



# Ethno-medicinal application of plants in the eastern region of Shimoga district, Karnataka, India

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## ARTICLE INFO

### Article history:

Received 11 November 2008

Received in revised form 6 August 2009

Accepted 7 August 2009

Available online 15 August 2009

### Keywords:

Herbal medicine

Traditional practitioners

Informant consensus factor

Fidelity level

Shimoga

## ABSTRACT

**Aim of the study:** The present paper aimed to document and study the role of traditional herbal drugs in the treatment of human and veterinary ailments by communities residing in the eastern part of Shimoga district of Karnataka in India and to determine the consensus of informant's knowledge on different category of ailments and fidelity level of plant species in treating particular disease.

**Methodology:** The ethno-medico-botanical information was collected from herbal healers and knowledgeable elder people residing in 15 randomly selected villages using semi-structured interviews. The data were subjected to informant consensus factor (ICF) and fidelity level (FL) analyses.

**Results:** Eighty-five plant species of 41 families used to treat 31 human and 10 veterinary ailments were documented. Those medicinal plants which are effective in the treatment of liver complaints category had high ICF (0.77) and the skin diseases and disorders category attracted low ICF (0.12). Certain medicinal plants like *Cyclea peltata*, *Justicia adhatoda*, *Memecylon umbellatum*, *Phyllanthus amarus* and *Tabernaemontana alternifolia* were assigned with high degree of FL (100%) value and certain species like *Cassia fistula* was assigned with very low FL (25%). Some of the noteworthy medicinal uses of plant species in the study area were not reported for such purposes in the previously published literature on ethnobotany.

**Conclusion:** The local communities residing in eastern part of Shimoga district depended on herbal formulations for the treatment of diseases and disorders that affected them and their animals, as well. A high ICF and FL values indicated the possible occurrence of valuable bioactive compounds in certain plants and such of these plants need scientific evaluation for their pharmacological activities.

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## 1. Introduction

Plants are important sources of therapeutic drugs and play a significant role in the survival of the tribal and ethnic communities. India is rich in cultural and floristic diversity and also a store house of ethno-botanical knowledge. Large sections of Indian population still rely on plant-based medicines as they are abundantly available, economical, and have little or no side-effects (Sinha, 1996; Dubey et al., 2004) in addition to their cultural acceptability (Pal and Shukla, 2003). Of late, medicinal plants have gained global importance in alternative health-care system, for their proven and effective curative properties. Certain plant drugs used in modern medicine have ethno-botanical background (Dev, 1997; Fabricant and Farnsworth, 2001). Certain important scientific evaluations of plant species include bioactive compounds like artemisinin from *Artemisia annua*, vincristine and vinblastine both isolated from *Catharanthus roseus* and shatavarin-I from roots of *Asparagus racemosus* and curcumin from *Curcuma longa* (Dev, 1997). Globalisation

and changes in human life style have tremendous ill-effects on traditional culture in India. Hence, medico-botanical knowledge of different ethnic and folklore communities and tribals need urgent documentation, before it is completely lost.

The wealth of ethno-botanical knowledge has been documented from various parts of India (Jana and Chauhan, 2000; Katewa and Galav, 2005; Udayan et al., 2005; Das and Tag, 2006; Dabagar, 2006; Tiwari and Pande, 2006; Samy et al., 2008). In Karnataka state, the knowledge of ethno-medicinal value of plants with various tribal and rural folk communities for treating various diseases and disorders has been documented to some extent (Bhandary et al., 1995, 1996; Harsha et al., 2002; Parinitha et al., 2004, 2005). A perusal of these reports suggest that documentation of this knowledge in Karnataka is incomplete, and particularly, it is so in the Shimoga district of Karnataka. In this paper, an attempt has been made to collect and document the traditional medicinal plant knowledge of local herbal healers of different castes and communities residing in the eastern part of Shimoga district.

## 2. Methodology

Shimoga district of Karnataka state is situated in the heart of the Western Ghats region, which is one of the 'hot-spots of bio-

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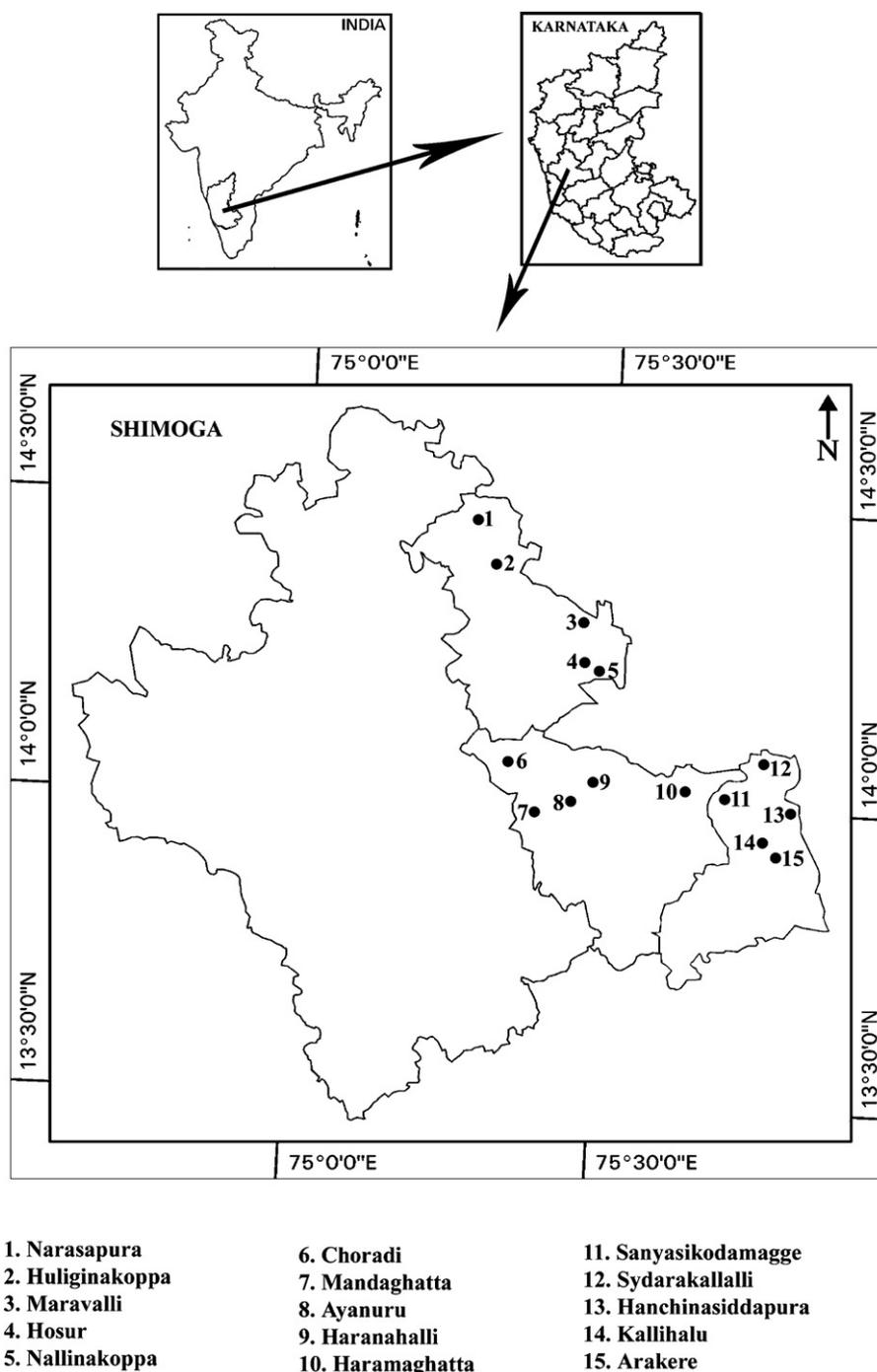


