



## Ethnobotanical and Traditional Knowledge on Psammophytic Plants: Southeast Indian Coastal Area



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**T**HE SOUTHEAST Indian (SEI) coastal area is rich in unique wild plant life. These coastal plants have various medicinal properties that the local inhabitants traditionally use. No study has reported the documentation of medicinal plants in the entire SEI coastal region. In this study, we report the complete medicinal plants found along the SEI coastal regions and the traditional ethnobotanical knowledge (TEK) inventory of fishermen's communities. Field study documented a total of 111 medicinal plant species, which belong to 49 families in the 46 fixed study sites along with the SEI and established herbaria. The highest species count was recorded from the Fabaceae family and the least from Amaranthaceae, Rhizophoraceae, and Apocynaceae family. Among the collected plants, 43% were herbs, followed by 33% trees, 15% shrubs, 6% climbers and 3% creepers. On surveying the fisherman community's traditional ethnobotanical knowledge (TEK), it was observed that among the total number of informants, 57% were above the age group of 60 yrs, followed by 28% and 15% of middle and younger age groups, respectively. This study will provide basic knowledge about the medicinal plant resources of SEI and TEK of fishermen's community to initiate the future-oriented conservation strategies

**Keywords:** Fishermen, Medicinal plants, Southeast Indian coast, Traditional ethnobotanical knowledge.

### Introduction

The coastal ecosystems are a rich source of wild flora, many of which are used to treat various diseases (Jenisha & Jeeva, 2014; Hamed et al 2021). The plants in the coastal dunes, Psammophytes, grow in sandy soils with high pH and low nutrients in dry conditions (Hesp,

1991). They have a variety of interesting morpho-physiological adaptations, such as being succulent, with a pubescent epidermis, thick cuticle, ground structure enabling burial, and many more annual habitats (Hesp, 1991). They are essential in protecting coastal areas from wind and flood erosion (Feagin et al., 2019).

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The coastal regions of Southeast India have well-delineated ethnic fisherman communities, and they have their system of traditional usage of plants as medicine (Sivaperumal et al., 2009, 2010). This knowledge is passed to generations verbally between individuals. The transition in acculturation and globalization leads to a high risk of losing the inherited traditional healing practices of local inhabitants due to improper documentation (Nautiyal et al., 2016). In India, there are very limited regional studies reported previously to elaborate on the fishermen's local information on Traditional ethnobotanical knowledge (TEK) and their day-to-day practice of healing diseases using the local medicinal plants. Documenting fishermen's TEK will provide the key step to conserve coastal medicinal plants from being eradicated and safeguard the TEK for future generations. Several authors have emphasized the value of preserving ethnobotanical knowledge as part of living culture and practice between communities and the environment for biodiversity conservation (Maroyi, 2011; Tng et al., 2019; Behera et al., 2021; Rashed et al., 2022). Research on TEK also demonstrates the importance of these traditional cultures in biodiversity conservation (Di Stasi et al., 2002).

To the best of our knowledge, no study has been reported earlier on the medicinal plants present along the Southeast Indian coast up to date. Therefore, the objectives of the present study were (i) to record the medicinal plants present along the sand dunes and (ii) to document the TEK of fishermen's communities.

## **Materials and Methods**

### *Study area*

The study was conducted along the Southeast Indian coast from Pulicate to Kanyakumari, covering 1146 km, which lies between 77.17469°E and 80.32839°E longitude and 8.23306°N to 13.40789°N latitude. The coastal districts included in this study are Thiruvallur, Chennai, Kancheepuram, Villupuram, Pondicherry, Cuddalore, Karaikkal, Nagapattinam, Thiruvarur, Thanjavur, Pudukkottai, Ramanathapuram, Thoothukudi, Tirunelveli, and Kanyakumari (Fig. 1). The climatic pattern in the above areas covers three distinct climate seasons – summer (March-June), rainy (July-October), and winter

(November-February). The rainfall pattern over the coastal areas is always higher than inland due to the rainfall-causing system starting from the Bay of Bengal with an average temperature of around 28-40°C.

### *Ethnobotanical survey and plant collection*

A field study was conducted periodically from March 2018 to Jan 2020 at 46 fixed locations along the study area. Medicinal plants were documented and collected within 200 meters of the seashore. The plants were identified using the Flora of the Presidency of Madras (Gamble & Fischer, 1915) with the support of plant taxonomy experts. The recorded species were classified as annuals, perennials, phanerogams, and cryptogams. Further, based on habits, they were subdivided into herbs, shrubs, climbers, creepers, and trees (Navaneethan et al., 2011).

Information on the ethnomedicinal usage of the plants was obtained by surveying local inhabitants and fishermen based on the questionnaire prepared by our team (Annexure). It covers the knowledge of local names of medicinal plants, uses and economic value, etc. (Suppl. Table 1). The surveys were conducted in the local language (Tamil). Survey participants (25 Numbers at each study site) were informed about the project and its outcome before starting the survey. The questions were posed only after receiving the verbal consent of the participants. Participants had the right to withdraw from the study at any time.

### *Herbaria*

The plants were collected randomly from the field, cleaned gently with a brush to remove the dust particles and packed in zip-lock bags. The herbarium sheets were prepared as described previously (Volkova et al., 2010). Briefly, the collected plants were placed in 42cm x 29cm (16 ½" x 11 ½") size blotting paper and pressed with the wooden presser. The larger plants were folded into N, V, and M shapes to accommodate them. After drying, pressing, and processing with chemicals, the herbarium specimen was prepared according to the standard protocol. Later taxonomic identification and labeling were made with the following data: scientific name, family, habitat, date of collection, locality, site of collection, name of the collector, and collection number.

