



Floristic Account Of North Gujarat Special Reference To Patan District: A Review

Mehul Sadhu¹, Jaivin Patel², Bharat Maitreya³

1. Master of botany, Department of botany, USSC, Gujarat University, Ahmedabad, Gujarat.
2. Research Scholar, Department of Botany, USSC. Gujarat University, Ahmedabad, Gujarat.
3. Professor, Department of botany, USSC, Gujarat University, Ahmedabad, Gujarat.

ABSTRACT

Biodiversity underlies ecosystem shape and function, which are extremely valuable because to the life-sustaining functions they provide. Biodiversity contributes significantly to the improvement of human life quality. The research focuses on native Angiosperm species found in the Patan district. The current study offers a variety of plant species with economic potential and distribution that may be found in Patan's seven talukas and neighbouring areas. Patan is a historically significant location. It is historically significant in so many ways. Vachhada bet, an oasis-like land located in the tiny desert of Kutch, is the heroic land where Vachharaj Solanki breathed his last breath.

It is located in the state of Gujarat's northern area. The findings revealed that almost every species is economically useful in some way, such as food, lumber, textiles, pharmaceuticals, dye, oil, and gum producing, and so on. Plant variety enriches from the dry zone to the district's urban regions, and tree species distribution indicates numerous commercially important types of trees in this semi-arid to desert type of terrain.

KEY WORDS: Biodiversity, Patan, North Gujarat, Gujarat, India

INTRODUCTION

The living and non-living elements of the planet are exceedingly diverse. The world's diversity of non-living creatures includes everything from the smallest atom to the most massive element. The world's biological diversity includes everything from germs, bacteria, and viruses to the world's largest and most powerful creatures and plants. Everything has been disseminated and classified with care, taking into account its structure, habitat, functions, and roles, among other things. Plants, in instance, have a great deal of diversity and are found all over the world. Biodiversity refers to the total number of different types of life on the planet. It comprises both freshwater and marine species. Ecological complexities, genetic variants, diversity within species, and diversity between species and ecosystems are also included.

India is one of the most diversified countries in terms of physiology and biology. The continent of India serves as the drainage basin for 14 major river systems and a slew of minor ones. Although India is largely tropical, altitude variations and other habitat characteristics have resulted in a variety of climates influencing its ecology, vegetation, and fauna. There are also significant disparities in the states' growth patterns and other socioeconomic and demographic features. The Western Himalayas, Eastern Himalayas, Assam and North-east, Gangetic lowlands, Indus plain region, Deccan, Malabar, and Andamans are the eight distinct floristic zones of India.

Gujarat's angiosperm flora is mostly diverse in terms of extent and composition. There are 2198 higher plant species, divided into 902 genera and 155 families. In Gujarat, 1808 plant species are listed in the flora [Shah G. L, 1978]. Although this list is incomplete, it represents 12.91 percent of the country's flora.

Northern tropical thorn forests include Saurashtra, Kutch, and North Gujarat, as well as the Little and Great Ranns of Kutch (LRK and GRK) and Banni. Dang, Gir-Girnar, Sabarkantha, and Panchmahals are examples of southern tropical dry deciduous forests. Dang, Valsad, and Sura are three South Indian moist deciduous forests. Kutch, Jamnagar, Bhavnagar, Bharuch, and Surat have swamp woods or tidal forests.

Patan is well-known for its "Rani Ki Vav" world heritage site and Patola sarees. Patan's splendour was at its height during the Solanki times, Gujarat's golden age [Snehal R. Thakor, *et al.*, 2019]. Angiosperm is the largest and most diverse category of flowering plants in the kingdom Plantae, with over 300,000 species. Angiosperms account for approximately 80% of all currently known green plants [Priyanka Chaudhari, *et al.*, 2019]. For the first time, Saxton and [Sedgwick, 1918] conducted a floristic survey in the North Gujarat area [Hitesh M. Patel, 2015]. Gujarat's Patan district is located in the semi-arid and desert zones. This area supports natural semi-arid to desert ecosystems with naturally lower forest cover that are generally intact and home to native species and communities. These ecosystems continue to be underrepresented [Dipika H. Rathod, *et al.*, 2012].

