BIOLOGIA (LAHORE)
June, 2020, 66 (I), 101-126

PKISSN 0006 – 3096 (Print)
ISSN 2313 – 206X (On-Line)

Tree Flora of the Botanical Garden and two campuses of Punjab University Lahore Pakistan

IRAM MUJAHID IQBAL[1*], ASAD SHABBIR[1, 2], KANZA SHABBIR[1], MAHAM NAVEED[1], FAREIHA UROOJ[1], AQSA BUTT[1], RAEES KHAN[3], NIDHAN SINGH[4] & FIRDAUS-E-BAREEN[1]

[1]Ecology and Evolution Laboratory, Department of Botany, University of the Punjab, Lahore 54590 Pakistan
[2]The University of Sydney, School of Life and Environmental Sciences, Camden, 2570 Australia
[3]Department of Plant Sciences, Quaid-e-Azam University, Islamabad, Pakistan
[4]Department of Botany, I.B. (PG) College, Panipat, Haryana, India

ARTICLE INFORMATION

Received: 19-08-2019
Received in revised form: 05-06-2020
Accepted: 28-06-2020

***Corresponding Author:**

Iram Mujahid Iqbal:
iram.phd.botany@pu.edu.pk

Original Research Article

ABSTRACT

The living collection of plants in botanical gardens and academic institutions play an important role in scientific research, education, and conservation. The University of the Punjab (PU) is one of the oldest and largest seat of higher education learning in Pakistan with its two main academic campuses located in the city of Lahore. Besides several on-campus plantations, PU has a dedicated botanical garden established in 1963. We documented all the tree species of the botanical garden and both of the campuses through extensive surveys during 2014-15. A total of 220 woody plant species belonging to 157 genera of 55 plant families were being reported. The major plant families in terms of species contribution were Fabaceae (34), Moraceae (19), Myrtaceae (14), Rutaceae (12) and Euphorbiaceae (11). The PU botanical garden represents 87% of the total tree collection of both the campuses. The tree flora of PU is a representative of the whole Lahore district and about half of the country. Some rare and new tree species in Botanical garden can be added into the flora of Pakistan.

Keywords: Botanical garden, Tree species, Punjab University, Quaid-e-Azam campus, Allama Iqbal campus, Conservation

INTRODUCTION

The plantations of the botanical gardens and urban environments enhance not only the aesthetic value of an area but also play a vital role in education, research, and conservation (Laverne & Geideman, 2003; Faraji & Karimi, 2020). Botanical gardens are living collections of plant species that provide opportunities for education, research and conservation of plant species (Dawson *et al.*, 2008; Primack & Rushing, 2009; Khoury *et al.,* 2019). Further, botanical gardens hold a wide range of plant species that differ taxonomically and ecologically, and that may not be found growing together under natural conditions. Plantations of urban areas including those of educational institutions are the merger of the diverse local and introduced tree floras (Qing, 2011). Trees planted in urban landscapes mitigate the ill-effects of air pollution, provide shade, and offer recreational opportunities for people (Eisenman *et al.,* 2019).

Lahore is the second-largest city of Pakistan, well-known for its gardens and educational institutions. University of the Punjab, Lahore established in 1882, is one of the oldest educational institutions in Pakistan. The Allama Iqbal and Quaid-e-Azam are its two main campuses established in Lahore in 1882 and 1958, respectively. A large number of tree species have been planted on both the campuses that provide shelter and food for a variety of birds and other fauna. The green areas in the different academic blocks have diverse plantations (Sidra *et al.,* 2013).

The PU botanical garden, established in 1963 on the premises of Quaid-e-Azam Campus is one of the oldest botanical gardens of Pakistan. It is one of the largest botanical gardens in the Punjab Province with very rich plant diversity. Limited information is available on the flora of botanical gardens of the Punjab Province. Nasim (2010) documented the flora of PU, Quaid-e-Azam campus, and photographed 75 tree species. Similarly, Bushra (2016) taxonomically described about 80 woody genera of the botanical garden of

Author Contribution: I.M., Did all surveys, photography and wrote up; **A.S.**, Wrote up, edited and corrected manuscript; **K.S.**, Did survey and data compilation; **M.N.**, Did field survey and specimen collected; **F.U.**, Did table formation and all relevant literature; **A.B.**, Did surveys and results excel work; **R.A. & N.S.,** Did plant identifications and paper reviewing & F.B., Reviewed and corrected manuscript

the University. However, the complete checklist of tree flora of both campuses and PU botanical garden has not been compiled to date. This work is, therefore a first attempt to describe the complete tree inventory of the botanical garden and two of its main campuses of University of the Punjab, Lahore.

MATERIAL AND METHOD

Site description

The PU botanical garden, located at the Quaid-e-Azam Campus covers a total area of 32 acres (31°29'57.78"N and 74°17'58.60"E). It consists of 36 specified areas where several natives, regional, and introduced exotic plant species are being maintained. The major sections of the botanical garden include a Gymnosperm garden established in 1970, later Rose and Jasmine gardens annexed in 2002 and 2004, respectively. In 2004, PU Seed Centre was established on the premises of the botanical garden covering an area of 2.5 acres.

The Allama Iqbal Campus of the University, covering an area of one km^2 is in the heart of the Lahore city near the suburb of Anarkali (31°34′09.75″ N and 74°18′33.25″ E). The Quaid-e-Azam campus covering an area of 7.25 km^2 is situated along the Lahore Branch canal near the suburb of Faisal Town (31°30′00.35″ N and 74°18′09.95″ E) (Figure 1).

Data collection

To record the trees planted on both campuses, many surveys of all the academic and administrative blocks, parks, and botanical garden were carried out during 2014-2015. During visits, all species were photographed depending upon their phenological stage and age. All the vegetative and reproductive characters were recorded in the field and collected specimens were brought to the Ecology and Evolution Lab, Department of Botany, University of the Punjab, Lahore. Plant species were identified with the help of available literature (Stewart, 1972), online e-flora of Pakistan (http://www.tropicos.org/Project/Pakistan), online google group of e-flora of India (https://groups.google.com/forum/#!forum/indiantreepix) and expert local and regional plant taxonomists.

The nomenclature of all woody species was written using taxonomic online databases, such as International Plant Names Index (http://www.ipni.org), Medicinal Plant Name Services (https://mpns.science.kew.org/mpns-portal) and The Plant List (http://www.theplantlist.org/). Native range and geographical distribution of all the species were extracted from two global databases; Germplasm Resource Information Network (GRIN) (www.ars-grin.gov/) and Invasive Species Compendium (CABI) (www.cabi.org). All the data collected from different sources were arranged in tabular form and the complete list of trees in PU was prepared, that included alphabetically arranged families of trees, information on origin, distribution, synonyms, local names, and plant phenology was compiled (Table I). The collected specimens were properly dried, preserved and mounted on herbarium sheets, later submitted to the Herbarium of Pakistan Museum of Natural History, Islamabad, as voucher specimens.

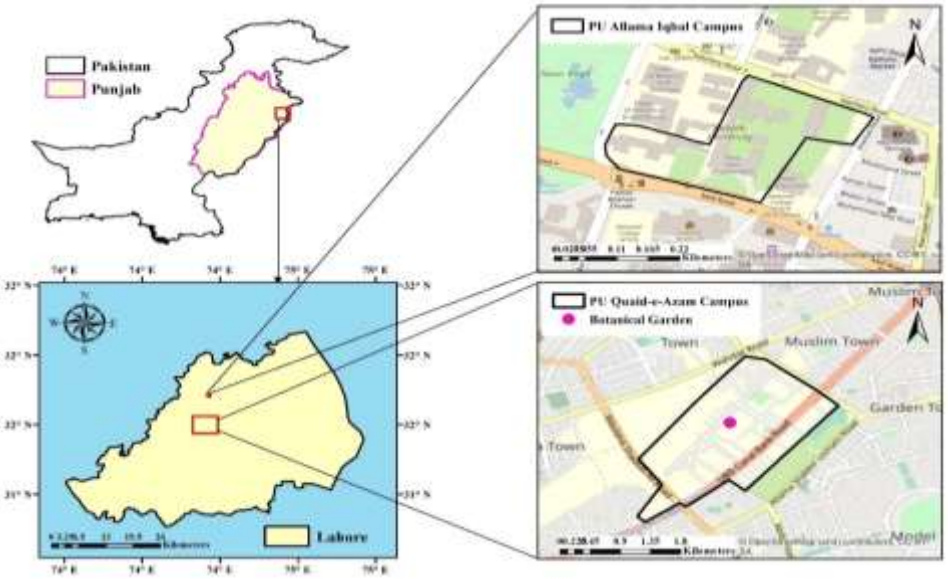

Fig. 1: Map of the study area. Red rectangles in the map of Lahore (bottom left) indicate the location of two PU campuses while the pink circle (bottom right) shows the location of the botanical garden within the Quaid-e-Azam campus, Lahore.

