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## Floristic Survey of Dicotyledonous Plants in Vadapuri Village from Indapur Tehsil, Dist. Pune, Maharashtra, India

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### Abstract

Floral diversity is the variety and variability of plants occurring in a specific region during a specific period. The present study focused on a floristic survey of dicotyledonous plants in Vadapuri village from Indapur Tehsil in Pune District. Indapur Tehsil is located between 18°19'86" N to 18°49'86" N latitude and 74°43'20" E to 75°13'20" E longitude. The total geographical area of Indapur Tehsil is 1,471km<sup>2</sup>. Frequent surveys and exploration were undertaken covering the growth during the rainy, winter & summer season from 2021 to 2022. The plant samples were collected based on morphological and reproductive characteristics. Collected dicot plant species are identified by using various regional and national floras and available standard literatures. In the present investigation, 111 species distributed under 96 genera and 41 families are reported in Vadapuri region from Indapur tehsil district Pune region. The predominant family of 12 species is Fabaceae (Leguminosae) involving the sub-family Caesalpinaceae, Mimosaceae, and Papilionaceae respectively 3, 2, and 1 species. Followed by Amaranthaceae family 7 spp. Apocynaceae family 6 spp. Family Moraceae and Euphorbiaceae, Asteraceae showing 5 spp. Malvaceae, Myrtaceae, and Oleaceae are each family 4 spp. 3 species for the family are Rutaceae, Acanthaceae, and Verbenaceae. The present study is based on the taxonomic view of dicot plants of the different seasons from Indapur tehsil of Pune district this survey appreciates the diversity of dicotyledonous plants, and their medical uses play an important role in people's health care.

**Keywords:** Floristic survey, dicotyledonous plants, plant species

### Introduction

Floral diversity is the variety and variability of plants occurring in a specific region during a specific period. Floristic diversity is generally mentioned in the diversity of naturally occurring great plants. India is a major biodiversity country in the world. India has 12 biogeographic zones, 5 biomes, and 3 bioregion kingdoms (Cox & Moore, 1993) [5]. The Indian flora is containing 47,513 plant species groups and 18,117 flowering plant species (Arisdason W, Lakshminarasimhan P., 2015-16) [2]. The current approximate account for a total of 17926 species of angiosperms in India (Singh *et al.*, 2014) [28]. The angiosperms are regularly divided into two groups, the monocotyledons, and dicotyledons. The dicotyledons group including the about more than 200,000 species. Most of the plants are the counting trees, herbs, shrubs, weeds, flowers, and most fruits, vegetables, and legumes, belong to this group.

In India, natural resources survey like floristic study plays an important role in economic development. According to Gaur

R.D. (1999) [11], vegetation is the most precious gift, nature has provided to us as meeting all kinds of essential requirements of humans in the form of food, fodder, fuel, medicine, timber, resins, and oil. Farooquee N.A. and Saxena K.G., (1996) [9] reported that plant communities play a pivotal role in sustainable management by maintaining biodiversity and conserving the environment. Last few decades floristic diversity studies have been conducted in different parts of the world (Whittaker R. and Niering W.A (1965) [30]. Risser P. and Rice E.L., (1971) [25], Nair N.C. and Daniel P (1986) [21], Gentry AH. (1988) [12], Sukumar R., Dattaraja H.S. and Suresh H.S (1992) [29], Linder P., Elfving B. and Zackrisson O., Stand (1997) [20], Kennard D.K., Gould K. and Putz F.E., (2002) [18], Sagar R., Raghubanshi A.S. and Singh J.S., (2003) [26], Devi L.S. and Yadava P.S.(2006) [8], Krishnamurthy Y.L., Prakasha H.M., Nanda A., Krishnappa M. and Suresh H.S.(2010) [19], Patil D.A. and Tayade S.K., Pawade P.N. and Rothe S.P., Dabgar P.J., Ghosh A, Mukherjee S and Naskar K.R., (2012) [13], Ganorkar Ravindra P. and Kshirsagar

Ayodhya D.(2013) <sup>[10]</sup>, Mulay J. R and Sharma P. P (2013), Aher S.K (2015) <sup>[1]</sup>, Rao P.S, Yadav A.M and Shah R.C (2017) <sup>[24]</sup>.

Dicotyledonous plants are the highest successful and dominant plant group (Heywood, 1993) having seeds with two cotyledons and an exogenous manner of growth (Cronquist, 1981) <sup>[6]</sup> About 4,00,000 species of angiosperms plants have, so far been recorded of which more than 2,50,000 are dicotyledons and remaining are monocotyledons. The present study deals with the floristic survey of dicot plants in Vadapuri from the Indapur tehsil region of Pune district, i.e. enumeration of dicot species in the study area. The present study attempts to highlight the diversity of dicot flora in Vadapuri village from the Indapur tehsil region of Pune District.

