Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Central European Journal of Experimental Biology, 2015, 4 (1):20-26
(http://scholarsresearchlibrary.com/archive.html)

Central European Journal of Experimental Biology
Scholars Research Library
ISSN: 2278–7364

Ethnomedicinal study on tribal area of Kathiri Hills in Erode district of Tamilnadu, India

Kadirvelmurugan Venkatachalam*, Dhamotharan Ramasamy and Ravikumar Sundaramurthy

[1]Post Graduate and Research Department of Plant Biology and Plant Biotechnology, Presidency College (Autonomous), Chennai, Tamil Nadu, India

---

ABSTRACT

The present study has been designed to Survey and document the indigenous knowledge of the Sholaga tribes who belong to villages of Bargur, Western Ghats of Tamil Nadu on the utilization of medicinal plants. The explorations were accomplished from April 2013 to March 2014 to Bargur village which is the most remote and less accessed hilly region of the kathiri hills in Erode district, Western Ghats of Tamil Nadu. This is habituated by the local tribal population known as Sholaga. With the help of informal schedule about 85 informants between the ages of 45 to 78 were interviewed on the folklore medicinal uses of the local flora. A total of 65 species of plants belonging to 60 genera and 32 families have been enumerated during the present study. Amongst them, the most frequently used medicinal plants are; Achyranthes aspera L., Aloe vera (L.) Burm. f., Andrographis paniculata Nees., Azadirachta indica A. Juss., Cissus quandrangularis L., Hemidesmus indicus R.Br., Ocimum sanctum L., Solanum trilobatum L. and Tridax procumbens L. in the traditional healthcare system of tribal community Sholaga. The collected medicinal plants were identified and enumerated alphabetically with their recent valid Nomenclature, Vernacular name, Field number and ethnomedicinal applications. The voucher specimens were deposited in the Herbarium of Presidency College, Chennai. The present study enumerated significant number of common medicinal plants used by sholaga community, which reflects the deep noted cultural abode of tribal knowledge on their health care practices.

Keywords: *Ethnomedicinal, Medicinal Plants, Sholaga tribals, Kathiri hills, Tamil Nadu.*

INTRODUCTION

The plants and plant products have inseparably interrelated with human culture since the origin of human race. People depend on plants for their every basic need such as, food, clothes, medicines and shelter [1]. Some people recognize that plants are an important part of our environment [2]. Hence ethnomedicines paved the first basic path for all modern drugs, and of late, the importance of the traditional knowledge on medicines is being exploitd throughout the world. Ethnobotanical studies assume a great importance in enhancing our knowledge about the plants grown and used by various tribal communities due to the rich diversity assembled for their nourishment and the different means adopted by them for its preservation and conservation. In India there are over 2500 plant species having documented for their medicinal values, a majority of them are growing in wild state, whereas only a few are cultivated [3]. A plenty of literature available on ethnobotanical survey of north Tamil Nadu region documented by several workers [4-9]. However, the studies on the ethnomedicinal study of tribal area of kathiri hills in Bargur village, Anthiur Taluk (Erode district) are scantier. Therefore, an attempt has been made to collect the data about the plants used by the tribes and the rural people in their traditional healthcare system.

MATERIALS AND METHODS

STUDY AREA

The study area is located to the west part of Tamil Nadu, Bargur village, Anthiur Taluk, Erode district. The Bargur forest division is the largest in the state of Tamil Nadu, The landscape harbors five major forest types. The predominant vegetation types in the landscape are the tropical semi-evergreen forests, tropical moist-deciduous forests, and tropical dry-deciduous forests or mixed together and the tropical dry-thorny jungles.