Biodiversity of India

The diversity of trees is essential for increasing the biodiversity of tropical woods, as trees provide resources and conditions for virtually all remaining woodland species. As a result, the great majority of tropical timberland plant variety inventories have focused on trees. The range of tree flavours in the tropical rainforest varies greatly from one location to the next, owing to differences in biogeography, environment, and stress.

Large landforms and a diverse range of climatic conditions, such as high mountains, have been gifted upon India. high altitude woodlands, riverine deltas Peninsular plateaus are a diverse geological structure with temperatures ranging from arctic cold to tropical hot, as well as rainfall varying from extreme aridity to thousands of centimetres. This results in a significant deal of variety on the ground, including open valleys, rolling upland, plains, marshes, and deserts [Mehta, 2001].

[Sabnis and Rao, 1983] published a book on India's uncommon and endangered plants. Tree variety in sacred groves of Jaintia hills in Meghalaya, Northeast India, was studied by [Laws et al., 2010]. He investigated into the mystical grooves of the Jaintila hills in northeast India. In a 0.5 ha plot in the Ialong sacred grove, 738 individuals belonging to 82 species, 59 genera, and 39 families were identified, whereas the same area in the Raliang sacred grove had 469 individuals belonging to 80 species, 62 genera, and 41 families.

[Kumar *et al.*, 2006] investigated the phytosociological properties and diversity patterns of tropical forest tree species in the Garo Hills of western Meghalaya, Northeast India. Primary forests (PFs), secondary forests (SFs), and sal (*Shorea robusta*) plantations made up the region's principal vegetation, with 162, 132, and 87 tree species, respectively. The Shannon–Wiener diversity index of trees in PF was 4.27 (n = 21 one-ha belt-transects), similar to the richest tropical forests on the world. Primary forests have more tree diversity and diversity than secondary forests or Sal plantations, according to statistical findings.

[Chavda, N. H., and S. K Mehta, 2015] investigate compacts containing 128 species of trees and shrubs from 44 families, all of which are listed along with their scientific names, vernacular names, families, and types. There are 42 dicotyledon families and two monocotyledon families among those 42. Mimosaceae (14 species), Caesalpiniaceae (12 species), and Euphorbiaceae were the most dominant families (08species).

[Sultana *et al.*, 2014] Tree diversity reached 69 species, with the Digota site hosting the most families (19), genera (25), and species (36). Mimosaceae (7 genera and 15 species) was the most diverse family across all sites. Shannon diversity (2.44) and species heterogeneity (2.23) were highest for the Ramgarh site, while species richness and diversity (3.62 & 5.55) were highest for the Digota site. The only species with regular distribution were *Cassia fistula*, *Butea monosperma*, and *Ehretia laevis*, while all others had random or contagious distribution.

[Yadav S.R. and Sardesai M. M., 2002] studied flowering plants in the Kolhapur district. A total of 2227 species, 5 subspecies, and 30 varieties of flowering plants belonging to 1023 genera and 182 families have been recorded for the district, with 149 families belonging to dicots and 33 families belonging to monocots. Subhramanyam K. (1962) reported floristic diversity of aquatic angiosperms of 117 taxa belonging to 32 families, 30 of which are dicotyledons and two of which are monocots.

[Hubbard c. e, 1954] illustrated 152 grass species from 620 genera. [Dr. A. K. Mukharjee, 1984] listed 778 species from 452 genera and 101 families. In addition, data on forest types, phytogeographical analysis, and statistical analysis of India's Panchmarhi and Bori Reserves are provided. [Pandey R. P et.al., 2009] identified 455 vascular plant species classified into 247 genera and 74 families. Aside from that, there are 39 rare, threatened, and endemic taxa at Narayan sarovar wildlife sanctuary, as well as important economic plants of bioperspective nature, a list of 13 cultivated plants and their 14 wild relatives, and a list of 13 cultivated plants and their 14 wild relatives.

Biodiversity of Gujrat

[Parabia, 1974] with emphasis on cyperaceae of Gujarat, with a total of 59 Gujarat plant species. [Gopal, 1983] published ethnobotanical studies and identified 722 ethnobotanical plant species. [Umadevi, 1988] studied the medicinal plants of Gujarat and discovered 745 plants with medicinal properties. [Asari, 2000] conducted research on the biodiversity of the Gujarat Forest. [Joshi, 1987] investigated rare and endangered plants in Gujarat. [Desai, 1992] reported on new Gujarat flora records. [Bedi and Sabnis, 1983] studied the ethnobotany of Dadra and Nagar Haveli. [Desai, 2003] investigated Gujarat's biodiversity, with a focus on protected areas.