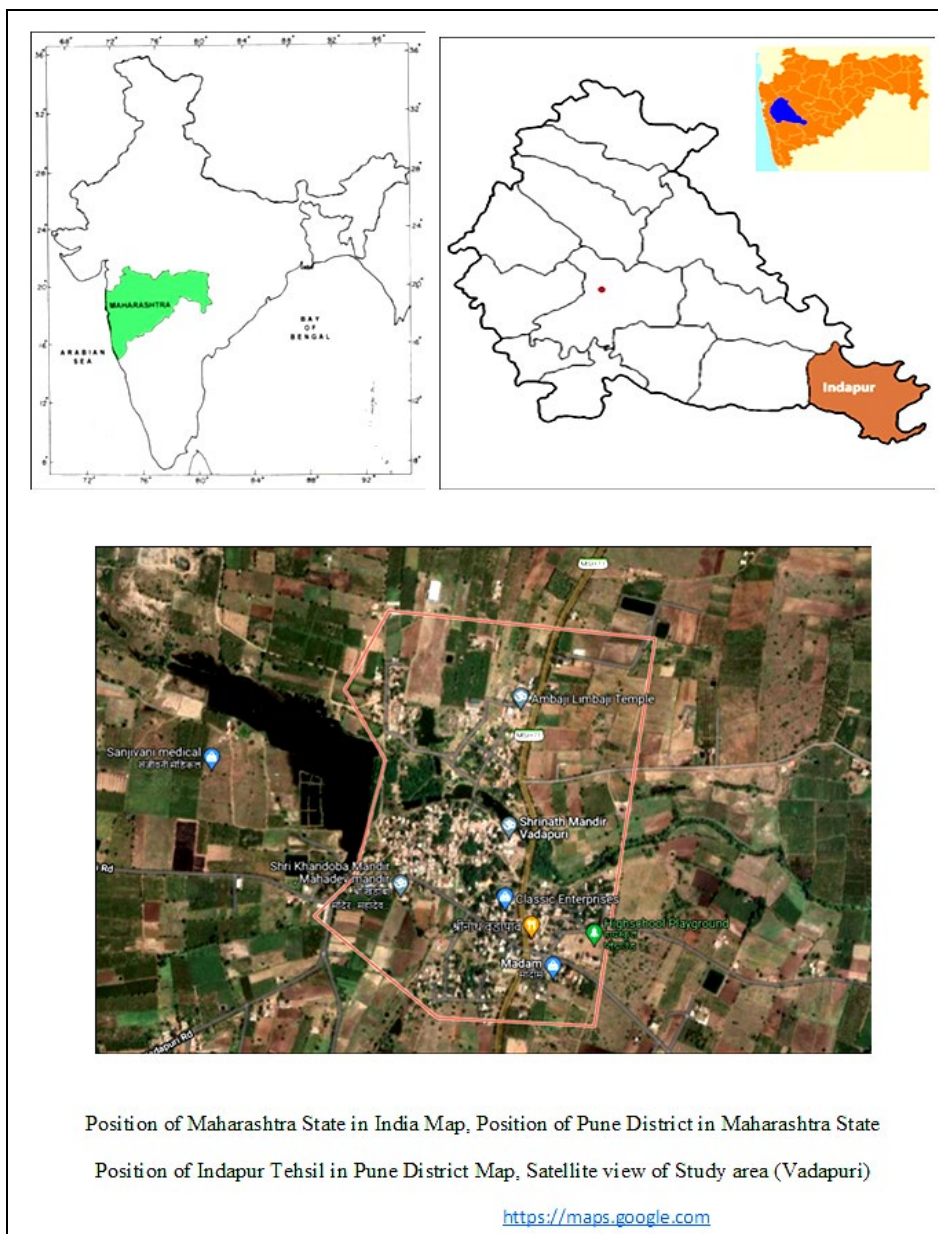
**Material and Method**

**Study Area:** The present study was conducted in Vadapuri from Indapur Tehsil in Pune District. Indapur is a town of a municipal council in Pune district in the Indian state of Maharashtra. It is Located between 18°19'86" N to 18°49'86" N latitude and 74°43'20" E to 75°13'20" E longitude Total

geographical area of Indapur tehsil is 1,471km<sup>2</sup>. Indapur City is located near the Bhima River and Ujani Dam. Vadapuri is a village in Indapur tehsil in Pune District of Maharashtra state.

