International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 10, 2020
ISSN: 1475-7192

Study Of Fabaceae Family Plant Diversity Of Narmadapuram District Of Madhya Pradesh

Dimpla Devi[1], Bharti Khare[2], Priyanka Tiwari[3]

Abstract
A preliminary survey on the Fabaceae family plant diversity in the flora of the Narmadapuram district of Madhya Pradesh India. The Fabaceae family is represented in the flora with 32 medicinal plant diversity, 16 food plants, ornamental and industrial used plants diversity have 6 respectively out of 60 Fabaceae family plants. Crotalaria juncea, Clitoria ternatea, Dalbergia sissoo, Ougeinia oojeinensis, Sesbania bispinosa, Butea monosperma, Hardwickia binata, Vachellia leucophloea and Desmodium laxiflorum are well known medicinal plant species, contributing important role in the local health care system of Narmadapuram district. Cajanus cajan, Cicer arietum, Trigonella foenum-graceum, Vicia faba, Vigna mungo, and Vigna sinensis is also as a food plant. Dalbergia latifolia, Pterocarpus marsupium, and Vachellia nilotica, plants are major role play wood processing industries.

Keywords: - *Diversity, Fabaceae Family, Narmadapuram District*

1. Introduction

Narmadapuram is a city and a municipality in Narmadapuram district in the Indian state of Madhya Pradesh. It is a city on the south bank of the Narmada River in the Central India region and is the administrative center of Narmadapuram District. The city is named Narmadapuram after the Narmada River. Earlier it was named Narmadapuram after Hoshang Shah, the first ruler of Malwa. Narmadapuram district was part of the Nerbudda (Narmada) division of Central Provinces and Berar, which became the state of Madhya Bharat (later Madhya Pradesh) after India's independence in 1947. The city is famous for its beautiful Ghats on the banks of the Narmada. The river, Sethani Ghat is a major attraction. Colorful celebrations take place in the city of Narmada Jayanti. This year during the ceremony the CM announced efforts to rename the city. A Satsang Bhawan on the ghat is regularly visited by Hindu saints who give regular religious discourses on Ramcharitmanas and Gita.

Narmadapuram is located at 22.75°N 77.72°E (Fig-1). Its average height is 278 meters. The climate of the Narmadapuram district is moderate. All seasons come in the district. The average elevation above sea level is 331 m and the average rainfall is 134 cm. The average maximum and minimum temperature is 40 °C and 19 °C respectively. On the whole, the climate of the district is neither too hot nor too cold except in the winter season of Pachmarhi.

Leguminosae (Fabaceae) family is the third-largest plant family with 740 genera and 19,400 species after Orchidaceae and Asteraceae, and it is one of about 12 flowering plants in the world (Talukdar, 2013). The vast majority of trees, shrubs, and herbaceous plants belonging to this family have significant economic value (Hickey and King, 1997). Leguminosae family consists of three subfamilies: Caesalpiniodeae, Mimosoideae, and Papilionoideae (Lewis *et al*., 2005). India is a rich diversity center for medicinal and aromatic plants. Around 45,000 plant species nearly 15,000 plants are used for their specific medicinal values (Singh, 2003). Due to fewer side effects and rich potential herbal medicines are in high demand in the world.

[1]Govt. M.L.B. Girls P.G. Autonomous College, Bhopal M.P, India, Gmail- dimplemanhas85@gmail.com
[2]Govt. M.L.B. Girls P.G. Autonomous College, Bhopal, M.P, India.
[3]SAM Global University, Bhopal, M.P, India.

