International Journal of Herbal Medicine
Available online at www.florajournal.com

I J H M International Journal of Herbal Medicine

E-ISSN: 2321-2187
P-ISSN: 2394-0514
IJHM 2016; 4(6): 124-130
Received: 20-09-2016
Accepted: 21-10-2016

Savinaya MS
Department of pg Studies and Research in Environmental Science, kuvempu University, jnana Sahyadri, Shankharaghatta, Karnataka, India

Sangamesh S Patil
Department of pg studies and research in environmental science, kuvempu University, jnanasahyadri, Shankharaghatta, Karnataka, India

Narayana J
Department of pg Studies and Research in Environmental Science, kuvempu University, jnanasahyadri, Shankharaghatta, Karnataka, India

Krishna V
Department of PG Studies and Research in biotechnology, kuvempu, University, jnanasahyadri, Shankharaghatta, Karnataka, India

Correspondence
Krishna V
Department of PG Studies and Research in biotechnology, kuvempu, University, jnanasahyadri, Shankharaghatta, Karnataka, India

Traditional medicine knowledge and diversity of medicinal plants in Sharavathi valley region of central western ghats

Savinaya MS, Sangamesh S Patil, Narayana J and Krishna V

Abstract
Sharavathi valley is one of the core forest zones of the Central Western Ghats. It is well known for medicinal plant species richness and harbours rare and endemic plant species. The study on medicinal plants distribution and ethno botanical values in Sharavathi valley was carried out for a period of six months (September to April 2016). Traditional practitioners resided in the study area are exclusively depends on herbal medicines and they are more knowledgeable to heal serious ailment in the light of their practical experiences that they have gained from their ancestors.
In the present study diversity of the medicinal plants was recorded based on taxonomical characters. Further traditional practitioners knowledge about medicinal values was documented by interacting with local traditional practitioners. Plant specimen's herbaria was prepared and maintained for documentation. The results revealed that the local traditional practitioners are mainly using Rubiaceae members for various herbal preparations.

Keywords: Traditional medicinal knowledge, Sharavathi valley, Rubiaceae

Introduction
Ethnobotany is the study of the interactions and relationship between plants and people [1]. Since, ancient time medicinal plants have been used traditionally as a source of medical care. The main traditional medicinal system includes Ayurveda, Sidha and Unani. Many ancient physicians like Charaka, Sushruta and Vagbhata recorded the therapeutic properties of medicinal plants and in many countries like China herbal medicine is practicing as the national Medicare system [2].
In India, plants have been used for medicinal purposes and served as the main source of medicine to the rural people and are used for preventive, promotive and curative purposes. Medicinal plants have been preliminary selected on the basis of local traditional knowledge. The traditional system of medicine along with folklore tradition continues to benefit a large section of the population, especially in rural areas, despite the arrival of the modern medicine. The traditional knowledge of herbs is famous among the indigenous and local people. The rural population has immense faith for traditional and medicinal herbs. The rural people have traditional indigenous knowledge about the use of medicinal plants to cure various diseases. Traditional indigenous knowledge comprises practices based on observations. There were still some regional differences between the principles and philosophy of traditional healing, although there are many fundamental similarities that arise from the profound knowledge of natural laws and the understanding of how these influence living things, which is shared by all traditional healers. During the last few decades, there has been an increasing interest in the study of medicinal plants and their indigenous uses in different parts of the world. Medicinal plants have been used for research in both systematic and advanced field of plant sciences. Documentation of such indigenous knowledge is essential for conservation and utilization of biological resources.
The Western Ghats of Indian peninsula constitute one of the 34 global biodiversity hotspots [3,4] and many single house villages located in the remote forest area are entirely depending upon herbal medicines for their emergency medical care. The Study area Sharavathi river valley is known for species richness, situated in the Central Western Ghats (Lies between latitudes 13º 54' to 14˚ 12' North and longitudes 74º 38' to 75˚ 00' East) at an altitude ranges from 94 to 1092 meters. The Sharavathi River, rising at the place Ambuthirtha in Thirthahalli Taluk of Karnataka state, flows north-west and drops down in the Ghats at the world famous Jog falls. The Valley is home for many waterfalls and to some of the beautiful streams. The average annual rainfall is 6000mm in the western side and 1700mm in the eastern side. Temperature ranges between 25ºC to 35ºC depending upon the season. The valley consists of evergreen to

