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Indigenous knowledge of Ethnic community on usage of Satavari (*Asparagus racemosus* Willd) and its preliminary screening

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Abstract

Satavari (*Asparagus racemosus*) is a herb of medicinal importance found in Indian subcontinent and traditionally used by ethnic community to treat multiple ailments. It has roughly a hundred tuberous roots with tapering at both ends which are mainly used in indigenous medicine. Satavari was identified as flagship species for conservation of medicinal plants in Mayurjharna forest of Paschim Medinipur district. The traditional usage of Satavari roots were captured through interaction with the local tribes. The roots were collected from the wild and a preliminary phytochemical analysis was conducted in methanolic, aqueous and alchoholic extraction by following standard methodology. The local tribes reported that the most common use of roots were to treat blood dysentery and bloody urine. They also use the leaves to treat night blindness and rhizomes to treat piles. The other use of Satavari includes the address of general pain, stomach pain, waist pain, leucorrhea and constipation as reported by the local *Santhal, Munda and Lodha* community. The preliminary phytochemical screening reveals that the roots of Satavari contains glycosides as responded in methanolic extraction, carbohydrate in both methanolic and aqueous extraction, steroids and triterpenoids in all methanolic, aqueous and alchoholic extraction. Satavari is overexploited for its high medicinal properties by the local and surrounding community, which needed adoption of scientific harvesting and sustainable conservation needs to be promoted by controlling illegal harvesting.

Keywords: Ethnic community, indigenous medicine, tuberous roots, phytochemical.

Introduction

India has one of the medicinal plant related health cultures in the world. It has both a codified and an oral tradition and over 1.5 million carriers of this tradition. The oral culture has traditionally been rooted in the 4635 ethnic communities in the country. This tradition in India is largely due to the diverse medicinal plants resource base, cultural rootedness, flexibility, easy accessibility and affordability, especially for the poorest. Government of India has reported that for 65% of its population, traditional medicine is the only available source of health care. Over 1,00,000 herbal formulations are used for a wide range of health condition by both the local health cultures and the codified system of medicine. Though allopathic drugs have

brought a revolution throughout the world but the plant base medicines have its own unique status. (Behera, 2006).

For centuries plants have provided mankind with useful, sometimes life saving drugs. Modern pharmaceutical in cases where correlation between chemical structure and biological activities were noted, empirical science began to give way to rational drug design. This emerging approach to identify and develop potential new drug is largely successful, due to the intellectual cooperation of medicinal chemistry (Verma et al., 2013).

The State of West Bengal is a Mega Bio-Diversity State. Out of 16779 species of Angiosperms recorded in India, West Bengal is having 3580 species (21.33%), spread over 9 Forest Types of the State out of 16 Forest Types found in India, covering Temperate and Sub-Alpine forests of Darjeeling to Estuarine plains of Sundarban. The floral diversity of West Bengal occurs over four (out of 10 in India) distinct Bio-Geographic Zones ranging from 8B-East Coast (littoral forest of Sundarban) to 2C-Central Himalayas (temperate and sub-alpine forests of Darjeeling District) and represent a wide range of rare, threatened and endemic flora (Anon., 2010).

The local uses of plants as a cure are common, which have little or no access to modern health services, such as the innumerable tribal villages and hamlets in India. Medicinal plants are not only a major resource base for the traditional medicine and herbal industry but also provide livelihood and health security to a large segment of Indian population (Anon., 2010).

India being one of the World's 12 mega biodiversity countries enjoys export of herbal raw material worth US $ 100-114 million per year approximately. (Sandhya et al., 2006). Satavari (*Asparagus racemosus*) is an herb of medicinal importance found in Indian subcontinent. Micro-level studies indicate that significant savings are made in tribal family health expenditure on account of the use of this plant for the treatment of various diseases as well as for fulfillment of their daily nutrient requirement.

The major objectives of the study includes:

- To identify the community of people in Paschim Medinipur who still inherit traditional knowledge regarding hodopathy and document them.
- To explore the ethnobotanical usage of *Asparagus racemosus* by the local tribal people of Paschim Medinipur, West Bengal.
- To screen the phytochemicals present in the roots of *Asparagus racemosus* collected from Mayurjharna forest.

Materials and Methods

A literature review has been done before visiting the field. The literature review primarily focused to identify the community of people in Paschim Medinipur district who still inherit traditional knowledge regarding hodopathy and practice regularly. During field work, interviews were conducted with local knowledgeable villagers, the herbal healer called '*Vaidyas or Ojhas*' (local physicians in Indian System of Medicine), old woman and medicinal plant vendor (Shaw et al., 2015). *Asparagus* was identified as very important species which are widely used by the local community. The roots were collected from its natural wild habitat by digging the command area of roots for investigation.

