INTERNATIONAL JOURNAL OF CONSERVATION SCIENCE

ISSN: 2067-533X Volume 6, Issue 3, July-September 2015: 411-418 www.ijcs.uaic.ro

ETHNOMEDICINAL PLANTS USED BY APATANI TRIBE OF ZIRO VALLEY OF ARUNACHAL PRADESH

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Abstract

Arunachal Pradesh is the store house of biological and socio-cultural diversity among the north eastern states of India. Local inhabitants of the state are mostly dependent on forest and forest resources having rich indigenous knowledge on practices of medicinal plant species for curing various ailments. Present study has been carried out to document the use pattern of medicinal plant species by the Apatani tribe of Ziro Valley of Lower Subanshiri district of Arunachal Pradesh. Information was gathered through conversations with elderly indigenous people inhabiting nearby the forest areas. Present study exhibited a total of 34 plant species belonging to 32 genera and 23 families. Herbs contributed highest with 67.65%, shrubs 11.76%, trees 11.76% while climbers only 8.82% of the total recorded medicinal plant species. Plants are used to cure various ailments like allergy, anthelmintic, appetizer, bleeding, blood pressure, body ache, cancer, cold, cough, cuts, diarrhea, dysentery, fever, gastritis, headache, indigestion, jaundice, stomach ache, swells, wounds etc. Most of the species are collected from wild. Leaves are the major plant parts used for the preparation of indigenous medicine. Such studies provide vital clues as to the formulation of potential products for pharmaceutical purposes. Besides, there is scope of improving rural economy of the state as a whole. Moreover, scientific input on indigenous knowledge is likely to benefit the traditional society as well as will help in conservation of useful plant species. The local inhabitants are still dependent on traditional folklore and traditional medicinal system. Therefore, it is high time to adopt holistic approach for conservation and documentation of ethnomedicobotanical knowledge of the tribal people for the greater benefit of the future generation.

Keywords: *Apatani tribe; Arunachal Pradesh; Conservation; Indigenous knowledge; Medicinal plants; Ziro Valley*

Introduction

India is one of the mega diversity countries of the world having rich biological diversity. It is the homeland of traditional medicinal systems having large number of ethnic communities with rich indigenous knowledge [1]. The ethnic people are using medicinal plants for the treatment of various ailments over the centuries. Since the time immemorial, plant and plant parts are used as medicine and over 1200 herbal plant species are cited in various ancient Indian literatures [2]. Still today, 80% of the world's populations rely on traditional medicine system. In India most of the rural and tribal communities are depended on traditional medicinal systems which play a significant role in the rural health care system [3-5]. North eastern region of India is well known for its cultural and biological diversity of the country. The region harbours over 200 ethnic communities although it has been reported more than 130 of the 427 tribal

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communities of the country [6]. It is the store house of medicinal plant species and its indigenous communities are totally dependent on herbal medicines for the treatment of different diseases. However, usages and application differ from one locality/community to another [1].

Arunachal Pradesh, the treasure house of biological and socio-cultural diversity in the Eastern Himalayan Region of India. The state has 26 major tribes and over 110 sub-tribes [7] who maintain a close relationship with the nature. The local inhabitants of the state have their own customs, tradition and medicinal system who mainly depended on forests and forest products for their day to day lives.

Apatani is the predominant tribal community in the Lower Subansiri district of Arunachal Pradesh. They are Tibeto-Mongoloid [8] and follow 'Donyi-Polo' and are patriarchal in social system. Apatanis trace their descent from one legendary ancestor, *ABOTANI*. *Apatani* peoples mainly subsist on agriculture and animal husbandry. They generally practice paddy cum fish culture which is one of the unique cultivations in the state, country as well as in Asia [8]. The name *Apatani* is derived from two words i.e., '*Apa*' and '*Tani*'. According to the local dialect, '*Apa*' means display of affection while '*Tani*' stands for human race.

Various utilization patterns of aromatic and medicinal plant species have been reported from the state. However, no detail study has been carried to enumerate the utilization patterns of medicinal plant species by the *Apatani* tribe of Ziro Valley. Therefore, the present study has been undertaken to enumerate the indigenous utilization of medicinal plant species in and around Ziro Valley of Lower Subansiri district of Arunachal Pradesh.