semi-evergreen forest along with moist deciduous type of forests that dominate the entire basin along with grasslands, marshy areas and plantation of acacia, cash crops like areca and rubber providing diverse niches for a variety of taxa. Many endemic, endangered species such as *Semecarpus kathalekanensis* Dasappa & M.H. Swaminath, *Dipterocarpus indicus* Bedd, *Syzygium travoncoricum* Gam, *Artocarpus hirsutus* Lam. and *Myristica magnifica* Bedd, populated and makes this region as an ecologically sensitive region to be conserved [5]. In order to save the indigenous traditional knowledge pertaining to medicinal plants, the study survey and documentation is utmost important. Therefore, ethnobotanical survey and medicinal plant species was documented in Sharavathi valley.

Materials and Methods

The Ethnobotanical survey was conducted in Sharavathi valley by frequent field visits in the remote single house villages of the valley based on a semi-structured questionnaire. The questionnaire was designed to collect data of expertise of the traditional practitioners to cure serious ailments by using plant products recommended as medicine, dosage and duration, mode of application. Each plant specimen was collected with local names, habitat, habit, nature of inflorescence, month of flowering and type of fruits. The people of all age groups were interviewed for their knowledge of medicinal plants [6]. A number of field visits were made to study area and consistent reveals were documented. Plants were collected for the herbarium preparation and were identified by referring various district floras such as, Flora of Shimoga (Ramaswamy *et al.*, 2001), Flora of Hassan (Saldahna., 1976), Flora of Mysore (Raghavendra and Razi., 1981), Flora of Davanagere (Manjunatha *et al*., 2004), Flora of Chikmagalur (Yoganarasihman *et al*., 1982) and the specimens were allotted with voucher numbers and deposited in the Kuvempu University herbaria.

Fig 1: View of Sharavathi river valley

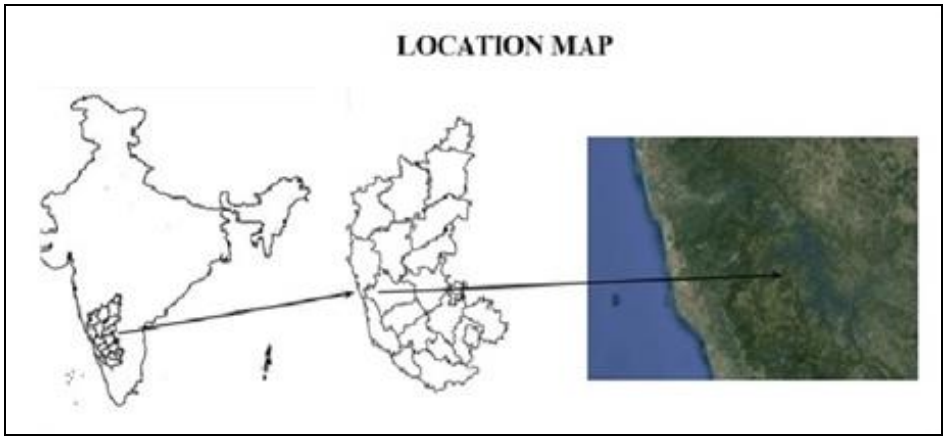

Fig 2: Location map of Sharavathi valley

Results and Discussion

The present study recorded 51 plant species of medicinal plants belongs to 50 genera and all were used by local traditional healers for curing different types of human ailments. Among them, 25 trees, 14 Shrubs, 8 Climbers, and 6 Herbs were recorded. The local traditional healers gave medicines to the needy using the traditional knowledge gained by their ancestor. Traditional healers used these species regularly for various human diseases and disorders. The traditional knowledge of recorded medicinal plants along with botanical description, common name, vernacular name, Parts of plant used and mode of use are revealed in the tables given below.

