



Ethno-Medicinal Plants in Sacred Groves in East Godavari District, Andhra Pradesh, India

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Authors' contributions

This work was carried out in collaboration between both authors. Author KSM designed the study and author VR performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: An ethnobotanical study was conducted to document traditional medicinal plants used by indigenous people around the four sacred groves (protected forest patches) of East Godavari district, Andhra Pradesh, India.

Place and Duration of Study: The study was conducted around the four sacred groves (protected forest patches) of East Godavari district, Andhra Pradesh, India from 2011-2015.

Methodology: The ethnomedicinal knowledge was gathered through interviews of tribal physicians. Data collected were processed using Microsoft Excel spreadsheet. The data was analyzed using the fidelity level (FL) of each species determined.

Results: The study revealed therapeutic applications of 87 plant species belonging to 76 genera and 45 families. These plants are used to cure various ailments such as malaria, jaundice, diabetes, bronchitis, fevers etc. The majority of remedies were taken orally in the form of juice extracted from freshly collected plant parts harvested from the wild. Plants that has the highest FL values are *Gymnema sylvestre* (100%) and *Andrographis paniculata* (100%), followed by *Phyllanthus amarus* (91%). The lowest is *Woodfordia fruticosa* (46%). The most used plant parts

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are leaves. Over-exploitation and deforestation and Podu-cultivation are main threats for medicinal plant vulnerability.

Conclusion: The documented information regarding therapeutic uses provides basic data for further studies on pharmacological studies and conservation of the most important medicinal plant species.

Keywords: Sacred grove; ethnobotany; East Godavari; India; fidelity value; medicinal plants.

1. INTRODUCTION

Ever since ancient times onwards people have been searching for natural drugs to rescue against diseases. Plants are indispensable source of both preventive and curative medicine. Thousands of plants have therapeutic values and used to treat various diseases. Tribal people who are living in remote areas primarily depend on traditional medicine system for healthcare. About 12.5% of the total 4,22,000 plant species documented worldwide is reported to have medicinal values [1]. In 1996 WHO issued guidelines for the Assessment of Herbal medicines and advocated the importance of documentation of knowledge on the application of an herbal medicine [2]. Sacred natural sites are important areas for traditional respect to the environment and traditional medicine. They are present in various regions of India and possess rich diversity of medicinal plants. More than 400 sacred groves are present in Andhra Pradesh [3], and many sacred groves serve as healing sanctuaries for various human ailments. Recent works record on ethnobotanically important plants of sacred groves [4,5,6,7]. Tribes in the Eastern Ghats have been using variety of medicinal plants for curing various ailments for primary health care [8]. Unsustainable harvesting of medicinal plants and large scale biotic interference during festival days in sacred groves affect the medicinal flora of the Rudrakod sacred grove in Nallamalais, Andhra Pradesh [9]. Other workers who reported medicinal plants in east Godavari district of Andhra Pradesh were [10,11].

Although various ethnobotanists and anthropologists have made attempt to document the traditional knowledge in various parts of the world, several remote localities and indigenous communities have remained unnoticed [12]. There has been rich ethnomedicinal knowledge available across the globe; but it is fading due to migration to urban areas, lack of interest among youth and dependence on modern medicine [13]. Therefore, there is a need to document and preserve the ethnomedicinal knowledge that

ultimately gives great inputs for research and discovery of new drugs to treat various diseases. Pharmaceutical researches advocated that screening of plants on the basis of information derived from traditional knowledge saves time and resources. Fourth world claims regards validation, isolation of active principles, pharmaco-toxicological efficacy and safety [14,13].

The traditional healers have rich knowledge by long experience through the practical applications from many years. Therefore, an attempt has been made to document Ethnomedicinal uses of plant species present in four sacred groves of East Godavari district, India.

Objectives of the present study were: (i) Identify and documentation of ethnomedicinal plants available in the study area, (ii) Medicinal plant species used for therapeutic applications, (iii) Creating awareness on sustainable harvesting of medicinal plants, (iv) Determination of threats to the treasured plants found in sacred groves, (v) Enhancing of marketability of medicinal plants besides conserving of plants species.

2. METHODOLOGY

2.1 Study Area

In Andhra Pradesh 33 types of schedule tribes (ST) are living in 8 districts. ST's are contributing about 6.6% in total population of Andhra Pradesh. The sacred groves are located within the agency area of east Godavari district and tribes are distinct ethnic group living in these areas. The indigenous communities are variously termed as adivasi, aboriginal, girijan, vanavasi, janjati (Schedule Tribes). Indigenous groups are homogeneous, culturally firm have developed strong magico-religious healthcare system and they wish to survive and live in their own style. The tribal society is patriarchal. The status of women in the society is elevated in many respects. Both men and women equally participate in collection of forest produce and in

agricultural activities. Generally the houses are constructed with bamboo, palm and other timber yielding trees. The leaves of *Borassus flabellifera* L. (Palmyra), *Phoenix sylvestris* L. (Etha) are extensively used for thatching. At the beginning of any economic activity and before harvesting agricultural produce, every tribal group celebrates a festival. Among them some important festivals are “Kothe, Bali panduga and Agam panduga” to please their ancestral spirits. The rituals performed at community level are called as jatara. The young men carry their bows, axes, arrows and knives to hunt wild animals like wild goat, wild pig, wild sheep, rabbit, pigeon, small birds etc. drinking of toddy and arrack is common among these tribes. The forest of this area provides firewood, timber, medicinal plants and edible plants to the community. In India, the Biological Diversity Bill (No. 93 of 2000), Wildlife Protection Act, 1972, and the Protections of Plant Varieties and Farmers’ Rights Act, 2001, support the indigenous people for conservation of sacred groves and their own territories [15]. Recently, the Tropical Botanic Garden and Research Institute (TBGRI) developed an indigenous knowledge system that supports adequate compensation to indigenous people [16]. ITDA (Integral Tribal Development Agency), Tribal Welfare Department, Indrira kranthi Patham and other organizations have been working towards the economic development of tribes.

The study was conducted in the selected sacred groves present in reserve forest and tribal areas of East Godavari district. The district lies North - East Coast of Andhra Pradesh and is bounded on the North by Visakhapatnam District and the State of Orissa, on the East and South by the Bay of Bengal and on the West by State of Telangana and West Godavari Districts. The district comprises 3,34,193.79 ha forest area and nearly 30% of the total area is under forests. It is inhabited by 1,91,561 indigenous people. The sacred sites surveyed here were Rampa Hill, Pedda konda, Dumma konda, and Korukonda. The approximate area of the four sacred groves ranges from 20-50 acres, the area estimates are based on nearby village devotee’s perceptions. All the study areas are composed of Tropical Deciduous type of vegetation. Lord Laxshmi narasimha swamy is the chief deity in Korukonda and Lord Shiva in Rampa Hill area. Villagers believe that Dummakonda and Peddakonda are Goddess sites. The common indigenous communities of this area are Konda kammara, Konda reddies, Konda kapu, Valmiki and Koya doras.

2.2 Data Collection

The Ethnomedical field survey was conducted according to the questionnaire [17]. In-depth interviews were conducted with the tribal physicians during 2011-2015. A series of questions were asked and categorized into five. They are: (i) demographic characteristics of the informants, (ii) botanical investigation (source of plant, local name, numbering, preliminary classification, specimen for herbarium), (iii) pharmacological investigation (How did the tribe acquire the ethnomedicinal knowledge?, gathering of plant, name the ailments you have dealt with?, dosage, method of use) (iv) what are the destructive agencies? (podu cultivation/burn agriculture, forest fire, fuel wood etc., and (v) what type of benefits obtained from natural resources to the local communities?

The interviews and discussions were organized in their native languages (Telugu, Koya) with the help of local translators. Plant specimens were collected, pressed, dried and stitched on standard herbarium sheets of 28 x 42cm according to the methodology described by Jain & Rao [18]. The specimens were identified with the help of standard Floras [19,20,21,22] and deposited in Acharya Nagarjuna University Herbarium (ANUBH) at Guntur.