**Method:** Frequent Surveys and explorations were undertaken covering the growth during rainy, winter & summer from 2021 to 2022. Different species have occurred are trees, herbs, climbers, flowering and fruiting plants, vegetables, and legumes belonging to the dicot group. The plant samples were collected based on morphological and reproductive characteristics. Capturing of the photographs Data on the names of plants during the field visit. Information on habit, flowering season, distribution, altitude, GPS data, and other features was recorded.

**Taxonomic Identification:** The identification of collected dicot plant species by using various regional and national floras and available literature of Bentham and Hooker (1872-97), 'Flora of presidency of Bombay' Vol-I to III T. Cooke (1901-1908), Flora of Maharashtra State'; Vol-II (Singh *et al.*, 2001) <sup>[27]</sup> 'Flora of Baramati'; (Bhagat *et al.*,2008) <sup>[3]</sup>. In the enumeration, the family of plants is arranged according to Bentham and Hooker's classification system (1862-1883).



**Fig 1:** Study area location map

**Table 1:** Checklist of dicot plant species in Vadapuri from Indapur tehsil of Maharashtra, India. According to Bentham and Hooker's (1862-1883) system of classification

Sr. No	Botanical Name	Family	Common Name
<b>Polypetalae</b>			
1.	<i>Annona reticulata</i> L.	Annonaceae	Ramphal
2.	<i>Annona squamosa</i> L.		Sitaphal
3.	<i>Tinospora cordifolia</i> (Thunb) Miers.	Menispermaceae	Gulvel
4.	<i>Argemone mexicana</i> L.	Papaveraceae	Pivla dhotra
5.	<i>Brassica nigra</i> L.	Cruciferae (Brassicaceae)	Mohari
6.	<i>Portulaca oleracea</i> L.		Ghol
7.	<i>Portulaca umbraticola</i> Kunth	Portulacaceae	Wingpod purslane
8.	<i>Ambelmoschus esculentus</i> Moench.	Malvaceae	Bhendi
9.	<i>Abutilon indicum</i> (L.) Sweat.		Petari
10.	<i>Gossypium herbaceum</i> L.		Kapus
11.	<i>Hibiscus rosa-sinensis</i> L.		Jaswand
12.	<i>Aegle marmelos</i> (L.) Corr.	Rutaceae	Bel
13.	<i>Citrus aurantifolia</i> (Christm.) Swingle		Limbu
14.	<i>Murraya koenigii</i> (L) Sprengel.	Meliaceae	Kadipata
15.	<i>Azadirachta indica</i> A.Juss.		Kadu limb
16.	<i>Melia azedarach</i> L.	Sapindaceae	Limbara
17.	<i>Cardiospermum helicacabum</i> L.		----
18.	<i>Zizyphus jujuba</i> Mill.	Rhamnaceae	Bor
19.	<i>Cissus quadrangularis</i> L.	Vitaceae	Kandvel
20.	<i>Mangifera indica</i> L.	Anacardiaceae	Amba
21.	<i>Moringa oleifera</i> Lam.	Moringaceae	Shevga
22.	<i>Arachis hypogea</i> L.	Fabaceae (Leguminosae)	Bhuimug
23.	<i>Cajanus cajan</i> (L.) Millsp.		Tur
24.	<i>Cicer arietinum</i> L.		Chana
25.	<i>Clitoria ternatea</i> L.		Nili gokarna
26.	<i>Cyamopsis tetragonoloba</i> (L.) Taub.		Gawar
27.	<i>Leucaena leucocephala</i> (Lam.) De wit.		Subhabhool
28.	<i>Pongamia pinnata</i> (L) Pierre		Karanj
29.	<i>Phaseolus vulgaris</i> L.		Ghevda
30.	<i>Pisum sativum</i> L.		Vatana
31.	<i>Rhynchosia minima</i> (L.) Dc.		Dhakta ranghevada
32.	<i>Vigna radiata</i> (L.) Wilezek		Mug
33.	<i>Tamarindus indica</i> L.		Mimosaceae
34.	<i>Acacia nilotica</i> (L.)Willd. Ex Delile	Babul	
35.	<i>Mimosa pudica</i> L.	Lajalu	
36.	<i>Bryophyllum pinnatum</i> (Lam.) Oken.	Rosaceae	Panphuti
37.	<i>Rosa indica</i> L.		Deshi gulab
38.	<i>Bahunia reacesosa</i> Lam.	Caesalpinaceae	Aapta
39.	<i>Delonix regia</i> (Bojer ex Hook) Raf		Gulmohar
40.	<i>Cassia auriculata</i> L.		Tarvad
41.	<i>Combretum indicum</i> (L.) Defilipps.	Combretaceae	Madhumalti
42.	<i>Terminalia catappa</i> L.		Deshi badam
43.	<i>Callistemon citrinus</i> (Curtis) Skeels.	Myrtaceae	Bottlebrush
44.	<i>Eucalyptus globulus</i> Labill.		Nilgiri
45.	<i>Psidium guajava</i> L.		Peru
46.	<i>Syzygium cumini</i> (L.) Skeels.		Jambhool
47.	<i>Lawsonia inermis</i> L.	Lythraceae	Mehndi
48.	<i>Punica granatum</i> L.		Dalimb
49.	<i>Carica papaya</i> L.	Caricaceae	Papaya
50.	<i>Momordica charantia</i> L.	Cucurbitaceae	Karela
51.	<i>Corindrum sativum</i> L.	Apiaceae (Umbelliferae)	Kothimbir

