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RESEARCH ARTICLE

Biodiversity of Woody Species in Kamla Nehru Institute of Physical & Social Sciences, Sultanpur U.P. India

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ABSTRACT

A study was conducted to explore the woody species diversity of Kamla Nehru Institute of Physical & Social Sciences (KNIPSS) main campus spreading over approx. 45 acre of land area. Data was derived from extensive field survey. Identification of the woody species was done using local floras and various external resources. A total of 43 woody species belonging to 24 families is represented in study area. The 39 species were represented as angiosperm and 04 species as represented as gymnosperm respectably. Result showed that 17 families consists of only 1 species each, 2 families have 2 species each respectively. Of the total species, available in campus 30 are native and 13 are exotic. The Apocynaceae, Caesalpiniaceae and Moraceae were the dominant families of the woody species on the KNIPSS main campus.

1) INTRODUCTION

KNIPSS is one of the constituent college of Dr. RML Avadh University, Faizabad, located at bank of almighty Gomti River (also known as Adi Ganga) with panoramic view through embankment and avenue trees from three sides. The foundation stone of this institute was laid on 18 November 1972. The vast institute presently has 4 campuses, 9 faculties, 24 departments, 2 advanced centers of learning by a person of vision and action with firm commitment, Late Sri Kedar Nath Singh. India is one of the richest countries in the world in terms of biodiversity. However, natural habitats are under threat from advancing civilization and other unsustainable human activities, the attitude of the population towards conservation is relatively poor; thereby resulting to predictable loss of genetic resources and biodiversity at all levels. Further, conservation of biodiversity is supported to be an intrinsic responsibility of all human beings [1], but this is far from the case, as the rate of destructive anthropogenic activities on the vegetation and biodiversity at large scale daily. Forests in India are experiencing severe degradation due to increased human interferences [2, 3, 4]. Redhead [5] defined a tree as a plant species capable of attaining at least a height of about 6m. However continued existence of these trees species is in danger; because deforestation, logging and other various forms of unsustainable activities have drastically increased in recent times, thereby posing appreciable risk of local extinction to some species. There is need for conservation of

biodiversity at local level for sustainable environment. In present study we tried to list the woody species that exist in study area which may further helpful in assessing the rate of depletion in woody biodiversity at KNIPSS Sultanpur.

2) METHODOLOGY

2.1 Study site

Kamla Nehru institute of Physical and Social Sciences main campus is located about 3 KM of the Sultanpur city (25°58' to 26°40'N and 81°33' to 82°40'E). The Sultanpur district belongs to Indo-Gangetic plains physiographic division of India.

The institute campus is covered with alluvial deposits of river Gomti. Soil is fertile and sandy loam in texture. The climate is tropical monsoonal type with three distinct seasons; the cold (November to February), the hot (march to mid-June), and the rainy (mid-June to September), while October is regarded as strictly transitional month. The average annual temperature is 26.5° C in Sultanpur. The temperatures are highest on average in May, at around 35.5° C. The lowest average temperatures in the year occur in January, when it is around 17.1° C. The annual rainfall is around 990 mm.

2.2 Sampling Procedure

2.2.1 Field observations

An extensive field observation was taken between October 2016 to December 2016 to observe and collect the various

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woody plant species growing inside the KNIPSS main campus. During observations, visits were made to every nook and corner of the institute campus including the residential compounds in search of woody plants species. Identification of woody species has been done by various sources [6, 7, 8, 9, 10]. The woody plant species were listed into based on the habits. The woody plant species were categorized into trees and shrubs.



Fig.1. (a) Tree of *Ficus bengalensis* in front of science faculty on the KNIPSS main campus



Fig.1. (b) Satellite image from google earth of our study site KNIPSS main campus.

2.2.2 Soil Sampling and analysis

Soil samples were collected from 10 random locations in KNIPSS main campus were sieved to pass through a 2 mm mesh screen. Soil organic carbon (SOC) was determined by Walkley Black rapid titration method [11], total N (Nitrogen) by Kjeldahl method and total P (phosphorus) perchloric extraction method [12], pH was observed by digital pH meter.

3) RESULT AND DISCUSSION

3.1 Soil analysis

Initial soil characterization in terms of physicochemical parameters is listed in table 1.

Table1. Initial characterization of soil of KNIPSS main campus, Sultanpur U.P. India.

S.No.	Parameters	Values
01.	Soil organic carbon (SOC)	5.93 ± 0.83 mg/g
02.	Total N	0.63 ± 0.08 %
03.	Total P	0.19 ± 0.06 %
04.	pH	7.17±0.81
05.	Texture	Sandy loam

3.2 Woody vegetation

The woody plants of KNIPSS main campus along with their groups Hindi name, common name, botanical name, habit, origin status and importance along with their groups and families are presented in **table 2**.

A total of 43 woody plant species were recorded from the Kamla Nehru Institute of Physical & Social Sciences main campus of which have 39 species and 20 families were represented by the Angiosperms while 04 species and 04 families were represented by the Gymnosperms (Table3).