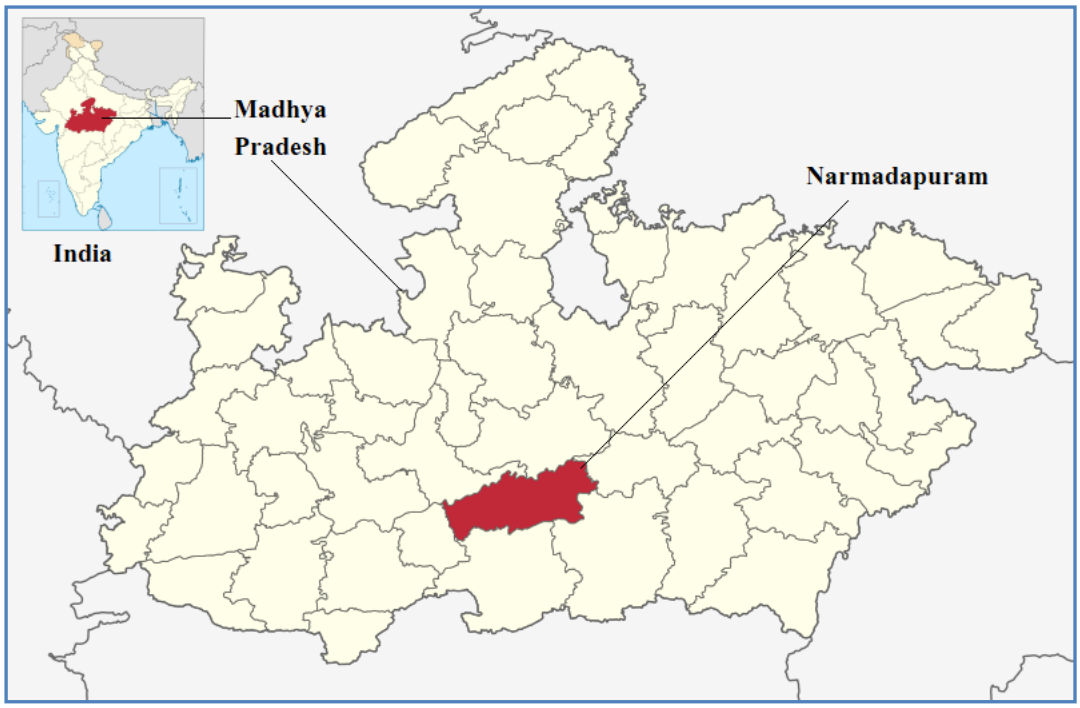

Fig.-1 Narmadapuram District Location Map

2. Methodology

The present study is the outcome of the two-year from July 2020 to June 2022 critical field survey in the different parts such as Bankhedi, Pipariya, Sohagpur, Makhannagar (Babai), Dolariya, Sioni Malva and Kesala blocks of the Narmadapuram district of Madhya Pradesh in various seasons. Fabaceae family plant information was gathered from the local and tribal people. All the specimens were collected in duplicate forms and they were deposited in the Department of Botany, Government Maharani Laxmibai Girls College, Bhopal (M.P.) Descriptions of species and identification were done with the help of Flora of Madhya Pradesh (Verma, Balakrishnan and Dixit 1993) Flora of Jabalpur (Oommachan and Shrivastava, 1996), and internet sites like "Trees of India" (Mukherjee, 2008) and confirmed with the help of taxonomist.

3. Observation

Medicinal plants diversity

Medicinal plants a total of 32 medicinal plant species belonging to the Fabaceae family presented in (Table-1) were reported. The most represented genus was *Bauhinia* (3 species) followed by *Vachellia, Albizia, Butea* and *Alysicarpus* (2 species each), (Table-1). *Vachellia nilotica, Tephrosia purpurea, Abrus precatorius* and *Pterocarpus marsupium* were common medicinal plants among all participants because these plants are important as they have long been used for generations and due to their rich bioactive constituents. Out of a total of 32 preparations, the herbal medicine formulations were prepared according to the traditional uses.

Food plants diversity

The food plants' diversity gives us fruits, vegetables, cereals, nuts, and spices. Plants store food in various ways, either in roots, stems, leaves, fruits, or seeds. In the present study Fabaceae family 16 plants used in the Narmadapuram district of Madhya Pradesh that is *Canavalia ensiformis, Canavalia gladiate, Arachis hypogeal, Cajanus cajan, Canavalia gladiate, Cicer arietum, Cyamopsis tetragonoloba, Dolichos lablab, Lathyrus odoratus, Pisum sativum, Pithecellobium dulce, Trigonella foenum-graceum, Vicia faba, Vigna mungo, Vigna radiate* and *Vigna sinensis* (Table-1).