2.3 Data Analysis

Ethnobotanical data obtained during the study were summarized using Microsoft Excel spreadsheet (2007[®]) to identify proportions like plant families, habit, plant parts, frequency of citation and popularly used plants.

The most used medicinal plants against human ailments is calculated using Fidelity level (FL) value. This value explains the relative healing potential of medicinal plants.

$$FL (\%) = I_p / I_u \times 100$$

where I_p is the number of informants who independently indicated the use of species for the same major ailment and I_u the total number of informants who mentioned the plant for any major ailment [23]. Before the calculation of FL, all human ailments were grouped into major disease categories, using a similar approach employed elsewhere [24].

3. RESULTS AND DISCUSSION

3.1 Demographic Profile of the Respondents

A total of twenty five key informants (21 men and 4 women) were interviewed. The ages of the respondents ranged from 35 to 65 years of age. Women's of this area have little indigenous knowledge of medicinal plants. The indigenous knowledge was acquired from their ancestors on among family members [25]. Similar type of

observations was observed. The key informants who inhabit in villages located near the sacred groves were given in the Table 1.

3.2 Medicinal Plants Diversity, Growth Forms, Plant Parts Used

The sacred groves of East Godavari are very rich in medicinal flora (Plate 1). A total 87 medicinal plant species belonging to 45 families were collected from the study area with help of traditional reputation.

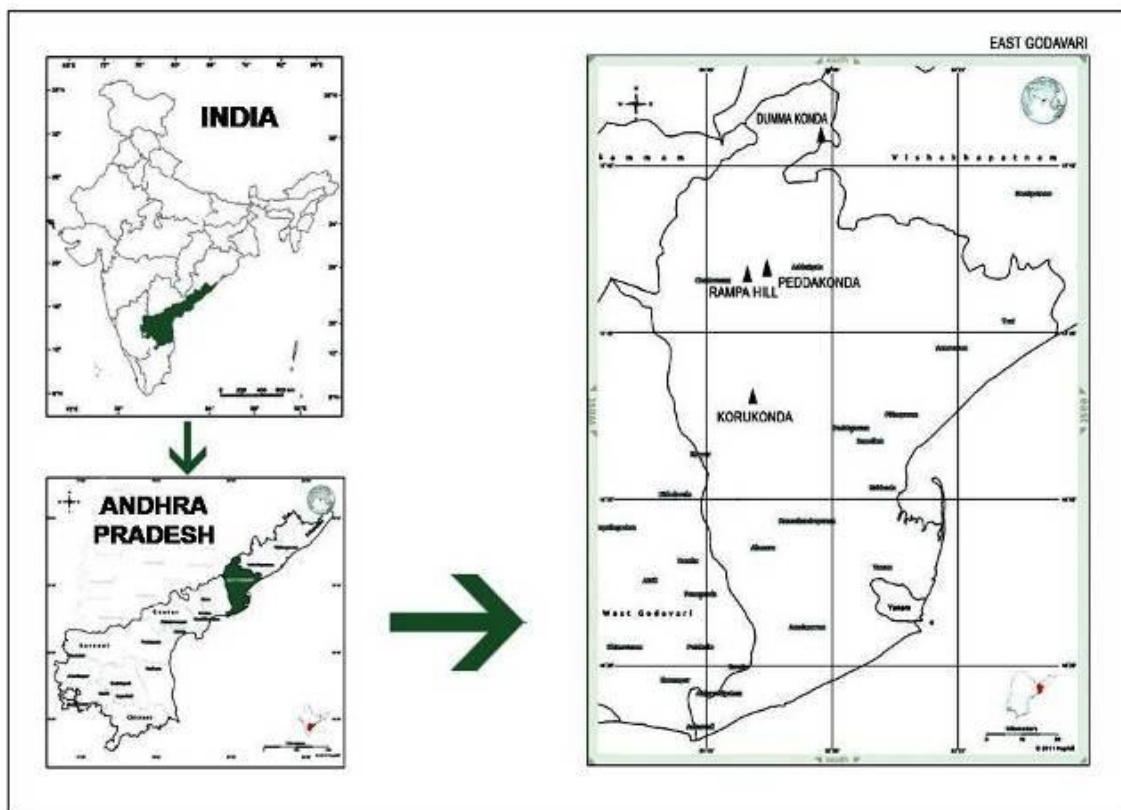


Fig. 1. Location of study area (Sacred Groves) in East Godavari District, Andhra Pradesh, India

Table 1. The key informants of studied sacred groves

S. no	Name of the tribal physician	Gender	Age (years)	Community
1	M. Devaiah	Male	60	Konda kapu
2	T. Subba rao	Male	65	Konda kammara
3	M. Sitaramareddy	Male	57	Konda reddy
4	N. Raja rao	Male	45	Konda reddy
5	Kunjam. Bujji dora	Male	60	Konda dora
6	K. Chinna reddy	Male	48	Konda reddy

These plants are used in preparation of 45 medical remedies against 52 different ailments of both human being and their livestock (Table 2). Similar findings were reported from five sacred groves in Cuddalore District, Tamilnadu, India [6]. There were also 69 vascular plants reported from Rudrakad sacred grove in Nallamalais, Andhra Pradesh, India [9]. The most commonly represented families of medicinal plants were Caesalpiniaceae (7 species), Euphorbiaceae (6 species), Fabaceae (5 species), Asclepiadaceae (4 species) Solanaceae, Lythraceae, Apocyanaceae, Combretaceae, Zingiberaceae, Liliaceae were represented by every one of them by (3 Species). Twelve families were represented by 2 species each and 23 families were represented by 1 species each. The family Caesalpiniaceae contributes highest number of Medicinal plants. According to the habit of plant trees are the most utilized plants (31%) followed by Herbs (28.7%), shrubs (24.13%), and climbers (16%) (Fig. 2). Out of total percentage herbs and climbers attains 45% hence there is a need of conservation of herbs and climbers because the study are vegetation is dry deciduous type.

Traditional practitioners used different plant parts. Among them leaves (31.6%) are mostly used for the preparation of medicines predominantly, followed by roots (15.33%), seeds (10.83%), bark (10%), tubers (7.5%), whole plant (6.6%), stem (5%), flowers (4.1%), fruits (3.3%), pods (3.3%), and latex (1.6%) (Fig. 3). The most extensively used plant part in the preparation of medicine for various ailments is the leaves, followed by roots. Bonet et al. [26] reported leaves as the most frequently utilized plant parts, followed by roots and bark [27].

A continuous harvesting of plant parts such as entire plant (*Andrographis paniculata*), roots (*Plumbago zeylanica*, *Rauwolfia serpentina*), bark (*Terminalia arjuna*) etc., from the wild threat the existence of plants and become vulnerable to extinction. This increased popularity and demand of various plant parts has grave consequences from both ecological point of view and survival of the medicinal plant species [28]. This signifies the role of sacred grove in the conservation of medicinal plants. It was observed that particular growth period or season tribal physicians harvest the plant parts used for medicinal purposes.

The ethnomedicines are taken orally along with different additives such as cow milk, butter milk, jaggary and honey. Many practitioners believe that polyherbal treatment increases healing power than the use of single medicinal plants [29]. When these medicines are taken patients are advised to avoid some food and alcoholic beverages to complete recovery from diseases. Highest number of thirty seven (37) species is used in different formulation to treat gastro intestinal ailments such as indigestion, constipation, diarrhea, blood and gum motions, intestinal worm, stomach ache, and other stomach problems. Twenty seven (27) species are used in respiratory tract infections (Fever, headache, asthma, tuberculosis, bronchitis, cold, and cough), 21 species used for Sexual diseases (lucorrhoea, gonorrhoea, menorrhagia, menstrual pain) and 13 species used in kidney and urinary ailments (renal stones, jaundice, diabetes, urinary disorders). It was observed that the dosage and the duration of medicine generally depend on the intensity of the disease and the age of patient.

