



Ethno Medicinal, Biological and Preliminary Phytochemical Analysis of Some Plants of Gorakhpur Forest Division, U.P, India

Manoj Kumar Chaubey, Neha Tiwari, Sarvesh Patel and V.N. Pandey*
Experimental Botany and Nutraceutical Laboratory, Department of Botany, DDU
Gorakhpur University, Gorakhpur – 273009, (U.P.) India.

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*Corresponding Author Email: vnpgu@yahoo.co.in

Abstract

Medicinal plants are rich source of herbal drug and of great importance in pharmaceutical industries. The aim of the present work is to collect ethno medicinal knowledge from local villagers and Tharus of Gorakhpur Forest Division. About 16 plant species viz., *Abrus precatorius* L., *Acacia pennata* (L.) Willd., *Caesalpinia decapetala* (Roth.) Alston, *Coccinia indica* Wight & Arn., *Cuscuta reflexa* Roxb., *Ficus indica* L., *Flacourtia jangomas* (Lour.) Raeusch., *Hiptage benghalensis* (L.) Kurz, *Madhuca indica* J.F. Gmel., *Millettia auriculata* Baker, *Mimosa himalayana* Gamble, *Mucuna pruriens* (L.) DC., *Putranjiva roxburghii* Wall., *Strychnos nux-vomica* L., *Terminalia arjuna* (Roxb.ex DC.) Wight & Arn. and *Toddalia asiatica* (L.) Lam. used in traditional medicinal system were collected and screened for their bioactive constituents using ethanol 80%. The study concluded the medicinal use of the plant against various human diseases and presence various bioactive constituents such as carbohydrates, proteins, alkaloids, glycosides, steroids and terpenoids, phenolic compound and tannins, flavonoids and saponins in varying plant extracts. The documentation of this information will help in cure and prevention of various human health related issues.

Keywords

Bioactive Constituents, Ethno medicinal Knowledge, Medicinal Plants, Pharmaceutical.

INTRODUCTION

Medicinal plants have been used in traditional medicinal system since the time immemorial. Early man got much interested towards green plants. He gathered the information about important beneficial as well as harmful properties of the plants by trial and error method. Later he became enriched with the knowledge of many useful and harmful plants. This enriched knowledge was transmitted verbally

from one generation to another. Major information about the medicinal values of plants has come from the knowledge gathered by the aboriginals since the tribals mostly inhabit forested and hilly terrains. They depend on the forest flora for curing various types of ailments and disorders. Now a day, people are being more dependent on herbal medicines globally. The increased demand of herbal medicines is due to their cost effectiveness, acceptability, accessibility,

biomedical benefits with very low side effects [1]. The rural areas are fascinated towards medicinal plants due to high cost of allopathic drugs and side effects [2]. Therefore, the present study is undertaken to evaluate ethno medicinal uses and preliminary phytochemical constituents of 16 different plant species growing in Gorakhpur Forest Division.

MATERIALS AND METHODS

Collection and Identification of Plant Sample

Fresh samples of *Abrus precatorius* L., *Acacia pennata* (L.) Willd., *Caesalpinia decapetala* (Roth.) Alston, *Coccinia indica* Wight & Arn., *Cuscuta reflexa* Roxb., *Ficus indica* L., *Flacourtia jangomas* (Lour.) Raeusch., *Hiptage benghalensis* (L.) Kurz, *Madhuca indica* J.F. Gmel., *Millettia auriculata* Baker, *Mimosa himalayana* Gamble, *Mucuna pruriens* (L.) DC., *Putranjiva roxburghii* Wall., *Strychnos nux-vomica* L., *Terminalia arjuna* (Roxb.ex DC.) Wight & Arn. and *Toddalia asiatica* (L.) Lam. were collected from different locations of Gorakhpur Forest Division of Uttar Pradesh in year 2018. The plants were identified from herbarium sheets available at Department of Botany, DDU Gorakhpur University. The leaves were washed thoroughly 2-3 times with running tap water followed by distilled water. The leaf material was shade dried and pulverized. The powdered material was then kept in air tight bottles with proper labelling at 4°C and used for further analysis.

