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Floristic Study of New Campus-The Homestead of Herbs, Jai Narain Vyas University, Jodhpur

Kamlesh Sapiens*, Dinesh Mehra
Department of Botany, J. N. V. University, Jodhpur, Rajasthan, India

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ABSTRACT

This paper deals with the present floral diversity of Jai Narain Vyas University, the New campus, Jodhpur, Rajasthan, India. The total area of the New campus is 263.31 hectares; 650.7 in acres and the constructed area is approximately 74,003 m2; 796,560 in sq. ft, thus a huge land is free from any kind of constriction of buildings that provide inhabit for many wild plant species. As biodiversity is the variety of life on the earth or in a particular habitat. The data conferred here are carried with botanical name, family, and some observed characters of them. Here in this paper 131 plant species are described from the respective study area. The study focussed on wild Angiosperms but a piece of additional information on cultivated and decorative plants is also given briefly. The information included in the study can be of use to many people along with the students of the university.

Keywords : Floral Diversity, Ephemerals, Species, Biodiversity, Homestead.

I. INTRODUCTION

Natural greenery of a particular habitat or area is measured by total available plant species. Biological diversity of an environment as indicated by numbers of all present species belonging to different kingdoms [1]. While Floral diversity refers to the diversity of plants occurring in a specific region during a particular era. It generally refers to the diversity of all naturally occurring indigenous or native plants. The floral diversity of India is concentrated in four phytogeographically unique regions, viz., Himalayas, Western Ghats, Northeast India, and Indian islands (Andaman and the Nicobar Islands). The Indian Flora accounts for 11.4% of the total recorded plant species present on earth and important is about 28% of the plant species are endemic (species restricted to a particular geographical region) to India. In India, Angiosperms are the largest plant group comprising a total of 17,817 species, which constitutes 38.15% of the total floral diversity of the country [2].

Wherever we are living we always found an enormous variety of plants close to us. Whether it is herb, shrub, climber, creeper or tree, they all share some same characters and parts like root, stem, leaves, flowers, fruits, seeds, etc. despite this the morphology,

anatomy, and genetics of all plants might be different, that is what makes a species unique.

II. MATERIAL AND METHODS

A. Area of study

Rajasthan, a state of India, located in the north-western part of the country. Although a colossal percentage of the total area is desert and even though there is little forest cover (16,629.51 sq. km which is 4.86 % of the State's geographical area) [3]. Rajasthan has a rich and varied flora and fauna. The natural vegetation of Rajasthan is classed as Northern Desert Thorn Forest (Champion 1936). Shetty and Singh (1993) in their 'Flora of Rajasthan' have list 1911 species belonging to 780 genera of 154 plant families [4].

The area of interest in this study is the New campus, Jai Narain Vyas University, Jodhpur. The university established in July 1962 and now the New campus is situated near 'Bhagat Ki Kothi' railway station, Jodhpur. The institution is the only residential university in the Marwar region of the state, catering mainly to the needs of students of western Rajasthan (Marwar). Its development and research activities mainly focused on the heritage, society, and challenges of the 'Thar Desert' region, in which it is located.

The total area of the new campus is 263.31 hectares (650.7 acres) [Constructed area is 74,003 m2 (796,560 sq. ft)][5] thus a huge land is free from any kind of constriction of buildings which provide inhabit for many wild plant species (figure 1).

B. Methodology

In this study, detailed surveys of the New campus were undertaken during the academic season of M.Sc. previous (2019-20). During the starting of the academic season in July 2019, there was an abundance of ephemeral plant species that only flourish in the rainy season. Therefore the plants were first identified one by one and then the herbarium sheets were prepared in July-August 2020. The study completed in four steps viz., collection of all plant specimens, preparation of herbarium sheets (this includes *poisoning*; for the killing of collected plant part and prevent the formation of abscission layer and this was done with formalin method; 70% ethyl alcohol with 5 cc of 10% formalin mixtures [6], *pressing, drying;* without any artificial heat so that the natural colour of the specimen remain*, mounting;* the plant specimen fixed on mounting sheets with the help of favicol*, stitching, and, labelling;* the size of the label is about 8 x 12 cm and it carries the required information about respective specimen), proper identification with the help of various literature, and finally the submission/incorporation.