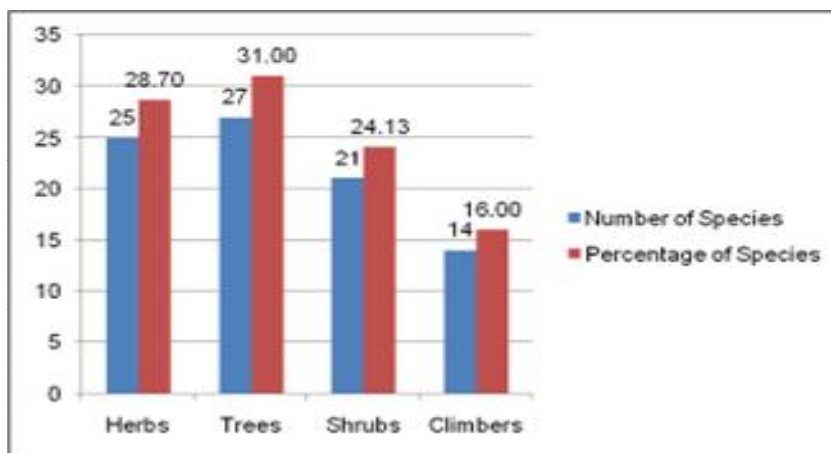


Fig. 2. Number and percentage of species per habit

Table 2. List of medicinal plants and their ethnobotanical uses in sacred groves of East Godavari District, Andhra Pradesh, India

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
<i>Abrus precatorius</i> L. ANUBH01101	Gurivinda	Papilionaceae	Climber	Leaves and Seeds	<i>Aristolochia</i> root and <i>Abrus precatorius</i> (white) seeds paste applied on the surface of white spots of the skin.	Once in a day.	Leucoderma	P, R
					Seed of <i>Sapindus</i> and <i>Abrus</i> paste applied externally on fore head.	During headache.	Headache	
					Leaf past applied on the surface of the bald head for hair growth.	Once in a day (1 month)	Hair growth on bald head	
<i>Acacia sundra</i> (Roxb.) DC. ANUBH01122	Sundra, chandra	Mimosaceae	Small Tree	Bark and leaves	Prepare 1 gm size tablets by using bark powder.	Three times per day.	Cough	P, K
					Prepare extract by boiling leaves in water.	Gargling of extract 3 to 4 times per day & ½ gm orally once in a day.	Dental diseases.	
					Clean the fistula with <i>Ficus religiosa</i> bark extract and apply <i>Acacia</i> bark powder as a balm on surface of the fistula area.	Once in a day	Fistula	
<i>Acalypha indica</i> L. ANUBH01111	Murkonda, kumpati	Ephorbiaceae	Herb	Leaves	Prepare paste by using 9 <i>Achalypha</i> leaves, 9 Pepper and make it into 2 gm size tablets.	Take two times per day with water.	Jaundice.	P, R, K
					Prepare paste by using leaves and Black <i>Cuminum</i> applies as a balm.	Apply twice per day.	Scabies.	
<i>Achyranthes aspera</i> L. ANUBH01110	Uttareni	Amaranthaceae	Herb	Whole plant	Prepare ash by burning whole plant.	Take ½ tea spoon daily two times orally.	Bronchitis and long term indigestion.	P, R, K, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
					Paste prepared by using leaves.	Apply around the sting area as band.	Scorpion sting	
Acorus calamus L. ANUBH01151	Vasa	Araceae	Shrub	Tubers and rhizome	Rhizome is grinded with water or arrack to prepare paste and apply surface of nipple before drank milk by baby. Prepare powder by using shade dried root tubers. 1/2 gram of this powder taken orally with ghee or milk.	Daily one or two times. Morning and evening about one month.	Cough /Cold Develop Memory	P, D
Adhatoda zeylanica Medic. ANUBH01152	Mandi	Acanthaceae	Shrub	Leaves	Take equal amounts of leaves of <i>Adathoda</i> and <i>Ocimum</i> prepare extract and add adequate amount of honey and juagery form paste.	A spoon full of paste taken orally in both morning and evening every day.	Asthma and cough	P, D
Aegle marmelos (L.) Correa. ANUBH01153	Maredu, Bilva chettu	Rutaceae	Tree	Leaves & Fruit	Make a tablet like by using leaves paste Prepare juice from ripen fruit pulp and sugar.	Apply on eye surface before sleep(avoid entry of extract in to the eye) ½ cup taken orally once in a day.	Eye diseases Mucoid stools & blood motions.	D
Aerva lanata (L.) Juss. ANUBH01112	Telagapindikura Or kondapindiaku	Amaranthaceae	Herb	Roots, Whole plant	Take 25 grams of <i>Aerva lanata</i> roots and 25gm poppy seeds are macerated prepared as paste and taken orally. Prepare extract by using whole plant and taken orally.	Twice in a day. 20 or 40 gm three times/day	Leucorrhoea Renal stones & over motions.	P, R, K
Ailanthus excelsa Roxb. ANUBH01154	Pedda manu	Simaroubaceae	Tree	Bark	Prepare a thick extract by using wet bark and taken orally with 10gm curd. Prepare powder by using shade dried bark.	Two times per day (morning and evening). Taken 1gm with	Blood and Gum motions, Diarrhoea. Piles	P, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
						glass of butter milk both morning and evening.		
<i>Alangium salvifolium</i> (L.f.) Wanger ANUBH01155	Uduga	Alangiaceae	Tree	Roots bark	Prepare paste by maceration of roots with goat urine. Apply this paste on bitten area externally. Prepare oil by mixing bark extract of <i>Alangium</i> and sesame oil.	Twice in a day. Massage with this oil Twice in a day.	Rat bite Reliefs from paralytic pains.	P, R, D
<i>Aloe vera</i> (L.) Burm.f. ANUBH01125	Kalabanda	Liliaceae	Shrub	Stem	Remove the skin of stem and take the pulp. Wash the pulp with hot water 5-6 times and taken orally with sugar.	Once in a day	Body coolant	P, D
<i>Ammannia baccifera</i> L. ANUBH01156	Agnivendramu	Lythraceae	Herb	Leaves and leaf tips	Prepare 2 g sized tablet by mixing leaf tips and pepper. Shade dried leaves are powdered and make in to 2g sized tablets.	Taken orally both in morning and evening. Taken orally with honey both morning and evening.	Malaria Whooping cough	P, D
<i>Andrographis paniculata</i> (Brum.f.) Nees. ANUBH01126	Nelavemu	Acanthaceae	Herb	Whole plant	Make 5 g sized tablets by mixing whole plant powder and leaf extract. Make 10 g sized tablets by using whole plant extract.	Twice/day about 15 days. One tablet early morning of the day about 2 days.	Malaria Worm infection	P, R, D
<i>Annona squamosa</i> L. ANUBH01127	Setaphalam	Annonaceae	Tree	Leaves	Prepare leaf powder and taken orally with honey or water. Prepare paste by mixing <i>Annona</i> leaf and rice grains, apply as band over swelling area.	1/4 tea spoon both morning & evening. Twice in a day.	Diabetes Furuncle	P, R, K, D
<i>Argemone mexicana</i> L.	Balurakkisa	Papaveraceae	Herb	Roots and	Take equal parts of <i>Argemone</i>	Twice in a day.	Asthma	P, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
ANUBH01157				latex	root bark, <i>Cissus</i> stem, salt, macerate and prepare as tablets. Mixture prepared by mixing root extract of <i>Argemone</i> and pepper powder, taken orally.	Once in a day	Gonorrhoea	
<i>Argyreia nervosa</i> (Burm.f.) Boj. ANUBH01158	Samudra pala	Convolvulaceae	Climber	Root and Seedling	Prepare juice by maceration of seedlings with water. The root powder soaked in Asparagus root juice in 7 times, after that shade dried & make it in to powder.	Taken ½ tea glass once in a day. Take 2 to 3 g powder dissolved in butter and taken orally for about one month.	Gum motions & Diarrhea. Semen development & male fertility.	P, D
<i>Aristolochia indica</i> L. ANUBH01128	Nalla eswari	Aristolochiaceae	Climber	Roots	Prepare extract by using root powder with water, apply on snake or scorpion bite area and take 2 or 3 spoons orally. Prepare paste using <i>Abrus precatorius</i> white type seeds and <i>Aristolochia</i> roots and apply on white spots.	One time after the bite. Twice in a day.	Snake bite or scorpion bite. Leucoderma	This is for first aid only. P, D
<i>Asparagus racemosus</i> Willd. ANUBH01129	Pilli teegalu	Liliaceae	Herb	Roots	Root tubers are fried in ghee and added sufficient amount of sugar and taken orally. Root tubers macerated in milk and make it in to extract.	Take 3 tubers at morning and evening. Taken orally once in a day.	Leucorrhoea Blood motions	P, R, K, D
<i>Azadirachta indica</i> A. Juss. ANUBH01113	Vepa	Meliaceae	Tree	Leaves	Take equal parts of <i>Oscimum</i> leaves, <i>Azadirachta</i> , pepper, patika macerate and prepare mixture. Prepare leaf paste by using	Taken orally 5mg tablets three times in a day. Taken orally early in	Malaria fever Worm infection	P, R, K, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
					leaftips and make in to 5mg tablets.	morning for three days.		
Bauhinia racemosa Lamk. ANUBH01114	Goddukura, Deva kanchanamu	Caesalpiniaceae	Tree	Roots and bark	Bark powder of <i>Bauhinia racemosa</i> mix with <i>Borassus</i> jaggery and make in to 5 g sized tablets. Prepare powder from roots.	Take orally with Honey once in day. Take orally with butter milk both morning & evening	Menorrhagia and sexually transmitted diseases. Anal diseases.	P, D
Boerhavia diffusa L. ANUBH01115	Atukamamidi	Nyctaginaceae	Herb	Leaves and roots	Prepare juice by using leaves and taken orally with curd. Boil the secondary roots in cow milk, dry it and make in to powder, take this powder with ghee and jiggery.	Twice in a day for 3 days. 3g of powder twice in a day	Jaundice Menstruation	P, R, K
Bombax ceiba L. ANUBH01130	Burugu, Konda burugu	Bombacaceae	Tree	Bark	The extract of the bark taken orally.	Twice in a day.	Blood motion & Tuberculosis	P, R, D
Butea superba Roxb. ANUBH01159	Teega moduga	Fabaceae	Climbing tree	Bark and seeds	Prepare seed powder and taken orally with rice washed water Seeds are macerated with <i>Calotropis</i> latex & apply on sting area, it take offs poison. Barks boiled in water make extract and add sufficient sugar.	Once in a day Immediate after scorpion sting Take ½ tea glass size extract for about 15 days.	Intestinal worms Scorpion sting Menorrhagia	P, R, D
Caesalpinia bonduc (L.) Roxb. ANUBH01160	Gacha kaya	Caesalpiniaceae	Shrub	Seed	Prepare macerated paste by using seed dal and applied as lotion on lymph nodes. Seed dal is macerated with egg yolk and applied as lotion.	Twice in a day. Twice in a day.	Inguinal lymph nodes Hydrocele	P, D
Calotropis gigantea (L.) R.Br.	Tella Jilledu	Asclepiadaceae	Shrub	Leaves and	Leaf juices prepared from heated leafs and adds zinger	Apply twice/day	Tonsils	R, K