RESULTS

The tree inventory of PU comprised a total of 220 tree species belonging to 157 genera of 55 plant families present at both campuses. Of the 55 plant families representing all the trees, Fabaceae was the most dominant family having 33 tree species (Table I). The top 10 species-rich families in descending order were: Fabaceae (34), Moraceae (19), Myrtaceae (14), Rutaceae (12), Euphorbiaceae (11), Arecaceae (11), Apocynaceae (8), Bignoniaceae (7), Anacardiaceae (4) and Combretaceae (6). These families having a total of 126 tree species, were representing a major proportion, i.e. 58% of PU trees, The remaining 45 families comprising 93 tree species were 42% (Figure 2). Twenty-one plant families were represented by a single species each. (Table I).

The top 3 species-rich genera are *Ficus* (13) followed by *Citrus* (7) and *Eucalyptus* (7). Out of 157 tree genera planted on campus, 125 genera (80%) are represented by a single species, showing a great generic diversity of tree species. The remaining 32 genera (20%) are represented by two or more species (Table I).

The botanical garden represents a major contribution to tree flora of PU. Out of 220 species, 191 tree species (87%) are present in the botanical garden. Of these species, 50 species of trees (23%) were planted only in the botanical garden. However, there were another 29 trees planted only at different academic blocks of the campus and not found in the botanical garden.

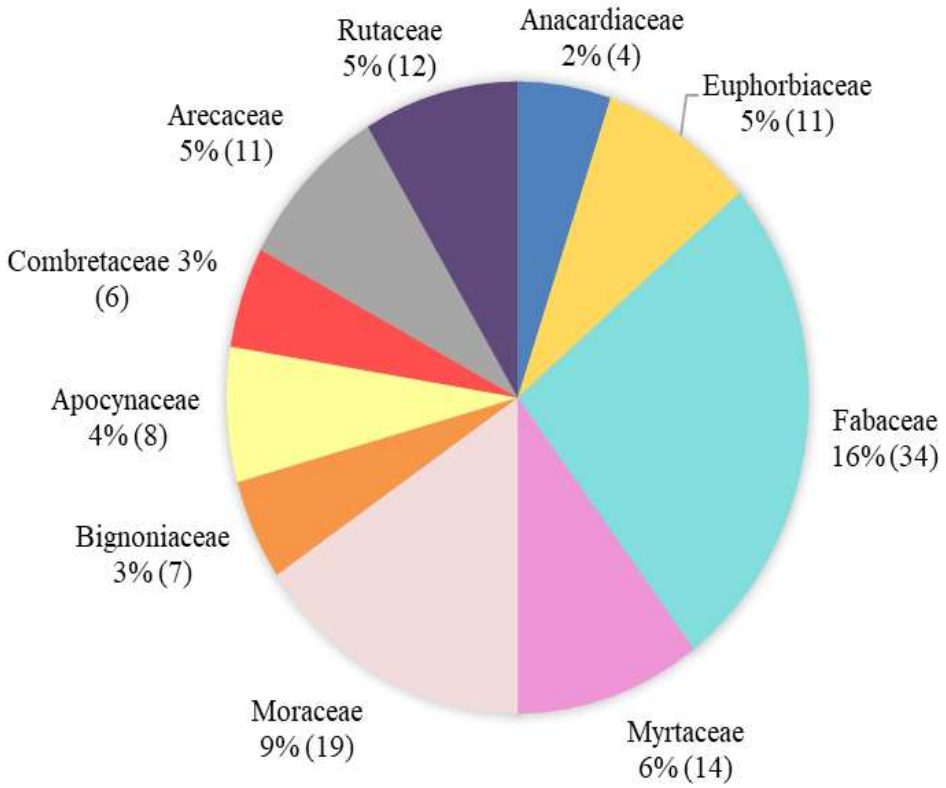

Fig. 2: Percentage contribution of top 10 plant families to the tree flora of PU campuses and botanical garden.

Table I: A checklist of trees of the botanical garden and campuses of University of the Punjab, Lahore

Family	Botanical name	English name	Local name	Flower/ Fruit	Flowering season	Status in Pakistan	Origin	Plant characteristics (Reproduction)	Location
Anacardiaceae	*Mangifera indica* L. (Syn: *Mangifera austroyunnanensis)*	Mango	Aam	Fl + Fr +	Feb-Apr	Cultivated, edible	Tropical Asia	Monoecious	Botanical garden, Q.A campus, I.A Campus
	Pistacia chinensis Bunge (Syn: *Pistacia formosana)*	Pistachio,	Araishi Pista	Fl + Fr +	Mar-Apr	Cultivated and naturalized	Temperate Asia	Monoecious & Dioecious	Botanical garden
	Pleiogynium timoriense (DC.) Leenh. (Syn: *Icica timoriensis)*	Burdekin plum	-	Fl + Fr –	Apr-May	Cultivated	Australia and Tropical Asia	Monoecious	Botanical garden
	Schinus terebinthifolia Raddi (Syn: *Lithraea chichita)*	Brazilian Pepper tree	Copal	Fl + Fr +	Jan-Feb	Cultivated	South America	Monoecious	Botanical garden
Annonaceae	*Polyalthia longifolia* (Sonn.) Thwaites (Syn: *Guatteria longifolia)*	False Ashoka	Ulta Ashok	Fl – Fr –	-	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus, I.A Campus
Apocynaceae	*Alstonia scholaris* (L.) R.Br. (Syn: *Alstonia kurzii)*	Indian devil tree	Shatiyan	Fl + Fr +	Oct-Dec	Cultivated	Asia and Australia	Monoecious & Dioecious	Botanical garden, Q.A campus, I.A Campus
	Carissa carandas L. (Syn: *Arduina carandas)*	Christ's thorn	Karanda	Fl + Fr +	May-Jul	Cultivated	Tropical Asia	Monoecious	Q.A campus
	Cascabela thevetia (L.) Lippold (Syn: *Thevetia peruviana)*	Yellow oleander	Karanda	Fl + Fr +	Throughout year	Cultivated	America	Monoecious	Botanical Garden, Q.A campus, I.A Campus
	Nerium oleander L. (Syn: *Oleander indica)*	Rose bay	Kaner	Fl + Fr +	Apr-May	Cultivated and naturalized	Africa, Asia and Europe	Monoecious	Botanical Garden, Q.A campus
	Plumeria rubra L. (Syn: *Plumeria acutifolia)*	Pagoda tree	Gul-e-chin	Fl + Fr –	May-Sept	Cultivated	America	Monoecious	Botanical Garden, Q.A campus, I.A Campus
	Plumeria obtusa L. (Syn: *Plumeria bicolor)*	Singapore graveyard flower	Gul-e-chin	Fl + Fr –	May-Jul	Cultivated	America	Monoecious	Botanical Garden, Q.A campus
	Tabernaemontana divaricata (L.) R.Br. ex Roem. & Schult (Syn: *Ervatamia divaricata)*	Adam's apple	Chandni	Fl + Fr –	Apr-Jun	Cultivated	Tropical and Temperate Asia	Monoecious	Q.A campus

	Vallaris solanacea (Roth) Kuntze (Syn: *Peltanthera solanacea)*	Bread flower	-	Fl + Fr –	May-Jun	Cultivated	Tropical Asia	Monoecious	Botanical garden
Araucariaceae	*Araucaria heterophylla* (Salisb.) Franco (Syn: *Araucaria excels)*	Norfolk Island pine	Araucaria	Fl – Fr –	-	Cultivated	Australia	Monoecious	Botanical garden, Q.A campus, I.A Campus
	Araucaria cunninghamii Aiton (Syn: *Araucaria glauca)*	Colonial pine, Hoop pine	-	Fl + Fr +	Dec-Feb	Cultivated	Australia	Monoecious	Q.A campus
Arecaceae	*Bismarckia nobilis* Hildebr. & H.Wendl. (Syn: *Medemia nobilis)*	Bismarck palm	Nobilis palm	Fl – Fr –	-	Cultivated	Africa	Monoecious	Q.A campus
	Caryota mitis Lour. (Syn: *Caryota furfuracea)*	Clustered Fish tail palm	Fish tail	Fl + Fr +	Oct-Dec	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Caryota urens L. (Syn: *No synonyms)*	SolitaryFish tail palm	Fish tail	Fl + Fr +	May-Jul	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus
	Chamaerops humilis L. (Syn: *Phoenix humilis)*	European Fan Palm	-	Fl + Fr +	Mar-May	Cultivated	Europe	Monoecious	Q.A campus
	Dypsis decaryi (Jum.) Beentje & J.Dransf. (Syn: *Neodypsis decaryi)*	Trianglular palm	Chinese palm	Fl – Fr –	-	Cultivated	Africa	Monoecious	Q.A campus
	Livistona chinensis (Jacq.) R.Br. ex Mart. (Syn: *Livistona japonica)*	Chinese fountain palm	Chinese fan palm	Fl + Fr +	Apr-May	Cultivated	Temperate Asia	Monoecious	Q.A campus, I.A Campus
	Phoenix dactylifera L. (Syn: *Phoenix iberica)*	Date palm	Khajoor	Fl + Fr +	Apr-May	Cultivated, edible	Tropical Asia	Monoecious & Dioecious	Q.A campus
	Phoenix sylvestris (L.) Roxb. (Syn: *Elate sylvestris)*	Wild date palm	Khajur	Fl + Fr +	Apr-Jun	Cultivated, edible	Tropical Asia	Monoecious	Q.A campus
	Phoenix roebelenii O'Brien	Pygmy Date Palm	Robellini	Fl – Fr –	-	Cultivated	Asia	Monoecious	Q.A campus
	Roystonea regia (Kunth) O.F.Cook (Syn: *Euterpe jenmanii)*	Royal Palm, Cuban royal palm	Bottle palm	Fl – Fr –	-	Cultivated	America	Monoecious	Q.A campus, I.A Campus
	Wodyetia bifurcata A.K.Irvine (Syn: *No synonyms)*	Foxtail palm	-	Fl – Fr –	-	Cultivated	Australia	Monoecious	Q.A campus