Fig. 1. Map showing study sites of Shimoga district.

diversity' in India. Shimoga district is situated between 13°27' and 14°39' N latitude and between 74°37' and 75°52' E longitude in about the mid-southwestern part of the Karnataka State (Fig. 1). The study area, the eastern part of Shimoga district, is rich in natural vegetation and comprises mainly of moist and dry deciduous types of forest supporting a variety of medicinal plants and receives an average annual rainfall of 1812 mm. The eastern part of the district include three taluks—Bhadravathi, Shimoga and Shikaripura, covering a total area of 2707 km<sup>2</sup>. Agriculture is the major occupation in this area and Bhadra, Tunga and Anjanapura reservoirs provide irrigation facilities. Paddy, sugarcane, areca nut, sorghum, maize and cotton are the main crops.

A preliminary survey of villages (study sites) in the eastern part of Shimoga district revealed that local communities used herbal medicine extensively in their health-care system. Twelve villages were in proximity to forests, and rivers, while three to towns (N. Rajakumar, personal observation). Frequent ethno-botanical field visits were paid to 15 selected study sites during December 2005–January 2007. Each village was visited atleast three times during the study period. The ethno-medico-botanical information was collected and documented through casual conversations and semi-structured interview technique (Martin, 1995) with local herbal practitioners and knowledgeable residents of the study area. During the field survey, the information collected on plant species used to treat various human and veterinary diseases and

