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Cover: A bag worm with its beautiful heap of junk. Acrylics on 300 GSM paper by Dupati Poojitha based on a picture by Sanjay Molur.



Riparian flora of Haveri District, Karnataka, India

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Abstract: The Haveri District is located in the central part of Karnataka, acting as a transitional zone between the Western Ghats and Maidan region. The riparian zones are the most diverse, dynamic, and complex habitats on land. The present study on the riparian vegetation along the four rivers of Haveri District identified a total of 307 species belonging to 233 genera of 73 families. Out of that 231 species are indigenous belonging to 160 genera and 68 families. The remaining 76 non-native species belong to 63 genera and 27 families. The highest number of species were recorded from the Tungabhadra River (232 species), followed by the rivers Kumadwathi (181), Dharma (156), and Varada (149). Herbs are the most common among the recorded plants, with 186 species representing approximately 61% of the total flora. With 36 species, Fabaceae is the most represented family accounting for 12% of the flora. The riparian vegetation in the study area faces several threats, including habitat loss due to encroachment for agriculture, overgrazing, dumping of plastic waste, sand mining, invasive species, and tourism activities. Effective conservation measures are needed to protect the riparian zones and their plant wealth.

Keywords: Angiosperms, aquatic plants, conservation, Dharma, diversity, Kumadwathi, nativity, rivers, Tungabhadra, Varada.

Kannada: ಹಾವೇರಿ ಜಿಲ್ಲೆಯ ಕರ್ನಾಟಕದ ಮಧ್ಯ ಭಾಗದಲ್ಲಿದ್ದು, ಉತ್ತರ ಕರ್ನಾಟಕದ ಹೆಚ್ಚಾಗಿ ಎಂದೆ ಪ್ರಸಿದ್ಧವಾಗಿದೆ. ಇದು ಪಶ್ಚಿಮ ಘಟ್ಟ ಮತ್ತು ಮೈದಾನ ಪ್ರದೇಶಗಳ ನಡುವೆ ಪರಿವರ್ತನೆಯ ವಲಯವಾಗಿ ಕಾರ್ಯನಿರ್ವಹಿಸುತ್ತದೆ. ನದಿಗಳ ಪ್ರದೇಶಗಳು ಭೂಮಿಯ ಮೇಲಿನ ಅತ್ಯಂತ ವೈವಿಧ್ಯಮಯ, ಕ್ರಿಯಾತ್ಮಕ ಮತ್ತು ಸಂಕೀರ್ಣ ಅವಾಸಸ್ಥಾನಗಳಾಗಿವೆ. ನದಿಪಾತ್ರದ ಸಸ್ಯಸಂಪತ್ತಿನ ಕುರಿತು ಪ್ರಸ್ತುತ ಅಧ್ಯಯನ ಹಾವೇರಿ ಜಿಲ್ಲೆಯಲ್ಲಿರುವ ನಾಲ್ಕು ನದಿಗಳ ಉದ್ದಕ್ಕೂ ವ್ಯಾಪಿಸಿಕೊಂಡಿರುವ 73 ಕುಟುಂಬಗಳ 233 ತಳಿಗಳಿಗೆ ಸೇರಿದ ಒಟ್ಟು 307 ಪ್ರಭೇದಗಳನ್ನು ದಾಖಲಿಸಲಾಗಿದೆ. ಅದರಲ್ಲಿ ಸ್ಥಳೀಯವಾದ 231 ಪ್ರಭೇದಗಳು 160 ಜಾತಿಗಳು ಮತ್ತು 68 ಕುಟುಂಬಗಳಿಗೆ ಸೇರಿದರೆ, ಉಳಿದ 76 ಸ್ಥಳೀಯವಲ್ಲದ ಪ್ರಭೇದಗಳು 63 ತಳಿಗಳು ಮತ್ತು 27 ಕುಟುಂಬಗಳಿಗೆ ಸೇರಿವೆ. ತುಂಗಭದ್ರಾ ನದಿ ಪ್ರದೇಶದಿಂದ (232) ಅತಿ ಹೆಚ್ಚು ಪ್ರಭೇದಗಳು ದಾಖಲಾದರೆ, ಕುಮದ್ವತಿ ನದಿ (181), ಧರ್ಮಾನದಿ (156) ಮತ್ತು ವರದಾ ನದಿ (149). ಒಟ್ಟು ದಾಖಲಾದ ಸಸ್ಯಗಳಲ್ಲಿ ಗಿಡಗಳು (186 ಪ್ರಭೇದಗಳು) ಹೆಚ್ಚಿನ ಸಂಖ್ಯೆಯಲ್ಲಿದ್ದು ಸರಿಸುಮಾರು 61% ಅನ್ನು ಪ್ರತಿನಿಧಿಸುತ್ತವೆ. 36 ಪ್ರಭೇದಗಳೊಂದಿಗೆ ಫ್ಯಾಬೇಸಿಯೇ ಹೆಚ್ಚು ಪ್ರತಿನಿಧಿಸುವ ಕುಟುಂಬವಾಗಿದ್ದು, ಸಸ್ಯವರ್ಗದ 12% ರಷ್ಟಿದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನದಿಯತೀರದ ಪ್ರದೇಶವು ಕೃಷಿಕಾರ್ಯಕ್ಕಾಗಿ ಅತಿಕ್ರಮಣ, ಪ್ಲಾಸ್ಟಿಕ್ ತ್ಯಾಜ್ಯಗಳ ಸುರಿಯುವಿಕೆ, ಮರಳು ಗಣಿಗಾರಿಕೆ, ಅಕ್ರಮಣಕಾರಿ ಜಾತಿಯ ಸಸ್ಯಗಳು ಮತ್ತು ಪ್ರವಾಸೋದ್ಯಮ ಚಟುವಟಿಕೆಗಳು ಸೇರಿದಂತೆ ಹಲವಾರು ಕಾರಣಗಳಿಂದ ಅಳವಿನಾಂಕಿಸಲ್ಪಟ್ಟಿವೆ. ನದಿಗಳ ಪ್ರದೇಶದ ವಲಯಗಳನ್ನು ಮತ್ತು ಅವುಗಳ ಸಸ್ಯ ಸಂಪತ್ತನ್ನು ರಕ್ಷಿಸಲು ಪರಿಣಾಮಕಾರಿ ಸಂರಕ್ಷಣಾ ಕ್ರಮಗಳ ಅಗತ್ಯವಿದೆ.

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Author contributions: NSM—fieldwork, data collection, species identification and preparation of the draft; KK—designed the research and edited the manuscript. Both authors read and approved the final manuscript.

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INTRODUCTION

The term riparian is derived from the Latin word 'riparius', referring to the banks of rivers, ponds or lakes, along with their surrounding landscapes. Riparian zones serve as the transitional areas between the aquatic and the terrestrial environment (Zaimes et al. 2010; Betz et al. 2018). They consist of the riverbed, banks, vegetation, adjacent land and floodplains, and are crucial for maintaining the water quality in aquatic ecosystems (Maraseni & Mitchel 2016; Singh et al. 2021). Riparian zones encompass the space between flowing water at low levels and the highest watermark where vegetation is influenced by floods, elevated water tables, and soil type (González et al. 2017). The riparian vegetation has been recognized as a 'keystone ecosystem', since it harbors unique habitats which are highly influenced by water (Sunil et al. 2016).

In Karnataka, Kotresha & Taranath (2010) recorded 275 angiosperm species in the Varahi River basin in Udupi District. Rao et al. (2014) studied the threatened tree species of swamps and riparian habitats along different streams of Uttara Kannada and Shimoga districts. Previous reports reveal that there was no proper documentation of floristic resources in the riparian vegetation of Haveri district and hence it was attempted in the present study. We explored the riparian flora along four rivers, namely, Dharma, Kumadwathi, Tungabhadra, and Varada, and enumerated the angiosperm species.

MATERIAL AND METHODS

Study area

Situated in the central part of Karnataka, the Haveri District serves as a gateway to the northern districts of the state. It is located at 14.661 N, 75.434 E (Figure 1). It comprises of eight talukas, namely: Byadagi, Haveri, Hanagal, Hirekerur, Ranibennur, Rattihalli, Savanur, and Shiggaon.

Dharma River: The river Dharma is a tributary of river Varada which flows a distance of about 32 km in northern Canara and Shimoga districts and further down it enters Haveri District near Mantagi Village in Hanagal Taluka. It drains about 625 km² of area and traverses for about 56 km before joining the Varada River Kudala near Naregal. The canals flow in the middle of Hanagal and serve as a major water source for the surrounding agricultural lands.

