

Full Length Research Paper

## Ethnomedicinal practices and phytochemical assessment of *Uraria lagopoides* (L.) DC. around Mayurjharna Reserve, Eastern India

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Plants have been used from ancient times in India for various systems of medicine like ayurveda, unani, homoeopathy, allopathy, siddha, ethnic, etc., to attempt cures for diseases and to relieve physical and mental sufferings. The aim of the study was to ascertain multiple usages of *Uraria lagopoides* in the outskirts of Mayurjharna and presence of phytochemicals in leaves and roots through standard tests for metabolites by extracting methanolic and aqueous solutions. Flavonoid and phenolic content in the extract were also determined by UV-visible spectrophotometer. *U. lagopoides*, a trailing perennial herb, was found to be the most important plant by the Santhal, Munda and Lodha ethnic community with a 'use value' of 1.85. Intensive exploration of *U. lagopoides* affirms that the plant has multipurpose use against various diseases viz. wound healing, anti-inflammatory, anti-diarrhoea, abortifacient, laxative, aphrodisiac and others. The methanolic extract reveals the presence of tannins, alkaloids, glycosides, carbohydrates, flavonoids, steroids, and saponins whereas aqueous extract shows positivity of tannins, glycosides, carbohydrates, flavonoids, and saponins. The flavonoid contents in *U. lagopoides* leaves and roots were 145.68 ( $\pm 5.80$ ) and 178.93 ( $\pm 0.05$ )  $\mu\text{g}$  of quercetin per mg of dry extract, respectively. The phenolic content in leaves and roots were 43.073 ( $\pm 1.36$ ) and 40.195 ( $\pm 2.13$ )  $\mu\text{g}$  of pyrocatechol equivalent per mg of dry extract. Preliminary qualitative and quantitative screening confirms the presence of multiple metabolites which also commensurate the multiple usage of the roots and leaves of *U. lagopoides*.

**Key words:** Ailments, indigenous, medicinal plants, metabolites, *Uraria lagopoides*.

### INTRODUCTION

Plants have been used from ancient times to attempt cures from diseases and to relieve physical and mental sufferings. About 85% of the rural population of India utilized wild plants for the treatment of various ailments (Fransworth, 1994; Jain, 1992). Though allopathic drugs have brought a revolution throughout the world but the plant base medicines have its own unique status (Behera, 2006). Natural forests are key resources for

poor forest fringe dwellers. Mainstream of poor rural households in developing countries depend on plant and animal products of forests which are the sources of a variety of food items that complement agricultural crops, fuels for cooking and a wide range of traditional medicines and other hygiene products (Warner, 2000; Pandey, 2009).

India has one of the medicinal plant resource related

health cultures in the world. It has both a codified and an oral tradition and over 1.5 million carriers. 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 plant 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 (Shaw et al., 2015).

In this context, India is one of the world's 12 mega diversity centers having rich vegetation with 47,000 plant species and a wide variety of medicinal plants along with tradition of plant-based knowledge distributed among the vast numbers of ethnic groups (Islam and Jha, 2003). Plants have been used from ancient times in India for various systems of medicine; ayurveda, unani, homoeopathy, allopathy, siddha, ethnic, etc., to attempt cures for diseases and to relieve physical like and mental sufferings. In the Indian State of West Bengal, major source of medicinal plants is within forest areas, which are having rich plant diversity in wide range of forest types supporting innumerable medicinal plants both in hills and plains. Out of 11,879 km<sup>2</sup> of forests in the state, the reserve forest comprises of 7,054 km<sup>2</sup>, that is, 54% of the total forest area and 3,772 km<sup>2</sup>, that is, 30% of the total forest area constitutes protected forest. Again 34% of the total forest area in the state are declared as protected areas where conservation of the habitat get due emphasis. Thus, medicinal plants resources in the protected areas and the remaining reserve forests and protected forests get satisfactory protection, though the resource in the remaining forest areas is under great stress in view of human interference and other biotic factors. To put special emphasis on medicinal plant conservation, Kankrajhore Medicinal Plant Conservation Area (MPCA) is one of the 11 MPCA established in the state (Biswas et al., 2017).