Materials and methods

Study area

The Lower Subansiri district is located between 26° 55′ and 28° 21′ N latitudes and 92° 40′ and 94° 21′ E longitude and covers an area of 3,460 km^2 (4.13% of the total geographical area of the sate). The district is mostly mountainous and hilly terrain. Agriculture is the main occupation of the local inhabitants. Tribal people like *Apatani*, *Nishi* and *Hill Miri* are inhabiting in the Lower Subansiri district of the state [8]. Although *Apatani* people celebrate many religious festivals however, *Murung* (during the month of January), *Myoko* (during the month of March) and *Dree* (during the month of July) are the main festivals who celebrate in each and every year [8].

Exploration and documentation

Extensive field survey was conducted in and around Ziro Valley of Lower Subansiri district of the state Arunachal Pradesh during 2012-2013. Various indigenous uses and utilization patterns of medicinal plant species were gathered through conversations with old aged ethnic people. Specimens of each of the species were collected and herbariums were prepared following the methodology Jain and Rao [9]. Species were identified with the help of flora references like *Flora of British India* [10], *Indian Medicinal Plants* [11] and *Materials for the Flora of Arunachal Pradesh* [12-14]. Herbaria like State Forest Research Institute (SFRI) and Botanical Survey of India (BSI) Itanagar were also consulted for further authentication of the identification. Voucher specimens were submitted to the Rajiv Gandhi University Harbaria.

Results and discussion

Present study revealed a total of 34 medicinal plant species (Fig. 1a-f) belonging to 32 genera and 23 families which are being used for the treatment of various ailments like allergy, anthelmintic, appetizer, bleeding, blood pressure, body ache, cancer, cold, cough, cuts, diarrhea, dysentery, fever, gastritis, headache, indigestion, jaundice, stomach ache, swells, wounds, etc. (Table 1).

Table 1. Medicinal plant species used for curing various ailments by the *Apatani* tribe of Ziro Valley of Lower Subansiri district of Arunachal Pradesh, India.

Botanical Name	Family	Habit	Local Name /Occurrence	Parts used	Uses
Acorus calamus Linn.	Acoraceae	Herb	*Kiile tolyo* (Wild)	Rhizome	A paste of rhizome is applied to cure headache, joint pain, wounds and skin rashes. Juice is also taken for stomach ache.
Ageratum conyzoides Linn.	Asteraceae	Herb	*Borbe tami* (Wild)	Leaves	Paste of leaves is applied to stop bleeding in minor cuts.
Allium cepa Linn.	Amaryllidaceae	Herb	*Byaku* (Cultivated)	Leaves	Leaves juice is taken orally for cold and cough.
Allium hookeri Thwaites	Amaryllidaceae	Herb	*Lepi* (Cultivated)	Leaves	Pounded leaves mixed with oil is warmed and massaged on body to get relief from body ache. It is also used against cold and cough.
Artemisia indica Willd.	Asteraceae	Shrub	*Kukulyu* (Wild)	Leaves	Leaves decoction is used to get relief from stomach ache and loose motion. Paste is applied to stop bleeding in minor cuts. It also has anthelmintic property.
Berberis wallichiana DC.	Berberidaceae	Shrub	*Tiipe tiire* (Wild)	Leaves	Leaves are boiled in oil and oil is applied against joint pain and swells.
Cardamine hirsuta Linn.	Brassicaceae	Herb	*Padii hamang* (Wild)	Whole plant	Whole plant is consumed raw for indigestion, cold and cough.
Centella asiatica Linn.	Apiaceae	Herb	*Ngiilyan akho hamang* (Wild)	Leaves	Leaf juice is taken against gastric, jaundice and stomach ache. Raw leaves or juice is also taken for diarrhea and dysentery.
Clerodendrum colebrookianum Walp.	Lamiaceae	Shrub	*Pato hamang* (Cultivated + Wild)	Leaves	Boiled or steamed leaves are taken to control high blood pressure.
Crassocephalum crepidioides (Benth.) S. Moore	Asteraceae	Herb	*Genda hamang* (Wild)	Leaves	Grinded leaves paste is applied on minor cuts to stop bleeding.
Eleusine coracana (Linn.) Gaertn.	Poaceae	Herb	*Sarse* (Cultivated)	Grains	Powdered grains are boiled and taken orally to reduce cholesterol and raise blood percentage.
Gynostemma pedata Blume.	Cucurbitaceae	Climber	*Riikoh* (Wild)	Stem and tuber	Grinded powder of stem or tuber mixed with salt is used to get relief from throat pain and cough. Powder mixed with water is taken against dysentery, gastric, loose motion and stomach ache.
Gynura cusimbua (D. Don) S. Moore	Asteraceae	Herb	*Kochi hamang* (Wild)	Leaves	Raw juice is taken against stomach ache and worms. It is also used as blood purifier and is applied against allergy.
Houttuynia cordata Thunb.	Saururaceae	Herb	*Siyan hamang* (Wild)	Tender leaves and stem	Juice is extracted and taken to get relief from dysentery, indigestion, loose motion, and stomach ache. It is also known to provide sound sleep.
Hydrocotyle javanica Thunb.	Apiaceae	Herb	*Subu tute* (Wild)	Whole plant	Raw juice is taken for dysentery and stomach ache.
Litsea cubeba (Lour.) Pers.	Lauraceae	Tree	*Santero* (Wild)	Tender leaves and fruits	Pounded tender leaves and fruits mixed with water are taken for dysentery, indigestion, stomach ache, cold and cough. It also provides sound sleep.
Mahonia napaulensis DC.	Berberidaceae	Shrub	*Taming* (Wild)	Bark	Bark juice is applied against boils in lips, itching, wounds and skin rashes. Juice is also used for preparation of dye.
Michelia champaca Linn.	Magnoliaceae	Tree	*Salyo sanii* (Wild)	Pericarp and seeds	Dried and grinded or boiled pericarps and seeds are taken for stomach ache and as an appetizer.
Mikania micrantha Kunth	Asteraceae	Climber	*Mantami* (Wild)	Tender leaves and stem	Tender leaves and stem are grinded into paste and applied on cuts and wounds to stop bleeding. Juice is also taken orally to cure nose bleeding.