Table 1: Medicinal Herbs with taxonomical description and traditional medicinal knowledge recorded in Sharavathi valley

Botanical name	Family	Local name (Kannada)	Common name	Parts used	Mode of uses	Reference
Eranthemum roseum (Vahl) R. Br.	Acanthaceae	Kaadu neeli	Blue Eranthemum	Root	Root juice mixed with milk for diabetes.	[2]
Leucas aspera (Willd) Link	Lamiaceae	Kalluthumbe	Common leucas	Leaf	Leaves pasted with water and taken for Gastritis.	[7, 11, 15, 18]
Euphorbia hirta L.	Euphorbiaceae	Achhegida	Snake weed	Root	Root powder and also root decoction used to cure respiratory problems	[11, 13]
Clerodendrum infortunatum L.	Lamiaceae	Thaggi	Hill glory bower	Root	Root decoction along with milk two times in a day for a common fever.	[12, 20]
Stachytarpheta indica (L.).Vahl	Verbenaceae	Kaadu uttarane, Neeliuttarane	Indian snakeweed	Root	Root decoction mixed with milk and taken for dysentery.	[11]
Barleria prionitis L.	Acanthaceae	Arashina gvatale	Porcupine flower	Leaf	Leaves crushed and the paste applied on tooth to cure ache.	[13]

Table 2: Medicinal Shrub with taxonomical description and traditional medicinal knowledge recorded in Sharavathi valley

Botanical name	Family	Local name (Kannada)	Common name	Parts used	Mode of uses	Reference
Syzygium caryophyllatum (L.) Alston	Myrtaceae	Kunnerale hannu	Indian Black berry	Fruit, Bark	Fruit is Edible. Raw fruit and bark decoction used for diabetes.	*
Callicarpa tomentosa (L.) Murr.	Verbenaceae	Pandavara batti, seethe kudi, deepavali kundige	Great wooly Malayan lilac	Root, Leaf	Root powder, jaggery, and milk mixed well and taken orally for digestive problems. Leaf juice diluted with milk and taken orally three times a day for Fever.	[14, 16, 20, 24]
Canthium angustifolium Roxb.	Rubiaceae	Kattaramullu	Narrow leaved Canthium	Root, Leaf	Leaf paste applied on swelling parts.	*
Calycopteris floribunda (Roxb.) Lam.	Combretaceae	Kubasa, Kumuslu balli	Paper Flower Climber	Leaf	Leaf extract heated and mixed with milk used for common fever. The tender copper coloured leaves ground into paste or dry powders administered for the expulsion of bacteria, free radicals and round worms (Nadkarni, 1927; Ratnagiriswaran *et al*., 1934)	[17]
Helicteres isora L.	Malvaceae	Kavari, Yedamuri	East Indian Screw Tree	Root, fruit, Stem bark	Root crushed and heated with milk and used for diarrhoea. Fruit powder pasted with water, milk, honey and used for intestinal worm infections. Bark decoction taken orally for abdominal pain.	[7, 18]
Caesalpinia mimosoides Lam.	Fabaceae	Mulluarishina	Mimosa thorn	Leaf, Root	The roots along with ginger paste for anti-helminthic property.	[18, 20]
Ixora coccinea L.	Rubiaceae	Hole daashala	Jungle flame ixora	Flower, Root	The flower crushed with milk and taken when body feeling excess of heat. The root paste mixed with milk and used for cough. Edible fruit.	[13, 14]
Bridelia stipularis (L.) Blume	Euphorbiaceae	Akshatheballi	Climbing Bridelia	Bark	Bark heated with water and given for children for fever, cough.	[24]
Jasminum malabaricum Wight	Oleaceae	Kaadumallige, Adavi mallige	Shruby Jasmine	Stem	Stem is crushed and the liquid obtained used raw when in eye trouble.	[7]
Wendlandia thyrsoidea (Roth) Steud.	Rubiaceae	Thilige	Showla	Leaf	Leaves crushed and applied on wounds. Excellent wound healer	*
Hibiscus furcatus Wall.	Malvaceae	Mullugogu,	Wild sour, Bush sorrel	Leaf	Leaf paste used in penile irritation	*
Lea indica (Burm. F.) Merr.	Vitaceae	Dippur deevalige	Bandicoot berry	Root	Root decoction used for colic and for relieving thirst. Roots heated in the milk and used for diarrhoea. Root paste also applied to cure rashes and other skin trouble	*
Carissa carandas Linn.	Apocynaceae	Kavali hannu	Crane berry	Fruit, Leaf, Stem	Stem decoction used for strengthening tendons. Leaf paste mixed with milk and used for fevers. Edible fruit used in skin infection.	*
Cassia occidentalis (L.) Link.	Caesalpiniaceae	Eleurige soppu	Coffee senna	Leaf	Leaf decoction along with milk used for digestive problems.	[1, 2, 11, 18]