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
ANUBH01131				flowers	powder, applied as bandage over the tonsils, it removes swelling & tonsils. White <i>Calotropis</i> flower latex applied in the dental caries it relief's pain.	Once in a day	Dental caries	
<i>Canthium parviflorum</i> Lamk. ANUBH01124	Balusu	Rubiaceae	Shrub	Leaves and bark	Prepare extract by using bark or leaf and taken orally.	15 to 25g once in a day	Blood motions & Diarrhea	D
<i>Cassia auriculata</i> L. ANUBH01132	Thangedu	Caesalpiniaceae	Shrub	Flowers	Take equal amounts of shade dried Cassia flower powder & honey, make in to 2-3 g sized tablets. Prepare extract by taking equal parts of <i>Ficus hispida</i> bark & Cassia bark. Take ½ tea glass orally.	Taken orally both morning & evening about 30 days. 2-4 times/day	Polyuria Blood and gum motions.	R
<i>Cassia fistula</i> L. ANUBH01161	Rela or rella	Caesalpiniaceae	Tree	Leaves	Leaves are macerated with rice washed water & prepared ointment and applied as lotion. Make chutney by using leaves & taken with rice.	Apply twice/day Once in day	Leprosy Free motion and constipation	P, R, D
<i>Cassia occidentalis</i> L. ANUBH01133	Kasinthu	Caesalpiniaceae	Herb	Leaves	Prepare paste by grinding Cassia leaves, salt & Turmeric. Macerate the leaves with cow ghee & apply as band over eye reduces eye redness.	Apply twice/day Apply twice/day	Wound healer Conjunctivities	P, R, K, D
<i>Cassia tora</i> L. ANUBH01116	Tagirasa, tantepu rodde	Caesalpiniaceae	Shrub	Leaves and seeds	Macerated paste of Cassia grains apply on fore head as band reliefs' pain. Prepare leaf paste by using leaves & apply as lotion.	Apply twice/day Apply twice/day	Migraine headache. Honeybee sting.	P, R, K
<i>Cassia angustifolia</i>	Sunamukhi	Caesalpiniaceae	Shrub	Leaves	Prepare powder by mixing	One tablet/day at	Indigestion	P, R, K

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
<i>M. Vahl.</i> ANUBH01117					equal parts of fruit wall of <i>T. chebula</i> & Cassia leafs; add honey to this powder make in to 5g tablets and taken orally.	night only.		
<i>Centella asiatica</i> (L.) Urban. ANUBH01123	Saraswathi aku	Apiaceae	Herb	Leaves	Extract prepared by using boiling leaves of <i>Centella</i> and <i>Mentha</i> seeds.	Take 10 to 15 grams per day orally.	Motion and Fever.	P, D
					A table spoon of dried leaf powder taken orally with glass of milk.	Table spoon/day (3 to 4 days)	Jaundice	
					A table spoon of dried leaf powder with glass of butter milk.	Table spoon/day (use in 10 days)	Gonorrhoea	
<i>Cissampelos pareira</i> L. ANUBH01163	Chiruboddi, Vishaboddi	Minispermaceae	Climber	Roots	Take equal parts <i>Cissampelos</i> roots, <i>Aillanthus</i> bark, Garliccloves and <i>Cuminum</i> macerated in to paste and make it in to 5 g sized tablets.	Taken orally both morning and evening.	Fever	P, D
					Prepare mixture by mixing 5parts of <i>Cissampelos</i> root powder, pepper 5parts, Asafoetida 3parts, <i>Zinger</i> 3parts and add honey make in to 3 g sized tablets.	Taken orally 3 tablets/day	Indigestion	
<i>Cissus quadrangularis</i> L. ANUBH01164	Nalleru	Vitaceae	Climbing Shrub	Stem	Take <i>Cissus</i> stem boil in the pot and make in to juice, add honey to this and taken orally.	Once in a day	Hiccups	K, D
					Cut small piece from woody twiner and shade dried and make in to powder. To this add roasted <i>Pipper longum</i> powder and taken orally with honey.	Once in a day	Bronchitis & cough	
					10 g without surface layer of <i>Cissus</i> stem and <i>Phaseolus</i>	1g in both morning and evening.	Removes paralytic pains.	

