

Inventory of the Woody flora of Jammu University Campus, Jammu & Kashmir, India

Nitan Kumar Katoch

Research Scholar of Regional Institute of Management and Technology (RIMT), Punjab -147301, India

Email id: nitankatoch18@gmail.com

Sajan Thakur*

Corresponding Author

Dept. of Botany, University of Jammu, J&K, 180006, India

Email id: sajan0007thakur@gmail.com

Harish Chander Dutt*

Dept. of Botany, University of Jammu, J&K, 180006, India

Email id: hcdutt@rediffmail.com

Brij Bala

Regional Institute of Management and Technology (RIMT), Punjab -147301, India

Email id: mattoobalabrij777@gmail.com

Mamta Verma

Dept. of Botany, University of Jammu, J&K, 180006, India

Email id: vermamamta52@gmail.com

ABSTRACT:

In an attempt to reveal the diversity, status and composition of woody plant species, surveys were conducted in the Jammu University campus. The results indicate that the total number of woody plants in the campus include 225 species belonging to 176 genera and 76 families. Of which, 211 woody species distributed among 166 genera are represented by Angiosperms while 14 woody species belonging to 10 genera are of Gymnosperms. The flowering plants have been found to be dominant, indicating their potential to withstand less rainfall and high temperature in the campus. The present study reveals that Fabaceae, Lamiaceae, Apocynaceae, Malvaceae and Apocynaceae are the dominant families in the campus. Also, the number of exotic woody plant species exceeds over the native woody plantspecies. All the recorded species are appended with their habit, global IUCN threat and nativitystatus. The area forms an important green space in the urban environment of Jammu city in Union territory of Jammu & Kashmir, India. The urban green spaces having such rich woody plant diversity needs to be conserved so as to maintain a good environment and biodiversity.

Keywords: *Woody Flora, Western Himalaya, Angiosperm, Jammu University Campus*

INTRODUCTION

Plants producing wood as its structural tissue and having a hard stem are considered as woody plants. They may belong to different groups of pteridophytes, gymnosperms and angiosperms. Usually, they are trees, shrubs or woody climbers. Among the various components of biodiversity in a region, the plant species having a woody habit represents one of the dominant elements of the floristic wealth. These plants not only preserve the physical feature of the earth but prevent soil

erosion, mitigate floods and make the streams flow permeably and help in sustaining river flows. Additionally, they also provide shelter to various life forms and helps in maintaining of ecological balance (Bennie *et al.* 2008). In terrestrial ecosystems, plants are the key providers of biochemical energy and habitat structure (Mayer *et al.* 2016). Individually, woody plants constitute about 45–48% of global vascular flora (FitzJohn *et al.*, 2014). The occurrence of these plants directly affects the formation of whole communities. They also play a significant role in landscape sculpturing and in forest management. Furthermore, there are several studies which have shown a strong relationship between woody and non-woody species suggesting the possibility to use the woody flora as a surrogate of the total vascular flora of an area (Macía 2008, Abbate *et al.*, 2015). In one hand, the microclimatic conditions in the understorey, nutrient cycles and the resource distribution are affected by the tree canopy while on the other, tree canopy also determines features that control the richness and abundance of abiotic community (Molder *et al.*, 2008; Burrascano *et al.*, 2011; Abbate *et al.*, 2015). Hence, for these reasons, the knowledge of woody plants is of immense importance.

India is one of the 17 mega diverse countries of the world having forest area of 24.62% of the total geographical area and harbors a rich diversity of plants. It accounts for 8% of the global biodiversity with only 2.4% of the total land area in the world (Reddy, 2008; Hajra & Chauhan, 1997). The Himalaya, which is recognized as a global biodiversity hotspot by Mittermeier *et al.* (2005), Zachos & Habel (2011) is still under-explored in terms of biodiversity exploration. In India, there are several studies focussing on the floristic documentation of educational institutions. The important ones include Singh (2015), Dash *et al.* (2016), Nerlekar *et al.* (2016), Neelamegam *et al.* (2016) and Durairaj *et al.* (2021).

The union territory of Jammu & Kashmir is gifted with rich flora and fauna of vast scientific interest and economic value (Dar *et al.*, 2002; Dar & Khuroo 2013). As stated by Dar *et al.* (2012), this region is recognised as floristically under-explored by Botanical Survey of India. The first account of woody plants was published by Lambert (1933) in which he enumerated trees and shrubs for Kashmir and Jammu Forest circles. Afterwards, several floristic studies (Sharma & Kachroo 1981, 1982; Kapur & Sarin 1990; Swami & Gupta 1998; Bhellum & Magotra 2012; Malik *et al.*, 2015; Mughal *et al.*, 2017) dealing with diversity of plants have been carried out over the last few decades. More recently, Malik *et al.* (2010) have recorded 521 species of woody plants from union territory of Jammu & Kashmir. However, there is no inventory of woody plants from educational institutions. Therefore, to improve our knowledge towards understanding the woody flora in educational institutions, the present study was undertaken with an aim to facilitate the documentation of up-to-date woody plant diversity of the Jammu university campus.

MATERIALS AND METHODS

Study area

The great centre of learning University of Jammu informally known as Jammu University, was established in 1969 by an act of the state legislature which effectively split the Jammu and Kashmir University into the separate University of Jammu and University of Kashmir. The university is the first university in India to receive the ISO-9001 certification. Presently, the university has 36 departments and 157 affiliated colleges and offers undergraduate, postgraduate and doctoral programs in different streams. The university covers an area of 118.70 acres and is located at the foothills of Trikuta on the banks of the Tawi River and lies between 32.7194° N, 74.8681° E, at Baba Saheb Ambedkar Road in Jammu district at an altitude of

314 m. The area experiences subtropical climatic regimes. The temperature during the summer months is extremely high reaching 46°C and having June is the hottest month with average temperature of 40°C. In winter months, the temperature ranges between 4–25°C having January a coldest month with average temperature of 7°C. The average annual rainfall is about 1270 mm.

