

RESEARCH PAPER

**Inventory study of ethno-medicinal herbs, shrubs and climbers from Terakanahalli reserve forest area of Sirsi taluka, Karnataka, India**

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(Received: August, 2023 ; Accepted: December, 2023)

DOI: 10.61475/JFS.2023.v36i4.17

**Abstract:** Enlisting of plant species from the different regions is a continuous and important process in understanding the changes occurring in floral composition over a period of time. Present study enumerated a total of 60 medicinal species of herbs, shrubs and climbers belonging to 34 families from Terakanahalli Reserve Forest area. The plants belong to diverse families with Apocynaceae, Fabaceae, Phyllanthaceae, Rubiaceae, and Solanaceae were top five families contributing a sum of 23 species. This shows the richness in species diversity of the present study area. The documented plants have diverse medicinal usage. Total 25 medicinal species were regarded under different Rare Endemic Threatened categories by FRLHT, Bengaluru and IUCN. The study area is under great pressure because of human interference. The reserve forest needs proper management and conservation practices to improve the floral and faunal diversity of the area.

**Key words:** Conservation, Ethno medicine, Medicinal plants, Sirsi, Western Ghats

## Introduction

Flora of a region decides the diversity of ethnobotanical knowledge existing in a region. Scientific study of floral components is a continuous process. Inventory of plant species used by human beings in a region normally aims at searching for new and re-examination of the earlier findings (Phillips *et al.*, 2003). Ethnobotanical inventory helps to recognize the new avenues and also to record the changes occurring in the resources with time and space. Rich biodiversity reaches a higher level when the plants are utilized sustainably for diverse uses including in the treatment of a variety of diseases (Vineeta *et al.*, 2022). The primary data collected, serve as vital information which are further utilized in finer taxonomic and other systematic studies. Sirsi town is present in the middle of Northern Central Western Ghats in Uttara Kannada district. The developmental activities of growing Sirsi town are the consequence of fragmentation of the forest land (Majge *et al.*, 2022). The documentation of floristic wealth is an urgent need of the hour (Hegde *et al.*, 2013). The ethnomedicinal trees from the present study area were enlisted by Majge *et al.* (2022). The present study was undertaken with the prime objective to enlist the medicinal herbs, shrubs and climbers existing in the Terakanahalli Reserve Forest area of Sirsi forest range.

## Material and methods

Floral inventory study was conducted in Terakanahalli reserve forest area to document herbs, shrubs and climber species. Terakanahalli reserve forest area is under the Jurisdiction of Sirsi forest division in Uttara Kannada district of Karnataka State, India. The area was selected because literature is not available on the herbs, shrubs and climber floral composition and the reserved forest area is under high risk as it is closely situated to developing Sirsi town. Terakanahalli reserve forest area divided into 4 different sections (one to

four) separated by human settlements in between and spread over Kalkuni, Gukharnathapura and Terakanahalli villages. For the present study, section-I of Terakanahalli reserve forest area under survey number 284 was selected, covering a total area of 37.70 Ha. The study area is composed of sandy red lateritic soil throughout the region with an average elevation of 580 m and 2500 mm per annum average rainfall. The temperature fluctuates between 37°C in mid-summer to 15°C in winter and remains moderate throughout the year (Majge *et al.*, 2022).

Field visits were conducted regularly (2017 to 2019) to observe and document the herb, shrub and climber species composition. The observed species were authentically identified using floras (Cooke, 1985; Puneekar and Lakshminarasimhan, 2011; Ingallhalikar 2014). Botanical identity of the species was noted from the International Plant Name Index (2021). The recorded species were sorted as per alphabetical names of the families. The information on the ethno-medicinal uses of species was collected during the study from local people and also obtained through available literature and publications reported from Uttara Kannada and surrounding districts. The references were also checked to bring in the endemic and Rare, Endangered and Threatened (RET) status of the species (IUCN, 2023). Related information regarding the plant species such as local name and usage were also noted during the field visit (Hegde *et al.*, 2013).

## Results and discussion

Documentation of the floral diversity and its utilization is an important process as even now new plant species are found and added to the State flora from Uttara Kannada district (Gurumurthi *et al.*, 2010; Mesta *et al.*, 2011; Hegde *et al.*, 2013). Ethno-medicinal survey also added medicinally used new plant

species to the state flora (Pai *et al.*, 2011) and these findings add up to scientific validation of medicinal uses related to the newly found plants (Ankad *et al.*, 2013; Upadhyay *et al.*, 2015). The population assessment of those species further aimed towards conservation (Desai *et al.*, 2016). Hence, regular floral inventory studies become important.