Botanical Name	Family	Habit	Local Name /Occurrence	Parts used	Uses
Molineria recurvata (Dryand.) Herb.	Hypoxidaceae	Herb	*Loli* (Wild)	Leaves and roots	Grinded paste of leaves is applied against body pain. Paste of roots is used against cuts and wounds for fast healing.
Oenanthe javanica (Blume) DC.	Apiaceae	Herb	*Hugu hamang* (Wild)	Tender leaves and stem	Raw tender leaves and stem is taken against stomach ache.
Oxalis corniculata Linn.	Oxalidaceae	Herb	*O- khui hamang* (Wild)	Leaves	Leaves are grinded into paste and are applied in cuts and wounds. Raw leaves are used as an appetizer. Leaves are also chewed for foul smell of mouth.
Paederia foetida Linn.	Rubiaceae	Climber	*Gandhali* (Wild)	Leaves and stem	Juice of leaves and stem is used to cure dysentery, diarrhea, gastric, indigestion and stomach ache.
Plantago erosa Wall. ex Roxb.	Plantaginaceae	Herb	*Mepi hamang* (Wild)	Leaves	Boiled leaves are taken to get relief from constipation and indigestion. Paste of raw leaves is applied on cuts to stop blood flow.
Plectranthus japonicus (Burm.f.) Koidz.	Lamiaceae	Herb	*Yode* (Wild)	Leaves	Leaves are grinded into paste and are applied on swells, wounds and on cuts to stop bleeding.
Pteridium revolutum (Blume) Nakai	Dennstaedtiaceae	Herb	*Taree* (Wild)	Leaves	Juice of young or tender leaves is used to stop bleeding in minor cuts.
Rhus javanica Linn.	Anacardiaceae	Tree	*Tamo sanii* (Wild)	Fruits	Water of boiled or soaked fruits is taken to cure dysentery, gastric and stomach pain.
Solanum nigrum Linn.	Solanaceae	Herb	*Hiiro hamang* (Cultivated)	Leaves and tender shoots	Fresh leaves are chewed to cure boils in mouth and tongue. Boiled leaves and tender shoots are taken to cure high blood pressure and stomach ache.
Solanum xanthocarpum Schrad. & Wendl.	Solanaceae	Herb	*Siitii byako* (Wild)	Seeds	Dried seeds are wrapped with clean cloth, burned and fumes are allowed to enter into teeth cavity to get relief from toothache.
Spilanthes paniculata Wall. ex DC.	Asteraceae	Herb	*Yorkhun* (Cultivated)	Flowers and leaves	Leaves are taken as raw for indigestion, stomach ache and throat pain. Flowers are chewed for toothache.
Swertia chirayita (Roxb. ex Fleming) Karsten	Gentianaceae	Herb	- (Cultivated)	Whole plant	Decoction of the dried plant is taken in malarial fever and cold. It is also used as anthelmintic.
Taxus wallichiana Zucc.	Taxaceae	Tree	*Talley Noori* (Cultivated)	Bark	Oil is extracted from bark and is used in the treatment of cancer.
Valeriana jatamonsii Jones	Valerianaceae	Herb	- (Cultivated+Wild)	Roots	Grinded paste of roots is applied for fast healing of boils and wounds.
Zingiber officinale Roscoe	Zingiberaceae	Herb	*Taki* (Cultivated)	Rhizome	Juice mixed with honey is taken for cold and cough. It is also taken with hot water against asthma and indigestion. Raw rhizome is chewed to cure tooth ache.