[Gibson, 1838] collected specimens from Gujarat and had a thorough understanding of the region's vegetation, as evidenced by his comprehensive outline of Gujarat's province. "Grasslands of Gujarat State" was researched and published by [Ansari and Rao, 1961]. [Patel, 1965] researched Gujarat grasses. Gujarat's flora was enhanced by [Ahuja and Pataskar, 1970]. Gujarat's mangroves were examined by [Kothari and Rao, 2001]. New plant records from Gujarat were published by [Parmar and Shrivastava, 2003]. [Meena, 2004,2005,2007] published a series of studies, I, II, and III, on several new plants to Gujarat, as well as two new Fimbristylis records for Gujarat. [Patel, 2013] made a critical study on the climbing plants of Gujarat and made 28 new records for Gujarat state. [Sahni and Naithani, 1976] described *Cyperus dwarkensis*. [Shetty and Pandey, 1992] described *Tamarix kutchensis*. [Parmar, 2008] described a new variety *Hygrophila schulli* var. *alba* from Gujarat. [Desai and Raole, 2008] described three new species viz *Desmostachya pingalaiae*, (2011) *Ischaemum sayajiraoi*, (2012) *Spodiopogon aristatus*. [Shah, 1978] for the first time brought out the Flora of Gujarat encompassing of 153 families, 788 genera, 1580 species, 124 varieties and 14 subspecies. [Raghavan *et al.*, 1981] from BSI of India published A checklist of a new plants of Gujarat, enlisting of 155 families, 861 genera, 1964 species, and 87 varieties.

Central Gujarat

Flowering plants of Ahmedabad have been studied earlier by [Saxton and Sedgwick, 1918], [Gandhi, 1958], [Vaidya and Vora, 1963], and [Vaidya, 1967]. References of the occurrence of the flowering plants at Ahmedabad are also found in the work of [Hooker, 1897], [Cooke, 1901, 1958], [Talbot, 1902, 1949], [Blatter and McCann, 1935] and [Shah, 1963]. [Gandhi, 1958] reported 809 species of flowering plants (including cultivated species) from Ahmedabad and surroundings; however, species of the families, Cyperaceae and Gramineae have not been described. [Vaidya, 1967] has worked out flora of Ahmedabad excluding the cultivated plants. [Sedgwick, 1914] also listed Grasses of Ahmedabad and Surat. [Pandya, 1972] studied flowering plants of Gujarat university campus. [Vidya and Vora, 1964] recorded new forms from Ahmedabad. [Gandhi, 1958] made plant collection in Ahmedabad and its vicinity. [Vaidya, 1967] published an account on the flora of Ahmedabad.

[Anjaria, 2002] studied the flora of the Anand district, with a focus on tree species. [Thaker, 1974] described floristic and ethnobotanical studies on the Kawant range forest in his thesis, identifying 38 ethnobotanical species of interest. [Desai, 2002] studied the floristic diversity and ethnobotany of the forest division of Chhotaudaipur. In his study on the floristic and phytosociology of the Chhotaudaipur forest division, [Karatela, 1973] found a total of 103 Leguminosae species and 123 uncommon plants. The flora and plants of Chhotaudaipur and Kawant were studied by Thaker et al. (1970-1971). [Oza, 1962] focused on the flora of Pavagadh at Panchmahal. In his publication on the flora of Ratanmahal and its environs, [Bedi, 1968] recorded a total of 640 plant species. [Deshpandey, 1968] studied the Tuwa panchmahal district's flora and discovered 29 uncommon species. [Pandya, 1995] investigated common property management of bioresources in the Jambughoda wildlife sanctuary. In his Ph.D. thesis, [Bhatt, 1975] described the floristic and photosociology of the Panchmahal district, analysed several communities, and discovered 81 new plant species. Pavagadh's flora has been expanded, according to [Bedi, 1968]. In the Panchmahal forest, [Vora and George, 1987] studied a variety of living species. Pavagadh's flora was published by [Chavan and Oza, 1966]. Pavagadh hills were surveyed by [Bedi *et al.*, 1972]. The flora and plants of the Ratanmahal hills were studied by [Bedi, 1973]. [Sabnis, 1996] studied the flora of Baroda and its environs, including a description of the cyperaceae of Gujarat, which included 69 species. [Patil, 1980] studied the urban vegetation of Baroda and discovered 57 plants that were thought to be extinct, as well as 16 new records. [Patil and Sabnis, 1982] discovered new Baroda plants. [Pathak and Oza, 1959] investigated some valuable weeds in Baroda and the surrounding area, as well as [Pavagadh and Padate, 1971] created a collection in the taluka of Salvi.