Present study enumerated a total of 60 medicinal plant species belonging to 34 different families. Identified plant species were enlisted in Table 1, alphabetically according to the family and genus. Table includes the information on Kannada name, habit nature, RET status, part used and medicinal uses reported from nearby districts Uttara Kannada.

### Families

Assortment of the floral species can be observed in the diversity of the families reported from a geographical area. The present study area showed deciduous type of forest and is a part of a biological hot spot North-Central Western Ghats. Inventory study represented species wealth belonging to diverse families. Among the 60 species more than one third of the plant species (23 species) belongs to Apocynaceae (06), Fabaceae (04), Phyllanthaceae (03), Rubiaceae (04), and Solanaceae (06) families (Figure 1). Ganeshiah *et al.* (2013), report diverse families from Western Ghats which shows similar type of species distribution among the families.

### Habit type

Habit of plant species were categorized into herbs, shrubs, trees and climbers mainly. The habit nature analysis excluding trees showed the highest number of medicinal species from shrubs (42%), followed by herb (35%) and climber (23%). Majge *et al.* (2022), reported 63 medicinal tree species from Terakanahalli Forest Reserve area. Inventory and ethnobotanical studies normally report a higher number of herbs (Bhat and Rajanna, 2022; Hegde *et al.*, 2019) whereas current study disclosed a higher number of shrubs than herbs.

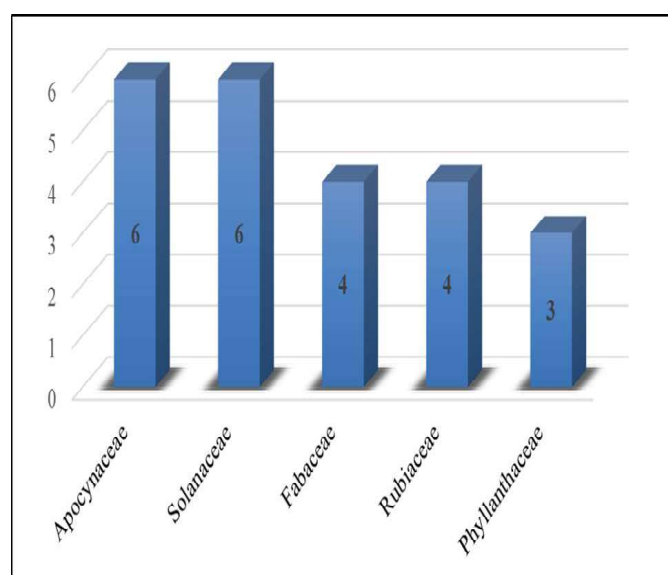


Fig 1 Top five families from the study area

The reserve forest consists of a large number of *Acacia auriculiformis* trees which were planted by the Forest Department. Presence of *A. auriculiformis* may be the reason for lower number of medicinal herbaceous species. Major portion of the forest area was evidenced by the *A. auriculiformis* trees litter fall. Therefore, covering of the upper surface of the soil for a long period was observed during the field visits. This situation may not be allowing small herbs to germinate and grow successfully. The allelopathic effect of *A. auriculiformis* affects the seed germination among herbaceous species (Vijayan, 2015). The floristic composition was reported to be poorest, found beneath the *A. auriculiformis* stands (Loumeto and Huttel, 1997). However, a well-designed study is essential to understand the effect of slow degradation of *A. auriculiformis* litter on germination of individual herbaceous and other plant species to find out a solution for the situation.

### Use of plants and plant parts as medicine

Several ethnobotanical studies enlisted the use of plant species for illness treatment from different areas of Uttara Kannada district and also from the tribes residing in the district (Achar *et al.* 2010; Bhandari *et al.* 1995; Bhat and Rajanna 2022; Bhat *et al.* 2012; Bhat *et al.* 2014; Hegde 2004; Hegde *et al.* 2019; Majge *et al.* 2022; Patwardhan 1965). Hegde (2004) documented a total of 380 plant species, belonging to 93 different families to treat 186 types of illness. Bhat (2016) reported use of 209 plant species in the treatment of 44 different types of wounds and skin diseases. The author documented the traditional medicinal knowledge from various ethnic tribes residing in Uttara Kannada district. Hegde *et al.* (2019) studied ethnic knowledge among the Havyaka community for mother and child care from Sirsi and surrounding talukas. The authors reported 28 species used in the preparation of 'Lehya'. Different types of Lehya's were prepared using a variety of ingredients and are used in different pre and postnatal preliminary health care conditions of mother and also the child. This indicates the