The family Asteraceae contributed highest having 6 species followed by Apiaceae (3), Amaryllidaceae, Berberidaceae, Lamiaceae and Solanaceae (2 species each). Seventeen families represented by 1 species each (Fig. 2).

Among the total recorded species 23 were herbs followed by 4 shrubs and 4 trees and only 3 climbers (Fig. 3a). Out of the recorded medicinal plant species about 70.59% of the species are harvested from wild, 23.53% are cultivated whereas 5.88% are both cultivated plus wild (Fig. 3b). Leaves are the major plant parts extensively used which contributing 38.24% of the recorded medicinal plant species followed by tender leaves+stems, 8.82%; bark, rhizomes, roots and whole plant, 5.88% each; flowers+leaves, fruits, grains, leaves+roots, leaves+stems, leaves+tender shoots, pericarp+seeds, stems+tubers and tender leaves+fruits, 2.94% each (Fig. 4).

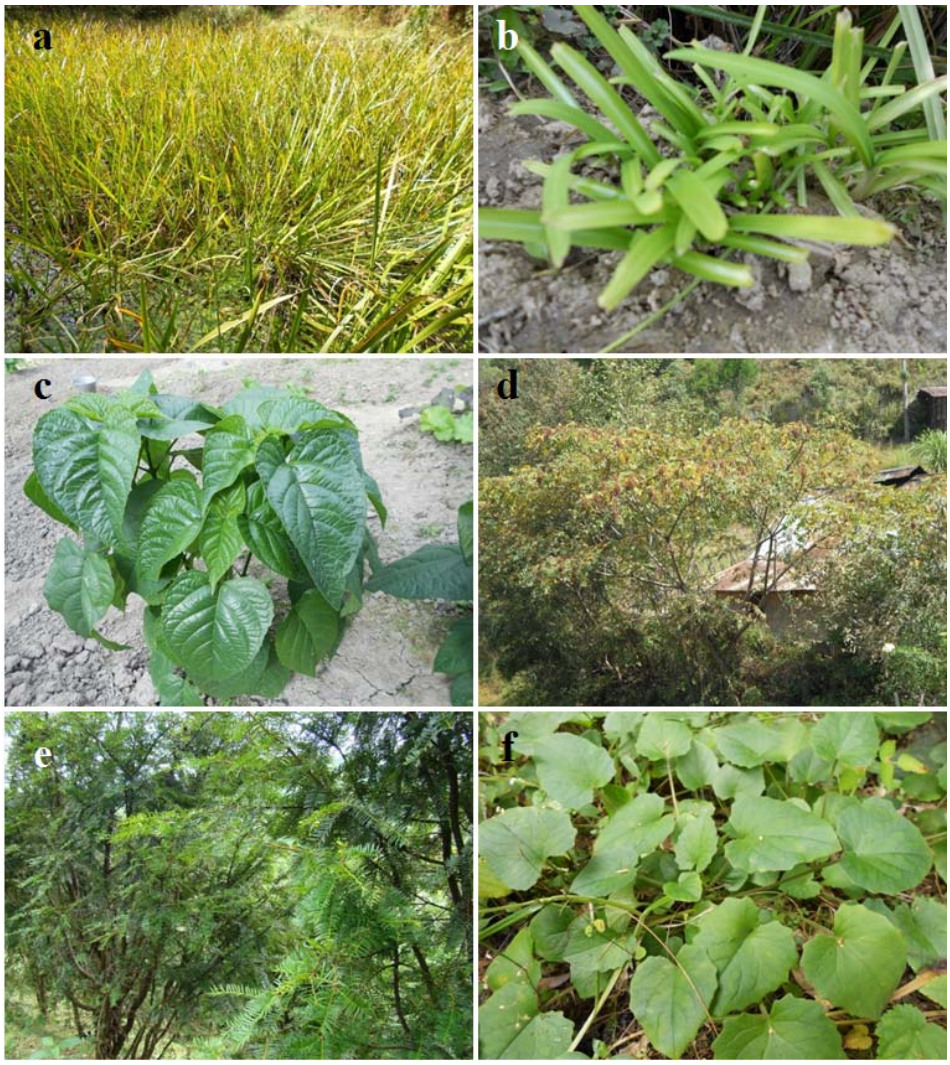

Fig. 1. Ethnomedicinal plant species (a) *Acorus calamus*, (b) *Allium hookeri*, (c) *Clerodendrum colebrookianum*, (d) *Rhus javanica*, (e) *Taxus wallichiana* and (f) *Valeriana jatamonsii* used by the *Apatani* tribe at Ziro Valley of Lower Subansiri district of Arunachal Pradesh.