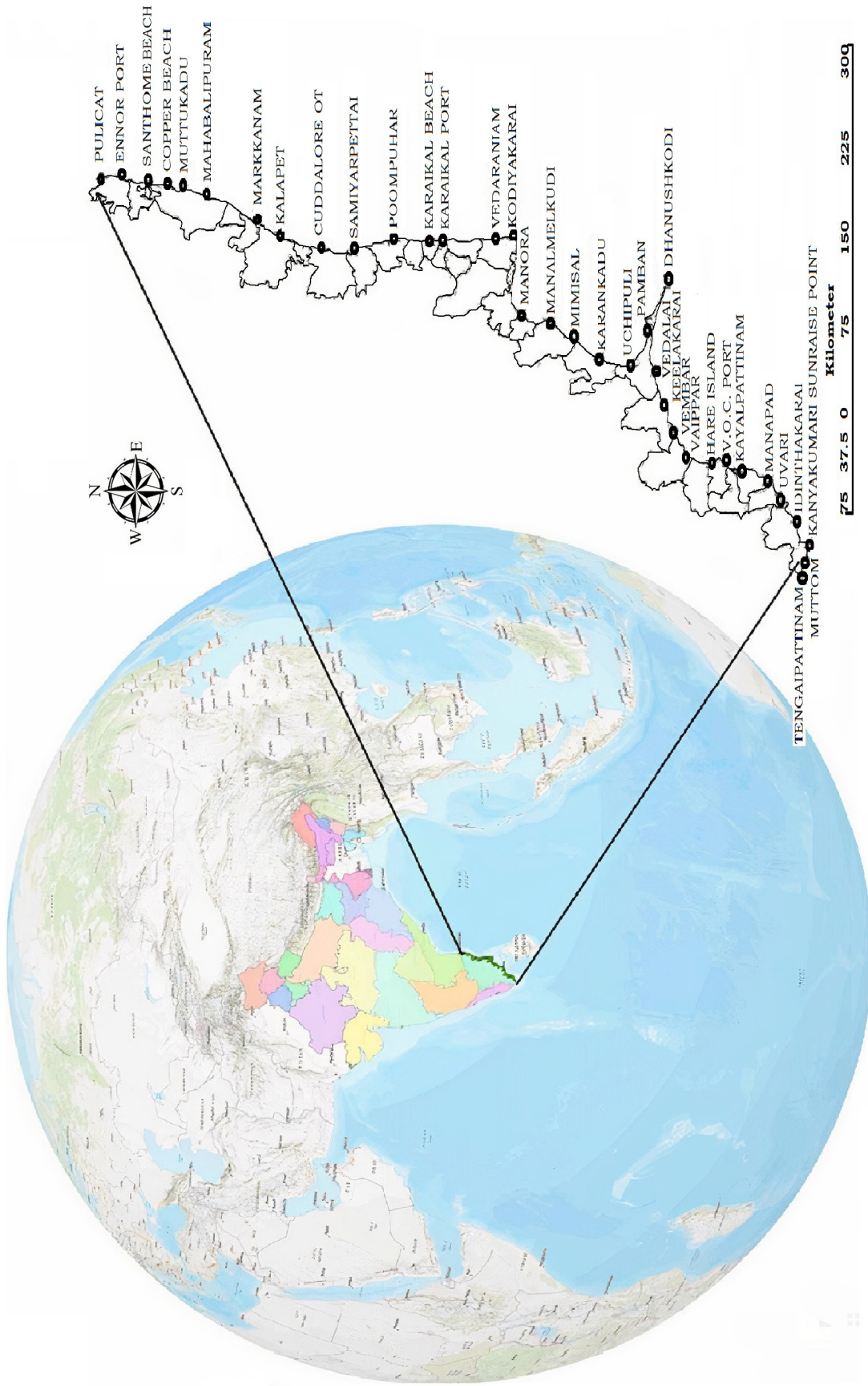


Fig. 1. Location of the area covered in the coastal regions of Southeast India

## Results and Discussion

### *Ethnobotanical exploration*

The ethnobotanical survey was conducted at 46 fixed locations along the SEI coast, covering 1146km periodically. A total of 111 medicinal plants were collected and identified with the assistance of a plant taxonomist. Herbariums were labelled with voucher numbers, prepared for all the collected plants, and stored for future reference (Table 1). Previous workers reported 129 plants in the entire Kanyakumari district (Nazar et al., 2008), 65 plants in the Ramanathapuram district (Ravikumar et al., 2011), and 60 plants in the Nagapattinam district of Tamil Nadu (Dhaarani et al., 2018). However, in our exploration, within 200 m vicinity of the seashore, we found 111 medicinal plants along the 13 districts of Tamil Nadu and 2 districts of Pondicherry. The collected plants

belong to 49 families, with the highest number of species under Fabaceae, followed by Malvaceae, Euphorbiaceae, Amaranthaceae, Rhizophoraceae, and Solanaceae (Fig. 2). The family Fabaceae, with 13 species, was the highest frequency (13.34 %) among the study locations (Fig. 2). A similar documentation study shows that the family Fabaceae was reported to be the most abundant in the East Midnapore district (31 species) and Purba Medinipur of West Bengal (21 species) (Sen & Bhakat, 2018, 2020). In another study, Ravikumar et al. (2011) reported 11 species of Leguminosae as dominant in the Ramanathapuram district, Tamil Nadu. The survey/field exploration results indicate species abundance declined compared to other studies due to anthropogenic activities and other natural calamities. Further, a systematic scientific study is needed to find the exact causes of plant diversity loss in these regions.