Varada River: The Varada River originates near Varadamoola in Sagara Taluka of Shimoga District in

Karnataka. It is one of the tributaries of the Tungabhadra River. It enters the Haveri District near Honkana Village in Hanagal Taluka. This river flows in a north-easterly direction in Hanagal Taluk and becomes a border between Haveri and Savanur. The river confluences with the Tungabhadra River at Galaganath. In its total length of 185 km, the Varada River traverses a distance of 101 km with several tributaries and drains an area of about 3,120 km² in the Haveri District.

Kumadwathi River: This river, also known as Joradi, originates in Agastyaparvata near Humcha of Shikaripur Taluk in Shimoga District. The river flows through northern Kumsi and Shikaripur and then enters Hirekerur Taluka. It serves as the lifeline for the Madaga tank in Masur (Madagada Kenchavvana Kere). The total length of the river is about 96 km. It flows through Ranibennur and Hirekerur taluks in Haveri District for about 32 km, before joining the Tungabhadra River at Mudenur.

Tungabhadra River: The rivers Tunga and Bhadra originate in the Western Ghats flowing north-east and merging near Kudli (16 km away from Shimoga) from there the river is called Tungabhadra. It serves as a lifeline for several districts in northern Karnataka and traverses a distance of about 403 km in the geographical limits of Karnataka State. It enters the district at 14.315 N, 75.633 E near Hallur Village of Hirekerur Taluka. Confluence of River Kumadwathi at 14.494 N, 75.697 E near Mudenur village in Ranibennur Taluka and the river Varada joins at 14.929 N, 75.682 E near Galaganath. Havanur, Galaganath, and Chaudayyanapur are important pilgrim centers in the district located on the banks of Tungabhadra.

Data collection and analysis

The floristic diversity along riparian zones was documented along all four rivers of the Haveri District: the Dharma, Kumadwathi, Tungabhadra, and Varada Rivers. These rivers are the major sources of water in the district (Figure 1). Random and criss-cross surveys were conducted across each study site and plant specimens were collected during different seasons, from November 2020 to August 2023. Observations made during the field visits were noted in the field notebook. The collected plant specimens were pressed and prepared herbarium vouchers following the standard methods (Jain & Rao 1977). The collected specimens were treated with a diluted solution (0.1%) of mercuric chloride (HgCl₂) to prevent fungal infections. The processed herbarium specimens were deposited in the Herbarium of the Botany Department, Karnatak Science College, Dharwad (HKSCD). All the collected specimens were taxonomically

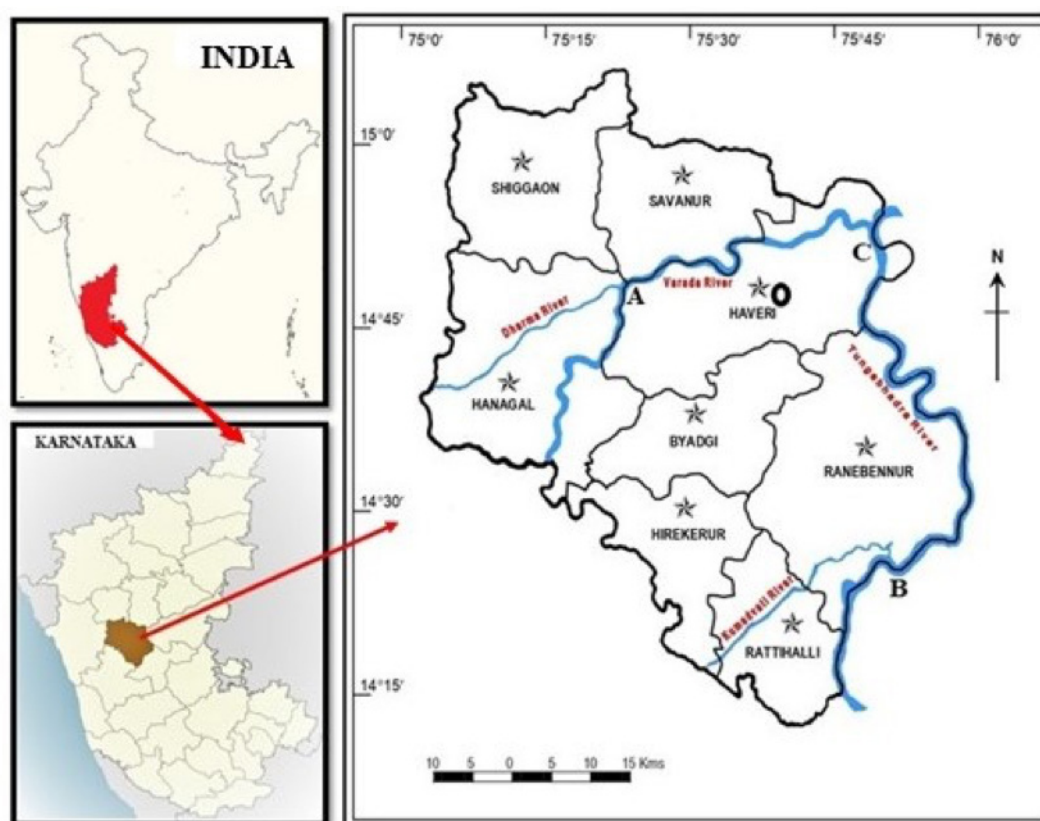


Figure 1. Map of Haveri District showing the major rivers: A—Confluence of Dharma River with Varada | B—Confluence of river Kumadwathi with Tungabhadra | C—Confluence of Varada River with Tungabhadra. Source: Survey of India.

identified and confirmed using relevant literature and floras, including Cooke (1958), Saldanha & Nicolson (1976), Blatter & McCann (1984), Saldanha (1984, 1996), Singh (1988), Prasad & Singh (2002), Gamble (2008), and Bhat (2014). The identified specimens were labeled with their accepted names and families as per the APG IV classification (Chase et al. 2016).

RESULTS

The present study documented a total of 307 species belonging to 233 genera from 73 families. Out of that 231 species belonging to 160 genera and 68 families are native to the Indian subcontinent, and remaining 76 species belonging to 63 genera and 26 families from the riparian vegetation of four rivers in the Haveri District of Karnataka, India (Table 1; Images 1–5). Of these, 249 species are dicots (181 native and 68 non-native) belonging to 63 families and 58 are monocots (49 native and 9 non-native) belonging to 10 families. The highest number of species were recorded from the riparian vegetation of the Tungabhadra River with 232 species

belonging to 182 genera and 61 families. It includes 167 native species belonging to 146 genera & 59 families and 65 non-native species belonging to 56 genera & 22 families. This is followed by the river Kumadwathi with 181 species, 148 genera, & 52 families comprising of 134 native species, 115 genera, & 43 families and 48 non-native species belonging to 43 genera & 20 families. River Dharma has a diversity of 156 species belonging to 130 genera & 48 families represented by 120 native species belonging to 109 genera & 33 families and 36 non-natives belonging to 33 genera & 17 families. River Varada has a floral diversity of 149 species belonging to 125 genera & four families, which comprises of 116 native species belonging to 102 genera & 43 families and 33 non-native species belonging to 26 genera & 17 families (Figure 2).

Life form study of the collected indigenous plants shows that herbaceous flora is dominant, with 186 species (141 native and 45 non-native) contributing to about 61% of the total flora, followed by 41 shrubs (13%; 30 native and 11 non-native), 52 trees (17%; 38 native and 14 non-native), and 28 climbers (10%; 21 native and 7 non-native). (Figure 3).

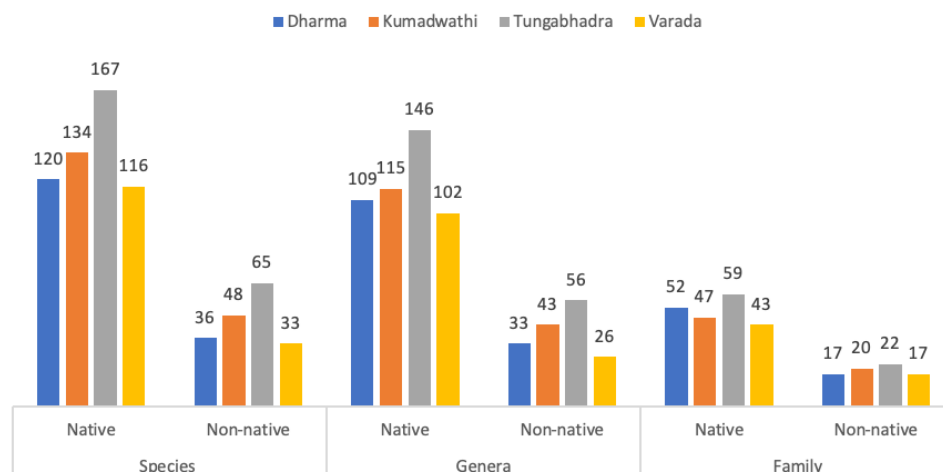


Figure 2. Comparison of riparian flora among the four rivers of Haveri District.