*Indicate the new document

Table 3: Medicinal Trees with taxonomical description and traditional medicinal knowledge recorded in Sharavathi valley

Botanical name	Family	Local name (Kannada)	Common name	Parts used	Mode of uses	References
Syzygium cumini L.	Myrtaceae	Nerale hannu	Jamun	Bark, Fruit	Fruit taken raw to get rid of dysentery. Leaf juiced with water and applied on bleeding gums.	[18]
Aporosa lindleyana (Wight) Baill.	Euphorbiaceae	Salle mara	-	Fruit, Root	Root juiced with heated water mixed with milk and taken for diabetes. Edible fruit is a coolant.	[19]
Mammea suriga (Buch.-Ham. ex Roxb.) Kosterm.	Calophyllaceae	Surige	Indian Rose Chestnut, Ceylon Ironwood.	Bark, Flower, Seed	Bark decoction used for dysentery. Seed oil used for urinary tract infection.	[20]
Dalbergia horrida (Dennst.) Mabb.	Fabaceae	Maradimatti, Muldimatti		Leaf	The leaf paste mixed with sheep urinals and applied on Herpes.	*

Holoptelea integrifolia Planch.	Ulmaceae	Thabase mara	Jungle cork tree,	Bark, leaf	Leaf decoction used in fatigue condition. Bark paste externally applied on ringworms and scabies.	[15]
Carallia brachiata (Lour.) Merr.	Rhizophoraceae	Andi mara, Nayi halasu	Karallia wood	Bark	The bark paste is applied on cut wounds for quick heal.	[20]
Ailanthus triphysa (Dennst.) Alston	Simaroubaceae	Guggul dhoopa,	Heaven tree	Bark	Bark decoction with milk taken for bronchitis.	*
Holigarna arnottiana Wall. ex Hook. f.	Anacardiaceae	Holegeru	Black varnish tree	Bark	Highly diluted Bark decoction mixed with milk and turmeric used in mild skin problems	[14, 24]
Couroupita guianensis Aubl.	Lecythidaceae	Nagalinga pushpa	Cannon ball tree	Bark	Bark decoction bath for stroke.	[22]
Flacourtia Montana J. Garh.	Flacourtiaceae	Sampigehannu, Mullu sampige	Mountain Sweet Thorn	Fruit, Leaf	Bark decoction is used for liver disorders. Fruit is edible and consumed as food.	[23]
Careya arborea Roxb.	Myrtaceae	Kovlu Mara	Wild guava	Bark	Bark decoction applied on cut wounds for quick healing.	[14, 16]
Olea dioica Roxb.	Oleaceae	Bilisarali mara	Indian Olive	Leaf	Root paste mixed with milk taken for cancer locally.	*
Memecylon umbellatum Burm. f.	Melastomataceae	Arachate	Iron wood	Root, Leaf	Leaf paste used in snake bite. Root decoction is used for abnormal menstrual periods.	[14, 24]
Santalum album L.	Santalaceae	Shri gandha	Sandalwood	Root, leaf, Bark	Bark paste applied on skin burn, cut wounds for quick relief. Root decoction used as a coolant for body. Bark paste mixed with milk used for fever.	[18]
Holarrhena pubescence (Linn.) Wall.	Apocynaceae	Kodasiga	Bitter oleander	Bark, Fruit, Flower	Bark paste mixed with milk used for dysentery. Flower grinded with little water and taken orally for reducing excess of heat from the body. Fruits are edible.	[20]
Dalbergia latifolia Roxb.	Fabaceae	Bheete	Rosewood	Bark	Bark is heated in water to solidify little and the oil is obtained applied on several types of skin diseases. Bark decoction mixed with milk is also taken for fever.	[16]