Asparagaceae	*Beaucarnea recurvata* Lem. (Syn: *Nolina recurvata)*	Ponytail palm tree	Surahi palm	Fl + Fr –	Jul-Sept	Cultivated	North America	Dioecious	Q.A campus, I.A Campus
Araliaceae	*Schefflera arboricola* (Hayata) Merr. (Syn: *Heptapleurum)arboricola*	Dwarf umbrella tree	Schefflera	Fl + Fr –	Jun-Jul	Cultivated	Temperate Asia	Dioecious	Botanical garden
Bombaceae	*Bombax ceiba* L. (Syn: *Bombax aculeatum)*	Silk cotton tree	Sumbal	Fl + Fr +	Feb-Mar	Cultivated	Asia and Australia	Monoecious	Botanical Garden, Q.A campus, I.A Campus
	Ceiba insignis (Kunth) P. E. Gibbs & Semir (Syn: *Chorisia insignis)*	White floss silk tree	Budha tree	Fl + Fr +	Oct-Nov	Cultivated	South America	Monoecious	Botanical Garden
	Ceiba speciosa (A. St.-Hil. *et al.*) Ravenna (Syn: *Chorisia speciosa)*	Silk floss tree	Budha tree	Fl + Fr +	Nov-Jan	Cultivated	South America	Monoecious	Q.A campus
Burseraceae	*Garuga pinnata* Roxb. (Syn: *Garuga kenghar)*	Grey downy balsam	Kharpat	Fl + Fr +	Mar-Apr	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Protium serratum (Wall. ex Colebr.) Engl. (Syn: *Bursera serrata)*	Indian red pear	Najor	Fl + Fr +	Apr-May	Cultivated	Asia	Monoecious	Q.A campus
Boraginaceae	*Cordia sinensis* Lam. (Syn: *Cornus gharaf)*	Grey leaved saucer berry	Gondi	Fl – Fr –	-	Cultivated	Asia and Africa	Monoecious & Dioecious	Q.A campus
	Cordia dichotoma G.Forst. (Syn: *Cordia obliqua)*	Clammy cherry	Lasura, Sipistan	Fl + Fr +	Mar-Apr	Cultivated	Asia	Monoecious	Botanical Garden, Q.A campus
	Ehretia acuminata R.Br. (Syn: *Ehretia ovalifolia.)*	Brown Cedar	Puna	Fl + Fr +	Mar-Apr	Cultivated, Naturalized	Asia and Australia	Monoecious	Q.A campus
Bignoniaceae	*Fernandoa adenophylla* (Wall. ex G. Don) Steenis (Syn: *Heterophragma adenophyllum)*	Katsagon	Nag phalli	Fl + Fr+	Mar-Apr	Cultivated	Tropical Asia	Monoecious	Q.A campus, I.A Campus
	Handroanthus impetiginosus (Mart. ex DC.) Mattos (Syn: *Tabebuia impetiginosa)*	Pink Trumpet Tree	-	Fl – Fr –	-	Cultivated	America	Monoecious	Q.A campus

	Jacaranda mimosifolia D.Don (Syn: *Jacaranda ovalifolia)*	Indian rosewood	Gul-e-Neelam	Fl + Fr +	Mar-Apr Sept- Oct	Cultivated	South America	Monoecious	Botanical Garden, Q.A campus
	Kigelia africana (Lam.) Benth. (Syn: *Kigelia pinnata)*	Sausage Tree	Gul-e-fanoos	Fl + Fr +	May-Jul	Cultivated	Asia and Africa	Monoecious	Botanical garden, Q.A campus
	Millingtonia hortensis L.f. (Syn: *Bignonia azedarachta)*	Indian cork tree	Villayti Neem	Fl – Fr –	-	Cultivated	Asia	Monoecious	Botanical garden
	Tabebuia aurea (Silva Manso) Benth. & Hook.f. ex S.Moore (Syn: *Bignonia aurea)*	Tree of Gold	Tabebuia	Fl – Fr –	-	Cultivated	South America	Monoecious	Botanical garden, Q.A campus
	Tecoma stans (L.) Juss. Ex Kunth (Syn: *Tecoma molla)*	Yellow bells, Yellow trumpet bush	-	Fl + Fr +	Apr-Jul	Cultivated	America	Monoecious	Q.A campus
Cornaceae	*Alangium salviifolium* (L.f.) Wangerin (Syn: *Grewia salviifolia)*	Sage leaved Alangium, Mayan gold	-	Fl + Fr +	Apr-May	Cultivated	Africa and Asia	Monoecious	Botanical garden
Capparaceae	*Capparis decidua* (Forssk.) Edgew. (Syn: *Capparis aphylla)*	Caper berry	Karir	Fl + Fr +	Jun-Jul	Cultivated, Naturalized	Asia and Africa	Monoecious	PU graveyard
	Crateva adansonii DC. (Syn: *Crateva guineensis)*	Garlic pear tree	Barna	Fl + Fr +	Apr-May	Cultivated	Asia and Australia	Monoecious	Botanical Garden, Q.A campus
Caricaceae	*Carica papaya* L. (Syn: *Carica citriformis)*	Papaya, tree melon	Papita	Fl + Fr +	Throughout the year	Cultivated, edible	America	Monoecious	Botanical garden, Q.A campus
Casuarinaceae	*Casuarina equisetifolia* L. (Syn:*Casuarina brunoniana* Miq.)	Coastal she-oak	Jangli Saru	Fl + Fr –	Oct-Nov	Cultivated	Asia, Australia	Monoecious	Botanical garden
Cannabaceae	*Celtis tetrandra* Roxb. Syn: *Sponia tetrandra*	Hackberry, Eastern Nettle Tree	Kharak	Fl – Fr –	Feb-Mar	Cultivated	Asia	Monoecious	Botanical garden, I.A campus
Cupressaceae	*Cupressus sempervirens* L. (Syn: *Cupressus horizontalis)*	Mediterranean cypress	Sarv, Saru	Fl + Fr +	Aug-Dec	Cultivated	Africa, temperate Asia and Europe	Monoecious	Q.A campus, I.A Campus
	Juniperus excelsa M.Bieb. (Syn: *Sabina excelsa)*	Grecian Juniper	Shupa, Shur	Fl – Fr –	-	Cultivated	Asia and Europe	Monoecious & Dioecious	Botanical garden

	Platycladus orientalis (L.) Franco (Syn: *Thuja orientalis)*	Chinese arbor-vitae	Morpankh	Fl + Fr +	Aug-Mar	Cultivated	Temperate Asia	Monoecious	Q.A campus, I.A Campus
Combretaceae	*Anogeissus acuminata* (Roxb. ex DC.) Wall. ex Guill. & Perr. (Syn: *Anogeissus penduala)*	Button tree	Dhokra	Fl + Fr +	Jun-Aug	Cultivated	Asia and Africa	Monoecious	Botanical garden
	Conocarpus lancifolius Engl. (Syn: *Anogeissus lancifolius)*	Common tug tree, Roma	Dammas	Fl + Fr +	Nov-Jan	Cultivated	Africa	Monoecious	Q.A campus
	Terminalia arjuna (Roxb. ex DC.) Wight & Arn. (Syn: *Terminalia elliptica)*	Arjun tree	Arjun	Fl + Fr +	May-Jun	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus, I.A campus
	Terminalia bellirica (Gaertn.) Roxb. (Syn: *Buceras bellirica)*	Beach almond	Bhahera	Fl + Fr +	Apr-Jul	Cultivated	Asia	Monoecious	Q.A campus
	Terminalia chebula Retz. (Syn: *Buceras chebula)*	Yellow Myrobalan	Harar	Fl + Fr +	Apr-May	Cultivated	Asia	Monoecious	Botanical garden
	Terminalia ivorensis A.Chev. (Syn: *Cedrela villosa)*	Ivory Coast almond	Idigbo	Fl – Fr –	-	Cultivated	Africa	Monoecious	Q.A campus
Cycadaceae	*Cycas revoluta* Thunb. (Syn: *Cycas inermis)*	King sago palm	Kangi palm	Fl + Fr +	Mar-Apr	Cultivated	Temperate Asia	Dioecious	Q.A campus
Euphorbiaceae	*Bischofia javanica* Blume (Syn: *Andrachnea petala)*	Bishop Wood	Akagi	Fl + Fr +	Mar-Apr	Cultivated	Temperate Asia	Monoecious & Dioecious	Q.A campus
	Croton mangelong Y.T. Chang. (Syn: *Croton roxburghii)*	Mahison	-	Fl – Fr –	-	Cultivated	Asia	Monoecious	Botanical garden
	Euphorbia cotinifolia L. (Syn: *Tithymalus cotinifolius)*	Caribbean Copper Plant, Red Spurge	-	Fl + Fr +	Apr-May	Cultivated	America	Monoecious	Q.A campus
	Euphorbia ingens E.Mey. ex Boiss. (Syn:*Euphorbia similis* A.Berger)	Candelabra tree	-	Fl – Fr –	-	Cultivated	Asia and Africa	Monoecious	Q.A campus
	Jatropha curcas L. (Syn: *Curcas adansonii)*	Barbados nut tree	-	Fl + Fr +	Oct-Dec	Cultivated	America	Monoecious	Botanical garden
	Jatropha integerrima Jacq. (Syn: *Jatropha pandurifolia)*	Peregrina	Jatropha	Fl + Fr +	Throughout the year	Cultivated	South America	Monoecious	Q.A campus