Study area

The study area i.e., Mayurjharna Forest under Jhargram Forest Division of Paschim Medinipur district was selected after discussion with the Silviculture South Division of West Bengal State Forest Department (Fig. 1). The area was already opted for establishment of Medicinal Plants

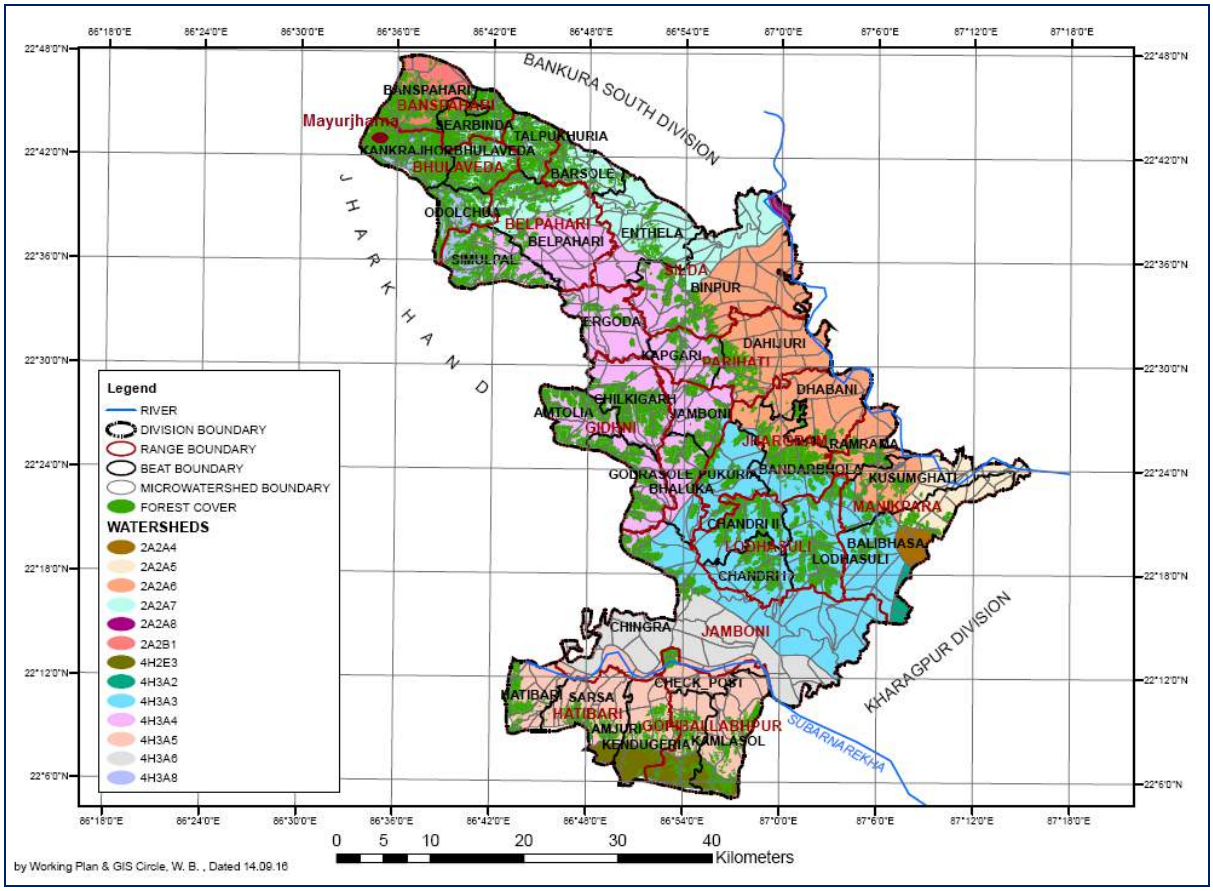

Figure 1. Map of Study Area (Mayurjharna) in Jhargram Forest Division map.

Conservation Area (MPCA) by the West Bengal State Forest Department under the 'National Programme on promoting conservation of Medicinal Plants and traditional knowledge for enhancing the Health and Livelihood Security'. MPCA have been suggested to be managed as 'hands off' area with certain interventions to encourage identification, preservation, natural regeneration, monitoring etc. by involving Forest Protection Committee (FPC) members through awareness and confidence building exercises.