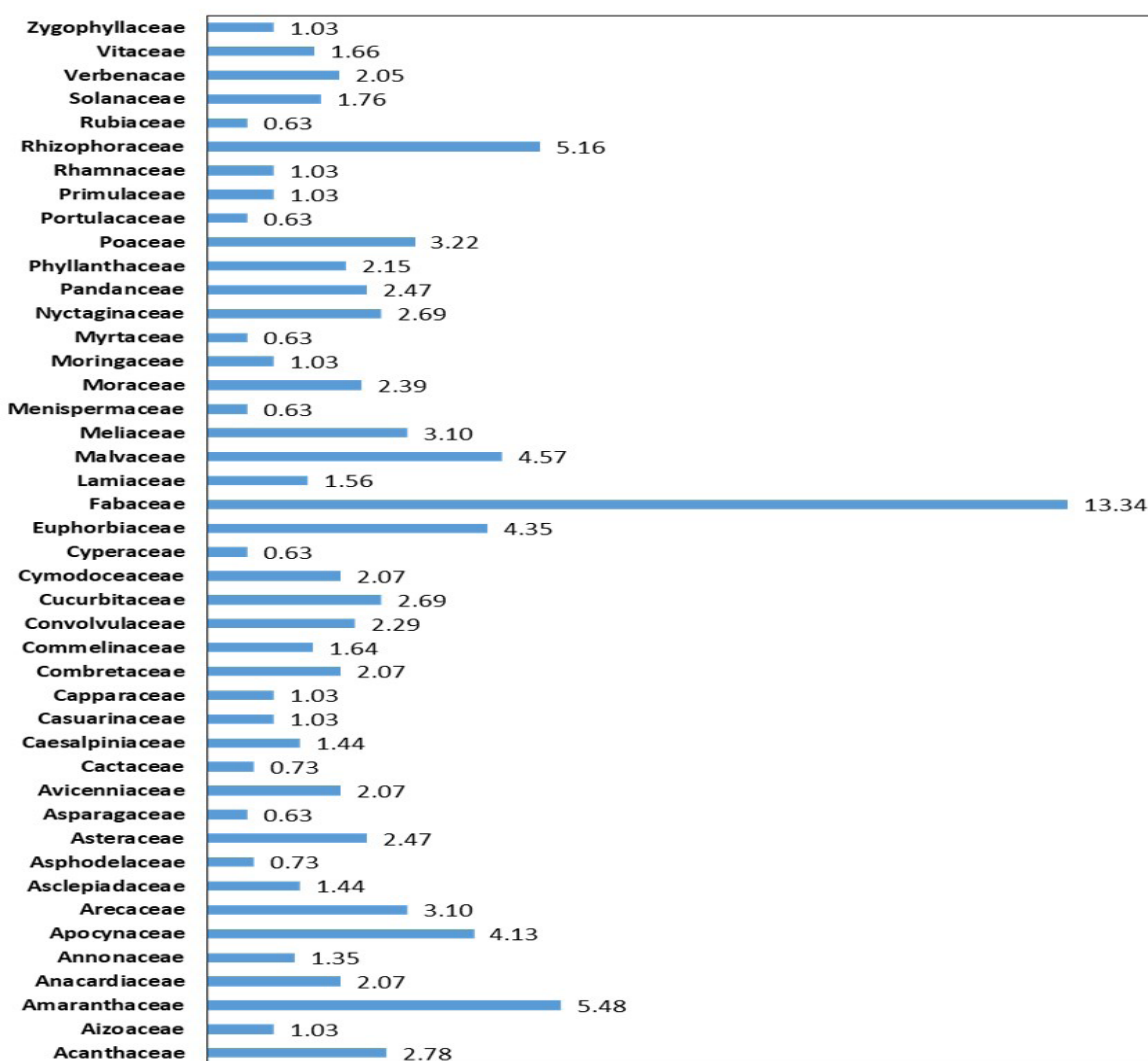


Fig. 2. Family-wise plant distribution in the coastal areas of Southeast India

TABLE 1. List of plants explore in the Southeast Indian coastal region and its traditional medicinal uses

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
1	<i>Abutilon indicum</i> (L.) Sweet	VITCS01	Malvaceae	AtiBala	Paniyaratutti	Dicot	Whole plant	Oral, decoction	Jaundice and liver disease, Prevent pregnancy and wound healing activity	Dhaarani et al. (2018)
2	<i>Acacia nilotica</i> (L.) Willd. ex Delile	VITMN093	Fabaceae	Gum arabic tree	Karuvelamar	Dicot	Leaf	Oral, decoction	Treat malaria, anti-microbial activity	Kumar et al. (2019)
3	<i>Acalypha indica</i> (L.)	VITCS02	Euphorbiaceae	Indian Acalypha	Kuppaimeni	Dicot	Leaf	Topical, powder	Treat throat infections, wound healing, snake bites, and migraine, pain relief	Alagesabooopathy (2011)
4	<i>Acanthus ilicifolius</i> (L.)	VITCS03	Acanthaceae	Holy Man-grove	Kaludaimulli	Dicot	Leaf	-	Asthma, diabetes, liver disease, inflammation, and rheumatoid treatments	Kumar et al. (2019)
5	<i>Achyranthes aspera</i> (L.)	VITMN035	Amaranthaceae	Prickly Chaff Flower	Shiru-Kadaldi, Nayuruvi	Dicot	Leaf	Oral, decoction	Anti-microbial, malaria, abortion and anti-tumor	Dhaarani et al. (2018)
6	<i>Aervalanata</i> (L.) Juss. exSchult.	VITMN76	Amaranthaceae	Mountain Knotgrass	Sirru-Pulay-Vayr	Dicot	Stem	Decoction, gargle	Treat inflammation, low sugar in the blood, diabetes, parasitic disease, asthma, and anti-fertility	Dhaarani et al. (2018)
7	<i>Aegiceras corniculatum</i> (L.) Stigma	VITCS04	Primulaceae	River Man-grove	Narikandam	Dicot	Stem	-	Asthma, diabetes, arthritis, and inflammation	Roome et al. (2008)
8	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC	VITCS05	Amaranthaceae	Sessile Joyweed	Ponnanganni	Dicot	Whole plant	Oral	Ulcers, cuts, wounds, headache, hepatitis, and asthma	Natarajan et al. (2013)
9	<i>Albizia saman</i> (F.) Muell.	VITCS06	Fabaceae	Monkey Pod Tree, Sama	Amaivagai, Thoogumoon-jiMararam	Dicot	Bark and leaf	Oral, powder	Stomach cancer, common cold, diarrhea, headache, intestinal ailments, sore throat, stomach ache, and wounds	Kumar et al. (2019)
10	<i>Anacardium occidentale</i> (L.)	VITCS07	Anacardiaceae	Cashew	Mundiri	Dicot	Bark and leaf	Decoction, pastes	Gastrointestinal disorders, mouth ulcers, throat infections, and hypertension	Kumar et al. (2019)
11	<i>Aristida setacea</i> Retz.	VITCS08	Poaceae	Needlegrass	Thodaippam	Monocot	Dry seeds	-	Wound healing	Kumar et al. (2019)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
12	<i>Asparagus racemosus</i> Wild	VITMN065	Asparagaceae	Shatawari	Satarav Or Shatamull	Monocot	Whole plant	Decoction	Used to increase the flow of mother's milk, pain reliever, urinary problems and increase the sexual pleasure	Hills (2010)
13	<i>Avicennia marina</i> (Forsk.) Vierh.	VITCS09	Avicenniaceae	Gray Mangrove	Kanna	Dicot	Leaf	-	Fever and cough	Kumar et al. (2019)
14	<i>Avicennia officinalis</i> (L.)	VITCS10	Acanthaceae	Indian Mangrove	Karunkantal	Dicot	Bark and leaf	-	Pain reliever and cancer activities	Kumar et al. (2019)
15	<i>Azadirachta indica</i> A.Juss	VITMN098	Meliaceae	Neem	VeppaiMaram	Dicot	Whole plant	Oral, decoction, topical, paste	Inflammation, arthritis, ulcer, and urinary problems	Dhaarani et al. (2018)
16	<i>Bauhinia blakeana</i> Dunn	VITCS11	Leguminosae	Hongkong Orchid Tree	Manoari	Dicot	Flowers and bark	Oral, juice	Wound healing, thyroid problem, and anti-tumor	Kumar et al. (2019)
17	<i>Boerhavia coulteri</i> (Hook.f.) S. Wats.	VITCS12	Nyctaginaceae	Coulter's Spiderling	-	Dicot	Flowers and leaf	Oral, decoction	Diabetes and water pills	Kumar et al. (2019)
18	<i>Boerhavia diffusa</i> (L.)	VITCS13	Nyctaginaceae	Red Hogweed	Mukkurtaikoti	Dicot	Leaf	Oral, decoction, juice	Treat stomach and liver problems, gynecological disorders	Dhaarani et al. (2018)
19	<i>Borassus flabellifer</i> (L.)	VITCS14	Arecaceae	Palm	Panai	Monocot	Fruit	Oral, powder	Treat infections of animals with parasitic worms, water pills, wound healing and malaria	Ravikumar et al. (2011)
20	<i>Bougainvillea glabra</i> Choisy.	VITCS15	Nyctaginaceae	Paperflower	Kakitha Poo	Dicot	Stem and leaf	Decoction	Inflammation, diabetes and anti-fertility	Islam et al. (2016)
21	<i>Brugiera cylindrical</i> (Linnaeus) Blume	VITCS16	Rhizophoraceae	BatauPuth	Kaakkandal	Dicot	Roots and flowers	-	Diabetes	Krishnamoorthy et al. (2011)
22	<i>Calotropis gigantea</i> (Ait.) Br.	VITCS17	Asclepiadaceae	Crown Flower	Erukku	Dicot	Stem and leaf	Oral, decoction, topical	Treat asthma, inflammation, panic disorder, and uterus problems	Dhaarani et al. (2018)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
23	<i>Cassipoula thevetia</i> (L.) Lippold	VITCS18	Apocynaceae	Yellow Oleander	Thangaarali	Dicot	Bark and leaf	Decoction, powder, topical	Fever, cough, and throat infections	Kumar et al. (2019)
24	<i>Cassia auriculata</i> (L.)	VITCS19	Fabaceae	Ranawara	Avarampoo	Dicot	Flowers, stem and root	Oral, topical	Skin diseases, liver diseases, and diabetes	Ravikumar et al. (2011)
25	<i>Cassia leptophylla</i> Vogel	VITCS20	Fabaceae	Gold Medalion Tree	Konrai	Dicot	Leaf	Topical	Liver disease, inflammation and ulcer	Hills (2010)
26	<i>Casuarina equisetifolia</i> Forst. & Forst	VITCS21	Casuarinaceae	Coast Sheoak	Savukku	Dicot	Leaf and stem	-		Kumar et al. (2019)
27	<i>Catharanthus roseus</i> (L.)	VITMN014	Apocynaceae	Rose Periwinkle	Nithyakalyaani	Dicot	Flower, stem and leaf	Decoction, topical	Wound healing, pain reliever and maintaining sugars in blood	Dhaarani et al. (2018)
28	<i>Cassia fistula</i> (L.)	VITCS22	Fabaceae	Golden Shower Tree	Sarakondrai	Dicot	Whole plant	Oral, topical	Diabetes, anti-fertility, inflammation and liver disease	Hills (2010)
29	<i>Ceiba pentandra</i> (L.) Gaertn.	VITCS23	Malvaceae	Kapok	Elavam	Dicot	Leaf	Decoction, juice	Diabetics, diarrhea, dysentery, skin diseases, arthritis, painful eye diseases, chronic fever, insect bite	Elumalai et al. (2012)
30	<i>Ceriops decandra</i> (L.)	VITCS24	Rhizophoraceae	Mangrove	ChiruKandal	Dicot	Bar and leaf	-	Diabetes, diarrhea, dysentery	Nabeel et al. (2010)
31	<i>Cissus quadrangularis</i> (L.)	VITCS25	Vitaceae	Veldt grape	Pirandai	Monocot	Stem	Decoction, oral, juice, topical	Gastritis treatment, bone fractures, skin infections, constipation, eye diseases, piles, anemia, asthma, irregular menstruation, burns and wounds	Sukumran & Raj (2010)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
32	<i>Citrullus lanatus</i> (Thumb.) Matsum. & Nakai	VITCS26	Cucurbitaceae	Watermelon	Dharpusani	Dicot	Seed	Decoction	Malaria, inflammation and pain killer	Natarajan et al. (2013)
33	<i>Cleome viscosa</i> (L.)	VITCS27	Cleomeaceae	Tick Weed	Naikkaduku	Dicot	Flowers and seeds	Oral, topical	Pain reliever	Alagesabooopathy (2011)
34	<i>Clitoria ternatea</i> (L.)	VITCS28	Fabaceae	Aparajita	Kokkattan, Sangu Poo	Dicot	Leaf	Decoction, capsules, paste	Inflammation, urinary problems, diabetes, local anesthetic and insecticidal	Divya et al. (2013)
35	<i>Coccinia grandis</i> (L.) Voigt	VITCS29	Cucurbitaceae	Scarlet Gourd	Kovai Kai	Dicot	Fruit, stem and leaf	Oral, topical	Jaundice, diabetes, wound healing, ulcers, stomach ache, skin disease, fever, asthma and cough	Alagesabooopathy (2011)
36	<i>Cocos nucifera</i> (L.)	VITCS30	Arecaceae	Coconut	Tenkay	Monocot	Fruit	Oral, juice, direct consumption, topical	Increase sugar level in blood, liver disease and immunity booster	Ravikumar et al. (2011)
37	<i>Commelina benghalensis</i> (L.)	VITCS31	Commelinaceae	Bengal Dayflower	Kanangkozai	Monocot	Leaf and flowers	Gargle, oral, topical	Mouth thrush, inflammation, mental disease, nose blockage in children,	Kumar et al. (2019)
38	<i>Commelina communis</i> (L.)	VITCS32	Commelinaceae	Asiatic Dayflower	Kanangkozai	Monocot	Leaf	Oral	Anti-inflammatory, anti-bacterial, anti-hyperglycemic, and anti-oxidant effects. Inflammation and diabetes	Kumar et al. (2019)
39	<i>Commelina tuberosa</i> (L.)	VITCS33	Commelinaceae	Dayflower	Kanangkozai	Monocot	Leaf	-	Used as herbicide	Kumar et al. (2019)
40	<i>Cuscuta campestris</i> (L.)	VITCS34	Convolvulaceae	Golden Dodder	Cuscuta	Dicot	Leaf	Oral, topical, paste	Pain reliever, infections of animals with parasitic worms, fever and inflammation	Kumar et al. (2019)
41	<i>Cymodocea serrulata</i> R. Brown	VITCS35	Cymodoceaceae	Sea Grass	Thazhai paasi	Monocot	Whole plant	-	Fever, skin diseases, muscle pains, wounds and stomach problems	Ragupathi Raja Kaman et al. (2013)



TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
42	<i>Cynodon dactylon</i> (L.) Pers	VITMN021	Poaceae	Bermuda Grass	Arugampul	Monocot	Whole plant	Topical	Cough, headache, diarrhea, muscle pain, dysentery, hypertension, snakebite, sores, stones, urogenital disorders, tumors, and warts.	Sukumran & Raj (2010)
43	<i>Cyperus esculentus</i> (L.)	VITCS36	Cyperaceae	Nut Grass	Korai	Monocot	Tubers	Oral, topical	Immunity booster	Ravikumar et al. (2011)
44	<i>Dactyloctenium aegyptium</i> (L.) P. Beauv.	VITCS37	Poaceae	Crowfoot Grass	Puliccan	Monocot	Stems, leaves and seeds	Topical	Stomach problems, constipation and diarrhea	Kumar et al. (2019)
45	<i>Datura metel</i> (L.)	VITMN058	Solanaceae	Devil's Trumpet	Ummattangani/Vella-Ummathai	Dicot	Seeds and leaf	Decoction, powder, capsules, topical	Fever, diarrhea and skin diseases	Ravikumar et al. (2011)
46	<i>Delonix regia</i> (Boj. ex Hook.) Raf.	VITCS38	Fabaceae	Flame Tree, Gulmohar	Semmayir-Konrai,	Dicot	Flowers	Decoction	Inflammation, arthritis, diabetes, anemia, fever, gynecological disorders, pneumonia, wound healing,	Ravikumar et al. (2011)
47	<i>Digitaria sanguinalis</i> (L.)	VITCS39	Poaceae	Hairy Crabgrass	Arispillu	Monocot	Leaf	Decoction	Anti-mutagenicity	Bajo (2017)
48	<i>Echinopsis pachanoi</i> (L.)	VITCS40	Cactaceae	San pedro cactus		Dicot	Stem	Animal medicine	Respiratory disorders, infections of female organs, liver ailments, inflammations, stomach problems and arthritis.	Bussman & Sharon, (2006)
49	<i>Eucalyptus globules</i> Labill.	VITMN047	Magnoliopsida	Blue-Gum	Karpuramaram	Dicot	Stem and leaf	Topical	Inflammation, cancer, and skin diseases	Hills (2010)
50	<i>Euphorbia heterophylla</i> (L.)	VITCS41	Euphorbiaceae	Milkweed	Paalperukki	Dicot	Stem and leaf	Decoction, paste, powder	Laxative, headache, insecticide and ordeal poisons	Hills 2010