The preparation of herbarium specimens was followed according to the method stated PREPARATION OF HERBARIUM SPECIMEN FOR PLANT IDENTIFICATION AND VOUCHER NUMBER [7]. Earlier there was no floristic study done on this particular area. Therefore, for the identification of species, 'Flora of Rajasthan' (Shetty and Singh - 1993) and 'Flora of The Indian Thar dessert' (M. M. Bhandari -1929) were referred. During July end to December, the focussed plant group was ephemerals because they only appear for a short period. After their complete listing other occurring shrubs and trees were studied and listed.

Beside wild occurring plant species, there are many cultivated and decorative plants in buildings of different departments (Department of Botany, Department of Chemistry, and others), they were also listed out. The information about local name and uses of these given plants were gathered from people working in the 'Department of Botany', as a gardener, non-teaching staff and from some reviews. Pictures of

plants were also clicked during the survey, some of them are presented in this paper. (figure 2)

III. RESULTS AND DISCUSSION

In this study total, 131 plant species among which 88 species are wild have been recorded. All recorded plants are listed below in Table A1, Table A2, and Table A3. Table A1 shows all naturally occurring (wild) herbs and climbers on the campus while table A2 listed with shrubs and tree species (naturally occurring and many years back planted tree lists that now naturally able to perpetuate.). Additional information on cultivated and decorative plants is given in Table A3.

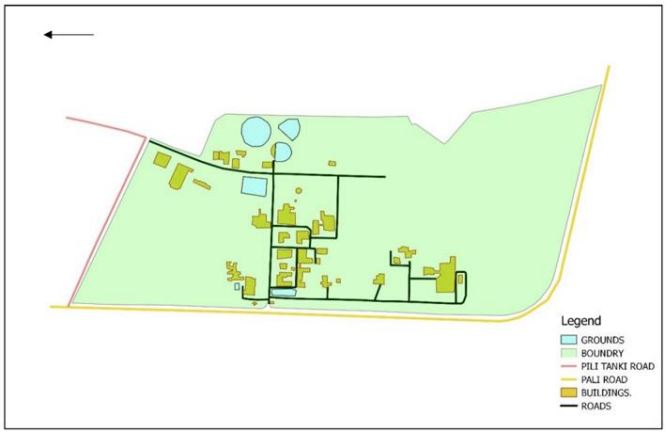

Figure 1: New campus map; showing the ground, road, and the entire constructed area. According to the legends shown in the map, there are few roads and buildings in the new campus area and the rest of the light green area is empty where plants can grow naturally. The arrow at the top left is pointing north. (map constructed with QGIS)

Table A1 : List of herbs and climbers* naturally occurring in the New campus

Serial no.	Botanical name	Common name	Family	Special characters or observation
1	*Abutilon indicum*	Kanghi	Malvaceae	Epicalyx absent, flowers appear throughout the year.
2	*Achyranthes aspera*	Undakanta	Amaranthaceae	The fruits falling off with bracteoles and perianths. And are sticks to clothes.
3	*Amaranthus spinosus*	Kanta Chaulai	Amaranthaceae	Greenish-white flowers, stem light radish.
4	*Boerhavia diffusa*	Punarnava	Nyctaginaceae	stem reddish, flower pink, style light pink, stigma capitate, stamen filament purple, anther yellow.
5	*Boerhavia erecta*	S`haati	Nyctaginaceae	Perianth pinkish-white, stamen 2, the abaxial surface of the leaf is pinkish.
6	*Cenchrus ciliaris*	bhunt	Poaceae	Inner bristles are not

