



# Intracultural Cognizance of Medicinal Plants of Warangal North Forest Division, Northern Telangana, India

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## Research

### Abstract

Differences in the traditional botanical knowledge of Koya communities inhabiting Eturnagaram Wildlife Sanctuary (Warangal North Forest Division) are investigated. Eighteen villages (16 within the wildlife sanctuary and two outside it) were selected to test the null hypothesis that there exist no cognitive differences among the ethnic inhabitants in their ability to recognize the plants and recall the vernacular names and medicinal uses since they are recipients of the same dry deciduous forest ecosystem services. The Koyas were found to use as medicine 237 species in 66 angiosperm families. Analyses of data gathered from villagers showed that there is significant intracultural diversity in terms of taxonomic groups and growth forms in regard to utilizing the proximate plant resource for their primary healthcare and disease treatment of pets.

for treating and preventing diseases or ailments in their communities (Ruelle & Kassam 2011). Therefore, intracultural cognizance should be studied at local, regional, and global scales to determine knowledge loss. There are few studies on intracultural cognizance of ethnic communities in India, let alone Koya community of southern India.

The objectives of this study are: (i) documentation of the medicinal plant knowledge of the Koya communities native to Godavari River Valley; (ii) analyses of the medicinal plants used by Koyas in terms of taxonomic diversity, growth forms, and nativity; and (iii) realization of, if any, intracultural differences in medicinal plant knowledge.

### Introduction

Biocultural diversity is a source of adaptive capacity since it represents the range of possibilities for humans to sustain communities in dynamic landscapes (Harmon 2002). The survival of a particular community may depend on diversity at local scales (Kassam 2009). Indigenous knowledge systems are therefore increasingly appreciated for their ability to anticipate, recognize, and respond to change (Ruelle & Kassam 2011, Turner & Clifton 2009). Moreover, while communities may rely on variation in knowledge to adapt to social and ecological changes, there has been meager attention paid to differences within cultural groups (Ruelle & Kassam 2011).

It is the common experience of traditional knowledge gatherers all over the globe that the consumption or utilization of non-cultivated plants has declined because younger generations are not learning how to gather them

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### Study site

The North Forest Division of Warangal (Northern Telangana, Andhra Pradesh, India) lies between 17°29'16" and 18°36'20"N and 78°49'49" and 80°40'13"E (Figure 1). The division has a geographical area of 8,687.81 km<sup>2</sup> which is 67.6% of the total area of the district (12,847 km<sup>2</sup>). Elevation is between 266 and 518 m, with a general SE slope along which surplus waters drain into the river Godavari. The climate is tropical, generally dry with temperature ranging from 15°C to 45°C and annual rainfall of 1182 mm, received mainly through south-west monsoon. Soils are primarily black cotton, loamy, sandy, and red chhalaka. The population of the division is 2.57 million with a population density of 296 individuals per km<sup>2</sup> (Anonymous 2011a). The area under forest cover is 2,310 km<sup>2</sup>, 27% of the total geographical area of the division. The forest canopy density categories are moderately dense forest (953 km<sup>2</sup>), open forest (1015 km<sup>2</sup>), scrub (91 km<sup>2</sup>), and non-forest (244 km<sup>2</sup>). Water bodies occupy 6.7 km<sup>2</sup> whereas reserved, protected, and un-classed forest categories cover 1,579 km<sup>2</sup>, 709 km<sup>2</sup>, and 22 km<sup>2</sup>, respectively (Anonymous 2011b). The forest division has six ranges: Bhupalapally North, Eturnagaram, Tadvai, Pasra, Mulugu, and Warangal. The study site is in Tadvai and Eturnagaram ranges which include Eturnagaram Wildlife Sanctuary (Figure 1).

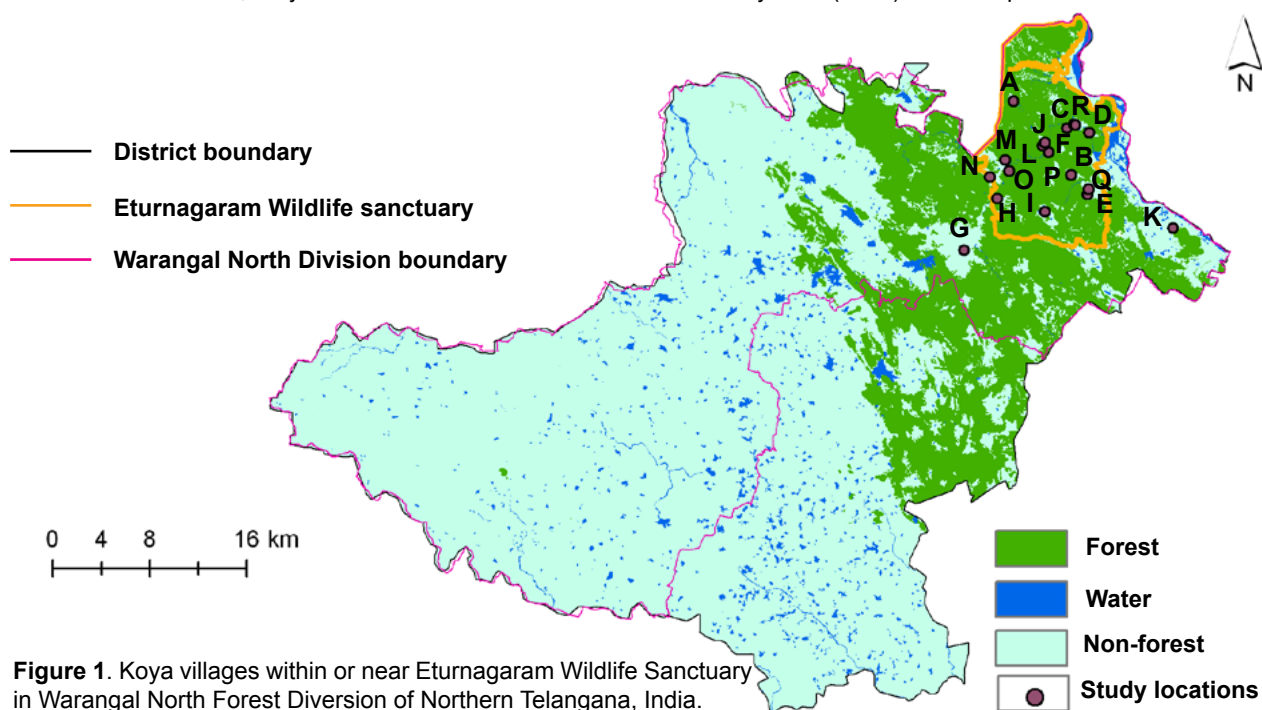
### Demography of study site

The state of Andhra Pradesh, India, has 33 (+2) scheduled tribes. Of these, Koyas are endemic to Godavari

Valley and are descendants of Gonds of central India (Sreeramulu 2009). They constitute a major endemic ethnic community whose medicinal plant knowledge is documented for intracultural study in the reserve forest area along the southern bank of the Godavari River, which lies between 18°10' and 18°26' N and 80°09' to 80°33' E (Figure 1). Land cover of the region supports two types of economic activity, namely seasonal agriculture (including podu [shifting] cultivation) and harvesting of forest produce (non-timber forest products).

### Research motivation

An impetus to conduct ethnobotanical research in India was provided by the Ministry of Environment and Forests through the sanction of "All India Coordinated Research Project on Ethnobiology (AICRPE 1992–1998)." The project began with states starting with "A" such as Andhra Pradesh, Arunachal Pradesh, Andaman and Nicobar islands, etc. (Raju 2013). It paved the way for the first scientific and authentic work on ethnobotany of Eastern Ghats of Andhra Pradesh through the doctoral work by Rao (1988), whose findings were later published as a book (Rao & Henry 1996). Rao (1988) visited Thupakulagudem village, which is part of Eturnagaram Wildlife Sanctuary, to document Koya ethnobotanical knowledge as part of intercultural study across the Eastern Ghats. Another intercultural study in the district was that of Reddy *et al.* (1998) on the ethnoveterinary phytomedicines. Later, Reddy *et al.* (2008) reported the phytotherapy practiced by Gonds, and Murthy *et al.* (2007) listed the plants used in ethnobot-



**Figure 1.** Koya villages within or near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division of Northern Telangana, India.

Koya villages: **A.** Ailapur, **B.** Allamvari Ghanpur **C.** Banojibandam, **D.** Chalpaka, **E.** Chinnaboinapally, **F.** Dodla, **G.** Gandhinagar, **H.** Gonepally, **I.** Kamaram, **J.** Kondai, **K.** Mallur, **L.** Malyala, **M.** Medaram, **N.** Narlapur, **O.** Oorattum, **P.** Shapally, **Q.** Venkatapuram, and **R.** Yelishettipally.

erinary practices by Koyas of Pakhal Wildlife Sanctuary, which is part of the Warangal South Forest Division in the district. Recently, Sreeramulu (2009) compared the TBK of the local people of neighboring Nalgonda and Warangal districts in the region and demonstrated that those of the latter district are more knowledgeable of ethnobotanical plants. The present study adds to this body of knowledge by highlighting the medicinal plant usage of Koyas from villages near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division.

## Methods

### *Ethnic villages*

Within the study area, 18 villages (Table 1) were chosen based on landscape heterogeneity, predominance of Koya inhabitants, and current use of local plants for medicinal purposes. The villagers are more or less equally impacted by village remoteness (proximity to the highway and developed towns with modern hospital facilities) and social and ecological changes. Mallur is one of two villages selected from outside the wildlife sanctuary to the southeast (18°13'08.4"N, 80°33'29.9"E). Although Mallur enjoys an almost similar physical environment, it is more culturally mixed (non-ethnic people) than other villages.