Ethno medicinal Study

Ethno medicinal information about the plants were collected and documented from Maharajganj, Gorakhpur Forest Division and its adjoining areas during the year 2018. Tharus, Vaidyas and local villagers were contacted to gather the information about the ethno medicinal uses of plant. Ethno medicinal information was recorded by interviewing the questionnaire.

Preparation of Plant Extract

The dried leaf powder of *Abrus precatorius* L., *Acacia pennata* (L.) Willd., *Caesalpinia decapetala* (Roth.) Alston, *Coccinia indica* Wight & Arn., *Cuscuta reflexa* Roxb., *Ficus indica* L., *Flacourtia jangomas* (Lour.) Raeusch., *Hiptage benghalensis* (L.) Kurz, *Madhuca indica* J.F. Gmel., *Millettia auriculata* Baker, *Mimosa himalayana* Gamble, *Mucuna pruriens* (L.) DC., *Putranjiva roxburghii* Wall., *Strychnos nux-vomica* L., *Terminalia arjuna* (Roxb.ex DC.) Wight & Arn. and *Toddalia asiatica* (L.) Lam. were extracted with ethanol 80% using Soxhlet apparatus. After extraction the plant extract was evaporated to

dryness, stored in deep freezer and used for further phytochemical analysis.

Qualitative Analysis of Phytochemicals

Qualitative analysis of phytochemicals was carried out using the standard procedures described by Harborne (1973) [3]; Trease and Evans (1989) [4] and Sofowara (1993) [5].

Test for Carbohydrates

Benedict's test: The prepared extract was added with the few drops of Benedict's reagent and boiled in water bath. The formation of reddish brown precipitate showed the presence of carbohydrate.

Test for Proteins

Biuret Test: To the extract, one drop of 2 per cent of copper sulphate was added. Then, 1 ml of 5 per cent ethanol was added followed by addition of excess of potassium hydroxide pellets. The presence of protein was indicated by formation of pink to violet colour in the ethanolic layer.

Test for Saponins

Foam Test: To the extract, 2 ml of distilled water was added and then shaken together. If the foam produced persists for 10 minutes, it indicated the presence of saponins.

Test for Phenolic Compound and Tannins

Ferric Chloride Test: Few drops of neutral ferric chloride solution were added to the extract. The formation of dark green or bluish black colour indicated the presence of phenolic compounds and Tannins.

Test for Alkaloids

Dragendroff's Test: Few drops of Dragendroff's reagent (KI+HgCl₂) was added to the extract. The presence of orange- brown to red precipitate indicated the presence of alkaloids.

Test for Glycosides

Keller Killani Test: Two ml of glacial acetic acid containing one drop of FeCl₃ solution 1 ml of concentrated sulphuric acid was added to the extract. A brown ring formed at the junction of two layers. Below this ring a violet ring appeared and along with it a bluish green coloured ring would also appear which indicated the presence of glycosides.

Test for Steroids and Terpenoids

Libermann Burchard's Test: To the extract, few ml of chloroform was added. Then, few drops of acetic anhydride were added to the extract, boiled and cooled at 0°C. Then, one drop of concentrated sulphuric acid was added from the wall of test tube. Formation of green colour ring indicated the presence of steroids while formation of deep red colour indicated the presence of terpenoids.

Test for Flavonoids

Alkaline Reagent Test: to the extract, few drops of NaOH solution were added. Formation of yellow colour which disappears on adding HCl indicated presence of flavonoids.

RESULTS AND DISCUSSION

The herbal remedies utilized by traditional medicinal system are important source of discovery of new drugs [6] [7] [8] [9] [10] [11] [12]. During the present investigation, total 16 plant species have been enumerated. The collected ethno medicinal plants were arranged in alphabetical order and their botanical name, common name, family, part used and ethno medicinal uses were recorded in Table 1. The plants are being used by local rural people as well as ethnic group of Gorakhpur Forest division for treatment of inflammation, bleeding gums, fever, headache, body pain, itching, burns, skin infections, stomach ache, arthritis, diarrhoea, dysentery, wounds, muscle sprains, malaria, tuberculosis, haemorrhage, scabies and typhoid fever.