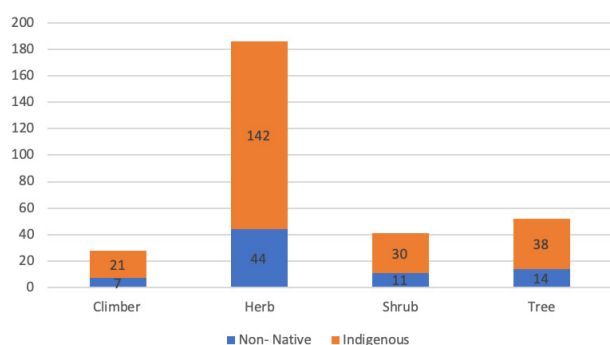


Figure 3. Habit-wise distribution of riparian plants.

With 25 native species, Fabaceae is the most represented family, accounting for 11% of the flora of the study area. Poaceae is the second largest family with 24 species (10%), followed by Asteraceae 16 species (7%), Euphorbiaceae, Acanthaceae, & Cyperaceae with 11 species each (5%), Lamiaceae with nine species (4%), Convolvulaceae eight species, and Moraceae & Apocyanaceae families with seven species each (Figure 4).

Limnocharis flava (L.) Buchenau (Alismataceae) collected at Makanur and Somalapura villages from the riparian vegetation of the Tungabhadra River, formed a new generic report to the flora of Karnataka state (Makanur & Kotresha 2022). As for the IUCN Red List status of the collected species, *Aegle marmelos* (L.) Correa is classified as 'Near Threatened'. Four endemic species were recorded during the present study: *Dicliptera cuneata* Nees (endemic to the Western Ghats), *Acilepis dendingulensis* (DC.) H. Rob. (Peninsular India), *Homonoia retusa* (Graham ex Wight) Müll. Arg. (Western Ghats of Karnataka), and *Phyllanthus lawii* J. Graham

(Andhra Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Tamil Nadu, and West Bengal). *Alternanthera philoxeroides* (Mart.) Griseb, *Mikania micrantha* Kunth, and *Pontederia crassipes* Mart. are invasive alien aquatic species recorded. *Crinum viviparum* (Lam.) R. Ansari & V. J. Nair, *Cryptocoryne spiralis* (Retz.) Fisch. ex Wydler, *Homonoia retusa* (Graham ex Wight) Müll. Arg., *Homonoia riparia* Lour., *Hydrilla verticillata* (L.f.) Royle, *Hygrophila auriculata* (Schumacher.) Heine, *Ottelia alismoides* (L.) Pers., *Pistia stratiotes* L., *Pontederia vaginalis* Burm. f., *Rotula aquatica* Lour., *Tamarix ericoides* Rottler, and *Vallisneria spiralis* L., are the aquatic plants documented during the study.

CONCLUSION

The riparian zones are the most diverse, dynamic, and complex habitats on Earth. The present study documented a total of 231 indigenous species belonging to 160 genera & 69 families and 76 non-native species belonging to 27 families of flowering plants along the riparian vegetation of four rivers in Haveri District, Karnataka. The highest number of species were recorded from the Tungabhadra River, with 232 species belonging to 61 families, followed by the river Kumadwathi with 181 species. The rivers Dharma and Varada showed a diversity of 156 and 149 species, respectively. Herbaceous flora is dominant in the study area, with 186 species accounting for about 61% of the total flora. Fabaceae was the predominant family, with 36 species representing 11.8% of the total flora.

The riparian vegetation in the study area is facing numerous threats. Key factors contributing to habitat

Table 1. Checklist of riparian plants along four rivers in Haveri District, Karnataka.

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	S	+	+	+	+	I
<i>Acacia auriculiformis</i> A.Cunn. ex Benth.	Fabaceae	T	+	+			I
<i>Acalypha indica</i> L.	Euphorbiaceae	H			+	+	I
<i>Acanthospermum hispidum</i> DC.	Asteraceae	H	+	+	+		I
<i>Achyranthes aspera</i> L.	Amaranthaceae	H	+		+		I
<i>Acilepis dendiulensis</i> (DC.) H.Rob.	Asteraceae	H	+		+		I
<i>Acmella radicans</i> (Jacq.) R.K.Jansen	Asteraceae	H					I
<i>Aegle marmelos</i> (L.) Correa	Rutaceae	T	+		+	+	I
<i>Aeschynomene indica</i> L.	Fabaceae	H	+				I
<i>Afrohybanthus enneaspermus</i> (L.) Flicker	Violaceae	H			+		I
<i>Ageratum conyzoides</i> L.	Asteraceae	H			+		I
<i>Ageratum houstonianum</i> Mill.	Asteraceae	H	+		+	+	I
<i>Alangium salviifolium</i> (L.f.) Wangerin	Cornaceae	T			+		I
<i>Albizia amara</i> (Roxb.) Boivin	Fabaceae	T	+	+			I
<i>Albizia lebbeck</i> (L.) Benth.	Fabaceae	T				+	I
<i>Alternanthera philoxeroides</i> (Mart.) Griseb	Amaranthaceae	H			+		Ar
<i>Alternanthera pungens</i> Kunth	Amaranthaceae	H	+	+	+		Am
<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	H	+	+	+	+	I
<i>Alysicarpus vaginalis</i> (L.) DC.	Fabaceae	H			+		I
<i>Amaranthus spinosus</i> L.	Amaranthaceae	H		+	+		Tam
<i>Ammannia baccifera</i> L.	Lythraceae	H	+		+		I
<i>Andrographis paniculata</i> (Burm.f.) Wall.	Acanthaceae	H		+		+	I
<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	H	+	+	+	+	I
<i>Anisomeles malabarica</i> (L.) R.Br. ex Sims	Lamiaceae	H	+	+	+	+	I
<i>Apluda mutica</i> L.	Poaceae	H	+				Wp
<i>Argemone mexicana</i> L.	Papaveraceae	H			+	+	I
<i>Argyrea cymosa</i> (Roxb.) Sweet	Convolvulaceae	C			+		I
<i>Aristida setacea</i> Retz.	Poaceae	H	+	+	+		I
<i>Artocarpus heterophyllus</i> Lam.	Moraceae	T	+		+		I
<i>Arundo donax</i> L.	Poaceae	H			+	+	I
<i>Asparagus racemosus</i> Willd.	Asparagaceae	S				+	I
<i>Aspidopterys cordata</i> (Wall.) A.Juss.	Malpighiaceae	C	+				I
<i>Azima tetraacantha</i> Lam.	Salvadoraceae	S	+	+	+		I
<i>Bacopa monnieri</i> (L.) Wettstein	Plantaginaceae	H		+	+	+	I
<i>Bambusa bambos</i> (L.) Voss	Poaceae	T	+	+	+	+	I
<i>Barringtonia acutangula</i> (L.) Gaertn.	Lecythidaceae	T	+	+		+	I
<i>Basilicum polystachyon</i> (L.) Moench	Lamiaceae	H		+	+		I
<i>Bergia ammannioides</i> Roxb.	Elatinaceae	H	+		+		I
<i>Bidens biternata</i> (Lour.) Merr. & Sherff ex Sherff	Asteraceae	H	+	+		+	I
<i>Blumea axillaris</i> (Lam.) DC.	Asteraceae	H			+	+	I
<i>Boerhavia diffusa</i> L.	Nyctaginaceae	H		+	+		I
<i>Boerhavia erecta</i> L.	Nyctaginaceae	H			+		Tam
<i>Bolboschoenus maritimus</i> (L.) Palla	Cyperaceae	H			+	+	I