	Mallotus philippensis (Lam.) Mull.Arg. (Syn: *Croton philippensis)*	Red Kamla, Kumkum tree	Kamila	Fl + Fr –	Oct-Dec	Cultivated	Asia	Monoecious	Botanical garden
	Phyllanthus emblica L. (Syn: *Cicca emblica)*	India Gooseberry	Amla	Fl + Fr +	Apr-May	Cultivated	Asia	Monoecious	Q.A campus
	Putranjiva roxburghii Wall. (Syn: *Drypetes roxburghii)*	Putranjiva	Putajan	Fl + Fr +	Apr-Jun	Cultivated	Tropical Asia	Monoecious & Dioecious	Q.A campus, I.A Campus
	Sapium sebiferum (L.) Roxb. (Syn: *Croton sebiferum, Triadica sebifera)*	Chicken tree, Chinese tallow tree	Makhan Charbi	Fl – Fr –	March- Oct	Cultivated, naturalized	Temperate Asia	Monoecious	Botanical garden
	Trewia nodiflora L. (Syn: *Mallotus nudiflorus)*	False White Teak	Gamhar	Fl + Fr +	March-April	Cultivated	Asia	Monoecious & Dioecious	Q.A campus
Ebenaceae	*Diospyros kaki* L.f. (Syn: *Diospyros amara)*	Asian persimmon, Kaki	Japani phal	Fl + Fr +	Apr-May	Cultivated, Edible	Asia	Dioecious	Q.A campus
	Diospyros montana Roxb. (Syn: *Diospyros cordifolia)*	Mountain persimmon	Abnus	Fl + Fr +	Mar-Apr	Cultivated	Asia and Australia	Dioecious	Botanical garden, Q.A campus
	Diospyros malabarica (Desr.) Kostel (Syn: *Diospyros peregrina)*	Malabar ebony, Indian persimmon	Gaub	Fl + Fr +	May-Sept	Cultivated	Tropical Asia	Dioecious	Q.A campus
Fabaceae	*Acacia modesta* Wall. (Syn: *Mimosa dumosa)*	Amritsar Gum	Phulai	Fl + Fr +	Mar-Apr	Cultivated, Naturalized	Asia	Monoecious	Botanical garden
	Acacia nilotica (L.) Delile (Syn: *Acacia pseudoarabica)*	Arabic gum tree	Babool, Kikar	Fl + Fr +	Throughout the year	Cultivated, Naturalized	Asia and Africa	Monoecious	Botanical Garden, Q.A campus
	Acacia seyal Delile (Syn: *Vachellia seyal)*	Shittimwood tree	Talh	Fl + Fr +	Apr-May	Cultivated	Africa and Temperate Asia	Monoecious	Botanical garden
	Acacia stenophylla A.Cunn. (Syn: *Acosperma stenophyllum)*	River Cooba	Balkura	Fl + Fr –	Oct-Jan	Cultivated	Australia	Monoecious	Botanical Garden
	Albizia lebbeck (L.) Benth. (Syn: *Acacia lebbeck)*	Woman's tongue tree	Shirin	Fl + Fr +	Apr-Jun	Cultivated	Africa and America	Monoecious	Botanical garden , Q.A campus

	Albizia procera (Roxb.) Benth. (Syn: *Acacia elata)*	Tall albizzia	Safed siris	Fl + Fr +	Apr-Jun	Cultivated	Asia and Australia	Monoecious	Botanical garden
	Bauhinia variegata L. (Syn: *Bauhinia alba)*	Orchid tree	Kachnar	Fl + Fr +	Feb-Apr	Cultivated	Asia	Monoecious	Q.A campus
	Bauhinia purpurea L. (Syn: *Bauhinia castrata)*	Camel's foot tree	Jangli Kachnar	Fl + Fr +	Sept-Nov	Cultivated	Tropical Asia	Monoecious	Botanical garden , Q.A campus
	Bauhinia racemosa Lam. (Syn: *Bauhinia parviflora)*	Bidi Leaf Tree	Kachnar	Fl + Fr –	Apr-May	Cultivated	Temperate Asia	Monoecious	Botanical garden
	Butea monosperma (Lam.) Kuntze. (Syn: *Butea braamiana)*	Flame of the Forest	Dhak, teen paat	Fl + Fr +	Mar-Apr	Cultivated	Tropical Asia	Monoecious	Botanical Garden, Q.A campus
	Calliandra haematocephala Hassk. (Syn: *Calliandra novaesii)*	Red powder puff	Calliandra	Fl + Fr +	Nov-Apr	Cultivated	South America	Monoecious	Botanical Garden, Q.A campus, I.A campus
	Calliandra emarginata (Willd.) Benth (Syn: *Calliandra tergemina)*	Dwarf powderpuff	Calliandra	Fl + Fr +	Mar-May	Cultivated	America	Monoecious	Q.A campus
	Cassia fistula L. (Syn: *Bactyrilobium fistula)*	Golden shower tree	Amaltas	Fl + Fr +	Apr-Jun	Cultivated	Tropical Asia	Monoecious	Q.A campus, I.A campus
	Caesalpinia pulcherrima (L.) Sw. (Syn: *Poinciana pulcherrima)*	Peacock flower, Dwarf Poinciana	-	Fl + Fr +	Aug-Oct	Cultivated	Asia	Monoecious	Q.A campus
	Dalbergia sissoo Roxb. (Syn: *Amerimnon sissoo)*	Indian rosewood	Shisham, Tali	Fl + Fr +	Mar-Apr	Cultivated, Naturalized	Asia	Monoecious	Q.A campus, I.A campus
	Delonix regia (Bojer ex Hook.) Raf. (Syn: *Poinciana regia)*	Peacock flower	Gul-e-Mohar	Fl + Fr +	May-Jun	Cultivated	Africa	Monoecious	Q.A campus
	Discladium obtusatum (DC.) Tiegh. (Syn: *Ochna obtusata)*	Mickey mouse plant	Okna	Fl + Fr +	Mar-May	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Gleditsia triacanthos L. *(Syn: Acacia villaregalis)*	Honey locust, Thorny locust	Dozekh	Fl – Fr –	-	Cultivated	North America	Dioecious	Botanical garden