Phytochemicals are naturally occurring chemical constituents responsible for definite colour, odour and smell of the plants with considerable therapeutic value for human health [13]. The preliminary phytochemical analysis of medicinal plants has been studied by many workers [14] [15] [16] [17]. The preliminary phytochemical screening of dried leaf

extract of various plant materials viz., *Abrus precatorius* L., *Acacia pennata* (L.) Willd., *Caesalpinia decapetala* (Roth.) Alston, *Coccinia indica* Wight & Arn., *Cuscuta reflexa* Roxb., *Ficus indica* L., *Flacourtia jangomas* (Lour.) Raeusch., *Hiptage benghalensis* (L.) Kurz, *Madhuca indica* J.F. Gmel., *Millettia auriculata* Baker, *Mimosa himalayana* Gamble, *Mucuna pruriens* (L.) DC., *Putranjiva roxburghii* Wall., *Strychnos nux-vomica* L., *Terminalia arjuna* (Roxb.ex DC.) Wight & Arn. and *Toddalia asiatica* (L.) Lam.in ethanol 80% was performed and the study revealed the presence of various important primary and secondary metabolites including carbohydrates, proteins, alkaloids, glycosides, steroids and terpenoids, phenolic compound and tannins, flavonoids and saponins in varying plant extracts (Table 2). Some important ethno medicinal plants of Gorakhpur Forest division shown in Fig.1 and Fig.2. Leaf powder of *Acacia pennata*, soxhlet extraction of leaf powder, ethanol 80% extract of powder and drying of leaf powder using rotatory evaporator shown in Fig. 3, 4, 5 and 6.

The therapeutic activity of medicinal plants is perhaps due to presence various secondary metabolites including alkaloids, flavonoids, phenolic compounds, glycosides, saponins, steroids and terpenoids. These phytochemicals produce definite physiological action on human body if it is administered [18].

Table-1: Ethno medicinal Uses of Some Important Plants of Gorakhpur Forest Division.

Plant Name	Common Name	Family	Part Used	Ethnomedicinal Uses
<i>Abrus precatorius</i> L.	Rosary pea	Fabaceae	Root	Aqueous root paste is applied on wounds in treatment of inflammation. Root paste along with milk is taken to treat snake and scorpion bite.
<i>Acacia pennata</i> (L.) Willd.	Climbing acacia, Agla bel	Mimosaceae	Leaf	Leaves are chewed along with sugar in case of bleeding gums. Leaf juice along with milk is used in treatment of indigestion. Decoction of leaf is helpful in relieving body pain, fever and headache.
<i>Caesalpinia decapetala</i> (Roth.) Alston	Crested fever nut	Caesalpinaceae	Leaf	Leaf paste is used in treatment of microbial infections, inflammations and burns.
<i>Coccinia indica</i> Wight & Arn.	Ivy gourd, Kunduru	Cucurbitaceae	Leaf	Decoction of leaf is helpful in treatment of diabetes.
<i>Cuscuta reflexa</i> Roxb.	Giant Dodder, Amar bel	Convolvulaceae	Leaf, Stem, Seed	The mixture of leaf juice and honey is used in treatment of jaundice. Stem paste is used in relieving body pain, itching and skin infections.