*Uraria lagopoides* (Papilionaceae), a trailing perennial herb locally known as 'Prisniparni' is found in India (Bihar, Orissa, West Bengal), Nepal, China and Northern Australia. The plant has been reported to be aphrodisiac, useful in treatment of asthma, dysentery, delirium, ulcers, malarial fevers, fractures of bones, inflammation of chest and diarrhoea (Kirtikar and Basu, 2006; Chopra et al., 1956; Dey, 1994; Narian, 1999; Nadkarni, 1976). This plant finds use as a remedy for several ailments in the indigenous system of medicine. The phytochemical studies of the ethanolic extract of *U. lagopoides* revealed the presence of flavonoids, glycosides, proteins and phytosterols (Kumar and Nuthakki, 2014).

Exploration and systematic documentation of indigenous knowledge on medicinal plants with special

focus on *U. lagopoides* is essential and the learning is possible by retrieving the lifelong experiences of the ethnic community and herbal practitioners. The major objectives of this paper includes: 1, Prioritization of frequently used medicinal plants by the local community against the health issues confronted by them; 2. intensive exploration of indigenous knowledge on usage of *U. lagopoides* in the outskirts of Mayurjharna Wildlife Sanctuary; 3. scientific validation of usage through preliminary screening of phytochemicals in leaves and roots of *U. lagopoides* collected from the wild.

## MATERIALS AND METHODS

### Study area

Mayurjharna Elephant Reserve (N 23°27' and 22°23', E 86°27' and 87°32') having an area of 414 km<sup>2</sup> covered three districts of West Bengal state of India (Figure 1) namely West Midinipur, Bankura and Purulia. This study included six villages of West Medinipur district namely Kakrajhore, Amlasol, Daldali, Jabola, Jujardhara and Mayurjharna under Binpur-II block for retrieval of ethnomedicinal information.

### Assessment tools

Focused Group Discussion (FGD) were carried out by organizing several meetings at Kakrajhore, Amlasol, Daldali, Jabola, Jujardhara and Mayurjharna villages for listing common diseases and frequently used medicinal plants by local tribes which include Santhal, Munda and Lodha tribal community. Personal interviews were conducted by exercising semi-structured questionnaire to retrieve inherited knowledge on usage of medicinal plants from the respondents. The emphasis was given to retrieve maximum information regarding the usage of *U. lagopoides* while conducting personal interviews.

Analysis of both qualitative and quantitative data was performed by using statistical software PASW Statistics 18.0. The relative importance of plant species used was evaluated by the use value (Phillips and Gentry, 1993), according to the following formula:

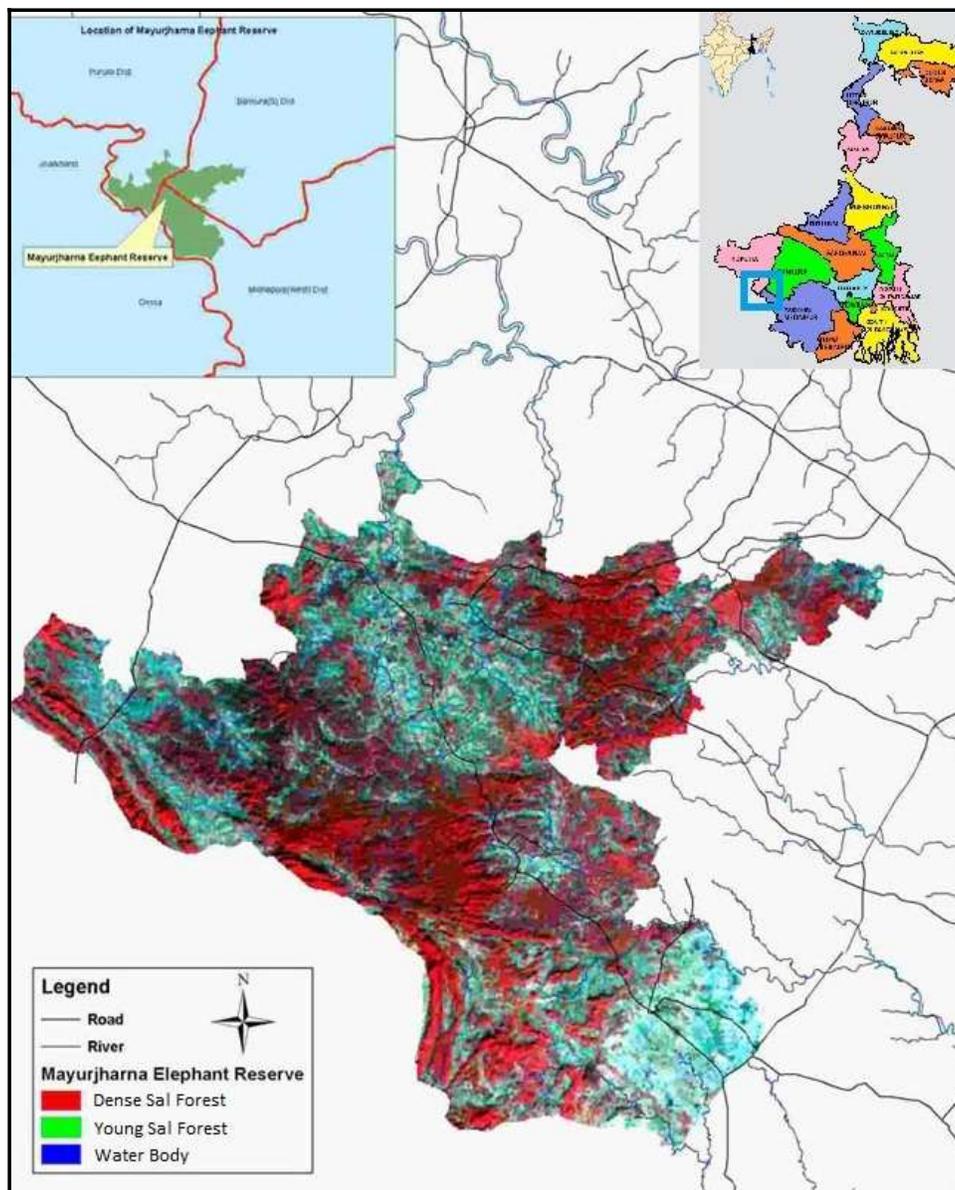
$$UV_i = \sum U_i / N_i$$

Where, UV<sub>i</sub> refers to the use value of a species i, U<sub>i</sub> represents the number of use reports by each informer for specific plant species i and N<sub>i</sub> is the number of informants. High use value indicates that there are many use reports for a plant, implying that the plant is important, and low value (approach to 0) indicates that there are few reports related to its use (Suleiman, 2015).

### Processing of plant parts

Plants of *U. lagopoides* were collected from its natural habitat at Mayurjharna forest. The collected plants were dry cleaned and leaves and roots parts were separated manually. Plant parts were dried under the shed about a month till a constant weight was achieved. Next the dried roots and leaves were ground

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**Figure 1.** Location map of study area (Mayurjharna, India).

mechanically into fine dust to facilitate the extraction process. Both of the samples were divided into two parts to be extracted by using methyl alcohol and aqueous media as solvent.

#### Extraction process

Alcoholic extraction was carried out with dried powdered leaves and roots of *U. lagopoides* by following Soxhlet extraction method (Harborne, 1998; Yadav and Agarwala, 2011; Ajayi et al., 2017) with minor alteration. Powdered plant material of 100 g was immersed in 500 mL of 80% methanol and shaken manually with 2 h interval for 72 h. Subsequently concentrated extract was separated through controlled evaporation at 30-40°C. In the case of aqueous extraction, 8 g of plant material was mixed with 250 mL of distilled water and concentrate was obtained by deploying same method as above.

#### Qualitative phytochemical analysis

The phytochemical screening process described by Kokate et al. (2006) and Harborne (1998) were applied for individual constituents of the crude extracts. The presence and absence of the compounds were indicated as positive (+) and negative (-), respectively for both extracts. The standard tests for tannins (ferric chloride and lead acetate test), carbohydrate (Fehling's and Molisch's test), alkaloids (Dragendorff's, Wagner's and Hager's test), flavonoids (alkaline test), glycosides (Modified Borntrager's Test), triterpenoids and steroids (Salkowski's test), and saponins (Lead acetate test) were conducted to find the metabolites presence in the plant material.

#### Quantitative estimation of flavonoid and phenolic content

Flavonoid content was determined as per Hsu (2006) that is 1 mg

of extract was added to 1 mL of 80% ethanol and aliquot of 0.5 mL was added to a test tube, containing 0.1 mL of 10% aluminium nitrate, 0.1 mL of 1 M potassium acetate and 4.3 mL of 80% ethanol. Absorbance of the mixture was measured at 415 nm in a UV-visible spectrophotometer, after incubation of 40 min at room temperature. The flavonoid content of the extract was determined in terms of quercetin equivalent using the linear equation based on the calibration curve,  $A = 0.0067C + 0.0132$ ; where, A=absorbance at 415 nm wavelength and C=quercetin equivalent in  $\mu\text{g}$ .