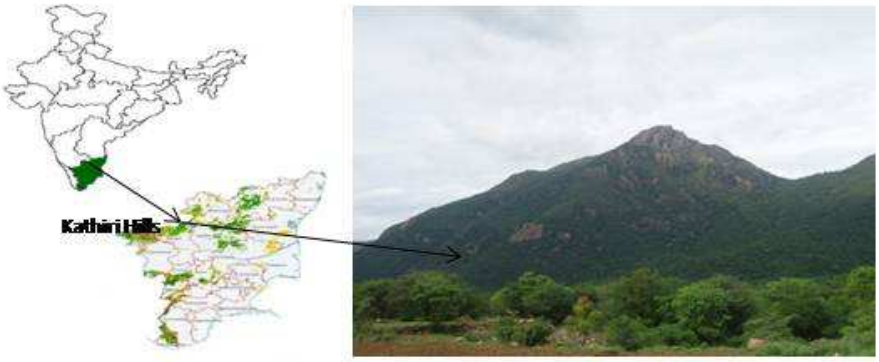

Figure 1 Location for study area of Kathiri hill in North Bargur Reserve forest, Western Ghats of Tamil Nadu, India

Kathiri hills region of Western Ghats of Tamil Nadu lies between 11°54'02.92 N latitude and 77°39'17.40 E longitude surrounded by three districts to the south Coimbatore and Erode in the North Dharmapuri and in East Salem (Figure 1). The region has several attractions especially for its natural beauty and customs, culture, traditions of the natives and of course for a vast resource of natural wealth. But this study is confined on a particular tribal population of Erode district known as Sholagas since a very less attention has been paid so far to explore the knowledge and experience of these natives. This is because the Erode district towards Karnataka border might be with an uncertain weather, difficult trekking, non-availability of food during excursion and unsafe trekking due to the dangerous wild animals. Hence, documenting the knowledge which is on the verge of vanishing that has been initiated in this study.

Figure 2: Preparation of Herbarium for collected medicinal plant

Climate

In kathiri hills, annual rainfall varies from ca. 500 mm to 1200 mm. Annual rainfall exceeds the maximum at high altitudes, especially in the tropical semi-evergreen forests, however it is < 2000 mm. There are two peaks in rainfall, one in May and the other, which is prominent in October. During the months of October, November, December, this region receives rainfall due to North-east monsoon [10]. Temperatures are higher in the plains; the mean of the hottest month is 30.3 -31.8°C. However the mean of the hottest month is lower at higher altitudes between 27.3 and 28.4°C. For example the mean of the hottest month in April at Thalavadi is only 27.7°C [11].

Identification of plants

The voucher specimens were preserved in as Herbariums following the standard techniques (Figure: 2); [12]; Voucher specimens of all plant species are deposited in the Herbarium of Presidency, Department of Plant Biology

and Plant Biotechnology, Presidency College, Chennai, India. Plants are arranged alphabetically with their botanical names and families followed by their common names. The information gathered from frequent field visits was compared with the other related literatures and documented.

Ethnobotanical Survey

The fieldworks were conducted in several villages like Chennampatti, Dhanda, Lakkampatti, Kollappatti, Chettiyappati, Karaikadu, Kutherikalkadu, Kathirippatti, Korappallam, and Mamarathur from April 2013 to March 2014 as a part of the study on Ethnobotanical Wealth of Kathri Hills practiced by the Sholaga tribals. Roughly about 45 Sholaga families with around 225 members are found in the study area. During the field study (Figure: 3), their daily activities were closely observed and interpersonal contacts were established by participating in several of their social and religious ceremonies such as marriages, rituals and curing sessions for observation of role of plants in their daily life. A total of 85 tribals informants, comprising of 64 males and 21 females were identified between the ages of 45 and 78 from the study area.

Figure 3: Ethno-botanical information gathers from sholaga tribal people of Kathiri hills.

RESULTS

A total of 65 species of plants belonging to 60 genera and 32 families have been enumerated during the present study. Amongst them, most frequently used medicinal plants namely are *Achyranthes aspera* L., *Aloe vera* (L.) Burm. f., *Andrographis paniculata* Nees., *Azadirachta indica* A. Juss., *Cissus quandrangularis* L., *Hemidesmus indicus* R.Br., *Ocimum sanctum* L., *Solanum trilobatum* L. and *Tridax procumbens* L. in the traditional healthcare system of Sholaga tribes residing in the forest. The collected medicinal plants were identified and classified according to APG III [13]. The data with botanical name, local names, families, plant parts used and medicinal utilities are given in detail (Table 1).