Paschim Medinipur is one of the South-western most districts of West Bengal, bordering Jharkhand and Orissa states in the Western and South-western part respectively. The district lies between 22°57'10"-21°36'35" North latitudes and 88°12'40"- 89°33'50" East longitudes. The elevation above mean sea level is 170 m (Pandit and Bhakat, 2009).

The major river flows along the district are Kangsabati, Subarnarekha and Silabati. Annual average rainfall is 1390 mm. May-June are the hottest months and December-January the coldest. During summer maximum temperature reaches up to 45°C and during winter temperature may drop to 4°C at night. Maximum relative humidity is around 95% during rainy season. The soil is red lateritic type (Pandit and Bhakat, 2009).

The total area of the district is 9,786 km^2 having 4 sub-divisions, 27 civil blocks, 29 police stations, 7,580 villages and a total population of 59,13,457 with population density of 636 per km^2 (Anon., 2011) and percentage of scheduled castes and scheduled tribes population is 18 and 15 respectively (Anon., 2005). Agriculture is the main occupation of the tribal people who are largely dependent on forest-based resource for their livelihood as the people live mostly (99%) in rural areas (Pandit and Bhakat, 2009).

The present study is aimed at the development of phytochemical parameters and to investigate the medicinally active substances present in methanolic ethanolic and aqueous extract obtained from roots of *Asparagus*.

Figure 2. Roots of *Asparagus racemosus.*

Processing of plant parts

The collected roots of plants are dried at sixty to seventy degree centigrade temperature for a period of 48-72 hours. Next the dried parts were grounded to very fine powdery condition for laboratory testing to confirm the phyto-chemical present in the sample in the pharmaceutical laboratory of Jadavpur University. The fine dusty powder is then divided into two parts- First part is converted to hot water extract and the other part to alcoholic extract of methanol base and ethanol base.

Test for triterpenoids and steroids

Libermann-Buchard test: 10mg of test sample was dissolved in 1.0 ml of chloroform; 1.0 ml of acetic anhydride was then added to the mixture followed by 2.0 ml of concentrated sulphuric acid. Appearance of reddish violet ring at the junction of the two layers confirms the presence of triterpenoids and steroids.

Salkowski Test

1.0 ml of concentrated sulphuric acid was added to 10 mg of test sample dissolved in 1.0 ml of chloroform. Appearance of reddish blue colour exhibited by chloroform layer and green fluorescence by the acid layer suggests the presence of steroids.

Test for Flavonoids

Ferric chloride test

Test solution when treated with few drops of Ferric chloride solution would result in the formation of blackish red color indicating the presence of flavonoids.

Alkaline reagent Test

Test solution when treated with sodium hydroxide solution, shows increase in the intensity of yellow color which would become colorless on addition of few drops of dilute Hydrochloric acid, indicates the presence of flavonoids.

Lead acetate solution Test

Test solution when treated with few drops of lead acetate (10%) solution would result in the formation of yellow precipitate.

Test for Glycosides

Keller Killiani Test – Test solution was treated with few drops of glacial acetic acid and Ferric chloride solution and mixed. Concentrated sulphuric acid was added, and observed for the formation of two layers. Lower reddish brown layer and upper acetic acid layer which turns bluish green would indicate a positive test for glycosides.

Tests for Alkaloids

Mayer test

A small quantity of test sample was treated with few drops of dilute hydrochloric acid and filtered. The filtrate was treated with Mayer's reagent. Appearance of yellowish buff colored precipitate indicates the presence of alkaloids.

Dragendorff test

A small quantity of test sample was treated with few drop of dilute hydrochloric acid and filtered. The filtrate was then treated with Dragendorff"s reagent. Appearance of orange brown precipitate indicates the presence of alkaloids.

Wagner test

A small quantity of test sample was treated with few drop of dilute hydrochloric acid and filtered. The filtrate was treated with Wagner's reagent. Failure to produce reddish brown precipitate suggested the absence of alkaloids.

Hager test

A small quantity of test sample was treated with few drop of dilute hydrochloric acid and filtered. The filtrate was treated with Hager's reagent. Appearance of yellowish precipitate demonstrates the positive test for alkaloids.

Test for Tannins

A small quantity of test sample was dissolved in minimum amount of distilled water and filtered. The filtrate was treated with 10% aqueous potassium dichromate solution. Development of yellowish brown precipitate demonstrates the presence of tannins.