Phenolic content was estimated as per Singleton et al. (1999), where 0.1 mL of extract solution containing 500  $\mu\text{g}$  of extract was transferred to 100 mL of conical flask, and the volume was adjusted to 46 mL by addition of distilled water, 1 mL of Folin-Coicalteu reagent was also added to the mixture. After 3 min, 3 mL of 2% sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) solution was added. The mixture was shaken occasionally for 2 h at room temperature. Absorbance of the mixture solution was measured at 760 nm in a UV-visible spectrophotometer. Phenolic content was determined as pyrocatechol equivalent using the following calibration curve,  $A = 0.0034C - 0.058$ ; where, A=absorbance and C=pyrocatechol equivalent in  $\mu\text{g}$ .

## RESULTS AND DISCUSSION

The study area is pre-dominated by local indigenous people primarily Santhal, Munda and Lodha ethnic community. The composition of respondent includes 80% male and 20% female whereas, 17% of the respondents were below 50 years of age and 83% were above 50 years of age. Though the male practitioners dominate, the women have a big role to address gynaecological and obstetrics issues faced by local villagers. The composition of age reveals that the traditional knowledge is deteriorating with the generation due to lack in faith or people want immediate remedy.

The FGD unfolded that the most common diseases or ailments confronted by the local people are in the following order - malaria, diarrhoea, jaundice, typhoid, dysentery, digestive disorder, leucorrhoea, snake bite, headache, etc. In the study area, more than 80% families are below the poverty line and because of malnutrition the local people are very much susceptible to various diseases especially vector borne disease. Snake bite is also a major concern as most of the victims are affected during the harvesting of Babui grass which is used for rope making and is a major cash crop.

Local people were able to figure out some of the important plants of all habits (tree, shrub, herb, and climber) available in the Mayurjharna forest area which were used for treating the most common ailments and other purposes. The 'use value' of top ten plants, that is, Shivjata (*U. lagopoides* (L.) DC.), Ramdatan (*Smilax ovalifolia* Roxb.), Satamul (*Asparagus racemosus* Wild.), Amloki (*Embllica officinalis* Gaertn.), Talmuli (*Curculigo orchoides* Gaertn.), Putla (*Croton roxburghii* Balakr.), Chitpunji (*Dregea volubilis* (L.f.) Benth.), Bhuikul (*Ziziphus nummularia* (Burm.f.) Wight & Walk.-Arn.), Dudhilata (*Ichnocarpus frutescens* R.Br.) and Paniyalata (*Cissus adnata* Roxb.) were 1.85, 1.84, 1.82, 1.74, 1.68, 1.61, 1.49, 1.29 and 1.18, respectively. *U. lagopoides* or

Shivjata was found to be the most important plant in the locality as per the 'use value' indicating multipurpose and frequently used medicinal plants.

By acute observation and refereeing standard literature, it was found that *U. lagopoides* is trailing subshrubs, prostrate or spreading up to 2 ft tall stems hispid; leaflets are of 5x2.5 cm, ovate-oblong, obtuse, mucronate, hispid below, subcordate at base, petiole 1.5 cm long, stipule 12 mm long filiform, mostly trifoliate, rarely 1 foliolate, central leaflet is nearly round or elliptic to ovate, gray-yellow velvety on the underside, base rounded or heart shaped, tip rounded or notched. Racemes are about 2 cm broad, 3-6 cm long at the end of branches, bracts 8x5 mm, ciliate. Flowers - many pale purple pea like are born in densely flowered, pedicelled, calyx lobes 10 mm long, bristled, upper lobes smaller, standard 7x5 mm, acute to the base, wings 5x2 mm, clawed; keel 6 mm long, auricled, joints of pods 3.5x2.5 mm, reticulate, shining; sepal cup is 5 parted, lower sepal about 2 times as long as upper ones, white hairy. Flowers are about 6 mm standard obovate, base flat, pod is enclosed by sepal cup, black brown at maturity, small. Flowering and fruiting is in November-December/May-September.