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
51	<i>Euphorbia hirta</i> (L.)	VITMN039	Euphorbiaceae	Asthma Plant	Ammaan Pachcharisi	Dicot	Leaf	Latex, paste, oral	Respiratory ailments, worm infestations, dysentery, jaundice, pimples, digestive problems, and tumors.	Dhaarani et al. (2018)
52	<i>Excoecaria agallocha</i> (L.)	VITCS42	Euphorbiaceae	Milky Mangrove	Ampala-Virutcam,	Dicot	Leaf	-	Inflammation, ulcers, diabetes and tumor	Kumar et al. (2019)
53	<i>Ficus benghalensis</i> (L.)	VITCS43	Moraceae	Banyan	Alai	Dicot	Fruit	Oral, decoction	Dysentery, diarrhea, diabetes, menstrual problems, nervous disorders, tonic and skin disease	Hills (2010)
54	<i>Ficus religiosa</i> (L.)	VITCS44	Moraceae	Sacred fig	Arasamaram	Dicot	Leaf	Decoction	Gastrointestinal tract infection, reproductive and respiratory system disorders.	Ravikumar et al. (2011)
55	<i>Gomphrena globosa</i> (L.)	VITCS45	Amaranthaceae	Globe amaranth	Vadamalli	Dicot	Flower	Decoction, paste	Cough, diabetes and hypertension	Kumar et al. (2019)
56	<i>Ipomea pescaprae</i> (L.)	VITCS46	Convolvulaceae	Railroad Vine	Adapukodi	Dicot	Aerial parts of plants	Decoction, topical	Arthritis, inflammation and immunity booster	Dhaarani et al. (2018)
57	<i>Indigofera tinctoria</i> (L.)	VITMN093	Fabaceae	True Indigo	Aviri	Dicot	Leaf	Oral, decoction, topical, gum, paste	Asthma, stomach pain, wounds and snake bites	Ravikumar et al. (2011)
58	<i>Lantana aculeata</i> (L.)	VITMN025	Verbenaceae	Tieberry	Unnichedi	Dicot	Dried flowers and leaf	Decoction	Insecticide	Dhaarani et al. (2018)
59	<i>Lawsonia inermis</i> (L.)	VITCS47	Lythraceae	Henna tree	Maruthani	Dicot	Leaves and whole plant	Decoction, topical	Digestive disorders, reduction of tissue loss in leprosy, diabetic foot disorders and ulcers	Hills (2010)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
60	<i>Leucas aspera</i> (L.)	VITMN006	Lamiaceae	Ceylon slitwort	Thumbai	Dicot	Leaf and fruits	Powder, decoction paste	Reduce fever and treat snake bite	Dhaarani et al. (2018)
61	<i>Lumnitzera racemosa</i> (L.)	VITCS48	Combretaceae	Black Mangrove	Tipparrathai	Dicot	Leaf	Decoction	Strokes and wounds	Kumar et al. (2019)
62	<i>Mangifera indica</i> (L.)	VITCS49	Anacardiaceae	Mango	Mambazham	Dicot	Leaf	Oral, topical	Diabetes, inflammation, muscle spasm, diarrhea, liver disease and gastric problems	Ravikumar et al. (2011)
63	<i>Melita azedarach</i> (L.)	VITCS50	Meliaceae	Chinaberry Tree	MalaiVembu	Dicot	Root and bark	Oral, topical, paste, gum	Pain killers, arthritis, insecticide, diarrhea, water pills and diabetes	Dhaarani et al. (2018)
64	<i>Mentha arvensis</i> (L.)	VITCS51	Lamiaceae	Wild Mint	Kumarakamuli	Dicot	Leaf	Decoction	Kashayam used to prevent microbial diseases	Kumar et al. (2019)
65	<i>Mimosa pudica</i> (L.)	VITMN060	Fabaceae	Touch Me Not	Thottalchungi	Dicot	Fruit, root and leaf	Oral, topical	Inflammation, mental disorders, cholesterol control, malaria, and maintain proper sugar levels in blood	Kumar et al. (2019)
66	<i>Moringa oleifera</i> Lam.	VITCS52	Moringaceae	Drumstick Tree	Murugai	Dicot	Leaf	Oral, topical, paste, gum	Asthma, diabetes, liver disease, inflammation, anti-fertility, allergic and wound healing	Ravikumar et al. (2011)
67	<i>Muktama deraspatana</i> (L.) M. Roem.	VITCS53	Cucurbitaceae	-	Musumusukai	Dicot	Leaf and flowers	Oral	Used for low blood pressure liver disease, ulcers, and local anaesthetic characteristics	Dhaarani et al. (2018)
68	<i>Nerium oleander</i> (L.)	VITMN066	Apocynaceae	Oleander	Arali	Dicot	Leaf and flowers	Topical	Inflammation, stroke, chest pain, radiation burns, hypertension and digestive problems	Kumar et al. (2019)
69	<i>Opuntia dillenii</i> Ker.	VITCS54	Cactaceae	Prickly pear cactus	Chappathikalli	Dicot	Flowers and leaf	Oral, topical	Inflammation, tumor, liver damage and low blood pressure	Ravikumar et al. (2011)
70	<i>Oldenlandia umbellata</i> (L.)	VITCS55	Rubiaceae	Choy Root	ChaayaVer	Dicot	Entire plant	Oral, decoction	Asthma and cough	Kumar et al. (2019)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
71	<i>Pandanus odorifer</i> (Forssk.)	VITCS56	Pandanaceae	Umbrella Tree	Thallampoo	Monocot	Root and flowers	Oral, decoction, topical	Headache, arthritis, muscle spasm, cold, wounds, boils, scabies, skin disease, ulcers, colic, hepatitis, smallpox, lep-rosy, syphilis, and cancer	Dhaarani et al. (2018)
72	<i>Parthenium hysterophorus</i> (L.)	VITCS57	Asteraceae	Congress Grass	Mookkuthi Poo	Dicot	Flower	Decoction	skin diseases, malaria, arthritis, and headache	Kumar et al. (2019)
73	<i>Pergularia daemia</i> (Forssk.) Chiov.	VITCS58	Asclepiadaceae	Trellis-vine	Seenthalkodi	Dicot	Whole plant	Oral, topical	Inflammation, liver damage and fertility problems	Dhaarani et al. (2018)
74	<i>Pemphis acidula</i> J.R.Forst. &G.Forst.	VITCS59	Lythraceae	Pemphis	Cheruthalam	Dicot	Bark	-	Prevents bleeding, regulates menstrual cycle	Taafaki et al. (2006)
75	<i>Phoenix pusilla</i> Roxb.	VITCS60	Arecaceae	Ceylon Date Palm	EechaMaram	Monocot	Leaf	Decoction, paste	Inflammation and diabetes	Kumar et al. (2019)
76	<i>Phyllanthus niruri</i> (L.)	VITMN029	Phyllanthaceae	Stone breaker	Killanelli	Dicot	Leaf	Decoction, juice, gums, paste	Liver diseases	Ravikumar et al. (2011)
77	<i>Polyalthia longifolia</i> Sonn.	VITCS61	Annonaceae	Indian Mast Tree	Netlinkam-Maram	Dicot	Bark and leaf	Powder, decoction	Treat ulcers and low blood pressure	Kumar et al. (2019)
78	<i>Pongamia pinnata</i> (L.) Pierce.	VITCS62	Fabaceae	Indian Beech Tree	Pungai	Dicot	Leaf and root	Decoction, paste	Inflammation and diabetes	Kumar et al. (2019)
79	<i>Portulaca oleracea</i> (L.)	VITCS63	Portulacaceae	Purslane	ParuppuKeerai	Dicot	Leaf	Oral, paste	Headaches, inflammation of the eyes and other organs, burning of the stomach, skin disease, numbness of the teeth, excessive sexual desire, burning fevers, dysentery, eruptions of blood, and snakebites	Kumar et al. (2019)
80	<i>Prosopis juliflora</i> (Sw.)	VITCS64	Fabaceae	Mesquite	SeemaiKaruvelam	Dicot	Leaf	Topical	Pain killer, toothache, asthma and cough	Kumar et al. (2019)
81	<i>Psidium guajava</i> (L.)	VITCS65	Myrtaceae	Guava	Koyya	Dicot	Fruit and leaf	Powder, decoction	Treat to allergy, coughs, diabetes, inflammation	Kumar et al., 2019