				very stouter at base and outer are more than 1.5 cm long .
7	*Cleome viscosa*	Bagra	Cleomaceae	Calyx red at the base, petal of 5 corolla but a corolla always falls early thus only 4 remain.
8	*Commelina benghalensis*	Kanchara	Commelinaceae	Creeping stem, zygomorphic flower; blue, stamen 6 (3 staminodes), stigma capitate.
9	*Convolvulus prostratus*	Sankhpushpi	Convolvulaceae	White-pinkish flower, funnel-shaped corolla, anther dorsifixed, stigma 2.
10	*Corchorus trilocularis*	Kova ghas	Malvaceae	Leaf margin serrate, petal yellow, stigma trifid, ovary triloculed.
11	*Cynodon dactylon*	Dob ghas	Poaceae	Very common near wet areas.
12	*Cyprus rotundus*	Moth, motha	Cyperaceae	-
13	*Dactyloctenium aegyptium*	Makda-ghas	Poaceae	Spikelets sessile, compressed, stamen 3.
14	*Datura metel*	Dhatura	Solanaceae	Corolla white-yellowish, funnelform, stem light violates.
15	*Digera muricata*	Latmahuria	Amaranthaceae	Spike is not compact, stamen 5, stigma bifid, ovary 1 celled
16*	*Ephedra foliate* ~	Unth-phog	Ephedraceae	Internode 5-6 cm long,
17^	*Euphorbia caducifolia*	Danda-thor	Euphorbeaceae	Succulent shrub without main stem, reddish flower.
18	*Euphorbia hirta*	Dudhi	Euphorbeaceae	Milky latex in stem and flowers, flowers are in clustered cyathia.
19	*Heliotropium curassavicum*	Khara-hathisund	Boraginaceae	Leaves somewhat succulent, flower white and sessile, stamen 5.

20	*Heliotropium subulatum*	Hathisunda	Boraginaceae	Corolla yellowish
21	*Heliotropium strigosum*	Chitiphool	Boraginaceae	Minute white flower
22	*Leptadenia pyrotechnica*	Khinp	Apocynaceae	Erect, green plant, latex (watery) present; medicinal.
23	*Ocimum gratissimum*	Van-tulsi	Lamiaceae	Style purple, stigma white and bifid, stamen 4 anther yellow.
24^	*Opuntia elatior*	Nag-phani	Cactaceae	Succulent with jointed stem, spiny.
25	*Pavonia zeylanica*	Chirki-nahl	Malvaceae	Glandular hairy plant, epicalyx present with 9-11 segments, stigma numerous and capitate, Mericarp winged.
26*	*Pergularia daemia [8]*	dudhibel	Asclepiadaceae	Corolla whitish-creamy, margin with hair, white coronary outgrowth. Aerial parts of the plant used for snake bite and other medicinal uses. [8]
27	*Peristrophe paniculata*	Kakajangha, kakanadi, nasbhanga	Acanthaceae	Stamens: filaments with some curved eglandular trichomes near the base, Fruit a short-stalked clavate capsule [9]
28	*Phyllanthus amarus*	Bhuin-anvalah	Phyllanthaceae	Sepals- five. Appear mostly in rainy season, monoecious; male flower toward tip and female near base.
29	*Phyllanthus flatenarus*	Bhuin-anvalah	Phyllanthaceae	sepals- six.
30	*Senna tora*	Chakunda	Fabaceae	Petal 5; Yellow, staminode stamen present, fruit is pod; 15-20 cm long.
31	*Tephrosia purpuria*	Bepuna	Fabaceae	Compound; Imparipinnate leaves, lower surface hairy, flower violet-pinkish, seeds are smooth