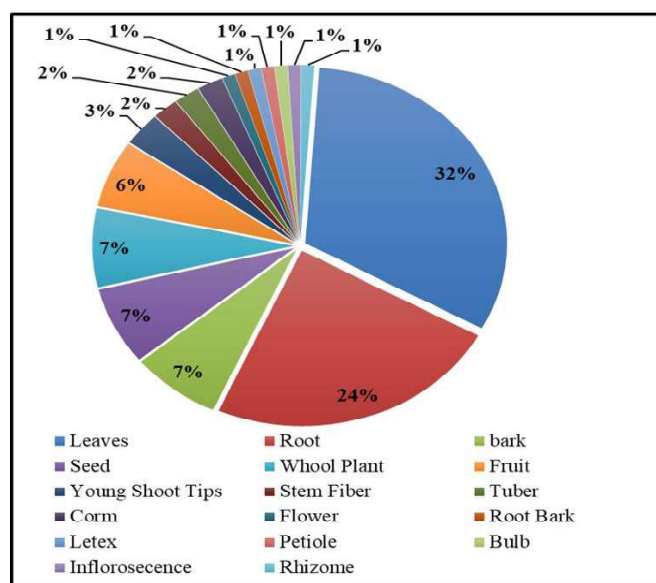


Fig 2 Parts used in medicinal treatments for reported species

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Table 1. Check list of medicinal plant species from Terakanahalli reserve forest area