Gamopetalae			
52.	<i>Ixora coccinea</i> L.	Rubiaceae	Kuda
53.	<i>Morinda pubescens</i> Sm.		Bartondi
54.	<i>Chrysanthemum indicum</i> L.	Asteraceae (Compositae)	Shevanti
55.	<i>Helianthus annuus</i> L.		Suryful
56.	<i>Parthenium hysterophorus</i> L.		Congress
57.	<i>Tridax procumbens</i> L.		Kutkuti
58.	<i>Echinops echinatus</i> Roxb		Kate chendu
59.	<i>Manilkara zopota</i> (L.) P. Royen.		Sapotaceae
60.	<i>Jasminum molle</i> L.	Oleaceae	Jui
61.	<i>Jasminum multiflorum</i> (Burm.f.) Andrews		Kunda
62.	<i>Jasminum sambac</i> (L.) Aiton.		Mogara
63.	<i>Nyctanthes arbor-tristis</i> L.		Parijatak
64.	<i>Alstonia scholaris</i> (L.) R.Br.		Saptparni
65.	<i>Cascabela thevetica</i> L.	Apocynaceae	Pivali kanher
66.	<i>Catharanthus roseus</i> (L.) G. Don		Sadaphuli
67.	<i>Calotropis procera</i> (L.) Dryand		Rui
68.	<i>Calotropis gigantea</i> (L.) Dryand		Rui
69.	<i>Nerium oleander</i> L.		Kanher
70.	<i>Plumeria rubra</i> L.		Deo chapha
71.	<i>Tabernaemontana divaricata</i> L.		Tagar
72.	<i>Asclepias curassavica</i> L.		Asclepidaceae
73.	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae	Ratal
74.	<i>Capsicum annuum</i> L.	Solanaceae	Mirchi
75.	<i>Cestrum nocturnum</i> L.		Ratrani
76.	<i>Datura metel</i> L.		Dhotra
77.	<i>Solanum lycopersicum</i> L.		Tomato
78.	<i>Solanum melongena</i> L.		Vangi
79.	<i>Solanum tuberosum</i> L.		Potato
80.	<i>Withania somnifera</i> (L.) Dunal.		Ashwagandha
81.	<i>Adhatoda vasica</i> Nees.	Acanthaceae	Adulsa
82.	<i>Crossandra infundibuliformis</i> (L.) Nees		Aboli
83.	<i>Pseuderanthemum radlk.</i>		Purple false Eranthemum
84.	<i>Clerodendrum chinense</i> (Osbeck) Mabb.	Verbenaceae	Hajari mogra
85.	<i>Lantana camara</i> L.		Tantani
86.	<i>Tectona grandis</i> L.		Sag
87.	<i>Ocimum sanctum</i> L.		Tulas
88.	<i>Leonotis nepetifolia</i> (L.) R.Br.	Lamiaceae	Dipmal
89.	<i>Sesamum indicum</i> L.	Pedaliaceae	Til
Monochlamydae (Apetalae)			
90.	<i>Boerhavia erecta</i> L.	Nyctaginaceae	Punarnava
91.	<i>Mirabilis jalapa</i> L.		Four o clock
92.	<i>Achrysanthes aspera</i> L.	Amaranthaceae	Aghada
93.	<i>Alternanthera sessilis</i> L.		Reshim kata
94.	<i>Amaranthus spinosus</i> L.		Kate math
95.	<i>Amaranthus cruentus</i> L.		Rajgira
96.	<i>Celosia argentea</i> L.		Kurdu
97.	<i>Digera muricata</i> (L.) Mart.		Kunjir
98.	<i>Gomphrena globosa</i> L.		-----
99.	<i>Santalum album</i> L.		Santalaceae
100.	<i>Acalypha indica</i> L.	Euphorbiaceae	-----
101.	<i>Euphorbia cyathophora</i> Murraya.		Titli phool
102.	<i>Euphorbia heterophylla</i> L.		Dudhani
103.	<i>Euphorbia hirta</i> L.		Dudhi
104.	<i>Jatropha integerrima</i> Jacq.		-----