32*	*Tinospora cordifolia*	Giloy	Menispermaceae	Dioicous plant, Cordate leaves with long petiole.
33	*Verbesina encelioides*	Surjmukhi	Asteraceae	Herb, smaller than cultivated sunflower.
34	*Chloris virgata*	-	Poaceae	Very common with Cynodon dactylon.
35	*Solanum virginianum*	Peeli-kanti	Solanaceae	Spine present on leaves and calyx, Corolla purple-blue, Calyx campanulate, yellow anther. Style curved at tip.
36	*Evolvulus alsinoides [10]*	Shyamkranti, Sankhapuspi	Convolvulaceae	Flowers light blue, it is used to cure insomnia and therapeutic uses [10]
37	*Cyanthillium cinereum*	sahdevi	Asteraceae	Corolla pinkish, stamen 5, style bifid, involucral bract present.
38	*Echinops echinatus*	Oont-kanteli	Asteraceae	have many ethnobotanical uses. Especially in sexual disability [11]
39	*Argemone mexicana*	Satyanashi	Solanaceae	Have Anti-malarial, Anti-plasmodial, Larvicidal, Antibacterial, Cytotoxic, Wound healing and Vasorelaxant activity [12]
40	*Celosia argentea*	Imarti	Amaranthaceae	Tepals white, with a light pink tip, stem erect.
41	*Barleria prionitis*	Vjradanti	Acanthaceae	Corolla orange to yellow, stamen 4; 2 staminode,
42	*Chenopodium album*	Bathua	Chenopodiaceae	Bisexual, greenish-white flower, tepal 5, stamen 5.
43*	*Ipomea pes-tigridis*	Ponchpatti bel	Convolvulaceae	Leaves densely hairy, corolla bell-shaped, white, calyx hairy.
44	*Brachiaria ramosa*	Ghas	Poaceae	Sheath hairy; pubescent, stamen 3, rachis is angular.

45	*Tribulus terrestris*	Bobio, gokhru, konti	Zygophyllaceae	Spreading herb, corolla yellow, stamen 10; anther versatile, stigma radiated hood like/striated.
46	*Senna alexandrina*	Sonamukhi	Fabaceae	Subshrub, Petals yellow, fruit pod; turn brown-black at maturity.
47	*Crotolaria burhia*	saniya	Fabaceae	Reduced leaves, calyx hairy, corolla yellow; red veins present on largest lower corolla, ovary hairy.
48	*Pupalia lappacea*	Undho-bhurat	Amaranthaceae	Flower sessile,
49	*Indigofera linnaei*	Bekariyo, leel	Fabaceae	Spreading herb forming dense mat on ground, flower pink.
50	*Portulaca oleracea*	lunaki	Portulacaceae	Flowers open only in morning time, flowers are yellow.
51	*Tetrapogon tenellus*	-	Poaceae	Inflorescence looks like pockets,
52	*Melanocenchris jacquemontii*	-	Poaceae	Small grass with white hair.
53	*Digitaria ciliaris*	Jhenno gha	Poaceae	Inflorescence digitate
54	*Eragrostis minor*	poongyo	Poaceae	Spikelet yellowish-green and loosely tufted.
55	*Echinochloa colonum*	Jharwa	Poaceae	Nodes are glabrous, leaves are linear-lanceolate, lower floret barren.
56	*Ochthochloa compressa*	Ghoda dhobdi	Poaceae	Spikelets are 4-8-flowered and present at the top.
57	*Tragus biflorus*	Charchara	Poaceae	Small herb, loose spike.
58	*Sporobolus coromondelianus*	-	Poaceae	lower glume a minute oblong scale but upper glume oblong-elliptic.
59	*Sida cordifolia*	Kharenti	Malvaceae	Stigma capitate, yellow, fruit Schizocarp