Ornamental plants diversity

Ornamental plants or garden plants are plants that are primarily grown for their beauty ornamental garden plants are grown for the display of aesthetic features including flowers, leaves, scent, overall foliage texture, fruit, stem and bark, and aesthetic form. The *Caesalpinia spinosa, Dichrostachys cinerea, Delonix regia, Parkinsonia aculeate, Saraca indica, Sesbania grandiflora* plants were planted (Table-1) in the Narmadapuram district during the study period.

Industrial plants diversity

The plantation is a large-scale farming specialized crops of trees. Industrial plantation makes continual wood flow to industries to meet rising industry demand. Industrial tree plantations as defined by the Department of Environment and Natural Resources are lands planted mainly for timber-producing species, primarily to supply the raw materials requirements of existing or proposed wood processing plants and related industries. *Dalbergia latifolia, Indigofera tinctoria, Dalbergia sissoo* Roxb., *Pterocarpus marsupium* Roxb., *Vachellia nilotica, Vachellia leucophloea* and *Senegalia catechu* plants (Table-1) were recorded in Narmadapuram district during the study.

Table-1: Fabaceae family plant diversity of Narmadapuram district

No.	Fabaceae family plants	Local Name	Vegetation type	Properties
1.	*Abrus precatorius* L.	Ratti/ Gunja	Wild	Tetanus, rabies, scratches, sores, wounds, fever, cough and cold
2.	*Acacia dealbata*	Bammora	Wild	The wood used in furniture and indoor work
3.	*Adenanthera pavonina*	Saga	Wild	used to treat diarrhea
4.	*Albizia lebbeck* (L.) Benth.	Kala siris	Wild/ Planted	scabies, lung ailments, piles, bronchitis, abdominal tumors, cough, eye disorders
5.	*Albizia procera* (Roxb.) Benth.	Safed siris	Wild/ Planted	ulcers
6.	*Alysicarpus hamosus* Edgew.	Clover	Wild	Stomach ache, fever, jaundice, leucoderma, diarrhea, skin diseases and kidney stones.
7.	*Alysicarpus vaginalis*	Neel	Wild	dullness, cures diarrhea, dysentery, kidney stones and inability
8.	*Arachis hypogea*	Mumfali	Cultivated	Seed is used as food material
9.	*Bauhinia malabarica* Roxb.	Amta	Wild/ Planted	cough, gout, glandular swellings and goiter
10.	*Bauhinia vahlii* Wight & Arn.	Mahulbel	Wild/ Planted	demulcent and mucilaginous
11.	*Bauhinia variegata* Linn.	Kachnar	Wild/ Planted	Ulcers, skin diseases and snake poison
12.	*Butea monosperma*	Palash	Wild	anti-diarrheal, anthelmintic, anti-diabetic, anti-stress, hepatoprotective, antifungal, astringent, aphrodisiac, laxative, anti-inflammatory and antioxidant qualities
13.	*Butea superba* Roxb.	Palash Bel	Wild	Alzheimer's
14.	*Caesalpinia spinosa*	Tara	Wild	Ornamental
15.	*Cajanus cajan*	Arhar/Tuar	Cultivated	Seed is used as food material
16.	*Canavalia ensiformis*	Jack bean	Planted	Animals fodder
17.	*Canavalia gladiata*	Badi Sem	Cultivated	Pod used as a vegetable
18.	*Cassia fistula* Linn.	Amaltas	Wild/ Planted	joint pain, migraine, chest pain and blood dysentery
19.	*Cassia occidentalis*	Usaya falli	Wild	Seeds treat hemorrhoids, gout, rheumatism, and diabetes.
20.	*Cicer arietum*	Chana	Planted	Seed used as food materials
21.	*Clitoria ternatea* Linn.	Aprajita	Wild/ Planted	antistress, anxiolytic, antidepressant, anticonvulsant, tranquilizing and sedative
22.	*Crotalaria juncea* Linn	Sanai/ Ghunghuna	Wild/ Cultivated	hypolipidemic, reproductive, antioxidant, antibacterial, antifungal, anti-diarrhoeal, anti-inflammatory, hepatoprotective
23.	*Cyamopsis tetragonoloba*	Gour falli	Cultivated	Pod used as a vegetable
24.	*Dalbergia latifolia*	Rosewood	Wild	The wood used as premium furniture making
25.	*Dalbergia sissoo* Roxb.	Shisham	Planted	sore throats, dysentery, syphilis, bronchitis, inflammations, infections, hernia, skin diseases, and gonorrhea
26.	*Delonix regia*	Gulmohar	Planted	Used as an Ornamental plant in the garden
27.	*Desmodium dichotomum* (Willd.) DC. Prodr.	Chikta	Wild	muscle pain
28.	*Desmodium laxiflorum* DC.	Parsniparni	Wild	dysentery, rheumatism, fever, jaundice, stomach ache, skin problems, wounds and ulcers