105.	<i>Ficus benghalensis</i> L.	Moraceae	Wad
106.	<i>Ficus benjamina</i> L.		Benjamin wad
107.	<i>Ficus elastica</i> L.		Rubber tree
108.	<i>Ficus racemosa</i> L.		Umber
109.	<i>Ficus religiosa</i> L.		Pimpal
110.	<i>Phyllanthus acidus</i> (L.) Skeels.	Phyllanthaceae	Rai awala
111.	<i>Phyllanthus niruri</i> L.		Bhui awala

**Table 2:** Plant groups distribution

Plant Group	Families	Genera	Species
Polypetalae	23	49	51
Gamopetalae	12	33	38
Monochlamydae	6	14	22
Total	41	96	111

**Results and Discussion**

In the present investigation, 111 species distributed under 96 genera and 41 families are reported in this Vadapuri from Indapur tehsil district Pune region. There are observed species of in this region are trees, herbs, shrubs, and climber are included. The predominant family of 12 species of Fabaceae (Leguminosae) involving the sub-family are Papilionaceae, Mimosaceae, and Caesalpinaceae respectively 3, 2, and 1 species total of 6 species. Followed by the Amaranthaceae family are 7 species. The Apocynaceae family 6 species. Family Moraceae and Euphorbiaceae, Asteraceae are 5 species. Malvaceae, Myrtaceae, Oleaceae are each family are 4 species. Each family is 3 species for the family Rutaceae, Asclepidaceae, Acanthaceae, Verbenaceae, and

Phyllanthaceae. There are 2 species of the family Annonaceae, Portulacaceae, Meliaceae, Rosaceae, Combretaceae, Lythraceae, and Nyctaginaceae. One species family are Menispermaceae, Papaveraceae, Cruciferae, Sapindaceae, Rhamnaceae, Vitaceae, Anacardiaceae, Moringaceae, Caricaceae, Cucurbitaceae, Apiaceae, Sapotaceae, Convolvulaceae, Lamiaceae, Pedaliaceae, Santalaceae. This data are involved in the checklist of dicot plant species in Indapur tehsil of Pune district, Maharashtra state in India (Table.1.) The distribution of dicotyledon plant species of Vadapuri locality from Indapur Tehsil (Table 2). Family-wise distribution of sub-class Polypetale, Gamopetalae, and Monochlamydae (Apetalae) is shown in Fig 2, 3, and 4.

**Photoplate-I**



*Annona squamosa* L



*Hibiscus rosa-sinensis* L



*Citrus aurantifolia* (Christm.) Swingle



*Azadirachta indica* A.Juss



*Arachis hypogaea* L.



*Cajanus cajan* (L.) Millsp.



*Lawsonia inermis* Linn



*Tridax procumbens* L



*Manilkara zopota* (L.)P.Royen.



*Nyctanthes arbor-tristis* L.



*Catharanthus roseus* (L). G.Don



*Lantana camara* Linn

Photoplate-II



*Ocimum sanctum* L.



*Santalum album* L



*Euphorbia hirta* L.



*Syzygium cumini* (L.)



Skeels. *Murraya koenigii* (L)



Sprengel. *Mangifera indica* L.