A small quantity of test sample was dissolved in minimum amount of distilled water and filtered. The filtrate was allowed to react with 10% lead acetate solution. Formation of yellow colour precipitate indicates the positive test for tannins. A small quantity of test sample was dissolved in minimum amount of distilled water and filtered. The filtrates were then allowed to react with 1.0 ml of 5% ferric chloride solution. Formation of greenish black coloration demonstrates the presence of tannins. A small quantity of test sample was dissolved in minimum amount of distilled water and filtered. The filtrates are then allowed to react with 1.0 ml of 1% gelatin and 1.0 ml of 10% sodium chloride solution. Formation of white buff colored precipitate demonstrates the presence of tannins.

Test for Saponins

A small quantity of test sample was dissolved in minimum amount of distilled water and shaken in a graduated cylinder for 15 minutes. Formation of stable foam suggests the presence of saponins. A small quantity of test sample was dissolved in methanol. 1.0 ml of extract solution was treated with 1% lead acetate solution. Formation of white precipitate indicates the presence of saponins.

Test for Carbohydrate

Molisch test

The test solution is combined with a small amount of Molisch's reagent (α-naphthol dissolved in ethanol) in a test tube. After mixing, a small amount of concentrated sulfuric acid is slowly added down the sides of the sloping test-tube, without mixing, to form a layer. A positive reaction is indicated by appearance of a purple ring at the interface between the acid and test layers.

Benedict test

A small quantity of test sample was treated in minimum amount of distilled water and filtered. To the filtrate equal volume of Benedict's reagent was added and heated for few minutes. Formation of brick red precipitate confirms the presence of reducing sugars.

Fehling test

A small quantity of test sample was treated in minimum amount of distilled water and filtered. To the filtrate equal volume of Fehling's A & B solution were added and

heated for few minutes. Development of brick red colour demonstrates the presence of reducing sugars.

Results and Discussion

The ethnic community living in the fringe of Mayurjharna Forests includes mainly *Santhal, Lodha and Munda* tribes who still dependent of the local medicinal plants available in the nearby forest. Focus group discussion reveals that *Asparagus* is the most frequently used medicinal plants by the local community and also traded commercially.

Satavari was identified as flagship species for conservation of medicinal plants in the newly created Medicinal Plant Conservation Area (MPCA). Morphological study has shown that it has roughly a hundred tuberous roots (Satamul) with tapering at both ends which are mainly used in indigenous medicine, though the other parts of the plants are also have importance from different point of views.

Local people are using this plant for the preparation of different herbal medicines, either singly or in combinations like with water, honey, or other plant species etc. The local tribes also reported that the most common use of roots were to treat blood dysentery and bloody urine, the leaves to treat night blindness and rhizomes to treat piles, it might be linked to the availability of this plant throughout the year that means the plant is also resistant to different biotic and abiotic stress factors and are not affected by seasonal variations. The other use of Satavari includes the address of general pain, stomach pain, waist pain, leucorrhea and constipation. The plant is having high commercial values that's why exploited extensively for business purposes by the local peoples as well as by the peoples in the vicinity.

The preliminary phytochemical screening reveals that the roots of Satavari contains glycosides as responded in methanolic extraction, carbohydrate in both methanolic and aqueous extraction, steroids and triterpenoids in all methanolic, aqueous and alchoholic extraction. The response details of preliminary phytochemical screening are represented in the table 1 below:

Table 1. Preliminary phytochemical tests.

Metabolites	A	B	C
Alkaloids	-	-	-
Glycosides	+	-	-
Tannins	-	-	-
Flavonoid	-	-	-
Carbohydrate	+	+	-
Fats and oils	-	-	-
Steroids & Triterpenoids	+	+	+
A = Methanolic; B = Aqueous; C = Alchoholic ; '+' indicates presence; '-' indicates absence.			

Asparagus is being used for the treatment of various ailments like Alzheimer's disease, diarrhea, anti ulcers, antidepressant, anticancer, anti-diabetic, anti anemic (Sharma et al., 2011). From the preliminary tests results it may be assume that the phytochemical present in the roots of Satavari supports the above uses, however further confirmation is need to be established through further detailed investigation.

Conclusion

Results show that people living around Mayurjharna forest hold a valuable knowledge of the uses of Satavari. It is extensively used by local tribes for various purposes. Preliminary screening confirm the presence of active phytochemicals. More in-depth investigations are required for the plant for possible phytochemical and pharmacological activity and for quantification of phytochemical constituents. As this plant is overexploited for its high medicinal properties by the local and surrounding community, which needed adoption of scientific harvesting and sustainable conservation needs to be promoted by controlling illegal

harvesting. These can be done by promotion of participatory conservation, *in-situ* conservation through the establishments of nature reserves, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection, awareness among the local people, traders and stakeholders.

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