29.	*Dichrostachys cinerea*	Kheri	Planted	Ornamental
30.	*Dolichos lablab*	Sem	Cultivated	Pod used as a vegetable
31.	*Erythrina suberosa* Roxb.	Pangra/ Dhoul Dhak	Wild	expectorant, bronchodilator, laxative, spasmolytic, anthelmintic, diuretic, and emmenagogue properties
32.	*Glycyrrhiza glabra*	Jethimadh	Wild	useful in conventional and naturopathic medicine for both mouth ulcers and peptic ulcers
33.	*Hardwickia binata* Roxb.	Anjan	Wild/ Planted	diarrhea, leprosy, worm's infection, indigestion, leucorrhoea, chronic cystitis, gonorrhea, and cancer
34.	*Indigofera astragalina* DC. Prodr.	Ranmethi	Wild	treat various illnesses such as rheumatism, arthritis
35.	*Indigofera tinctoria*	Neel	Wild	Color making
36.	*Lathyrus odoratus*	Matar	Cultivated	Used as food materials
37.	*Mimosa pudica*	Chhuimui	Wild	Ornamental
38.	*Mucuna pruriens* (L) DC	Gunja/Ratti/Gomachi	Wild	male infertility, nervous disorders, and also as an aphrodisiac
39.	*Ougeinia oojeinensis* Roxb.	Tinsa	Wild	burning syndrome, skin disease, urinary disorder, obesity, anti-inflammatory, anti-spasmodic and anti-hypertensive activity
40.	*Parkinsonia aculeata*	Palo	Planted	Ornamental
41.	*Pisum sativum*	Golmatar	Cultivated	Seed used as a vegetable
42.	*Pithecellobium dulce*	Jangle Jalebi	Planted	Pod used as a food
43.	*Pongamia pinnata* L. Pierre.	Putikaranj/ Karanj	Wild/ Planted	tumors, piles, skin diseases, and ulcers
44.	*Prosopis cineraria*	Shami	Planted	Holy plants
45.	*Pterocarpus marsupium* Roxb.	Beejasal	Wild	boils, sores, and other skin diseases
46.	*Saraca indica*	Sita Ashok	Planted	Ornamental
47.	*Senegalia catechu* (L. f) Willd.	Khair	Wild	sore throat and diarrhea
48.	*Senna tora* Linn.	Powar	Wild	skin diseases and arthritis
49.	*Sesbania bispinosa* (Jacq.) W.F. Wight	Dhunchi	Wild	menorrhagia, spleen enlargement, diarrhea and asanthelmintic, astringent, emmenagogue, anti-inflammatory and dysuria
50.	*Sesbania grandiflora*	Agati/Agast	Planted	Ornamental
51.	*Tamarindus indica* L.	Imili	Wild	abdominal pain, diarrhea, dysentery, parasitic infestation
52.	*Tephrosia purpurea* (L.) Pers.	Sirponka	Wild	jaundice, kidney disorders and reduced thirst in diabetes
53.	*Teramnus mollis* Benth.	Lomasparni	Wild	fatigue, muscle wasting, Vata and Pitta
54.	*Trigonella foenum-graceum*	Methi	Cultivated	Used as vegetable and spices
55.	*Vachellia leucophloea* (Roxb.) Willd.	Rimjha	Wild	bronchitis, cough, vomiting, wounds, ulcers, diarrhea, dysentery, internal and external hemorrhages
56.	*Vachellia nilotica* L.	Babool	Wild	sexually transmitted diseases
57.	*Vicia faba*	Bakla	Cultivated	Pod used as a vegetable
58.	*Vigna mungo*	Urd	Cultivated	Seeds used as a food
59.	*Vigna radiata*	Moong	Cultivated	Seeds used as a food
60.	*Vigna sinensis*	Lobiya	Cultivated	Pod used as a vegetable

