Socio-Economic Utility of Coastal Flora Growing in and around Porbandar District of Gujarat

Abstract

Porbandar District, situated on the western coastline of Gujarat, India, boasts a diverse array of coastal flora with potential socio-economic and ecological significance. This study, conducted in 2022, aimed to systematically survey the coastal plant species within the district and compile their documented uses through an extensive review of ethnobotanical literature from various regions. A total of 96 species belonging to 38 families were identified during the survey. The reviewed literature provided valuable insights into the traditional medicinal, agricultural, and socio-cultural applications of these plants, offering a basis for their potential adaptation in the local context. This research highlights the critical role of coastal flora in supporting biodiversity and livelihoods while emphasizing the importance of integrating traditional knowledge into sustainable management practices. The findings serve as a resource for conservation strategies and the promotion of socio-economic development in coastal areas.

Keywords: Coastal flora, Socio-economic utility, Ethnobotanical review, Sustainable management, Biodiversity conservation, Livelihoods, Coastal communities.

Introduction

The state of Gujarat is predominately an arid and semi-arid region and has 1600 km long coastline - longest in the country. Due to geographical positioning and distinct physical and oceanographic characteristics, the coastal tract can be divided into four sub-regions. These includes, (i) Gulf of Kachchh, (ii) Saurashtra coast, (iii) Gulf of Khambhat and (iv) South Gujarat coast. Importantly, out of three Gulfs in the country, two are situated in the Gujarat state.

Coastal resources are an integral part of natural resources. Similarly, coastal zones form part of the coastal environment. A vast segment of the coastal communities heavily depends on the coastal and marine resources and ecosystems for their livelihoods. Coastal ecosystems (e.g., coral reefs, mangroves, and wetlands) are also one of the world's richest storehouses of biological diversity and primary productivity (Maurya, *et al.*, 2022). However, since past several decades, the ecosystems have been threatened by various human activities and development interventions (Pessoa & Lidon, 2013). They are vulnerable to various developmental activities including rapid industrialization and coastal infrastructure expansion projects (like ports, oil terminals etc.) as part of strategic economic development policies (like promotion of Special Economic Zone, Special Investment Region etc) (Maurya, *et al.*, 2022). In direct dependency term, total population of more than one million people in about 550 villages reside along the coast and extract its resources, the coastal ecosystems are under severe pressure threatening the future of these ecosystems (Devi and Pathak, 2016).

This research aims to systematically document the coastal plant species of Porbandar Taluka, Gujarat, and to explore their ethnobotanical uses through a detailed review of existing literature. The study follows a two-step approach: first, compiling a comprehensive list of coastal flora from the region, and second, identifying their traditional uses and applications as

recorded in various sources. By bridging this knowledge with local contexts, the research seeks to highlight the potential utility of these plants for ecological, economic, and societal benefits in the region.

Study site

Porbandar district, situated on the far-reaching Saurashtra coast of Gujarat at 21.6778ºN latitude and 69.8121ºE longitude, experiences an average rainfall of 539.11 mm and an average temperature of 28.31ºC. The district boasts a coastline stretching approximately 90 km. Among its three talukas - Porbandar, Ranavav and Kutiyana - only Porbandar Taluka lies along the coastline. Porbandar Taluka comprises a total of 74 villages, with 23 of them being coastal, accounting for 30% of the taluka's total village count.These 23 coastal villages serve as the primary study sites for this study (Table 1; Fig. 1).

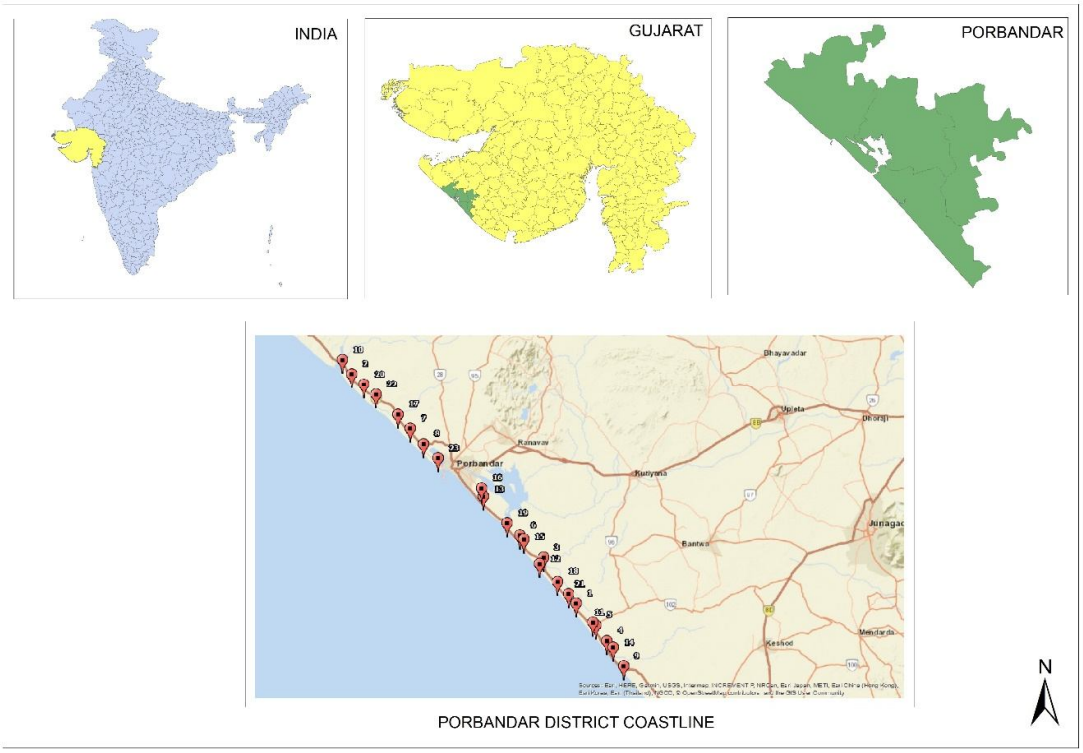

Fig. 1: Study site Map

Table 1: Coastal villages of Porbandar district

No.	Villages	Coordinates	No.	Villages	Coordinates
1.	Balej	21°22'29"N 69°51'42"E	13.	Oddar	21°34'44"N 69°40'15"E
2.	Bhavpara	21°48'46"N 69°24'05"E	14.	Pata	21°17'27"N 69°56'14"E
3.	Chikasa	21°27'45"N 69°47'40"E	15.	Rajpar(/Navagam)	21°29'47"N 69°45'14"E
4.	Chingariya	21°18'12"N 69°55'28"E	16.	Ratanpar	21°35'40"N 69°40'02"E
5.	Gorasar	21°20'00"N 69°54'08"E	17.	Ratdi	21°44'05"N 69°29'46"E
6.	Gosa	21°30'16"N 69°44'46"E	18.	Ratiya	21°24'59"N 69°49'24"E