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
					<i>aureus</i> seeds are macerated and taken orally.			
<i>Costus speciosus</i> (Koenig.) J.E. Smith. ANUBH01165	Basica dumpa, Changalava costu	Costaceae	Herb	Root tubers	Grinded tubers of <i>Costus speciosus</i> boiled in sessamum oil and filter the extract and prepare oil.	Used this oil as lotion twice in a day	Piles	P, D
					Prepare extract by mixing <i>Costus</i> tuber and <i>Ricinus</i> root bark with soured rice extract.	Once in a day	Headache	
<i>Curculigo orchioides</i> Gaertn. ANUBH01166	Nelathadi	Hypoxidaceae	Herb	Tubers	The paste prepared by using roots with gout milk, jaugary and applied as face pack.	Once in week.	Cosmetics	P, D
					Powder prepared by using tuber, from this 1.5 g to 3 g combined with milk & sugar and taken orally.	Once in a day.	Leucorrhoea and sperm wastage.	
					Take equal amounts of tuber and <i>Psoralea</i> seeds and prepare powder.	Take 1 gram daily morning and evening.	Deafness removal.	
<i>Curcuma angustifolia</i> Roxb. ANUBH01167	Palabitra dumpa	Zingiberaceae	Herb	Tuber	Take boiling milk add Palagunda & sugar stir it till it become semisolid. To this add Elachi powder make it into small size biscuits.(cut the curcuma tuber in to small pieces & keeps in water & sun dry it about 2 days, this is known as palgunda).	Once in a day	Venereal & menstrual Diseases.	D
<i>Curcuma longa</i> L. ANUBH01168	Pasupu	Zingiberaceae	Herb	Tuber	Prepare oil by mixing turmeric powder and neem oil, apply as lotion.	Apply twice in a day	Skin disease.	P, D
					Prepare turmeric water by mixing stem powder with water	Apply twice in a day	Conjunctivities	

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
<i>Datura metal</i> L. ANUBH01118	Ummetta	Solanaceae	Herb/Under shrub	Leaves and roots.	and used to clean the eyes. It reduces redness of eyes. Prepare extract by macerization of <i>Datura</i> leaves <i>Piper longum</i> with cold water and taken orally.	Once in a day	Filariasis	R, K
					Take north side roots of <i>Datura</i> plant grind them and mix with milk, jiggery, ghee and taken orally.	Once in a day	Mental recovery (use only in the presence of herbal doctor)	
<i>Eclipta alba</i> (L.) Hassk. ANUBH01119	Guntagalagara-ku	Asteracea	Herb	Whole plant	Prepare tablets by mixing with <i>Eclipta alba</i> whole plant powder with whole plant extract.	Taken orally twice in a day.	Blood motions	K
					Fish egg is taken with whole plant extract orally reduces xerophthalmia.	Once in a day for 7 days.	Xerophthalmia	
<i>Euphorbia hirta</i> L. ANUBH01120	Reddyvari nanudubalu	Euphorbiaceae	Herb	Leaf tips	Take 9 leaf tips of <i>Euphorbia</i> and add sufficient pepper, mix each other and make in to 1 g tablets.	Taken orally early in the morning.	Cold fever	R, K
					Prepare extract by mixing 5 g leaf juice, 5 g pepper and taken orally.	Once in day after menstruation for only 3 days.	Menstrual pain	
<i>Euphorbia trigona</i> Mill. ANUBH01169	Kattimandu	Euphorbiaceae	Shrub	Latex	Take equal parts of milky latex, oil and cow milk boil the contents till oil evaporated. Massage with this oil on paralytic hand reduces the pain.	Apply twice/day	Paralysis	D
					Collect the latex from stem and apply externally on cuts parts of the body, it clots the blood.	Apply at the time of cuts.	Wound healer and Blood clot.	

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
<i>Ficus religiosa</i> L. ANUBH01134	Ravi chettu	Moraceae	Tree	Leaves	Leaves are boiled in water for about one hour and applied for healing of wounds.	Twice per day.	Healing of wounds	R, K
<i>Gloriosa superba</i> L. ANUBH01170	Potti dumpa, Adavi nabi	Liliaceae	Herb	Root tuber	Root tuber pastes with kerosene apply on scorpion bite area.	Twice in a day.	Scorpion bite.	Poisinuous plant(utmost care needed before use of the plant) P, D
					Prepare root tuber paste by using pomegranate juice and keep in hot oven until it becomes ash. These ashe mixed with lemon juice and apply on piles area.	Twice in a day.	Piles	
<i>Gymnema sylvestre</i> (Retz.)R.Br.ex.Schultes.. ANUBH01171	Podapatri	Asclepiadaceae	Climber	Leaves	Prepare powder by using equal amount of leaf powder and <i>Syzigium</i> seed powder. Prepare solution by using leaves and pour 2 to 4 drops into eye of animal to cure watery eye.	1 gm. with glass of water in morning and evening. Two times per day.	Diabetes Animal eye diseases.	P, R, D
<i>Hemidesmus indicus</i> (L.) R.Br. ANUBH01172	Pala sugandi or avu sugandi	Asclepiadaceae	Climber	Root	Prepare extract by mixing 2 parts of roots and 1 part ghee. Prepare extract by using root bark and apply on diseased area. Use this extract to prepare tablets.	Take orally once in a day. Apply lotion Two times in a day. Take one tablet with milk.	Rat poisoning Herpetic	P, R, K, D
<i>Holarrhena antidysenterica</i> (Roth) Wall. ex A. DC. ANUBH01173	Kodisa pala or pala chettu.	Apocyanaceae	Tree	Bark & roots.	Make extract by taking equal amounts of stem bark of <i>Holarrhena</i> , <i>Calotropis</i> and <i>Nerium</i> .	Apply lotion Two times.	Wound cleaning	P, R, K, D
					Prepare extract by using root bark and taken orally with curd.	Once in a day.	Dissolves renal stones.	
<i>Hybanthus enneaspermus</i> (L.) J.	Nelakobbari, ratnapurusha	Violaceae	Herb	Leaves	Prepare paste by mercuration of leaves and stalks. Use this	Twice in a day.	Filariasis	P, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
Muell. ANUBH01102								
<i>Ipomoea mauritiana</i> Jacq. ANUBH01174	Palagummadu	Convolvulaceae	Climber	Root tuber	paste as lotion over filarial parts. Prepare powder from shade dried tuber pieces. Take 2 spoonful powder with fresh toddy (alcoholic product of <i>Borassus flabellifera</i>) enhances the milk production in delivery women's.	Once in a day	Lactation	P, D
<i>Lannea coromandelica</i> (Houtt.) Merr. ANUBH01175	Gumpena	Anacardiaceae	Tree	Bark	Bark and 7 pepper seeds grinded and prepared as 1 g size tablets.	Take two tablets per day.	Blood motions	R, D
<i>Lawsonia inermis</i> L. ANUBH01103	Gorinta	Lythraceae	Tree	Leaves	A paste of leaves and piece of soap applied for swellings or sprains. Prepare oil by boiling leaves in coconut oil or sesamum oil. Leaf paste applies on the surface of the nail.	Twice in a day. Once in a month	Sprains and swellings. Hair fall &and blackening hair. With low and Herpetic	P, R, K
<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr. ANUBH01176	Vippa, Ippa	Sapotaceae	Tree	Flowers	Prepare extract using flowers; add ¼ part honey pour in to pot. Keep this pot below the soil for 1 month. Prepare flower powder and Take 1 tea spoon with glass of milk	Take orally 1-2 ounce in a day Twice in a day.	Mucoid stools. Enhances male Fertility.	D
<i>Mimosa pudica</i> L. ANUBH01104	Attipatti	Mimosaceae	Shrub	Leaves	Take 4 grams of a <i>Mimosa</i> leaves, black pepper and cup of water, macerate and filtered extract consume orally early morning. The extract applied as a bandage around the filarial leg. It removes pain and boils.	Once in a day early morning for about 30 days.	Filariasis	P, K