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Bonnaya antipoda</i> (L.) Druce	Linderniaceae	H	+		+		I
<i>Breynia retusa</i> (Dennst.) Alston	Phyllanthaceae	H		+	+		I
<i>Butea monosperma</i> (Lam.) Taubert	Fabaceae	T	+		+		I
<i>Cadaba fruticosa</i> (L.) Druce	Capparaceae	S		+		+	I
<i>Caesalpinia bonduc</i> (L.) Roxb.	Fabaceae	S		+	+	+	I
<i>Calotropis gigantea</i> (L.) R.Br.	Apocynaceae	S	+	+	+	+	I
<i>Calotropis procera</i> W.T.Aiton	Apocynaceae	S	+		+		I
<i>Calyptocarpus vialis</i> Less.	Asteraceae	H		+	+		I
<i>Cansjera rheedei</i> Gmelin	Opiliaceae	S		+			I
<i>Canthium coromandelicum</i> (Burm.f.) Alston	Rubiaceae	S	+	+		+	I
<i>Capparis sepiaria</i> L.	Capparaceae	S	+	+	+	+	I
<i>Cardiospermum halicacabum</i> L.	Sapindaceae	C	+		+		I
<i>Careya arborea</i> Roxb.	Lecythidaceae	T		+		+	Afg-M
<i>Caryota urens</i> L.	Arecaceae	T	+	+			I
<i>Cascabela thevetia</i> (L.) Lippold	Apocynaceae	S			+		Tam
<i>Cassia fistula</i> L.	Fabaceae	T	+		+		I
<i>Catharanthus pusillus</i> (Murray) G.Don	Apocynaceae	H	+			+	I
<i>Causonis trifolia</i> (L.) Mabb. & J.Wen	Vitaceae	C	+		+		I
<i>Cenchrus pedicellatus</i> (Trin.) Morrone	Poaceae	H	+				I
<i>Centella asiatica</i> (L.) Urb.	Apiaceae	H	+				I
<i>Centrosema pubescens</i> Benth.	Fabaceae	C		+			I
<i>Chloris barbata</i> Sw.	Poaceae	H	+	+	+	+	I
<i>Chloris quinquesetica</i> Bhide	Poaceae	H	+	+			I
<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Asteraceae	S		+	+		Am
<i>Chrozophora plicata</i> (Vahl) A.Juss. ex Spreng.	Euphorbiaceae	H	+			+	I
<i>Chrozophora rottileri</i> (Geiseler) A.Juss. ex Spreng.	Euphorbiaceae	S		+	+	+	I
<i>Cleome gynandra</i> L.	Cleomaceae	H	+	+	+		I
<i>Cleome viscosa</i> L.	Cleomaceae	H	+	+	+		Taf
<i>Clerodendrum phlomidis</i> L.f.	Lamiaceae	T			+	+	I
<i>Clitoria terneata</i> L.	Fabaceae	C	+	+	+		I
<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	C		+	+	+	I
<i>Coldenia procumbens</i> L.	Boraginaceae	H	+	+	+	+	I
<i>Colocasia esculenta</i> (L.) Schott	Araceae	H			+	+	I
<i>Combretum albidum</i> G.Don	Convolvulaceae	C			+	+	I
<i>Commelina benghalensis</i> L.	Commelinaceae	H			+		I
<i>Conyza japonica</i> (Thunb.) Less.	Asteraceae	H		+	+		Afg
<i>Corchorus fascicularis</i> Lam.	Malvaceae	H	+	+	+		I
<i>Crateva magna</i> (Lour.) DC.	Capparaceae	T		+	+		I
<i>Crinum viviparum</i> (Lam.) R.Ansari & V.J.Nair	Amaryllidaceae	H	+	+	+	+	I
<i>Crotalaria hebecarpa</i> (DC.) Rudd	Fabaceae	H	+		+		I
<i>Crotalaria pallida</i> Aiton	Fabaceae	S		+	+		I
<i>Croton bonplandianus</i> Baill.	Euphorbiaceae	H			+	+	I
<i>Cryptocoryne spiralis</i> (Retz.) Fisch. ex Wydler	Araceae	H	+	+	+		I
<i>Cryptolepis buchananii</i> Roemer & Schultes	Apocynaceae	C		+	+		I
<i>Cryptostegia grandiflora</i> R.Br.	Apocynaceae	S		+	+		Mad

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Cucumis melo</i> L.	Cucurbitaceae	C		+	+		I
<i>Cucumis sativus</i> L.	Cucurbitaceae	C	+	+		+	I
<i>Cuscuta campestris</i> Yunc.	Convolvulaceae	C			+		I
<i>Cyathocline purpurea</i> (D.Don) Kuntze	Asteraceae	H	+	+	+	+	I
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	H	+	+	+		I
<i>Cyperus difformis</i> L.	Cyperaceae	H			+		I
<i>Cyperus flavidus</i> Retz.	Cyperaceae	H				+	Eu–Au
<i>Cyperus haspan</i> L.	Cyperaceae	H		+	+	+	I
<i>Cyperus iria</i> L.	Cyperaceae	H		+		+	I
<i>Cyperus pumilus</i> L.	Cyperaceae	H	+		+		I
<i>Dactyloctenium aegyptium</i> (L.) P.Beauv.	Poaceae	H	+	+	+		Sam
<i>Dalbergia sissoo</i> Roxb.	Fabaceae	T		+	+	+	I
<i>Datura discolor</i> Bernh.	Solanaceae	H		+	+		I
<i>Datura ferox</i> L.	Solanaceae	H		+	+	+	Te–Me
<i>Datura stramonium</i> L.	Solanaceae	S		+	+		Nam
<i>Delonix regia</i> (Hook.) Raf.	Fabaceae	T			+	+	Mad
<i>Dentella repens</i> (L.) J.R.Forst. & G.Forst.	Rubiaceae	H	+		+		I
<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	H		+	+	+	I
<i>Dicliptera cuneata</i> Nees	Acanthaceae	H				+	I
<i>Dicliptera paniculata</i> (Forssk.) I.Darbysh.	Acanthaceae	H			+		I
<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	H		+	+		I
<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	H	+	+		+	I
<i>Dinebra retroflexa</i> (Vahl) Panz.	Poaceae	H			+	+	I
<i>Dipteracanthus patulus</i> (Jacq.) Nees	Acanthaceae	H			+		I
<i>Dyschoriste erecta</i> (Burm.f.) Kuntze	Acanthaceae	H	+			+	I
<i>Ecbolium ligustrinum</i> (Vahl) Vollesen	Acanthaceae	H				+	I
<i>Echinochloa colona</i> (L.) Link	Poaceae	H		+	+	+	I
<i>Echinochloa crus-galli</i> (L.) P.Beauv.	Poaceae	H	+		+	+	Pal
<i>Eclipta prostrata</i> (L.) L.	Asteraceae	H			+	+	Sta
<i>Eleocharis geniculata</i> (L.) Roem. & Schult.	Cyperaceae	H	+	+	+		I
<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	H	+		+		I
<i>Emilia sonchifolia</i> (L.) DC.	Asteraceae	H	+	+		+	I
<i>Enicostema axillare</i> (Poir. ex Lam.) A.Raynal	Gentianaceae	H	+	+	+		I
<i>Enteropogon dolichostachyus</i> (Lag.) Keng	Poaceae	H		+			I
<i>Eragrostis aspera</i> (Jacq.) Nees	Poaceae	H	+				I
<i>Eragrostis ciliaris</i> (L.) R.Br.	Poaceae	H	+		+		I
<i>Eragrostis japonica</i> (Thunb.) Trin.	Poaceae	H	+		+		I
<i>Eragrostis tenella</i> (L.) P.Beauv. ex Roem. & Schult.	Poaceae	H	+	+		+	I
<i>Erigeron sumatrensis</i> Retz.	Asteraceae	H	+		+		I
<i>Eucalyptus globulus</i> Labill.	Myrtaceae	T	+	+	+	+	Au
<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	H		+	+	+	Cam
<i>Euphorbia heyneana</i> Sprengel	Euphorbiaceae	H	+	+	+	+	I
<i>Euphorbia hirta</i> L.	Euphorbiaceae	H	+	+	+	+	Tam
<i>Euphorbia hypericifolia</i> L.	Euphorbiaceae	H					Sta