				Seed juice is helpful in purifying blood and in case of stomach pain.
<i>Ficus indica</i> L.	Java Fig, Pakar	Moraceae	Stem bark, fruit	Decoction of stem bark as well as fruit is effective in purifying blood, jaundice, spleen diseases, and urinary tract infections. Bark paste can be applied to treat arthritis as well as wounds. Powder of dried ripe fruits along with milk is used to treat diabetes.
<i>Flacourtia jangomas</i> (Lour.) Raeusch	Indian Plum, Paniyala	Flacoutiaceae	Bark	Decoction of bark along with mustard seed paste is used to treat diarrhoea and dysentery.
<i>Hiptage benghalensis</i> (L.) Kurz.	Helicopter flower, Madhavi lata	Malpighiaceae	Leaf	Leaf decoction is used in treatment of ulcers. Leaf is applied in form of paste for treatment of inflammations, skin diseases, wound infections, burning sensations and rheumatism.
<i>Madhuca indica</i> J.F. Gmel.	Indian Butter tree, Mahua	Sapotaceae	Leaf, fruit, Seed, bark, flower	Leaf paste is applied for healing, burns and bone fracture. Fruit is used to treat bronchitis, ulcer and tonsillitis. Bark paste/powder is used to cure rheumatism and bleeding, diabetes, stomach ache, snake bite and fracture. Flower juice is effective in increasing lactation as well as anthelmintic and hepatoprotective.
<i>Millettia auriculata</i> Baker	Agarbel	Fabaceae	Leaf, Stem, Stem Bark	Aqueous leaf and stem decoction is used against helminths. Topical application of bark juice is effective in treating scabies.
<i>Mimosa himalayana</i> Gamble	Himalayan mimosa, Shiahkanta	Fabaceae	Stem	Topical application of stem paste is helpful in reducing inflammation.
<i>Mucuna pruriens</i> (L.) D.C.	Itch weed, Kevanch	Fabaceae	Seed, Leaf	Seed paste is used as snake antivenom, diabetic, neuroprotective as well as leaves are used for antimicrobial and antioxidant property.
<i>Putranjiva roxburghii</i> Wall.	Child-life tree, Putrajiv	Euphorbiaceae	Leaf, fruit	Leaf paste is used in treating illness, muscle sprain, skin diseases, rheumatism and sterility. Fruits are taken orally for having birth to male child.
<i>Strychnos nux-Vomica</i> L.	Poison nut, Kuchla	Loganiaceae	Seed	Seed powder is used as remedy for alcohol addiction and it increases appetite. It promotes blood circulation and relief pain.
<i>Terminalia arjuna</i> (Roxb.ex DC.)	Arjun	Combretaceae	Bark	Bark powder along with wheat cooked in ghee, jaggery and milk used to overcome heart disorder. Bark decoction is also used to treat spermatorea, fracture, haemorrhage, piles as well as skin disease.
<i>Toddalia asiatica</i> (L.) Lam	Forest Pepper, Orange Climber, Jangali Kalimirch	Rutaceae	Root Bark, leaf	Root bark decoction is used to treat ulcer, diarrhoea, sore throat, food poisoning, skin rash, ulcer, malaria and tuberculosis. Leaf concoction is used to treat wound, bacterial infection, chest pain and typhoid fever.

Table 2: Preliminary Phytochemical Analysis of Some Important Plants of Gorakhpur Forest Division.

Plant Name	Phytochemical Constituent							
	Ch	Pr	Al	Gl	St	Ph	Fl	Sa
<i>Abrus precatorius</i> L.	+	+	+	+	+	+	+	+
<i>Acacia pennata</i> (L.) Willd.	-	-	+	-	+	+	+	+
<i>Caesalpinia decapetala</i> (Roth.) Alston	+	+	-	+	-	+	+	-
<i>Coccinia indica</i> Wight & Arn.		+	+	+	+	+	+	+
<i>Cuscuta reflexa</i> Roxb.	+	+	+	+	-	+	+	-
<i>Ficus indica</i> L.	+	-	-	-	+	+	+	+
<i>Flacourtia jangomas</i> (Lour.) Raeusch	+	+	+	-	-	+	+	+
<i>Hiptage benghalensis</i> (L.) Kurz.	+	+	+	+	+	+	+	+
<i>Madhuca indica</i> J.F. Gmel.	+	+	+	-	+	+	+	+
<i>Milletia auriculata</i> Baker	+	+	+	-	+	+	+	+
<i>Mimosa himalayana</i> Gamble	+	+	+	-	+	+	-	-
<i>Mucuna pruriens</i> (L.) D.C.	-	+	-	-	+	+	-	-
<i>Putranjiva roxburghii</i> Wall.	+	-	+	-	+	-	+	+
<i>Strychnos nux-Vomica</i> L.	+	-	+	-	+	+	+	+
<i>Terminalia arjuna</i> (Roxb.ex DC).	+	+	+	+	+	+	+	+
<i>Toddalia asiatica</i> (L.) Lam.	+	+	+	+	+	+	+	+

+= Present, -= Absent, Ch= Carbohydrates, Pr= Proteins, Al= Alkaloids, Gl= Glycosides, St= Steroids and Terpenoids, Ph= Phenolic Compound and Tannins, Fl=Flavonoid, Sa= Saponin.



***Abrus precatorius* L.**



***Acacia pennata* (L.) Willd.**



***Caesalpinia decapetala* (Roth.) Alston**



***Coccinia indica* Wight & Arn**



***Cuscuta reflexa* Roxb.**



***Ficus indica* L.**



***Flacourtia jangomas* (Lour.) Raesch**



***Hiptage benghalensis* (L.) Kurz.**

Fig. 1: Some Important Plants of Gorakhpur Forest Division.