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
82	<i>Rhizophora apiculata</i> Blume	VITCS66	Rhizophoraceae	Char	Kaya-Kandel	Dicot	Leaf	Topical, decoction	Inflammation suppressant and tumor	Prabhu & Guruvayoorappan (2012)
83	<i>Rhizophora x lamarckii</i> Montr.	VITCS67	Rhizophoraceae	-	-	Dicot	Leaf, roots and bark	Oral	Diabetes	Sur et al. (2015)
84	<i>Rhizophora mucronata</i> Poir.	VITCS68	Rhizophoraceae	Red Mangrove	Kandal	Dicot	Leaf and bark	Topical	Diabetes and inflammation	Bandaranayake et al. (1998)
85	<i>Ricinus communis</i> (L.)	VITMN046	Euphorbiaceae	Castor-Bean	Amanakkam	Dicot	Seed	Oral, topical	Inflammation, diabetes, larvicide and asthma	Alagesabopathy (2011)
86	<i>Salicornia brachiata</i> Roxb.	VITCS69	Amaranthaceae	Pickleweed	Pavalappundu	Dicot	Whole plant	Oral, decoction	Inflammation, diabetes and asthma	Santhana-Krishnan et al. (2014)
87	<i>Senna auriculata</i> (L.) Roxb.	VITMN085	Caesalpinoideae	Avaram Senna	Avarampoo	Dicot	Root	Oral, decoction, paste, gum	Diabetes and cholesterol control	Kumar et al. (2019)
88	<i>Sida acuta</i> Burm.f.	VITMN086	Malvaceae	Wire weed	Vathathiruppi	Dicot	Leaf	Powder smoked as an insect repellent	Fever, bronchitis, ulcer, diarrhea, dysentery, skin diseases	Divya et al. (2013)
89	<i>Sida rhombifolia</i> (L.)	VITMN045	Malvaceae	Indian Hemp	Karisalanganni	Dicot	Root and leaf	Paste, gum, decoction, powder	Inflammation	Divya et al. (2013)
90	<i>Sida cordifolia</i> (L.)	VITCS70	Malvaceae	Country mallow	kurunthotti	Dicot	Whole plant	Oral, decoction, gargling	Pain killer	Divya et al. (2013)
91	<i>Solanum torvum</i> Sw.	VITMN049	Solanaceae	Eggplant	Sundaikaai	Dicot	Leaf and fruit	-	Inflammation and blood pressure maintenance	Divya et al. (2013)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
92	<i>Solanum nigrum</i> (L.)	VITMN009	Solanaceae	black nightshade	Manathakkali	Dicot	Leaf and fruit	Oral, paste, decoction, topical, gum	Pain, inflammation, fever, water pills, liver damage	Dhaarani et al. (2018)
93	<i>Solanum lycopersicum</i> (L.)	VITCS71	Solanaceae	Tomato	Thakkali	Dicot	Fruit	Oral, food	Stops blood bleeding in injury	Kumar et al. (2019)
94	<i>Solanum Procumbens</i> (L.)	VITCS72	Solanaceae		Tuduvalai	Dicot	Stem and leaf	Oral, topical	To treat liver diseases	Kumar et al. (2019)
95	<i>Spinifex littoreus</i> (Burm.f.) Merr.	VITCS73	rhizophoe	Ravan's Moustache	Ravana-Meesai	Monocot	Whole plant	-	Skin diseases	Thirunavukkarasu et al. (2010)
96	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	VITCS74	Verbenaceae	Blue Porter-weed	Ceemai-Nayuruvi	Dicot	Flower, leaf and stem	Decoction, powder	Inflammation, low blood pressure, diuretic, laxative and sleeping pills	Liew & Yong (2016)
97	<i>Suaeda maritima</i> (L.) Dumort.	VITCS75	Amaranthaceae	Seepweed	Nir-Umari	Dicot	Leaf	Oral	Treat to liver damage	Ravikumar et al. (2011)
98	<i>Syringodium isoetifolium</i> (L.)	VITCS76	Cymodoceaceae	Seagrass	Kadal korai	Monocot	Leaf	Oral, topical	Fever, stomach and muscular pains	Ahila et al. (2016)
99	<i>Tabernaemontana divaricate</i> R.Br. exRoem. &Schult.	VITCS77	Apocynaceae	Pinwheel-flower	Nandiar-Vattai	Dicot	Stem and leaf	Oral, decoction	Pain killer and tumor prevention	Kumar et al. (2019)
100	<i>Tectona grandis</i> (L.)	VITCS78	Verbenaceae	Teak Wood	Tekkumaram	Dicot	Flower and leaf	Oral, topical	Inflammation, pain killer, water pills and low blood pressure	Kumar et al. (2019)
101	<i>Tephrosia purpurea</i> (L.)	VITCS79	Fabaceae	Wild Indigo	KollukkaiVelai	Dicot	Leaf	Oral, decoction	Cough and kidney disorders	Divya et al. (2013)
102	<i>Terminalia catappa</i> (L.)	VITCS80	Combretaceae	Indian Almond	BadhamiMaram	Dicot	Leaf and fruit	Decoction	To protect against liver damage	Sukumran & Raj (2010)
103	<i>Thespesia populnea</i> (L.) Soland. ex Correa	VITCS81	Malvaceae	Indian Tulip Tree	Poovarasu	Dicot	Leaf	Oral, paste, gum, topical	Anti-fertility, inflammation, liver disease and laxative	Ravikumar et al. (2011)

TABLE 1. Cont.