Moreover, Mallur village is also a medicinal plants conservation area (MPCA) and has a sacred grove (a non-ethnic [Hindu] temple) on a hill following the Chinthamani stream. Gandhinagar is the other control village located outside the wildlife sanctuary (18°10'30.1"N, 80°09'25.4"E) but is relatively far from the Godavari River in the southwest direction. An open degraded forest surrounds this village (Figure 1).

A premise of this study is that the ability to find and recognize medicinal plants is need-based and could be the same among villages but still vary with ethnic group and nature of forest habitat. The plants in a given habitat can be "apparent" (perennial and woody) or "non-apparent" (herbaceous which disappear at the end of the season; geophytes). The present study ensured that the sites (villages) compared are similar and there is minimal temporal difference in the data gathered. It is against this background that the levels of medical aid available and economic status of the ethnic peoples are the same for the villages. Therefore, it was presumed that the medicinal plant knowledge of the local people is homogeneous as well.

### *Ethnic interviews and informants*

Ethnobotanical/ethnomedicinal data were collected through household surveys, questionnaires, and semi-

**Table 1.** Demographic information of Koya informants from 18 villages within or near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division of Northern Telangana, India. Number of informants (#). Gender: male (M), female (F).

Village	Gender	#	Age (yrs)	Village	Gender	#	Age (yrs)
Mallur	M	6	52, 55, 72, 64, 45, 38	Yelishettipally	M	5	50, 53, 57, 41, 44
	F	4	45, 32, 38, 43		F	3	37, 46, 57
Kamaram	M	4	63, 59, 41, 48	Banojibandam	M	2	44, 53
	F	3	41, 37, 44, 55		F	1	54
Venkatapuram	M	4	52, 59, 64, 51	Chalpaka	M	5	51, 57, 59, 65, 48
	F	2	48, 42		F	4	64, 53, 48, 52
Chinnaboinapally	M	5	70, 84, 79, 68, 55	Allamvari Ghanpur	M	6	55, 48, 66, 45, 68, 76
	F	2	53, 57		F	2	58, 63
Shapally	M	6	40, 65, 50, 48, 70, 62	Narlapur	M	3	40, 77, 50
	F	2	55, 48		F	4	46, 38, 65, 45
Dodla	M	5	64, 58, 54, 62, 48	Medaram	M	6	60, 65, 40, 48, 64, 65
	F	3	35, 42, 57		F	4	48, 70, 55, 58
Malyala	M	7	55, 40, 44, 64, 39, 51, 56	Oorattum	M	3	68, 46, 55
	F	5	48, 69, 58, 49, 54		F	2	42, 49
Kondai	M	8	58, 48, 46, 53, 42, 55, 66, 63	Gonepally	M	2	70, 64
	F	2	49, 56		F	2	55, 40
Ailapur	M	3	42, 39, 45	Gandhinagar	M	2	68, 55
	F	3	48, 54, 52		F	1	48

structured and open-ended interviews. The interviews held for each village included a minimum of three informants (both genders) of the Koya community who were requested to gather in the village commons or one of their homes. The same questions were put to all informants selected for the study. Repeated (common or shared) uses and unique uses for plant species or disease categories were documented. Informants were shown plant specimens or pictures of species listed by other villages. To avoid variation in seasonal availability of medicinal plants, the study was conducted in the same season for all the sites. The 131 informants were all 32–84 years of age (Table 1). The criteria for informant selection were: (i) village residents for at least two decades, with a family hierarchy; (ii) podu cultivators or settled agriculturists; (iii) cattle owners; (iv) midwives; and (v) local healers (vaidyas or health-care practitioners).

#### **Data collection and PIC**

The study of indigenous knowledge usually relies on interactions with a few members of the community to represent the knowledge held by the entire community. Many ethnobotanists adopt the cultural consensus model developed by Romney *et al.* (1986). Although this model has some limitations, it devalues differences in knowledge and focuses on consensus and was thus adopted for the present study.

Prior informed content (PIC) is an important concern underlying the philosophical and political environment of bioprospecting research involving indigenous societies (Rosenthal 2006). A scientific approach towards traditional botanical knowledge (TBK) holders began in Kakatiya University when the Government of India, through University Grants Commission, New Delhi, sanctioned a Special Assistance Program (SAP) in 2004. In compliance with the convention on biological diversity (CBD), PIC was established after relevant discussions between the university and the Koya community regarding the intended use of their knowledge. The mutual understanding was that any benefit derived from research pursued after their medicinal plant knowledge shall belong to them. Since TBK is a community knowledge and the purpose of the present survey is non-monetary, the Koya agreed to disclose information for the purposes of documenting their ability to recognize plant species by vernacular name and medicinal use. They readily consented because a prior survey in some of their villages helped to establish the Medicinal Plant Conservation Area (MPCA) at Mallur.

In India, there is a general and urgent need to pattern the process of PIC after educating the local ethnic groups in different regions of IPR, as per a standard scale. Furthermore, the majority of the local people in India are of the opinion that the knowledge could be displayed in full text for non-commercial and academic purposes (Singh 2008), as is the present case. However, something sophisticated

that has happened on medicinal plant research in Guinea in regard to PIC and benefit-sharing in compliance with CBD (Carlson *et al.* 2001) should happen for India.

#### **Plant collections and identification**

Majority of plant species were identified either with the botanical name or local (vernacular/trivial) name by the authors in the field on the basis of their past taxonomic knowledge about these plants in the study area. The specimens of the unidentified species in the field were brought to the laboratory and identified with help of local floras (e.g. Gamble & Fischer 1915–1935), eFlorAs ([www.eFlorAs.org](http://www.eFlorAs.org)), and recent taxonomic monographs. The currently accepted names of plant species are after [www.ipni.org](http://www.ipni.org), [www.plantlist.org](http://www.plantlist.org), and [www.tropicos.org](http://www.tropicos.org). Voucher specimens were pressed, processed, and preserved at Kakatiya University Herbarium (KUW), Warangal.

#### **Data analysis**

The medicinal plant knowledge documented from Koyas across 18 villages was analyzed by plant species and family. The data were further classified as per the plant divisions and classes, growth forms (trees, shrubs, herbs, and climbers), ethnomedicine (human and veterinary), and nativity (indigenous and exotic). Analysis of variance was performed to determine presence of intervillage differences for the above categories.

The Family-Use Value (FUV) was calculated for top five families. It is based on sum of the species used within a given family ( $\Sigma UVs$ ) in all 18 villages divided by the number of species that are used ( $ns$ ) in the whole study area as per Hoffman & Gallaher (2007).

## **Results**

#### **Intracultural cognizance**

Overall the Koyas in the study area differed village-wise in both the number and kinds of species exploited. Analysis of variance showed significant intervillage differences relative to plant taxonomy (dicots versus monocots;  $F = 30.247$ ), growth form (trees, shrubs, herbs, climbers;  $F = 11.496$ ), medicinal target (humans, veterinary, both;  $F = 25.827$ ), and plant nativity ( $F = 23.835$ ). All species reported by informants are listed in Table 2 along with their vernacular names, habit, parts used, and medicinal use.

Trees typically dominated the species list except in villages Chinnaboinapally and Allamvari Ghanpur where herbs are used more than the trees or climbers. These two villages are surrounded by secondary forests. The analysis of medicinal plant knowledge of Koyas in terms of growth forms revealed that 43% are trees, 30% herbs, 18% climbers, and 9% shrubs (Table 3). Patterns of growth form use are indicative of certain trends: (i) local people still primar-

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**North Forest Division, Northern Telangana, India**

**Table 2.** Names, families, habit, parts used, and ethnomedicinal use of plant species reported by Koya informants from 18 villages within or near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division of Northern Telangana, India. Habit: climber (C), epiphyte (E), fern (F), herb (H), shrub (S), straggler (St), tree (T), twiner (Tw). Parts used: bark (B), flower (Fl), fruit (Fr), gum (G), latex (La), leaf (L), root (R), seed (Se), tender sticks (TS), tuber (T), whole plant (W).

Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
ACANTHACEAE					
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Nelavemu	307	H	W	Dyspepsia
<i>Barleria cristata</i> L.	Neeli gorinta	643	H	R	Abortifacient
<i>Barleria montana</i> Nees	Nilambaram	881	S	R	Skin disease
<i>Barleria prionitis</i> L.	Mulla gorinta	201	H	R	Scorpion bite
<i>Hemigraphis latebrosa</i> (Roth) Nees	Akkala	819	H	R	Anti-alcoholic agent
<i>Hygrophila auriculata</i> (Schumach.) Heine	Gorimidi	533	H	L	Dropsy
<i>Justicia betonica</i> L.	Pedda nilambaram	119	S	R	Mental disorders
<i>Lepidagathis cristata</i> Willd.	Nakka peetirigadda	644	H	R/W	Fever, fits
<i>Peristrophe paniculata</i> (Forssk.) Brummitt	Chebura	287	H	L	Skin disease
AMARANTHACEAE					
<i>Achyranthes aspera</i> L.	Uttareni	63	H	R	Scorpion bite
<i>Aerva lanata</i> (L.) Juss.	Pindi kura	19	H	L	Wounds
<i>Aerva sanguinolenta</i> (L.) Blume	Konda pindi	1400	H	W	Urinary troubles
<i>Amaranthus spinosus</i> L.	Mulla thotakura	280	H	L	Appetite stimulant
<i>Celosia argentea</i> L.	Gunugu	64	H	L	Cuts
<i>Pupalia lappacea</i> (L.) Juss.	Gundu uttareni	620	H	L	Insect bite
ANACARDIACEAE					
<i>Buchanania axillaris</i> (Desr.) Ramamoorthy	Pedda morli	329	T	B/G	Veterinary, skin disease, back pain
<i>Buchanania cochinchinensis</i> (Lour.) M.R.Almeida	Morri, Morli	259	T	G	Back pain, laxative
<i>Lannea coromandelica</i> (Houtt.) Merr.	Dumpena, Dumpidi	863	T	B	Antiseptic, appetite stimulant
<i>Mangifera indica</i> L.	Konda mamidi	1012	T	B/Fr	Appetite stimulant, tonic
<i>Semecarpus anacardium</i> L.f.	Nalla jeedi	261	T	Se	Wounds
ANNONACEAE					
<i>Milium tomentosum</i> (Roxb.) J.Sinclair	Barre duddi	853	T	B	Veterinary
<i>Polyalthia cerasoides</i> (Roxb.) Bedd.	Chiluka duddi	321	T	B	Veterinary
APOCYNACEAE					
<i>Anodendron paniculatum</i> A.DC.	Athukudu teega	1631	C	B	Bone fracture
<i>Calotropis gigantea</i> (L.) Dryand.	Jilledu	12	S	R	Snake bite

Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
<i>Cyrtolipsis dubia</i> (Burm.f.) M.R.Almeida	<b>Budda pala</b>	304	C	R	Veterinary
<i>Hemidesmus indicus</i> (L.) R.Br. ex Schult.	<b>Sugandhi pala</b>	331	C	R	Blood purifier, sugar control
<i>Hemidesmus indicus</i> var. <i>pubescens</i> (Wight & Arn.) Hook.f.	<b>Barre sugandhi pala</b>	55	C	R	Diabetes
<i>Holarrhena pubescens</i> Wall ex G.Don	<b>Istari pala</b>	269	T	B	Dysentery
<i>Pergularia daemia</i> (Forssk.) Chiov.	<b>Dustapu teega</b>	121	C	W	Respiratory disease
ARACEAE					
<i>Pistia stratiotes</i> L.	<b>Antara thamara</b>	558	H	W	Baldness
ARECACEAE					
<i>Phoenix loureiroi</i> Kunth	<b>Jittetha</b>	1650	T	Fr	Laxative
ARISTOLOCHACEAE					
<i>Aristolochia indica</i> L.	<b>Nalleswari</b>	145	C	R	Snake bite
ASPARAGACEAE					
<i>Asparagus gonocladus</i> Baker	<b>Guddelugu bochu</b>	316	C	T	Aphrodisiac
<i>Asparagus racemosus</i> Willd.	<b>Pilli teegalu</b>	1624	C	T	Aphrodisiac
ASTERACEAE					
<i>Blumea bifoliata</i> (L.) DC.	<b>Kukka pogaku</b>	968	H	R	Cough
<i>Blumea virens</i> DC.	<b>Adavi pogaku</b>	945	H	L	Skin disease
<i>Pentanema indicum</i> (L.) Ling	<b>Adavi chamanti</b>	815	H	R	Abortifacient
<i>Sphaeranthus indicus</i> L.	<b>Bodasaram</b>	50	H	W	Kill lice in domestic fowl
<i>Tridax procumbens</i> (L.) L.	<b>Nalla alam</b>	31	H	L	Hemorrhage, cuts
<i>Vernonia cinerea</i> (L.) Less.	<b>Garita kamma</b>	80	H	R	Fever
<i>Vernonia cinerea</i> var. <i>parviflora</i> (Reinw. ex Blume) DC.	<b>Adavi garita kamma</b>	1652	H	R	Fever
BIGNONIACEAE					
<i>Millingtonia hortensis</i> L.f.	<b>Boda malle</b>	125	T	B	Bronchitis
<i>Oroxylum indicum</i> (L.) Kurz	<b>Dundilam</b>	708	T	B	Rheumatism
<i>Stereospermum chelonoides</i> (L.f.) DC.	<b>Kalagoru</b>	597	T	B	Veterinary
BOMBACACEAE					
<i>Bombax ceiba</i> L.	<b>Buruga</b>	213	T	B	Cough
BORAGINACEAE					
<i>Coldenia procumbens</i> L.	<b>Cheppu tattaku</b>	200	H	W	Wounds
<i>Cordia dichotoma</i> G.Forst.	<b>Iriki</b>	640	T	Fr	Dyspepsia
<i>Cordia macleodii</i> Hook.f. & Thomson	<b>Botuku</b>	704	T	B	Veterinary
<i>Ehretia laevis</i> Roxb.	<b>Pala danthi</b>	888	T	Fr	Dyspepsia
<i>Trichodesma indicum</i> (L.) Lehm.	<b>Gabba</b>	56	H	L	Wounds
BURSERACEAE					

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Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
<i>Boswellia serrata</i> Roxb. ex Colebr.	<b>Anduga</b>	354	T	B	Fever, tonic
<i>Garuga pinnata</i> Roxb.	<b>Garugu</b>	978	T	B	Veterinary
CAPPARACEAE					
<i>Capparis sepiaria</i> L.	<b>Uppi</b>	941	St	B	Veterinary
<i>Capparis zeylanica</i> L.	<b>Aadonda</b>	373	C	R/Fr	Dyspepsia, tonic
CARYOPHYLLACEAE					
<i>Polycarpaea corymbosa</i> (L.) Lam.	<b>Gaddi puvvu</b>	116	H	R	Snake bite
CELASTRACEAE					
<i>Cassine glauca</i> (Rottb.) Kuntze	<b>Bhutankush</b>	606	T	B	Dyspepsia
<i>Gymnosporia emarginata</i> (Willd.) Thwaites	<b>Danthi</b>	257	T	B	Skin disease
CLEOMACEAE					
<i>Cleome viscosa</i> L.	<b>Vaminta</b>	2	H	W	Skin disease
COMBRETACEAE					
<i>Anogeissus acuminata</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr.	<b>Pasi</b>	1639	T	L	Cough
<i>Combretum albidum</i> G. Don	<b>Yada teega</b>	338	C	B	Veterinary
<i>Combretum roxburghii</i> Spreng.	<b>Yadaku</b>	878	C	B	Veterinary
<i>Combretum latifolium</i> Blume	<b>Yada teega</b>	1547	C	B	Veterinary
<i>Getonia floribunda</i> Roxb.	<b>Bontha</b>	264	C	B	Veterinary
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	<b>Yeru maddi, Tella maddi</b>	337	T	B	Wounds, heart disease
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	<b>Tani</b>	879	T	Fr	Cough
<i>Terminalia chebula</i> Retz.	<b>Karakkaya</b>	978	T	Fr	Cough
CONVOLVULACEAE					
<i>Ipomoea coptica</i> (L.) Roth ex Roem. & Schult.	<b>Suvarchala</b>	900	C	L	Mouth wash
<i>Ipomoea eriocarpa</i> R.Br.	<b>Elika chevi</b>	397	C	R	Stomach-ache
<i>Ipomoea hederifolia</i> L.	<b>Kashiratnam</b>	594	C	R	Tonic
<i>Ipomoea obscura</i> (L.) Ker Gawl.	<b>Macha aku</b>	453	C	L	Insect bite
<i>Merremia hederacea</i> (Burm.f.) Hallier f.	<b>Talantu teega</b>	885	C	Fr	Hair wash
<i>Rivea hypocrateriformis</i> Choisy	<b>Boddi kura</b>	596	C	R	Snake bite
CORNACEAE					
<i>Alangium salviifolium</i> (L.f.) Wangerin.	<b>Ooduga</b>	1004	T	B	Snake bite
CUCURBITACEAE					
<i>Diplocyclos palmatus</i> (L.) C. Jeffrey	<b>Linga donda</b>	84	C	Fr	Diarrhea
<i>Momordica charantia</i> L.	<b>Kakara</b>	158	C	Fr	Diabetes
<i>Momordica dioica</i> Roxb. ex Willd.	<b>Boda kakara</b>	579	C	Fr	Diabetes
CYPERACEAE					
<i>Cyperus rotundus</i> L.	<b>Thunga</b>	27	H	T/R	Tonic, scorpion bite
<i>Scleria levis</i> Retz.	<b>Ashta medha</b>	1316	H	R	Blood purifier

Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
DILLENIACEAE					
<i>Dillenia pentagyna</i> Roxb.	Kalinga	1028	T	B/Fr	Tonic, fever, veterinary
DIOSCOREACEAE					
<i>Dioscorea bulbifera</i> L.	Chenna gadda	1100	C	T	Arthritis, fever
EBENACEAE					
<i>Diospyros chloroxylon</i> Roxb.	Illinda	616	T	B	Veterinary
<i>Diospyros malabarica</i> (Desr.) Kostel.	Konda tuniki	54	T	B	Bronchitis
<i>Diospyros melanoxylon</i> Roxb.	Tuniki	335	T	Fr	Dyspepsia, laxative
<i>Diospyros montana</i> Roxb.	Muchi tuniki	894	T	B/Fr	Veterinary
ERYTHROXYLACEAE					
<i>Erythroxylum monogynum</i> Roxb.	Deva daru	1029	T	Fr	Tonic
EUPHORBIACEAE					
<i>Acalypha indica</i> L.	Penta puti	22	H	W	Skin disease
<i>Euphorbia hirta</i> L.	Reddivari nanubalu	23	H	L	Wounds
<i>Euphorbia nivulia</i> Buch.-Ham.	Aku jemudu	1640	T	La	Bone fracture
<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	Kunkuma	1700	T	Se	Leucoderma
<i>Microstachys chamaelea</i> (L.) Müll.Arg.	Isaka	954	H	R	Skin disease
<i>Tragia involucrata</i> L.	Dula gondi	953	C	R	Scorpion bite
FABACEAE					
<i>Abrus precatorius</i> L.	Gurija	5	C	Se	Abortifacient
<i>Acacia chundra</i> (Rottler) Willd.	Sandra	613	T	B	Appetite stimulant
<i>Acacia nilotica</i> (L.) Willd. ex Del.	Nalla tumma	236	T	B	Burns
<i>Albizia odoratissima</i> (L.f.) Benth.	Chinduga	731	T	B	Leucoderma
<i>Bauhinia malabarica</i> Roxb.	Puli are	1651	T	B	Dyspepsia
<i>Bauhinia racemosa</i> Lam.	Are	87	T	B	Leucoderma
<i>Bauhinia semla</i> Wunderlin	Goddeti are	1490	T	B	Tonic
<i>Butea superba</i> Roxb.	Teega moduga	328	C	B	Urinary troubles
<i>Canavalia cathartica</i> Thouars	Adavi tamba	732	C	Se	Scorpion bite
<i>Cassia fistula</i> L.	Rela	132	T	Fr	Diarrhea, diuretic
<i>Crotalaria albida</i> B.Heyne ex Roth	Adavi janumu	1222	H	R	Scorpion bite
<i>Crotalaria ramosissima</i> Roxb.	Tella janumu	865	H	L	Wounds
<i>Crotalaria verrucosa</i> L.	Tella janumu	41	H	R	Snake bite
<i>Dalbergia lanceolaria</i> subsp. <i>paniculata</i> (Roxb.) Thoth.	Porla pachari	359	T	B	Baldness
<i>Dalbergia volubilis</i> Roxb.	Teega pachari	1340	C	B	Skin disease
<i>Derris scandens</i> (Roxb.) Benth.	Chakali teega	346	C	B	Veterinary
<i>Desmodium gangeticum</i> (L.) DC.	Konda saru	260	H	R	Scorpion bite
<i>Desmodium triflorum</i> (L.) DC.	Munta mandu	378	T	R	Hemorrhage
<i>Desmodium velutinum</i> (Willd.) DC.	Teega velga	654	H	R	Scorpion bite



Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Veluthuru	582	S	B	Skin disease
<i>Erythrina suberosa</i> Roxb.	Muli moduga	1405	T	B	Veterinary, appetite stimulant
<i>Flemingia macrophylla</i> (Willd.) Merr.	Err puvvu	1625	S	R	Skin disease
<i>Flemingia strobilifera</i> (L.) W.T.Aiton	Adavi chappa	1339	S	R	Skin disease
<i>Hardwickia binata</i> Roxb.	Narepa	1031	T	B	Veterinary
<i>Indigofera cassioides</i> Rottler ex DC.	Karu kandi	609	S	R	Scorpion bite
<i>Mimosa hamata</i> Willd.	Magadadi	615	S	B	Aphrodisiac
<i>Mucuna pruriens</i> (L.) DC.	Dula gondi	868	C	Se	Abortifacient, aphrodisiac
<i>Paracalyx scariosus</i> (Roxb.) Ali	Adavi tella kandi	1635	C	R	Skin disease
<i>Phyllodium pulchellum</i> (L.) Desv.	Sarivi	1381	H	R	Scorpion bite
<i>Pongamia pinnata</i> (L.) Pierre	Kanuga	133	T	B	Skin disease
<i>Pueraria tuberosa</i> (Willd.) DC.	Nela gummadi	567	H	T	All diseases
<i>Rhynchosia suaveolens</i> (L.f.) DC.	Adavi kandi	1098	S	Se	Dysentery
<i>Senna alata</i> (L.) Roxb.		715	H	L	Skin disease
<i>Senna occidentalis</i> (L.) Link	Adavi chennangi	149	H	Fr	Appetite stimulant
<i>Senna tora</i> (L.) Roxb.	Tagarisa	8	H	L	Insect bite
<i>Sophora velutina</i> Lindl.	Adavi kanuga	870	T	B	Appetite stimulant
<i>Tamarindus indica</i> L.	Chinta	156	T	B	Scorpion bite
<i>Tephrosia purpurea</i> (L.) Pers.	Vempali	6	H	R	Easy delivery
<i>Xylia xylocarpa</i> (Roxb.) Taub.	Bojja	273	T	B	Skin disease
FERN AND FERN ALLIES					
<i>Ceratopteris thalictroides</i> (L.) Brongn.	Medha	1213	F/S	W	Memory
<i>Cyclosorus parasiticus</i> (L.) Farw.	Hamsa padu	655	F/H	W	Mental disorders
<i>Lygodium flexuosum</i> (L.) Sw.	Dayyapu jeda	982	F/C	R	Skin disease
<i>Selaginella bryopteris</i> (L.) Baker	Pittakalu	1653	H	W	Memory
GISEKIACEAE					
<i>Gisekia pharnaceoides</i> L.	Iska rasi	1427	H	W	Pains
HYPOXIDACEAE					
<i>Curculigo orchiooides</i> Gaertn.	Nela thadi	603	H	T	Aphrodisiac
LAMIACEAE					
<i>Anisomeles malabarica</i> (L.) R.Br. ex Sims	Dayyam chettu	646	H	W	Fever
<i>Gmelina arborea</i> Roxb.	Gummadi tekku	354	T	B	Anti-inflammatory, veterinary
<i>Leucas aspera</i> (Willd.) Link	Thummi	72	H	L	Healing power
<i>Leucas decemdentata</i> (Willd.) Sm.	Konda tummi	1213	H	L	Skin disease
<i>Ocimum americanum</i> L.	Kukka tulasi	17	H	L	Antiseptic
<i>Plectranthus mollis</i> (Aiton) Spreng.	Nela marri	600	H	R	Scorpion bite

Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
<i>Symphorema involucreatum</i> Roxb.	Konda takkali	697	C	B	Veterinary
<i>Tectona grandis</i> L.f.	Teku	308	T	B	Abortifacient
LAURACEAE					
<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	Narra mamidi	567	T	B	All diseases
LECYTHIDACEAE					
<i>Barringtonia acutangula</i> (L.) Gaertn.	Nir kanki	301	T	B	Veterinary
<i>Careya arborea</i> Roxb.	Budadharmi	1360	T	Fr/B	Cough, appetite stimulant
LINDERNIACEAE					
<i>Lindernia ciliata</i> (Colsm.) Pennell	Nela rampi	1108	H	W	Skin disease
LOGANIACEAE					
<i>Strychnos nux-vomica</i> L.	Visha mushti	270	T	B	Snake bite, antiseptic
<i>Strychnos potatorum</i> L.f.	Chilla	332	T	Se	Eye disease
LORANTHACEAE					
<i>Dendrophthoe falcata</i> (L.f.) Ettingsh.	Vadanica	850	H	W	Fever
LYTHRACEAE					
<i>Lagerstroemia parviflora</i> Roxb.	Chennangi	265	T	B	Veterinary
<i>Woodfordia fruticosa</i> (L.) Kurz	Jaji	1033	T	B	Tonic
MALVACEAE					
<i>Abutilon indicum</i> (L.) Sweet	Mudra benda	3	H	R	Aphrodisiac
<i>Eriolaena hookeriana</i> Wight & Arn.	Bothuku	607	T	B	Veterinary
<i>Grewia hirsuta</i> Vahl	Jibilika	350	S	Fr	Laxative
<i>Grewia damine</i> Gaertn.	Adavi jana	608	S	Fr	Laxative
<i>Grewia rothii</i> DC.	Jana, Chinna jana	836	S	Fr	Laxative
<i>Grewia tiliifolia</i> Vahl	Tada	326	S	B	Veterinary
<i>Helicteres isora</i> L.	Nulthada	276	S	B	Veterinary
<i>Hibiscus panduriformis</i> Burm.f.	Adavi benda	842	S	R	Skin disease
<i>Kavalama urens</i> (Roxb.) Raf.	Tabasi	322	T	B	Appetite stimulant
<i>Kydia calycina</i> Roxb.	Konda patti	1234	T	B	Dyspepsia
<i>Pterospermum xylocarpum</i> (Gaertn.) Santapau & Wagh	Lolugu	1591	T	B	Veterinary
<i>Sida acuta</i> Burm.f.	Chilka parre	34	H	R	Mental disorders
<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	Gaya paku	253	H	R	Tonic
<i>Sida cordifolia</i> L.	Chiru benda	401	H	R	Appetite stimulant
<i>Thespesia lampas</i> (Cav.) Dalzell & A.Gibson	Adavi patti	489	H	R	Fever, diuretic
<i>Triumfetta rhomboidea</i> Jacq.	Marla benda	36	H	R	Galactagogue
<i>Waltheria indica</i> L.	Nalla benda	35	H	L	Insect bite
<i>Urena lobata</i> L.	Pedda benda	508	H	R	Skin disease
MELASTOMATAACEAE					
<i>Memecylon umbellatum</i> Burm.f.	Alli	1034	T	R	Diuretic