DISCUSSION

The present study reveals the customs of people of both tribal and rural natives of Kathri Hills. They are frequently affected by different kinds of common ailments such as asthma, jaundice, dysentry, cough, fever, stomach troubles, skin diseases, etc., habitually, tribal communities are living with very close vicinity of vegetation and hence their health care system is occupied with plants as a major part. They use whole plants or a part of the plants in different forms such as paste, extract, powder and decoction in their folklore practices. The informations about herbal medicines are transmitted orally from generation to next generation.

The leaf decoction of *Andrographis paniculata* is used to treat stomach ache in the study area which was also reported [14-15] and observed that decoction of whole plant is given for asthma. Leaf gel of *Alove vera* is given for indigestion [16]. And their juices are orally administered against jaundice, fever, rheumatism and piles [14]. Reported that leaf decoction of *Tridax procumbens* is used for treating improper blood circulation but in our study the plant is used for wound healing [17]. The extract of *Hemidesmus indicus* is administered in fever and stomachache, whereas a scientist [18], reported that the root powder of the same mixed with sugar solution is taken orally as a cooling agent. Similar utility of some of the plants reported for the treatment of various ailments from different parts of the Tamil Nadu and other parts of our country have also been observed with the cross culture similarities in the use of medicinal plants. The people of the study area still have a strong belief in the efficacy and success of the herbal medicines.

Table 1: Ethnomedicinally used for important plant species of Kathiri hills in Erode district of Tamil Nadu

Botanical name	Vernacular name in Tamil	Family	Plant part of used	Form of usage	Administration And mode of preparation of medicines	Human Diseases	Voucher Number
Abrus precatorius L.	Kundumani	Fabaceae	Leaves and seeds	Fresh leaves and seed powder.	Fresh leaves are chewed to cure mouth ulcer. Seeds are taken for two days for abortions.	Mouth ulcer	HPRKVK13/019
Abutilon indicum (L.) Sweet	Thuthi	Malvaceae	Whole plant	Raw	Plant crushed with rice washed water is taken twice daily to cure dysentery.	Dysentery	HPRKVK13/033
Acalypha indica L.	Kuppaimeni	Euphorbiaceae	Leaves	Juice	Leaf extract mix with lime is applied externally to cure poisonous bites.	Snake and Dog bite	HPRKVK13/014
Achyranthes aspera L.	Naayurivi	Amaranthaceae	Seeds	Powder	Powdered seeds are taken with betel leaves to cure cough.	Cough	HPRKVK13/005