**Table 1**  
Plant species used to treat human diseases and disorders.

Plant name (Family) voucher number	Local (common) name	Ailments	Uses
<i>Abutilon indicum</i> (L.) Sweet (Malvaceae) KU/SG/JJS 151	<i>Mudre gida</i> (Indian mallow)	Piles	2–3 spoonfuls of leaf decoction is taken orally with a cup of fresh cow's milk early in the morning till cure.
<i>Achyranthes aspera</i> L. (Amaranthaceae) KU/BS/GG 34	<i>Uttarani</i> (Prickly chaff flower)	Gastric problems	Root juice is taken orally, daily thrice for 2–3 days.
<i>Aegle marmelos</i> (L.) Correa (Rutaceae) KU/SG/V 85	<i>Bilpatre</i> (Bael)	Asthma	1 kg of leaves boiled in 4 L of water with one coconut fruit pulp and made into decoction. 200 ml of this decoction is taken orally twice a day for 3–4 weeks.
<i>Alstonia scholaris</i> (L.) R. Br. (Apocynaceae) KU/SD/SH 342	<i>Maddale</i> (Devil tree)	Fever	One handful of bark ground with rice washed water to prepare a juice and one teaspoonful of juice is taken internally with a cup of rice washed water, daily twice for 3 days.
<i>Alternanthera sessilis</i> (L.) R. Br. ex DC. (Amaranthaceae) KU/SG/JJS 94	<i>Honagone</i> (Sessile joy weed)	Stomachache	Half kilogram of leaves mixed with pepper and salt and fried in ghee. Fried plant material is taken orally, daily once for 2–3 days.
<i>Amaranthus viridis</i> L. (Amaranthaceae) KU/SG/JJS 679	<i>Harive</i> (Green amaranth)	Boils	Root juice is applied externally on infected area, daily thrice, till cure.
<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees (Acanthaceae) KU/SG/JJS 89	<i>Nela bevu</i> (Creat)	Itching	Juice of leaves is taken orally with a cup of fresh cow's milk early in the morning, for 4–5 days.
<i>Aristolochia indica</i> L. (Aristolochiaceae) KU/SG/JJS 98	<i>Eswariballi</i> (The Indian Birthwort)	Skin allergies	Leaves ground with seeds of <i>Mesua ferrea</i> L. (Clusiaceae; <i>Nagasampigae</i> ; KU/SD/SH 437) into paste and applied topically on infected parts of the skin, till cure.
<i>Azadirachta indica</i> A. Juss. (Meliaceae) KU/SG/MH 67	<i>Bevina mara</i> (Neem)	Body ache	One handful of leaves with 4 fruits of <i>Piper nigrum</i> L. and small piece of jaggery boiled in 4 L water and made into 1 L decoction. 10 ml of decoction is given orally in the early morning, for 1 month.
<i>Butea monosperma</i> (Lam.) Taubert (Papilionaceae) KU/SG/V 62	<i>Muttuga</i> (Flame of the forest)	Urinary infection	One cup of bark decoction is taken orally, daily thrice for 1–2 days.
<i>Caesalpinia bonduc</i> (L.) Roxb. (Caesalpinaceae) KU/SD/BT 337	<i>Gajjuga</i> (Bonduc nut)	Hydrocele	Seeds of <i>Caesalpinia bonduc</i> ground in water with rhizomes of <i>Zingiber officinale</i> Rosc. (Zingiberaceae; <i>Shunti</i> ; KU/SG/JJS 187) and <i>Curcuma longa</i> to prepare a paste, which is taken orally with a cup of water, twice a day for 10 days.
<i>Capparis zeylanica</i> L. (Capparaceae) KU/SD/BT 313	<i>Kurutigana soppu</i> (Indian caper)	Cough and cold	Leaf juice is taken orally with a cup of fresh goat's milk for 2–3 days.
<i>Cardiospermum halicacabum</i> L. (Sapindaceae) KU/SG/JJS 177	<i>Bekkina budde gida</i> (Balloon vine)	Cough	A handful of fresh leaves is kept in fire and the smoke is inhaled, daily once for 1–2 days.
<i>Careya arborea</i> Roxb. (Lecythidaceae) KU/BS/LV 36	<i>Kavlu</i> (Slow match tree)	Dysentery	One teaspoonful of bark juice is taken orally with a cup of cow's milk, daily once for 1–2 days.
<i>Carissa carandas</i> L. (Apocynaceae) KU/SG/JJS 190	<i>Kavali</i> (Karanda)	Asthma	Roots are ground in lemon juice and half-teaspoonful of root juice taken orally with water, daily once for 2–3 weeks.
<i>Cassia fistula</i> L. (Caesalpinaceae) KU/BD/MG 08	<i>Kakke</i> (Indian laburnum)	Acidity	A handful of leaves boiled in 6 L of water and reduced to 1 L decoction. One teaspoonful of decoction in one cup of cow's milk with a sugar, taken orally daily twice for 1–2 days.
		Eczema	Paste of crushed leaves is applied externally on infected skin part with a pinch of salt, daily twice for 3 days.
		Headache	One handful of leaves boiled in water and vapour is inhaled at least for 4–5 min, twice a day for 1–2 days.
		Jaundice	Bark ground with pepper and onion in water to prepare a juice, which is taken orally with water in empty stomach for 7 days.
		Wounds	Leaves crushed in lemon juice into paste are applied topically on wound, daily twice till cure.
<i>Catharanthus roseus</i> (L.) G. Don (Apocynaceae) KU/SG/JJS 97	<i>Nitya kanagale</i> (Periwinkle)	Blood pressure	About 5–6 leaves chewed and juice is swallowed in the early morning for 2–3 weeks.
<i>Centella asiatica</i> (L.) Urban (Apiaceae) KU/BS/MU 14	<i>Ondelega</i> (Indian Pennywort)	Cardiac problems	Leaf paste of <i>Centella asiatica</i> and <i>Aegle marmelos</i> is taken internally with a cup of hot water early in the morning until cure.
		Fever	A handful of roots boiled with cumin seeds in 4 L of water and made into 1 L decoction. Two spoonful of decoction is taken orally, daily twice for 2–3 days.
<i>Chromolaena odorata</i> (L.) King & Robinson (Asteraceae) KU/SD/SH 328	<i>Communist gida</i> (Siam weed)	Wounds	Leaf juice is applied on affected area, till cure.
<i>Clematis gouriana</i> Roxb. ex DC. (Ranunculaceae) KU/SD/SH 274	<i>Ballivadaka</i> (Gourian clematis)	Asthma	Flowers crushed with fruits of <i>Piper longum</i> L. and made into pills and dried. One pill taken orally with honey, in an empty stomach for 4–5 weeks.
		Headache	Two-inch piece of stem or a handful of leaves are boiled in water and immediately vapour is inhaled for 3–4 min, twice a day for 1 day.
		Stomach ulcer	Two handfuls of leaves fried in ghee. Half-teaspoonful of fried leaf material is taken orally, daily twice for 1 week.
<i>Clitoria ternatea</i> L. (Papilionaceae) KU/SG/JJS 168	<i>Shankapushpi</i> (Butterfly pea)	Cholera	Leaf juice is taken internally with honey or jaggery, daily twice for 1–2 days.

Table 1 (Continued)