7.	Kantela	21°42'28"N 69°31'17"E	19.	TukdaGosa	21°31'39"N 69°43'13"E
8.	Kuchhdi	21°40'42"N 69°32'56"E	20.	TukdaMiyani	21°47'33"N 69°25'36"E
9.	Madhavpur	21°15'20"N 69°57'30"E	21.	Untda	21°23'33"N 69°50'45"E
10.	Miyani	21°50'25"N 69°22'57"E	22.	Visavada	21°46'23"N 69°27'06"E
11.	Mocha	21°20'19"N 69°53'45"E	23.	Zavar(/Javar)	21°39'05"N 69°34'45"E
12.	Navi Bandar	21°27'02"N 69°47'13"E	-	-	-

Method

The study focuses on documenting the coastal flora of Porbandar Taluka in Gujarat and analyzing their ethnobotanical significance. Twenty-three villages were selected for the survey (Table 1), chosen for their proximity to the coastline and representation of diverse coastal habitats such as beaches, sand dunes, mangroves, and coastal scrublands. Systematic field surveys were conducted in these habitats, and plant species encountered were carefully identified using the Flora of Gujarat (Shah, 1978) and recorded with both their common and scientific names. Specimens were collected and preserved in the herbarium of the Department of Botany, M. D. Science College, Porbandar, for future reference.

In the second phase, an extensive review of scientific literature, research papers, and relevant publications was undertaken to gather data on the ethnobotanical uses of the documented species. This review focused on their traditional uses, economic value, medicinal properties, and socio-cultural significance, with an aim to identify applications that could be adapted to benefit the local community. The findings were used to develop recommendations for the conservation and sustainable utilization of coastal flora, ensuring their integration into regional development and policy frameworks.

Result & Discussion

Diversity Overview

During the survey, a total of 96 species across 87 genera belonging to 38 families were recorded (Appendix 1; Fig. 3). Notably, Polypetalae demonstrates the highest diversity, comprising 18 families, 52 genera, and 56 species, while Monochlamydae exhibits the lowest diversity, consisting of 3 families, 6 genera, and 6 species (Table 2). Among the recorded species, there were 70 herbaceous plants, 10 shrubs, 8 trees, and 8 climbers (Fig. 2). Dicotyledons show greater diversity with 32 families, 75 genera, and 82 species, compared to monocotyledons with 5 families, 10 genera, and 12 species (Table 2). The ratio of monocots to dicots for families, genera, and species is 1:6.4, 1:7.5, and 1:6.8 respectively.

Table 2: Synoptic analysis of Coastal flora of Porbandar

Class	No. of Families	No. of Genera	No. of Species
(i) Polypetalae	18	52	56
(ii) Gamopetalae	12	19	22
(iii) Monochlamydae	3	6	6
Total Dicotyledons	33	77	84
%	86.84210526	88.50574713	87.5
Total Monocotyledons	5	10	12
%	13.15789474	11.49425287	12.5
Grand Total	38	87	96