Methodology

The present study is primarily based on regular field visits to different spots of the campus for observation and collection of specimens at different seasons. All the collected specimens were dried, made as per standard methodology (Jain & Rao 1977) and identified with the help of available Floras (Sharma & Kachroo 1981, 1982; Kapur & Sarin (1990; Swami & Gupta 1998). The APG III (2016) classification was followed for arranging the taxa to families. The Voucher specimens are deposited in herbarium of Department of Botany, University of Jammu (HBJU). The latest nomenclatural changes have been incorporated in order to recognize the currently valid scientific name by following POW (2022).

Table 1: Representation of woody plants present in Jammu University Campus.

S. No.	Family and Name of the species	Habit	Global IUCN threat status	Nativity status
	Acanthaceae			
1.	<i>Dianthera ovata</i> Walter	ES	NE	Central and South East USA to Mexico
2.	<i>Eranthemum pulchellum</i> Andrews	ES	NE	Himalaya to Indo-China
3.	<i>Justicia adhatoda</i> L.	ES	NE	Afghanistan to Indo-China
4.	<i>Lepidagathis incurva</i> Buch.- Ham. ex D. Don	DS	NE	Tropical and subtropical Asia
5.	<i>Strobilanthes scabra</i> Nees	DS	NE	Assam to Indo-China
	Anacardiaceae			
6.	<i>Mangifera indica</i> L.	ET	DD	Assam to China
	Annonaceae			
7.	<i>Artabotrys blumei</i> Hook.f. & Thomsom	ET	NE	South China to Vietnam
8.	<i>Monoon longifolium</i> (Sonn.) B. Xue & R.M.K.Saunders	ET	NE	South India and Sri Lanka
	Apocynaceae			
9.	<i>Alstonia scholaris</i> (L.) R.Br.	ET	LC	Tropical and subtropical Asia to North Australia
10.	<i>Asclepias curassavica</i> L.	ES	NE	Mexico to tropical America
11.	<i>Calotropis gigantea</i> (L.) W.T.Aiton.	ES	NE	South China to tropical Asia
12.	<i>Carissa spinarum</i> L.	ES	LC	Africa to Indo-China and Australia to New Caledonia
13.	<i>Cascabela thevetia</i> (L.) Lippold	ET	LC	Mexico to South tropical America

14	<i>Nerium oleander L.</i>	ES	LC	Mediterranean
15	<i>Pergularia daemia (Forssk.) Chiov.</i>	ES	LC	South Africa to Arabian Peninsula and Iran to Indo China
16	<i>Plumeria rubra L.</i>	ET	LC	Mexico to Venezuela
17	<i>Rauvolfia serpentina (L.) Benth. ex Kurz.</i>	ES	NE	Indian subcontinent to South central China and Malaysia
18	<i>Tabernaemontana divaricata (L.) R.Br.</i>	ET	LC	Himalaya to China and Indo China
19	<i>Vallisneria spiralis (L.) Kuntze</i>	ES	NE	Indian subcontinent to Indo-China
	Araceae			
20	<i>Monstera deliciosa Liebm.</i>	EC	NE	Mexico to Central America
	Araliaceae			
21	<i>Tetrapanax papyrifer (Hook.) K.Koch</i>	ES	NE	Central and South China and Taiwan
	Araucariaceae			
22	<i>Agathis robusta (C.Moore ex F.Muell.) F.M.Bailey</i>	ET	LC	Papua New Guinea to Bismarck Archipelago, East Queensland
23	<i>Araucaria araucana (Molina) K.Koch</i>	ET	EN	Argentina and Chile
24	<i>Araucaria bidwillii Hook.</i>	ET	LC	Queensland
25	<i>Araucaria columnaris (G.Forst.) Hook.</i>	ET	LC	South east New Caledonia
	Arecaceae			
26	<i>Bismarckia nobilis Hildebrandt & H.Wendl.</i>	ET	LC	North west Madagascar
27	<i>Roystonea regia (Kunth) O.F.Cook</i>	ET	LC	South Florida, Mexico to Central America
	Asparagaceae			
28	<i>Agave americana L.</i>	ES	LC	South USA to Mexico
29	<i>Agave attenuata Salm-Dyck</i>	ES	LC	West and Central Mexico
30	<i>Agave demeesteriana Jacobi</i>	ES	NE	Mexico
31	<i>Agave vivipara L.</i>	ES	VU	Aruba, Bonaire, Curacao
32	<i>Nolina parviflora (Kunth) Hemsl.</i>	ET	VU	Mexico
33	<i>Ruscus hypophyllum L.</i>	ES	LC	East and South Spain, South East Sicilia, North west Africa
34	<i>Yucca aloifolia L.</i>	ES	DD	South East Texas to South East USA, Bermuda, Central and South Mexico
35	<i>Yucca filamentosa L.</i>	ES	LC	West Virginia to South East USA
	Asteraceae			
36	<i>Artemisia scoparia Waldst. & Kit.</i>	DS	NE	Eurasia