	Gmelina arborea Roxb (Syn: *Gmelina rheedei)*	Kashmir tree	Gumhar	Fl + Fr +	Feb-Mar	Cultivated	Asia	Monoecious	Botanical garden
	Hardwickia binata Roxb. (Syn: *Hardwickia trapeziformis)*	Indian Black wood	Anjan	Fl – Fr –	-	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Leucaena leucocephala (Lam.) de Wit (Syn: *Acacia frondosa)*	White lead tree	Ipil Ipil, Jungli Imli	Fl + Fr +	Mar-Jun	Cultivated, naturalized	America	Monoecious	Botanical garden, Q.A campus
	Millettia pinnata (L.) (Syn: *Pongamia pinnata)*	Pongam oil tree	Sukh chain	Fl + Fr +	Apr-May	Cultivated	Asia and Australia	Monoecious	Botanical garden, Q.A campus
	Millettia ovalifolia sensu Kurz (Syn: *Millettia peguensis)*	Moulmein Rosewood	Vilayati Sheeshum	Fl + Fr +	Feb-Apr	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus
	Parkinsonia aculeata L. (Syn: *Parkinsonia spinosa)*	Jerusalem thorn tree	Vilayati kikar	Fl + Fr +	Apr-Jun	Cultivated, naturalized	America	Monoecious	Q.A campus
	Prosopis cineraria (L.) Druce (Syn: *Mimosa cineraria)*	Ghaf, Loong Tree	Jand, Kandi	Fl + Fr +	Apr-May	Cultivated, naturalized	Asia	Monoecious	Botanical garden, Q.A campus
	Prosopis juliflora (Sw.) DC. (Syn: *Acacia juliflora)*	Mesquite	Vilayti jand	Fl + Fr +	Mar-Oct	Cultivated, naturalized	America	Monoecious	Botanical garden, Q.A campus
	Saraca asoca (Roxb.) Willd. (Syn: *Jonesia asoca)*	Sorrow less tree	Ashoka	Fl + Fr –	Apr-May	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Senna alata (L.) Roxb. (Syn: *Cassia alata)*	Candle bush	Dadmurdan	Fl + Fr +	Sept-Nov	Cultivated	South America	Monoecious	Q.A campus
	Senna polyphylla (Jacq.) H. S. Irwin & Barneby (Syn: *Cassia biflora)*	Desert cassia	Dadmurdan	Fl + Fr +	May-Jul	Cultivated	South America	Monoecious	Botanical garden
	Senna sulfurea (Collad.) H.S.Irwin & Barneby (Syn: *Cassia glauca, Senna surattensis)*	Glossy shower, Scrambled egg bush	-	Fl + Fr +	Mar-Dec	Cultivated	Tropical Asia and Australia	Monoecious	Q.A campus
	*Sophora secundiflora (*Ortega) DC. (Syn: *Dermatophyllum secundiflorum)*	Texas Mountain Laurel	Shama	Fl + Fr-+	Mar-Oct	Cultivated	North America	Monoecious	Botanical garden

	Sophora tomentosa L. (Syn: *Sophora occidentalis)*	Necklace Pod, Silver bush	-	Fl + Fr +	Mar-Oct	Cultivated	Asia, Africa and Australia	Monoecious	Botanical garden
	Schotia brachypetala Sond. (Syn: *Schotia latifolia)*	Weeping Boer-bean, Parrot Tree	-	Fl – Fr –	-	Cultivated	South Africa	Monoecious	Botanical garden
	Tamarindus indica L. (Syn: *Tamarindus occidentalis)*	Tamarind, Indian date	Imli	Fl + Fr +	May-Jun	Cultivated	Africa and Temperate Asia	Monoecious	Botanical garden, Q.A campus
Ginkgoaceae	*Ginkgo biloba* L. (Syn: *Ginkgo macrophylla)*	Maidenhair tree, Common ginkgo	Ginko	Fl – Fr –	-	Cultivated	Temperate Asia	Dioecious	Botanical garden, Q.A campus
Lauraceae	*Cinnamomum camphora* (L.) J.Presl (Syn: *Cinnamomum verum)*	Camphor Tree	Kafoor	Fl + Fr –	Mar-Apr	Cultivated	Temperate Asia	Monoecious	Q.A campus
	Cinnamomum tamala (Buch.-Ham.) T.Nees & Eberm (Syn: *Cinnamomum albiflorum)*	Indian bay leaf	Dalchini, Tezpat	Fl + Fr +	May-Jun	Cultivated	Asia	Monoecious	Botanical garden
	Persea americana Mill. (Syn: *Laurus persea)*	Avocado	Avocado	Fl – Fr –	-	Cultivated, Edible	America	Monoecious	Botanical garden
Lamiaceae	*Callicarpa macrophylla* Vahl (Syn: *Callicarpa cana)*	Beauty berry	Sumali	Fl + Fr +	July-Sept	Cultivated	Asia	Monoecious	Botanical garden
	Tectona grandis L.f. (Syn: *Jatus grandis)*	Teak tree	Sumali	Fl + Fr +	June-Aug	Cultivated	Africa and Tropical Asia	Monoecious	Botanical garden
	Vitex trifolia L. (Syn: *Vitex integerrima)*	Chaste tree	Nirgundi	Fl + Fr +	Apr-Aug	Cultivated	Asia and Australia	Monoecious	Botanical garden
Lythraceae	*Lagerstroemia speciosa* (L.) Pers. (Syn: *Lagerstroemia flos-reginae,)*	Queen Crape Myrtle	Jarul, Banaba	Fl + Fr +	May-Jun	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus
	Lawsonia inermis L. (Syn: *Lawsonia alba)*	Mignonette tree	Henna, Mehndi	Fl + Fr +	Mar-Oct	Cultivated	Africa and Tropical Asia	Monoecious	Botanical garden
	Lagerstroemia indica L. (Syn: *Lagerstroemia chinensis)*	Crape-myrtle, Crape-myrtle	-	Fl + Fr +	May-Oct	Cultivated	Asia	Monoecious	Q.A campus
	Punica granatum L. (Syn: *Granatum punicum)*	Pomegranate tree	Anaar	Fl + Fr +	Apr-Jul	Cultivated, Edible	Asia	Monoecious	Q.A campus
Lecythidarciceae	*Barringtonia acutangula (L.)* Gaertn. (Syn: *Barringtonia rubra)*	Strings of Red Beads	Samundar phal, Hijol	Fl + Fr +	Jun-Aug	Cultivated	Asia and Australia	Monoecious & Dioecious	Q.A campus

Meliaceae	*Azadirachta indica* A. Juss. (Syn: *Antelaeaaza dirachta)*	Indian Lilac	Neem	Fl + Fr +	Apr-May	Cultivated	Tropical Asia	Monoecious	Q.A campus
	Chukrasia tabularis A.Juss. (Syn: *Chukrasia velutina)*	White cedar	Chikrasi	Fl + Fr –	Mar-Apr	Cultivated	Tropical Asia	Monoecious	Botanical Garden, Q.A campus
	Cedrela toona Roxb. ex Willd (Syn: *Toona ciliata)*	Indian Mahagony, Red Cedar	Toon, Toona	Fl + Fr +	Mar-May	Cultivated	Asia and Australia	Monoecious	Botanical Garden, Q.A campus
	Melia azedarach L. (Syn: *Toona ciliata)*	China tree	Dhrek, Bakain	Fl + Fr +	Mar-May	Cultivated	Asia and Australia	Monoecious	Q.A campus, I.A campus
Moranginaceae	*Moringa oleifera* Lam. (Syn: *Guilandina moringa)*	Drumstick tree	Sohanjana	Fl + Fr +	Febr-Mar	Cultivated, Edible	Tropical Asia	Monoecious	Botanical Garden, Q.A campus
Malvaceae	*Dombeya spectabilis* Bojer (Syn: *Assonia spectabilis)*	Maple Leaved Dombeya	-	Fl + Fr –	Sept-Jan	Cultivated	Africa	Monoecious	Botanical garden
	Firmiana simplex (L.) W.Wight (Syn: *Hibiscus simplex)*	Japanese Varnish Tree, Chinese Parasol Tree	-	Fl + Fr +	May	Cultivated	Temperate Asia	Monoecious	Botanical Garden, Q.A campus
	Grewia asiatica L. (Syn: *Grewia subinaequalis)*	Phalsa blueberry	Falsa	Fl + Fr +	Mar- Sept	Cultivated	Tropical Asia	Monoecious	Botanical Garden, Q.A campus
Moraceae	*Artocarpus integer* (Thunb.) Merr. (Syn: *Artocarpus integrifolia)*	Jack fruit, Jack tree	Kathal	Fl + Fr +	Febr-Jul	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Artocarpus lakoocha Roxb. (Syn: *Artocarpus benghalensis)*	Monkey jack tree, Lakoocha	Lakoocha	Fl + Fr +	Mar-Apr	Cultivated	Asia	Monoecious	Q.A campus
	Broussonetia papyrifera (L.) (Syn: *Broussonetia billardii)*	Paper mulberry	Gul toot, Jangli toot	Fl + Fr +	Mar-Aug	Cultivated, Naturalized	Asia	Dioecious	Q.A campus
	Ficus benghalensis L. (Syn: *Ficus banyana)*	Banyan fig, Horn fig	Bohr, Bergad	Fl + Fr +	August-Dec	Cultivated	Tropical Asia	Monoecious	Q.A campus, I.A campus
	Ficus benjamina L. (Syn: *Ficus umbrina)*	Golden fig, Weeping fig	Feekas	Fl + Fr +	Apr-Aug	Cultivated	Asia and Australia	Monoecious	Q.A campus, I.A campus
	Ficus benjamina var pandora (Syn: *Ficus benjamina)*	Pandora's Weeping Fig,	Feekas	Fl – Fr –	-	Cultivated	Asia	Monoecious	Botanical garden