| Table 1. Check list of medicinal plant species from Perakulamanam reserve forest area |                                                                        |                              |    |       |             |                                                                                                                                      |      |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------|----|-------|-------------|--------------------------------------------------------------------------------------------------------------------------------------|------|
| Order and Family                                                                      | Botanical Name                                                         | Local Name                   | CS | Habit | Part used   | Ailments treated                                                                                                                     | Ref. |
| Alismatales                                                                           |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Araceae                                                                               | <i>Amorphophallus bulbifer</i> (Roxb.) Blume                           | Kaadu panjara gadde          | -- | H     | C           | Liver problems                                                                                                                       | 11   |
|                                                                                       | <i>Colocasia esculenta</i> (L.) Schott                                 | Kaadakesu                    | LC | H     | L/Pt/C      | Nephrolithiasis, Wounds, Cracks, Furuncles, To keep eyes healthy                                                                     | 1    |
| Apiales                                                                               |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Apiaceae                                                                              | <i>Centella asiatica</i> (L.) Urb.                                     | Ondelaga                     | LC | H     | L           | Memory power, Hair growth, Toothache                                                                                                 | 3    |
| Asperagales                                                                           |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Asparagaceae                                                                          | <i>Asparagus racemosus</i> Willd.                                      | Satavari                     | -- | Cl    | R           | Cold, Fever, Hiccup, Scrofula, Sprains                                                                                               | 1    |
| Hypoxidaceae                                                                          | <i>Curculigo orchioides</i> Gaertn.                                    | Nelathengu                   | -- | H     | R/WP        | Deafness, Furuncle, Gonorrhoea, Impotence, Leucoderma, Nephritis, Puerperal weakness, Premature ejaculation, to increase sperm count | 1    |
| Orchidaceae                                                                           | <i>Nervilia concolor</i> Schltr.                                       | --                           | -- | H     | Bu          | Galactagogue                                                                                                                         | 11   |
| Asterales                                                                             |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Asteraceae                                                                            | <i>Chromolaena odorata</i> (L.) R.M.King & H.Rob                       | Kangres gida                 | -- | S     | L           | Wounds                                                                                                                               | 4    |
|                                                                                       | <i>Emilia sonchifolia</i> (L.) DC. ex DC.                              | Ilikivisoppu                 | -- | H     | R/L         | Haemorrhagic dysentery in infants, Dysmenorrhoea, Infantile amoebiasis                                                               | 1    |
| Brassicales                                                                           |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Cleomaceae                                                                            | <i>Cleome viscosa</i> L.                                               | Kadu sasive gida             | -- | H     | L           | Wounds, Fever                                                                                                                        | 11   |
| Caryophyllales                                                                        |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Amaranthaceae                                                                         | <i>Achyranthes aspera</i> L.                                           | Uttarani                     | -- | H     | R/S/ L      | Asthma, Skin Diseases, Piles, Eye Diseases                                                                                           | 4    |
| Cucurbitales                                                                          |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Cucurbitaceae                                                                         | <i>Cayaponia laciniosa</i> Shivlingi, Mahalinganaballi (L.) C. Jeffrey |                              | -- | Cl    | L/R         | Hair fall, Dysmenorrhoea, Hypermenorrhoea, Impotence, Leucoderma, Mastitis, Pimples, Snakebite, Spermaturia                          | 1    |
| Dioscoreaceales                                                                       |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Dioscoreaceae                                                                         | <i>Dioscorea bulbifera</i> L.                                          | Handhigadde                  | -- | Cl    | R/Tu        | Nephritis                                                                                                                            | 1    |
|                                                                                       | <i>Dioscorea pentaphylla</i> L.                                        | Kaadugubala, adavigummathige | -- | Cl    | Tu          | Swellings                                                                                                                            | 10   |
| Ericales                                                                              |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Balsaminaceae                                                                         | <i>Impatiens balsamina</i> L.                                          | Sone huvu, Gouri huvu        | -- | H     | R/L         | Wounds, Swelling                                                                                                                     | 11   |
| Primulaceae                                                                           | <i>Embelia tsjeriam-cottam</i> (Roem. & Schult.) A.DC.                 | Vaivaling, choldhanna        | -- | S     | S           | Vermifuge                                                                                                                            | 11   |
| Fabales                                                                               |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Fabaceae                                                                              | <i>Hultholia mimosoides</i> (Lam.) E. Gagnon & G. P. Lewis             | Chingey, Kombe               | -- | S     | L           | Boils                                                                                                                                | 8    |
|                                                                                       | <i>Mimosa pudica</i> L.                                                | Nachike mullu                | LC | H     | WP          | Gingival wounds                                                                                                                      | 1    |
|                                                                                       | <i>Senna alexandrina</i> Mill.                                         | Sonamukhi                    | LC | S     | L           | Skin Diseases, Constipation, Pimples, Rheumatism, Purgative, Acidity                                                                 | 7    |
|                                                                                       | <i>Senna tora</i> (L.) Roxb.                                           | Chagache, Vanavarike         | -- | H     | L, S, WP, R | Ring Worm (Skin Diseases)                                                                                                            | 6    |
| Gentianales                                                                           |                                                                        |                              |    |       |             |                                                                                                                                      |      |
| Apocynaceae                                                                           | <i>Allamanda cathartica</i> L.                                         | Kotehuvu                     | -- | Cl    | Fl          | Whitlow                                                                                                                              | 1    |
|                                                                                       | <i>Carissa carandas</i> L.                                             | Kavali                       | -- | S     | B/R         | Bubo, Cold, throat infections, Fractures, Cancer, Mumps, Pneumonia, Scabies, Snakebite, Sore throat, Toothache                       | 1    |
|                                                                                       | <i>Gymnema sylvestre</i> (Retz.) R.Br.ex Sm.                           | Madhunaashini                | -- | Cl    | B/L/R       | Herpes, Otagia, Scabies, Diabetes, Haemorrhagic dysentery, High blood pressure                                                       | 1    |
|                                                                                       | <i>Hemidesmus indicus</i> (L.)                                         | Ananthamoola,                | -- | S     | R           | Wounds, Urinary Disease, Skin                                                                                                        | 6    |