Intensive exploration of *U. lagopoides* affirms that the plant has multipurpose use against various diseases and the whole plant bears healing properties. The potential use of the plant parts includes:

- (1) Wound healing: The paste of leaves is applied to wounds for recovery.
- (2) Anti-inflammatory: The whole plant is used medicinally for relieving swelling. Aqueous and alcoholic extracts of the plants are used to treat intermittent fever, asthma and chest inflammation.
- (3) Anti-diarrhoea: Decoction of the leaves and roots for the treatment of dysentery and diarrhoea.
- (4) Abortifacient: An aqueous extract of the leaves has abortifacient properties. On the other hand the paste of roots mixed with milk is given to a pregnant woman as a remedy against miscarriage.
- (5) Laxative: The whole plant is consumed to have clear bowl.
- (6) Aphrodisiac: The whole plant is also consumed to stimulate sexual desire.

Others - this plant is used along with other plant to treat rheumatism, bleeding piles, catarrh and scorpion sting.

The qualitative tests for both methanolic and aqueous extracts for both roots and leaves were carried out and their respond in various reagents are shown in Table 1 which indicates the presents of multiple metabolites. The methanolic extract reveals the presence of tannins, alkaloids, glycosides, carbohydrates, flavonoids, steroids, and saponins whereas aqueous extract shows positivity of tannins, glycosides, carbohydrates, flavonoids, and saponins.

Quantification was exercised in case of flavonoid and phenolic content in the extract. The results has shown that the flavonoid contents in *U. lagopoides* leaves is

**Table 1.** Metabolites presents in leaves and roots of *U. lagopoides*.

S/N	Metabolites	Reagent	Methanolic		Aqueous	
			Root	Leaf	Root	Leaf
1	Tannins	Ferric chloride	+	+	+	+
		Lead acetate	+	+	+	+
		Wagner's reagent	+	+	-	-
2	Alkaloids	Dragendorff's reagent	-	-	-	-
		Hager's reagent	-	-	-	-
3	Glycosides	Modified Borntrager's	-	-	+	+
4	Carbohydrates	Molisch's test	+	+	+	+
		Fehling's test	-	-	-	-
5	Flavonoids	Alkaline test	+	+	+	+
6	Steroids	Salkowski's test	+	+	-	-
7	Saponins	Lead acetate	+	+	+	+

'+' indicates presence and '-' indicates absence of metabolites in plant material.

145.68 ( $\pm 5.80$ )  $\mu\text{g}$  of quercetin per mg of dry extract whereas roots contain 178.93 ( $\pm 0.05$ )  $\mu\text{g}$  of quercetin per mg of dry extract. The phenolic content in leaves is 43.073 ( $\pm 1.36$ )  $\mu\text{g}$  of pyrocatechol equivalent per mg of dry extract, whereas roots contain 40.195 ( $\pm 2.13$ )  $\mu\text{g}$  of pyrocatechol equivalent per mg of dry extract. Comparison with the above two extract, in petroleum ether extract showed positive for carbohydrates, flavonoids and glycosides, and on the other hand petroleum ether extract showed higher total flavonoid content than methanol extract (Hossain et al., 2015).

## Conclusion

The ethnic people mainly Santhal, Munda, Lodha community living around Mayurjharna forest area of West Medinipur District hold a valuable knowledge of the uses of plant resources and others represent an important component of the local livelihood strategies. Qualitative and quantitative screening confirms the presence of multiple metabolites which also commensurate the multiple usage of the roots and leaves of *U. lagopoides*. More in-depth investigations are required for more possible phytochemical and pharmacological activity.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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## REFERENCES