S. No.	Botanical name	Voucher number	Family name	Common name	Vernacular name	Monocot/Dicot	Parts used	Therapeutic method	Traditional uses	References
104	<i>Tinospora cordifolia</i> (L.)	VITCS82	Menispermaceae	Heart-Leaved Moonseed	Shindilakodi	Dicot	Leaf and stem	Oral. Decoction, powder, paste, gum	Diabetes, inflammation, arthritis, allergy, stress, malaria and immunity booster	Divya et al. (2013)
105	<i>Trianthema portulacastrum</i> (L.)	VITCS83	Aizoaceae	Desert Horse Purslane	Sharunmai	Dicot	Leaf and stem	Oral, decoction	Pain killer, stomachic, laxative, blood disease, anemia, inflammation, and night blindness	Kumar et al. (2019)
106	<i>Tribulus terrestris</i> (L.)	VITCS84	Zygophyllaceae	Puncture Vine	Cherunerinche, Nerinji	Dicot	Leaf and stem	Oral, decoction	Water pills, increase sexual pleasure, urinary disorders,	Dhaarani et al. (2018)
107	<i>Tridax procumbens</i> (L.)	VITCS85	Asteraceae	Tridax Daisy	Vettukaaya poondu	Dicot	Leaf	Topical	Diabetes	Dhaarani et al. (2018)
108	<i>Vicia sativa</i> (L.) subsp. <i>nigra</i>	VITCS86	Fabaceae	Garden Vetch	Ananta Muli	Dicot	Leaf	Topical	Skin infections, asthma, urinary diseases, anti-septic, anti-poison, arthritis and fever	Saleem et al. (2014)
109	<i>Vitex negundo</i> (L.)	VITMN066	Lamiaceae	Chinese Chastetree	Nochchi	Dicot	Leaf, stem, and root	Oral, topical, gum, paste, powder, decoction	Dysentery, diarrhea, flatulence, fever, vomiting and	Dhaarani et al. (2018)
110	<i>Xylocarpus mekongensis</i> Pierre	VITCS87	Meliaceae	Mangrove	-	Dicot	Fruit and bark	Oral, decoction	Fever, diarrhea, cholera and inflammation	Akter et al. (2016)
111	<i>Ziziphus jujube</i> (L.) Gaertn.	VITMN077	Rhamnaceae	Jujube	Ilandhai	Dicot	Leaf and fruit	Gum, paste	Induce sleep, inflammation, muscle spasm, prevent pregnancy, low blood pressure and Wound healing	Ravikumar et al. (2011)

### Plant habit distribution

The collected medicinal plants were classified based on their habit (Table 2). Among the total plants, the highest percentage of plants were trees (43%), followed by herbs (33%), shrubs (15%), climbers (6%), and creepers (3%). Similarly, the collected angiosperms were subdivided into psammophytes, mesophytes, seagrass, salt marsh, and mangroves (Fig. 3). Among the dune plants collected, 31% were annuals, and 69% were perennials.

### Ethnopharmacological knowledge

The ethnobotanical survey was conducted with the indigenous people living in the selected study locations. About 72% of the informants were fishermen, 16% were allied with fishing, 7% were non-fishing, and 5% were unemployed (Fig. 4). The ethnopharmacological uses of the collected medicinal plants were categorized based on the information obtained from the fishermen communities living in the coastal regions (Fig. 5 a, b). The major health problems like diabetes, hypertension, snakebite, cholera, jaundice, asthma and minor health issues like insect bites, lesions, backache, fever, cough, wounds, and indigestion were treated using coastal plants (Ramya et al., 2008; Nautiyal et al., 2014). The highest number of plant species was used for treating wounds (22 species), followed by diabetes (17 species) and hypertension (15 species). Similar TEK survey findings show that many such coastal plants have been used to treat skin diseases and various other diseases from the Kanyakumari district only (Kingston et al., 2009; Jenisha & Jeeva, 2014). A recent study on *Aristolochia bracteolata* Lam., located in South Sudan, reported treating malaria without any side effects on long time exposure in local inhabitants (Kadhirvel et al., 2010; Mathew et al., 2021).

Similarly, bioactive compounds like flavonoids, phenolics, alkaloids and terpenes extracted from traditional herbal medicines were found to ameliorate rheumatoid arthritis to a greater extent by associating inflammation as

the primary target (Wang et al., 2021). Most of the informants were above 60 yrs (Fig. 4), which is evident in the dissemination of knowledge of botanicals for ailments vanishing with time from older to younger generations. It could lead to the deterioration of traditional practices are dominancy of allopathic medicinal usage (Navaneethan et al., 2011), which is a severe threat to the scientific and cultural heritage of the coastal population. These studies unwind the significance of coastal plant usage by fishermen communities of the SEI coast.

### Therapeutic application of different plant parts

Generally, more than one plant part is used to prepare various traditional formulations for medicinal purposes (Sen & Bhakat, 2020). The utilization of different parts of the plants collected from the coastal region against multiple diseases is shown in (Fig. 6). It was found that the leaf (70 plants) was the most predominantly used part compared to other plant parts for treating various ailments, followed by the stem (19 plants), flower (17 plants), bark (14 plants), fruit & root (12 plants), seed (6 plants), and whole plants (7 plants). Similarly, Jenisha & Jeeva (2014) reported that leaves (21 plants) were the predominantly used plant part for various treatments in coastal regions of the Kanyakumari district.

Our data shows that coastal regions of Southeast India have well-delineated fisherman communities with their system of traditional usage of plants as medicine.

With the comprehensive information, this study provides a baseline for future phytochemical and pharmacological researchers to determine these sand dunes plants' beneficial and potential medicinal properties. In addition, the herbarium collections of this study will be a stock record for the future reference of psammophytic medicinal plants of SEI. Moreover, this study provides a key step to conserve the TEK of coastal communities and promote coastal plants' conservation strategies.