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Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
<i>Osbeckia stellata</i> Buch.-Ham. ex Ker Gawl.	<b>Adavi gulabi</b>	1125	S	R	Abortifacient
MELIACEAE					
<i>Azadirachta indica</i> A.Juss.	<b>Vepa</b>	484	T	B	Stomach-ache
<i>Soymida febrifuga</i> (Roxb.) A.Juss.	<b>Somi</b>	859	T	B	Tonic, diuretic
MENISPERMACEAE					
<i>Cissampelos pareira</i> L.	<b>Bodhi</b>	322	C	R	Cardiac stimulant
<i>Cocculus hirsutus</i> (L.) W.Theob.	<b>Shibbi teega</b>	1	C	R	Veterinary
MORACEAE					
<i>Ficus benghalensis</i> L.	<b>Marri</b>	309	T	La	Wounds
<i>Ficus hispida</i> L.f.	<b>Bomma medi</b>	114	T	L	Bone fracture
<i>Ficus microcarpa</i> L.f.	<b>Juvvi</b>	974	T	B	Leucoderma
<i>Ficus racemosa</i> L.	<b>Medi</b>	565	T	L	Bone fracture
<i>Ficus tinctoria</i> subsp. <i>gibbosa</i> (Blume) Corner	<b>Adavi barrenka</b>	936	T	B	Veterinary
<i>Ficus virens</i> Aiton	<b>Banda juvvi</b>	955	T	B	Rheumatism
<i>Streblus asper</i> Lour.	<b>Barrenka</b>	171	T	TS	Tooth brush
MORINGACEAE					
<i>Moringa pterygosperma</i> Gaertn.	<b>Munaga</b>	92	T	B	Aphrodisiac
MYRTACEAE					
<i>Syzygium cumini</i> (L.) Skeels	<b>Neredu</b>	580	T	B/Fr	Tonic, diabetes
NYCTAGINACEAE					
<i>Boerhavia diffusa</i> L.	<b>Atika mamidi</b>	18	H	W/R	Fever, tonic
OCHNACEAE					
<i>Ochna obtusata</i> DC.	<b>Sonnari</b>	781	T	B	Veterinary
OLEACEAE					
<i>Nyctanthes arbor-tristis</i> L.	<b>Karise</b>	227	T	B	Bone fracture
<i>Schrebera swietenoides</i> Roxb.	<b>Mokkam</b>	1405	T	B	Veterinary
ORCHIDACEAE					
<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	<b>Kodikalla chettu</b>	1161	E	R	Fever
PAPAVERACEAE					
<i>Argemone mexicana</i> L.	<b>Mulu puccha</b>	140	H	W	Skin disease
PHYLLANTHACEAE					
<i>Breynia retusa</i> (Dennst.) Alston	<b>Purugudu</b>	1214	S	R	Aphrodisiac
<i>Bridelia montana</i> (Roxb.) Willd.	<b>Panchotkam</b>	310	T	B	Veterinary
<i>Bridelia retusa</i> (L.) A.Juss.	<b>Korra maddi</b>	772	T	B	Veterinary
<i>Cleistanthus collinus</i> (Roxb.) Benth. ex Hook.f.	<b>Nalla kodisa</b>	601	T	All parts	Homicide, fish stupifying
<i>Glochidion zeylanicum</i> (Gaertn.) A.Juss.	<b>Neeralli</b>	1047	T	B	Veterinary
<i>Phyllanthus amarus</i> Schumach. & Thonn.	<b>Nela usiri</b>	24	H	W	Jaundice

Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
<i>Phyllanthus emblica</i> L.	Usiri	602	T	W	Tonic
<i>Phyllanthus urinaria</i> L.	Yerra usiri	1852	H	W	Jaundice
PLANTAGINACEAE					
<i>Scoparia dulcis</i> L.	Oosari	519	H	W	Menstrual pains
PLUMBAGINACEAE					
<i>Plumbago zeylanica</i> L.	Chitramulam	682	H	R	Boils
POACEAE					
<i>Bambusa bambos</i> (L.) Voss	Kanka bongu	521	T	Se	Food
<i>Cymbopogon flexuosus</i> (Nees ex Steud.) W.Watson	Adavi nimma gaddi	425	H	R	Tonic
PUTRANJIVACEAE					
<i>Putranjiva roxburghii</i> Wall.	Putranjiva	1048	T	B	Bronchitis
RHAMNACEAE					
<i>Ventilago maderaspatana</i> Gaertn.	Galivana teega	849	C	B	Anthrax
<i>Ziziphus oenopolia</i> (L.) Mill.	Pariki	256	S	Fr	Diuretic
<i>Ziziphus rugosa</i> Lam.	Enugu pariki	1643	C	L	Bone fracture
<i>Ziziphus xylopyrus</i> (Retz.) Willd.	Gotte	347	T	L	Skin disease
RUBIACEAE					
<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	Manga	303	T	Fr	Laxative
<i>Ceriscoides turgida</i> (Roxb.) Tirveng.	Kukka elka	358	T	B	Cough
<i>Gardenia latifolia</i> Aiton	Pedda karinga	1224	T	B	Rheumatism, veterinary
<i>Gardenia resinifera</i> Roth	Karinga	764	S	B	Neck pains
<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Bandaru	422	T	B	Veterinary
<i>Ixora arborea</i> Roxb. ex Sm.	Korivi	1034	T	B	Appetite stimulant
<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Batta ganapa	852	T	B	Veterinary
<i>Morinda pubescens</i> Sm.	Togara mogili	267	T	B	Appetite stimulant, anthrax
<i>Paederia foetida</i> L.	Savirela	1634	C	L	Skin disease
<i>Tamilnadia uliginosa</i> (Retz.) Tirveng. & Sastre	Guvvenka	450	T	B	Veterinary
RUTACEAE					
<i>Aegle marmelos</i> (L.) Corrêa	Maredu	370	T	L/Fr	Skin disease, digestive
<i>Atalantia monophylla</i> DC.	Adavi nimma	858	T	R	Paralysis
<i>Chloroxylon swietenia</i> DC.	Bilugu	1046	T	B	Skin disease
<i>Limonia acidissima</i> L.	Velaga	741	T	Fr	Tonic
SALICACEAE					
<i>Casearia nigrescens</i> Tue.	Kanmeswaram	534	T	B	Fish poison
<i>Flacourtia indica</i> (Burm.f.) Merr.	Kanregu	854	T	L	Scorpion bite
SAPINDACEAE					
<i>Sapindus emarginatus</i> Vahl	Kunkudu	39	T	Fr	Hair wash
<i>Schleichera oleosa</i> (Lour.) Merr.	Pusuku	1367	T	B	Dyspepsia

Botanical Names		Voucher Number	Habit	Part(s) used	Ethnic use
Scientific	Vernacular				
SAPOTACEAE					
<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	Ippa	268	T	Fl/Se	Dyspepsia, hair oil
<i>Manilkara hexandra</i> (Roxb.) Dubard	Pala	576	T	Fr	Laxative
SIMAROUBACEAE					
<i>Ailanthus excelsa</i> Roxb.	Peda manu	519	T	B	Piles
SMILACACEAE					
<i>Smilax perfoliata</i> Lour.	Nageti dumpa	1601	C	T	Abortifacient
SOLANACEAE					
<i>Solanum virginianum</i> L.	Vakudu	124	C	Fr	Laxative
ULMACEAE					
<i>Holoptelea integrifolia</i> Planch.	Nemali nara	340	T	L	Skin disease
VIOLACEAE					
<i>Hybanthus enneaspermus</i> (L.) F.Muell.	Nela kobbari	97	H	W	Aphrodisiac
VITACEAE					
<i>Cissus vitiginea</i> L.	Adavi draksha	734	S	Fr	Healing power
<i>Leea asiatica</i> (L.) Ridsdale	Velama sandi	1094	S	R	Skin disease
ZINGIBERACEAE					
<i>Curcuma pseudomontana</i> J.Graham	Adavi pasupu	956	H	T	Antiseptic

ily use “apparent” species (trees and their climbers) which are wild and abundant in the adjoining forests, and (ii) the relatively infrequent use of herbs or “non-apparent” species is reflective of their limited distribution to open areas or secondary forest patches tending towards therophytic phytoclimate.

The number of medicinal plant species reported per village (Table 4) ranged from 15 (Oorattum) to 167 (Mallur). Eighty-two plant species were reported only in one village while 30 species were reported in 9 or more villages (i.e., ≥50%). Each of the 237 plants was scored for shared use (common citation) among the 18 villages. Plants were grouped into shared-use batches that reflected the extent of common plant knowledge (1–3 villages, 4–6 villages, ... 16–18 villages) (Figure 2). Results from this analysis show that (i) plant knowledge among the different villages is not uniform but is rather shared by an average of 1 to 3 villages, and (ii) shared knowledge declines over an increasing number of villages, with no single plant species being shared by 16 or more of the 18 villages.

#### Floristic cognizance

A total of 237 different plant species were listed as phyto-medicines for Koyas across all 18 villages. These were predominantly angiosperms (233; 98.3%) and a few ferns

(4; 1.7%), the latter of which were used only in one village (Mallur). Amongst the angiosperms, far more Dicotyledonae species were mentioned (220 species; 94.4%). The species used are almost all indigenous (219; 92.4%) with the few exotics being either planted or naturalized.

The present study found the local people using both indigenous and exotic species, the latter of which are cultivated or naturalized for economic purposes. Some exotic weeds, however, appear inadvertently as escapees in natural forests in areas of biotic disturbance and land-use change (**podu** [shifting] cultivation). The exotics are normally light-demanding and unacceptable as graze or forage as they are expected to bear more diverse secondary metabolites which aid in herbivory defense. In the present survey, the indigenous flora formed the basis (92.4%; 219 species) of ethnobotanical practices of Koyas. The ethnomedicine practiced by Koyas in northern Telangana includes phytomedicines applied to both humans and their pets (Table 3) with 84% of plant species used as human medicine, 13% as veterinary, and just 3% for both.

#### Family-use index

An index was prepared to investigate the top five plant families which offer the most to the medicinal plants cognitive domain of the ethnic inhabitants of the 18 villages

**Table 3.** Breakdown of plant taxonomy, habit, ethnomedicinal use, and nativity by village. All villages are in Warangal North Forest Division of Northern Telangana, India. Villages denoted with an asterisk (\*) are outside the Eturnagaram Wildlife Sanctuary while all others are located within it. Taxonomic groupings: ferns (F), dicots (D), monocots (M), genera (G), species (S). Growth forms: trees (T), shrubs (S), herbs (H), climbers/lianas/epiphytes/stragglers (C). Ethnomedicine: human (H), veterinary (V), both human and veterinary (H/V). Nativity: indigenous (I), exotic (E).