Plant name (Family) voucher number	Local (common) name	Ailments	Uses
<i>Croton oblongifolius</i> Roxb. (Euphorbiaceae) KU/SD/SH 276	Somavarada gida (Chukka)	Heart problems	Roots ground in lemon juice and two teaspoonful of paste taken orally with buttermilk early in the morning, for 1 week.
<i>Cuminum cyminum</i> L. (Apiaceae) KU/SD/BT/292	Jirige (Cumin)	Body heat	Seeds crushed with sugar candy and kept in coconut milk overnight are taken next day morning orally for 5 days.
<i>Curcuma longa</i> L. (Zingiberaceae) KU/BS/SM 53	Arishina (Turmeric)	Scabies	Rhizome crushed with cumin seeds and made into paste, which is applied externally on affected part till cure.
<i>Cyclea peltata</i> (Lam.) J. Hooker & Thoms. (Menispermaceae) KU/SG/JS 156	Agalushunti balli (Pata root)	Dysentery	One teaspoonful of leaf juice is taken orally, daily twice for 1–2 days.
		Intestinal worms (children)	Leaves crushed into paste and half or one teaspoon of paste is taken orally, daily twice for 2 days.
<i>Cynodon dactylon</i> (L.) Pers. (Poaceae) KU/BS/SM 51	Garike (Dhub grass)	Dandruff	Leaf paste with water is applied externally over the head, weekly twice for 2–3 weeks.
		Fever	Two handfuls of leaves boiled in 4L water with cumin seeds into 1 L decoction. 2–3 teaspoonfuls of decoction are taken orally, daily twice for 3 days.
<i>Embelia ribes</i> Burm.f. (Myrsinaceae) KU/SG/JS 238	Vayuvilanga (Vidanga)	Cough and cold	A handful of roots ground in lemon juice or buttermilk and 1–3 teaspoonful of juice are taken orally with sugar/jaggery, daily twice for 2 days.
		Paralysis	Leaves of <i>Embelia ribes</i> are ground with roots of <i>Withania somnifera</i> (L.) Dun. (Solanaceae; <i>Ashwagandha</i> ; KU/SG/NS 71) and <i>Asparagus racemosus</i> Willd. (Liliaceae; <i>Shatavari</i> ; KU/BS/AL 04) to prepare a paste, which is taken orally with a cup of hot water, twice a day for 1 month.
<i>Emilia sonchifolia</i> (L.) DC. (Asteraceae) KU/SG/JS 108	Sahadevi (Purple sow thistle)	Leprosy	Two handfuls of leaves kept in fire and made into ash. Ash is mixed with sesame oil and applied topically on infected part of the skin, daily twice, till cure.
<i>Ensete superbum</i> (Roxb.) Cheesman (syn. <i>Musa superba</i> Roxb.) (Musaceae) KU/SD/SH 395	Kallubale (Wild plaitain)	Appendicitis	Pith region is taken orally as in the raw form, early in the morning for 10 days.
<i>Erythrina variegata</i> L. (syn. <i>Erythrina indica</i> Lam.) (Papilionaceae) KU/BS/MG 03	Halavana (Indian coral tree)	Toothache	Leaf paste is applied on affected tooth, till cure.
<i>Ferula assa-foetida</i> L. Apiaceae KU/UK/KV/HG 302	Hingu (Asafoetida)	Stomachache	Commercial crystalline root exudate is powdered and taken orally with buttermilk, daily once for 1–2 days.
<i>Ficus racemosa</i> L. (syn. <i>Ficus glomerata</i> Roxb.) (Moraceae) KU/SG/NS 236	Atthi (Udumbara)	Leucorrhoea	10 fruits ground with 100 g of cumin seeds and sugar candy into paste. One teaspoonful of paste is taken orally with half teaspoon of ghee, daily twice for 1 week.
		Piles	Bark powder mixed with rice washed water and filtrate taken orally with water for 2 weeks.
<i>Ficus religiosa</i> L. (Moraceae) KU/SD/SH 331	Aralimara (Peepal tree)	Skin allergies	Paste of bark is applied externally on affected part, daily once, till cure.
<i>Gliricidia sepium</i> (Jacq.) Kunth (Papilionaceae) KU/SD/SH 388	Gobbaradagida (Mexican lilac)	Ring worm	Leaf juice is applied externally over ring worm part, till cure.
<i>Glycyrrhiza glabra</i> L. (Papilionaceae) KU/SD/BT 311	Jhestamadhu (Liquorice)	Asthma	One teaspoonful of root powder is taken orally with a cup of water, twice a day for 10 days.
<i>Gmelina arborea</i> Roxb. (Verbenaceae) KU/SD/SH 333	Shivani (Gamhar)	Cuts and wounds	Juice of crushed leaves is applied externally on wound part, till cure.
<i>Grewia abutifolia</i> Mast. (Tiliaceae) KU/SD/SH 277	Kowri (Raisin)	Piles	One handful of roots ground in water and 1–2 teaspoonfuls of juice are taken internally in an empty stomach, till cure.
<i>Hemidesmus indicus</i> (L.) W. T. Aiton (Asclepiadaceae) KU/BS/MG 01	Sogade (Indian Sarsaparilla)	Diabetes	Roots ground with rhizome of <i>Zingiber officinale</i> Rosc. and coconut fruit pulp to prepare a paste, which is taken orally, daily morning for 2–3 weeks.
<i>Hibiscus rosa-sinensis</i> L. (Malvaceae) KU/BS/SM 52	Dasavala (China rose)	Leucorrhoea	Flowers macerated with seeds of cardamom and cumin is mixed with a cup of fresh cow's milk. Three teaspoonfuls of juice is taken orally early in the morning for 7 days.

Table 1 (Continued)

Plant name (Family) voucher number	Local (common) name	Ailments	Uses
<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex. G. Don (Apocynaceae) KU/SG/KG 24	Kodasiga (Kutaja)	Ring worm	Roots of <i>Holarrhena pubescens</i> are ground along with bark of <i>Azadirachta indica</i> and leaves of <i>Trichosanthes cucumerina</i> L. (Cucurbitaceae; <i>Kadu padavala</i> ; KU/SD/BT 362) made into a paste and applied externally on infected part for 3–4 days.
		Stomach ache	Roots crushed in water and juice is taken orally, daily twice for 1–2 days.
		Intestinal worms	One handful of roots ground and taken orally with a pinch of salt, twice a day for 1–2 days.
<i>Holoptelea integrifolia</i> (Roxb.) Planch. (Ulmaceae) KU/BS/GG 32	Tapasi (Indian elm)	Herpes	Two handfuls of bark ground into paste and applied topically over herpes affected part, daily once for 2 weeks.
<i>Justicia adhatoda</i> L. (syn. <i>Adhatoda zeylanica</i> Medik.) (Acanthaceae) KU/SG/NS 78	Aadusoge (Malabarnut)	Bronchitis	One teaspoonful of root paste is mixed with garlic and pepper paste and taken with human breast milk early morning for 5–7 days.
		Cough and cold	Pills are made out of crushed leaves and one pill taken orally, daily thrice for 2–3 days.
		Fever	One handful of leaves crushed in lemon juice and a teaspoonful of juice taken orally with little honey for 2 days in the early morning.
<i>Lantana camara</i> L. (Verbenaceae) KU/SG/NS 265	Chaduranga (Lantana)	Wound	Leaf juice applied externally with lime on wound, till cure.
<i>Leucas aspera</i> (Willd.) Link (Lamiaceae) KU/BS/MV 13	Tumbe (Dronapuspi)	Wound	Leaves of <i>Leucas aspera</i> crushed with leaves of <i>Lantana camara</i> into paste, which is applied externally on wound part, till cure.
		Eye infection	2–3 drops of leaf juice is poured in the eye daily once, till cure.
<i>Melia azedarach</i> L. (Meliaceae) KU/SD/BT 339	Arebevu (Bead tree)	Menstrual problems (stomach pain)	Leaves ground with equal quantities of cardamom, pepper and cumin seeds and made into pills. Daily three pills taken orally, for 5 days.
<i>Memecylon umbellatum</i> Burm. f. (Melastomataceae) KU/SD/SR 532	Adichari (Iron wood tree)	Herpes	Leaf juice is applied externally on herpes affected part with cow's urine, daily twice, till cure.
		Bone fracture	Young leaves crushed with black gram ( <i>Vigna mungo</i> (L.) Hepper; Papilionaceae; Uddu) and taken internally with egg albumin and butter, daily twice for 3 weeks.
<i>Mesua ferrea</i> L. (Guttiferae) KU/SD/BT 355	Nagakesara (Mesua)	Menstrual problems	Seeds ground with pepper & alum is made into powder. Half teaspoon of powder is taken orally with milk, daily once in the morning for 5 days.
<i>Mimosa pudica</i> L. (Mimosaceae) KU/SG/JJS 159	Muttidare muni (Touch me not)	Partial headache	Root juice is poured (3–4 drops) in the ear lobes and nostrils for 1 day.
		Piles	A handful of roots ground with old jaggery and made into paste. This paste is taken orally with one cup of cow's milk, early in the morning, till cure.
<i>Moringa oleifera</i> Lam. (Moringaceae) KU/BS/MU 12	Nugge (Drumstick tree)	Blood pressure	A handful of bark ground with lemon juice to prepare a paste and paste is mixed with a teaspoonful of honey and a cup of cow's milk is taken orally in an empty stomach for 1 week.
		Intestinal worms	A handful of bark ground and juice is taken orally with a pinch of salt, twice a day for 1–2 days.
<i>Naravelia zeylanica</i> DC. (Ranunculaceae) KU/SG/JJS 174	Talevadethada balli (Vatanasini)	Headache	Stem parts are boiled in water and vapour is inhaled for 3 min, for only once in a day.
<i>Nicotiana tabacum</i> L. (Solanaceae) KU/SD/BT 346	Hoge Soppu (Tobacco)	Scorpion sting	Leaf juice of tobacco is taken orally with a cup of buttermilk and latex of <i>Euphorbia tirucalli</i> L. (Euphorbiaceae; <i>Kolugalli</i> ; KU/SG/MH 79) is also applied on bitten site, for 1 day.
<i>Ocimum tenuiflorum</i> L. (Lamiaceae) KU/SG/V 61	Tulasi (Holy basil)	Eczema	Leaf paste of <i>Ocimum tenuiflorum</i> , <i>Leucas aspera</i> mixed with turmeric is applied externally over eczema part, daily once for 7 days.
<i>Oxalis corniculata</i> L. (Oxalidaceae) KU/SG/JJS 165	Hulisoppu (Indian sorrel)	Toothache	One handful of leaves ground into paste and applied on affected tooth, daily once for 2–3 days.
		Skin diseases	Leaves boiled in coconut oil and applied externally on affected part of the skin, daily three times for 2–3 days.