*Morinda pubescens*



*Sesamum indicum L.*



*Carica papaya L*



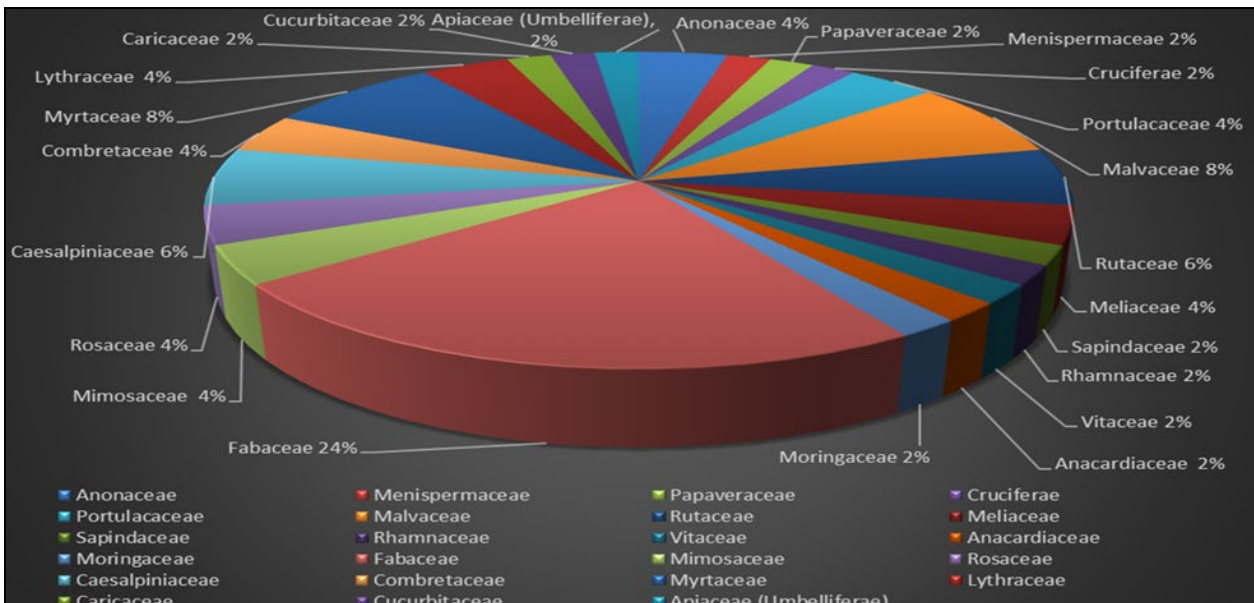
*Ficus racemosa L.*



*Gomphrena globosa L.*



*Phyllanthus acidus (L.) Skeels.*



**Fig 2:** Family-wise distribution of dicot species in Vadapuri from Indapur Tehsil of Pune District (MH) India. (Polypetalae)