Saurashtra

[Dangar, 2000] conducted a survey of Saurashtra's biodiversity. [Shah and Menon, 1980] investigated Saurashtra's flora and biological spectrum. Plants from the Saurashtra coast were studied by [Rao and Korlahali, 1966]. [Bole and Pathak, 1988] found 750 plant species belonging to 335 genera in Saurashtra, ranging from the Asteraceae to the Poaceae family. [Menon, 1979] investigated Saurashtra's phytosociology and identified a total of 1090 plant species. [Chavan, 1957] have worked on flora and

fauna of Gir forest and reported total 330 plant species. [Chavan, 1993] worked on flora and fauna of Gir forest and reported total 330 plant species. [Murthy, 1957] have worked on biological spectrum of Bhavnagar. [Oza, 1991] studied the flora of Bhavnagar. [Mehta, 1997] has studied flora of Palitana. [Ahluwalia, 1965] studied the medicinal plants of Jamnagar. [Malhotra and Wadhwa, 1973] from BSI explored Jamnagar district and gave a list of 785 taxa. [Nagar, 2000] has worked on biodiversity of Barda hills. [Nagar *et al.*, 2003] published a book on floristic biodiversity of Barda hills and its surroundings. [Thaker, 1987] has worked on flora of Rajkot.

South Gujarat

[Joshi, 1983] carried a floristic and phytosociological survey of the forest in South Gujarat, with a focus on medicinal plants. [Yadav, 1979] conducted floristic and phytosociological research in certain districts of South Gujarat. [Prasad, 1989] carried ecological research in the South Gujarat deciduous forest habitat. Desai and Raole studied the sedges and grasses of south Gujarat from 2008 to 2013, making numerous new Gujarat Grasses discoveries.

[Joshi, 1980] studied the flora of Surat and its environs and discovered nine new plant records. While researching the flora of Surat, [Mac, 1982] concluded that 35 plant species are medicinally important, and 5 plants have been added to the flora of Surat. [Vashi, 1985] identified 183 Leguminosae plant species in his thesis on floristic phytosociology and ethnobotany of the Umarpada forest. [Patel, 1971] studied flora of Bulsar and its environs and reported total 705 plant species with 191 plant species as cultivated. [Patel, 1972] worked on flora of Parnera hills Pardi and Udvada areas and noted total 44 rare plants in the areas. [Vora, 1980] in his thesis on Dharampur identified 151 Plants species of ethnobotanical interest and 11 plant species as addition to the flora of south Gujarat. [Contractor, 1986] in his thesis on floristic phytosociology and ethnobotany studies of Vapi and Umargaon forest noted total 122 plants species of Leguminosae and 83 plants species as ethnobotanical interest. [Reddy, 1987] studied flora of Dharampur and noted that total 281 plant species are of ethnobotanical interest and 12 plant species are additions to the flora of Dharampur.

[Reddy, 1987] studied flora of Dharampur and noted that total 281 plant species are of ethnobotanical interest and 12 plant species are additions to the flora of Dharampur.

Shoolpaneshwar Wildlife Sanctuary was worked on by [Pradeepkumar, 1998]. [Vyas, 1974] studied the floristic and phytosociology of the Narmada River. [Bhatt, *et al.*, 1971] conducted a survey of the Rajpipla Gora range. Shoolpaneshwar Wildlife Sanctuary's tree diversity was studied by [Pradeepkumar and Prathapasenan, 2001]. [Suryanarayan, 1969] noted 65 plant species, 30 uncommon plants, and 10 ethnobotanical plants in his thesis on the flora of Dang Forest. [Rao, 1989] conducted research on the ecological features of the Dang Forest.