Villages	Taxonomic groupings					Growth forms				Ethnomedicines			Nativity	
	F	D	M	G	S	T	S	H	C	H	V	H/V	I	E
Mallur*	4	153	10	133	167	72	12	51	32	144	19	4	155	12
Kamaram		19		18	19	15	1	2	1	16	1	2	17	2
Venkatapuram		28		26	28	18	1	5	4	22	5	1	26	2
Chinnaboinapally		41	1	39	42	11	1	22	8	37	4	1	36	6
Shapally		102	5	92	107	50	8	34	15	97	8	2	97	10
Dodla		101	4	94	105	45	6	38	16	93	11	1	93	12
Malyala		33	1	33	34	19		8	7	31	3		31	3
Kondai		65	3	60	68	34	3	22	9	59	8	1	63	5
Ailapur		57	2	56	59	23	2	22	12	51	8		53	6
Yelishettipally		19	2	21	21	12	2	6	1	18	2	1	17	4
Banojibandam		21		21	21	8	4	5	4	19	1	1	20	1
Chalpaka		24	1	25	25	14		6	5	23	2		24	1
Allamvari Ghanpur		36		34	36	11		19	6	32	3	1	30	6
Narlapur		100	5	94	105	49	7	35	14	91	11	3	95	10
Medaram		40		37	40	27	2	8	3	30	7	3	37	3
Oorattum		15		15	15	10	1		3	14	1		14	1
Gonepally		81	5	80	86	36	5	28	18	78	7	1	80	6
Gandhinagar*		21		19	21	11	1	6	3	17	3	1	18	3

**Table 4.** Reports of plant species usage as Koya ethnomedicine for each of 18 villages within or near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division of Northern Telangana, India. Villages: (1) Mallur; (2) Kamaram; (3) Venkatapuram; (4) Chinnaboinapally; (5) Shapally; (6) Dodla; (7) Malyala; (8) Kondai; (9) Ailapur; (10) Yelishettipally; (11) Banojibandam; (12) Chalpaka; (13) Allamvari Ghanpur; (14) Narlapur; (15) Medaram; (16) Oorattum; (17) Gonepally; (18) Gandhinagar. Villages 1 and 18 are outside the Eturnagaram Wildlife Sanctuary.

Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ACANTHACEAE																		
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	X			X	X	X	X	X	X			X	X	X				X
<i>Barleria cristata</i> L.	X			X										X				X
<i>Barleria montana</i> Nees	X																	
<i>Barleria prionitis</i> L.	X																	
<i>Hemigraphis latebrosa</i> (Roth) Nees	X																	
<i>Hygrophila auriculata</i> (Schumach.) Heine				X		X		X					X					
<i>Justicia betonica</i> L.	X				X	X		X						X				X
<i>Lepidagathis cristata</i> Willd.	X				X	X			X					X				X
<i>Peristrophe paniculata</i> (Forssk.) Brummitt	X				X	X												
AMARANTHACEAE																		
<i>Achyranthes aspera</i> L.	X			X	X	X		X	X				X	X				X

Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Aerva lanata</i> (L.) Juss.	X			X	X	X		X	X	X			X	X				X
<i>Aerva sanguinolenta</i> (L.) Blume	X			X	X	X		X	X									
<i>Amaranthus spinosus</i> L.	X				X	X				X				X				
<i>Celosia argentea</i> L.						X			X									
<i>Pupalia lappacea</i> (L.) Juss.	X																	
ANACARDIACEAE																		
<i>Buchanania axillaris</i> (Desr.) Ramamoorthy			X											X	X			X
<i>Buchanania cochinchinensis</i> (Lour.) M.R.Almeida	X	X			X	X		X						X				X
<i>Lannea coromandelica</i> (Houtt.) Merr.	X	X		X	X	X		X	X				X	X	X			
<i>Mangifera indica</i> L.	X	X			X	X			X					X				X
<i>Semecarpus anacardium</i> L.f.	X		X		X	X		X							X			
ANNONACEAE																		
<i>Milium tomentosa</i> (Roxb.) J.Sinclair			X												X			
<i>Polyalthia cerasoides</i> (Roxb.) Bedd.	X				X	X			X					X				X
APOCYNACEAE																		
<i>Anodendron paniculatum</i> A.DC.	X																	
<i>Calotropis gigantea</i> (L.) Dryand.						X				X								
<i>Cyrtolipsis dubia</i> (Burm.f.) M.R.Almeida			X												X			
<i>Hemidesmus indicus</i> (L.) R.Br. ex Schult.	X	X	X	X	X	X	X	X	X			X	X		X			X
<i>Hemidesmus indicus</i> var. <i>pubescens</i> (Wight & Arn.) Hook.f.																		X
<i>Holarrhena pubescens</i> Wall ex G.Don	X	X	X		X	X	X	X	X	X	X	X		X	X			
<i>Pergularia daemia</i> (Forssk.) Chiov.			X											X	X			X
ARACEAE																		
<i>Pistia stratiotes</i> L.																		X
ARECACEAE																		
<i>Phoenix loureiroi</i> Kunth	X				X	X								X				X
ARISTOLOCHIACEAE																		
<i>Aristolochia indica</i> L.	X				X	X					X			X				X
ASPARAGACEAE																		
<i>Asparagus gonocladus</i> Baker					X													
<i>Asparagus racemosus</i> Willd.	X																	
ASTERACEAE																		
<i>Blumea bifoliata</i> (L.) DC.	X				X									X				X
<i>Blumea virens</i> DC.	X				X													
<i>Pentanema indicum</i> (L.) Ling	X																	
<i>Sphaeranthus indicus</i> L.	X			X	X	X	X	X	X			X	X	X				X
<i>Tridax procumbens</i> (L.) L.	X								X									
<i>Vernonia cinerea</i> (L.) Less.	X			X	X	X		X	X				X	X				X
<i>Vernonia cinerea</i> var. <i>parviflora</i> (Reinw. ex Blume) DC.	X					X												

Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
BIGNONIACEAE																		
<i>Millingtonia hortensis</i> L.f.	X																	
<i>Oroxylum indicum</i> (L.) Kurz	X																	
<i>Stereospermum chelonoides</i> (L.f.) DC.	X														X			
BOMBACACEAE																		
<i>Bombax ceiba</i> L.		X																
BORAGINACEAE																		
<i>Coldenia procumbens</i> L.														X				X
<i>Cordia dichotoma</i> G.Forst.	X																	X
<i>Cordia macleodii</i> Hook.f. & Thomson	X																	
<i>Ehretia laevis</i> Roxb.	X																	
<i>Trichodesma indicum</i> (L.) Lehm.				X		X		X	X				X					
BURSERACEAE																		
<i>Boswellia serrata</i> Roxb. ex Colebr.	X				X	X	X	X		X	X			X		X		
<i>Garuga pinnata</i> Roxb.														X				
CAPPARACEAE																		
<i>Capparis sepiaria</i> L.																		X
<i>Capparis zeylanica</i> L.	X				X	X				X			X		X	X		
CARYOPHYLLACEAE																		
<i>Polycarpaea corymbosa</i> (L.) Lam.	X					X								X				X
CELASTRACEAE																		
<i>Cassine glauca</i> (Rottb.) Kuntze	X				X									X				
<i>Gymnosporia emarginata</i> (Willd.) Thwaites	X				X	X			X	X				X				
CLEOMACEAE																		
<i>Cleome viscosa</i> L.	X				X	X			X					X				X
COMBRETACEAE																		
<i>Anogeissus acuminata</i> (Roxb. ex DC.) Guill., Perr. & A.Rich.						X												
<i>Combretum albidum</i> G.Don	X																	
<i>Combretum roxburghii</i> Spreng.	X			X	X		X	X	X				X	X			X	X
<i>Combretum latifolium</i> Blume	X																	
<i>Getonia floribunda</i> Roxb.				X		X		X	X				X					
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	X				X	X		X						X				X
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	X				X	X	X	X	X			X				X		
<i>Terminalia chebula</i> Retz.					X													
CONVOLVULACEAE																		
<i>Ipomoea coptica</i> (L.) Roth ex Roem. & Schult.	X																	
<i>Ipomoea eriocarpa</i> R.Br.	X																	



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Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Ipomoea hederifolia</i> L.	X																	
<i>Ipomoea obscura</i> (L.) Ker Gawl.	X																	
<i>Merremia hederacea</i> (Burm.f.) Hallier f.	X				X	X			X					X				
<i>Rivea hypocrateriformis</i> Choisy	X			X			X					X				X		X
CORNACEAE																		
<i>Alangium salviifolium</i> (L.f.) Wangerin.	X			X	X	X	X	X	X			X	X	X		X	X	
CUCURBITACEAE																		
<i>Diplocyclos palmatus</i> (L.) C. Jeffrey						X												
<i>Momordica charantia</i> L.						X												
<i>Momordica dioica</i> Roxb. ex Willd.																X		
CYPERACEAE																		
<i>Cyperus rotundus</i> L.	X			X	X	X		X	X					X				X
<i>Scleria levis</i> Retz.	X																	
DILLENIACEAE																		
<i>Dillenia pentagyna</i> Roxb.	X													X	X			
DIOSCOREACEAE																		
<i>Dioscorea bulbifera</i> L.	X																	X
EBENACEAE																		
<i>Diospyros chloroxylon</i> Roxb.	X		X		X	X		X	X					X	X			X
<i>Diospyros malabarica</i> (Desr.) Kostel.	X																	
<i>Diospyros melanoxylon</i> Roxb.	X		X		X	X	X	X	X			X		X	X			X
<i>Diospyros montana</i> Roxb.		X																X
ERYTHROXYLACEAE																		
<i>Erythroxylum monogynum</i> Roxb.																		X
EUPHORBIACEAE																		
<i>Acalypha indica</i> L.										X	X				X			X
<i>Euphorbia hirta</i> L.	X		X	X	X	X		X	X			X	X	X				X
<i>Euphorbia nivulia</i> Buch.-Ham.					X													
<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	X				X	X												
<i>Microstachys chamaelea</i> (L.) Müll.Arg.	X																	
<i>Tragia involucrata</i> L.	X																	
FABACEAE																		
<i>Abrus precatorius</i> L.	X			X	X	X		X	X	X	X			X				X
<i>Acacia chundra</i> (Rottler) Willd.																X		
<i>Acacia nilotica</i> (L.) Willd. ex Del.														X				
<i>Albizia odoratissima</i> (L.f.) Benth.	X				X	X								X				X
<i>Bauhinia malabarica</i> Roxb.	X				X									X				
<i>Bauhinia racemosa</i> Lam.	X				X									X				X
<i>Bauhinia semla</i> Wunderlin	X																	
<i>Butea superba</i> Roxb.	X			X	X	X	X	X				X	X	X				X

Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Canavalia cathartica</i> Thouars	X																	
<i>Cassia fistula</i> L.	X			X	X	X	X	X	X			X	X	X			X	X
<i>Crotalaria albida</i> B.Heyne ex Roth	X																	
<i>Crotalaria ramosissima</i> Roxb.						X												
<i>Crotalaria verrucosa</i> L.																		X
<i>Dalbergia lanceolaria</i> subsp. <i>paniculata</i> (Roxb.) Thoth.	X		X		X	X		X		X				X	X		X	
<i>Dalbergia volubilis</i> Roxb.	X																	
<i>Derris scandens</i> (Roxb.) Benth.	X				X	X			X					X				X
<i>Desmodium gangeticum</i> (L.) DC.	X				X	X												
<i>Desmodium triflorum</i> (L.) DC.	X				X									X				X
<i>Desmodium velutinum</i> (Willd.) DC.	X																	
<i>Dichrostachys cinerea</i> (L.) Wight & Arn.					X									X				X
<i>Erythrina suberosa</i> Roxb.	X	X			X						X							
<i>Flemingia macrophylla</i> (Willd.) Merr.	X										X							
<i>Flemingia strobilifera</i> (L.) W.T.Aiton	X																	
<i>Hardwickia binata</i> Roxb.														X				
<i>Indigofera cassioides</i> Rottler ex DC.	X				X	X			X									
<i>Mimosa hamata</i> Willd.											X							X
<i>Mucuna pruriens</i> (L.) DC.	X			X	X	X		X	X		X		X	X		X	X	
<i>Phyllodium pulchellum</i> (L.) Desv.	X				X						X			X				X
<i>Pongamia pinnata</i> (L.) Pierre	X					X				X				X				X
<i>Pueraria tuberosa</i> (Willd.) DC.	X										X			X				
<i>Senna alata</i> (L.) Roxb.		X				X				X	X				X			
<i>Senna occidentalis</i> (L.) Link	X			X	X	X	X	X					X	X				X
<i>Senna tora</i> (L.) Roxb.	X			X	X	X	X	X					X	X				X
<i>Sophora velutina</i> Lindl.	X																	
<i>Tamarindus indica</i> L.	X				X	X								X				X
<i>Tephrosia purpurea</i> (L.) Pers.			X												X			X
<i>Xylia xylocarpa</i> (Roxb.) Taub.	X		X		X	X	X	X	X		X			X	X			X
FERNS AND FERN ALLIES																		
<i>Ceratopteris thalictroides</i> (L.) Brongn.	X																	
<i>Cyclosorus parasiticus</i> (L.) Farw.	X																	
<i>Lygodium flexuosum</i> (L.) Sw.	X																	
<i>Selaginella bryopteris</i> (L.) Baker	X																	
GISEKIACEAE																		
<i>Gisekia pharnaceoides</i> L.				X		X		X			X							
HYPOXIDACEAE																		
<i>Curculigo orchioides</i> Gaertn.	X				X	X		X		X				X				X
LAMIACEAE																		
<i>Anisomeles malabarica</i> (L.) R.Br. ex Sims	X													X				

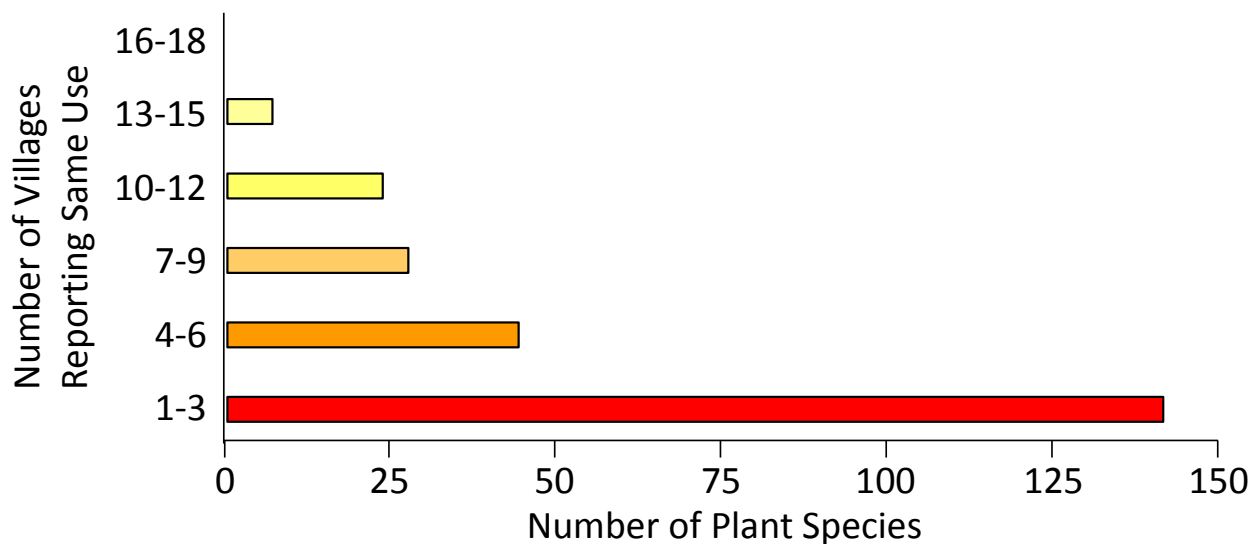
Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Gmelina arborea</i> Roxb.	X													X				
<i>Leucas aspera</i> (Willd.) Link						X			X						X			
<i>Leucas decemdentata</i> (Willd.) Sm.	X																	
<i>Ocimum americanum</i> L.	X			X	X	X							X					
<i>Plectranthus mollis</i> (Aiton) Spreng.	X				X	X					X			X				
<i>Symphorema involucratum</i> Roxb.																		X
<i>Tectona grandis</i> L.f.						X	X	X				X						
LAURACEAE																		
<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	X				X	X												
LECYTHIDACEAE																		
<i>Barringtonia acutangula</i> (L.) Gaertn.						X					X						X	
<i>Careya arborea</i> Roxb.			X												X			X
LINDERNIACEAE																		
<i>Lindernia ciliata</i> (Colsm.) Pennell	X																	
LOGANIACEAE																		
<i>Strychnos nux-vomica</i> L.	X			X	X	X	X	X	X			X	X	X			X	X
<i>Strychnos potatorum</i> L.f.			X												X		X	
LORANTHACEAE																		
<i>Dendrophthoe falcata</i> (L.f.) Ettingsh.																		X
LYTHRACEAE																		
<i>Lagerstroemia parviflora</i> Roxb.	X		X		X	X		X	X					X	X			
<i>Woodfordia fruticosa</i> (L.) Kurz	X				X									X			X	
MALVACEAE																		
<i>Abutilon indicum</i> (L.) Sweet	X				X	X			X					X			X	
<i>Eriolaena hookeriana</i> Wight & Arn.															X			
<i>Grewia hirsuta</i> Vahl	X		X	X	X	X		X	X					X	X			
<i>Grewia damine</i> Gaertn.	X																	
<i>Grewia rothii</i> DC.	X													X				
<i>Grewia tiliifolia</i> Vahl	X				X									X				
<i>Helicteres isora</i> L.		X																X
<i>Hibiscus panduriformis</i> Burm.f.	X				X	X								X				
<i>Kavalama urens</i> (Roxb.) Raf.	X													X				
<i>Kydia calycina</i> Roxb.	X																	
<i>Pterospermum xylocarpum</i> (Gaertn.) Santapau & Wagh	X									X				X				
<i>Sida acuta</i> Burm.f.	X			X	X	X		X					X	X				
<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	X			X	X	X		X	X				X	X			X	
<i>Sida cordifolia</i> L.						X		X										
<i>Thespesia lampas</i> (Cav.) Dalzell & A.Gibson		X			X									X			X	X
<i>Triumfetta rhomboidea</i> Jacq.	X			X	X	X	X	X	X			X	X	X			X	

Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Urena lobata</i> L.	X			X	X	X	X	X	X			X	X	X			X	
<i>Waltheria indica</i> L.	X		X	X	X	X		X	X	X			X	X	X		X	
MELASTOMATACEAE																		
<i>Memecylon umbellatum</i> Burm.f.					X													
<i>Osbeckia stellata</i> Buch.-Ham. ex Ker Gawl.	X																	
MELIACEAE																		
<i>Azadirachta indica</i> A.Juss.		X																
<i>Soymida febrifuga</i> (Roxb.) A.Juss.	X																	X
MENISPERMACEAE																		
<i>Cissampelos pareira</i> L.	X				X	X			X					X				X
<i>Cocculus hirsutus</i> (L.) W.Theob.			X			X			X									
MORACEAE																		
<i>Ficus benghalensis</i> L.	X				X									X				
<i>Ficus hispida</i> L.f.	X	X	X	X	X	X	X	X	X	X			X	X	X		X	X
<i>Ficus microcarpa</i> L.f.		X																
<i>Ficus racemosa</i> L.								X										
<i>Ficus tinctoria</i> subsp. <i>gibbosa</i> (Blume) Corner	X																	
<i>Ficus virens</i> Aiton	X																	
<i>Streblus asper</i> Lour.																		X
MORINGACEAE																		
<i>Moringa pterygosperma</i> Gaertn.														X				X
MYRTACEAE																		
<i>Syzygium cumini</i> (L.) Skeels	X				X	X	X	X				X		X		X	X	
NYCTAGINACEAE																		
<i>Boerhavia diffusa</i> L.	X			X	X	X		X	X				X	X				X
OCHNACEAE																		
<i>Ochna obtusata</i> DC.	X							X										
OLEACEAE																		
<i>Nyctanthes arbor-tristis</i> L.	X																	
<i>Schrebera swietenoides</i> Roxb.						X		X		X								
ORCHIDACEAE																		
<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	X				X	X	X	X	X			X		X				X
PAPAVERACEAE																		
<i>Argemone mexicana</i> L.														X				X
PHYLLANTHACEAE																		
<i>Breynia retusa</i> (Dennst.) Alston					X													
<i>Bridelia montana</i> (Roxb.) Willd.	X			X	X	X	X	X				X	X	X				
<i>Bridelia retusa</i> (L.) A.Juss.	X															X		