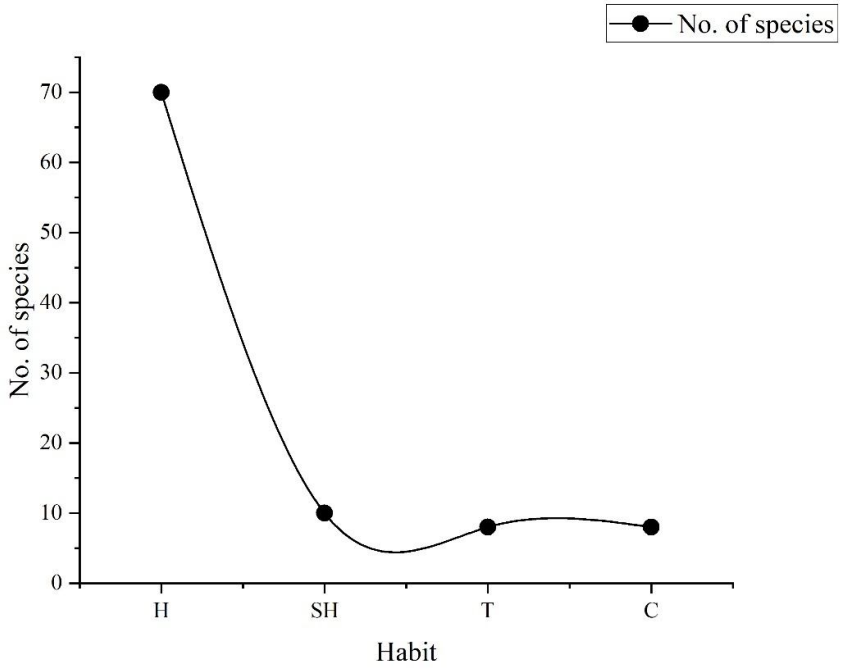

Fig. 2: Habit of Coastal flora

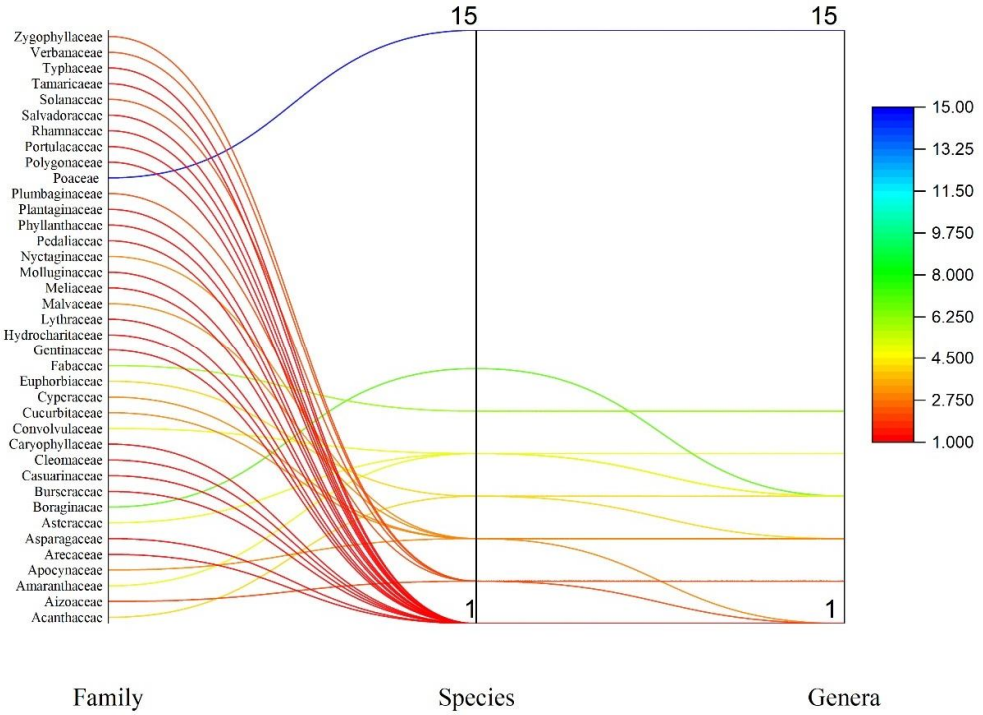

Fig. 3: Distribution of Species and Genera Across Plant Families

Socio-economic Utility Assessment

Traditional uses

The coastal flora of Porbandar District, Gujarat, holds significant ethnobotanical value, deeply embedded in the local customs, livelihoods, and ecological systems of the region. These plant species, extending from the coastal shores to the hinterlands, provide essential resources that support various aspects of community life. The documented 162 uses of these plants have been systematically categorized into 12 distinct functional groups (Fig. 4), reflecting their diverse socio-economic and ecological importance.

In the realm of traditional medicine, coastal flora reigns supreme, with a staggering 86 documented uses and 6 ethnoveterinary applications. This wealth of medicinal knowledge reflects generations of accumulated wisdom, where plants are not just remedies but cultural symbols of health and well-being. Whether it's brewing herbal concoctions to alleviate common ailments or crafting poultices for wound healing, these botanical remedies not only offer relief but also empower communities with self-sufficiency in healthcare.

In the realm of agriculture and animal husbandry, coastal flora demonstrates its versatility with 21 documented uses as fodder. This abundant resource not only sustains livestock populations but also mitigates the impact of erratic weather patterns on rural economies. Additionally, with 18 recorded uses as food, coastal flora contributes to dietary diversity and food security, enriching local cuisines with unique flavours and nutritional benefits. With 6 documented uses in household item making and 2 in ornamental applications, these plants inspire creativity and craftsmanship within local communities.

Furthermore, the ecological importance of coastal flora is underscored by its role as sand binders and dune stabilizers, with 5 documented uses. These plants play a crucial role in preserving coastal ecosystems, mitigating erosion, and safeguarding habitats for diverse flora and fauna. Their presence not only contributes to environmental resilience but also supports industries such as tourism and fisheries, which rely on the health of coastal ecosystems.

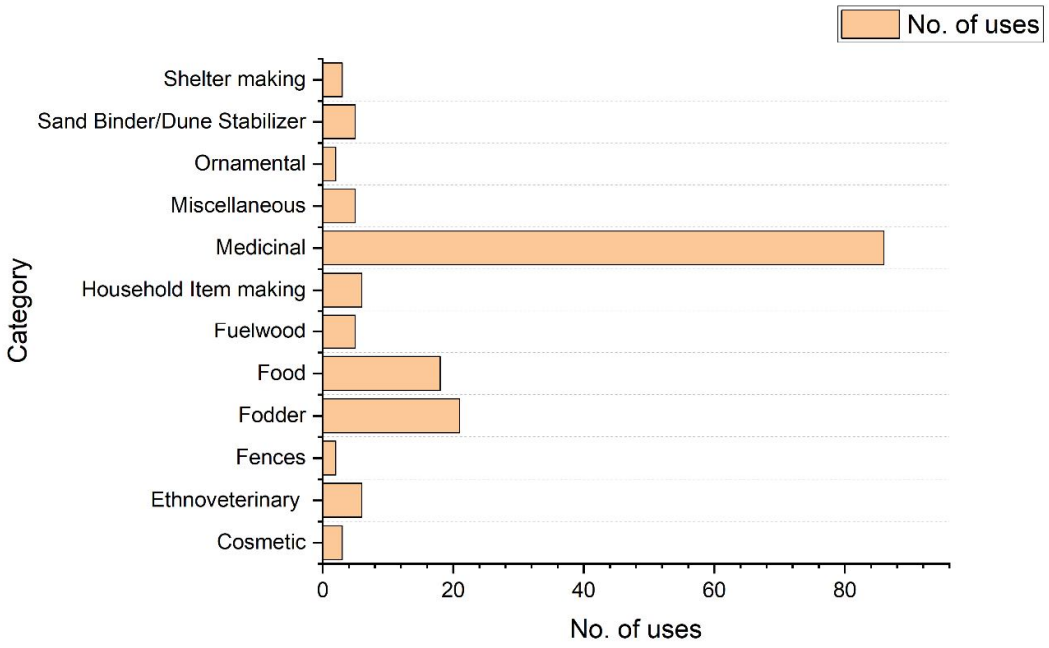

Fig. 4: Categories of utility of coastal flora

Plant part used

The traditional uses of coastal flora a deep understanding of plant biology and utilization, reflecting the ingenuity and knowledge of local communities. An analysis of the parts of plants used in various applications reveals a broad spectrum of utility, emphasizing the versatility and resourcefulness embedded in traditional practices (Fig. 5).

The most frequently utilized part of the plant is the whole plant, which accounts for 54 documented uses. This comprehensive use suggests a holistic approach where multiple parts of the plant contribute synergistically to its applications, maximizing its utility. The use of the whole plant is often seen in traditional medicine, where entire plants are used to create potent remedies, ensuring that all beneficial compounds are harnessed.

Leaves are the second most commonly used part, with 45 recorded uses. The high frequency of leaf use reflects their accessibility and the ease with which they can be harvested without significantly harming the plant. Stems are used in 21 instances, indicating their importance in various applications, from structural uses in construction and crafting household items to their role in traditional medicine. Stems often provide structural support in the form of fencing materials and are also used in making tools and implements. Roots are utilized 14 times. Fruits, with 15 documented uses, are primarily consumed as food but also have applications in traditional medicine and other uses. Seeds are documented 8 times while Flowers, though less commonly used with only 2 recorded instances.