|                 |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
|-----------------|-------------------------------------------------------------------|-------------------------------------------|----|----|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|                 | R. Br. ex Schult.<br><i>Holarrhena pubescens</i><br>Wall. & G.Don | Beruballi<br>Dadasaloo hale,<br>Haalemara | LC | LS | S/RB/     | Diseases, Anaemia<br>L x Headache,<br>Amoebic dysentery,<br>Diarrhoea, Irritable bowel<br>syndrome, Bleeding piles<br>Body Pain                                                                                                                                                     | 2,4 |
|                 | <i>Ichnocarpus frutescens</i> (L.)<br>W.T.Aiton                   | Kari ananthamoola,--<br>Kareballi         | -- | Cl | R         |                                                                                                                                                                                                                                                                                     | 3   |
| Asclepiadaceae  | <i>Cryptolepis buchananii</i><br>Roem. & Schult.                  | Kareballi,<br>Maetlahambu                 | -- | Cl | L         | Snake Bite, Wounds                                                                                                                                                                                                                                                                  | 5   |
| Rubiaceae       | <i>Catunaregam spinosa</i> Tirveng.<br>(Thunb.)                   | Karekayi                                  | LC | LS | B/F/R/YST | Arthritis, Eczema, Leucoderma,<br>Myopia, Fish Poison, Herpes                                                                                                                                                                                                                       | 8   |
|                 | <i>Ixora coccinea</i> L.                                          | Hole dasavala                             | -- | S  | F         | Arthritis, Cold, Paediatric herpes                                                                                                                                                                                                                                                  | 1   |
|                 | <i>Mussaenda frondosa</i> L.                                      | Baletappu, Belloti                        | -- | S  | L         | Gangrene                                                                                                                                                                                                                                                                            | 5   |
|                 | <i>Rubia cordifolia</i> L.                                        | Manjit, Madder                            | -- | Cl | L         | Coolant, Haemorrhagic<br>dysentery                                                                                                                                                                                                                                                  | 1   |
| Lamiales        |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Acanthaceae     | <i>Justicia adhatoda</i> L.                                       | Adsoge                                    | LC | S  | L         | Pain Relief                                                                                                                                                                                                                                                                         | 9   |
| Lamiaceae       | <i>Clerodendrum</i><br><i>infortunatum</i> L.                     | Ibbane, Ittai,<br>Parele                  | -- | S  | R/L       | Fever                                                                                                                                                                                                                                                                               | 2   |
| Oleaceae        | <i>Jasminum malabaricum</i><br>Wight                              | Kaadu jaaji mallige--                     |    | S  | L         | Aphthae, Cuts, wounds                                                                                                                                                                                                                                                               | 3   |
| Verbenaceae     | <i>Rothea serrata</i> (L.)<br>Steane & Mabb.                      | Gantu bhaaragi, --<br>Kirithaggi          | S  | R  | Snakebite |                                                                                                                                                                                                                                                                                     | 1   |
| Malpighiales    |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Passifloraceae  | <i>Turnera ulmifolia</i> L.                                       | Maena mallige                             | LC | H  | L         | Indigestion                                                                                                                                                                                                                                                                         | 11  |
| Phyllanthaceae  | <i>Breynia retusa</i> (Dennst.)<br>Alston                         | Betta nelli                               | LC | H  | L         | Conception, Haemorrhagic<br>septicaemia, Piles, Spermaturia                                                                                                                                                                                                                         | 1   |
|                 | <i>Bridelia stipularis</i> (L.)<br>Blume                          | Bola thatle naaru                         | LC | S  | B/F/L/SF  | Pushkarmoola<br>Cough, Fever, Asthma, Jaundice,<br>Malaria, Allergy, Scabies,<br>Dermatitis, Anaemia                                                                                                                                                                                | 1   |
|                 | <i>Phyllanthus niruri</i> L.                                      | Kirinelli, Neranelli                      | -- | H  | WP        | Hiccups, Eye Diseases                                                                                                                                                                                                                                                               | 6   |
| Malvales        |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Malvaceae       | <i>Helicteres isora</i> L.                                        | Aavarthini,<br>Aedamuri                   | -- | S  | L         | Cough                                                                                                                                                                                                                                                                               | 3   |
|                 | <i>Sida acuta</i> Burm.f.                                         | Bheemanakaddi, --<br>Vishakaddi           | H  |    | R/SF/WP   | Paralysis, Tonic in pregnancy,<br>Arthritis, Rickets                                                                                                                                                                                                                                | 1   |
| Myrtales        |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Melastomataceae | <i>Melastoma .</i><br><i>malabathricum</i> L                      | Nekkaraka, Nakkare                        | -- | S  | R/YST     | Jaundice, Stomachic,<br>Haemorrhagic dysentery,<br>Amoebiasis                                                                                                                                                                                                                       | 1   |
| Piperales       |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Piperaceae      | <i>Piper nigrum</i> L.                                            | Kaalu menasu                              | -- | Cl | L/R       | Barking cough, Carbuncle,<br>Corns, Epiglottitis, Febrifuge,<br>Inflammation of jaw, Malaria,<br>Typhoid, Whooping cough,<br>Wounds, Toothache                                                                                                                                      | 1   |
| Poales          |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Poaceae         | <i>Cynodon dactylon</i> (L.) Pers.                                | Doorbhe,<br>Barmuda grass                 | -- | H  | R/WP      | Arthritis, Diabetes, Influenza,<br>Migraine, Paediatric herpes,<br>Snakebite, Oliguria, Polyuria,<br>Tumours, Blood purifier, Cold,<br>Fever, Cough,<br>Dysuria, Febrifuge, Fractures,<br>Gonorrhoea, Haematemesis,<br>Head ache, Hypermenorrhoea,<br>Jaundice, Prostatitis, Ulcers | 1   |
| Ranunculales    |                                                                   |                                           |    |    |           |                                                                                                                                                                                                                                                                                     |     |
| Menispermaceae  | <i>Cyclea peltata</i> (Lam.)<br>Hook.f. & Thomson                 | Hade balli                                | -- | Cl | L         | Dysentery                                                                                                                                                                                                                                                                           | 3   |
|                 | <i>Tinospora sinensis</i>                                         | Sudarshanaballi                           | -- | Cl | S         | Burning Sensation in Body,                                                                                                                                                                                                                                                          | 7   |