37	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	ES	NE	Tropical and subtropical America
38	<i>Xanthium strumarium</i> L.	ES	NE	North America, South America, Peru to Brazil
	Berberidaceae			
39	<i>Berberis lycium</i> Royle	DS	NE	East Afghanistan to Central Himalaya and North West India
	Bignoniaceae			
40	<i>Handroanthus chrysotrichus</i> (Mart. Ex DC.) Mattos	DT	NE	Brazil to North East Argentina
41	<i>Jacaranda mimosifolia</i> D.Don	DT	VU	Bolivia to North West Argentina
42	<i>Oroxylum indicum</i> (L.) Kurz	DT	NE	South China to tropical Asia
43	<i>Tecoma stans</i> (L.) Juss. & Kunth	ET	LC	Tropical and subtropical America
	Boraginaceae			
44	<i>Cordia superba</i> Cham.	DT	LC	Brazil
45	<i>Ehretia aspera</i> Willd.	DT	DD	Pakistan to Hainan and Peninsular Malaysia
	Cactaceae			
46	<i>Opuntia elatior</i> Mill.	ES	LC	South Caribbean, Costa Rica to Venezuela
	Calophyllaceae			
47	<i>Mesua ferrea</i> L.	ET	NE	Indian subcontinent to Indo-China and West & Central Malaysia
	Capparaceae			
48	<i>Capparis sepiaria</i> L.	ES	LC	India to China and North Australia
	Caprifoliaceae			
49	<i>Lonicera japonica</i> Thunb.	EC	NE	China to temperate East Asia
	Caricaceae			
50	<i>Carica papaya</i> L.	ET	DD	South Mexico to Venezuela
	Casuarinaceae			
51	<i>Casuarina equisetifolia</i> subsp. <i>equisetifolia</i> L.	ET	LC	India to Western Pacific
	Celastraceae			
52	<i>Euonymus japonicus</i> Thunb.	ES	NE	Korea and Japan
	Combretaceae			
53	<i>Combretum indicum</i> (L.) DeFilipps	DS	NE	Tanzania, Tropical and subtropical Asia to North America
54	<i>Terminalia arjuna</i> (Roxb. Ex DC.) Wight & Arn.	ET	NE	Indian subcontinent
55	<i>Terminalia chebula</i> Retz.	ET	LC	Indian subcontinent to China and Indo-China
	Convolvulacea			
56	<i>Ipomoea carnea</i> Jacq.	DS	NE	Mexico to South tropical America

	<i>Cupressaceae</i>			
57	<i>Hesperocyparis arizonica</i> (Greene) Bartel	ES	LC	Central and South East Arizona to West Texas and North Mexico
58	<i>Juniperus communis</i> L.	ES	LC	Subarctic and temperate northern hemisphere
59	<i>Platycladus orientalis</i> (L.) Franco	ET	NT	Russian Far East to East Central China and Korea
60	<i>Taxodium distichum</i> var. <i>mexicanum</i> (Carrière) Gordon & Glend.	ET	LC	South Texas to Guatemala
	Cycadaceae			
61	<i>Cycas circinalis</i> L.	ES	EN	South India
62	<i>Cycas revoluta</i> Thunb.	ES	LC	Japan
63	<i>Cycas rumphii</i> Miq.	ES	NT	South Borneo to New Guinea and Ashmore Reef
	Dilleniaceae			
64	<i>Dillenia indica</i> L.	ET	LC	India to China and West and Central Malaysia
	Ebenaceae			
65	<i>Diospyros montana</i> Roxb.	DT	NE	Tropical Asia
	Elaeagnaceae			
66	<i>Elaeagnus umbellata</i> Thunb.	DS	NE	Afghanistan to Temperate East Asia
	Elaeocarpaceae			
67	<i>Elaeocarpus angustifolius</i> Blume	ET	LC	Himalaya to China and South West Pacific
	Ephedraceae			
68	<i>Ephedra ciliata</i> Fisch. & C.A.Mey.	ES	LC	North Africa to India
	Euphorbeaceae			
69	<i>Euphorbia royleana</i> Boiss.	DS	NE	Pakistan to China, Taiwan
70	<i>Euphorbia milii</i> Des Moul.	DS	LC	Madagascar
71	<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch	DS	LC	USA
72	<i>Jatropha curcas</i> L.	DS	LC	Mexico to Tropical America
73	<i>Jatropha rosea</i> Radcl.-Sm.	DS	NE	Somalia
74	<i>Ricinus communis</i> L.	DS	NE	North East Tropical Africa
	Fabaceae			
75	<i>Abrus precatorius</i> L.	DC	NE	Tropical and Subtropical Old World to North and East Australia
76	<i>Albizia chinensis</i> (Osbeck) Merr.	DT	NE	South China to Tropical Asia
77	<i>Albizia lebbek</i> (L.) Benth.	DT	LC	Indian subcontinent to Myanmar

78	<i>Bauhinia variegata L.</i>	ET	LC	Indian subcontinent to China
79	<i>Butea monosperma (Lam.) Kuntze</i>	DT	LC	Indian subcontinent to China and Indo-China
80	<i>Cassia fistula L.</i>	DT	LC	Indian subcontinent to Myanmar
81	<i>Clitoria ternatea L.</i>	DS	NE	Cape Verde, Tropical and South Africa, Arabian Peninsula
82	<i>Crotalaria breviflora DC.</i>	DS	NE	Bolivia to Brazil
83	<i>Crotalaria grahamiana Wight and Arn.</i>	DS	NE	South West India
84	<i>Crotalaria juncea L.</i>	DS	NE	Afghanistan to Indo-China
85	<i>Crotalaria ochroleuca G.Don.</i>	DS	NE	Tropical and South Africa
86	<i>Dalbergia lanceolaria subsp. paniculata (Roxb.) Thoth.</i>	DT	NE	Indian subcontinent to Indo-China
87	<i>Dalbergia sissoo Roxb. ex DC.</i>	DT	LC	South Arabian Peninsula to Myanmar
88	<i>Delonix regia (Bojer ex Hook.) Raf.</i>	DT	LC	Madagascar
89	<i>Enterolobium cyclocarpum (Jacq.) Griseb.</i>	DT	LC	Mexico to South Tropical America
90	<i>Erythrina variegata L.</i>	DT	LC	Tanzania to Pacific
91	<i>Leucaena leucocephala (Lam.) de Wit</i>	DT	NE	Mexico to Central America
92	<i>Mimosa pudica L.</i>	DS	LC	Mexico o Brazil
93	<i>Mimosa rubicaulis L.</i>	DS	NE	Indian subcontinent
94	<i>Phanera vahlii (Wight & Arn.) Benth.</i>	DT	NE	Indian subcontinent
95	<i>Pithecellobium dulce (Roxb.) Benth.</i>	DT	LC	Mexico to Guyana and Peru
96	<i>Senegalia modesta (Wall.) P.J.H.Hurter</i>	DT	NE	East Afghanistan to North India
97	<i>Senna occidentalis (L.) Link.</i>	DT	NE	Tropical and subtropical America
98	<i>Senna sulfurea (DC. ex Collad.) H.S.Irwin & Barneby</i>	DS	NE	Indian subcontinent to Indo-China, North Australia
99	<i>Senna tora (L.) Roxb.</i>	DS	NE	Central America
100.	<i>Tamarindus indica L.</i>	DT	LC	Madagascar
101.	<i>Vachellia nilotica (L.) P.J.H.Hurter & Mabb.</i>	DT	LC	Africa to India and Myanmar
	Fagaceae			
102.	<i>Quercus baloot Griff.</i>	DT	LC	Afghanistan to Western Himalaya
	Ginkgoaceae			