North Gujarat

[Bharti, 1959] explored some parts of North Gujarat. [Saxton and Sedgwick, 1918] gave an account of plants of North Gujarat records. This study discusses the vegetation and flora of the Khedbrahma region of north Gujarat, as well as preliminary data based on a two-year survey. There were 554 species identified, with 448 dicotyledons and 102 monocotyledons. [R. P. Bhatt, *et al.*, 1969].

[Rao, 1981] worked in Kutch's south eastern region, noting 12 new records from 30 different areas. [Bhatt, 1993] studied the flora of western Kutch and discovered 14 new records. Kutch flora and phytochemistry were reported by [Rao and Sabnis, 1981]. The flora of the Barda hills has been studied by [Inderji Thaker, 1910]. "Plants of Kutch and their Utility" was published by [Thaker, 1926]. The Kutch has been investigated by [Bhandari, 1965]. [Raole, 1993] studied endangered and endemic desert taxa of Kutch. [Yogi, 1970] described the flora of north Gujarat (Mahudi, Mehsana district) in his Ph.D. thesis, noting a total of 132 poaceae species, 61 ethnobotanical species, and 13 uncommon plants. More plants from the Khedbrahma region in North Gujarat were documented by [Shah and Yogi, 1971]. [Panjani, 1997] noted ethnobotanical studies on tribals in the Sabarkantha district. [Patel, 2002] studied the Danta Forest in North Gujarat for floristic and ethnobotanical studies. During study of Patan district recorded 396 angiosperm plant species belong to 288 genus and 82 families [N.K.Patel And A.J.Parmar, 2011]. this study area of Sarva village, Patan taluka, Gujarat. Total of 72 species of 66 genera and 37 angiosperm families and 1 Gymnosperm families were recorded for the first time during present survey conducted in from the study area [Priyanka Chaudhari, 2019]. The species come under 30 genera, 33 species and 22 families. Sacred groves (SGs) are forest patches conserved by the local people intertwined with their socio-cultural and religious practices [H.M. Patel And N.K. Patel, 2017].

Conclusion

After so many exploration Authors still has managed to report about 2555 species in Gujarat state. North Gujarat is unique due to its ecosystem diversity. It has unique little ran of Kutch region near to Patan. Wetland formation in Sami Taluka, Cultivation land specialy for Cumin and chickpea in Patan district, unique grassland ecosystem in Sidhpur Taluka. It has lots of potential for diversity exploration. Sami and Radhanpur Taluka reports very less study in floristics.

Future scope

- More exploration for floristic account.
- Reinvestigation of reported plant species in North Gujarat.
- Geotagging of Rare and endangered species for their conservation
- Ecosystem and niche modelling for different species.
- Availability of medicinal plants in North Gujarat.
- Threats to biodiversity of North Gujarat.

REFERENCES:

- Agnarsson, I., & Kuntner, M. (2007). Taxonomy in a changing world: seeking solutions for a science in crisis. *Systematic Biology*, 56(3), 531-539.
- Ahluwalia, K. S. KS 1964-1965. *Medicinal Plants of Jamnagar*, 1, 73-74.
- Ahuja, K. K., & Pataskar, R. D. (1970). Additions to the Flora of Gujarat. *Indian forester*, 96(8), 629-630.
- Anjaria, K. B. (2002). Floristic studies of Anand district.
- Ansari, M. Y., & Rao, R. S. (1961). Grasslands of Gujarat State. *Proc. Second annual sess. Acad. Agri. Sci*, 97-100.
- Baroda, V. Kolhapur, for confirming the identity of species; Dr. P M. Padhye, Jt. Director, BSI, Jodhpur.
- Bentham, G., & Hooker, J. D. 1862–1883. *Genera plantarum*, 3 vols. A. Black, London.
- Bhatt, J. B. (1993). Studies on the flora of Western Kachchh.
- Bhatt, R. P., Sabnis, S. D., & Bedi, S. J. (1969). A contribution to the study of the vegetation and flora of Khedbrahma region of North Gujarat. *Nelumbo-The Bulletin of the Botanical Survey of India*, 11(3-4), 311-321.
- Bole, P. V., & Pathak, J. M. (1988). Flora of Saurashtra, Part 3. *Flora of India ser*, 2, 347-484.
- Chaudhari, P., Faneja, S., Gamit, T., Taral, S., Makawa, R., & Maheshvari, S. (2019). 4. Study Of Flora Of Sarva Vilage, Patan (North Gujarat) By Priyanka Chaudhari, Shivani Faneja, Tejasvi Gamit, Sejal Taral, Rinku Makawana And Shreya Maheshvari. *Life Sciences Leaflets*, 110, 41-To.
- Chavan, S. A. (1993). Vegetational and wildlife studies in Gir forest.
- Chavda, N. H., & Mehta, S. K. (2015). Study of species diversity of trees and shrubs in Bhandaria Forest Area, District–Bhavnagar, Gujarat. *International Journal of Pure & Applied Bioscience*, 3, 356-361.
- Cook, T. (1958). Flora of the Presidency of Bombay. I, II & III. London. *Botanical Survey of India, reprinted*.
- Desai, R. J., & Raole, V. M. (2012). *Spodiopogon aristatus*, a new species of Poaceae from Gujarat, India. *Kew Bulletin*, 67(1), 103-107.
- Dubois, A. (2003). The relationships between taxonomy and conservation biology in the century of extinctions. *Comptes rendus biologies*, 326, 9-21.
- Gandhi, H. P. (1958). Freshwater diatoms from Kolhapur and its immediate environs. *Journal of the Bombay Natural History Society*, 55, 493-511.
- Gibson, J. R. (1982). Smallpox on the Northwest Coast, 1835-1838. *BC Studies: The British Columbian Quarterly*, (56), 61-81.
- Golding, J. S., & Timberlake, J. (2003). How taxonomists can bridge the gap between taxonomy and conservation science. *Conservation Biology*, 17(4), 1177-1178.

- Gopal, G. V. 1983. Ethnobotanical studies in the forest areas of some parts of Gujarat.
- Hubbard, C. E. (1954). Grasses. A guide to their structure, identification, uses, and distribution in the British Isles. *Grasses. A guide to their structure, identification, uses, and distribution in the British Isles*.
- Joshi, P. N. Ecology and Conservation Of Rare, Endangered And Threatened Plants In Kachchh District, Gujarat, India.
- Joshi, V. (1983). Rehabilitation of submerging villages (Sardar Sarovar Narmada project): General report. Surat: Centre for Social Studies.
- Karatela, Y. Y. A contribution to the floristics and phytosociology of the Chhotardepur forest division in Gujarat state volume I. Malhotra, S. K., & Wadhwa, B. M. (1973). Studies on the Botany of Jamnagar district (Gujarat). *Maharashtra Vidnyan Mandir Patrika*. Shah, G. L., & Deshpande, M. B. (1969). A Contribution to the Flora of Tuva in Panchmahal District Gujarat. *Nelumbo-The Bulletin of the Botanical Survey of India*, 11(3-4), 277-285.
- Kothari, M. J., & Rao, K. M. (2001). Mangroves of Gujarat. *Nelumbo*, 43(1-4), 83-150.
- Kumar, P., Singh, C. K., Saraswat, C., Mishra, B., & Sharma, T. (2017). Evaluation of aqueous geochemistry of fluoride enriched groundwater: a case study of the Patan district, Gujarat, Western India. *Water Science*, 31(2), 215-229.
- Kumar, V., & Desai, B. S. Biodiversity And Phytosociological Analysis Of Plants Around The Chikhali Taluka, Navsari District, Gujarat, India.
- Lawrence, G. H. (1953). Cultivar, Distinguished from Variety. *Baileya*, 1, 19-20.
- Lynch, D., Laws, K. R., & McKenna, P. J. (2010). Cognitive behavioural therapy for major psychiatric disorder: does it really work? A meta-analytical review of well-controlled trials. *Psychological medicine*, 40(1), 9-24.
- Mahabale, T. S. (1948). Prothalli of *Ceratopteris thalictroides*. *Botanical Gazette*, 109(3), 349-354.
- Malhotra, S. K., & Wadhwa, B. M. (1973). Studies on the Botany of Jamnagar district (Gujarat). *Maharashtra Vidnyan Mandir Patrika*.
- Mehta, K. K. (1997). The impact of religious beliefs and practices on aging: A cross-cultural comparison. *Journal of Aging Studies*, 11(2), 101-114.
- Mehta, K. P. (2001). Reducing the environmental impact of concrete. *Concrete international*, 23(10), 61-66.
- More, P. G. (1972). A contribution to the flora of Parnera hills Pardi and Udwarda area in south Gujarat. Kumar, P., Singh, C. K., Saraswat, C., Mishra, B., & Sharma, T. (2017). Evaluation of aqueous geochemistry of fluoride enriched groundwater: a case study of the Patan district, Gujarat, Western India. *Water Science*, 31(2), 215-229.
- Murthy, M. H. S. (1957). The vegetation of Bhavnagar and its biological spectrum. *Vidya. J. Guj. Univ*, 1, 42-46.