# Inventory study of ethno-medicinal herbs,

|                |                                               |                         |    |    |          |                                                                                                                                                                               |    |
|----------------|-----------------------------------------------|-------------------------|----|----|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| (Lour.) Merr.  |                                               |                         |    |    |          | Diabetes, Constipation, Fever                                                                                                                                                 |    |
| Rosales        |                                               |                         |    |    |          |                                                                                                                                                                               |    |
| Rhamnaceae     | <i>Ziziphus oenopolia</i> (L.) Mill.          | Bore                    | LC | S  | B/F/L/S  | Acute mastitis, Mouth ulcers, Anaemia, Amoebiasis, Arthritis, Eye irritation, Dog bite, Pregenital emesis                                                                     | 1  |
|                | <i>Ziziphus rugosa</i> Lam.                   | Bili mullu hannu        | -- | S  | B/F/R    | Debility, Hyperacidity, Mesels, Typhoid, Stomach ache                                                                                                                         | 1  |
| Sapindales     |                                               |                         |    |    |          |                                                                                                                                                                               |    |
| Sapindaceae    | <i>Allophylus cobbe</i> (L.)                  | Muruelebende Raesch     | -- | S  | YST      | Intestinal disorders                                                                                                                                                          | 1  |
| Solanales      |                                               |                         |    |    |          |                                                                                                                                                                               |    |
| Convolvulaceae | <i>Argyreia nervosa</i> (Burm. f.) Bojer      | Chandra paada           | -- | Cl | B        | Cancer                                                                                                                                                                        | 4  |
|                | <i>Evolvulus alsinoides</i> (L.) L.           | Vishnukranthi           | -- | H  | WP       | Hair Growth, Skin Disease                                                                                                                                                     | 6  |
| Solanaceae     | <i>Duranta erecta</i> L.                      | Duranta                 | LC | S  | L        | Skin disease                                                                                                                                                                  | 11 |
|                | <i>Lantana camara</i> L.                      | Kakke, Chaduranga       | -- | S  | L/R      | Asthma, Bubo, Conjunctivitis, Cuts, Eczema, Hysteria, Infantile oliguria, Nervine tonic, Giddiness, Paediatric fever, Phlegm disorders in infants, Wounds, Mastitis, Scrofula | 1  |
|                | <i>Physalis minima</i> L.                     | Gulape, Utle -- hannu   | H  | L  | Ear ache |                                                                                                                                                                               | 11 |
|                | <i>Solanum torvum</i> Sw.                     | Kaadu badhane           | -- | S  | L        | Back ache                                                                                                                                                                     | 1  |
|                | <i>Solanum viarum</i> Dunal                   | Kadu badne LC           | S  | F  |          | Fever                                                                                                                                                                         | 11 |
|                | <i>Stachytarpheta indica</i> (L.) Vahl        | Kari uttarani LC        | H  | L  |          | Cuts, wounds, sores                                                                                                                                                           | 11 |
| Vitales        |                                               |                         |    |    |          |                                                                                                                                                                               |    |
| Vitaceae       | <i>Ampelocissus indica</i> (L.) Planch.       | Sanyasi gadde, Kemballi | -- | CL | L        | Inflammation                                                                                                                                                                  | 11 |
|                | <i>Leea indica</i> (Burm. f.) Merr.           | Andilu, Nadilsoppu      | LC | LS | R/IF     | Snake Bite, chest pain                                                                                                                                                        | 5  |
| Zingiberales   |                                               |                         |    |    |          |                                                                                                                                                                               |    |
| Costaceae      | <i>Hellenia speciosa</i> (J. Koenig) Govaerts | Neeraja, Pushkarmoola   | LC | H  | L        | Dog Bite, Wounds                                                                                                                                                              | 5  |
| Zingiberaceae  | <i>Curcuma longa</i> L.                       | Arisina                 | DD | H  | Ri       | Anthelmintic, Arthritis, Diabetes, Dysphemia, Jaundice, Phlegm fever, Piles, Wounds                                                                                           | 1  |