Table3. Analysis of species, families and origin status of the woody plants of the KNIPSS, main campus Sultanpur U.P. India

Plant Groups	Species	Families	Origin Status	
			Native	Exotic
Angiosperms	39	20	29	10
Gymnosperms	04	04	01	03

Thus it is evident from the study that the woody plant species of KNIPSS, Sultanpur main campus is dominated by the Angiospermic group of plant species. Among Angiosperms, 35 woody plant species and 18 families were represented by the dicotyledons while 04 woody species and 02 families were represented by the monocotyledons (Table-4). Therefore the woody dicotyledonous plants dominate over the woody monocotyledonous plants at main campus of the Institute.

Table4. Analysis of species, families and origin status of the Angiospermic woody plants of the KNIPSS main campus, Sultanpur U.P. India

Angiospermic Groups	Species	Families	Origin Status	
			Native	Exotic
Dicotyledons	35	18	28	07
Monocotyledons	04	02	01	03
Total	39	20	29	10

The maximum number of woody plant species in studied area are represented by family Apocynaceae (06 species) followed by the families Caesalpiniaceae (05 species) and Moraceae (04 species). Therefore, the study indicates that Apocynaceae, Caesalpiniaceae and Moraceae are the dominant families of the woody plants of KNIPSS main campus. These three families together constitute more than one-fourth of the woody plant species of KNIPSS main campus.

The analysis on origin status of the woody plants of the KNIPSS main campus reveals that, of the total recorded woody species, 30 species were represented by the native whereas 13 by the exotic species.

Furthermore, among the angiospermic group of plants, 29 woody plants were represented by native species while 10 woody plants were represented by the exotic species (Table 3). Thus the native woody plants dominate over the exotic woody plants in the KNIPSS main campus. Study on the vascular flora of KNIPSS main campus also suggests the dominance of native species over the exotic species.

Table2. – List of the woody plants of KNIPSS main campus, Sultanpur U.P. India.

S. No	Hindi Name	Common Name	Botanical Name	Habit	Origin status	Importance
ANGIOSPERMS Dicotyledons						
Apocynaceae						
1	Saptaparni	Scholar tree	<i>Alstoniascholaris</i>	Tree	Exotic	Medicinal
2	Kaner	Oleander	<i>Nerium oleander</i>	Shrub	Native	Ornamental & Medicinal
3	PeeliKaner	Yellow Oleander	<i>Thevetiaperuviana</i>	Shrub	Native	Ornamental, Paint & Biological Pest control
4	Madar	Swallow wart	<i>Calotropisgigantea</i>	Shrub	Native	Fibres
5	Chandra bagha	Indian Snakeroot	<i>Rauwolfiaserpentine</i>	Shrub	Native	Medicinal
6	Chandani	Jasmine	<i>Tabernaemontanadi vericata</i>	Tree	Native	Ornamental & Medicinal
Anacardiaceae						
1	Aam	Mango	<i>Mangiferaindica</i>	Tree	Native	Food & Medicinal
Bombacaceae						
1	Semal	Silk cotton tree	<i>Bombaxceiba</i>	Tree	Native	Fibres, Medicinal
Caesalpiaceae						
1	Amaltas	Indian laburnum	<i>Cassia fistula</i>	Tree	Native	Medicinal
2	Imli	Tamarind	<i>Tamarindusindica</i>	Shrub	Exotic	Medicinal
3	Kachnar	Orchid tree	<i>Bauhinia variegata</i>	Tree	Native	Medicinal
4	Gulmohar	Flame tree	<i>Delonixregia</i>	Tree	Native	Medicinal, fuel & ornamental
5	Seemia	Spectacular Cassia	<i>Sennaspectabilis</i>	Tree	Exotic	Ornamental & Firewood
Caricaceae						
1	Papita	Papaya	<i>Carica papaya</i>	Tree	Native	Ornamental, Cosmetic & Medicinal
Euphorbiaceae						
1		Orchid Crown of Thorns	<i>Euphorbia milisplendens</i>	Shrub	Exotic	Ornamental & Medicinal
2	Lal pate	Painsettia	<i>Euphorbia pulcherrima</i>	Shrub	Exotic	Ornamental & Medicinal
3.		Alder leaved cat tail	<i>Acalyphacapitata</i>	Shrub	Native	Food & Medicinal
Febaceae						
1.	Sheesam	Indian Rosewood	Delbergiasisso	Tree	Native	Timber & Fuel wood
2	Dhak	Sacred tree	Buteamonosperma	Tree	Native	Medicinal, timber, resin, Fodder
Lamiaceae						
1	Sagwan	Teak	<i>Tectonagrandis</i>	Tree	Native	Timber
Meliaceae						
1	Neem	Indian Lilac	<i>Azardirachtaindica</i>	Tree	Native	Medicinal, Lubricant, Cosmetics, vegetable
Mimosaceae						
1	Saras (Sheersa)	Siris tree	<i>Albizialebbeck</i>	Tree	Exotic	Fodder, Medicinal, Timber
2	Babul	Indian gum Arabic tree	<i>Acacia nilotica</i>	Tree	Native	Medicinal
Moraceae						
1	Anjeer	Fig	<i>Ficuscarica</i>	Tree	Native	Medicinal & Ornamental
2	Gular	Cluster fig	<i>Ficusracemosa</i>	Tree	Native	Fruit & Health use