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae	H	+	+	+		Tam
<i>Ficus benghalensis</i> L.	Moraceae	T	+	+	+		I
<i>Ficus heterophylla</i> L.f.	Moraceae	T		+	+	+	I
<i>Ficus hispida</i> L.f.	Moraceae	T			+	+	I
<i>Ficus mollis</i> Vahl	Moraceae	T		+			I
<i>Ficus racemosa</i> L.	Moraceae	T	+	+	+	+	Pa
<i>Ficus religiosa</i> L.	Moraceae	T	+	+	+		I
<i>Fimbristylis ovata</i> (Burm.f.) J.Kern	Cyperaceae	H					I
<i>Fimbristylis quinquangularis</i> (Vahl) Kunth	Cyperaceae	H		+	+		I
<i>Flueggea leucopyrus</i> Willd.	Phyllanthaceae	S					Ch
<i>Fuirena umbellata</i> Rottboell	Cyperaceae	H			+	+	I
<i>Glinus lotoides</i> L.	Molluginaceae	H	+		+	+	I
<i>Glinus oppositifolius</i> (L.) Aug.DC.	Molluginaceae	H		+	+		I
<i>Gmelina arborea</i> Roxb.	Lamiaceae	T				+	I
<i>Gnaphalium polycaulon</i> Pers.	Asteraceae	H		+	+	+	I
<i>Gomphrena celosioides</i> Mart.	Amaranthaceae	H		+		+	Sam
<i>Grangea maderaspatana</i> (L.) Poir.	Asteraceae	H	+	+	+		Af
<i>Grona triflora</i> (L.) H.Ohashi & K.Ohashi	Fabaceae	H			+		I
<i>Heliotropium indicum</i> L.	Boraginaceae	H			+		Ar
<i>Heliotropium marifolium</i> J.Koenig ex Retz.	Boraginaceae	H	+	+	+	+	I
<i>Heliotropium ovalifolium</i> Forrsk.	Boraginaceae	H	+	+		+	I
<i>Hemigraphis latebrosa</i> (Roth) Nees	Acanthaceae	H	+	+			I
<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	Poaceae	H	+		+		I
<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex G.Don	Apocynaceae	S	+				I
<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Ulmaceae	T	+	+	+	+	I
<i>Homonoia retusa</i> (Graham ex Wight) Müll. Arg.	Euphorbiaceae	S	+	+	+	+	I
<i>Homonoia riparia</i> Lour.	Euphorbiaceae	S		+		+	I
<i>Hydrilla verticillata</i> (L.f.) Royle	Hydrocharitaceae	H	+	+	+	+	I
<i>Hygrophila auriculata</i> (Schumach.) Heine	Acanthaceae	H	+	+	+	+	I
<i>Indigofera astragalina</i> DC.	Fabaceae	H		+	+		I
<i>Indigofera linifolia</i> (L.f.) Retz.	Fabaceae	H	+	+	+	+	I
<i>Indigofera linnaei</i> Ali	Fabaceae	H			+		I
<i>Ipomoea alba</i> L.	Convolvulaceae	C					Tam
<i>Ipomoea aquatica</i> Forsk.	Convolvulaceae	C				+	I
<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	C		+			Med
<i>Ipomoea carnea</i> (L.) Sweet	Convolvulaceae	S	+		+		Sam
<i>Ipomoea obscura</i> (L.) Ker Gawl.	Convolvulaceae	C	+		+		I
<i>Ipomoea staphylinia</i> Roem. & Schult.	Convolvulaceae	C	+		+	+	I
<i>Ipomoea triloba</i> L.	Convolvulaceae	C	+	+	+		Tam
<i>Jatropha curcas</i> L.	Euphorbiaceae	S			+	+	I
<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	H		+	+		Me
<i>Kalanchoe lanceolata</i> (Forssk.) Pers.	Crassulaceae	H	+				I
<i>Lagasea mollis</i> Cav.	Asteraceae	H	+	+	+		Tam
<i>Lantana camara</i> L.	Verbenaceae	S	+	+	+	+	Cam

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Lemna minor</i> L.	Araceae	H			+		I
<i>Leptochloa chinensis</i> (L.) Nees	Poaceae	H		+	+		I
<i>Leucaena leucocephala</i> (Lam.) de Wit	Fabaceae	T		+	+		Tam
<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	H		+	+	+	I
<i>Leucas urticifolia</i> R.Br.	Lamiaceae	H	+		+		I
<i>Limncharis flava</i> (L.) Buchenau	Alismataceae	H		+	+		Me-Tam
<i>Limonia acidissima</i> L.	Rutaceae	T		+			I
<i>Lindernia hyssopoides</i> (L.) Haines	Linderniaceae	H		+	+	+	I
<i>Lindernia parviflora</i> (Roxb.) Haines	Linderniaceae	H		+	+	+	I
<i>Lindernia rotundifolia</i> (L.) Alston	Linderniaceae	H	+	+	+		I
<i>Ludwigia adscendens</i> (L.) Hara	Onagraceae	H		+	+		I
<i>Ludwigia hyssopifolia</i> (G.Don) Exell	Onagraceae	H	+			+	Tam
<i>Macroptilium lathyroides</i> (L.) Urb.	Fabaceae	H			+		Tam
<i>Mallotus nudiflorus</i> (L.) Kulju & Welzen	Euphorbiaceae	T	+	+	+		I
<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	H	+	+	+		I
<i>Mecardonia procumbens</i> (Mill.) Small	Plantaginaceae	H		+	+		Tam
<i>Melinis repens</i> (Willd.) Zizka	Poaceae	H	+	+	+		Af
<i>Merremia emarginata</i> (Burm.f.) Hallier.f.	Convolvulaceae	C		+	+	+	Sea
<i>Merremia hederacea</i> Hall.f.	Convolvulaceae	C	+	+		+	I
<i>Merremia tridentata</i> (L.) Hallier.f.	Convolvulaceae	C		+			I
<i>Mesosphaerum suaveolens</i> (L.) Kuntze	Lamiaceae	H	+	+	+	+	Cam
<i>Microcos paniculata</i> L.	Malvaceae	S				+	I
<i>Mikania micrantha</i> Kunth	Asteraceae	C	+	+	+	+	Sta
<i>Mimosa pudica</i> L.	Fabaceae	H	+		+	+	I
<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	T		+	+		I
<i>Momordica charantia</i> L.	Cucurbitaceae	C		+	+	+	I
<i>Morinda coreia</i> Buch.-Ham.	Rubiaceae	T	+	+			I
<i>Muntingia calabura</i> L.	Muntingiaceae	T			+		Tam
<i>Nicotia glauca</i> (L.) Lindau	Acanthaceae	H	+	+	+		I
<i>Nicotiana glauca</i> (L.) Lindau	Solanaceae	H		+	+	+	Tam
<i>Nymphoides hydrophylla</i> (Lour.) Kuntze	Menyanthaceae	H	+		+		I
<i>Ocimum americanum</i> L.	Lamiaceae	H	+		+		Pal
<i>Oldenlandia corymbosa</i> L.	Rubiaceae	H		+	+		I
<i>Ottelia alismoides</i> (L.) Pers.	Hydrocharitaceae	H		+	+		I
<i>Oureta lanata</i> (L.) Kuntze	Amaranthaceae	H			+		I
<i>Oxalis corniculata</i> L.	Oxalidiaceae	H	+	+	+		I
<i>Oxystelma esculentum</i> (L.f.) R.Br. ex Schult.	Apocynaceae	C		+	+	+	Au
<i>Parthenium hysterophorus</i> L.	Asteraceae	H			+		Am
<i>Paspalum distichum</i> L.	Poaceae	H	+		+	+	Vt
<i>Paspalum vaginatum</i> Sw.	Poaceae	H		+	+		Sta
<i>Passiflora foetida</i> L.	Passifloraceae	C		+	+	+	Tam
<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	C	+		+		I
<i>Persicaria glabra</i> (Willd.)	Polygonaceae	H			+	+	I
<i>Phaulopsis dorsiflora</i> (Retz.) Sant.	Acanthaceae	H		+			I
<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	H	+	+	+	+	I