Aegle marmelos (L.) Corr.	Vilvam	Rutaceae	Fruit	Powder	Dried fruit is mixed with sugar and taken orally during fever and cold.	Fever and cold	HPRKVK13/037
Allium cepa L.	Venkayam	Amaryllidaceae	Bulb	Juice	Bulb extract mixed with Mentha leaves extract is taken to cure high blood pressure	Blood pressure	HPRKVK13/001
Aloe vera (L.) Burm. f.	Kathalai	Xanthorrhoeaceae	Leaves	Paste	Leaf paste with garlic is given to increase digestion.	Digestion disorder	HPRKVK13/062
Andrographis paniculata Nees..	Siriya nangai	Acanthaceae	Leaves	Decoction	Decoction of leaves is taken to treat blood purifying, stomach ache.	Stomachache	HPRKVK13/045
Anisomeles indica (L.) Kuntze.	Peymarutti	Lamiaceae	Leaves	Juice	Leaves are boiled in steam and administered to get relief from rheumatic pains.	Rheumatic pain	HPRKVK13/006
Azadirachta indica A. Juss.	Vaembu	Meliaceae	Stem bark	Decoction	Stem bark decoction is taken orally for 3 weeks to treat rheumatism	Rheumatic pain	HPRKVK13/036
Barleria mysorensis Roth.	Chulli-mullu	Acanthaceae	Leaves	Decoction	Leaf decoction is given to treat of cough.	Cough	HPRKVK13/046
Bauhinia racemosa Lam.	Kokku Mandharai	Caesalpiniaceae	Stem bark	Juice	Bark juice with honey is taken orally against leucorrhoea.	Leucorrhoea	HPRKVK13/057
Bergera koenigii (L.) Spreng.	Karuvapillai	Rutaceae	Leaves	Juice	Leaf extract mixed with honey is given to cure cough and worm infections.	Worm infections	HPRKVK13/038
Boerhaavia diffusa L.	Mukurattai	Nyctaginaceae	Leaves	Juice	Leaf extract is administered to treat of jaundice.	Jaundice	HPRKVK13/011
Borassus flabellifer L.	Panai	Arecaceae	Fruit	Juice	Fresh toddy is taken orally as a cooling beverage.	Cooling	HPRKVK13/002
Calotropis gigantea (L.) R. Br.	Erukku	Apocynaceae	Root and Leaf latex	Paste	Root paste and leaf latex is applied on the bitten area scorpion sting and snake bite.	Snake bites	HPRKVK13/041
Cardiospermum halicacabum L.	Moodakkathan	Sapindaceae	Leaves	Juice	Fresh leaf juice is taken with palm sugar for the treatment of rheumatism.	Rheumatism	HPRKVK13/040
Carica papaya L.	Pappali	Caricaceae	Fruits	Raw	Fruits are consumed to cure constipation.		HPRKVK13/031
Cassia auriculata L.	Aavaaram	Caesalpiniaceae	Flowers	Powered	Powered flower is given to treat diabetes.	Diabetes	HPRKVK13/058
Cassia sophera L.	Ponavarai	Caesalpiniaceae	Leaves	Paste	Leaves are ground with turmeric and the paste is applied to heal wounds.	Wounds	HPRKVK13/059
Cissus quadrangularis L.	Pirandai	Vitaceae	Stem	Paste	Tender shoot paste is consumed for the treatment of rheumatism.	Rheumatism	HPRKVK13/012
Citrus medica L.	Kaattu naarthai	Rutaceae	Fruit	Juice	Fruit juice is given for common cold and is also applied on head against dandruffs.	Dandruff	HPRKVK13/039