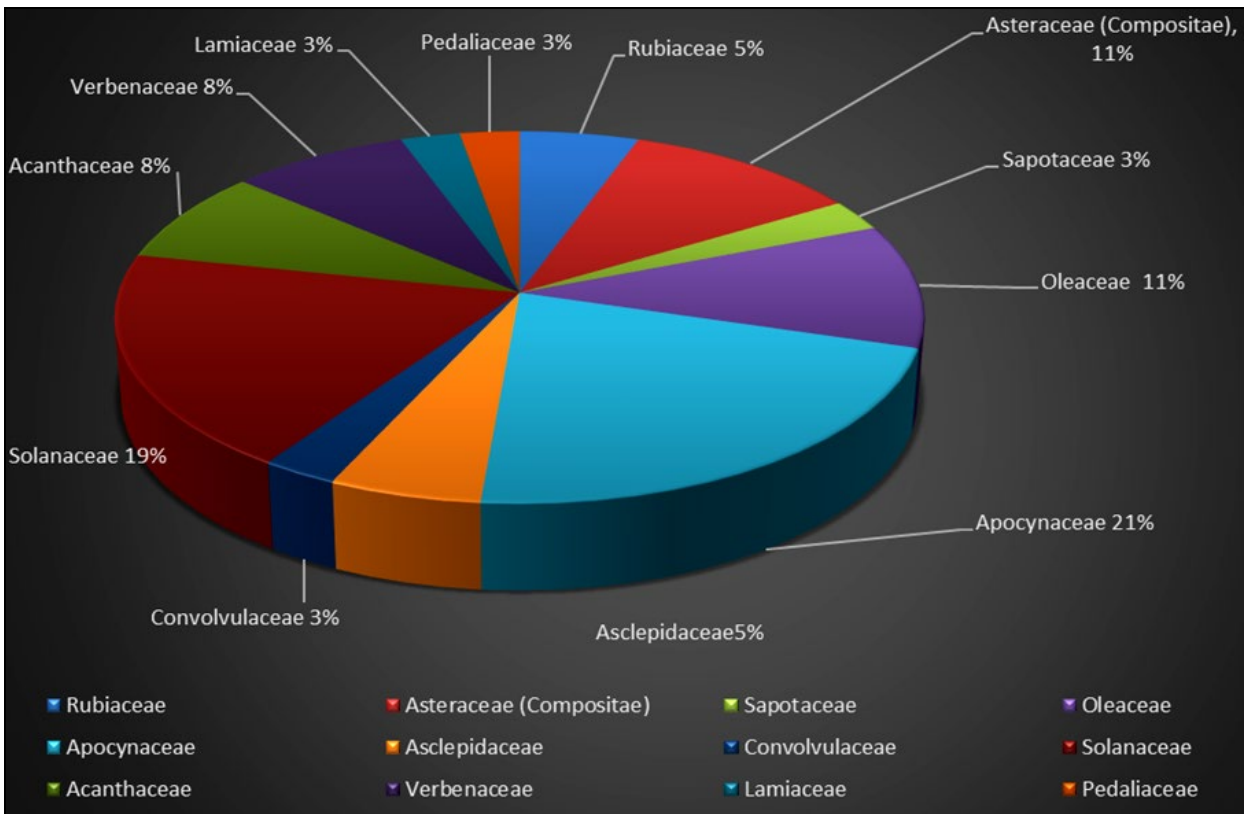


Fig 3: Family-wise distribution of dicot species in Vadapuri from Indapur Tehsil of Pune District (MH) India. (Gamopetalae)

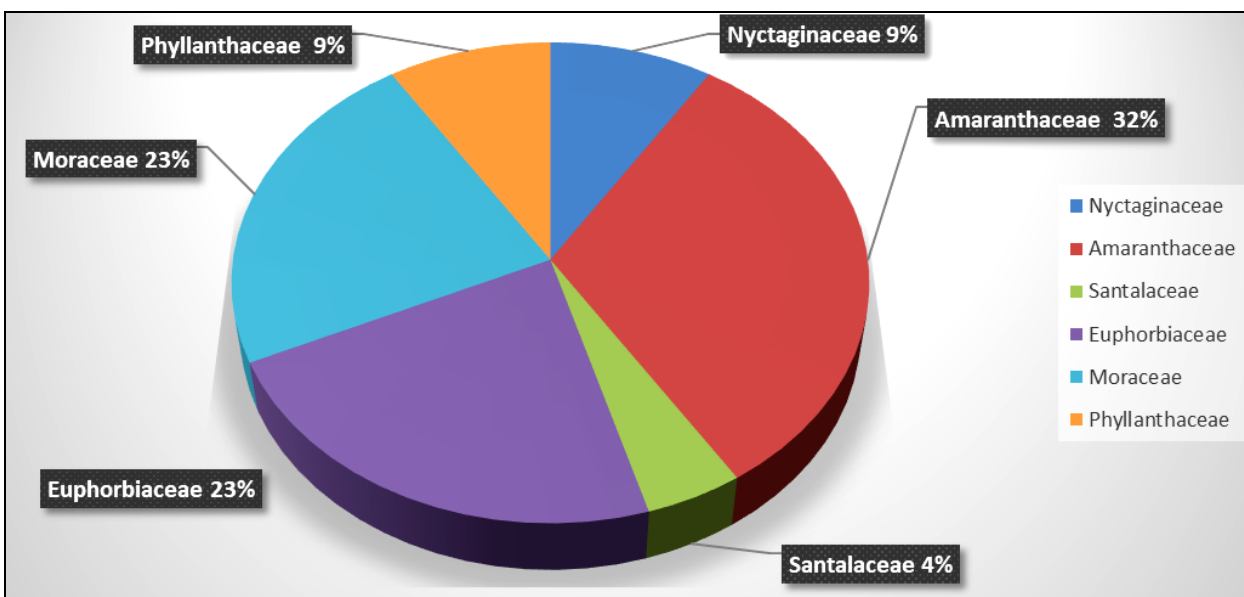


Fig 4: Family-wise distribution of dicot species in Vadapuri from Indapur Tehsil of Pune District (MH) India. (Monochlamydae)

**Conclusion**

The present study is based on the taxonomic view of dicots plant species of the different seasons from the Vadapuri village From Indapur tehsil of Pune district, which provides a preliminary checklist of plants. It provides information about the diversity and adaptability of the dicots plants in Vadapuri from Indapur tehsil. This survey appreciates the diversity of dicotyledonous plants, and their medicinal uses play an important role in people’s health care.

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**References**

1. Aher S. Floristic diversity assessment of Parner Tahsil, Maharashtra (India). *Indian J Applied & Pure Bio*; 2015; 30(2):123-130.
2. Arisdason W, Lakshminarasimhan P. Status plant diversity in India: An overview. Central national herbarium, Botanical Survey of India, Howrah. Retrieved from <http://www.bsienviis.nic.in/Database/Status of plant Diversity in India 17566.aspx> 2015-16.