\*CS–IUCN conservation status: DD–Data Deficient; EN–Endangered; LC–Least Concern; Habit Nature: CL–Climber; H–Herb; S–Shrub; Parts mentioned in ethnomedicinal uses: B–Bark; Bu–Bulb; C–Corm; F–Fruit; Fl–Flower; G–Gum; IF–inflorescence; L–Leaf; Lx–Latex; Pt–Petiole; R–Root; RB–Root Bark; Ri–Rhizome; S–Seed; SB–Stem Bark; SF–Stem Fiber; Tu–Tubers; WP–Whole Plant; YST–Young Shoot Tips; References for ethno medicinal uses: 1 - Hegde (2004); 2 - Bhandari *et al.* (1995); 3 - Rajkumar and Shivanna (2009); 4 - Achar *et al.* (2010); 5 - Bhat *et al.* (2012); 6 - Siddamallaya *et al.* (2008); 7 - Upadhy (2014); 8 - Bhat *et al.* (2014); 9 - Prakasha *et al.* (2006); 10 - Ravikumar *et al.* (2009); 11 - Patwardhan (1965)

existence of age-old valuable traditional medicinal knowledge for human ailments in Sirsi and other places of Uttara Kannada district. The ancient knowledge was transferred and practiced from one generation to the next generation. The richness in traditional knowledge is because of the floral diversity existing in the district.

The documented plant species from the reserve forest area were reported for multiple medicinal uses as evidenced by literature review. The review disclosed use of different parts *viz.*, leaves, root, fruits, seed, stem, stem/root bark and other plant parts as medicine or in the preparation of medicine to

treat various types of human disorders. Single or multiple plants and plant parts were used as medicine in the treatment of single or multiple diseases.

Fig 2, indicates the percent plant parts used as medicine. Leaves are reported to be used maximum (32%), followed by root (24%), bark, seed and whole plants (7% each) respectively. It was also noticed the use of other plant parts such as fruits, young shoot tips, fiber, underground parts (tuber, corm, bulb, rhizome), flower, inflorescence, latex and petiole as medicine by the local people in Uttara Kannada district and elsewhere as indicated in table



Fig3. Images of plant species under RET category as per FRLHT, A – *Asparagus racemosus*; B - *Embelia tsjeriam-cottam*; C - *Gymnema sylvestre* ; D - *Piper nigrum*;

The enlisted medicinal plants help in the treatment of common diseases like cough, cold, normal fever, *etc.*, to complicated health conditions such as cancer, herpes, pediatric ill health conditions, long term skin disorders, kidney and liver related problems, *etc.* Use of medicinal plants as medicine by people all over the globe is increasing either in the form of crude medicine, finished medicinal products, dietary supplements or as cosmetic products. Diverse use of medicinal plants is creating a larger demand for medicinal plants by food, pharmaceutical and cosmetic industries. The industrial medicinal plant demand was fulfilled by wild collections of medicinal plants. Nearly 75 to 80 per cent of the medicinal plants were collected from the wild habitat in an unsustainable manner (Chen *et al.*, 2016). Hence, in the present study IUCN status (2023) of the listed plants was reviewed to understand the population status at global level. Sixteen species has Least Concerned (LC) status under IUCN red list classes and *Curcuma longa* (Turmeric) obtained Data Deficient (DD) class (IUCN, 2023). Turmeric is growing as an escape from the nearby houses present to the Forest Reserve.