Clitoria ternatea L.	Sangu poo	Fabaceae	Leaves	Juice	Leaf extract is given orally thrice to cure dysentery.	Dysentery	HPRKVK13/020
Coccinia grandis (L.) Voigt.	Kovai	Cucurbitaceae	Fruits	Juice	Fruit is consumed regularly to control diabetes.	Diabetes	HPRKVK13/017
Cucumis sativus L.	Vellarikai	Cucurbitaceae	Fruit	Paste	Fruit pulp is applied on abdomen to cure urinary troubles.	Urinary troubles	HPRKVK13/018
Cynodon dactylon (L.) Pers.	Aarugam-pullu	Poaceae	Whole plant.	Juice	Whole plant extract is taken orally in dysentery and for bleeding nose.	Dysentery & Nose bleeding	HPRKVK13/003
Datura metel L.	Oomathai	Solanaceae	Leaves	Juice and paste	Leaves soaked in boiling water are bandaged over the affected part to get relief from rheumatism.	Rheumatism	HPRKVK13/050
Eclipta prostrata L.	Karisilanganni	Asteraceae	Stem and leaves	Juice	Stem and leaves boiled in coconut oil is applied on head for an hour before bath to reduce body heat.	Body heat	HPRKVK13/054
Emblica officinalis Gaertn.	Nelli	Euphorbiaceae	Leaves and fruits	Juice	Leaves and fruits are useful in diabetes	Diabetes	HPRKVK13/015
Enicostema axillare (Lam.) Raynal	Vellarugu	Gentianaceae	Leaves	Paste	Leaf paste is used in the treatment of rheumatism and against ulcers.	Rheumatism and Ulcer	HPRKVK13/060
Evolvulus alsinoides L.	Vishnukrandi	Convolvulaceae	Leaves	Paste	Leaf paste is applied for burn-injuries.	Wounding	HPRKVK13/048
Ficus benghalensis L.	Aal	Moraceae	Latex	Latex juice	Latex is given to children in fever and dullness.	Fever and dullness	HPRKVK13/025
Ficus racemosa L.	Atthi	Moraceae	Stem bark and fruit	Paste and juice	Bark is pasted for skin diseases and poison bites. Fruit juice is taken for urine complaints	Skin diseases, poison bites and urine complaints	HPRKVK13/026
Cleome gynandra L.	Nallavelai	Cleomaceae	Fruits	Paste	Fruit paste is applied externally on forehead during intense headache.	Headache	HPRKVK13/032
Hemidesmus indicus R.Br.	Nannari	Apocynaceae	Whole plant and leaves	Decoction	Decoction of whole plant is taken orally to cure fever. The fresh leaves are taken internally to cure stomach ache.	Fever and stomachache	HPRKVK13/065
Hibiscus rosa-sinensis L.	Chemparuthi	Malvaceae	Leaves and flower	Paste	Leaves and flowers paste is applied for hair growth.	Hair tonic	HPRKVK13/034
Ipomoea obscura (L.) Ker- Gawl.	Siruttalai	Convolvulaceae	Latex	Juice	Fresh milky juice of the plant is applied on fresh cuts and wounds.	Cut and wounds	HPRKVK13/049
Jatropha glandulifera Roxb.	Kattamanakku	Euphorbiaceae	Stem and latex	Juice	Fresh stem juice is given to cure toothache and plant latex is used to cure headache.	Toothache and headache	HPRKVK13/016
Justicia tranquebariensis L.	Thavasi murungai	Acanthaceae	Leaves	Juice and Paste	Leaf juice is given orally to treat jaundice and leaf paste is applied over affected area to treat skin diseases.	Jaundice and skin diseases	HPRKVK13/047
Kalanchoe pinnata (Lamk.) Pers.	Runa kalli	Crassulaceae	Leaves	Paste	Leaves paste are applied on cuts to stop bleeding, healing wound, cure piles and skin related disease.	Wound and skin disease	HPRKVK13/056
Lawsonia inermis L.	Maruthani	Lythraceae	Leaves	Paste	Leaf paste of dried leaves is applied externally as hair tonic.	Hair tonic	HPRKVK13/028
Leucas aspera (Willd.) Link	Thumbai	Lamiaceae	Leaves	Juice	Fresh leaf juice mixed with turmeric powder is applied externally to cure throat infection.	Throat infection	HPRKVK13/007
Mentha spicata L.	Podina	Lamiaceae	Leaves	Paste	Leaf paste with extract of ginger and onion is taken during dehydration, vomiting and liver diseases.	Dehydration and liver diseases	HPRKVK13/008
Mimosa pudica L.	Thottal surungi	Fabaceae	Leaves	Juice and Powder	Leaf extract is taken with black pepper powder and honey twice daily to cure diarrhoea.	Diarrhoea	HPRKVK13/021
Mucuna monosperma (Roxb.) DC.	Thelu kodi	Fabaceae	Seeds	Paste	Seeds used as an expectorant and sedative in cough, asthma and affections of the tongue.	Cough	HPRKVK13/022
Musa paradisiaca L.	Vaazhai	Musaceae	Stem	Juice	Juice obtained from central trunk is taken orally to dissolve the kidney stones.	Kidney stones	HPRKVK13/063