3. Bhagat RB, Shimple VB, Deshmukh RB. "Flora of Baramati." Published by Bhagat R.B., Hol (8-Phata), Baramati, Pune, 2008.
4. Cooke T. The Flora of the Presidency of Bombay London. 2 (Repr. edition), B. S. I. Calcutta. (1901-1908)
5. Cox C, Moore P, Biogeography. An ecological and evolutionary approach (5th edn). Oxford: Blackwell Scientific Publications. x + 326 pp. f 16.50 paper, 1993.
6. Cronquist A. An integrated system of classification of flowering plants. Columbia University Press, New York, United States, 1981.
7. Dabgar PJ. A Contribution to the flora of Wadhvana wetland, Dabhoi taluka (Gujarat) India, *Biosci. Dis.*, 2012; 3(2):218-221
8. Devi LS, Yadava PS. Floristic diversity assessment and vegetation analysis of tropical semi-evergreen forest of Manipur, northeast India, *Int. Soci. Tropi. Eco.*, 2006; 47(1):89-98.
9. Farooque NA, Saxena KG. Conservation and utilization of medicinal plants in high hills of the central Himalayas, *Environ.Conserv.* 1996: 23:75-80.
10. Ganorkar R, Kshirsagar A. Floristic Study of Shirur Region Pune, Maharashtra, *India International Research Journal of Biological Sciences.* 2013; 2(5):1-6.
11. Gaur RD. Flora of the district Garhwal northwest Himalaya (with ethnobotanical notes). Transmedia Publication, Srinagar (Garhwal) India, 1999.
12. Gentry AH. Tree species richness of upper Amazonian forests, *Proceedings of the National Academy of Science of U.S.A.* 1988; 85:156-159.
13. Ghosh A, Mukherjee S, Naskar KR. Floristic study and vegetational relationship of Bagmara Block in Sundarbans Tiger Reserve (STR), *Indian J Applied & Pure Bio.* 2012; 27(2):207-218
14. Heywood V. H *Flowering plants of the world* (No. Ed. 2). BT Batsford Ltd., 1993.
15. Hooker JD. The Flora of British India, 1875, I(VII).
16. Hooker JD. The Flora of British India L. Reeve and Co. Henrietta Street, Covent Garden, London, 1888-1897, V(VII).
17. <https://maps.google.com>
18. Kennard DK, Gould K, Putz FE. Effect of disturbance intensity on regeneration mechanisms in a tropical dry forest, *Forest Eco.& Manage.*, 2002; 162:197-208.
19. Krishnamurthy YL, Prakasha HM, Nanda A, Krishnappa M, Suresh HS. Vegetation structure and floristic composition of a tropical dry deciduous forest in Bhadra Wildlife Sanctuary, Karnataka, India, *Tropi. Eco.* 2010; 51(2):235-246
20. Linder P, Elfving B, Zackrisson O. Stand Structure and successional trends in virgin boreal forest reserves in Sweden, *Forest Eco.& Manage.* 1997; 98:17-33
21. Nair N.C. and Daniel P., The floristic diversity of the Western Ghats and its conservation, a review, *Proc. Indian Acad. Sci. (Animal Sc./Pl. Sci.) Suppl.*, 1986, 127-163.
22. Patil DA, Tayade SK. Floristic studies in Khandesh region (Maharashtra: India): an Overview, *Life sci. Leaf.*, 2012; 10:30-38.
23. Pawade PN, Rothe SP. Diversity of ornamental trees from Amravati city of West Vidarbha region, *Recent Res. Sci.Tech.* 2012; 4(10):25-27
24. Rao PS, Yadav AM, Shah RC. A survey on biodiversity of J. M. Patel College campus, Bhandara, Maharashtra, *International Journal for Environmental Rehabilitation and Conservation.* 2017; 8(2):29-33.
25. Risser P, Rice EL. Diversity in tree species in Oklahoma upland forest, *Eco.* 1971; 52:876-880.
26. Sagar R, Raghubanshi AS, Singh JS. Tree species composition, dispersion and diversity along a disturbance gradient in a dry tropical forest region of India, *Forest Eco.& Manage.* 2003; 186:61-71
27. Singh NP, Lakshminarsimhan P, Karthikeyan S, Prasanna P. V-Flora of Maharashtra State Dicotyledons; (2): Botanical Survey of India, Kolkata, 2001.
28. Singh P, Dash S-Plant Discoveries 2013-New genera, species and new records. Botanical survey of India, Kolkata, 2014.
29. Sukumar R, Dattaraja HS, Suresh HS. Long-term monitoring of vegetation in a tropical deciduous forest in Mudumalai, southern India, *Current Science.* 1992; 62:608-613.
30. Whittaker R, Niering W. A-Vegetation of the Santa Catalina Mountains, Arizona: A gradient analysis of the south slope, *Eco.* 1965; 46:429-452.