The remedies are prepared either from freshly collected plant parts or after drying according to the needs. The remedies are either taken orally or used externaly. Among the recorded species, *Allium cepa* Linn., *Allium hookeri* Thwaites, *Cardamine hirsuta* Linn., *Eleusine coracana* (Linn.) Gaertn., *Litsea cubeba* (Lour.) Pers., *Swertia chirayita* (Roxb. ex Fleming) Karsten and *Zingiber officinale* Roscoe are used to cure cold and cough. Whereas, *Artemisia indica* Willd., *Centella asiatica* Linn., *Gynostemma pedata* Blume., *Gynura cusimbua* (D. Don) S. Moore, *Houttuynia cordata* Thunb., *Hydrocotyle javanica* Thunb., *Litsea cubeba* (Lour.) Pers., *Paederia foetida* Linn., *Rhus javanica* Linn. and *Spilanthes paniculata* Wall. ex DC. are used against stomach troubles like diarrhea, dysentry, gastritis, loose motion, indigestion and stomach ache. Species like *Ageratum conyzoides* Linn., *Artemisia indica* Willd., *Crassocephalum crepidioides* (Benth.) S. Moore, *Mikania micrantha* Kunth, *Molineria recurvata* (Dryand.) Herb., *Oxalis corniculata* Linn., *Plectranthus japonicus* (Burm.f.) Koidz.,

Pteridium revolutum (Blume) Nakai and *Valeriana jatamansii* Jones are used to stop bleeding, healing minor cuts and wounds. Furthermore, *Acorus calamus* Linn., *Allium hookeri* Thwaites, *Berberis wallichiana* DC. and *Molineria recurvata* (Dryand.) Herb. are used against body ache and joint pain (Table 1).

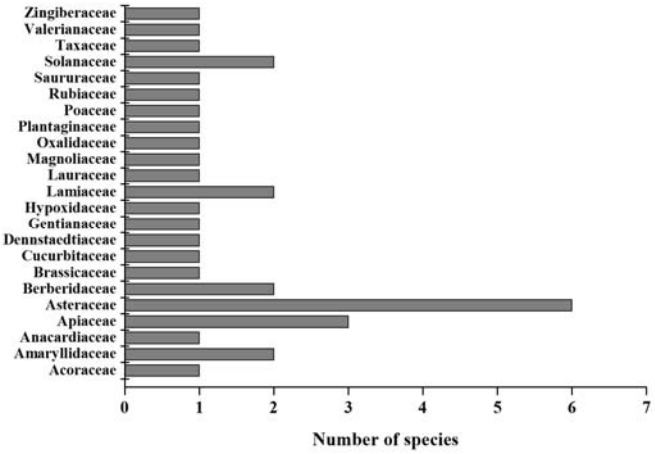

Fig. 2. Family contribution of the recorded medicinal plant species used by the *Apatani* tribe in their traditional health care system.