Table 2, shows the list of medicinal plant species which are enumerated by Foundation for Revitalization of Local Health Traditions (FRLHT), Bengaluru (1997) according to regional RET status. They have categorized these plants because of extensive collection and habitat destruction in Karnataka and

other South Indian states. Total eight species were listed under Endangered (EN) and Vulnerable (VU) as per FRLHT (1997). Few images of the plants species from the table 2 were provided in fig.3 *Piper nigrum* or black pepper is widely cultivated at large scale in the Areca nut plantations in Central and Southern Western Ghats parts of Karnataka and Kerala states. In Uttara Kannada district also one can observe inclusive cultivation of the species. The presence of *P. nigrum* in the study area is also an escape from the nearby Areca nut plantations or from home gardens into the reserve forest. But the occurrence of *P. nigrum* in natural habitat is rare. Hence it was categorized under the endangered category by FRLHT.

Normally Endemic and Vulnerable plants are always given more importance over the common and widely distributed plant

Table 2. RET status medicinal plants as per FRLHT

| Name of the Plants             | Status |
|--------------------------------|--------|
| <i>Ampelocissus indica</i>     | EN     |
| <i>Asparagus racemosus</i>     | EN     |
| <i>Gymnema sylvestre</i>       | EN     |
| <i>Piper nigrum</i>            | EN     |
| <i>Dioscorea bulbifera</i>     | VU     |
| <i>Embelia tsjeriam-cottam</i> | VU     |
| <i>Rubia cordifolia</i>        | VU     |
| <i>Tinospora sinensis</i>      | VU     |

En – Endangered; VU - Vulnerable

species for conservation. Habitat specificity, number of individual species and human or natural disturbances are the major factors in deciding the RET status of the floral species (Chen *et al.*, 2016). Hence habitat conservation became the prime priority in India and elsewhere in floral sustainable management.

The present study area shares its boundaries with human settlements viz., Government Degree College of Sirsi town, private houses, government horticultural and private areca farms, betta lands and public roads. During the field visits lack of fencing was noticed. This situation resulted in grazing activity of domestic animals. Because of the close proximity to Sirsi town, unwanted human intrusion is observed for fuelwood collection, garbage disposal and campfire parties, *etc.* These elevated the risk of forest degradation mainly because of pollution and forest fire incidences. Same observations were also made by Majge *et al.* (2022), from the same area. Herbaceous flora is sensitive to forest degradation hence an immediate action is required for habitat conservation of documented medicinal plants. Karnataka Forest Department of Sirsi range undertaking maximum efforts to conserve the area by reforestation programs and minimizing the anthropogenic activities in the reserve forest areas.

However as suggested by Majge *et al.* (2022) and Hegde *et al.* (2013), a continuous improved management and conservation practices such as construction of permanent structure or live fence, evacuation of encroached forest land, increased surveillance for zero human interference, plantation of local tree species to improve the diversity of the area are need of the hour. A connecting corridor between surrounding forest and the study area will help to conserve and improve the wildlife fauna.

There are a number of studies which indicate that conservation will not be successful without active participation

and support of the local public (Adom 2016). Conducting awareness among local people and improving the area as an attractive Biodiversity Centre will help in conservation. The awareness programs have to be conducted regularly using information, education and communication material on medicinal plants in collaboration with different stakeholders such as education and research institutions, non-governmental organizations and village forest committees (Envis-FRLHT, 2020; Upadhyay *et al.*, 2010). Presence of *Embelia tsjeriam-cottam* species in the study area is an act of conservation measure from College of Forestry, Sirsi in collaboration with Karnataka Forest Department.

A proper conservation activity in the study area probably helps it to host a number of diverse medicinal plants aiming to educate students, naturalists' and other interested stakeholders.

### Conclusion

Terakanahalli reserve forest area is rich in medicinal plant species composition and the species found to be used for treatment of many diseases. Total 25 medicinal species were enumerated under RET category as per FRLHT, Bengaluru and IUCN based on their availability. An active role of the local public is vital to conserve the reserve forest. Further plans for conservation, sustainable management and restoration of medicinal plant diversity in this area is the need of time, through active participation of stake holders, along with the local people from all the fronts.

### Acknowledgement

Authors acknowledge officials of Karnataka Forest Department, Sirsi Range for the guidance and assistance during the study. Authors are thankful to the Dean, College of Forestry, Sirsi for the support during the study

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