Dillenia pentagyna Roxb.	Dilleniaceae	Kaadukanagile	Dog teak	Bark	Bark paste applied on joint pain and bark decoction along with the milk used for diabetes.	[20]
Hopea ponga (Dennst.) D. J. Mabberley.	Dipterocarpaceae	Haayga	Thingam	Root, bark	Root decoction taken orally for piles. Bark paste mixed with milk taken to minimize spreading of poison during snake bite.	*
Pterocarpus marsupium Roxb.	Fabaceae	Honne	Indian Kino	Bark	Bark decoction used to increase haemoglobin level in the blood. Several skin diseases cured using the mixed paste of bark and cow milk.	[16, 24]
Vitex altissima L. f.	Lamiaceae	Bharanige, Naviladi	Peacock chaste tree	Bark	Bark heated with milk and then taken with jaggery for cough	[16]
Artocarpus hirsutus Lam.	Moraceae	Hebbalasu	Wild Jack	Fruit, seed	Fruit is edible. Dried seed mixed with milk and honey and used for respiratory problems.	[15, 16]
Ixora brachiata Roxb	Rubiaceae	Gorbale	Gorbale	Bark, Root	Bark paste along with honey taken orally for fever. Root decoction diluted with milk taken orally at the time of weakness.	*

*Indicate the new document

Table 4: Medicinal Climbers with taxonomical description and traditional medicinal knowledge recorded in Sharavathi valley

Botanical name	Family	Local name (Kannada)	Common name	Parts used	Mode of uses	Reference
Cyclea peltata Hook. f. & Thoms.	Menispermaceae	Haade balli	Pata root, Raj patta	Whole plant	Leaf pasted with water applied on hair for conditioning.	[18, 20]
Naravelia zeylanica (L.) DC.	Ranunculaceae	Nerle balli, Mooguri balli,	Chagalbati	Whole plant	Stem grinded and smelled when in cold and headache	[20]
Gymnema	Asclepiadaceae	Madhunaashini	Cow plant,	Whole	Root and leaf paste is used for diabetes	[11, 18]

sylvestre R. Br.			Periclopa of Woods	plant		
Elaeagnus conferta Roxb.	Elaeagnaceae	Halige hannu	Bastard oleaster	Fruit, leaf	Fruit pulp taken raw in anaemic condition.	*
Pothos scandens L.	Araceae	Appachi kaal balli, Adikebeelu balli, Agesoppu	Climbing Aroid	Whole plant	Leaf paste is applied on burned places of skin. Plant heated with water and given to cattle to increase fertility	*
Rubia cordifolia L.	Rubiaceae	Ky koykana balli	Indian Madder	Whole plant	Leaf paste along with milk and honey used for blood purification. Root paste is used to treat several skin allergic effects.	[18]
Acacia concinna (Willd.) DC.	Mimosaceae	Sheege	Shikakai, Soap-pod	Leaves, fruit	Dried powder of fruit pasted with water and applied on hairs for the control of dandruff and to promote hair growth. Leaf paste with milk applied on skin allergy.	[21]
Celastrus paniculatus Willd.	Celastraceae	Gangammana balli	Black oil plant,	Whole plant	Seed oil is used for various skin diseases by direct applying.	[2, 20]
Ziziphus oenoplia (L.) Miller.	Rhamnaceae	Parige hannu	Wild jujube	Fruit, leaf	Leaf paste used for dressing wounds. Fruit is Edible	*