Ocimum teniflorum L.	Thulasi	Lamiaceae	Leaves	Paste	Leaf paste is taken with black pepper to treat cough, fever, cold and ear ache.	Cough, fever, cold, ear pain	HPRKVK13/009
Pergularia daemia (Forsk.) Chiov.	Valli parutthi	Apocynaceae	Leaves	Vapour	Fresh leaves are boiled with water and the vapour is inhaled to get relief from headache.	Headache	HPRKVK13/042
Phyllanthus amarus Schum. and Th.	Keelaa nelli	Phyllanthaceae	Whole plant	Juice	Plant extract is used to cure jaundice.	Jaundice	HPRKVK13/061
Psidium gujava L.	Koyya	Myrtaceae	Leaves	Juice	Tender leaves are chewed for relief from diarrhoea.	Diarrhoea	HPRKVK13/030
Punica granatum L.	Maadulai	Lythraceae	Buds and fruits	Juice	Young buds and fruits are chewed for relief from dysentery.	Dysentery	HPRKVK13/029
Rauvolfia serpentina Benth. *ex* Kurz.	Sarpagaantha	Apocynaceae	Leaves	Juice	Leaf juice is taken as soup to control high blood pressure.	Blood pressure	HPRKVK13/043
Ricinus communis L.	Kottaimuthu	Euphorbiaceae	Leaves	Paste	Leaf paste is applied on head to relieve headache.	Headache	HPRKVK13/064
Santalum album L.	Sandanam	Santalaceae	Whole Tree	Powder and paste	Leaves and stem past is applied for skin diseases.	Skin diseases	HPRKVK13/004
Sesbania grandiflora (L.) Poir.	Agathi keerai	Fabaceae	Leaves	Juice	Cooked leaves are taken to get cooling effect and to cure eye infections.	Cooling	HPRKVK13/023
Solanum nigrum L.	Manathakkali	Solanaceae	Leaves	Juice	Leaf juice is consumed to cure stomach ulcer	Stomach ulcer	HPRKVK13/051
Solanum surattense Burm.f.	Kandankathiri	Solanaceae	Fruits	Juice or Powder	Fresh or dried fruits are kept in fire and the smoke is inhaled through mouth once a week to treat toothache.	Toothache	HPRKVK13/052
Solanum trilobatum L.	Tuduvalai	Solanaceae	Leaves	Juice	Leaf extract is consumed with milk to cure cold and cough.	Cold and cough	HPRKVK13/053
Tephrosia purpurea (L.) Pers.	Kolinji	Fabaceae	Roots	Paste	Root paste mixed with ginger and given with honey to cure fever and vomiting.	Fever and vomiting	HPRKVK13/024
Thespesia populnea (L.) Sol.	Poovarasu	Malvaceae	Leaves	Decoction	Leaf decoction is taken to control severe body heat.	Body heat	HPRKVK13/035
Tribulus terrestris L.	Nerungii	Zygophyllaceae	Leaves	Juice	Leaf juice is used for jaundice.	Jaundice	HPRKVK13/013
Tridax procumbens L.	Kallipudu	Asteraceae	Leaves	Paste	Leaf paste is applied on wounds.	Wounds	HPRKVK13/055
Vitex negundo L.	Nochchi	Lamiaceae	Leaves	Vapour	Fresh leaves are boiled with water and the vapour is inhaled twice a day to get relief from headache, fever, cold and cough.	Headache, Fever, Cold and Cough.	HPRKVK13/010
Wrightia tinctoria R.Br.	Palla maram	Apocynaceae	Stem bark	Paste	Bark paste is applied for various skin diseases.	skin diseases	HPRKVK13/044
Ziziphus jujuba Mill.	Ilandhai	Rhamnaceae	Leaves	Smoke	Dry leaves of taken, made into cigarette and smoke is inhaled in to cure tonsillitis of Throat problem.	Throat problem	HPRKVK13/027