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Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Cleistanthus collinus</i> (Roxb.) Benth. ex Hook.f.	X	X		X	X	X	X	X	X			X	X	X			X	
<i>Glochidion zeylanicum</i> (Gaertn.) A.Juss.	X																	
<i>Phyllanthus amarus</i> Schumach. & Thonn.	X			X	X	X	X	X				X	X	X				
<i>Phyllanthus emblica</i> L.	X		X		X	X		X						X	X	X	X	
<i>Phyllanthus urinaria</i> L.	X		X		X	X								X	X		X	
PLANTAGINACEAE																		
<i>Scoparia dulcis</i> L.	X				X									X				
PLUMBAGINACEAE																		
<i>Plumbago zeylanica</i> L.														X			X	
POACEAE																		
<i>Bambusa bambos</i> (L.) Voss										X				X			X	
<i>Cymbopogon flexuosus</i> (Nees ex Steud.) W.Watson	X																	
PUTRANJIVACEAE																		
<i>Putranjiva roxburghii</i> Wall.	X																	
RHAMNACEAE																		
<i>Ventilago maderaspatana</i> Gaertn.	X				X	X	X	X	X					X			X	
<i>Ziziphus oenopolia</i> (L.) Mill.																	X	
<i>Ziziphus rugosa</i> Lam.	X																	
<i>Ziziphus xylopyrus</i> (Retz.) Willd.	X		X		X	X	X	X	X			X		X	X		X	
RUBIACEAE																		
<i>Catunaregam spinosa</i> (Thunb.) Tirveng.			X												X			X
<i>Ceriscoides turgida</i> (Roxb.) Tirveng.					X									X			X	
<i>Gardenia latifolia</i> Aiton	X		X		X	X		X						X	X	X		
<i>Gardenia resinifera</i> Roth	X			X	X	X		X		X			X		X			
<i>Haldina cordifolia</i> (Roxb.) Ridsdale	X				X	X			X					X				
<i>Ixora arborea</i> Roxb. ex Sm.	X		X		X	X	X	X	X	X				X	X		X	
<i>Mitragyna parvifolia</i> (Roxb.) Korth.						X		X										
<i>Morinda pubescens</i> Sm.	X	X	X	X	X	X	X	X	X			X	X	X	X		X	
<i>Paederia foetida</i> L.	X																	
<i>Tamilnadia uliginosa</i> (Retz.) Tirveng. & Sastre	X																	
RUTACEAE																		
<i>Aegle marmelos</i> (L.) Corrêa	X	X			X	X		X	X		X			X		X	X	
<i>Atalantia monophylla</i> DC.															X			
<i>Chloroxylon swietenia</i> DC.	X			X	X	X	X	X	X		X	X	X	X			X	
<i>Limonia acidissima</i> L.		X																
SALICACEAE																		
<i>Casearia nigrescens</i> Tue.	X				X	X												
<i>Flacourtia indica</i> (Burm.f.) Merr.	X				X									X			X	X

Scientific name	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SAPINDACEAE																		
<i>Sapindus emarginatus</i> Vahl																X		
<i>Schleichera oleosa</i> (Lour.) Merr.	X																X	
SAPOTACEAE																		
<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	X	X		X	X	X	X	X	X			X	X	X	X		X	
<i>Manilkara hexandra</i> (Roxb.) Dubard					X													
SIMAROUBACEAE																		
<i>Ailanthus excelsa</i> Roxb.																X		
SMILACACEAE																		
<i>Smilax perfoliata</i> Lour.	X																	
SOLANACEAE																		
<i>Solanum surattense</i> Burm.f.	X			X	X	X	X	X	X			X	X	X			X	
ULMACEAE																		
<i>Holoptelea integrifolia</i> Planch.	X				X	X	X	X	X	X			X	X				
VIOLACEAE																		
<i>Hybanthus enneaspermus</i> (L.) F.Muell.	X		X	X	X	X	X	X	X			X	X	X	X		X	
VITACEAE																		
<i>Cissus vitiginea</i> L.						X		X								X		
<i>Leea asiatica</i> (L.) Ridsdale									X	X					X			
ZINGIBERACEAE																		
<i>Curcuma pseudomontana</i> J.Graham	X																	
TOTAL SPECIES RICHNESS	167	19	28	42	107	105	34	68	59	21	21	25	36	105	40	15	86	21



**Figure 2.** Knowledge sharing among inhabitants of 18 Koya villages within or near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division of Northern Telangana, India. Note that no shared plant species were reported by 16 or more villages.

(Table 5). The plant families, in the order of their utility, are Fabaceae, Malvaceae, Euphorbiaceae s.l., Rubiaceae, and Acanthaceae. Of these, Fabaceae (39 species) is the only family which is put to use in all 18 villages. It is followed by Malvaceae (18 species), Euphorbiaceae s.l. (15 species), Rubiaceae (10 species), and Acanthaceae (9 species). When the total family-use values of villages are viewed, three of them (Shapally, Dodla, and Narlapur) form a triangle within the sanctuary, with high top five family-use values totaling 2.43, 2.24, and 2.16, respectively. The least family-use value among the 16 villages in Eturnagaram Wildlife Sanctuary is Oorattum, with the value 0.15. The two villages located outside the sanctuary and used here to compare have the dominant five family-use values totaling 3.44 for Mallur, which is high, and 0.35 for Gandhinagar, which is very low compared to both the mean value of all villages (1.17) and the within-sanctuary mean (1.08).

### Discussion

The dominant families of ethnic use reported are all dicots, supporting the assertion by Gottlieb *et al.* (2002) that dicotyledonous families possess more medicinal properties. Differential use of plant taxa according to class rank may be due to knowledge of the prevalence of bioactive compounds and/or the simple preponderance of these taxa in the foraging area. Obviously, the ethnic knowledge of medicinal plants of Koya community is variable and is not uniformly spread amongst either the informants/inhabitants or the floristic groups.

Another observation, though not experimentally demonstrated here, is that the local people knew of more medicinal plants than they actually used. When local people were asked to mention names and uses other than those listed; they recalled some species but declared that they no longer use them. The village-wise difference in num-

ber of plant species used by the Koyas living in the same habitat vouches for this. The intracultural differences in the knowledge domain could be due to other available medical options or erosion of traditional pharmacological knowledge.

The patterns of medicinal plant use by local people are considered to vary as a function of plant habitat diversity, cultural changes, ecological, and biochemical aspects (Stepp 2004). Besides, the diversity in the ecological knowledge held by individuals within indigenous communities, as in Koyas, may be fundamental to community adaptation. For example, Standing Rock elders (Ruelle & Kassam 2011) themselves challenged that their knowledge is not homogeneous within their community. The variables that have been found to pattern the intracultural variation of ethnobotanical knowledge are age (Phillips & Gentry 1993), gender, kinship (Boster 1986), acculturation (Zent 2001), and level of integration with the market economy (Reyes-Garcia 2001). The conscious perception of cognitive signals, together with the individual cultural history of different ethnic groups, assert that these signals may be connected and interpreted in culture-specific ways.

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**Table 5.** Family-use values of the five most ethnomedicinally important plant families as reported by Koya inhabitants of 18 villages within or near Eturnagaram Wildlife Sanctuary in Warangal North Forest Division of Northern Telangana, India. Villages 1 and 18 are outside the sanctuary. Villages: 1 = Mallur; 2 = Kamaram; 3 = Venkatapuram; 4 = Chinnaboinapally; 5 = Shapally; 6 = Dodla; 7 = Malyala; 8 = Kondai; 9 = Ailapur; 10 = Yelishettipally; 11 = Banojibandam; 12 = Chalpaka; 13 = Allamvari Ghanpur; 14 = Narlapur; 15 = Medaram; 16 = Oorattum; 17 = Gonepally; 18 = Gandhinagar. \*The family Euphorbiaceae here includes Phyllanthaceae and Putranjivaceae.

Family	Villages																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Fabaceae	0.73	0.05	0.08	0.15	0.44	0.40	0.13	0.21	0.12	0.10	0.21	0.05	0.13	0.49	0.10	0.05	0.41	0.10
Malvaceae	0.72	0.14	0.11	0.33	0.47	0.50	0.11	0.33	0.39	0.08	0.00	0.11	0.28	0.67	0.14	0.00	0.33	0.08
Euphorbiaceae s.l.*	0.50	0.07	0.07	0.17	0.37	0.23	0.10	0.17	0.13	0.07	0.07	0.10	0.17	0.17	0.37	0.00	0.13	0.07
Rubiaceae	0.60	0.10	0.30	0.25	0.60	0.55	0.20	0.50	0.25	0.25	0.00	0.10	0.25	0.40	0.40	0.10	0.40	0.10
Acanthaceae	0.89	0.00	0.00	0.22	0.56	0.56	0.11	0.33	0.22	0.00	0.00	0.11	0.22	0.44	0.00	0.00	0.44	0.00
TOTAL	3.44	0.36	0.55	1.13	2.43	2.24	0.65	1.54	1.11	0.50	0.27	0.47	1.04	2.16	1.01	0.15	1.72	0.35

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