*Indicate the new document

Fig 3: Some rare, endemic, endangered plant species recorded in Sharavathi valley of Central Western Ghats

Present study also determines the habit wise distribution of medicinal plants used by the traditional practitioners (Fig 4). It revealed that tree species were dominated with 43.13%, followed by shrubs 27.45%, climbers 17.64% and herbs 11.76%. The ethno medical investigation conducted in Sagar taluk region by Rajkumar *et al* (2010) also revealed the use of tree species as dominant herbal medicine source [7]. This may also due to the inhabit of evergreen type of forest where floor is covered maximum with juvenile forms of evergreen tree species. Only where the sunlight shines the floor along the borders of forest, we can find the herb population.

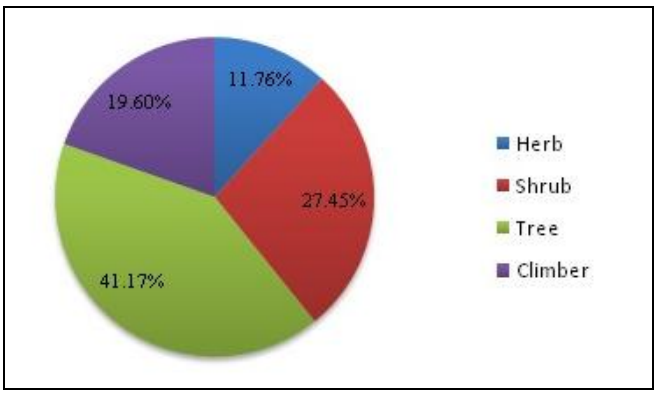

Fig 4: Habit wise distribution of recorded ethnomedicinal plants from Sharavati valley

Among the 33 different plant families recorded in the study area, Rubiaceae topped the list with 5 species pre-dominated by Euphorbiaceae, Lamiaceae, and Fabaceae each with 4 species, followed by Myrtaceae, Acanthaceae, Anacardiaceae, oleaceae, Apocynaceae, Malvaceae etc., and the data is depicted in the Fig 5.

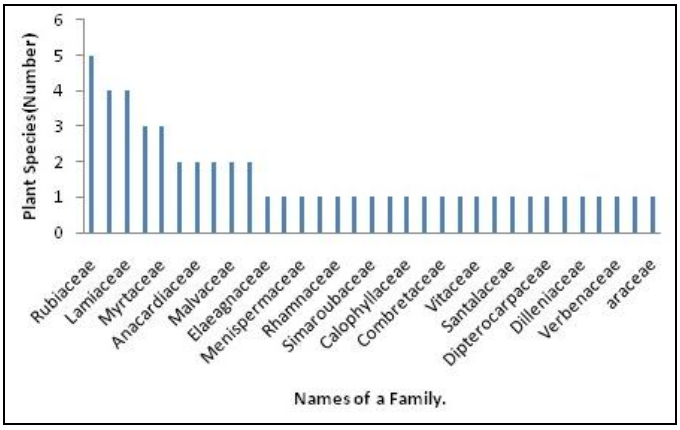

Fig 5: Family dominance in the recorded in Sharavathi valley

The traditional healers resided in and around the valley region uses various plant parts for medicinal purposes. In majority of the cases, leaves were used as the medicinal source followed by stem bark, root and fruit. Investigation of traditional use of medicinal plants in Wayanad district (Shyma and Deviprasad, 2012) and Jawalamukhi, Himachal Pradesh (Sharma Arti *et al*., 2014) concluded that the traditional healers uses leaf part in most of the medicinal care [8, 9]. So as a whole traditional healer prefers a leaf part for majority of their medical cares. Skin diseases, joint pains, wounds are generally treated using leaf parts as a leaf paste but fever, cough, cold and headache were treated using bark and roots. The percentage of plant parts used for medicinal purposes is shown in the Fig 6.