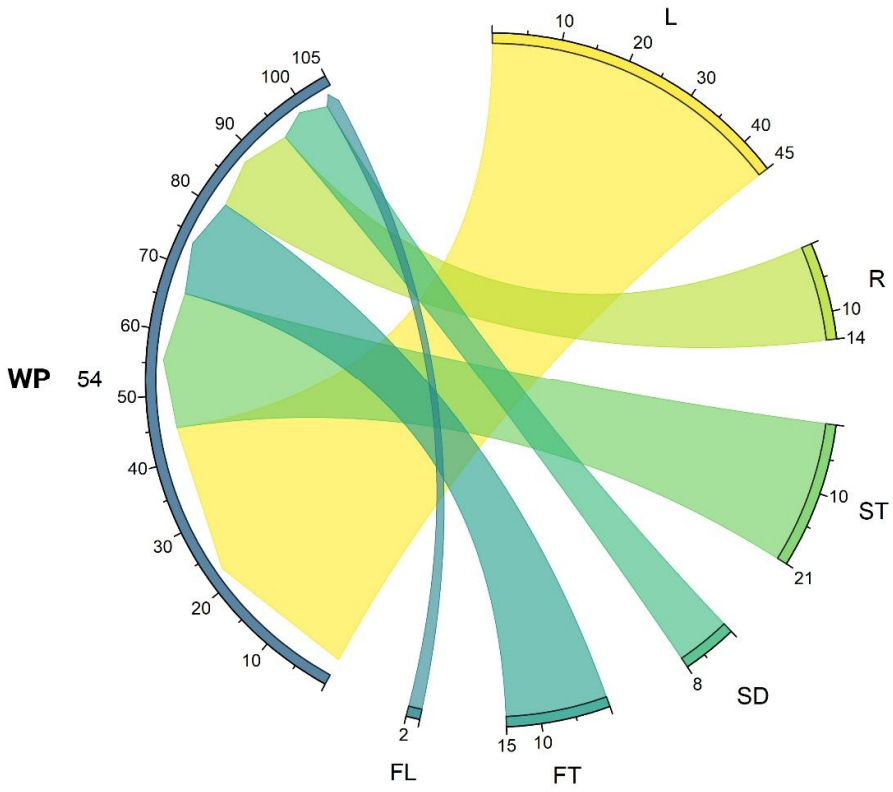

Fig 5: Plant part used

Agriculture

The major crops cultivated in the area include Chickpea (*Cicer arietinum* L.), Sorghum (*Sorghum bicolor* (L.) Moench), Cotton (*Gossypium herbaceum* L.), Groundnut (*Arachis hypogaea* L.), Wheat (*Triticum aestivum* L.), Pearl millet (*Cenchrus americanus* (L.) Morrone) Caster (*Ricinus communis* L.), and Cumin (*Cuminum cyminum* L.).

Ecological significance

Coastal vegetation, including mangroves, salt marshes, and beach grasses, plays a vital role in stabilizing shorelines and preventing erosion (Salm and Clark, 2000). Their extensive root systems bind soil together, reducing the impact of waves, currents, and storm surges, thereby protecting coastal infrastructure and communities from erosion and flooding. Moreover, they provide essential habitats for a diverse range of plant and animal species. For instance, mangroves serve as nurseries for fish, crustaceans, and other marine organisms, while salt marshes support various bird species, amphibians, and small mammals, contributing to coastal biodiversity and ecological functions (Neogi*et al.*, 2017).

Additionally, coastal vegetation, especially mangroves, seagrasses, and salt marshes, efficiently sequester carbon dioxide from the atmosphere (Hilmi *et al.*, 2021). They store substantial amounts of carbon in their biomass and sediments, aiding in mitigating climate change by reducing greenhouse gas emissions and storing carbon in coastal ecosystems. Furthermore, coastal vegetation offers valuable protection against storms, hurricanes, and

tropical cyclones by absorbing wave energy and lessening the impact of storm surges and coastal flooding.

Threats & Conservation

In Porbandar district, coastal flora faces numerous significant threats. Soil theft, often associated with illegal excavation practices, poses a severe menace to coastal vegetation. Unauthorized digging for construction, landscaping, or agricultural purposes disrupts the delicate balance of coastal ecosystems by removing topsoil and sediment layers crucial for plant growth and habitat stability. Mining activities exacerbate the degradation of coastal flora, with sand mining and gravel extraction altering sediment dynamics and destabilizing habitats along coastlines, diminishing vegetation cover and disrupting essential hydrological processes vital for ecosystem survival. Furthermore, the conversion of coastal areas into farmland represents another pressing concern. Recent cases of setting fire for land clearance result not only in the loss of critical habitats such as mangroves and salt marshes but also in the disruption of soil characteristics and vegetation composition, leading to fragmentation and biodiversity loss.

Infrastructure development compounds the threats faced by coastal flora in Porbandar district. Linear projects traverse through coastal ecosystems, fragmenting habitats and disrupting wildlife corridors crucial for plant dispersal and survival (Williams *et al.*, 2018). These developments reduce vegetation cover and exacerbate habitat fragmentation, posing challenges for the long-term viability of coastal plant communities. Additionally, the district is vulnerable to typhoons, which can cause widespread damage to coastal vegetation through strong winds, heavy rainfall, and storm surges, further exacerbating the pressures faced by coastal flora.

Conclusion

This study emphasizes the socio-economic potential of coastal flora in Porbandar District, Gujarat, through a two-step approach of documenting species diversity and analyzing their ethnobotanical uses. A total of 96 species across 38 families were identified, showcasing 162 traditional uses, ranging from medicinal and agricultural applications to craftsmanship. These findings highlight the critical role of coastal flora in supporting local livelihoods and sustaining ecological balance. However, the integrity of these ecosystems faces challenges from anthropogenic pressures and developmental activities.

Conservation efforts and sustainable management strategies, informed by traditional knowledge and supported by community engagement, are essential to protect the socio-economic and ecological values of these species. By leveraging the documented uses of coastal flora, this research provides a foundation for policymakers, researchers, and communities to promote sustainable development, enhance biodiversity conservation, and preserve cultural heritage within Porbandar District and similar coastal regions.

Declarations

List of Abbreviation:

C – Climber, FL – Flower, FT – Fruit, H – Herb, L – Leaf, R – Root, SD – Seed, SH – Shrub, ST – Stem, T – Tree, WP - Whole plant.

Disclaimer (Artificial Intelligence):

Author(s) hereby declare that generative AI technologies, specifically ChatGPT (OpenAI, GPT-4), have been used during the writing or editing of this manuscript. This usage was limited to improving the clarity and fluency of the English language, as English is not the author's first language.

Details of AI usage:

1. ChatGPT (GPT-4) was used for refining grammar, vocabulary, and sentence structure.

2. No content generation or data analysis was conducted using AI; all scientific insights and interpretations are the authors' original work.