10 3.	<i>Ginkgo biloba L.</i>	DT	EN	South East China
	Lamiaceae			
10 4.	<i>Callicarpa macrophylla Vahl</i>	DS	LC	Tropical and subtropical Asia to Queensland
10 5.	<i>Clerodendrum chinense (Osbeck) Mabb.</i>	DS	LC	India to South China and Malaysia
10 6.	<i>Clerodendrum splendens G.Don</i>	DS	NE	West Tropical Africa to Angola
10 7.	<i>Colebrookea oppositifolia Sm.</i>	DS	NE	Pakistan to China
10 8.	<i>Coleus scutellarioides (L.) Benth.</i>	DS	NE	Indo-China and North Australia
10 9.	<i>Gmelina arborea Roxb. ex Sm.</i>	DT	LC	Indian subcontinent to South China
11 0.	<i>Holmskioldia sanguinea Retz.</i>	DS	NE	Indian subcontinent to Myanmar
11 1.	<i>Isodon rugosus (Wall. ex Benth.) Codd</i>	DS	NE	Oman, East Afghanistan to Bangladesh
11 2.	<i>Ocimum basilicum L.</i>	DS	NE	India to Australia
11 3.	<i>Ocimum tenuiflorum L.</i>	DS	NE	India to Australia
11 4.	<i>Pogostemon benghalensis (Burm.f.) Kuntze</i>	DS	NE	Pakistan to Indo-China
11 5.	<i>Premna serratifolia L.</i>	DS	LC	East Africa, Madagascar, Indo-China to Australia
11 6.	<i>Scutellaria scandens D.Don</i>	DS	NE	Indian Himalaya
11 7.	<i>Tectona grandis L.f.</i>	DT	NE	India to Vietnam
11 8.	<i>Vitex negundo L.</i>	DS	LC	South Somalia to Mozambique, Indian subcontinent, Iran to Japan and Marianas
11 9.	<i>Volkameria inermis L.</i>	DS	NE	Tropical and subtropical Asia to West Pacific
	Lauraceae			
12 0.	<i>Cinnamomum camphora (L.) J.Presl</i>	ET	NE	Korea, West Central and South Japan to East and South Taiwan
	Linaceae			
12 1.	<i>Reinwardtia indica Dumort.</i>	DS	NE	Indian subcontinent to South China and Indo-China
	Loranthaceae			
12 2.	<i>Dendrophthoe falcata (L.f.) Ettingsh.</i>	ES	NE	Indian subcontinent
	Lythraceae			
12 3.	<i>Lagerstroemia indica L.</i>	DT	LC	Central Himalaya to South China and Indo-China
12 4.	<i>Lagerstroemia speciosa (L.) Pers.</i>	DT	NE	China to tropical Asia
12 5.	<i>Lawsonia inermis L.</i>	ET	LC	North East Tropical Africa, Arabian Peninsula, South Pakistan to India
12	<i>Punica granatum L.</i>	DT	LC	North East Turkey and North Pakistan

6.				
	Magnoliaceae			
12 7.	<i>Magnolia grandiflora L.</i>	ET	LC	South East USA to Texas
	Malvaceae			
12 8.	<i>Abutilon indicum (L.) Sweet</i>	DS	NE	North West Africa, Madagascar, Tropical and subtropical Asia to West Pacific
12 9.	<i>Bombax ceiba L.</i>	DT	LC	Tropical and subtropical Asia to North Australia
13 0.	<i>Ceiba insignis (Kunth) P.E.Gibbs & Semir</i>	DT	NE	South Ecuador, North Peru
13 1.	<i>Grewia asiatica L.</i>	DT	LC	South Iran to Queensland
13 2.	<i>Grewia optiva J.R.Drumm. ex Burret</i>	DT	NE	Indian subcontinent
13 3.	<i>Hibiscus rosa-sinensis L.</i>	ES	NE	West Tropical Africa to North West Angola
13 4.	<i>Hibiscus schizopetalus (Mast.) Hook.f.</i>	ES	NE	South East Kenya to East Tanzania
13 5.	<i>Pterospermum acerifolium (L.) Willd.</i>	ET	LC	Nepal to China and Malaysia
13 6.	<i>Pterygota alata (Roxb.) R.Br.</i>	DT	NE	Indian subcontinent to China and Sumatra
13 7.	<i>Sida rhombifolia L.</i>	DS	NE	Tropical and subtropical Old World
13 8.	<i>Urena lobata L.</i>	DS	LC	South America to Indian subcontinent and Indo-China
	Meliaceae			
13 9.	<i>Azadirachta indica A. Juss.</i>	DT	LC	Assam to Indo-China
14 0.	<i>Melia azedarach L.</i>	DT	LC	Tropical and subtropical Asia to North and East Australia
14 1.	<i>Toona hexandra (Wall.) M.Roem.</i>	DT	LC	South China to Tropical Asia
	Menispermaceae			
14 2.	<i>Tinospora cordifolia (Willd.) Hook.f. & Thomson</i>	DC	NE	Indian subcontinent to Indo-China
	Moraceae			
14 3.	<i>Artocarpus heterophyllus Lam.</i>	ET	NE	South West India
14 4.	<i>Broussonetia papyrifera (L.) L'Hér. ex Vent.</i>	DS	LC	Indian subcontinent to China
14 5.	<i>Ficus benghalensis L.</i>	ET	NE	Indian subcontinent
14 6.	<i>Ficus benjamina L.</i>	ET	LC	Tropical and subtropical Asia and North Australia
14 7.	<i>Ficus elastica Roxb. ex Hornem.</i>	ET	NE	Nepal to China and West Malaysia
14 8.	<i>Ficus hispida L.f.</i>	ET	LC	South China to Tropical Asia and North Australia
14 9.	<i>Ficus krishnae C.DC.</i>	ET	NE	India