Due to the intrusion of modern civilization and scientific innovation, younger generations gradually give up their traditional faith and ultimately resulted with the loss their folklore knowledge on the medicinal properties of the plants utilized in their day-to-day life. There is an urgent need to study and document the precious knowledge of the ethnomedicinal practices and such information will help us to develop many effective and new drugs in future.

Hence further studies on the aspect of biochemical characterization and pharmacological efficacy of ethnomedicinal plants proved to validate and claims. The present data on the ethnomedicinal plants will help to develop the strategies for conservation of traditional system of medicine and socio-economic welfare of rural and tribal populations. A few studies have been already documented on medicinal plants from nearly areas of the forest [19]; [20]; [21].

The present study highlighted the rich cultural and folklore traditions of the sholaga tribes and their knowledge on the medicinal plants of Kathri Hills. The plants are to be further explored for their biochemical identity and pharmacological efficacy that is urgently needed for developing a plant based safe drugs in future.

Acknowledgement
We are sincerely thankful to Dr. S. Ravikumar, Assistant Professor, and Dr. P.T. Devarajan, Associate Professor, Department of Plant Biology and Plant Biotechnology, Presidency College (Autonomous), Chennai, for identification of plants and given instructions for the preparation of Herbariums. My sincere gratitute to the Forest Range Officers of Chennampatti and Sholaga tribes of kathiri hills for their help during the study. Also author would like to thank, the Principal and the Head of the Department of Plant Biology and Plant Biotechnology, Presidency College for the facilities given to do the research works.

REFERENCES

[1] G. Watt, Dictionary of Economic products of India, **1889**, 6, Cosmo Publication, Delhi.
[2] P. B. Singh, *Bull. Med. Ethnobot. Res.*, **1993**, 14(3-4); 126-136.
[3] S. K. Jain, Dictionary of India Folk medicine and Ethnobotany. Deep Publications, New Delhi, 1991.
[4] S. Rajan, M. Senthuraman, P. K. Mukherjee, *Phytotherap. Res.* **2002**, 16 (2): 98-116.
[5] M. Ayyanar, S. Ignacimuthu, *J. Ethnopharmacol*., **2005**, 102 (2): 246-255.
[6] P. S. Udayan, G. Sateesh, K. V. Thuskar, B. Indira B, *Ind. J. Trad. Knowl*. **2005**, 4(4): 437-442.
[7] C, Muthu, M. Ayyanar, N. Raja, S. Ignacimuthu, *J. Ethnobiol. Ethnomed*. **2006**, 2:43.
[8] S. Ignacimuthu, M. Ayynar, K. Sankaranarayanan, *J. Ethnobiol. Ethnomed*. **2006**, 2:25.
[9] P. Revathi, T. Parimelazhagan, *E. bot. Leaflets*, **2010**, 14: 136-160.
[10] J. P. Pascal, B. R. Ramesh, Forest Map of South India (1:250 000), notes on the sheet Bangalore-Salem. Institut francais de Pondichery, Pondicherry, India, **1995**.
[11] N. Kodandapani, N. Satheesh, S. S. Ashutosh, Spatial pattern of forest characteristics and fire susceptibility in the sathyamangalam landscape. Asian Nature Conservation Foundation (ANCF) Innovation Centre, Indian Institute of Science, Bangalore – 560 012, India, **2012**.
[12] T. F. Stuessy, S. H. Sohmer, Sampling the Green World: Innovative Concepts of Collection, Preservation, and Storage of Plant Diversity. New York: Columbia University Press, **1996**.
[13] W. C. Mark, James and Reveal, *Botanical Journal of the Linnear Society*, **2009**, 161; 122-127.
[14] C. Alagessaboopathi, *Afr. J. Trad. Comp. Alt. Med*., **2009**, 6(3): 222-227.
[15] K. Kamalakannan, V. Balakrishnan, *J. Phytol*., **2009**, 1(2): 108-111.
[16] C. Kingston, S. Jeeva, G. M. Jeeva, S. Kiruba, B. P. Mishra, D. Kannan, *Ind. J. Trad. Knowl*, **2009**, 8(2): 196-200.
[17] S. J. Karungal, B. Andrews, *Ind. J. Trad. Knowl*. **2010**, 9 (2): 264-270.
[18] K. Rajendran, P. Balaji, B. M. Jothi, *J. Trad. Knowl*. **2008**, 7(3): 417-420.
[19] K. R. Arya and Vedprakash, Ethnomedicinal study of a remote tribal area of almora District; A survey report-1, **2000**.
[20] N. C. Shah, M. C. Joshi, *Econ.Bot.* **1970**; **1971**, 25:414-422.
[21] P. Joshi, P. C. Pandey, Stuides on kumaon Himalaya. In: S. K. Sharma and N. C. Dhoundiyal (Eds.). Indian publishing company, New Delhi, **1997**, 65-89.