3	Peepal	Sacred Fig	<i>Ficus religiosa</i>	Tree	Native	Medicinal
4	Bargad	Banyan	<i>Ficus bengalensis</i>	Tree	Native	Medicinal
Moringaceae						
1	Senjana	Drumstick tree	<i>Moringa oleifera</i>	Tree	Native	Food & Medicinal
Myrtaceae						
1	Cheel	Bottle brush	<i>Callistemon viminalis</i>	Shrub	Exotic	Antibacterial
Malvaceae						
1	Gurhal	China rose	<i>Hibiscus rosa-sinensis</i>	Shrub	Native	Medicinal & ornamental
Rosaceae						
1	Gulab	Rose	<i>Rosa hybrid</i>	Shrub	Native	Ornamental & Medicinal
Rubiaceae						
1	Rugmini	Ixora red	<i>Ixora coccinea</i>	Shrub	Native	Medicinal
2	Kadamb	Kadam	<i>Neolamarckia cadamba</i>	Tree	Native	Medicinal
Sapotaceae						
1	Mahua	Mahua tree	<i>Madhuca indica</i>	Tree	Native	Medicinal, Cosmetics, Fuel oil
Ulmaceae						
1	Chilbil	Jungle cork tree	<i>Holoptelea integrifolia</i>	Tree	Native	Medicinal
Monocotyledons						
Arecaceae						
1	Bismarkia Palm	Bismarck Palm	<i>Bismarckianobilis</i>	Tree	Exotic	Ornamental
2	Pygmy Date Palm	Pygmy Date Palm	<i>Phoenix roebelenii</i>	Tree	Exotic	Ornamental
3	Taad	Royal palm	<i>Roystonea regia</i>	Tree	Exotic	Ornamental
Pandanaceae						
1	Kewda	Screw pine	<i>Pandanus odorifer</i>	Tree	Native	Perfume & Kevda oil
GYMNOSPERMS						
Araucariaceae						
1	Christmas tree	Monkey Puzzles	<i>Araucaria Columnaris</i>	Tree	Exotic	Ornamental
Cycadaceae						
1	Japanese sago palm	Sago Palm	<i>Cycas revoluta</i>	Tree	Exotic	Sago & ornamental
Cupressaceae						
1	Vidya	Cypress	<i>Cupressus torulosa</i>	Tree	Native	Medicinal, Ornamental, Timber
Zamiaceae						
1	Mexican cycad	Cardboard Palm	<i>Zamia furfuracea</i>	Shrub	Exotic	Ornamental

The analysis on habits of the woody plants of the institute campus reveals that of the total recorded woody plant species, 30 were represented by trees and 13 by the shrubs. Hence the study indicates that the woody plant species of KNIPSS main campus are dominated by the trees.

The study reveals that several woody species growing on the KNIPSS main campus are represented by the valuable medicinal plants. These includes; *Cassia fistula*, *Tamarindus indica*, *Acacia nilotica*, *Azadirachta indica*, *Ficus religiosa*, *Ficus bengalensis*, *Madhuca indica*, *Bauhinia variegata*, *Holoptelea integrifolia*, *Alstonia scholaris*, *Ixora coccinea*, *Nerium oleander*, *Carica papaya*,

Neolamarckia cadamba, *Hibiscus rosa-sinensis*, *Rauvolfia serpentina* and *Tabernaemontana divaricata*.

Dalbergia sissoo and *Tectona grandis* were the two most important timbers yielding woody species recorded from the KNIPSS main campus. Several woody plants recorded from the studied area like; *Cassia fistula*, *Acacia nilotica*, *Delbergia sissoo*, *Azadirachta indica*, *Bombax ceiba*, *Tectona grandis*, *Holoptelea integrifolia*, *Albizia lebbek*, *Moringa oleifera*, *Alstonia scholaris*, *Roystonea regia* and *Rosa hybrid* which are the chief component species of the dry deciduous forests of India.

4) CONCLUSION

This list has provided details on the tree species growing in the study area. It can be concluded from the study that KNIPSS main campus hosts a large variety of woody plant species dominated by the Angiospermic group of plants. The Apocynaceae, Caesalpiniaceae and Moraceae are the dominant families of the woody plantspecies of the KNIPSS main campus. The number of native woody plant species exceeds over the exotic woody plant species, and the woody plants of tree habit dominate over the other habit forms. However, it is very important to enhance biodiversity with plantation of appropriate native species in study area for *in situ* conservationas well as an effective means of conserving the species through *ex situ* method, by introducing botanical garden and possibly collecting seed banks for conservation in appropriate repositories. This is also important to collect a complete checklist of overall floristic biodiversity of this campus to enhance our knowledge about existing status of overall floral diversity.

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