3. The input prompts provided to the AI were primarily the text of the manuscript sections for linguistic enhancement only.

Conflict of Interest:

The authors declare no conflict of interest related to this research. There are no financial, personal, or professional relationships that could influence or bias the content of this manuscript.

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Appendix 1: Coastal flora of Porbandar district

Scientific Name	Family	Habit	Vernacular name	Plant part used	Uses	References
Aeluropuslagopoides (L.) Thwaites	Poaceae	H	ખારી ધ્રોકડ(Khari dhrokad)	WP	Paste applied on wounds for Healing and Pain Killing.	Sen andBhakat, 2018
Aervalanata(L.) Juss.	Amaranthaceae	H	ગોરખગાંજો (Gorakhganjo)	L, FL, R	Leaves, flowers and roots crushed in curd and given orally in jaundice.	Odedra, 2009
Alternanthera sessilis (L.) DC.	Amaranthaceae	H	પાણી ની ભાજી (Panini Bhaji)	L	Leaves are used as vegetable.	Modhvadia, 2009
				WP	As fodder for grazing animals.	Modhvadia, 2009
				WP	Whole plant Juice taken for easy digestion.	Sen andBhakat, 2018
				WP	Plants are made into paste and paste is administered as poultice on skin disease.	Chakraborty andDuary, 2014
Ammanniabaccifera L.	Lythraceae	H	જળ આગ્યો (Jal Aagiyo)	WP	Two spoonful decoction of entire plant was taken orally twice a day for a week to cure Gonorrhoea.	Odedra, 2009
				L	Leaf paste applied on skin Itching.	Satapathy *et al.*, 2012
*Aristida funiculata*Trin. &Rupr.	Poaceae	H	ફુસીયુ (Fusiyu)	WP	Fodder	Majeed *et al.*, 2020
Asparagus dumosus Baker	Asparagaceae	SH	દરીયાઇ ગજવેલ (Dariaigajvel)	ST	Rhizome paste is given orally in digestive disorders.	Sen andBhakat, 2018
Avicennia marina (Forssk.) Vierh.	Acanthaceae	T	તવરીયા (Tavariya)	L	Leaves paste applied on sunburns.	Arbiastutie*et al.*, 2021
				L	Leaves are used as fodder in famine.	Odedra, 2009

				ST	Dried branches are used as fuel.	Odedra, 2009
*Azadirachtaindica*A.Juss.	Meliaceae	T	લીંબડો (Limbdo)	L	Leaves are used as a mosquito replant.	Odedra, 2009
				ST	Young branches are chewed to cure tooth ache.	Rani and Sood, 2021
Bacopa monnieri (L.) Wettst.	Plantaginaceae	H		L	Leaves are made into powder and given orally to increase memory power.	Sainuddin*et al.*, 2017
Boerhaviadiffusa L.	Nyctaginaceae	H	નાનો વસેડો (Nano vasedo)	R	Root decoction is used to cure stomach ache.	Patil andBhalsing, 2016
				R	Root decoction is used to cure Jaundice.	Patil andBhalsing, 2016
				L	Leaves are boiled in water and applied on burns.	Odedra, 2009
Boerhaviaerecta L.	Nyctaginaceae	H	ઓરલોગોરલો (Orlogorlo)	WP	Smoke of Plant powdered is used to cure Asthma.	Patil andBhalsing, 2016
				WP	Whole plant decoction to treat convulsions in children	Muzila, 2008
				R	Root paste is rubbed on the skin to ripen abscesses and ulcers	Rameshkumar andRamakritinan, 2013
Boerhaviaplumbaginea Cav.	Nyctaginaceae	H	મોટો વસેડો (Moto vasedo)	R	Root pieces are kept in the mouth to cure mouth ulcers.	Maru and Patel, 2012
				L	Leaves are chewed in scorpion bite.	Bajpai and Ojha,2000
Bolboschoenusmaritimus (L.) Palla	Cyperaceae	H	ચિયો (Chiyo)	ST	Young bulbus after baking in fire can be eaten.	Fairbairn and Weiss, 2009.
Casuarina	Casuarinaceae	T	જુરી (Jhuri)	ST	Dried stem is used as fuel.	Odedra, 2009

equisetifolia L.						
				L	Leaf juice is taken to reduce severe stomach pain.	Hossan*et al.*, 2009
				ST	Bark juice is taken to reduce toothache.	Hossan*et al.*, 2009
Chrozophoraplicata (Vahl) A.Juss. ex Spreng.	Euphorbiaceae	H	કાળો ઓખરાડ (Kalookhrad)	WP	Decoction of whole plant taken orally twice a day to treat coughing & Lower respiratory tract infection	Ali *et al.*, 2023
				WP	Infusion of whole plant is taken orally for Urinogenital Pain.	Madani *et al.*, 2014
				FT	Raw fruits are taken for Male infertility.	Rahim *et al.*, 2023
Chrozophorarottleri (Geiseler) Spreng.	Euphorbiaceae	H	બેઠો ઓખરાડ (Bethookhrad)	FT	Juice of the fruit is given in cases of cough and colds.	Dipankar *et al.*, 2011
Citrullus colocynthis (L.) Schrad.	Cucurbitaceae	C	કોઠીમબડું(Kothimbdu)	FT	A small hall is made in the fruit and the infected finger is inserted into it and kept for 4-5 hours.	Odedra, 2009
				SD	Seed oil apply on hair for blackness.	Meena *et al.*, 2014
				FT	In Arthritis Paste is applied on joints	Modhvadia, 2009
Cleome viscosa L.	Cleomaceae	H	પીલી તલવણી (Pili talavani)	L	Leaves paste is applied externally to cure wounds in cattle.	Odedra, 2009
				L	Leaves used as a vegetable, it is good in taste and is used as a diuretic.	Odedra, 2009
Cocciniagrandis (L.) Voigt	Cucurbitaceae	C	ઘોલું(Gholu)	SD	Seeds consumed in the morning to treat diabetes.	Choudhury *etal.*, 2012
				R	Juice of roots given twice' daily in empty stomach to treat diabetes.	Choudhury *et al.*, 2012
				L	The leaf juice applied on fresh tattoos to avoid infection.	Odedra *et al.*, 2024