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Phyllanthus acidus</i> (L.) Skeels	Phyllanthaceae	T		+	+	+	Br
<i>Phyllanthus amarus</i> Schumacher & Thonn.	Phyllanthaceae	H	+		+	+	Am
<i>Phyllanthus lawii</i> J.Graham	Phyllanthaceae	S	+	+	+	+	I
<i>Phyllanthus maderaspatensis</i> L.	Phyllanthaceae	H			+	+	I
<i>Phyllanthus reticulatus</i> Poir.	Phyllanthaceae	S		+	+	+	I
<i>Phyllanthus urinaria</i> L.	Phyllanthaceae	H	+	+			Tea
<i>Physalis angulata</i> L.	Solanaceae	H	+	+	+	+	Tam
<i>Pistia stratiotes</i> L.	Araceae	H		+	+	+	I
<i>Pithecellobium dulce</i> (Roxb.) Benth.	Fabaceae	T			+		Tam
<i>Pluchea tomentosa</i> DC.	Asteraceae	H		+	+		I
<i>Plumbago zeylanica</i> L.	Plumbaginaceae	H			+	+	I
<i>Polygonum plebeium</i> R.Br.	Polygonaceae	H	+	+	+		I
<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	T	+	+	+	+	I
<i>Pontederia crassipes</i> Mart.	Pontederiaceae	H			+	+	Sam
<i>Pontederia vaginalis</i> Burm.f.	Pontederiaceae	H		+	+	+	I
<i>Portulaca oleracea</i> L.	Portulacaceae	H	+	+		+	Pa
<i>Prosopis cineraria</i> (L.) Druce	Fabaceae	T		+	+	+	I
<i>Prosopis juliflora</i> (Sw.) DC	Fabaceae	T	+	+	+	+	Tam
<i>Rhynchospora corymbosa</i> (L.) Britton	Cyperaceae	H		+			I
<i>Ricinus communis</i> L.	Euphorbiaceae	S		+			I
<i>Rotula aquatica</i> Lour.	Boraginaceae	S	+		+		I
<i>Rungia pectinata</i> (L.) Nees	Acanthaceae	H	+			+	I
<i>Saccharum spontaneum</i> L.	Poaceae	H	+	+	+	+	I
<i>Salix tetrasperma</i> Roxb.	Salicaceae	T	+	+	+	+	I
<i>Samanea saman</i> (Jacq.) Merr.	Fabaceae	T		+	+	+	Sam
<i>Santalum album</i> L.	Santalaceae	T	+	+		+	I
<i>Schoenoplectiella articulata</i> (L.) Lye	Cyperaceae	H			+		I
<i>Scoparia dulcis</i> L.	Plantaginaceae	H	+	+	+	+	Tam
<i>Senegalia catechu</i> (L.f.) P.J.H.Hurter & Mabb.	Fabaceae	T	+	+		+	I
<i>Senna auriculata</i>	Fabaceae	S		+		+	I
<i>Senna occidentalis</i> (L.) Link	Fabaceae	H	+		+		Tam
<i>Senna siamea</i> (Lam.) H.S.Irwin & Barneby	Fabaceae	T	+				Sea
<i>Senna sophora</i> (L.) Roxb.	Fabaceae	S		+	+	+	Tam
<i>Senna tora</i> (L.) Roxb.	Fabaceae	H		+	+	+	I
<i>Sesamum indicum</i> L.	Pedaliaceae	H			+		I
<i>Sesbania sesban</i> (L.) Merr.	Fabaceae	S	+			+	I
<i>Setaria geminata</i> (Forssk.) Veldkamp	Poaceae	H	+	+		+	I
<i>Setaria intermedia</i> Roem. & Schult.	Poaceae	H	+	+	+		I
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Poaceae	H		+		+	I
<i>Sida cordata</i> (Burm.f.) Borssum	Malvaceae	H		+	+	+	I
<i>Solanum nigrum</i> L.	Solanaceae	H	+	+	+	+	I
<i>Solanum torvum</i> Sw.	Solanaceae	S	+		+		Pan
<i>Solanum virginianum</i> L.	Solanaceae	H	+		+		I
<i>Sonchus asper</i> Hill	Asteraceae	H	+	+	+	+	I
<i>Spermacoce verticillata</i> L.	Rubiaceae	H	+	+	+		Tam

Botanical name	Family	Habit	Dharma	Kumadwathi	Tunga Bhadra	Varada	Nativity
<i>Sphaeranthus indicus</i> L.	Asteraceae	H	+		+		Tam
<i>Spilanthes paniculata</i> Wall. ex DC.	Asteraceae	H	+	+	+	+	Ch
<i>Spilanthes radicans</i> Jacq.	Asteraceae	H					I
<i>Stachytarpheta cayennensis</i> (Rich.) Vahl	Verbenaceae	S			+		Tam
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbenaceae	H	+	+	+	+	Tam
<i>Stemodia viscosa</i> Roxb.	Plantaginaceae	H	+	+	+	+	I
<i>Streblus asper</i> Lour.	Moraceae	T		+	+	+	I
<i>Striga asiatica</i> (L.) Kuntze	Orobanchaceae	H	+		+		I
<i>Striga densiflora</i> (Benth.) Benth.	Orobanchaceae	H					I
<i>Synadenium grantii</i> Hook.f.	Euphorbiaceae	S		+		+	I
<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	T		+	+		I
<i>Tamarindus indica</i> L.	Fabaceae	T	+	+	+	+	Taf
<i>Tamarix ericoides</i> Rottler	Tamaricaceae	S			+	+	I
<i>Tecoma stans</i> (L.) Kunth	Bignoniaceae	S	+			+	I
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	T			+	+	I
<i>Terminalia catappa</i> L.	Combretaceae	T	+	+	+	+	I
<i>Terminalia elliptica</i> Willd.	Combretaceae	T		+		+	I
<i>Themeda triandra</i> Forssk.	Poaceae	H	+				I
<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	Menispermaceae	C		+	+		I
<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	Asteraceae	S		+	+		I
<i>Tonningia axillaris</i> (L.) Kuntze	Commelinaceae	H	+		+		I
<i>Trianthema portulacastrum</i> L.	Aizoaceae	H	+	+	+	+	I
<i>Tribulus terrestris</i> L.	Zygophyllaceae	H		+	+	+	I
<i>Trichodesma indicum</i> (L.) Lehmann	Boraginaceae	H	+		+	+	I
<i>Tridax procumbens</i> L.	Asteraceae	H	+	+	+		Cam
<i>Turnera ulmifolia</i> L.	Turneraceae	H		+	+		I
<i>Typha domingensis</i> Pers.	Typhaceae	H	+	+	+	+	I
<i>Vachellia farnesiana</i> (L.) Wight & Arn.	Fabaceae	T	+		+	+	Tam
<i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb.	Fabaceae	T	+	+	+	+	I
<i>Vahlia dichotoma</i> (Murray) Kuntze	Vahliaceae	H			+		I
<i>Vallisneria spiralis</i> L.	Hydrocharitaceae	H		+	+	+	I
<i>Ventilago maderaspatana</i> Gaertner	Rhamnaceae	S	+				I
<i>Verbascum coromandelianum</i> (Vahl) Hub.-Mor.	Scrophulariaceae	H	+		+	+	I
<i>Vincetoxicum indicum</i> (Burm.f.) Mabb.	Apocynaceae	C		+	+	+	I
<i>Vitex leucoxylon</i> L.f.	Lamiaceae	T	+	+		+	I
<i>Vitex negundo</i> L.	Lamiaceae	T		+	+		Ja
<i>Volkameria inermis</i> L.	Lamiaceae	S	+		+		I
<i>Wendlandia thyrsoides</i> (Roem. & Schult.) Steud.	Rubiaceae	S	+	+		+	I
<i>Xanthium strumarium</i> L.	Asteraceae	S			+		Sam
<i>Zaleya decandra</i> (L.) Burm.f.	Aizoaceae	H	+	+	+	+	I
<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	Rhamnaceae	T			+	+	I

C—Climber | H—Herb | S—Shrub | T—Tree | +—Present | Af—Africa | Afg—Afghanistan | Am—America | Ar—Argentina | Au—Australia | Br—Brazil | Cam—Central America | Ch—China | Eu—Europe | I—Indigenous | Ja—Japan | M—Malaysia | Mad—Madagascar | Me—Mexico | Med—Mediterranean | Nam—North America | Pa—Pakistan | Pal—Paleotropics | Pan—Pantropical | Sam—South America | Sta—Subtropical America | Sea—Southeast Asia | Taf—Tropical Africa | Tam—Tropical America | Te—Texas | Tea—Tropical East Asia | Vt—Vietnam | W—West Pacific.



Image 1. A—*Acmella radicans* (Jacq.) R.K.Jansen (Native) | B—*Alternanthera philoxeroides* (Mart.) Griseb (Non-native) | C—*Anisomeles indica* (L.) Kuntze (Native) | D—*Aristida setacea* Retz. (Native) | E—*Arundo donax* L. (Native) | F— *Bacopa monnieri* (L.) Wettstein (Native) | G—*Bergia ammannioides* Roxb. (Native) | H—*Bolboschoenus maritimus* (L.) Palla (Native) | I—*Cansjera rheedei* Gmelin (Native) | J—*Causonis trifolia* (L.) Mabb. & J.Wen. (Native) | K—*Cleome viscosa* L. (Non-native) | L—*Crateva magna* (Lour.) DC. (Native). © Ningaraj S. Makanur.