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
<i>Mirabilis jalapa</i> L. ANUBH01177	Mogga malle, chandrakantha	Nyctaginaceae	Shrub	Leaves and root tubers	Prepare paste by using root tuber and black pepper in equal amounts and form 1 g size tablets.	Take one tablet at morning & evening daily for 10 days.	All diseases.	R
					Take castor oil on to the surface of the leaf and heat the leaf, place in gonorrhoeal wounds.	Once in a day.	Gonorrhoea wounds.	
<i>Momordica dioica</i> Roxb.ex.Willd ANUBH01105	Agakara	Cucurbitaceae	Climber	Leaves and root tubers	Tuber is macerated with honey and prepare as lotion. Leaf juice is poured in <i>Ricinus</i> oil and boiled the contents and used as massage oil for joint pains.	Apply the lotion twice in a day on fore head. Twice in a day.	Headache. Arthritis	R
<i>Mucuna pruriens</i> (L.) DC. ANUBH01178	Dulagondi	Fabaceae	Climbing vine	Seeds	Prepare powder by taking equal parts of <i>Mucana</i> grains, <i>Tribulus</i> grains, seeds of <i>Hygrophila</i> , <i>Asparagu</i> roots, <i>Curculago</i> tuber.	One spoon powder taken orally with cow milk once in a day.	Enhances male fertility.	P, D
<i>Ocimum basilicum</i> L. ANUBH01106	Sabja, rudrajeda tulasi	Lamiaceae	Shrub	Leaves and roots	The grains are soaked in water about 6 hours till they become imbibed & taken orally with sugar.	Once in a day.	Body coolants	P, D
					Prepare extract by using roots and taken ¼ tea glass orally.	Once in a day.	Constipation	
<i>Ocimum sanctum</i> L. ANUBH01107	Tulasi	Lamiaceae	Shrub	Leaves	Prepare juice by using leaves and taken orally with honey.	Both morning and evening	Cough with mucous	P, R, K, D
<i>Operculina turpethum</i> (L.) Silva Mansu. ANUBH01179	Tegada	Convolvulaceae	Twiner	Roots	Prepare powder mixture by mixing 3 parts of white <i>Operculina</i> roots and one part of <i>zingiber</i> , <i>pipper</i> mixture, <i>Phyllanthus</i> fruit wall, elachi, <i>Cinnamom</i> powder mixture	Take 3 to 5g orally twice in a day	Piles and constipation	D`

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
<i>Pergularia daemia</i> (Forsk.) ANUBH01108	Dustapu teega	Asclepiadaceae	Climber	Roots and latex	Make extract using twining root of <i>Pergularia</i> and sessam seeds.	Take 2g of extract orally once in a day.	Dysmenorrhoea	P, R, K, D
					Make extract by mixing <i>Coleous</i> and <i>Cuminum</i> seeds with <i>Pergularia</i> latex.	1g with hot water once in a day	Constipation	
<i>Phyllanthus amarus</i> Schum.& Thonn. ANUBH01109	Nela usiri	Euphorbiaceae	Herb	Whole plant and Leaves	Prepare juice from whole plant by mixing with curd or butter milk taken orally.	Daily early morning one glass.	Jaundice	P, R, K, D
					Prepare paste by using leaves and make in to 3 g size tablets and taken orally.	One tablet/day.	Motions	
					Prepare paste by using leave of <i>Phyllanthus</i> and <i>Trigonella</i> seeds and make in to 2 g size tablets.	Three times per day with a cup of curd.	Blood motions	
<i>Phyllanthus emblica</i> L. ANUBH01110	Usiri kaya	Euphorbiaceae	Tree	Fruits	Prepare mixture by mixing 120 g fruit wall of <i>Phyllanthus emblica</i> , 120 gm <i>Terminalia.chebula</i> , 60 g <i>T.bellarica</i> powder and 270g sugar pellets.10 g of this powder taken orally with water.	Twice in a day.	Indigestion	P, R, K, D
					Fruit macerated paste applied as band below the abdomen relieved the urinary tract pain and irritation.	Twice in a day.	Urinary tract irritation & pain.	
<i>Piper longum</i> L. ANUBH01181	Pippali	Piperaceae	Herb	Root and pods	Take equal parts of roots and pepper make into powder and ½ g of this powder taken orally with milk. This promotes lactation.	Once in day at night time	Galactagogue	Cultivated
					Take equal parts of <i>Asaftoida</i> , rock salt, <i>Terminalia</i>	½ tea spoon taken orally both morning	Stomachache	

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
					<i>chebula</i> fruit wall, Pippali prepare in to powder.	& evening.		
<i>Piper nigrum</i> L. ANUBH01180	Meriyalu	Piperaceae	Climbing shrub	Seeds	Prepare 2 mg size tablets by maceration of equal parts of pepper and <i>Holarrhina</i> root bark.	Taken orally 3 times in a day for 3 days.	Gum motions	Cultivated
<i>Plumbago zeylanica</i> L. ANUBH01143	Tella chitramulamu	Plumbaginaceae	Shrub	Root bark	Prepare powder by using root & taken orally with Honey. Mixture prepared by mixing equal amounts of root bark of <i>plumbago</i> , <i>zingiber</i> Pepper, rocksalt, <i>Coleous</i> powder.	1g in a day. 4grams twice/day	Obesity Indigestion.	P, D
<i>Pongamia pinnata</i> (L.) Pierre. ANUBH01142	Kanuga chettu	Fabaceae	Tree	Seeds and bark	Prepare juice by mixing bark juice of <i>Pongamia</i> and <i>Phyllanthus</i> and taken orally with sugar. The seeds are macerated with water and applied as lotion over diseased parts of skin.	¼ tea glass taken once in a day Apply Twice in a day.	Small pox Scabies	P, R, K, D
<i>Pueraria tuberosa</i> (Willd.) DC. ANUBH01150	Nelagummadu, Vidari	Fabaceae	Climbing vine	Tubers	Prepare powder by using tubers and taken orally with cow ghee. Prepare powder by taking equal parts of <i>Pueraria</i> tuber and <i>Asparagus</i> root taken orally with milk.	3-5gm three times/day Take one spoon both morning & Evening	Reduces sperm discharge Menustral & pregnancy problems.	D
<i>Randia dumetorum</i> (Retz.) Poir. ANUBH01149	Manga chettu	Rubiaceae	Tree	Pods	Take equal parts of <i>Randia</i> pods and <i>Katukarohini</i> (<i>Picrorrhiza kurroa</i>) macerate with hot water apply as band over the stomach.	Twice in a day.	Stomachache	D
<i>Rauwolfia serpentina</i> (L.) Benth.ex Kurz.	Sarpagandi	Apocyanaceae	Shrub	Root bark	Make powder by using 100 g root bark of <i>Rauwolfia</i> , 200 g	Take one tablet daily morning and	Blood pressure reduces.	P, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
ANUBH01148					<i>Phyllanthus</i> powder without seeds, 50 g katukarohini (<i>Picrorrhiza kurroa</i>). Add sufficient amount of <i>cuminum</i> extract and make in to tablets.	evening		
<i>Ricinus communis</i> L. ANUBH01141	Amudamu	Euphorbiaceae	Shrub	Leaves and seeds	Prepare tablets by mixing leaf tips of <i>Ricinus</i> and pepper paste.	Take one tablet once in a day for three days.	Jaundice	P, R, K, D
					Prepare tablets by grinding <i>Ricinus</i> seeds and sugar.	One tablet twice/day	Arthritis	
<i>Sapindus emarginatus</i> Vahl. ANUBH01140	Kunkudu	Sapindaceae	Tree	Flowers	Make a powder from shade dried flowers. Taken orally 1 g of this powder with 1 spoon sugar.	Twice/day both morning & evening.	Menorrhagia	P, R, K, D
<i>Semecarpus anacardium</i> L.f. ANUBH01147	Nallajeedi	Anacardiaceae	Tree	Seed	Prepare oil by mixing pod juice of <i>Semecarpus</i> and Sesamum oil.	Massage the paining part with this oil twice in a day.	Arthritis	P, R, D
					Take pod juice by using pin and applied as lotion over foot cracks and soul pains.	Twice in a day.	Foot and soul pain	
<i>Solanum nigrum</i> L. ANUBH01139	Kamanchi, gajukura	Solanaceae	Herb	Whole plant and leaves	Whole plant dry in shade area & make into powder, taken orally one table spoon.	Both morning & evening for about 3 days.	Jaundice	R
					Prepare leaf juice by using young leaves.	Apply twice in a day	Swelling (due to water accumulation)	
<i>Soymida febrifuga</i> (Roxb.) A.Juss. ANUBH01187	Somita	Meliaceae	Tree	Bark	Prepare extract from 20 g of bark powder and taken ½ tea glass orally.	Morning and evening for 4 days.	Menstrual pain.	P, R
<i>Sphaeranthus indicus</i> L.	Bodatharam, kodipenu	Asteraceae	Herb	Whole	Prepare extract by using whole	Taken orally 20ml of	Migraine	P, R