Coldeniaprocumbens L.	Boraginaceae	H	ઓખરાડ (Okharad)	L	Leaf extract is applied on knee pain.	Singh and Dutt, 2013
				L	Leaf powder used to improve resistance power in children	Ignacimuthu*et al.*,2008
Commiphorawighthii (Arn.) Bhandari	Burseraceae	SH	ગૂ ગડ(Gugad)	ST	Young branches are used as tooth brushes to cure pyorrhoea.	Odedra, 2009
				FT	10 to12 fruits are taken orally to cure urticaria.	Odedra, 2009
*Convolvulus prostratus*Forssk.	Convolvulaceae	H	શંખાવલી (Sankhavali)	WP	Extract of whole plant is taken orally for month as a brain tonic.	Modhvadia, 2009
Corchorus depressus (L.) Stocks	Malvaceae	H	બહુફળી (Bahuphali)	WP	10-15g plant paste with curd is given orally to cure diarrhoea.	Odedra, 2009
				FT	Fruit powder used for Bladder inflammation.	Bibi *et al.*, 2014
Cressacretica L.	Convolvulaceae	H	પરીયો (Pariyo)	WP	Used as fodder during famine	Odedra, 2009
				R	The dried powder of roots extracted in hot water and is taken as tonic after hardwork.	Prasad *et al.*, 2012
Crotalaria hebecarpa (DC.) Rudd	Fabaceae	H	અડદીયો(Adadiyo)	WP	Used as fodder for livestock and local believe it increases milk production of cattle.	Thaker, 1910
*Cucumis prophetarum*L.	Cucurbitaceae	C	ઇન્દ્રાણું (Indranu)	R	Root paste are applied on insect bite.	Thaker, 1910
				FT	Fruits are great fodder for Horses.	Thaker, 1910
Cymbopogon gidarba(Steud.) A.Camus	Poaceae	H	રૂષ-ઘાસ(Roush-ghas)	WP	Its essential oil is used in making perfumes.	Zhao *et al.*, 2024
Cynodondactylon (L.) Pers.	Poaceae	H	ધ્રોકડ(Dhrokhad)	WP	Whole plant is used as fodder.	Odedra, 2009

				WP	Plant is believed auspicious in Hindu religious.	Odedra, 2009
				WP	Plant extract is mixed with honey and 1 tea spoon of it is given to children for treatment of vomiting.	Chaudhari *et al.*, 2013
*Cyperusconglomeratus*Rottb.	Cyperaceae	H	ખારો ચિયો(Kharochiyo)	WP	In coastal area it is used for landscaping, sand-binder, dune stabilisation, ground cover.	Simpson and Inglis, 2001
Dactylocteniumaegyptium(L.) Willd.	Poaceae	H	ચોકડી(Chokadi)	WP	Used as fodder for livestock.	Thaker, 1910
Desmostachyabipinnata (L.) Stapf	Poaceae	H	ડાભ (Dabh)	L	It is used for rope making.	Odedra, 2009
				L	It is used to make brooms.	Marwat *et al.*, 2012
*Dyerophytumindicum*Kuntze	Plumbaginaceae	SH	લાલ ચિત્રો (Lal chitro)	ST	Paste of young stem applied against scorpion bites.	Gupta and Yadav, 2023
*Echinopsechinatus*Roxb.	Asteraceae	H	ઉત્કંટો (Utkanto)	L, ST, FL	All the aerial parts of the plant are cut into small pieces and mixed with the other cattle fodder, which help in increase in the fat percentage of the milk.	Odedra *et al.*, 2024
Echiochilonpauciflorum (Stocks) Långström&M. W.Chase	Boraginaceae	H	કારવાસ (Karvas)	ST	Decoction made of stem bark is helpful in digestive disorder.	Sen andBhakat, 2018
				WP	Whole plant decoction is given twice a day for Haemorrhoids.	Jadeja *et al.*, 2006
				WP	Whole plant including root are used as fodder during famine.	Thaker, 1910
Enicostemaaxill	Gentianaceae	H	મામેજવો	L	Powder of dry leaves taken orally twice a	Odedra, 2009

are (Poir. ex Lam.) A.Raynal			(Mamejvo)		day for a week to cure fever.	
*Euphorbia heyneana*Spreng.	Euphorbiaceae	H	દુધલી (Dudhli)	WP	Infusion of Whole plant made with Garlic and Pepper given orally to cure Leukorrhea.	Ratnam and Raju, 2005
Evolvulusalsinoides L.	Convolvulaceae	H	કાળી શંખાવલી(Kali Sankhavali)	WP	Powdered plant (2-5 g) given once a day for 15 days as a tonic.	Odedra, 2009
				L	The leaves are made into cigarettes and smoked in chronic bronchitis and asthma.	Singh, 2008
Fimbristylisbisumbellata(Forssk.) Bubani	Cyperaceae	H	ચિયો (Chiyo)	ST	The dug-out rhizomes are burned, and the roots are removed and given to cattle in famine conditions.	Odedra, 2009
				WP	The plant is stacked in compact bundles and tied to make the thatch work of cattle shelter roof.	Odedra, 2009
Glinuslotoides L.	Molluginaceae	H	મીઠો ઓખરાડ (MithoOkhrad)	L	The tender leaves are consumed as vegetable.	Mallick *et al*., 2020
Halopyrummucronatum (L.) Stapf	Poaceae	H	કાંસડો (Kansado)	R	Root Decoction is effective against Skin diseases.	Sen andBhakat, 2018
				WP	They are effective as due stabilizers.	Khan *et al*., 1999
Halosarciaindica(Willd.) Paul G.Wilson	Amaranthaceae	H	ભોલડો(Bholdo)	WP	Food	Accogli*et al*., 2023
				WP	As ornamental plant in fish tanks.	Accogli*et al*., 2023
Helichrysumcutchicum *(C.B.Clarke) R.S.Rao& Deshp.*	Asteraceae	H	કાડો ફુલવો(KadoFulvo)	WP	The entire plant is boiled in water, and its vapor is used for relieving fever.	Thaker, 1910