^ succule

Table A2 : Naturally occurring shrubs and tree species

Serial no.	Botanical name	Common name	Family	Special characters or observation
1	*Senegalia catechu*	Kattha	Fabaceae	paripinnate, sessile leaflets, Flowers pale yellow.
2	*Vachellia leucophloea*	Safed-babool	Fabaceae	-
3	*Vachellia nilotica*	Deshi babool	Fabaceae	Stem black, flower head yellow.
4	*Acacia Senegal*	Kummat	Fabaceae	Spine in set of three-pointed apex.
5	*Aerva javanica*	Bui	Amaranthaceae	The dried plant used to make brooms and inflorescence used to make a cushion.
6	*Albizia lebbeck*	Sirsa, shresh	Fabaceae	Leaves bipinnate, calyx tube funnel-shaped, corolla infundibuliform, small anther.
7**	*Anogeissus sericea var. nummularia*	-	Combretaceae	Round leaves, cluster of flowers is yellowish, rare plant.
8	*Azadirachta indica*	Neem	Meliaceae	Abundant
9	*Balanites roxburghii*		Zygophyllaceae	slightly leathery leaves, spines on stem, Leaves are always in pairs of two placed right below the spine.
10	*Calotropis procera*	Aak	Apocynaceae	Common
11	*Capparis decidua*	Ker	Capparaceae	Small leaves only present on young twigs, sepals are petaloid.
12	*Colophospermum mopane*	Mopane	Fabaceae	It was planted years back but now naturally occurring.
13	*Commiphora wightii*	Gugal	Burseraceae	Old stems are shiny with papery bark, flower light red. Leaf trifoliate.
14	*C*ordia *sinensis*	Gondani	Boraginaceae	Filament glabrous; Fruit up to 1.2 cm long [13]

15	*Dalbergia sisso*	Seesam	Fabaceae	flowers yellowish-white, leaf imparipinnate, pods are light and not thick.
16	*Maytenus senegalensis*	kantali	Celastraceae	Thorny stem, thorn; red.
17	*Mimosa hamata [14]*	Mundi, Bander-ki-Rakhi	Fabaceae	Pods are sutures armed with hooked prickles, flower pink.
18	*Parkinsonia aculeata*	Kikar, vilayati-kikar	Fabaceae	Flower yellow, stamen 10, thorny shrub-small tree.
19	*Prosopis cineraria*	Khejdi	Fabaceae	Anther with gland (figure 2; I)
20	*Prosopis juliflora*	Vilayti babool	Fabaceae	Abundant, invasive species.
21	*Salvadora oleoides*	Meetha jaal, pilu	Salvadoraceae	Leaves elliptic-lanceolate, fruit yellow when ripped.
22	*Salvadora persica*	Jaal, khari-jaal	Salvadoraceae	Leaves elliptic-ovate, fruit white to red/ black when ripped. (figure 2; J)
23	*Tamarindus indica*	Imli	Fabaceae	Sepals white-yellowish, Petals pink; veined, stigma curved.
24	*Tecomella undulata*	Rohida	Bignoniaceae	Leaf blade wavy, flower orange with red veins (flowers change colour 2-3 times from opening to mature)
25	*Vitex negundo*	Nirgunthi	Lamiaceae	Flower pale violate, having good fragrance
26	*Withania somnifera*	Ashvagandha, ashgandh	Solanaceae	New twig densely hairy, Fruit red when ripped.
27	*Ziziphus mauritiana*	Bor	Rhamnaceae	Flower greenish-yellow, 5 stamen, style bifid and disc lobed.
28	*Justicia adhatoda*	Arusa/adusa	Acanthaceae	Lower lip of the corolla marked with red veins.
29	*Ailanthus excelsa*	Maharunk, ardu/arlu	Simaroubaceae	The root bark is used to cure epilepsy and heart trouble, other medicinal uses. [15]

** Rare, endemic forest tree of Indian Thar desert.

Note: The former genus *Acacia* divided into five genera [16], according to International Botanical Congress, July 2005; Vienna. Now all African *Acacia* falling under two genera, *Vachellia* and *Senegalia*.[17].

Table A 3 : Additional information on cultivated plants; including herb, shrub, climber, trees etc.