- Nagar, P. S. (2000). *Biodiversity of the Barda Hills* (Doctoral dissertation, Ph. D. thesis, Saurashtra University, Rajkot).
- Oza, R. A. (1991). *Taxonomical and Ecological study of the flora of and around Bhavnagar* (Doctoral dissertation, Ph D Thesis, Bhavnagar University, Bhavnagar).
- Panchal, B. V., Gorakha, M. H., Chaudhary, J. S., & Parekh, A. P. (2018). 5. A Contribution To The Flora Of Patan Taluka (North Gujarat) By Baldev V. Panchal, Mukesh H. Gorakha, Jyotsna S. Chaudhary And Aarti P. Parekh. *Life Sciences Leaflets*, 96, 18-To.
- Pandey, R. P., Singh, V., & Parmar, P. J. (2009). Phytodiversity of the Narayan Sarovar Wildlife Sanctuary, Kachchh, Gujarat, India. *Nelumbo*, 51, 41-98.
- Pandya, S. M. (1972). Flowering plants of the Gujarat University campus and its surrounding (Ahmedabad). *Vidya. Jour. Guj. Univ*, 12, 21-48.
- Parabia, M. H. (1974). A contribution to the cyperaceae of Gujarat state floristics trichomes glume anatomy and palynology part I.
- Parmar PJ, A new variety of *Hygrophila schulli* (Hamilton) M.R. Almeida & S.M. Almeida from Gujarat, India. *Journal of Economic and Txonomic Botany* 32(2008): 149-150.
- Parmar, P. J., & Shrivastava, A. (2003). Some new plant records from Saurashtra (Gujarat State). *Ind. J. For*, 26.
- Patel, H. M., & Patel, N. K. (2017). 8. Sacred and Medicinal Plant Diversity Of Patan Sacred Grove Of Patan District (Ng) By Hm Patel And Nk Patel. *Life Sciences Leaflets*, 92, 50-To.
- Patel, H. M., & Patel, N. K. (2017). 8. Sacred and Medicinal Plant Diversity Of Patan Sacred Grove Of Patan District (Ng) By Hm Patel And Nk Patel. *Life Sciences Leaflets*, 92, 50-To.V
- Patel, K. C. (2002). *Floristic and Ethnobotanical studies on Danta Forest of North Gujarat, India* (Doctoral dissertation, Ph. D thesis submitted to Sardar Patel university, Vallabh vidyanagar, Gujarat, India).
- Patel, N. K., & Parmar, A. J. (2011). 5. Study Of Angiospermic Plants Of Patan (North Gujarat) By Nk Patel And Aj Parmar. *Life Sciences Leaflets*, 14, 472-To.
- Patel, R. (2013). *Ethnobotanical Study Of Jhalod Taluka Of Dahod District Gujarat India*.
- Patel, R. J. (1971). Epidermal structure and ontogeny of stomata in some Dioscoreaceae and Taccaceae. *Flora*, 160(6), 562-E2.
- Patil, N. B. (1980). Aurva: A Mythical Form of Fire Motif in the Mahabharata. *Journal of the Oriental Institute Baroda*, 30(1-2), 13-19.
- Pradeepkumar, V. K., Rajadurai, V. S., & Tan, K. W. (1998). Congenital candidiasis: varied presentations. *Journal of Perinatology*, 18(4), 311-316.
- Raghavan, R. S., Wadhwa, B. M., Ansari, M. Y., & Rao, R. S. (1981). checklist of the plants of Gujarat. *Records-Botanical Survey of India*.
- Ram, H. K., & Goswami, H. K. (2016). Survival Strategies Among Species In Nature. Ii: Invasive Species In And Around Pachmarhi Biosphere. *Bionature*, 53-69.