	Ficus carica L. (Syn: *Caprificus insectifera)*	Fig tree	Anjeer	Fl + Fr +	Throughout year	Cultivated, Edible	Africa, Asia and Europe	Monoecious	Q.A campus, I.A campus
	Ficus elastica Roxb. ex Hornem (Syn: *Ficus clusiifolia)*	Rubber fig tree, Rubber plant	-	Fl – Fr –	Mar-Apr	Cultivated	Tropical Asia	Monoecious	Q.A campus
	Ficus lyrata Warb. (Syn: *Ficus pandurata)*	Fiddle-leaf fig tree, Banjo fig	-	Fl + Fr +	Mar-Apr	Cultivated	Africa	Monoecious	Q.A campus
	Ficus maclellandii King (Syn: *Ficus rhododendrifolia)*	Alii Fig, Banana Leaf Fig	-	Fl + Fr +	Throughout year	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus
	Ficus racemosa L. (Syn: *Covellia lanceolata)*	Cluster fig	Gular, Umber	Fl + Fr +	Dec-Feb	Cultivated	Tropical Asia	Monoecious	Q.A campus
	Ficus retusa L. (Syn: *Ficus microcarpa)*	Cuban-laurel tree, Chinese banyan	Bohri	Fl + Fr +	May-Jun	Cultivated	Asia and Australia	Monoecious	Q.A campus
	Ficus rubiginosa Desf. ex Vent. (Syn: *Ficus australis*)	Port Jackson fig, Rusty fig	-	Fl + Fr +	Mar-Jul	Cultivated	Australia	Monoecious	Botanical garden
	Ficus religiosa L. (Syn: *Ficus caudata)*	Sacred fig tree	Banyan	Fl + Fr +	Mar-Oct	Cultivated	Asia	Monoecious & Dioecious	Q.A campus, I.A campus
	Ficus triangularis Warb (Syn: *Ficus natalensis)*	Natal Fig, Triangle Fig	-	Fl + Fr +	Apr-Jul	Cultivated	Africa	Monoecious	Botanical garden
	Ficus virens Aiton (Syn: *Ficus aegeirophylla)*	White fig, Grey fig	Pilkhan	Fl + Fr +	Throughout year	Cultivated	Asia and Australia	Monoecious	Q.A campus
	Morus alba L. (Syn: *Morus venosa)*	White mulberry	Shehtoot, toot	Fl + Fr +	Mar-Apr	Cultivated, Edible	Temperate Asia	Monoecious & Dioecious	Q.A campus, I.A campus
	Morus macroura Miq. (Syn: *Morus wallichiana)*	Himalayan mulberry	Pakistan mulberry	Fl + Fr +	Mar-Apr	Cultivated, Edible	Asia	Monoecious & Dioecious	Botanical garden, Q.A campus
	Morus nigra L. (Syn: *Morus siciliana)*	Black mulberry, Moral negro	Shehtoot, Toot	Fl + Fr +	Mar-Apr	Cultivated, Edible	Asia	Monoecious & Dioecious	Q.A campus
Magnoliaceae	*Magnolia champaca* (L.) Baill. ex Pierre (Syn: *Michelia champaca)*	Joy Perfume Tree	Shehtoot, Toot	Fl + Fr +	Apr-Jun	Cultivated	Asia	Monoecious	Botanical Garden, Q.A campus
	Magnolia grandiflora L. (Syn: *Magnolia angustifolia)*	Southern Magnolia, Bull bay	Magnolia	Fl + Fr +	Apr-May	Cultivated	North America	Monoecious	Botanical Garden, Q.A campus
Myrtaceae	*Callistemon viminalis* (Sol. Ex Gaertn.) G.Don (Syn: *Melaleuca viminalis)*	Weeping bottlebrush	Bottle brush	Fl + Fr +	Mar-Jun	Cultivated	Australia	Monoecious	Q.A campus

	Corymbia citriodora (Hook.) K.D.Hill & L.A.S.Johnson (Syn: *Eucalyptus citriodora)*	Lemon eucalyptus	Sufaida	Fl + Fr +	Feb-Mar	Cultivated	Australia	Monoecious	Q.A campus, I.A campus
	Eucalyptus camaldulensis Dehnh. (Syn: *Eucalyptus acuminata)*	River red gum, Blue gum	Sufaida	Fl-+ Fr-+	May-Jan	Cultivated	Australia	Monoecious	Q.A campus
	Eucalyptus paniculata Sm (Syn: *Eucalyptus nanglei)*	Torrangora	Sufaida	Fl – Fr –	-	Cultivated	Australia	Monoecious	Botanical garden
	Eucalyptus crebra F. Muell. (Syn: *Metrosideros salicifolia)*	Grey ironbark	Sufaida	Fl + Fr +	Oct-Nov	Cultivated	Australia	Monoecious	Q.A campus
	Eucalyptus polyanthemos Schauer (Syn: *Eucalyptus ovalifolia)*	Red box, Silver Dollar Gumtree	Sufaida	Fl – Fr –	-	Cultivated	Australia	Monoecious	Botanical garden
	Eucalyptus microcarpa (Maiden) Maiden (Syn: *Eucalyptus woollsiana)*	Grey box, Narrow-leaved box	Sufaida	Fl – Fr –	-	Cultivated	Australia	Monoecious	Botanical garden
	Eucalyptus robusta Sm. (Syn: *Eucalyptus multiflora)*	Swamp mahogany	Sufaida	Fl + Fr +	Oct-Nov	Cultivated	Australia	Monoecious	Botanical garden
	Melaleuca quinquenervia (Cav.) S.T.Blake (Syn: *Melaleuca maidenii)*	Broad leaved paper bark, Punk tree	White Bottle brush	Fl + Fr +	Oct-Nov	Cultivated	Australia	Monoecious	Botanical garden
	Melaleuca lanceolata Otto (Syn: *Melaleuca pubescens)*	Black paperbark tree	Moonah, Bottle brush	Fl + Fr +	Apr-Jun	Cultivated	Australia	Monoecious	Q.A campus
	Psidium guajava L. (Syn: *Psidium angustifolium)*	Guava	Amrood	Fl + Fr +	Oct-Nov	Cultivated, Edible	America	Monoecious	Botanical garden, Q.A campus, I.A campus
	Syzygium cumini (L.) Skeels (Syn: *Eugenia jambolana)*	Black plum tree	Jaman	Fl + Fr +	Apr-May	Cultivated, Edible	Africa and Asia	Monoecious	Botanical garden, Q.A campus, I.A campus
	Syzygium aromaticum (L.) Merr. & L.M.Perry (Syn: *Eugenia aromatic)*	Clove	Laung	Fl – Fr –	-	Cultivated, Edible	Tropical Asia	Monoecious	Botanical garden
	Syzygium heyneanum (Duthie) Gamble (Syn: *Eugenia heyneana)*	River plum	Kath Jamun	Fl + Fr +	June-july	Cultivated, Edible	Tropical Asia	Monoecious	Q.A campus
Nyctangeniaceae	*Bougainvillea glabra* Choisy (Syn: *Bougainvillea arborea)*	Paper flower	-	Fl + Fr –	Apr-Oct	Cultivated	South America	Monoecious & Dioecious	Botanical garden, Q.A campus, I.A campus

Oleaceae	*Ligustrum lucidum* W.T.Aiton (Syn: *Ligustrum roxburghii)*	Chinese privet	-	Fl + Fr –	Mar-Apr	Cultivated	Temperate Asia	Monoecious	Botanical garden
	Nyctanthes arbor-tristis L. (Syn: *Nyctanthes dentata)*	Night flowering jasmine	Haar singhar	Fl + Fr +	Sept-Nov	Cultivated	Tropical Asia	Monoecious	Q.A campus
	Olea ferruginea Wall. Ex Aitch (Syn: *Olea europaea subsp.)cuspidata*	Indian Olive	Kahu, Jungli Zaitoon	Fl – Fr –	-	Cultivated, Naturalized	Asia and Africa	Monoecious	Q.A campus
Poaceae	*Bambusa vulgaris* Schrad. Ex J.C.Wendl. (Syn: *Arundarbor blancoi)*	Common bamboo, Golden bamboo	Basini Bans	Fl – Fr –	-	Cultivated	Temperate Asia	Monoecious	Q.A campus
	Dendrocalamus strictus (Roxb.) Nees (Syn: *Bambos stricta)*	Male bamboo	Bans	Fl – Fr –	-	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus
Papilionaceae	*Erythrina suberosa* Roxb. (Syn: *Erythrina alba) Erythrina stricta Roxb. var. suberosa*	Coral tree, Flame tree	Gull-e-Nishtar	Fl + Fr –	Mar-Apr	Cultivated	Tropical Asia	Monoecious & Dioecious	Botanical garden, Q.A campus, I.A campus
	Erythrina bidwillii Lindl. (Syn: *Erythrina corallodendron)*	Bidwill's Coral Bean, Red shower	-	Fl + Fr –	Mar-Apr	Cultivated	Australia	Monoecious	Q.A campus
Proteaceae	*Grevillea robusta* A.Cunn. ex R.Br. (Syn: *Grevillea venusta)*	Silk oak, Silver oak	Gull-e-Nishtar	Fl + Fr –	Apr-May	Cultivated	Australia	Monoecious	Q.A campus, I.A campus
Plantanaceae	*Platanus orientalis* L. (Syn: *Platanus nana)*	Oriental plane tree, Plaintain	Chinar	Fl – Fr –	-	Cultivated	Temperate Asia and Europe	Monoecious	Q.A campus
Primulaceae	*Jacquinia macrocarpa* Cav. (Syn: *Bonellia macrocarpa)*	Jacquinia	-	Fl + Fr +	May-Jun	Cultivated	America	Monoecious	Botanical garden
Podocarpaceae	*Podocarpus macrophyllus* (Thunb.) Sweet (Syn: *Podocarpus canaliculatus)*	Yew plum pine	Podocarpas	Fl – Fr –	-	Cultivated	Temperate Asia	Dioecious	Botanical garden
Pittosporaceae	*Pittosporum tobira* (Thunb.) W.T.Aiton (Syn: *Euonymus tobira)*	Mock orange, Japanese cheesewood	Tobira	Fl + Fr +	Apr-May	Cultivated	Temperate Asia	Monoecious	Q.A campus
	Pittosporum angustifolium Lodd. (Syn: *Pittosporum philyraeoides)*	Butter bush, Cattle bush	-	Fl + Fr –	Mar-May	Cultivated	Australia	Monoecious	Botanical garden