15 0.	<i>Ficus pumila L.</i>	EC	NE	Central and South China to Temperate East Asia and Indo-China
15 1.	<i>Ficus religiosa L.</i>	DT	NE	South East Pakistan to Myanmar
15 2.	<i>Morus alba L.</i>	DT	LC	Central China
15 3.	<i>Morus nigra L.</i>	DT	NE	West and South West Iran
15 4.	<i>Ficus palmata Forssk.</i>	ET	NE	South East Egypt to North East Tropical Africa and Arabian Peninsula
	Moringaceae			
15 5.	<i>Moringa oleifera Lam.</i>	DT	LC	North East Pakistan to North West India
	Myrtaceae			
15 6.	<i>Eucalyptus globulus Labill.</i>	DT	LC	New South Wales, Tasmania, Victoria
15 7.	<i>Melaleuca armillaris (Sol. ex Gaertn.) Sm.</i>	ET	LC	South East Australia
15 8.	<i>Melaleuca viminalis (Sol. ex Gaertn.) Byrnes</i>	ET	LC	Queensland to New South Wales
15 9.	<i>Psidium guajava L.</i>	DT	LC	Tropical and subtropical America
16 0.	<i>Syzygium jambos (L.) Alston</i>	ET	LC	Himalaya to China and West Malaysia
	Nyctaginaceae			
16 1.	<i>Bougainvillea glabra Choisy</i>	DS	LC	East and South Brazil
16 2.	<i>Bougainvillea spectabilis Willd.</i>	DS	NE	East and South Brazil
	Oleaceae			
16 3.	<i>Chrysojasminum humile (L.) Banfi</i>	DS	NE	South Iran to Central China and North Myanmar
16 4.	<i>Forsythia europaea Degen & Bald.</i>	DS	NE	Montenegro to North Albania
16 5.	<i>Jasminum auriculatum Vahl</i>	DS	NE	Indian subcontinent
16 6.	<i>Jasminum officinale L.</i>	DS	NE	Transcaucasia to South Central China
16 7.	<i>Jasminum sambac (L.) Aiton</i>	DS	NE	Bhutan to India
16 8.	<i>Ligustrum nepalense Wall.</i>	DT	NE	Himalaya to North Myanmar
16 9.	<i>Nyctanthes arbor-tristis L.</i>	DS	NE	Himalaya to Indo-China, Sumatera to Java
17 0.	<i>Olea europaea subsp. cuspidata (Wall. & G.Don) Cif.</i>	DT	DD	South Africa, Arabian Peninsula to China
17 1.	<i>Olea paniculata R.Br.</i>	DT	NE	Indian subcontinent to China and South West Pacific
	Paulowniaceae			
17 2.	<i>Paulownia tomentosa (Thunb.) Steud.</i>	DT	NE	Central and East China, South Korea
	Phyllanthaceae			

17 3.	<i>Phyllanthus emblica L.</i>	DT	LC	Tropical and subtropical Asia
	Pinaceae			
17 4.	<i>Pinus roxburghii Sarg.</i>	ET	LC	Pakistan to Himalaya and North West India
	Pittosporaceae			
17 5.	<i>Pittosporum eriocarpum Royle</i>	DT	EN	West Central Himalaya to North West India
	Plantaginaceae			
17 6.	<i>Russelia equisetiformis Schltdl. & Cham.</i>	DS	NE	Mexico
	Platanaceae			
17 7.	<i>Platanus orientalis L.</i>	DT	DD	South East Europe and South West Asia
	Plumbaginaceae			
17 8.	<i>Plumbago indica L.</i>	ES	NE	Indian subcontinent to China and Malaysia
	Poaceae			
17 9.	<i>Arundo donax L.</i>	DS	LC	West and Central Asia to Temperate East Asia
18 0.	<i>Bambusa bambos (L.) Voss</i>	ET	NE	Indian subcontinent to Indo-China
	Podocarpaceae			
18 1.	<i>Podocarpus nerifolius D.Don</i>	ET	LC	Nepal to West and Central Malaysia
	Proteaceae			
18 2.	<i>Grevillea robusta A.Cunn. ex R.Br.</i>	ET	LC	South West Wales, Queensland
	Putranjivaceae			
18 3.	<i>Putranjiva roxburghii Wall.</i>	ET	LC	Tropical Asia
	Ranunculaceae			
18 4.	<i>Clematis napaulensis DC.</i>	DC	NE	Himalaya to North Myanmar
	Rhamnaceae			
18 5.	<i>Ziziphus oxyphylla Edgew.</i>	DS	NE	East Afghanistan to West Nepal
	Rosaceae			
18 6.	<i>Prunus domestica L.</i>	DT	DD	Turkey
18 7.	<i>Prunus persica (L.) Batsch</i>	DT	NE	North Central China
18 8.	<i>Pyrus pashia Buch.-Ham. ex D.Don</i>	DT	LC	Iran to South Central China and Indo-China
18 9.	<i>Rhaphiolepis bibas (Lour.) Galasso & Banfi</i>	DT	NE	China
19 0.	<i>Rosa indica L.</i>	DS	NE	South China to North Indo-China, Taiwan
	Rubiaceae			
19 1.	<i>Gardenia jasminoides J. Ellis</i>	ES	NE	Indo-China to South Japan
19	<i>Hamelia patens Jacq.</i>	ES	LC	Tropical and subtropical America