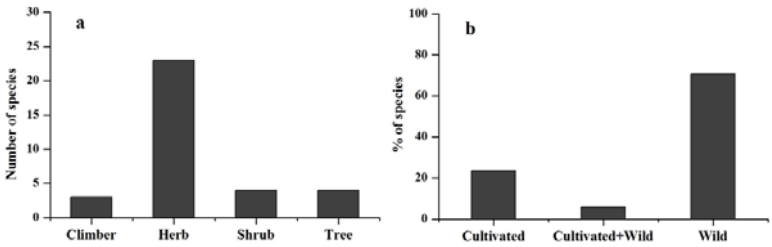

Fig. 3. Medicinal plant species used by the *Apatani* tribe in their traditional health care system. (a) habit and (b) occurrence.

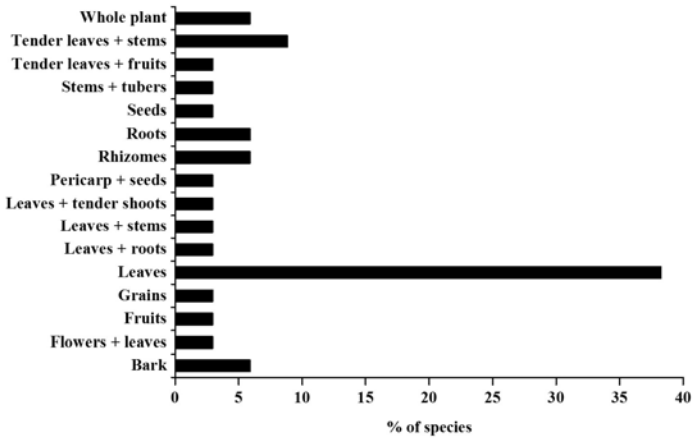

Fig. 4. Plant parts of medicinal plant species used by the *Apatani* tribe of Ziro Valley of Lower Subansiri district of Arunachal Pradesh.

It has also been observed that villagers are growing some of the medicinal plant species in their homegarden according their needs. It has been observed that species like *Acorus calamus* Linn., *Allium cepa* Linn., *Allium hookeri* Thwaites, *Centella asiatica* Linn., *Clerodendrum colebrookianum* Walp., *Eleusine coracana* (Linn.) Gaertn., *Houttuynia cordata* Thunb., *Hydrocotyle javanica* Thunb., *Litsea cubeba* (Lour.) Pers., *Paederia foetida* Linn., *Pteridium revolutum* (Blume) Nakai, *Solanum nigrum* Linn., *Spilanthes paniculata* Wall. ex DC., *Swertia chirayita* (Roxb. ex Fleming) Karsten and *Zingiber officinale* Roscoe have economic importance and are used to sell in local market. Present study reveals that species like *Taxus wallichiana* Zucc. and *Swertia chirayita* (Roxb. ex Fleming) Karsten have great economic potential in the medicinal plant market (Table 1).

The valley is not only rich in repository of medicinal plants but also rich in various ethnomedicinal, socio-cultural systems since the long time. This mountainous region shows a good diversity of medicinal plant species representing temperate vegetation. The results exhibited the immense knowledge of the *Apatani* tribe of Arunachal Pradesh, who use hundreds of plants while, many more still to be explored and documented. It is the tribal people who have close association with forest and forest resources have adequate knowledge on how to best use of forest resources which are playing vital role in their life style.

Conclusion

The present observations revealed that the *Apatani* people in and around Ziro Valley are mainly dependent on the surrounding forest areas for medicinal plants which plays a significant role in their traditional health care system. In this 21st century of modern medicinal systems, the indigenous people are still dependent on traditional folklore and traditional medicinal practices. The present study reveals that the region comprises a large number of important plant species having medicinal value and supporting the livelihood of the communities. The present information gathered on indigenous knowledge associated with plant species with important medicinal values amongst the *Apatani* people should be conserved and needs further study. Traditional knowledge could be made effective use of forest planners, policy makers, conservationist and ecologists to ensure the ecological sustainability and conservation of our forest resources with the active involvement of local communities. Moreover, scientific input on indigenous knowledge is likely to benefit the traditional society as well as will help in conservation of useful plant species. Therefore, it is the right time to come up to immediate conservation and documentation of ethnomedicinal knowledge of the ethnic community for the larger benefit of our future generation.