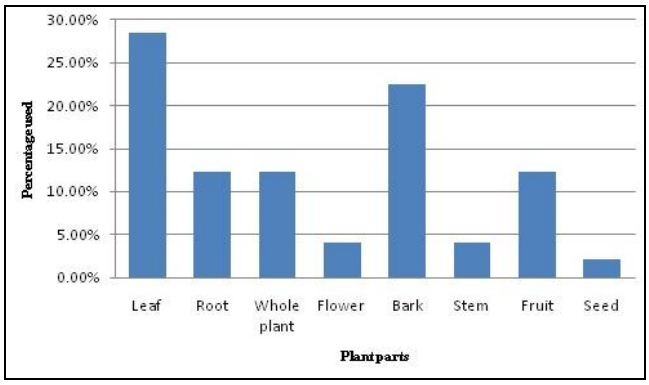

Fig 6: Percentage plant parts used for traditional medical care in Sharavathi valley

In the study we noted that among the recorded 51 species, 9species of plant bears an edible fruit. The pulp of a fruit also used effectively in healing various ailments. The fruits of *Elaeagnus conferta* Roxb and *Flacourtia Montana* J. Garh are used in anaemic condition which increases haemoglobin of the blood. They can also care on the iron deficiency problem. *Ixora coccinea* L fruit is a best coolant for the body. The healers suggest it in dry season to lower the excess heat in the body. The other wild edible fruit bearing medicinal species recorded in the study area are *Ziziphus oenoplia* (L.) Miller, *Aporosa lindleyana* (Wight) Baill, *Carissa carandas* Linn, *Syzygium cumini* L, *Syzygium caryophyllatum* (L.) Alston, *Artocarpus hirsutus* Lam.

Most of the recorded medicinal plants in the study area are used to heal skin diseases and fever. In addition, this area also inhabited with many of the endemic, vulnerable and an endangered plant species like *Hopea ponga* Dennst of Dipterocarpaceae, *Elaeagnus conferta* Roxb of elagnaceae. In the study Ixora *coccinea* L, *Hopea ponga* (Dennst.) D. J. Mabberley, *Flacourtia montana* J. Garh, *Artocarpus hirsutus* Lam are the endemic species of Western Ghats with a rich traditional medicinal value. However, an Endemic species, *Semecarpus Kathalekanensis* Dasappa & M.H. Swaminath is the only red listed plant noted in the study area [10] (Fig 7) but the resident healers do not prefer it for traditional medical care.

Fig 7: Red listed plant *Semecarpus kathalekanensis* Dasappa & M.H. Swaminath.

Acknowledgment

The authors thankful to DBT New Delhi for sanction of the research project under BUILDER programme (No.BT/PR9128/INF/22/190/2013) and also the resident traditional practitioners of the study area for revealing their traditional medicine knowledge for the benefit of society and conservation of medicinal plants.