- Ramaley, F. (1918). Vegetation of Northern Bombay.
- Rao, K. S. S., & Sabnis, S. D. (1981). The Flora of Kutch-Floristics and Phytochemistry. *Nelumbo*, 23(1-2), 46-50.
- Rao, K. S. S., & Sabnis, S. D. (1981). The Flora of Kutch-Floristics and Phytochemistry. *Nelumbo*, 23(1-2), 46-50.
- Raole, V. M. (1993). Studies on endangered and endemic desert taxa.
- Reddy, A. S. (1987). *Flora of Dharampur Forest Part 1 & 2* (Doctoral dissertation, PH. D. Thesis, Department of biosciences, SP University, VallabhVidyanagar, Gujarat-INDIA).
- Sabnis, S. D., & Bedi, S. J. (1983). Ethnobotanical studies in Dadra-Nagar Haveli and Daman. *Indian journal of forestry*.
- Sabnis, S. D., & Rao, K. S. S. (1983). Observation on some rare and endangered endemics of south eastern Kachchh. *Assessment of Threatened plants of India.(eds.) SK Jain and RR Rao. Botanical Survey of India, Howrah, 71-77.*
- Sahni, K. C., & Naithani, H. B. (1976). A New Species of Cyperus from India. *Indian Forester*, 102(6), 357-359.
- Saxton, W. T., & SEDGWICK, L. G. (1918). Plants of north Gujarat. *Rec. Bot. Surv. India*, 6(7), 207-323.
- Sedgwick, L. J. 1914. A List of Grasses from Ahmedabad and Surat. J. Bombay
- Shah, G. L. (1978). Flora of Gujarat state.
- Shah, G. L., & Yogi, D. V. (1971). Some more plants from Khedbrahma region, North Gujarat. *Nelumbo*, 13(3-4), 282-284.
- SHAH, G., YADAV, S., & MENON, A. (1981). BÚLL. BOT. SURV. INDIA. *Bulletin*, 23, 25.
- Subramanian, K. S. (1962). Progress report on the geological mapping of the Talcher Coalfield, Orissa. *Unpublished Report, Geological Survey of India.*
- Thaker, D. N. Floristic and ethnobotanical studies on Kawant range forests in central Gujarat Volume 2.
- Thaker, J. I. (1926). Plants of Kutch and their utility. *Rajkot, 200pp.*
- Umadevi, A. J. (1988). *Identification and status survey of medicinal plants of Gujarat* (Doctoral dissertation, Ph. D. Thesis. South Gujarat University, Surat, Gujarat).
- Vaidya, B. S. (1967). Flora of Ahmedabad. *Gujarat University, Ahmedabad.*
- Vaidya, R. M., & Mazumdar, B. N. (1967). Studies on serum iron, serum copper and normal hemoglobin iron levels in healthy medical students. *Indian Journal of Medical Sciences*, 21(4), 232-9.
- Vora, A. B., & George, V. C. (1987). The distribution of various life forms in the ground flora under different canopies of Panchamahar forests: Gujarat, India. *Indian Journal of Forestry*, 10, 223-225.

- Vora, H. A Contribution To The Flora Of Dharampur Kaprada And Nana_Pondha Ranges_Volume_2.
- Wheeler, Q. D., & Valdecasas, A. G. (2007, December). Taxonomy: myths and misconceptions. In *Anales del Jardín Botánico de Madrid* (Vol. 64, No. 2, pp. 237-241).
- Williams, P. H., Humphries, C. J., & Vane-Wright, R. I. (1991). Measuring biodiversity: taxonomic relatedness for conservation priorities. *Australian systematic botany*, 4(4), 665-679.
- Wilson, E. O. (2004). Taxonomy as a fundamental discipline. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 359(1444), 739-739.
- Yadav, S. R. (1979). A contribution to the floristics and phytosociology of some parts of South Gujarat