*Heliotropiumbacciferum*Forssk.	Boraginaceae	H	હાથીસું ઢી (Hathisundhi)	L	Traditional use in herbal remedies for various ailments, including skin conditions, wounds, or respiratory issues.	Al-Qudah M. A, and Al-Jaber H. I. 2011
				FT	Extraction of juices or oils for therapeutic benefits. Use in treating skin conditions, digestive issues, or as general tonics.	Al-Qudah M. A, and Al-Jaber H. I. 2011
				R	Harvesting, drying, and grinding into powders or decoctions, having diuretic, anti-inflammatory, or analgesic properties.	Al-Qudah M. A, and Al-Jaber H. I. 2011
				SD	Occasional use in herbal formulations or preparations.	Al-Qudah M. A, and Al-Jaber H. I. 2011
Heliotropiumcurassavicum L.	Boraginaceae	H	હાથીસું ઢી (Hathisundhi)	R	Root paste are applied on boils.	Qureshi and Bhatti, 2008
Heliotropiumsupinum L.	Boraginaceae	H	હાથીસું ઢી (Hathisundhi)	WP	Mixture of pulped plant with water is useful against Tumours.	SchmelzerandGurib-Fakim, 2008
*Heliotropiumzeylanicum*Lam.	Boraginaceae	H	હાથીસું ઢી (Hathisundhi)	WP	Whole plant crushed in paste and applied on Scorpion bite.	Mownika *et al.*, 2022
*Indigoferaoblongifolia*Forssk.	Fabaceae	SH	ગળી (Gali)	ST	Twigs are used to make broom.	Odedra, 2009
				L	10-12 leaves chewed in mouth and applied on the neck of bullock to cure suffering from a neck sore.	Odedra, 2009
				L	Its leaves are grazed by goats, sheep and camels	Singh *et al.*, 2022
*Ipomoea aquatica*Forssk.	Convolvulaceae	C	નાડાવેલ (Nada Vel)	L	Leaves are used as vegetable.	Odedra, 2009
				WP	Ipomoea aquatica is also fodder for chickens, ducks, pigs, fish and cattle.	Austin, 2007
Ipomoea pes-caprae(L.) R.Br.	Convolvulaceae	C	દિપડ વેલ(DipadVel)	WP	Plant grown nearby hut to prepare live roof.	Odedra, 2009

					It is sand dune stabilizer.	Thaker, 1910
Jatropha gossypiifolia L.	Euphorbiaceae	SH	નેપારો (Neparo)	WP	It is grown on cropland boundaries as a field fence and prevents soil erosion.	Odedra, 2009
				L	Pounded leaves applied locally on Boils.	Ong and Nordiana, 1999
*Lantana indica*Roxb.	Verbenaceae	SH	ધાણીદારીયા(Dhanidariya)	L	Leaf paste are applied on wounds of cattle until cured.	Thaker, 1910
				FT	The juice of fruit is black hence sometime used as ink.	Thaker, 1910
Launaeasarmentosa (Willd.) Kuntze	Asteraceae	H	ભોપાત્રી (Bhopatri)	L	Leaf decoction is taken internally to get relief from fever.	Sathishpandiyane *t al.*, 2014
*Lepidagathisbandraensis*Blatt.	Acanthaceae	H	હરણચરો(Harancharo)	SD	Seeds are used to make cooling drink.	Saini, 2008
Limonium stocksii(Boiss.) Kuntze	Plumbaginaceae	H	ચિત્રક(Chitrak)	L	Leaf juice given orally during stomach ache.	Perveen *et al.*, 2024
Lotus garcinii Ser.	Fabaceae	H	મોટો ભાંખો (MohtoBhankho)	WP	As fodder for Goats, sheep and Cattles.	Thaker, 1910
				WP	The whole plant was burned, and the ashes were mixed into groundnut oil, which was then applied to the wounds of the animal until it was healed.	Thaker, 1910
Lyciumeuropaeum L.	Solanaceae	SH	કાગ મહેંદી(Kaag Mehndi)	L	Leaves are used as vegetable.	Thaker, 1910
				F	Fruits are edible.	Thaker, 1910
Najas marina L.	Hydrocharitaceae	H	લેખરી (Lekhri)	WP	Young plant can be eaten raw.	Tanaka and Nakao, 1976

Neltumajuliflora (Sw.) Raf.	Fabaceae	T	ગાંડો બાવળ (Gandobaval)	ST	Dried stem used as firewood.	Prasad and Tewari, 2016
				WP	Dune Stabilizer	Prasad and Tewari, 2016
Oxystelma esculentum (L.f.) Sm.	Apocynaceae	C	જળ દુધી (Jaldudhi)	L	Leaves are crushed and juice to cure jaundice.	Venkatesan, 2019
				FT	Fruits juice is orally taken by adults to rescue muscle pain.	Venkatesan, 2019
Parkinsonia aculeata L.	Fabaceae	T	પરદેસી બાવળ (Pardeshibaval)	WP	It is grown on outskirt of field as a live fence.	Odedra, 2009
				ST	Dried stem is used as fuel.	Odedra, 2009
				F	Dried pods are eaten.	Odedra, 2009
Paspalum distichum L.	Poaceae	H	વેલારી ધ્રોકડ(Velaridhrokad)	WP	Whole plants in dried and the cut into small pieces and used as a fodder for livestock.	Thaker, 1910
Pedalium murex L.	Pedaliaceae	H	ઉભુ ગોખરુ(UbhuGokharu)	R	The powdered roots are also taken with water as tonic for 7-8 days to calm body heat.	Patel *et al.*, 2011
				SD	Sweet prepared from the seeds are given to patients suffering from joint pain	Patel *et al.*, 2011
Pergulariadaemia (Forssk.) Chiov.	Apocynaceae	C	ચમાર દૂધલી (Chamardudheli)	FL	10-20 flowers are taken along with table salt twice a day to remove cough.	Odedra, 2009
Phoenix dactylifera L.	Arecaceae	T	ખજુરી (Khajuri)	FT	Fruits are edible and highly nutritive.	Sadeghi andKuhestani, 2014
				SD	Seeds are used for animal feeds such as cattle, sheep, camel, and poultry industries	Sadeghi andKuhestani, 2014

Phragmites karka (Retz.) Trin. ex Steud.	Poaceae	H	નાલી (Nali)	ST	Making mats and baskets.	Maisha *et al.*, 2024
				FL	Young Inflorescence bundled together to make brooms.	Maisha *et al.*, 2024
Phyla nodiflora (L.) Greene	Verbenaceae	H	રતવેલીયો (Ratveliyo)	WP	Whole plant is given orally twice a day to cure urinary complains.	Modhvadia, 2009
				L	Leaves Extract used to cure common cold	Roy, 2015
Phyllanthus niruri L.	Phyllanthaceae	H	ભોય આમલી(BhoyAamli)	R	Root decoction given twice a day in Jaundice.	Thaker, 1910
Polycarpaea spicata Wight ex Arn.	Caryophyllaceae	H	વજ્રદંતી (Vajradanti)	L	Leaves were made into a paste and applied to the toothache.	Thaker, 1910
Polygonum plebeium R.Br.	Polygonaceae	H	રાતો લાણો (Ratolano)	L, ST	Tender leaves and shoots are eaten as vegetable.	Pegu *et al.*, 2013
				WP	Plant extract is tonic and used to cure bowel complaints.	Amjad *et al.*, 2017
Portulaca oleracea L.	Portulacaceae	H	મોટી લુણી (Moti luni)	L	Fresh leaves are used as vegetable.	Odedra, 2009
				L	The pest of leaves made with milk applied over pimples.	Odedra, 2009
Rostellulariadiffusa (Willd.) Nees	Acanthaceae	H	કાળો અરડુસો (KaloArduso)	L	The 2-3 leaves are boiled in water with turmeric powder and given in fever 3 times a day.	Thaker, 1910
*Ruelliapatula*Salzm. Ex Ness	Acanthaceae	H	જં ગલી ફટાકડી (JungliFatakdi)	L	The infusion of the fresh leaves is applied to the ear ache.	Jagtap *et al.*, 2022
				WP	The whole plant is dried in the shade and made into powder. 10 gm of powder three times a day once for Snake bite and	GobbiandKatrahalli, 2023