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
ANUBH01138	mokka			plant and leaves	plant. Prepare oil by mixing leaf juice and coconut oil.	extract before lunch for 7 days. Hair tonic for about 1 month	headache Blackening of hair	
<i>Strychnos nuxvomica</i> L. ANUBH01162	Mushini, vishamushti	Strychnaceae	Tree	Seeds and fruit pulp	Seed are heated till it become black soot and grinded, make it in to powder. Lotion prepared by using fruit pulp & turmeric.	½ tea spoon of powder taken orally with milk once in a day. Once in a day.	Leucorrhoea. Cosmetics & Foot cracks.	P, R, D
<i>Syzygium cumini</i> (L.) Skeels. ANUBH01186	Neredu	Myrtaceae	Tree	Leaves and seeds	First seeds are heated then make powder. Add a spoon of seed powder and tadi (<i>Borassus flabellifera</i>) jagery to cup of milk and make it coffee like. Prepare bark extract and take with sugar. 2 g of Seed powder with glass of water. Prepare extract by using leaf tips of <i>Syzygium</i> and mango, take with sugar or honey and reduces the vomiting.	Take two times per day. Take two times per day. Take three times per day. Take three times per day.	Diabetes Leucorrhoea Heavy motions Vomiting	P, R, D
<i>Terminalia arjuna</i> (Roxb.ex.Dc.) wt & Arn. ANUBH01144	Tella maddi or yeti maddi	Combretaceae	Tree	Bark and leaves.	Extract of bark is mixed with ghee and applied on breakage portion of the bone. Bark boiled in milk and add little amount of ghee and honey. Leaves extract applied as a lotion to reduce joint pains.	Once in a day Once in a day Once in a day	Bone fracture Blood motions and heart diseases. Arthritis pains.	P, R, D
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Tani, Tademanu	Combretaceae	Tree	Pods and seed	The roasted pods with salt taken orally. Seed inner part is taken with	Once in a day. Take 1 gm 3 times in	Diarroehoea Dissolve stones in	P, R, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
ANUBH01145					thatikallu (alcoholic liquid of <i>Borassus flabellifera</i>). Seed powder	a day. 0.5 g taken orally in a day.	kidney. Cough and bronchitis.	
<i>Terminalia chebula</i> Retz. ANUBH01146	Karakaya	Combretaceae	Tree	Fruits	Take equal amounts of Powder of fruit and Juagery to prepare paste. Fruit only taken orally.	Small balls prepared and taken after meal per day two times. Single fruit every day two times. Continue up to two months.	Blood piles Indigestion	P, R, D
<i>Tinospora cordifolia</i> (Willd) Miers.ex Hook.f & Thoms. ANUBH01182	Kodipudi teega or teppa teega.	Minispermaceae	Climber	Stem and leaves	Prepare extract by using leaf and stem. The leaves grind and form paste.	A cup of extract in the morning and evening every day. A small amount of past taken orally every day morning with glass of butter milk.	Fever Jaundice	P, R, D
<i>Tribulus terrestris</i> L. ANUBH01137	Palleru	Zygophyllaceae	Herb	Whole plant and Leaves	Leaf juice prepared by grinding leaves with water & taken orally. Prepare wholeplant extract & add ¼ part sesamum oil to this extract, used as massage oil for arthritis.	½ cup both morning and evening Apply twice in a day.	Dissolve renal stones Arthritis	R, K
<i>Vitex negundo</i> L. ANUBH01183	Vavili	Verbenaceae	Tree	Leaves	Prepare extract by using leaves. Take 4 parts of this extract and 1 part of cow ghee boil it till the extract removal. Take leaf and sesamum oil into dish and boil and add syndava salt (rock salt) & old	2g of this ghee twice in a day. Clean the ear with cotton and pour two drops per day in 3 to	Tuberculosis Ear nerve wound discharge.	P, D

Species name/Voucher specimen code	Local name (in telugu)	Family	Habit	Parts used	Preparation & Mode of use	Dosage	Medicinal use	Found in Sacred grove
					jaggery. Prepare curry by using leaf tips and ghee.	4 days. Eat a cup of curry with rice once in day per/ week.	Blood piles & red discharge(over bleeding)	
<i>Withania somnifera</i> (L.) Dunal ANUBH01184	Penneru	Solanaceae	Shrub	Roots	Prepare powder by taking equal parts of roots and sugar pellets. Prepare root powder and add little amount of sugar pellets powder, ghee and taken orally.	Morning and evening for few days. Once in a day for 40 days	To overcome anaemia Increases Sperm count.	D
<i>Woodfordia fruticosa</i> (L.) Kurz ANUBH01185	Jaji, Arepuvvu	Lythraceae	Shrub	Flowers	2 g sized tablets are prepared by the maceration of flowers and taken orally with rice water.	Once in a day	Menorrhagia	P
<i>Wrightia tinctoria</i> R.Br. ANUBH01136	Aku pala	Apocyanaceae	Tree	Leaves	Prepare leaf extract and taken ½ tea glass orally.	Once in a day	Stomachache	R, K
<i>Zingiber officinale</i> Roscoe. ANUBH01135	Sonti	Zingiberaceae	Perrenial herb	Stem	Dried pieces are soaked in cow butter over night. These soaked pieces are macerated and prepared in to 5 g sized tablets.	Two tablets in a day in Two days.	Blood motions	P

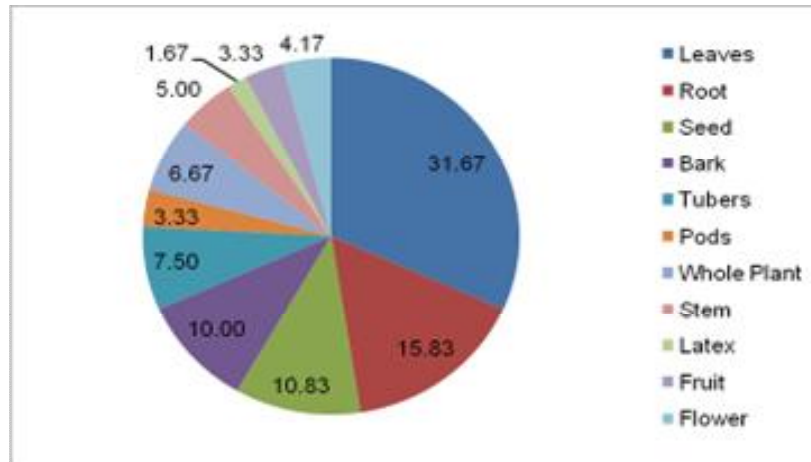


Fig. 3. Number of medicinal remedies prepared from different plant parts



Plate 1. Some of the important medicinal plants observed in present study

3.3 Fidelity Level of Medicinal Plants

The Fidelity Level of medicinal plants is useful to explain preferred species used for treating certain ailments. Medicinal plants with high FL values are those widely used by the local practitioners. The category that has the highest

FL value were *Gymnema sylvestre* (100%) and *Andrographis paniculata* (100%), followed by *Phyllanthus amarus* (91%); the lowest was *Woodfordia fruticosa* (46%). The fidelity level calculated for medicinal plants are showed in Table 3.