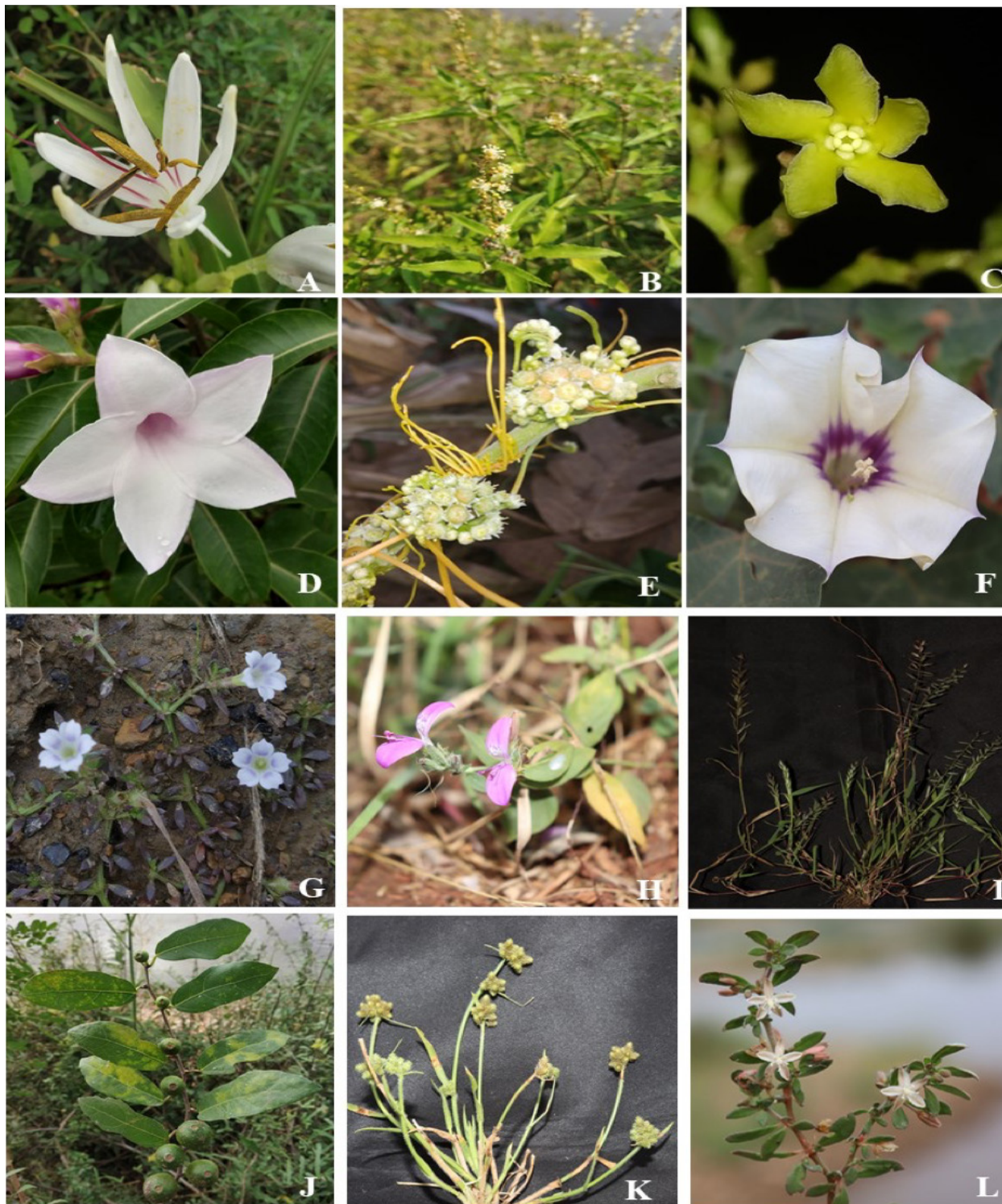


Image 2. A—*Crinum viviparum* (Lam.) R.Ansari & V.J. Nair (Native) | B—*Croton bonplandianus* Baill. (Native) | C—*Cryptolepis buchananii* Roemer & Schultes (Non-native) | D—*Cryptostegia grandiflora* R.Br. (Non-native) | E—*Cuscuta campestris* Yunck. (Non-native) | F—*Datura discolor* Bernh. (Non-native) | G—*Dentella repens* (L.) J.R.Forst. & G.Forst. (Native) | H—*Dicliptera cuneata* Nees (Native) | I—*Dinebra retroflexa* (Vahl) Panz. (Native) | J—*Ficus heterophylla* L.f. (Native) | K—*Fuirena umbellata* Rottboell (Native) | L—*Glinus oppositifolius* (L.) Aug. DC. (Native). © Ningaraj S. Makanur.



Image 3. A—*Gnaphalium polycaulon* Pers. (Native) | B—*Grangea maderaspatana* (L.) Poir. (Non-native) | C—*Heliotropium marifolium* J.Koenig ex Retz. (Native) | D—*Hemigraphis latebrosa* (Roth) Nees (Native) | E—*Heteropogon contortus* (L.) P.Beauv. ex Roem. & Schult. (Native) | F—*Homonoia retusa* (Graham ex Wight) Müll. Arg. (Native) | G—*Homonoia riparia* Lour. (Native) | H—*Hygrophila auriculata* (Schumach.) Heine (Native) | I—*Ipomoea aquatica* Forsk. (Native) | J—*Ipomoea carnea* (L.) Sweet (Non-native) | K—*Limnocharis flava* (L.) Buchenau (Non-native) | L—*Lindernia hyssopioides* (L.) Haines. (Native). © Ningaraj S. Makanur.



Image 4. A—*Ludwigia adscendens* (L.) Hara (Native) | B—*Mallotus nudiflorus* (L.) Kulju & Welzen (Native) | C—*Merremia tridentata* (L.) Hallier f. (Native) | D—*Mikania micrantha* Kunth (Non-native) | E—*Nymphoides hydrophylla* (Lour.) Kuntze (Native) | F—*Ottelia alismoides* (L.) Pers. (Native) | G—*Phyllanthus lawii* J. Graham (Native) | H—*Pistia stratiotes* L. (Native) | I—*Pontederia crassipes* Mart. (Non-native) | J—*Pontederia vaginalis* Burm.f. (Native) | K—*Rotula aquatica* Lour. (Native) | L—*Saccharum spontaneum* L. (Native). © Ningaraj S. Makanur.

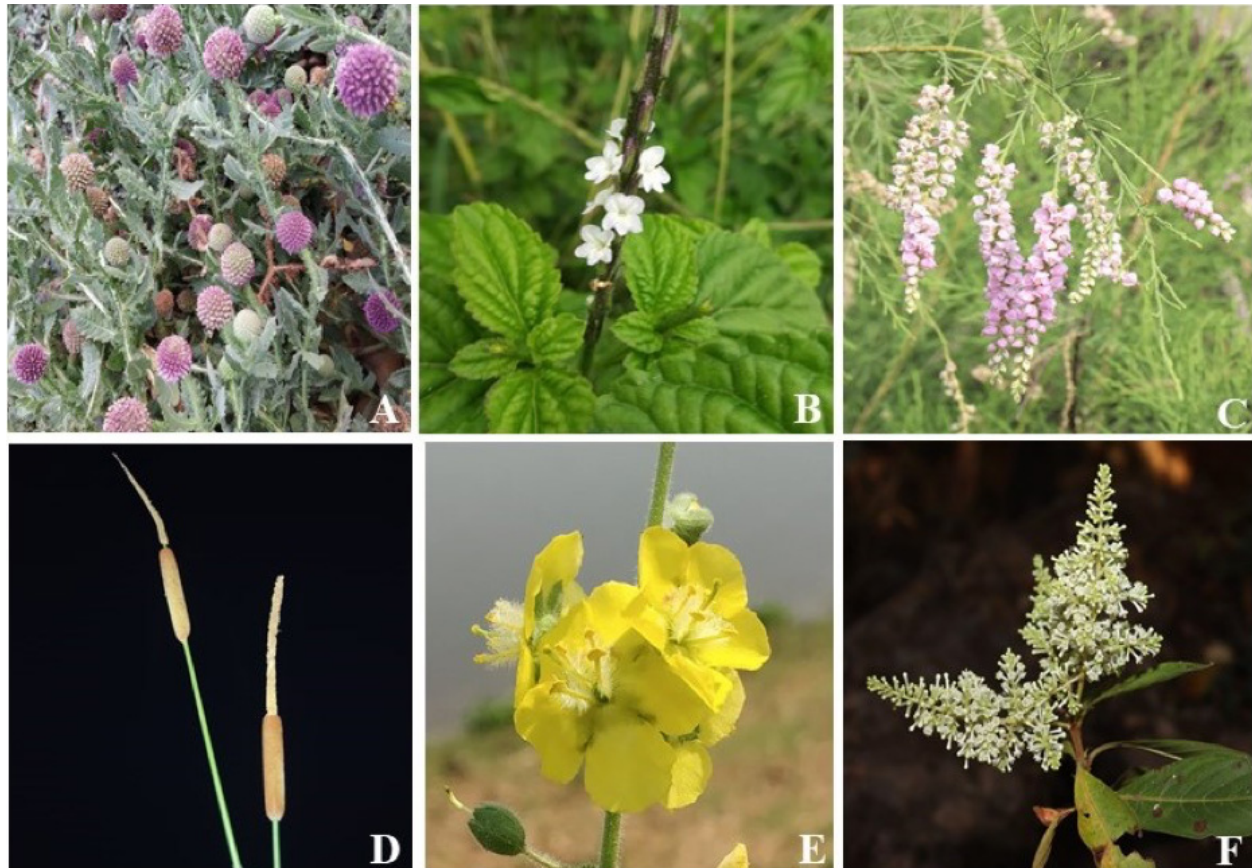


Image 5. A—*Sphaeranthus indicus* L. (Non-native) | B—*Stachytarpheta cayennensis* (Rich.) Vahl (Non-native) | C—*Tamarix ericoides* Rottler (Native) | D—*Typha domingensis* Pers. (Native) | E—*Verbascum coromandelianum* (Vahl) Hub.-Mor. (Native) | F—*Wendlandia thyrsoides* (Roem. & Schult.) Steud. (Native). © Ningaraj S. Makanur.