4. Result and discussion

The present research is the first attempt at a Fabaceae family diversity survey in the Narmadapuram district of Madhya Pradesh, India. Fabaceae family plants were the most used for medicinal, ornamental, food, and industrial use in the area. *Crotalaria juncea*, *Clitoria ternatea*, *Dalbergia sissoo*, *Ougeinia oojeinensis*, *Sesbania bispinosa*, *Butea monosperma*, *Hardwickia binata*, *Vachellia leucophloea* and *Desmodium laxiflorum* are well known medicinal plant species, contributing important role in the local health care system of Narmadapuram district. *Canavalia ensiformis, Canavalia gladiate, Arachis hypogeal, Cajanus cajan, Canavalia gladiate, Cicer arietum, Cyamopsis tetragonoloba, Dolichos lablab, Lathyrus odoratus, Pisum sativum, Pithecellobium dulce, Trigonella foenum-graceum, Vicia faba,*

Vigna mungo, Vigna radiate and *Vigna sinensis* Plants store food in various ways, either in roots, stems, leaves, fruits or seeds. The *Caesalpinia spinosa, Dichrostachys cinerea, Delonix regia, Parkinsonia aculeate, Saraca indica, Sesbania grandiflora* ornamental plants were planted in the Narmadapuram district. *Dalbergia latifolia, Indigofera tinctoria, Dalbergia sissoo* Roxb., *Pterocarpus marsupium* Roxb., *Vachellia nilotica, Vachellia leucophloea* and *Senegalia catechu* plants were recorded as use requirements of existing or proposed wood processing plants and related industries. The order Fabales contains around 7.3% of eudicot species and the greatest part of this diversity is contained in just one of the four families that the order contains: Fabaceae. This clade also includes the families Polygalaceae, Surianaceae and Quillajaceae and its origins date back 94 to 89 million years, although it started its diversification 79 to 74 million years ago (Stevens, 2006). The Fabaceae diversified during the Paleogene to become a ubiquitous part of the modern earth's biota, along with many other families belonging to the flowering plants (Lewis *et al*., 2005). The Fabaceae have an abundant and diverse fossil record, especially for the Tertiary period. Fossils of flowers, fruit, leaves, wood and pollen from this period have been found in numerous locations (Crepet, and Taylor, 1985). The earliest fossils that can be definitively assigned to the Fabaceae appeared in the early Palaeocene (approximately 65 million years ago) (Herendeen *et al*., 2022). Representatives of the 3 sub-families traditionally recognized as being members of the Fabaceae - Cesalpinioideae, Papilionoideae and Mimosoideae- as well as members of the large clades within these sub-families – such as the genistoides- have been found in periods later, starting between 55 and 50 million years ago (Herendeen, Crepet, and Dilcher. 1992). A wide variety of taxa representing the main lineages in the Fabaceae have been found in the fossil record dating from the middle to the late Eocene, suggesting that the majority of the modern Fabaceae groups were already present and that a broad diversification occurred during this period (Herendeen, Crepet, and Dilcher. 1992). Therefore, the Fabaceae started their diversification approximately 60 million years ago and the most important clades separated 50 million years ago (Bruneau *et al.,* 2008b). The age of the main Cesalpinioideae clades has been estimated as between 56 and 34 million years and the basal group of the Mimosoideae is 44 ± 2.6 million years Bruneau *et al*., 2008. The division between Mimosoideae and Faboideae is dated as occurring between 59 and 34 million years ago and the basal group of the Faboideae was 58.6 ± 0.2 million years ago (Wikstrom, Savolainen and Chase, 2001). It has been possible to date the divergence of some of the groups within the Faboideae, even though diversification within each genus was relatively recent. For instance, Astragalus separated from the Oxytropis 16 to 12 million years ago. In addition, the separation of the aneuploid species of Neoastragalus started 4 million years ago. Inga, another genus of the Papilionoideae with approximately 350 species, seems to have diverged in the last 2 million years (Wojciechowski, 2003, 2005).