Pinnaceae	*Pinus roxburghii* Sarg. (Syn: *Pinus longifolia)*	Himalayan Pine	Sanobar, Cheer	Fl + Fr +	Mar-May	Cultivated, Naturalized	Asia	Monoecious	Q.A campus, I.A campus
	Pinus wallichiana A.B.Jacks (Syn: *Pinus excelsa)*	Bhutan pine, Himalayan white pine	Biar, Kail	Fl – Fr –	-	Cultivated, Naturalized	Asia	Monoecious	Botanical garden
Rutaceae	*Aegle marmelos* (L.) Correa (Syn: *Belou marmelos)*	Beel fruit, wood apple	Bael giri	Fl + Fr +	May-Jun	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Citrofortunella microcarpa Bunge (Syn: *Citrus microcarpa)*	Orange	Narangi	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Q.A campus
	Citrus nobilis var. *deliciosa* (Ten.) Swingle (Syn: *Citrus delicosa)*	Mandarin Hybrid	Kinnow	Fl + Fr +	Mar-May	Cultivated, Edible	Asia	Monoecious	Botanical garden
	Citrus medica L. (Syn: *Citrus limetta)*	Citron	Meetha	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Q.A campus
	Citrus taitensis Risso (Syn: *Citrus aurantium, C. jhambiri)*	Mandarin lime	Khatta, Khatti	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Q.A campus
	Citrus grandis (L.) Osbeck (Syn: *Citrus maxima)*	Forbidden fruit, Paradise apple	Chakotra	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Botanical garden
	Citrus pseudolimon Tanaka (Syn: *Citrus x limon)*	Hill lemon	Chakotra	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Q.A campus
	Citrus reticulata Blanco (Syn: *Citrus chrysocarpa)*	Green tangerine peel	Santara	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Botanical garden
	Citrus sinensis (L.) Osbeck (Syn: *Citrus ×macracantha)*	Sweet lemon	Santara	Fl + Fr +	Mar-May	Cultivated, Edible	Tropical Asia	Monoecious	Q.A campus
	Murraya koenigii (L.) Spreng. (Syn: *Bergera koenigii)*	Curry leaf tree	Kurry patta	Fl + Fr +	Apr-Jun	Cultivated	Asia	Monoecious	Q.A campus
	Murraya paniculata (L.) Jack (Syn: *Murraya exotica)*	Orange Jasmine	Marwa	Fl + Fr +	Throughout the year.	Cultivated	Asia	Monoecious	Botanical garden, Q.A campus, I.A campus
	Naringi crenulata (Roxb.) Nicolson (Syn: *Hesperethusa crenulata)*	Hesperethusa, Beli	-	Fl + Fr +	Apr-May	Cultivated	Asia	Monoecious	Botanical garden
Rubiaceae	*Gardenia resinifera* Roth (Syn: *Gardenia lucida)*	Brilliant Gardenia	Gardenia	Fl + Fr +	Apr-May	Cultivated	Tropical Asia	Monoecious	Botanical garden
	Gardenia jasminoides J. Ellis (Syn: *Gardenia augusta)*	Cape Jasmine	Gardenia	Fl + Fr –	May-Oct	Cultivated	Asia	Monoecious	Q.A campus

	Hamelia patens Jacq. (Syn: *Duhamelia odorata)*	Hummingbird bush, Fire bush	-	Fl + Fr +	Apr-Jun	Cultivated	America	Monoecious	Botanical garden
	Mitragyna parvifolia (Roxb.) Korth. (Syn: *Nauclea parvifolia)*	Cheesewood	Kadamb	Fl + Fr +	Apr-Jun	Cultivated	Tropical Asia	Monoecious	Botanical garden
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl. (Syn: *Mespilus japonica)*	Japanese Medlar, Chinese plum	Loquat	Fl + Fr +	Nov- Jan	Cultivated, Edible	Temperate Asia	Monoecious	Q.A campus
	Malus domestica Borkh. (Syn: *Malus pumilla)*	Apple	Saib	Fl + Fr +	Throughout year	Cultivated, Edible	Temperate Asia	Monoecious	Botanical garden
	Prunus persica (L.) Batsch (Syn: *Amygdalis persica)*	Peach	Aaru	Fl + Fr +	Feb-Apr	Cultivated, Edible	Temperate Asia	Monoecious	Q.A campus
	Pyrus communis L. (Syn: *Malus communis)*	Common pear	Nashpati	Fl + Fr –	Mar-Apr	Cultivated, Edible	Temperate Asia and Europe	Monoecious	Botanical garden
	Rosa banksiae W. T. Aiton (Syn: *Rosa inermis)*	Lady Bank's rose	Sfaid gulab	Fl + Fr –	Mar-Apr	Cultivated	Temperate Asia	Monoecious	Q.A campus
Rhamnacceae	*Ziziphus jujuba* Mill. (Syn: *Girtanneria jujuba)*	Chinese date	Bair	Fl + Fr +	Sept-Nov	Cultivated, Edible	Temperate Asia	Monoecious	Q.A campus
	Ziziphus mauritiana Lam. (Syn: *Rhamnus jujuba)*	Indian cherry, Indian plum,	Bair	Fl + Fr +	Sept-Nov	Cultivated, Edible	Asia	Monoecious	Botanical garden
Sterculiaceae	*Brachychiton populneus* (Schott & Endl.) R.Br. (Syn: *Poecilodermis populnea)*	Bottle tree**,** Kurrajong	Pagla tree	Fl + Fr +	Apr-Jun	Cultivated	Australia	Monoecious	Botanical garden
	*Pterospermum acerifolium*L. wild. (Syn: *Pentapetes acerifolia)*	Maple-Leafed, Dinner Plate Tree	Kanak Champa	Fl + Fr +	Mar-May	Cultivated	Asia	Monoecious	Botanical garden , Q.A campus
Salicaceae	*Populus deltoides* Marshall (Syn: *Populus angulata)*	Eastern cottonwood, Necklace poplar	Poplar	Fl – Fr –	-	Cultivated	North America	Monoecious	Botanical Garden, Q.A campus
	Salix tetrasperma Roxb. (Syn: *Salix apiculata)*	Indian Willow tree,	Bed-i-laila	Fl + Fr +	Oct-Mar	Cultivated	Tropical Asia	Monoecious	Botanical Garden, Q.A campus
Sapindaceae	*Acer negundo* L. (Syn: *Acer trifoliatum)*	Three leaved maple, Box elder	Acer, Kirmola	Fl + Fr +	Mar-April	Cultivated	America	Monoecious & Dioecious	Botanical garden
	Cupaniopsis anacardioides (A.Rich.) Radlk. (Syn: *Cupaniopsis parvifolia)*	Carrot wood	Jhanwi, Tackeroo	Fl + Fr +	Feb-Apr	Cultivated	Australia and Asia	Monoecious & Dioecious	Botanical garden