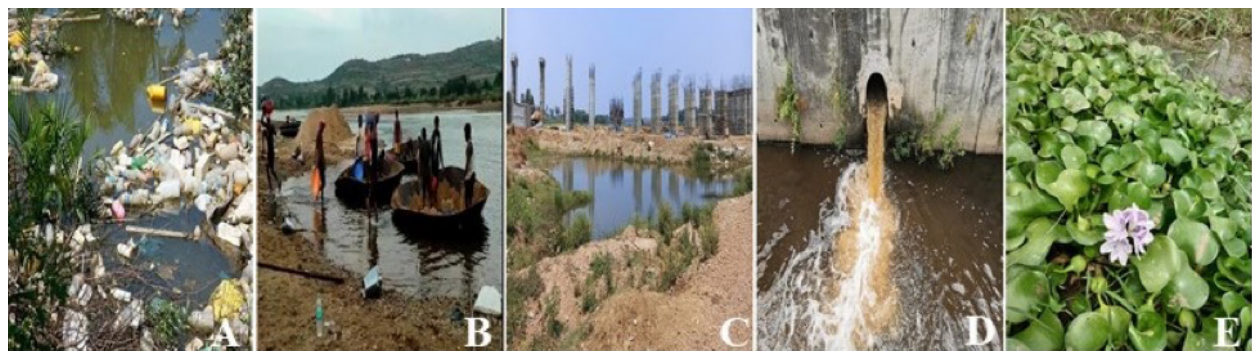


Image 6. Threats to the riparian vegetation in the study area: A—Dumping of plastic waste | B—Sand mining | C—Construction of dams and check dams | D—Discharging of industrial effluents | E—Invasive alien species. © Ningaraj S. Makanur

loss and vegetation degradation include agricultural encroachment, overgrazing, the construction of dams and check dams, sand mining, dumping of plastic and chemical waste, invasive species, and tourism activities. Therefore, it is crucial to implement effective conservation programs to protect these vital riparian ecosystems.

REFERENCES

- Betz, F., M. Lauermann & B. Cyffka (2018). Delineation of the riparian zone in data-scarce regions using fuzzy membership functions: an evaluation based on the case of the Naryn River in Kyrgyzstan. *Geomorphology* 306: 170–181. <https://doi.org/10.1016/j.geomorph.2018.01.024>
- Bhat, G.K. (2014). *Flora of South Kanara*. Akriti Prints, Mangalore, India, 928 pp.

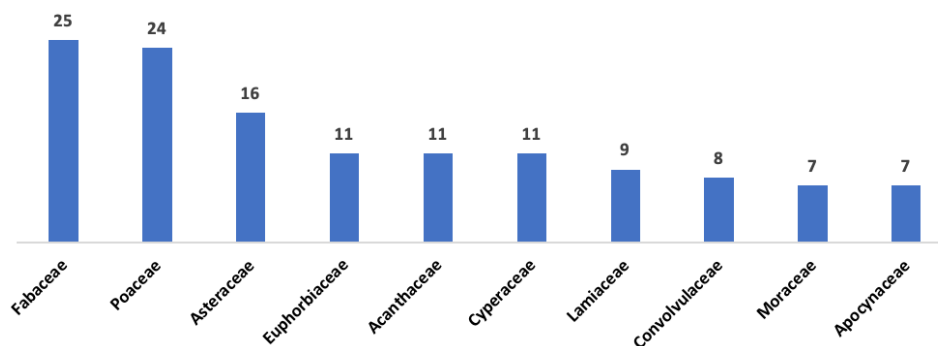


Figure 4. Ten native dominant families in the study area.

Blatter, E. & C. McCann (1984). *The Bombay Grasses*. Bishen Singh Mahendra Pal Singh, Dehradun, India, xxi + 324 pp.

Chase, M.W., M.J., Christenhusz, M.F. Fay, W.S. Byng, D.E. Judd, D.J. Soltis, A.N. Mabberley, P.S. Sennikov, P.F. Soltis & Stevens (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society* 181(1): 1–20. <https://doi.org/10.1111/boj.12385>

Cooke, T. (1958). *The Flora of the Presidency of Bombay, Vol. 1–3*. Bishen Singh Mahendra Pal Singh, Dehradun, 1–204 pp, 205–435 pp, 435–611 pp.

Gamble, J.S. (2008). *Flora of the Presidency of Madras 11 parts (1–7 Gamble & 8–11 by Fischer)*, Bishen Singh Mahendra Pal Singh, Dehradun (Reprint edition), 1245 pp.

González, E., M.R. Felipe-Lucia, B. Bourgeois, B. Boz, C. Nilsson, G. Palmer & A.A. Sher (2017). Integrative conservation of riparian zones. *Biological Conservation* 211: 20–29. <https://doi.org/10.1016/j.biocon.2016.10.035>

Jain, S.K. & R.R. Rao (1977). *A Handbook of Field and Herbarium Methods*. Today and Tomorrow Printed & Publication, New Delhi, India, 150 pp.

Kotresha, K. & T.C. Taranath (2010). Floristic studies on river Varahi Basin and its Environs-Hosangadi, Udipi, Karnataka. *Journal of Economic and Taxonomic Botany* 34(2): 262–273.

Makanur, N.S. & K. Kotresha (2022). *Limnocharis* Bonpl. (Alismataceae): a new generic record to Karnataka State, India. *Nelumbo* 64(2): 227–229. <https://doi.org/10.20324/nelumbo/v64/2022/172348>

Maraseni, T.N. & C. Mitchell (2016). An assessment of carbon sequestration potential of riparian zone of Condamine Catchment,

Queensland, Australia. *Land Use Policy* 54: 139–146. <https://doi.org/10.1016/j.landusepol.2016.02.013>

Prasad, V.P. & N.P. Singh (2002). *Sedges of Karnataka, India (Family: Cyperaceae)*. Scientific Publishers, India.

Rao, G.R., G. Krishnakumar, S. Chandran & T.V. Ramachandran (2014). Threatened tree species of swamps and riparian habitats of central Western ghats. In *LAKE 2014: Conference on Conservation and Sustainable Management of Wetland Ecosystems in Western Ghats*. Bangalore.

Saldanha, C.J. (1984). *Flora of Karnataka, Vol. 1*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 535 pp.

Saldanha, C.J. (1996). *Flora of Karnataka, Vol. 2*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 304 pp.

Saldanha, C.J. & D.H. Nicolson (1976). *Flora of Hassan District Karnataka, India*. Amerind Publishing Co. Pvt. Ltd. Lucknow, 560 pp.

Singh, N.P. (1988). *Flora of Eastern Karnataka, Vol. 1 & 2*. Mittal Publications. New Delhi, 794 pp.

Singh, R., A.K. Tiwari & G.S. Singh (2021). Managing riparian zones for river health improvement: an integrated approach. *Landscape and Ecological Engineering* 17(2): 195–223. <https://doi.org/10.1007/s11355-020-00436-5>

Sunil, C., R.K. Somashekar & B.C. Nagaraja (2016). Diversity and composition of riparian vegetation across forest and agro-ecosystem landscapes of river Cauvery, southern India. *Tropical Ecology* 57(2): 343–354.

Zaimis, G.N., V. Iakovoglou, D. Emmanouloudis & D. Gounaridis (2010). Riparian areas of Greece: their definition and characteristics. *Journal of Engineering Science and Technology Review* 3(1): 176–183.

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