Table 1 (Continued)

Plant name (Family) voucher number	Local (common) name	Ailments	Uses
<i>Phyllanthus amarus</i> Schum. & Thonn. (Euphorbiaceae) KU/SG/V 57	<i>Nelanelli</i> (Carry me seed)	Jaundice	Root juice is taken orally with cow's milk early in the morning for 1 week.
<i>Plumeria rubra</i> L. (Apocynaceae) KU/SD/SH 325	<i>Deva kanigile</i> (Frangipani pink)	Ring worm	Milky latex is applied externally on infected part of skin, twice a day externally for 1 week.
		Jaundice	A handful of bark ground to prepare a juice is mixed with a cup of water and taken orally early in the morning for 15–20 days.
<i>Plumbago zeylanica</i> L. (Plumbaginaceae) KU/BS/MA 23	<i>Chitramoola</i> (White leadwort)	Eczema	Leaves kept in fire into ash and ash is applied externally on infected part with coconut oil, daily twice, till cure.
		Wound	One handful of roots ground with lemon juice and made into paste, which is applied topically over wound, till cure.
<i>Psidium guajava</i> L. (Myrtaceae) KU/BS/MG 10	<i>Perale</i> (Common Guava)	Indigestion	4–5 tender leaves eaten daily morning for 1–2 days.
<i>Ruta graveolens</i> L. (Rutaceae) KU/BS/MA 18	<i>Sadapu</i> (Garden Rue)	Cough and cold	2–3 teaspoonfuls of leaf juice taken orally, daily early in the morning for 1–2 days.
		Typhoid	One teaspoonful of leaf powder is taken orally with a cup of hot water twice a day for 3–4 days.
<i>Salacia chinensis</i> L. (Hippocrateaceae) KU/SD/BT 314	<i>Ekanayaka</i> (Chinese salacia)	Diabetes	Equal quantity leaves of <i>Salacia chinensis</i> and <i>Catharanthus roseus</i> are crushed and one teaspoonful of leaf paste is taken orally with a cup of hot water early in the morning for 1 month.
<i>Santalum album</i> L. (Santalaceae) KU/SG/V 65	<i>Srigandha</i> (Sandalwood)	Urticaria	Leaves crushed and mixed with coconut oil and applied externally over affected part, daily twice for 2–3 days.
<i>Sapindus trifoliatus</i> L. (syn. <i>Sapindus laurifolius</i> Vahl.) (Sapindaceae) KU/SG/JS 272	<i>Aantuvala</i> (Soapnut tree)	Eczema	Fruits crushed with pepper, camphor and then fried in coconut oil are applied externally over infected part of the skin, till cure.
<i>Saraca asoca</i> (Roxb.) W. J. de Wilde (Caesalpiniaceae) KU/SG/JS 202	<i>Ashokamara</i> (Ashoka)	Leucorrhoea	Two handfuls of bark boiled in 6L of water and made into 1.5L decoction. 3–4 teaspoonfuls of bark decoction taken orally, twice a day for 1–2 days.
<i>Senna occidentalis</i> (L.) Link (syn. <i>Cassia occidentalis</i> L.) (Caesalpiniaceae) KU/SD/SH 438	<i>Kasamarda</i> (Coffee senna)	Nerve problems	Paste of crushed leaves is applied externally on affected area and also one teaspoonful of paste is taken orally with a cup of water early in the morning for 2–3 days.
<i>Senna sophora</i> (L.) Roxb. (syn. <i>Cassia sophora</i> L.) (Caesalpiniaceae) KU/BS/SM 38	<i>Elevarige</i> (Senna sophora)	Rheumatic pain	One teaspoonful of leaf paste is taken orally, daily once for 2–3 days.
<i>Sida acuta</i> Burm. f. (Malvaceae) KU/SG/JS 154	<i>Kasabarike gida</i> (Bala)	Boils	Root paste in lemon juice is applied externally over infected part twice a day for 2–3 days.
		Dysentery	Dried roots are powdered and one teaspoonful of powder is taken orally with a cup of hot water, twice a day for 2 days.
<i>Solanum virginianum</i> L. (syn. <i>Solanum xanthocarpum</i> Sch. & Wendl.) (Solanaceae) KU/BS/AL 40	<i>Kadubadane</i> (Thorny nightshade)	Boils	Roots crushed in lemon juice and made into paste, which is applied externally, daily once for 3–4 days.
<i>Syzygium cumini</i> (L.) Skeels. (Myrtaceae) KU/SG/V 60	<i>Nerale</i> (Jambolan)	Dysentery	One teaspoonful of bark juice is taken orally with a cup of water, twice a day for 1–2 days.
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn. (Combretaceae) KU/SG/NS 207	<i>Bilimati</i> (Arjun tree)	Headache	Leaf juice is taken orally and also applied externally on forehead for 1 day.
<i>Terminalia bellirica</i> (Gaertn.) Roxb. (Combretaceae) KU/SG/V 71	<i>Taare</i> (Belliric myrobalan)	Psoriasis	Fruits are ground with cow's urine and applied externally on infected part, daily twice for 2 weeks.
<i>Terminalia chebula</i> Retz. (Combretaceae) KU/SG/JS 209	<i>Alalekayi</i> (Chebulic myrobalan)	Body heat	Dried fruit powdered and taken orally with a cup of water early in the morning for 7 days.
<i>Tinospora cordifolia</i> (Willd.) Hook. f. & Thomson (Menispermaceae) KU/SG/JS 157	<i>Amruthaballi</i> (Gulanacha)	Boils	Leaves ground with turmeric powder and pinch of salt to prepare a paste and paste is applied topically over infected area twice a day for 2 days.
		Blood pressure	Leaf paste mixed in a cup of fresh cow's milk is taken orally twice a day for 10 days.
		Diabetes	One inch stem piece of <i>Tinospora cordifolia</i> crushed with 3–4 leaves of <i>Catharanthus roseus</i> into paste and taken orally daily morning for 3 weeks.
		Itching	Whole plant of <i>Tinospora cordifolia</i> crushed with leaves of <i>Sida acuta</i> , turmeric powder and pinch of salt is applied externally on infected part of the skin till cure.