Serial no.	Botanical name	Common name	Family
1	*Abrus pictorious*	Chirmi	Fabaceae
2	*Aloe barbadinsis*	Gwarpatha, ghritkumari	Liliaceae
3	*Bombax ceiba*	Semhar	Bombacaceae
4	*Bougainvillea spp.*	Kagaj phool	Nyctaginaceae
5	*Callistemon citrinus*	Bottle brush	Myrtaceae
6	*Carissa carandas*	Kerunda	Apocynaceae
7	*Cascabela thevetia*	Peeli-kaner	Apocynaceaa
8	*Cassia fistula*	Amaltash	Fabaceae
9	*Catharanthus roseous*	Sadabahar	Apocynaceae
10	*Celastrus paniculatus*	Black oil plant	celastraceae
11	*Cissus quadrangularis*	Had-jod	Vitaceae
12	*Citrus*lemon*	Nimboo	Rutaceae
13	*Clitoria ternatea*	Blue pea	Fabaceae
14	*Colocasia spp.*	-	Araceae
15	*Crinum asiaticum*	Poison bulb	Amaryllidaceae
16	*Cycas spp.*~	-	Cycadaceae
17	*Delphinium ajacis*	Dog flower	Ranunculaceae
18	*Dianthus caryophyllus*	Carnation	Caryophyllaceae
19	*Dichrostychys cinerea*	-	Fabaceae
20	*Euphorbia pulchierrima*	Panch-ranga	Euphorbiaceae
21	*Euphorbia spp.*	-	Euphorbiaceae
22	*Hibiscus rosa-sinensis*	Gudd-hal	Malvaceae
23	*Jasminum grandiflorum*	Jasmin	Oleaceae
24	*Mitragyra spp.*	Kadamb	Rubiaceae
25	*Murreya koenigii*	Mitha-neem	Rutaceae
26	*Nilumbo nucifera*	Kamal	Nympheaceae
27	*Ocimum sanctum*	Tulsi	Lamiaceae
28	*Pandanus*	Kewda	Pandanaceae
29	*Petunia spp.*	-	Solanaceae
30	*Phoenix spp.*	khajur	Arecaceae
31	*Plumbago zeylanica*	Chitrak	Plumbaginaceae

32	*Pongamia pinnata*	Karanj	Fabaceae
33#	*Psilotum nodum*	-	Psilotaceae
34	*Tradescantia spathacea*	-	Commelinaceae
35	*Ricinus communis*	Arandi	Euphorbiaceae
36	*Dracaena angolensis*	cylindrical snake plant	Aspergaceae
37	*Dracaena trifasciata*	Snake plant	Aspergaceae
38	*Tecoma stans*	Yellow bells	Bignoniaceae
39	*Terminalia arjuna*	Arjun	Combretaceae
40	*Loropetalum spp.*	-	Hamamelidaceae
41	*Eucalyptus spp.*	Safeda, neelgiri	Myrtaceae
42	*Tabernaemontana divaricata*	Pinwheel flower	Apocynaceae
43	*Sonchus spp.*	-	Asteraceae

~ gymnosperm

IV. CONCLUSION

As mentioned above, having such a large space in the middle of the city means that many plant species are inhabited. Some plants are rarely found in the city such as *Acacia Senegal, Aerva javanica, Balanites roxburghii, Tecomella undulata*, etc. are present there. The most abundant family is Fabaceae. A total of 59 herbs (55 species) and climber (4 species; including a gymnosperm i.e. *Ephedra foliate* family Ephedraceae is commonly known as unth-phog) belonging to 23 different families were documented, that's why the corresponding author labeled New campus with the title 'The Homestead of Herbs'. 29 species of naturally occurring shrubs and tree were also listed. Rare, endemic forest tree of Indian Thar desert i.e. *Anogeissus sericea* var. *nummularia* and another critically endangered (CR) IUCN species i.e. *Commiphora wightii* common name guggal were also found [18]. 13 species of a very typical family i.e. Poaceae were also documented with the help of various literature. [19] [20]

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Figure 2 : A. *Mimosa hamata*; fruit (pod) B. *Echinops echinatus* C. *Argemone mexicana* D. *Evolvulus alsinoides* E. *Celocia argentiana* (inflorescence) F. *Convolvalus prostrates* G. *Ocimum gratissimum* H. *Senna alexandrina* I. *Prosopis cineraria;* anther glands at the tip of each anther J. *Salvadora persica;* fruit K. *Tetrapogon tenellus* L. *Ziziphus mauritiana*.

Figure 2: A,B,C,D,E,F,G,H and I

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