***Madhuca indica* J.F. Gmel.**



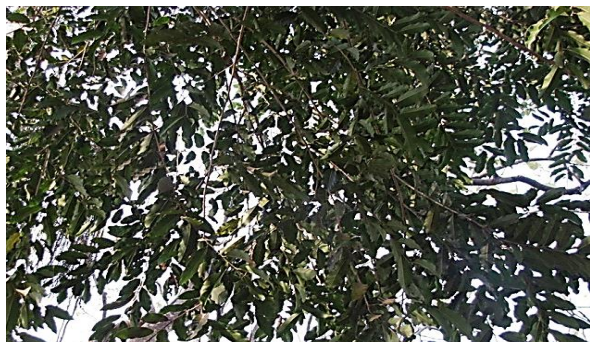
***Milletia auriculata* Baker**



***Mimosa himalayana* Gamble**



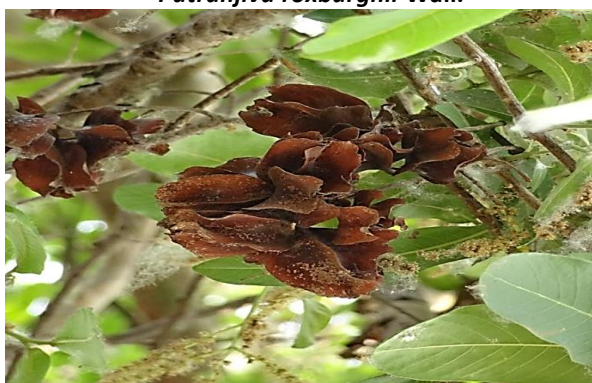
***Mucuna pruriens* (L.) D.C.**



Putranjiva roxburghii Wall.



Strychnos nux-Vomica L.



Terminalia arjuna (Roxb.ex.DC.)



Toddalia asiatica (L.) Lam.

Fig. 2: Some Important Plants of Gorakhpur Forest Division.



Fig.3: Leaf Powder of *Acacia pennata* (L.) Willd.



Fig.4: Soxhlet Extraction of Leaf Powder

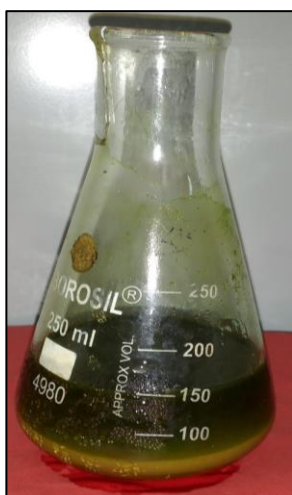


Fig.5: Ethanol 80% Leaf Extract of *Acacia pennata* Willd.



Fig.6: Drying of Extract using Rotatory Evaporator

CONCLUSION

The present study showed that the traditional knowledge lying with tribes and local people for the uses of some plants of the Gorakhpur Forest Division viz. *Abrus precatorius* L., *Acacia pennata* (L.) Willd., *Caesalpinia decapetala* (Roth.) Alston, *Coccinia indica* Wight & Arn., *Cuscuta reflexa* Roxb., *Ficus indica* L., *Flacourtia jangomas* (Lour.) Raeusch., *Hiptage benghalensis* (L.) Kurz, *Madhuca indica* J.F. Gmel., *Millettia auriculata* Baker, *Mimosa himalayana* Gamble, *Mucuna pruriens* (L.) DC., *Putranjiva roxburghii* Wall., *Strychnos nux-vomica* L., *Terminalia arjuna* (Roxb.ex DC.) Wight & Arn. and *Toddalia asiatica* (L.) Lam. were being utilized in their day to day life. Preliminary phytochemical screening of these plants showed the presence of bioactive phytochemicals like carbohydrates, proteins, alkaloids, glycosides, steroids and terpenoids, phenolic compound and tannins, flavonoids and saponins. The therapeutic potential of these plants is probably due to presence of bioactive phytochemicals. These plants have a greater hope for therapeutic mining, bio prospection and at a greater extent to use in health care system.

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