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 practioners 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. Buldana district is a district in the Amravati division of Maharashtra state in Western India. It is situated at the westernmost border of Vidarba 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 | - | Mucuna nivea 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 recemes. Pods are hard, curved at both end, constricted between the seeds, 7-12 cm, 6-8 seeded.

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Amongst modern Indian authors working on Indian medicinal plants the pioneering work has been done by Nadkarni, Kirtikar and Basu. Duke reported the presence of nicotine, physostigmine and serotonin in Mucuna. Ghosal et al. claimed that this last compound, the important neurotransmitter also known as 5-hydroxytriptamine (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.

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. Many Mucuna species have been reported processing medicinal value apart from nutritional value and as fodder crop.

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, Kokate.

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.

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 in water and dil. Ferric Chloride solution (5%) was added to it. A small quantity of the extract was hydrolysed with dilute HCl and then tested with Liberman Burchard’s test to detect presence of glycosides.

2.4 Phyto-chemical Tests:
Following phyto-chemical tests were performed to find out the chemical constituents in the plant.

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.), Dragandroff’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 Lieberman 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 -)

<table>
<thead>
<tr>
<th>Test</th>
<th>Reagent</th>
<th>Extracting Solvent</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Petroleum Ether</td>
</tr>
<tr>
<td>Alkaloid</td>
<td>Mayer’s Reagent</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Dragandroff’s Reagent</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Wagner’s Reagent</td>
<td>-</td>
</tr>
<tr>
<td>Glycosides</td>
<td>Liberman</td>
<td>-</td>
</tr>
<tr>
<td>Saponin</td>
<td></td>
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<tr>
<td>Tannin</td>
<td></td>
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<tr>
<td>Phytoesters</td>
<td>Lib. Bur. Reagent</td>
<td>-</td>
</tr>
</tbody>
</table>

~ 97 ~
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 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.

4. References
16. Patil DA. Ahirrao YA. Ethnomedicinal Knowledge of Plants used by Local People in Buldhana District of Maharashtra (India) Journal of Ecobiotechnology 2011; 3(3):11-17, ISSN; 2077-0464.