**TABLE 2. Plant habit distribution**

Exploration	Herbs (%)	Shrubs (%)	Trees (%)	Climbers (%)	Creepers (%)
1	31.7	17.0	45.1	4.8	1.2
2	35.3	13.1	40.4	6.0	5.0
3	31.7	14.0	44.8	6.5	2.8



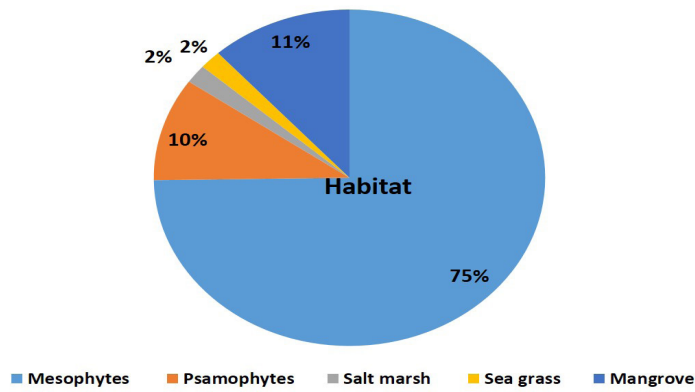


Fig. 3. Plant distribution based on their habitat

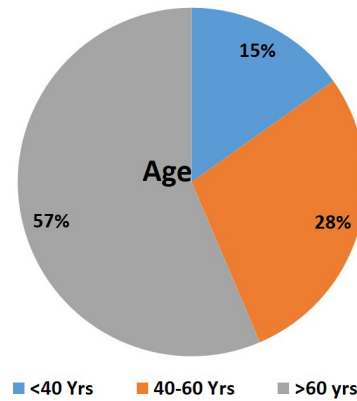


Fig. 4. Age-wise informants detail

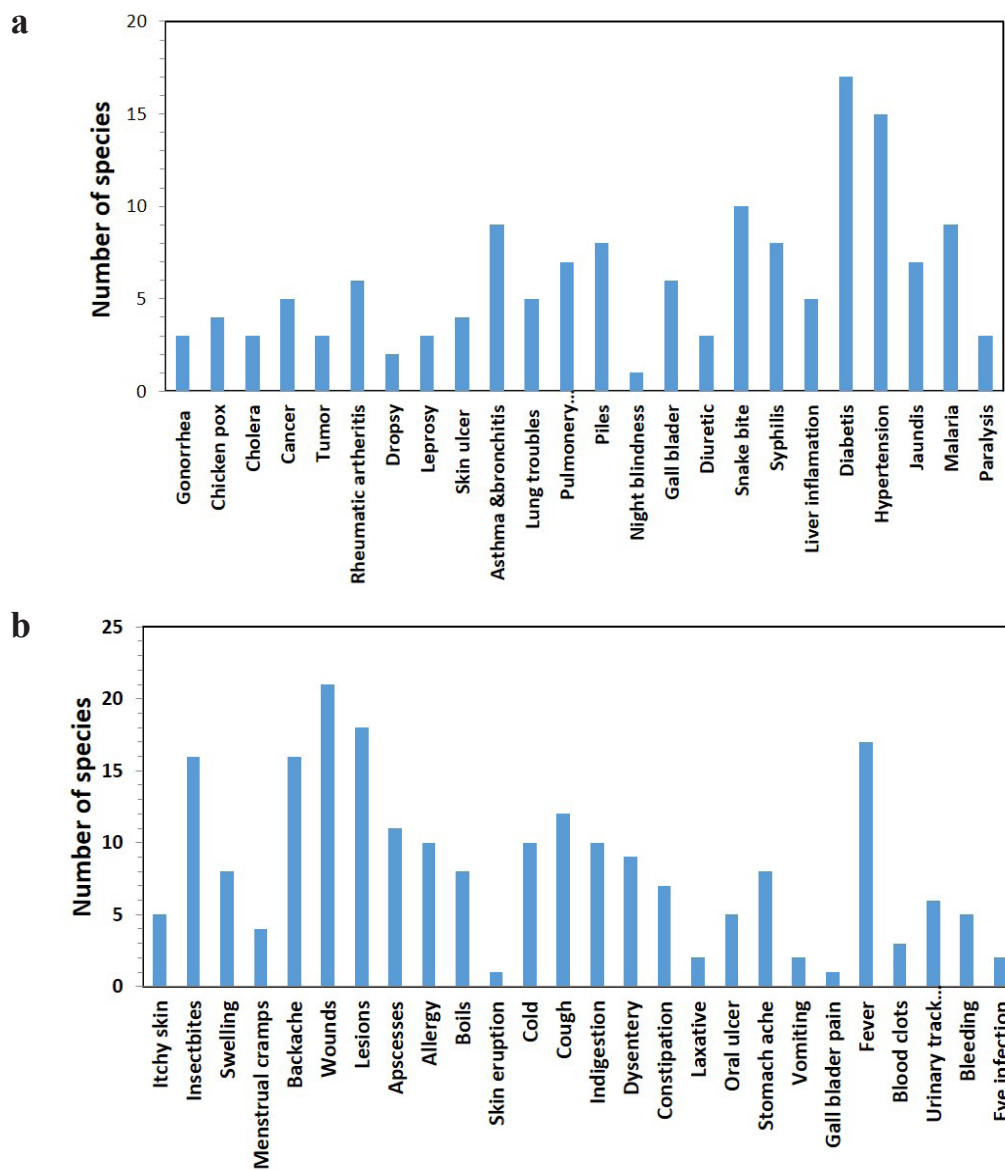


Fig. 5. Traditional ethnobotanical knowledge of coastal fishermen community: a – Major, b - minor .

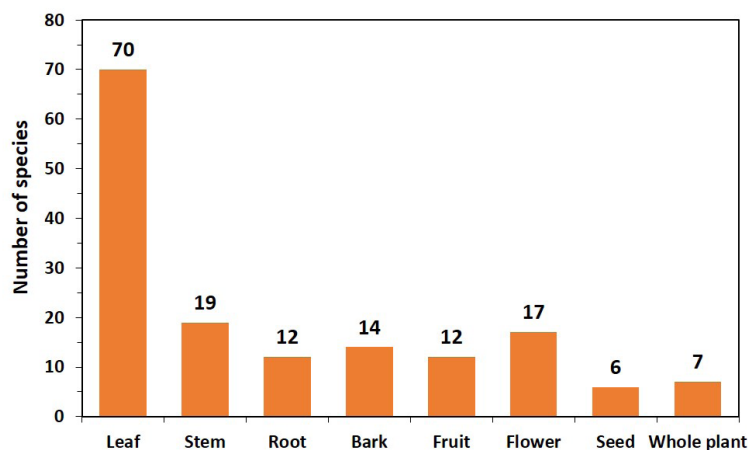


Fig. 6. Medicinal application of different plant parts by the fishermen's community

### Conclusion

This investigation revealed that the sand dunes are rich in diverse medicinal plants with ethnobotanical values. The highest number of species were recorded from the Fabaceae, and herbs were found to be a predominant habit. Additionally, the herbarium prepared from this study will be used in future references to identify and assess coastal floristic diversity. It also provides the base knowledge about the medicinal plants of SEI and TEK of the fishermen's community to initiate the conservation strategies.

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*Authors' contributions:* All the authors are involved in survey, collection of data from the experimental sites. Further contributions as follow, Mariadoss Alphonse, Nagaraj Nallakaruppan, Chandra Veluchamy, Manoj Sekaran, Kanagam Nachiappan are involved in identification of plants and drafting the manuscript. William Raja Tharsius

Raja - identification of plants and reviewing the manuscript. Santosh Adhikari, Radha Navapara, Richa Doshi, Nidhi Sabade - herbarium preparation. Parthipanraja Andandaraj - GPS and analysis the data. And Anantharaman Perumal, Kalaiivani Thiagarajan, Rajasekaran Chandrasekaran - conceptualization, supervised the field work and reviewing the manuscript.

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