Reference

1. Raut S, Raut S, Kumar S S, Satpathy S, Pattnaik D. An Ethnobotanical Survey of Medicinal plants in semiliguda of Koraput District, Odisha, India, BRI 2012; 5(4):97-107.
2. Kamble SY, Patil SR, Sawant PS, Sawant S, Pawar SG, Singh EA. Studies on plants used in traditional medicine by Bhilla tribe of Maharashtra, IJTK 2010; 9(3):591-598.
3. Myers N. The biodiversity challenge: Expanded hot-spots analysis, E 1990; 10(4):243-256.
4. http://www.conservation.org. August, 2016
5. Chandran MDS, Rao GR, Gururaja KV, Ramachandra TV. Ecology of the swampy relic forest of Kathalekan from central Western Ghats, India. GSB 2010; 4(1):54-68.
6. Somashekhara Achar KG, Boosanur V, Shivanna MB. Ethno-medico-botanical knowledge of tiptur taluk in Tumkur district of Karnataka, India. IJTK 2015; 1(1):147-154.
7. Rajkumar N, Shivanna MB. Traditional herbal medicinal knowledge in Sagar taluk of shimoga district, Karnataka, India. IJNPR. 2010; 1(1):102-108.
8. Shyma TB, Deviprasad AG. Traditional use of medicinal plants and its status among the tribes in Mananthvady of Wayanad District, Kerala. WRJMA, 2(1):22-26.
9. Sharma A, Santvan VK, Sharma P, Chandel S. Studies on traditional knowledge of Ethnomedicinal plants jawalamukhi, Himachal Pradesh, India. IJBS 2014; 3(10):6-12.
10. Dasappa, Swaminath MH. A new species of Semecarpus (Anacardiaceae) from the Myristica swamps of Western Ghats of North Kanara, Karnataka, India. IF 2000; 126(1):78-82.
11. Muthu C, Ayyanar M, Raja N, Ignacimuthu S. Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India, JEE, 2006; 2:43.
12. Korpenwar AN. Ethnomedicinal plant Clerodendrum Infortunatum linn used by the traditional practitioners for the treatment of cuts, wounds and burns, IJIBS 2012; 2(1):55-58.
13. Sankaranarayanan S, Bama P, Ramachandran J, Kalaichelvan PT, Deccaraman M, Vijayalakshimi M *et al*. Ethnobotanical study of medicinal plants used by traditional users in Villupuram district of Tamilnadu, India,JMPR 2010; 4(12):1089-1101.
14. Devi Prasad AG, Shyma TB. Medicinal plants used by the tribes of Vythiri taluk, Wayanad district (Kerala state) for the treatment of human and domestic animal ailments, JMPR 2013; 7(20):1439-1451.
15. Kadhirve K, Ramya S**,** Palin Sathya Sudha T**,** Veera Ravi A**,** Rajasekaran C, Vanitha Selvi R *et al*. Ethnomedicinal Survey on Plants used by Tribals in Chitteri Hills, EWIJST 2010; 5:35-46.
16. Ratheesh Narayanan MK, Mithunlal S, Sujanapal P, Anil Kumar N, Sivadasan M, Alfarhan AH *et al*. Ethnobotanically important trees and their uses by Kattunaikka tribe in Wayanad Wildlife Sanctuary, Kerala, India, JMPR 2011; 5(4):604-612.
17. Savithramma N, Yugandhar P, Suhrulatha D. Traditional medicinal plants used by local people of Kailasakona- A Sacred grove of Chittoor district, Andhra Pradesh, India, IJPPS. 2015; 7(3):407-411.
18. Silja VP, Samitha Varma K, Mohanan KV. Ethnomedicinal plant knowledge of the Mullu kuruma tribe of Wayanad district, Kerala, IJTK 2008; 7(4):604-612.
19. Jothi GJ, Benniamin A, Manickam VS. Glimpses of Tribal Botanical Knowledge of Tirunelveli Hills, Western Ghats, India, EL 2008; 12:118-126.
20. Devi Prasad AG, Shyma TB, Raghavendra MP. Traditional herbal remedies used for management of reproductive disorders in Wayanad district, Kerala. IJRPC 2014; 4(2):333-341.
21. Sharma L, Agarwal G, Kumar A. Medicinal plants for skin and hair care, IJTK. 2003; 2(1):62-68.
22. Gousia SK, Kumar AK, Kumar VT, Latha LNJ. Biological activities and medicinal properties of couroupita guianensis. IJPPSR 2013; 3(4):140-143.
23. Ratheesh NMK, Mithunlal S, Sujanapal P, Kumar A N, Sivadasan M, Ahmed HA *et al*. Ethnobotanically important trees and their uses by Kattunaikka tribe in Wayanad Wildlife Sanctuary, Kerala, India. JMPR 2011; 5(4):604-612.
24. Devi Prasad AG, Shyma TB. Medicinal plants used by the tribes of Vythiri taluk, Wayanad district (Kerala state) for the treatment of human and domestic animal ailments. JMPR. 2013; 7(20):1439-1451.