Table 1 (Continued).

Plant name (Family) voucher number	Local (common) name	Ailments	Uses
<i>Tridax procumbens</i> L. (Asteraceae) KU/SG/JJS 121	<i>Gabbu sannasavanti</i> (Mexican daisy)	Toothache	Leaf paste is applied on the affected tooth, twice a day for 2–3 days.
<i>Vitex negundo</i> L. (Verbenaceae) KU/BS/HB 29	<i>Lakki</i> (Nirgundi)	Fever Rheumatic pain	Leaves boiled in water and the vapour is inhaled at least for 5 min, thrice a day for 2 days. Equal quantity leaves of <i>Vitex negundo</i> , <i>Millettia pinnata</i> (L.) Panigrahi (syn. <i>Pongamia pinnata</i> (L.) Pierre; Papilionaceae; Honge; KU/SG/V 66) and <i>Eucalyptus globulus</i> Labill. (Myrtaceae; Nilagiri; KU/SD/BT 350) are crushed and then heated with half liter sesame oil to prepare a paste, which is applied externally on body ache part with the help of eucalyptus stick twice a day till cure.
<i>Ziziphus oenoplia</i> (L.) Mill. (Rhamnaceae) KU/SD/SH 403	<i>Parake</i> (Jackal jujube)	Mouth ulcer	Roots crushed in water and 2 teaspoonfuls of paste taken orally, daily twice for 2 days.

disorders, their local name, part of the plant, method of drug preparation, mode of application, dosage and duration was documented in the field data book. The reveals were confirmed by discussion with respondents and also individuals who received herbal treatments. The data collected were also compared with the already existing literature (Nadakarni, 1976; Kirtikar and Basu,

1986; Jain, 1991; Anonymous, 1992). Based on the information collected from the herbal healers of the study area, all the reported ailments were grouped into 10 categories: cuts and wounds, fever, gastro-intestinal disorders, general health, liver complaints, pains, respiratory system disorders, skin diseases and disorders, urinary problems and veterinary ailments.

Table 2

Plant species used to treat veterinary diseases and disorders.

Plant name Family (voucher number)	Local (common) name	Ailments	Uses
<i>Abrus precatorius</i> L. (Papilionaceae) KU/SG/JJS 166	<i>Gulaganji</i> (Indian Liquorice)	Tympanites	Leaf paste is given to cattle orally, daily once for 2–3 days.
<i>Alstonia scholaris</i> (L.) R. Br. (Apocynaceae) KU/SD/SH 342	<i>Maddale</i> (Devil tree)	Cold and cough Weakness	Leaves are crushed with pepper and made into paste. Paste is applied over painful area, daily twice for 2–3 days. One handful of leaves crushed with leaves of <i>Aegle marmelos</i> and given orally with buttermilk for 3 weeks.
<i>Asparagus racemosus</i> Willd. (Liliaceae) KU/BS/AL 41	<i>Majjige gadde</i> (Shatawari)	Galactagogue	Equal quantity of leaves and roots crushed in water and given to cattle orally, daily once for 3–4 weeks.
<i>Ferula assa-foetida</i> L. (Apiaceae) KU/SD/SH 315	<i>Hingu</i> (Asafoetida)	Cold and cough	Commercial crystalline root exudate ground with onion and jaggery and made into paste. Paste is given to cattle orally in the early morning for 2–3 days.
<i>Hibiscus cannabinus</i> L. (Malvaceae) KU/SD/SH 336	<i>Pundisoppu</i> (Deccan hemp)	Foot and mouth disease	Leaf paste is given to cattle orally with a cup of buttermilk, twice a day for 1–2 days.
<i>Holoptelea integrifolia</i> (Roxb.) Planch. (Ulmaceae) KU/BS/GG 32	<i>Tapasi</i> (Indian elm)	Cold and cough Weakness	A handful of bark and leaves ground with 15 pepper seeds, one bulb of garlic in rice washed water. Half liter of plant extract given to cattle, daily once for 1–2 days. Bark ground with jaggery and lemon juice and made into paste. Paste is given to cattle orally, daily once for 1–2 days.
<i>Leea indica</i> (Burm. f.) Merr. (Vitaceae) KU/UK/KV/MD 297	<i>Doopanige</i> (Bandicoot berry)	Diarrhoea and dysentery	10 handfuls of leaves crushed in buttermilk and given to cattle, daily two times for 2–3 days.
<i>Leucas aspera</i> (Willd.) Link (Lamiaceae) KU/BS/MU 13	<i>Tumbe</i> (Dronapuspi)	Body ache Conjunctivitis	Leaves are ground with pepper and made into paste. Paste is applied over painful area, daily twice for 2–3 days. Juice of crushed leaves poured in the eye part, daily once, till cure.
<i>Senna sophera</i> (L.) Roxb. (Caesalpiniaceae) KU/BS/SM 038	<i>Elavarige</i> (Senna sophera)	Wound and worms in cattle	Leaf paste is applied externally on the infected foot part, daily once for 3 days.
<i>Tabernaemontana alternifolia</i> L. (syn. <i>Ervatamia heyneana</i> Cooke) (Apocynaceae) KU/SD/SH 352	<i>Maddarasa</i>	Snake bite	Two handfuls of bark ground in buttermilk to prepare a paste, which is given to cattle, thrice a day for 1 day.
<i>Tagetes erecta</i> L. (Asteraceae) KU/SD/SH 319	<i>Chendu hoovu</i> (Marigold)	Wound and worms in cattle	Leaf paste is applied externally on infected foot of the cattle, for 3–4 days.
<i>Terminalia bellirica</i> (Gaertn.) Roxb. (Combretaceae) KU/SG/V 71	<i>Taare</i> (Belliric myrobalan)	Foot and mouth disease	Bark paste is given to cattle orally, daily once for 1–2 days.
<i>Zingiber officinale</i> Rosc. (Zingiberaceae) KU/SG/JJS 187	<i>Shunti</i> (Ginger)	Tympanites	Rhizome crushed with <i>Allium sativum</i> L., <i>Ferula assa-foetida</i> L. and jaggery in equal quantity, made into paste. Paste is given to cattle orally, daily one time for 3 days.