					Scorpion sting	
Salvadora persica L.	Salvadoraceae	T	મીઠી પીલુ (Mithi Pilu)	FT	Ripe fruits are eaten.	Odedra, 2009
				ST	Twigs are used as truth brushes.	Odedra, 2009
Senegaliasenegal (L.) Britton	Fabaceae	T	ગોરડ (Gorad)	ST	Dried branches are used to prepare fencing to the croplands.	Odedra, 2009
Setariageminata (Forssk.) Veldkamp	Poaceae	H	મોટો સામો(Moto Samo)	WP	Wild pasture for livestock	Odedra, 2009
Sidacordifolia L.	Malvaceae	H	બલા (Bala)	R	Roots given orally twice a day for 5 days for urinary troubles.	Odedra, 2009
Solanum virginianum L.	Solanaceae	H	ભોંયરિંગણી (Bhoyringni)	SD	Dry seed powder applied on teeth ache.	Rajalakshmi *et al.*, 2019
				L	Dry leaf powder taken orally for 15 days in cough.	Rajalakshmi *et al.*, 2019
Sporobolusdiandrus (Retz.) P.Beauv.	Poaceae	H	વેલારીમરમર (Velarimermer)	WP	It is good fodder for cattle.	Sarwar *et al.*, 2018
*Suaedavermiculata*Forssk. ex J.F.Gmel.	Amaranthaceae	H	લાણો (Lano)	L	It can be eaten raw or can be cooked as vegetable.	Öztürk *et al.*, 2014
Suaedanudiflora (L.) Dumort.	Amaranthaceae	H	લાણો (Lano)	L	Leaves made into ointment used to treat wounds.	Pullaiah *et al.*, 2016
				WP	Fodder	Ishnava*et al.*, 2011
*Tamarixericoides*Rottler	Tamaricaceae	SH	પ્રાંસ(Prans)	ST	Wood is used to prepare cattle shed.	Odedra, 2009
				ST	Dried branches are used as fuel.	Odedra, 2009
*Tetrapogonvillosus*Desf.	Poaceae	H	લાસોલાંપડો (Lasolampdo)	WP	As a fodder for Livestock	Thaker, 1910
*Tragus mongolorum*Oh	Poaceae	H	વાંદરીયુ(Vandariyu)	WP	As a fodder for Livestock	Thaker, 1910

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Trianthema triquetra Willd. ex Spreng.	Aizoaceae	H	સાટોડી(Satodi)	WP	Paste made from whole plant to treat swellings associated with rheumatism.	Saqib et al., 2021
*Trianthemaportulacastrum*L.	Aizoaceae	H	સાટોડો(Satodo)	L	Leaves are used as vegetable.	Gaddeyyaand Kumar, 2016
Tribulus terrestris L.	Zygophyllaceae	H	બેઠુ ગોખરુ(Bethugokharu)	FT	A cup of decoction of fruits, taken orally for seven days disintegrates the kidney stone.	Odedra, 2009
				FT	Dry fruit powder is mixed with the other millet flour to make breads.	Thaker, 1910
Trichodesmaindicum(L.) Lehm.	Boraginaceae	H	ઉંધા ફૂલી (Undhafuli)	WP	Paste made up of whole plant applied on Snake bite.	Thaker, 1910
				WP	Plant paste is applied on cattle wounds.	Odedra, 2009
Tridaxprocumbens L.	Asteraceae	H	ઘાબુ રી(Ghaburi)	L	Paste of leaves is applied over fresh cuts to stop bleeding.	Odedra, 2009
				L	Its leaf decoctions were known to treat infectious skin diseases	Ghosh *et al.*, 2019
Triumfettarotundifolia Lam.	Malvaceae	SH	ઝિપ્ટો (Zipto)	ST	Stem is used as brooms.	Odedra, 2009
				ST	The woody clump is preserved by the pipe smokers as a very efficient pipe cleaner.	Odedra, 2009
*Typha elephantina*Roxb.	Typhaceae	H	પન્ની (Panni)	SD	Seeds are boiled in milk and eaten as desert.	Maisha *et al.*, 2024
Urochloaramosa (L.) T.Q.Nguyen	Poaceae	H	કારીયુ (Kariyu)	WP	As a fodder for Livestock	Thaker, 1910
Vincetoxicumspirale(Forssk.) D.Z.Li	Apocynaceae	C	સીંગરોટી (Singroti)	L	Leaf pastes applied wounds for healing.	Rahim *et al.*, 2023
				L	Leaves infusion used as Blood purifier.	Shah *et al.*, 2019

Xanthium strumarium L.	Asteraceae	H	ગાડરિયું (Gadariyu)	L	Young leaves crushed on palm and mixed with a pinch of table salt and put into the root of tooth for a while to relieve the pain.	Islam *et al*., 2009
				R	Root paste is mixed with a pinch of table salt and is applied to the affected Skin disease area twice daily	Islam *et al*., 2009
Ziziphusnummularia (Burm.f.) Wight &Arn.	Rhamnaceae	SH	બોરડી(Bordi)	FT	Ripe fruit are eaten.	Odedra, 2009
				ST	Dry branches are used as field fencing.	Odedra, 2009
Zoysia matrella (L.) Merr.	Poaceae	H	ખારી ધ્રોકડ(Khari Dhrokad)	WP	Can be grown as lawn grass.	Sarwar *et al*., 2018
Zygophyllumcreticum (L.) Christenh. & Byng	Zygophyllaceae	H	જવાસો (Javaso)	WP	The whole pant is crushed and boiled with water. This water is used for bath to relieve the patient from itching.	Odedra, 2009
				L	Leaves are used as Camel Feed	Rashid and Marwat, 2006