2.				
19 3.	<i>Himalrandia tetrasperma</i> (Wall. ex Roxb.)	DS	NE	East Afghanistan to Assam
19 4.	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	ET	NE	South China to Tropical Asia
19 5.	<i>Spermadictyon suaveolens</i> Roxb.	DS	NE	Indian subcontinent
	Rutaceae			
19 6.	<i>Aegle marmelos</i> (L.) Corrèa	DT	NT	Indian subcontinent
19 7.	<i>Citrus aurantium</i> L.	ET	NE	A hybrid plant introduced all over the world
19 8.	<i>Citrus limon</i> (L.) Osbeck	ET	NE	A hybrid plant introduced all over the world
19 9.	<i>Citrus medica</i> L.	ET	NE	West Central Himalaya to Myanmar
20 0.	<i>Murraya koenigii</i> (L.) Spreng.	DS	NE	Indian subcontinent to China
	Salicaceae			
20 1.	<i>Flacourtia indica</i> (Burm.f.) Merr.	DT	LC	Ethiopia to South Africa, south East China to tropical Asia
20 2.	<i>Populus alba</i> L.	DT	LC	Central and South Europe to Xinjiang and West Himalaya
20 3.	<i>Populus deltoides</i> W.Bartram ex Marshall	DT	LC	Central and East Canada to Mexico
20 4.	<i>Salix alba</i> L.	DT	LC	Europe to North China, north West Africa
	Santalaceae			
20 5.	<i>Santalum album</i> L.	ET	VU	Jawa to North Australia
	Sapindaceae			
20 6.	<i>Litchi chinensis</i> Sonn.	DT	NE	China to Peninsular Malaysia, Borneo, Philippines
	Sapotaceae			
20 7.	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr.	ET	NE	Nepal, India, Sri Lanka, Bangladesh
	Scrophulariaceae			
20 8.	<i>Buddleja asiatica</i> Lour.	ES	LC	Central and south China to tropical Asia
20 9.	<i>Buddleja paniculata</i> Wall.	DS	NE	Nepal to South China and north Indo-China
	Simaroubaceae			
21 0.	<i>Simarouba glauca</i> DC.	ET	LC	Florida to Caribbean, Mexico to Central America
	Smilacaceae			
21 1.	<i>Smilax rotundifolia</i> L.	DC	NE	East Canada to Central and East USA
	Solanaceae			
21 2.	<i>Brugmansia suaveolens</i> (Humb. & Bonpl. ex Willd.) Sweet	ES	EW	Brazil
21 3.	<i>Brunfelsia pauciflora</i> (Cham. & Schltdl.) Benth.	DS	LC	Brazil

21 4.	<i>Cestrum diurnum L.</i>	ES	LC	South Florida to Caribbean, Mexico
21 5.	<i>Cestrum nocturnum L.</i>	ES	LC	Mexico to Venezuela
21 6.	<i>Solanum erianthum D.Don</i>	DS	NE	Tropical and subtropical America
21 7.	<i>Solanum virginianum L.</i>	DS	NE	North East Tropical Africa, Arabian Peninsula, South Iran to South Central China and Indo-China
	Strelitziaceae			
21 8.	<i>Ravenala madagascariensis Sonn.</i>	ET	LC	North and East Madagascar
	Tamaricaceae			
21 9.	<i>Tamarix aphylla (L.) H.Karst.</i>	DT	NE	Sahara to India
	Urticaceae			
22 0.	<i>Debregeasia saeneb (Forssk.) Hepper & J.R.I.Wood</i>	ES	NE	North East Tropical Africa to Indian subcontinent
	Verbenaceae			
22 1.	<i>Duranta erecta L.</i>	ES	LC	South Florida to Caribbean, Mexico to North America
22 2.	<i>Lantana camara L.</i>	ES	NE	Mexico to Tropical America
22 3.	<i>Petrea volubilis L.</i>	EC	NE	Florida, Mexico to Tropical America
22 4.	<i>Verbena officinalis L.</i>	ES	LC	Old world to Australia
	Zamiaceae			
22 5.	<i>Zamia pygmaea Sims</i>	ES	EN	West Cuba

DT = Deciduous tree, ET = Evergreen tree; DS = Deciduous shrub; ES = Evergreen shrub; DC = Deciduous climber, EC = Evergreen climber.

CR=Critically endangered; VU=Vulnerable; NE =Not Evaluated; LC=Least Concern; NT=Near Threatened; EN=Endangered; DD=Data Deficient; EW=Extinct in the Wild.

Figure 1. Representation of different growth forms of woody plants present in Jammu University Campus.

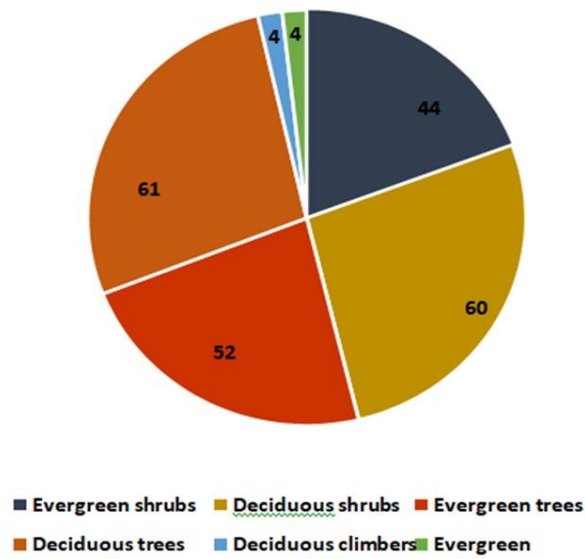


Figure 2. Representation of different conservation categories of woody plants encountered in Jammu University Campus.