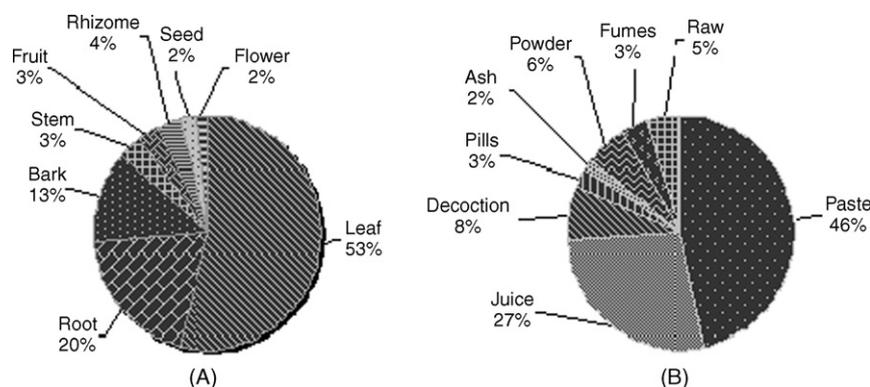


Fig. 2. Plant parts used for drug preparation (A) and preferred herbal remedies (B).

Informant consensus factor (ICF) was used to identify the ethno-botanical importance of the reported plant species (Heinrich et al., 1998) and this method was used to analyze the agreement of the informant's knowledge on each category of ailments. Informant consensus factor was calculated by the formula:  $ICF = n_{ur} - n_t / n_{ur} - 1$ , where  $n_{ur}$  is the number of use citation in each category;  $n_t$  is the number of species used.

The fidelity level (FL) was calculated (Alexiades, 1996) for determining the most important plant species used for treating a particular disease by the local herbal practitioner(s) and knowledgeable elder(s) of the study area. It was calculated by the formula:

$$FL(\%) = \frac{Np \times 100}{N}$$

where  $Np$  is the number of informants who claim the use of a plant species to treat a particular ailment,  $N$  is the number of informants who use plants as a medicine to treat any given ailment.

Systemic position of each plant species was determined using the identification manuals (Yoganarasimhan et al., 1981; Gamble, 1995; Ramaswamy et al., 2001). The plant species were photographed and specimens were collected for preparing the herbarium, allotted voucher number and deposited in the Department of Applied Botany, Kuvempu University.

### 3. Results and discussion

A total of 32 respondents (27 male and 5 female individuals, aged between 28 and 83 years) in the study area belonged to different castes and communities (Adikarnataka, Besta, Brahmin, Ediga, Lambani, Lingayatha, TAMILIAN, Vokkaliga, Uppara and Muslims).

Most resident herbal healers consider their herbal knowledge as traditional secrets, but revealed their knowledge upon repeated contacts, persuasions and discussions. They were also informed of the importance of their therapeutic knowledge to the mankind.

The present investigation revealed the use of 85 plant species of 41 families to cure 31 human and 10 veterinary ailments (Tables 1 and 2). Among them, 34 were tree, 27 herb, 14 shrub and 10 climber species. Most herbal practitioners preferred freshly harvested above ground plant parts to underground parts for herbal formulations. The percentage of plant part used and preferred drug formulation are shown in Fig. 2. Oral administration (63.00%) was the most common method and for skin problems, external application (31.50%) was recommended. Sometimes inhalation therapy (5.40%) was also recommended. The dosage of drug always depended on the age of the patient, type or severity of illness.

Some of the noteworthy observations not documented in the ethno-medicinal literature are, leaves of *Tridax procumbens* for toothache, *Tinospora cordifolia* for boils, *Catharanthus roseus* for blood pressure, *Embelia ribes* and *Withania somnifera* for paralysis, *Senna occidentalis* for nerve swelling, *Ruta graveolens* for typhoid, *Capparis zeylanica* for cough and cold and *Melia azedarach* to menstrual problems; roots of *Mimosa pudica* for partial headache; bark of *Holarrhena pubescens* for ring worm; and fruits of *Sapindus laurifolius* to treat eczema. The above plants apart, certain plant species in the study area also find mention in Ayurveda, Unani or Siddha medicine (Joshi, 2000; Nair and Mohanan, 2005).