Acknowledgements

Authors are thankful to all the villagers, gaon buras (village headmen) and local field guides for sharing their valuable information on traditional medicinal health care system, help and cooperation. The corresponding author thankfully acknowledges the University Grants Commission, GOI, New Delhi for UGC-Dr. D.S. Kothari Post Doctoral Fellowship. The laboratory facility provided by the Department of Botany, Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh is gratefully acknowledged.

References

[1] A. Paul, M.L. Khan, A.K. Das, *Utilization of rhododendrons by Monpas in Western Arunachal Pradesh*, *India*. **Journal American Rhododendron Society**, **64**(2), 2010, pp. 81-84.

[2] S.K. Jain, V.N. Mudgal, **A Handbook of Ethnobotany**, Bishan Singh and Mahendra Paul Singh, Dehradun, Uttrakhand, India, 1999, 309 p.
[3] M. Gadgil, *Documenting diversity*: *An experiment*, **Current Science**, **70**(1), 1996, pp. 36-44.
[4] R.A. Mashelkar, *Protecting India's Traditional Knowledge*, **Employment News**, **26**, 2002, p. 50.
[5] Z.S. Khan, A.A. Khuroo, G.H. Dhar, *Ethnomedicinal survey of Uri, Kashmir Himalaya*. **Indian Journal of Traditional Knowledge**, **3**(4), 2004, pp. 351-357.
[6] A.L. Sajem, K. Gosai, *Traditional use of medicinal plants by the Jaintia tribes in North Cachar Hills district of Assam*, *northeast India*. **Journal of Ethnobiology and Ethnomedicine**, **2**(33), 2006, pp. 1-7.
[7] A.C. Bhagwati, *Social structure in Arunachal Pradesh: An anthropological overview*, **Arunachal Pradesh: Environmental Planning and Sustainable Development – Opportunities and Challenges,** vol. 16, (Editors: R.C. Sundriyal, T. Singh and G.N. Sinha), Himavikas Occasional Publication, G.B. Pant Institute of Himalayan Environment and Development, Kosi-Katarmal, India, 2002, pp. 47-50.
[8] * * *, **Official Web Site. Lower Subansiri District**, Arunachal Pradesh, India, http://www.lowersubansiri.nic.in, (Accessed on 16 October 2014).
[9] S.K. Jain, R.R. Rao, **A Handbook of Field and Herbarium Methods**, Today and Tomorrow's Printers and Publishers, New Delhi, India, 1977, 157 p.
[10] J.D. Hooker, **Flora of British India**, Vol. 1-7, Published Under the Authority of the Secretary of State for India in Council, Publishers to the Home, Colonial and Indian Governments, L. Reeve and Co., London, 1872-1897.
[11] K.R. Kirtikar, B.D. Basu, **Indian Medicinal Plants**, Vol. I-IV, 1st Edition, Lalit Mohan Basu Publications, Allahabad, India, 1918.
[12] P.K. Hajra, D.M. Verma, G.S. Giri, **Materials for the Flora of Arunachal Pradesh**, Flora of India, Series 2, Vol. 1. Ranunculaceae-Dipsacaceae, Botanical Survey of India, Calcutta, India, 1996, 693 p.
[13] G.S. Giri, A. Pramanik, H.J. Chowdhery, **Materials for the Flora of Arunachal Pradesh**, Flora of India, Series 2, Vol. 2. Asteraceae-Ceratophyllaceae, Botanical Survey of India, Kolkata, India, 2008, 492 p.
[14] H.J. Chowdhery, G.S. Giri, A. Pramanik, **Materials for the Flora of Arunachal Pradesh**, Flora of India, Series 2, Vol. 3. Hydrocharitaceae-Poaceae, Botanical Survey of India, Kolkata, India, 2009, 349 p.

Received: October, 17, 2014
Accepted: July, 20, 2015