5. Conclusion

Plants are the basic lifelines of the terrestrial ecosystems as they are primary producers, Air purifiers, and Thermo regulators and support varied varieties of birds, insects, and animals. The Narmadapuram district is a part of Satpura Hills in central India. Most of the Satpura range was heavily forested; but the area has been subject to gradual deforestation in recent decades, although significant stands of forests remain. Several protected areas have been earmarked in the area, including the Satpura National Parks, Pachmarhi Biosphere Reserve, and the Bori Reserve Forest. The Satpura Foundation is a grass-roots organization that coordinates conservation efforts in the area, which continue to face challenges from development and infrastructure projects, logging, and poaching. The Fabaceae family is represented in the flora with 32 medicinal plant diversity, 16 food plants, ornamental and industrial used plants diversity have 6 respectively out of 60 Fabaceae family plants.

Reference

1. Bruneau, A., Lewis, G. P., Herendeen, P. S., Schrire, B., & Mercure, M. (2008b). Biogeographic patterns in early-diverging clades of the Leguminosae. Pp. 98-99, in Botany 2008. Botany without Borders. Botanical Society of America, Abstracts.
2. Bruneau, A.; Mercure, M.; Lewis, G. P. & Herendeen, P. S. (2008). "Phylogenetic patterns and diversification in the caesalpinioid legumes". *Canadian Journal of Botany*. **86** (7): 697–718.
3. Crepet, W. L.; Taylor, D. W. (1985). "The Diversification of the Leguminosae: First Fossil Evidence of the Mimosoideae and Papilionoideae". *Science*. **228** (4703): 1087–1089.
4. D cruz, Lancelot (2007). Ethnobotanical studies on Leguminous plants of Dediapada forests.Ethnobotany vol 19 pp.73-77.
5. Herendeen, P. S., W. L. Crepet, and D. L. Dilcher. (1992). The fossil history of the Leguminosae: phylogenetic and biogeographic implications. Pages 303 – 316 in Advances in Legume Systematics, part 4, the fossil record (P. S. Herendeen and D .L. Dilcher, eds). Royal Botanic Gardens, Kew, UK.
6. Herendeen, Patrick S.; Cardoso, Domingos B. O. S.; Herrera, Fabiany; Wing, Scott L. (2022). "Fossil papilionoids of the Bowdichia clade (Leguminosae) from the Paleogene of North America". *American Journal of Botany*. **109** (1): 130–150.
7. Jain S.K. and Mudgal, V. (1999). A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun.

8. Lewis G., Schrire B., Mackinder B. and Lock M. (2005). (eds.) Legumes of the world. The Royal Botanic Gardens, Kew, Reino Unido. 577 pages.
9. Mukherjee P. (2008). Trees of India, World Wildlife Fund India/ Oxford University Press, Flowering Trees and Shrubs in India, D.V. Cowen
10. Oommachan M. and Shrivastava J.L.,(1996). Flora of Jabalpur. Scientific Publishers, Jodhpur. pp. 354.
11. Rai R. & Nath, V. (2005). Use of medicinal plants by traditional herbal healers in central India. *Indian Forester*;131(3): 463-468.
12. Stevens, P. F. (2006). "Fabaceae". *Angiosperm Phylogeny Website. Version 7 May*. Retrieved 28 April 2008.
13. Verma D.M., Balakrishnan, N.P. and Dixit, R.D., (1993). Flora of Madhya Pradesh. Volume 1. Botanical Survey of India, Calcutta.
14. Wikstrom, N.; Savolainen, V.; Chase, M. W. (2001). "Evolution of the angiosperms: calibrating the family tree". *Proceedings of the Royal Society B: Biological Sciences*. **268** (1482): 2211–2220.
15. Wojciechowski, M. F. (2003). Reconstructing the phylogeny of legumes (Leguminosae): An early 21st century perspective. Pp. 5-35, in Klitgaard, B. B. & Bruneau, A. (eds), Advances in Legume Systematics, Part 10, Higher Level Systematics. Royal Botanic Gardens, Kew.
16. Wojciechowski, M. F. (2005). "Astragalus (Fabaceae): A molecular phylogenetic perspective." *Brittonia*. **57** (4): 382–396.