The herbal healers also used plants in combination(s) to successfully treat chronic human diseases and disorders. Some of the examples are, roots of *Withania somnifera* and *Asparagus racemosus* in combination with leaves of *Embelia ribes* for paralysis, leaves of *Vitex negundo*, *Millettia pinnata* and *Eucalyptus globulus*

Table 3

Category of ailments and their informant consensus factor (ICF).

Category (diseases and disorders)	Plant species	Use reports	Informant consensus factor
Liver complaints	3	10	0.77
Respiratory system disorders (asthma, bronchitis, cough)	9	16	0.46
Cuts and wounds	6	10	0.44
Urological problems (urinary infection, diabetes)	9	15	0.42
Fever	6	9	0.37
Veterinary ailments	14	19	0.27
Gastro-intestinal disorders (diarrhoea, dysentery, indigestion, intestinal worms, piles, stomach ache, stomach ulcer)	14	18	0.23
General health (cold, body heat, blood pressure, heart problems, nerve swelling, menstrual problems, paralysis)	23	28	0.18
Pains (bodyache, headache, toothache)	13	15	0.14
Skin diseases and disorders (allergies, boils, eczema, herpes, itching, leprosy, ringworm and scabies)	22	25	0.12

for rheumatic pain, seeds of *Caesalpinia bonduc* in combination with rhizome of *Zingiber officinale* and *Curcuma longa* for hydrocele, leaves of *Salacia chinensis* and *Catharanthus roseus* in combination for diabetes, and leaves of *Centella asiatica* and *Aegle marmelos* for cardiac problems. In addition to the above, combinations of medicinal plants have also been used for treatment of asthma, ring worm, scorpion sting and wound. In contrast to the above, the individual plant species was used to treat multiple ailments also. For example, *Cassia fistula* to treat acidity, eczema, headache, jaundice and wounds, *Tinospora cordifolia* to boils, diabetes, blood pressure and itching and *Ruta graveolens* to typhoid, cough and cold.

The ethno-botanical data of the study area were analyzed by ICF with values ranging from 0 to 1 (Table 3). The ICF value of 0.77 (maximum) for liver complaints and 0.46 for respiratory system disorder categories indicated moderate consistency of informant knowledge in the use of these medicinal plant species, while the low ICF value of 0.12 for skin diseases and disorders category indicated the less consistency of the informant knowledge in the plants used for treatment. Further, high ICF was always associated with a few plants with high use citations for treating single disease category. On the other hand, low ICF was associated with many plants with an almost equal high use citation (Table 3) suggesting the lesser level of agreement among the informants on use of plant species to treat a particular disease category. The ICF of local knowledge for disease treatment depended on the availability of plant species and the study area. In Northeastern Brazil, the treatment of blood and hematopoietic organ related problems showed a high ICF of 1.0 followed by the ear problems (0.60) and skin diseases (0.54) (Gazzaneo et al., 2005). Ragupathy et al. (2008) studied the herbal medicinal knowledge of Malasars community and came across an ICF of 0.92 for jaundice and 0.50 for fever. Yineger et al. (2008) working on the ethno-medicinal plant practices of Oromo ethnic group in southwestern Ethiopia arrived at an ICF of 0.50 for tumor, 0.33 for rabies and insect bite.

The fidelity value of a plant species for a specific disease in the study area varied between 25 and 100%. The maximum FL of 100% expressed by *Justicia adhatoda*, *Cyclea peltata*, *Memecylon umbellatum*, *Phyllanthus amarus* and *Tabernaemontana alternifolia* for

bronchitis, dysentery, herpes, jaundice and snake bite, respectively, indicated the 100% choice of most healers for treating such diseases. On the other hand, the lowest FL of 25% indicated less preferred species by most healers for treating specific ailment. For example, *Cassia fistula* used to treat eczema, jaundice, headache, wounds and acidity (Table 4). In Northwestern Ethiopia, *Carissa spinarum*, *Clausena anisata*, *Acokanthera schimperi*, *Calpurina aurea*, *Ficus thoningii* and *Cyphostemma junceum* are highly popular among local people (FL 100%) and were used to treat evil eye while, *Dorstenia barnimiana* with very low FL (22%) was shown to treat many ailments (Teklehaymanot and Giday, 2007).

A high ICF and FL values in the present study may indicate the possible occurrence of valuable compounds, suggesting areas for further study, and with potential for new drugs to treat chronic ailments. The present study throws light on the treasure of traditional knowledge of people residing in the eastern part of Shimoga. Plants of this area are medicinally valuable and need proper conservative measures in view of their exploitation by local communities.

### Acknowledgements

The authors express their sincere thanks to the local herbal practitioners and elderly people of eastern part of Shimoga district for providing the valuable information on medicinal plants.

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**Table 4**  
Important ethno-medicinal plant species and their fidelity levels (FL).

Plant species	Ailments	Fidelity level (FL) (%)
<i>Justicia adhatoda</i>	Bronchitis	100
<i>Cyclea peltata</i>	Dysentery	100
<i>Memecylon umbellatum</i>	Herpes	100
<i>Phyllanthus amarus</i>	Jaundice	100
<i>Tabernaemontana alternifolia</i>	Snake bite	100
<i>Catharanthus roseus</i>	Diabetes, blood pressure	80
<i>Mimosa pudica</i>	Partial headache, Piles	75
<i>Oxalis corniculata</i>	Toothache, skin allergies	66.67
<i>Ficus racemosa</i>	Leucorrhoea, piles	62.50
<i>Ruta graveolens</i>	Typhoid, cold and cough	60
<i>Holarrhena pubescens</i>	Ring worm, stomachache, intestinal worms	60
<i>Sida acuta</i>	Dysentery, boils, itching	57.14
<i>Plumeria rubra</i>	Jaundice, ring worm	50
<i>Moringa oleifera</i>	Intestinal worms, blood pressure	50
<i>Plumbago zeylanica</i>	Wound and eczema	50
<i>Mesua ferrea</i>	Skin allergy, menstrual problems	50
<i>Tinospora cordifolia</i>	Blood pressure, boils, diabetes, itching	45.45
<i>Alstonia scholaris</i>	Fever, cold, cough, weakness	42.85
<i>Leucas aspera</i>	Wound, eye infection, body ache	41.60
<i>Cassia fistula</i>	Eczema, jaundice, headache, wounds, acidity	25

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