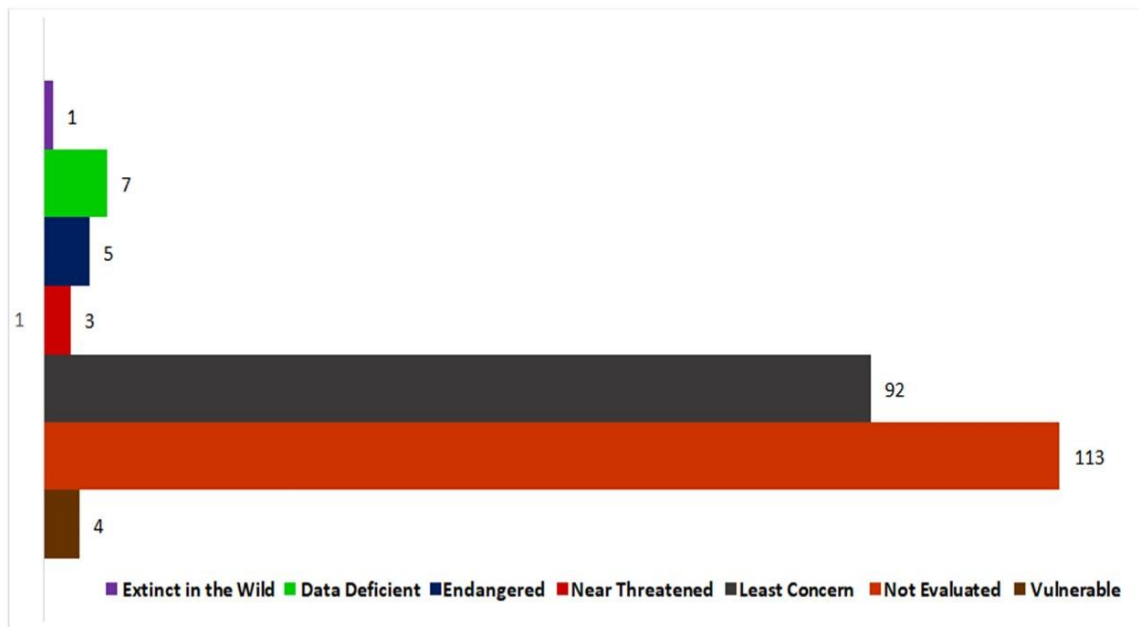
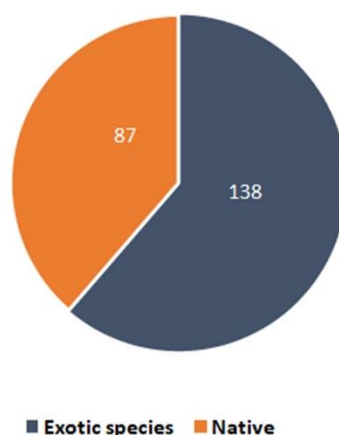


Figure 3. Representation of number of exotic and native species known from Jammu University Campus.

RESULTS AND DISCUSSION

Present investigation revealed that the woody flora of Jammu University Campus comprises 225 species belonging to 176 genera and 76 families which represent an extensive collection in a small area. Among the recorded woody species, 211 species distributed among 166 genera are represented by Angiosperms while 14 species belonging to 10 genera are of Gymnosperms (Table 1). With reference to different growth forms, the deciduous trees, evergreen trees, deciduous shrubs, evergreen shrubs, deciduous climbers and evergreen climbers are represented by 61 (27.11%), 52 (23.11%), 60 (26.66%), 44 (19.55%), 4 (1.77%)

and 4 (1.77%) species, respectively (Fig. 1). Among angiosperms, Fabaceae with 27 species emerges out to be the largest family followed by Lamiaceae (16), Moraceae (12), Apocynaceae and Malvaceae being represented by 11 species each are the dominant families in the campus. However, among gymnosperms, Araucariaceae and Cupressaceae each being represented by four species are largest families followed by Cycadaceae (3), while Ephedraceae, Ginkgoaceae and Pinaceae are represented by one species each, respectively. Considering the conservation strategy, 92 (40.88%) species have been found to be least concern (LC), 4 (1.77%) species fall under vulnerable (VU), 5 (2.22%) species are endangered (EN), 3 (1.33%) species are nearly threatened (NT), while rest of the species fall under different conservation categories (Fig. 2). It has also been observed that the number of exotic (138) woody plant species exceeds over the native (87) woody species (Fig. 3).

Khan et. al (2021) revealed the occurrence of a total of 917 species belonging to 574 genera and 145 families of vascular plants in Jahangir Nagar University campus, Bangladesh. Of these 70.34% species were wild rest were planted and 63.79% of species were native and 36.21% were exotic to Bangladesh. Similarly, 183 exotic plant species belonging to 149 genera and 58 families were described by Singh (2011) from Banaras Hindu University. Although, main campus of University of Jammu is not a protected area but it is enriched with conspicuous woody plant diversity. This can be explained by the fact that this composition is being made by undertaking several plantation programmes and management practices over last few decades.

CONCLUSION

It can be concluded from the study that Jammu University main campus harbors a great diversity of woody plant species dominated by angiosperms. The university campus is dominated by families Fabaceae, Lamiaceae, Apocynaceae, Malvaceae and Apocynaceae. The number of exotic woody plant species exceeds over the native woody plant species, and the woody plants of tree habit dominate over the other habit forms in the university campus. Thus, the campus is a suitable habitat for the conservation of endangered and threatened plant species. The baseline data generated through this investigation will of immense use to faculties, students of biology, environment studies, natural resource departments and conservation strategists.

ACKNOWLEDGEMENTS

The authors are indebted to Head, Department of Botany, University of Jammu, for providing necessary facilities during the course of this study.

Conflict of interest statement

All the authors declare that they have no conflict of interest.

