.
Locality	-	Vasali forest rest house
Vernacular name	-	Kuiri, Kuyari
Habitat	-	Cultivated
Flowers and Fruits	-	October - January

The leaves are trifoliate, leaflets ovate-oblong or rhomboids ovate. Flowers are upto 3cm long occurs in group of 2-3, on 10-15 long, pendulous, terminal racemes. Pods are hard, curved at both end, constricted between the seeds, 7-12 cm, 6-8 seeded.



Fig 1: Fruits of *Mucuna Nivea* DC.



Fig 2: Seeds of *Mucuna Nivea* DC.

Correspondence:**J B Devhade**Department of Chemistry,
Jijamata Mahavidyalaya,
Buldana (MS), India-443001

Amongst modern Indian authors working on Indian medicinal plants the pioneering work has been done by Nadkarni, [2] Kirtikar and Basu [3]. Duke [4] reported the presence of nicotine, physostigmine and serotonin in *Mucuna*. Ghosal *et al.* [5] claimed that this last compound, the important neurotransmitter also known as 5-hydroxytryptamine (5-HT), is present in the *Mucuna nivea* DC. *Mucuna puriens* are recognised as an aphrodisiac in Ayurveda. It has been shown to increase testosterone levels, leading to deposition of protein in the muscles and increased muscle mass and strength. The extract is also known to enhance mental alertness and improve co-ordination. [6]

One spoonful boiled seed powder with a glass of milk is given in impotency and sterility in males. Immature fruits are used as vegetable. Seed powder is taken orally in menstrual disorder. Fresh fruits are eaten raw and by the delivery to increase haemoglobin content of blood. The seeds are traditionally used as nervine tonic, astringent, aphrodisiac, leucorrhoea and paralysis. The hairs of the pods are vermifuge and treated for round worm infections. [7] Many *Mucuna* species have been reported processing medicinal value apart from nutritional value and as fodder crop. [8]

2. Experimental

2.1 Material and Methods:

Plants are the chief source of ethno-medicines which are widely practised in remote areas. The forest dwellers have been using these plants from many decades. The local persons are the main source of information. During the investigation the ethno medicinal significance, plants were then subjected to phytochemical screening by adopting the established methods suggested by Harborn [9], Kokate [10].

2.2 Collection of Material:

The plant material for present investigation was collected from Buldana region. The information regarding its use as crude formulation for treatment was confirmed through the local practitioners. The plants were brought to the laboratory and processed for herbarium specimens. Subsequent visits were planned to confirm the folk medicinal uses. After the completion of description, identification and noting of ethno botanical significance the plants were scrutinised for phytochemical constituents. [11-16]

2.3 Treatment of Plant Materials:

The plant materials were treated and analysed at the laboratory of P.G. Department of Chemistry, Jijamata Mahavidyalaya, Buldana (MS) - India. The plant material was dried on the laboratory bench for 15 days. The dry sample was milled and ground into powder. The air dried powder was extracted in Soxhlet assembly successively first with petroleum ether. The extract obtained in the solvent was concentrated by distilling of solvent and then evaporated to dryness on water bath at 50°C. Before extracting with other solvent the residue powder

was dried in hot air oven below 50°C.

Dried residue was extracted successively with benzene, chloroform, acetone, ethanol and water. The extract obtained in each solvent was concentrated and solidified. Solvent free extract obtained as above was then subjected to qualitative tests for identification of various plant constituents of each sample.

2.4 Phyto-chemical Tests:

Following phyto-chemical tests were performed to find out the chemical constituents in the plant. [17-22]

2.4.1 Detection of Alkaloids:

Small portions of solvent free alcoholic and water extract was transferred in three test tubes and was stirred with few drops of dilute HCl and filtered. The filtrate was tested carefully with alkaloid reagents such as Mayer's reagent (cream ppt.), Dragandoff's reagent (Orange brown ppt.), Hager's reagent (yellow ppt.) and Wagner's reagent (reddish brown ppt.)

2.4.2 Detection of Glycosides:

A small quantity of the extract was hydrolysed with dilute HCl for a period of about an hour on water bath at 50°C. The hydrolysate was further subjected to Lieberman Burchard's test to detect presence of glycosides.

2.4.3 Detection of phytosterols:

The petroleum ether, acetone and alcoholic extracts were treated separately with solution of potassium hydroxide (1%) till complete saponification takes place. Take 5 ml of treated extract, 5 ml of distilled water and 5 ml ether. Shake well and allow the ether extract to evaporate to half quantity by volume and then tested with Liberman Burchard's reagent. Brown colored precipitate indicated the presence by phytosterols.

2.4.4 Detection of Saponins:

To 1 gm alcoholic and aqueous extract 1 ml of distilled water was added with constant shaking till it make a volume of 20 ml was reached and further shaken thoroughly in a graduated cylinder for 15 minutes. Appearance of 1 cm layer of foam indicated the presence of saponin.

2.4.5 Detection of Tannins:

A small quantity of alcoholic and aq. Extract taken separately in water and dil. Ferric Chloride solution (5%) was added to it. The appearance of black or green colour indicated presence of tannins.

3. Results and Discussion:

The phytochemical screening of the plant studied showed the presence of alkaloids, glycosides, saponin, tannin, phytosterols and steroids. The phytochemical constituents of *Mucuna nivea* DC. All are tabulated in the Table 1.

Table 1: Phytochemical constituents of *Mucuna nivea* DC. (Seeds) (Low +, Medium ++, High +++, Absent -)

Test	Reagent	Extracting Solvent					
		Petroleum Ether	Benzene	Chloroform	Acetone	Ethanol	Water
Alkaloid	Mayer's Reagent	-	++	+	+++	++	+
	Dragandoff's Reagent	-	+	-	+++	++	-
	Wagner's Reagent	-	+	-	-	+	+
	Hagger Reagent	-	+	-	+	+	+
Glycosides	Liberman	-	-	-	++	+	-
Saponin	-	++	-	-	+	++	-
Tannin	-	-	-	-	-	-	++
Phytosterols	Lib. Bur. Reagent	-	-	-	+	+	++

Alkaloids

Alkaloids with medium concentration are present in ethanol extract and it has low concentration in benzene, chloroform and water extract.

Glycosides

Medium concentration of glycosides is present in acetone extract and low concentration in ethanol extract.

Saponins

Medium concentration of saponin is present in medium concentration in petroleum and ethanol extract. Found with low concentration in acetone.

Tannins

Tannins in medium concentration are found in water extract.

Phytosterols

Medium conc. of phytosterols were found in water extract and in acetone and ethanol have low concentration.

Conclusion

Phytochemical Screening of *Mucuna nivea* DC. Shows the presence of alkaloids, glycosides, tannins, saponins, phytosterols which is important in condiments, medicines and as ornamental point of view. The plant has various medicinal applications such as sedative, to relieve urinary tract infections, treatment of chest complaints, to treat snake bite and intoxication. It is used in flavouring in cakes, sweet breads and candy.

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