- Ajaji AM, Naluwuge A, Buyinza P, Luswata I (2017). Comparative physicochemical, phytochemical and acute toxicity studies of two Ocimum species in Western Uganda. *J. Med. Plants Res.* 11(1):1-10.
- Behera KK (2006). Ethnomedicinal Plants used by the Tribals of Similipal Bioserve, Orissa, India: A Pilot Study. *Ethno. Leaflets* 10:149-173.
- Biswas S, Sanyal R, Bala S, Mazumdar A (2017). Inventorization of Some Ayurvedic Plants and their Ethnomedicinal Use in Kakrajhore Forest Area of West Bengal. *J. Ethnopharmacol.* 197:231-241.
- Chopra RN, Nayar SL, Chopra IC (1956). *Glossary of Indian Medicinal Plants.* Council of Scientific and Industrial Research, New Delhi, India. P 170.
- Dey AC (1994). *Indian Medicinal Plants Used in Ayurvedic Preparations.* Dehra Dun, India, Bishen Singh, Mahendra Pal Singh. P 122.
- Fransworth NR (1994). *Ethnopharmacology and drug development.* Ciba Found Symp. 185:42-51.
- Harborne JB (1998). *Phytochemical Methods. A Guide to Modern Techniques of Plant Analysis.* Chapman and Hall, London. P 135.
- Hossain MM, Alam MN, Uddin UN, Uddin MB, Ferozuddin AYS, Chowdhury A (2015). In vitro Antioxidant, Antimicrobial and in vivo Peripheral Analgesic Activities of Methanol and Petroleum Ether Extracts of Whole Plant of *Uraria lagopoides* Dc. *Br. J. Pharm. Res.* 8(5):1-14.
- Hsu CY (2006). Antioxidant activity of extract from *Polygonum aviculare* L. *Biol. Res.* 39(2):281-288.
- Islam MA, Jha RK (2003). Ethnopharmacology of tribals of Ranchi District in Jharkhand. *J. Econ. Taxon. Bot.* 27(2):300-310.
- Kirtikar KR, Basu BD (1918). *Indian Medicinal Plants.* Int. Book Dist., Dehradun, India. Available at: <http://krishikosh.egranth.ac.in/bitstream/1/2027864/1/183582.pdf>
- Kokate CK, Purohit AP, Gokhale SB (2006). *Pharmacognosy.* Nirali Prakashan, Pune. pp. 133-525.
- Kumar KR, Nuthakki VK (2014). In-vivo evaluation of anti-diarrhoeal activity of ethanolic extract of *Uraria lagopoides*, Sch. Ac. *Jr. Pharmacy.* 3(6):444-448. Available at: [https://www.researchgate.net/profile/Dr\\_Konda\\_Kumar/publication/285577774\\_In-vivo\\_Evaluation\\_of\\_Antidiarrhoeal\\_Activity\\_of\\_Ethanolic\\_Extract\\_of\\_Uraria\\_lagopoides\\_L/links/565f225b08aefe619b284ede.pdf](https://www.researchgate.net/profile/Dr_Konda_Kumar/publication/285577774_In-vivo_Evaluation_of_Antidiarrhoeal_Activity_of_Ethanolic_Extract_of_Uraria_lagopoides_L/links/565f225b08aefe619b284ede.pdf)
- Nadkarni KM (1976). *Indian Materia Medica.* Popular Prakashan. P 1255.
- Narian SC (1999). *Medicinal and aromatic plants of Himachal Pradesh.* Indus Publishing. pp. 422-423.
- Pandey R (2009). Forest resource utilization by tribal community of

- Jaunsar, Uttarakhand. *Indian For.* 135(5):655.
- Phillips O, Gentry AH (1993). The useful plants of Tambopata, Peru I. Statistical hypotheses test with a new quantitative technique. *Econ. Bot.* 47:15-32.
- Shaw (Sanyal) R, Bala S, Bhattacharyya A, Mazumdar A, Sen T (2015). Study on the phytochemical present in the herbal contraceptives consumed by the ethnic females in Jharkhand. *Asian J. Microbiol. Biotechnol. Environ. Sci.* 17(4):277-280. Available at: [http://www.envirobiotechjournals.com/article\\_abstract.php?aid=6618&iid=205&jid=1](http://www.envirobiotechjournals.com/article_abstract.php?aid=6618&iid=205&jid=1)
- Singleton VL, Orthofer R, Lamuela-Raventós RM (1999). Analysis of total phenols and other oxidation substrates and antioxidants by means of folin-ciocalteu reagent. *Methods Enzymol.* 299:152-178.
- Suleiman MHA (2015). An ethnobotanical survey of medicinal plants used by communities of Northern Kordofan region, Sudan. *J. Ethnopharmacol.* 176:232-242.
- Warner K (2000). Forestry and sustainable livelihoods: What part can forests and forestry play in reducing poverty? *Unasylva* 51(202):3-2.
- Yadav RNS, Agarwala M (2011). Phytochemical analysis of some medicinal plants. *J. Phytol.* 3(12):10-14.
- Jain SK (1992). Ethnopharmacology and Drug Development, In: *Ethnobotany and Search for New Drugs* by Chadwick DJ, March U (eds,). In *Ciba Foundation symposium* (Vol. 183).