REFERENCES

- APG IV. (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: *Botanical journal of the Linnean Society*, 181(1): 1–20.
- Abbate, G., Bonacquisti, S., Burrascano, S., Giovi, E., Giuliani, A., Pretto, F. & Scassellati, E. (2015) Woody flora as a predictor of vascular plant richness: an insight in Italy. *Plant Biosystems* 149: 565–573. <https://doi.org/10.1080/11263504.2013.870251>
- Bennie, J., B. Huntley, A. Wiltshire, M. O. Hill & R. Baxter (2008). Slope, aspect and climate: Spatially explicit and implicit models of topographic microclimate in chalk grassland. *Ecological Modeling* (1): 47-59.
- Bhellum, B.L & Magotra, R. (2012). A Catalogue of Flowering Plants of Doda, Kishtwar and Ramban Districts (Kashmir Himalayas). Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Burrascano, S., Sabatini, F.M. & Blasi, C. (2011) Testing indicators of sustainable forest management on understory composition and diversity in southern Italy through variation partitioning. *Plant Ecology* 212: 829–841. <https://doi.org/10.1007/s11258-010-9866-y>
- Dar, G.H. & Khuroo, A.A. (2013). Floristic diversity in the Kashmir Himalaya: progress, problems and prospects. *Sains Malaysia* 42(10): 1377–1386.
- Dar, G.H. Bhagat, R.C. & Khan, M.A. (2002). Biodiversity of the Kashmir Himalaya. Valley Book House, Srinagar, India.
- Dar, G.H., Khuroo, A.A. Reddy, C.S. & Malik, A. H. (2012). Impediment to taxonomy and its impact on biodiversity science: an Indian perspective. *Proceedings of the National Academy of Sciences India, Section Biological Sciences*. 82: 235–240.

- Durairaj, Manogar & Morvinyabesh (2021). Floristic Survey in the Campus of Nehru Memorial College, Puthanampatti Tiruchirapalli Tamilnadu South India. *International Journal of Innovative Research in Technology*, 8 (5): 466–474.
- FitzJohn, R.G., Pennell, M.W., Zanne, A.E., Stevens, P.F., Tank, D.C. & Cornwell, W.K. (2014) How much of the world is woody? *Journal of Ecology* 102: 1266–1272. <https://doi.org/10.1111/1365-2745.12260>
- Hajra, P. K., & Chauchan, A. S. (1997). Plant diversity hotspots in India: An overview. *Botanical Survey of India, Ministry of Environment & Forests*.
- Jain, S.K. & Rao R.R. (1977). *A Handbook of Field and Herbarium Methods*. Today and Tomorrow Printers and Publishers, New Delhi.
- Kapur, S.K. & Sarin, Y.K. (1990). *Flora of Trikuta Hills (Shri Vaishno Devi Shrine)*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Khan, S.A., Sultana, S., Hossain, G.M., Shetu, S. & Rahim, M.A. (2021). Floristic composition of Jahangirnagar University Campus - A semi-natural area of Bangladesh. *Bangladesh Journal of Plant Taxonomy* 28(1): 27-60.
- Lambert, W.J. (1933). List of trees and shrubs for Kashmir and Jammu Forest circles, Jammu and Kashmir State. *Forest Bulletin* 80: 1–36.
- Malik, A. H., Khuroo, A. A., Dar, G. H., & Khan, Z. S. (2010). The woody flora of Jammu and Kashmir State, India: an updated checklist. *Journal of Economic and Taxonomic Botany*, 34(2), 274–297.
- Malik, A.H., Rashid, I., Ganie, A.H., Khuroo, A.A. & Dar, G.H. (2015). Benefitting from geoinformatics: estimating floristic diversity of Warwan valley in northwestern Himalaya, India. *Journal of Mountain Science* 12(4): 854–863.
- Mayer, C., Weigelt, P. & Kreft, H. (2016). Multidimensional biases, gaps and uncertainties in global plant occurrence information. *Ecology Letters* 19: 992–1006. <https://doi.org/10.1111/ele.12624>
- Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. & Da Fonseca, G.A.B. (2005). *Hotspots Revised: Earth's biologically richest and most threatened terrestrial ecoregions*. University of Chicago Press. pp. 392.
- Molder, A., Bernhardt-Romermann, M. & Schmidt, W. (2008) Herbivore diversity in deciduous forests: raised by tree richness or beaten by beech? *Forest Ecology and Management* 256: 272–281. <https://doi.org/10.1016/j.foreco.2008.04.012>
- Mughal, R., Malik, A. H., Dar, G. H., & Khuroo, A. A. (2017). Woody Flora of Poonch District in Pir Panjal Himalaya (Jammu & Kashmir), India. *Pleione*, 11(2), 367–388.
- Neelamegam, R., Preetha, M. M., Priya, K., Sathiyar, B., & Vanaja, L. (2016). Woody Species Composition and Diversity Analysis in the ST Hindu College Campus Located at Nagercoil, Kanniyakumari District, Tamil Nadu, India. *International Journal of Pure & Applied Biosciences* 4(6), 193-203.
- Nerlekar, A.N., S.A. Lapalika, A.A. Onkar, S.L. Laware & M.C. Mahajan (2016). Flora of Fergusson College campus, Pune, India: monitoring changes over half a century. *Journal of*

- Threatened Taxa 8(2): 8452–8487. <http://dx.doi.org/10.11609/jott.1950.8.2>.
- POWO (2022). "Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.plantsoftheworldonline.org/> Retrieved 28 December 2022.
- Reddy C S (2008). Catalogue of invasive alien flora of India. Life science Journal, 5: 84-89.
- Sharma, B.M. & Kachroo, P. (1981). Flora of Jammu and Plants of Neighbourhood, Vol. 1. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Sharma, B.M. & Kachroo, P. (1982). Flora of Jammu and Plants of Neighbourhood, Vol. 2, Illustrations. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Singh, A. (2011). Exotic flora of the Banaras Hindu University Main Campus, India. Journal of Ecology and the Natural Environment, 3(10): 337-343
- Singh, A. (2015). Woody Plant Diversity of Banaras Hindu University Main Campus, India. International Journal of Research, 2(8): 25-35.
- Swami, A. & Gupta, R.K. (1998). Flora of Udhampur. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Zachos, F.E. & Habel, J.C. (2011). Biodiversity Hotspots: Distribution and Protection of Conservation Priority Areas. Springer-Verlag, Berlin, Heidelberg.