3.4 Threats to Medicinal Plants

It is observed that various threat factors responsible for degradation of study area are listed in Table 4. "Podu cultivation/and burn agriculture" is one of the major threat factors observed. "Other factors such as fuel wood, mono cultivation, lack of awareness in public with regards medicinal plants, over exploitation and

drought" (Plate 2). Globally, consequent loss of medicinal plant species due to Agricultural encroachment from natural habitat was reported [30]. The conservation effort to medicinal plants in the study area is very poor and Forest department activities like monocultivation of some timber yielding plants (Teak, Eucalyptus) are also cause depletion of medicinal plants.

Table 3. Fidelity level of medicinal plants used by tribal people of sacred groves, East Godavari, Andhra Pradesh, India

Plant species	Family	Therapeutic uses	No. of informant (Ip)	Total no. of informants (In)	Fidelity level (%)
<i>Acorus calamus</i> L.	Araceae	Cough & cold	11	14	78
<i>Adathoda zeylanica</i> Medic.	Acanthaceae	Asthma	7	13	54
<i>Andrographis paniculata</i> (Brum.f.) Nees.	Acanthaceae	Malaria	6	6	100
<i>Cassia fistula</i> L.	Caesalpinaceae	Anal diseases	7	14	50
<i>Curcuma longa</i> L.	Zingiberaceae	Skin diseases	9	11	81
<i>Gloriosa superba</i> Linn.	Liliaceae	Scorpion sting	4	10	40
<i>Gymnema sylvestre</i> (Retz.)R.Br.ex.Schultz.	Asclepiadaceae	Diabetes	7	7	100
<i>Hemidesmus indicus</i> (L.) R.Br.	Asclepiadaceae	Herpetic	4	7	54
<i>Phyllanthus amarus</i> Schum. & Thonn.	Euphorbiaceae	Jaundice	10	11	91
<i>Soyimida febrifuga</i> (Roxb.ex.DC.)Wt & Arn.	Meliaceae	Menstrual pain	6	13	46
<i>Strychnos nux vomica</i> L.	Strychnaceae	Leucorrhoea	9	13	69
<i>Terminalia arjuna</i> (Roxb.ex.Dc.)	Combretaceae	Bone fracture	5	7	71
<i>Terminalia chebula</i> Retz.	Combretaceae	Blood piles	6	9	66
<i>Woodfordia fruticosa</i> (L.)	Lythraceae	Mennoergia	4	9	45

Ip = number of informants who use a species for a specific ailment *I*,
In = total number of informants who mentioned the plant for any other use

Table 4. Threat factors of medicinal plants reported by local people of sacred groves, East Godavari, Andhra Pradesh, India

Factors	Respondents				Total	Percentage (%)
	S1	S2	S3	S4		
Poducultivation (Burn agriculture)	5	10	6	5	26	19.25
Fuel wood	4	6	5	4	19	14
Monocultivation of plants like teak, Eucalyptus etc., by forest dept.	6	5	3	4	18	13.33
Lack of awareness in public with regards Medicinal plants	3	5	5	3	16	11.85
Over exploitation	3	3	4	5	15	11.11
Forest fires	3	5	3	2	13	9.6
Drought	2	2	1	1	6	4.4

S1= Rampa, S2= Pedda konda, S3= Dumma konda, S4 Korukonda



Plate 2. Podu cultivation in studied areas



Plate 3. Local market in study area

3.5 Marketability of Medicinal Plants

In paradigm shift to herbal medicines and increasing demand for natural products is resulted growing dependence on forests that are rich source of these medicinal plants. Plant resources of Indian arid zones for industrial uses are explored by Paroda [31]. Medicinal plants are sold by various organizations from local cultivators (Plate 3 above). The market survey

was carried out by interviews with local cultivators, annual yield and local price are listed in Table 5. Similarly, a preliminary study of medicinal plants and plant products in markets was carried out in central Ethiopia [32]. The data indicates the commercial gathering of medicinal plant products in large amount likely causing a rapid depletion of medicinal plant species. Similar observations were reported by scholars [33,34].

Table 5. Market Assessment of important medicinal plants species of study area

Botanical name	Parts used	Approximate annual yield (per plant in Kg.)	Price per Kg
<i>Andrographis paniculata</i> L.	Whole plant	50 Plants	15-00
<i>Cassia fistula</i> L.	Bark	5	10-00
<i>Gloriosa superba</i> Linn.	Tuber	4Plants	250-00
<i>Phyllanthus emblica</i> L.	Fruit wall	30-50	65-00
<i>Plumbago zeylanica</i> L.	Root	10Plants	70-00
<i>Semicarpus anacardium</i> L.f.	Seed	400	5-00
<i>Sterculia urens</i> L.	Latex	2	60-00
<i>Strychnos nux</i> L.	Seed	50	50-00
<i>Strychnos nux vomica</i> L.	Seed	15	50-00
<i>Terminalia arjuna</i> (Roxb.ex.Dc.)	Bark	20	15-00
<i>Terminalia bellerica</i> (Gaertn.) Roxb.	Fruit wall	500	8-00
<i>Terminalia chebula</i> Retz.	Fruit	200-400	9-00
<i>Tinospora cordifolia</i> (Willd.) (Miers.ex Hook.f & Thoms.	Stem	2-3	8-00
<i>Woodfordia fruticosa</i> (L.)	Flower	2-3	60-00

4. CONCLUSION

The study indicates that sacred groves have plenty of medicinal plants to treat a wide spectrum of human ailments. For some chronic diseases ethnomedicine only tackles the problem. Hence traditional medicinal knowledge is important for discovery of new drugs and human healthcare. In tribal areas of India the traditional medicine contributes to improve living standards of poor people. In present study there was a 87 plant species of medicinal importance were identified and used for 52 different human ailments. Among all the plant parts leaves are mostly used for drug preparation. It was observed that the medicinal plants used by traditional practitioners for the preparation of medicine were collected from the wild, seed generated, and root parts used for medicine preparation. Harvesting of roots is a big threat to conservation of medicinal plant diversity. Hence sustainable harvesting is an urgent need to conserve medicinal plant diversity. Documentation of medicinal plants status by forest department is needed for conservation of medicinal plants because they are good model of in-situ conservation of biodiversity and medicinal plants. The programmatic approach is necessary. Hence in present study we created awareness among the local practitioners regarding conservation strategies with the help of non government organization such as Laya Foundation, and with biology graduates of local colleges, who belong to different tribal communities.

5. RECOMMENDATIONS

On the basis of our findings we suggest the following points:

- 1) Utilization of plant species as fuel wood can be significantly reduced by substitution with solar power by governments at low cost.
- 2) Recording of medicinal plants status by the forest department is needed to conservation of medicinal plants.
- 3) Introducing biodiversity management committee (village level) by forest department with primary tribal group to conserve biodiversity.
- 4) Identifying threatened medicinal plants through investigations and encouraging the cultivation of these plants.
- 5) Reorganization of the traditional medicine system and traditional healers association (Adivasimulika Vydula Sangam in study area) by the governments will be needed for ethnobotanical health care.
- 6) Government should come forward to encourage the traditional healers by providing some honorarium every month and establishing Traditional Health care hospitals.

CONSENT

Basing on all the tribal rights we have taken prior permission from local tribal doctors to use the data given by them.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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