	Dodonaea viscosa Jacq. (Syn: *Ptelea viscosa)*	Switch sorrel	Sanatha	Fl + Fr +	Feb-Apr	Cultivated, naturalized	Asia and Afria	Monoecious	I.A campus
	Litchi chinensis Sonn. (Syn: *Nephelium chinense)*	Lychee tree	Lichi	Fl – Fr –	Mar-Apr	Cultivated, Edible	Asia	Monoecious	Botanical garden
	Sapindus mukorossi Gaertn. (Syn: *Sapindus abruptus)*	Soap nut tree	Reetha	Fl + Fr –	Oct-Feb	Cultivated	Asia	Monoecious & Dioecious	Botanical garden
	Sapindus saponaria L. (Syn: *Sapindus rigidus)*	Western soap berry	Reetha	Fl + Fr +	Oct-Feb	Cultivated	America	Monoecious	Q.A campus
	Schleichera oleosa (Lour.) Oken (Syn: *Scytalia trijuga)*	Ceylon oak, Lac tree	Kusum	Fl + Fr –	Apr-May	Cultivated	Tropical Asia	Monoecious	Botanical garden
Sapotaceae	*Madhuca indica* J.F.Gmel (Syn: *Madhuca latifolia)*	Butter tree	Mohwa, Gul chikan	Fl + Fr +	Mar-Apr	Cultivated	Tropical Asia	Monoecious	Botanical garden, Q.A campus
	Manilkara hexandra (Roxb.) Dubard (Syn: *Mimusops hexandra)*	Ceylon Iron Wood	Khirni	Fl + Fr +	Dec-Feb	Cultivated	Asia	Monoecious & Dioecious	Botanical Garden, Q.A campus
	Manilkara zapota (L.) P. Royen (Syn: *Manilkara achras)*	Nose berry, Sapodilla plum	Chikoo	Fl + Fr +	Apr-Jul	Cultivated, Edible	America	Monoecious	Botanical Garden, Q.A campus
	Mimosops elengi L. (Syn: *Kaukenia elengi)*	Spanish cherry	Molsari, Bakul	Fl + Fr +	Jul-Sept	Cultivated	Tropical Asia and Australia	Monoecious	Q.A campus
Scrophulariaceae	*Leucophyllum frutescens* (Berland.) I.M. Johnst. (Syn: *Leucophyllum texanum)*	Purple Sage, Texas Sage	Silvery	Fl + Fr –	Jul-Oct	Cultivated	North America	Monoecious	Botanical garden
Strelitziaceae	*Ravenala madagascariensis* Sonn. (Syn: *Urania madagascariensis)*	Traveler's Palm	Banana palm	Fl + Fr –	Nov-Jan	Cultivated	Africa	Monoecious & Dioecious	Q.A campus
Tamaricaccae	*Tamarix aphylla* (L.) H.Karst. (Syn: *Tamarix articulata)*	Athel pine	Farash	Fl + Fr –	Oct-Nov	Cultivated, Naturalized	Asia and Africa	Monoecious & Dioecious	Q.A campus
Urticaceae	*Holoptelea integrifolia* (Roxb.) Planch. (Syn: *Ulmus integrifolia)*	Indian Elm	Chilhil papri	Fl + Fr +	Jan-Feb	Cultivated	Tropical Asia	Monoecious	Botanical Garden

Angiosperms constitute a major proportion of tree species of the flora of the PU. Of the 55 families, 5 belong to Gymnosperms (7 spp.) and 50 to Angiosperms (213 spp.). The Gymnosperm families included Araucariaceae, Cycadaceae, Ginkgoaceae, Pinnaceae and Podocarpaceae (Table I). Among angiosperms, dicotyledons contributed the maximum number of tree species (198) of 46 families, while monocotyledons represent 15 trees of 4 families, Arecaceae, Asparagaceae, Poaceae and Strelitziaceae (Figure 3).

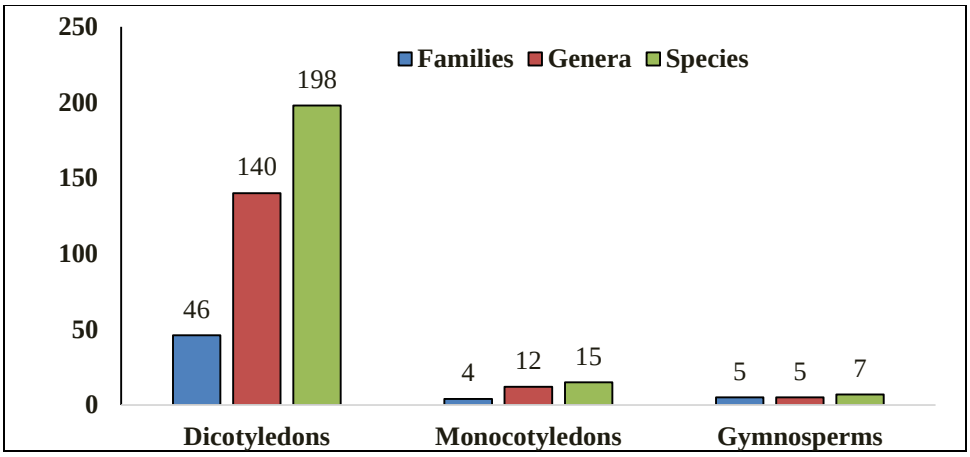

Fig. 3: Distribution of plant families, genera and species among different groups of plants present at PU.

The data on biogeographical distribution ranges of tree species revealed that most of the trees were of tropical Asian (48 spp.) origins. The species with tropical as well as temperate Asian origin were constituting 43 species. About 20 species belong to the Australian continent and another 19 species are from North and South America (Figure 4). Ten species have their native distribution in Africa only. However, the contribution of plant species from Europe is rare with only one European species, *Chamaerops humilis* L., planted at the Department of Botany (Table I).

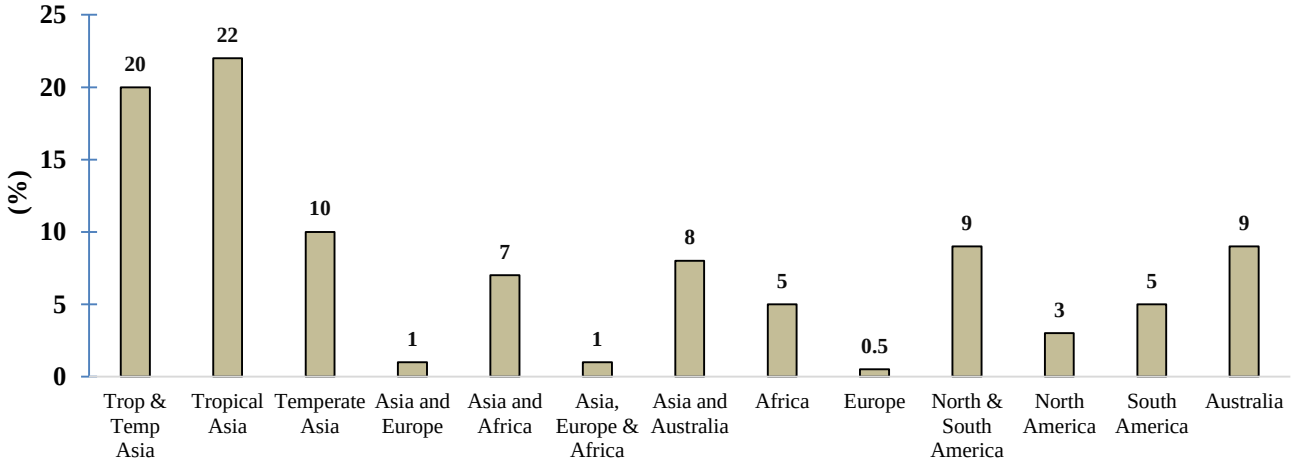

Fig. 4: The biogeographic origin of different woody species planted at PU campuses and botanical garden

Tree species present in the botanical garden and the two campuses exhibit different phenological stages. About 71 % (156) species complete their life cycle by producing flowers (Table I; Plate 1) and fruits in their respective season (only 15 % species with edible fruits), but 16% (36) of the

planted trees were never observed in flowering stage (e.g *Polyalthia longifolia* Sonn., *Millingtonia hortensis* L.*f. Hardwickia binata* Roxb. etc.).This may be due to the mismatching of photoperiods of these introduced species in a new environment. About 28 tree species (13%) produced spectacular flowers (Figure 5) but they were unable to fruit, for example, *Plumeria rubra* L., *Acacia stenophylla* A.Cunn, *Pittosporum angustifolium* Lodd., *Ravenala madagascariensis* Sonn. This inability to fruit may be due to the absence of specialized pollinators or other climatic constraints. About 87% (191 spp.) and 5% (11 spp.) of planted trees were monoecious and dioecious, respectively. The remaining 8% (18 spp.) species can be both monoecious and dioecious (Table I).

Fig. 5: Spectacular display of flowers of some trees: (a) *Alangium salviifolium* (b) *Capparis decidua* (c) *Magnolia grandiflora* (d) *Butea monosperma* (e) *Cassia fistula* (f) *Carica papaya* (g) *Lagerstroemia speciosa* (h) *Ceiba insignis* (i) *Crateva adansonii* (j) *Delonix regia* (k) *Pittosporum angustifolium* (l) *Eriobotrya japonica* (m) *Tamarindus indica* (n) *Callicarpa macrophylla* (o) *Garuga pinnata* (p) *Chukrasia tabularis* (q) *Manilkara hexandra* (r) *Melaleuca quinquenervia* (s) *Saraca asoca* (t) *Syzygium heyneanum*

Some ornamental tree species extensively planted on campus are not listed in the Flora of Pakistan. These species included *Terminalia ivorensis*, *Wodyetia bifurcata*, *Phoenix roebelenii* and *Conocarpus lancifolius*. Some other rare species are also planted in the campus listed in the Table II. Out of these rare species, *Pleiogynium timoriense, Handroanthus impetiginosus, Discladium obtusatum, Pittosporum angustifolium, Sapindus saponaria, Syzygium heyneanum, Tabebuia aurea* and *Anogeissus acuminata* are not previously reported from Pakistan, therefore they are considered new additions to the flora of Pakistan (Table II).

Table II: List of some rare and new records of tree species.

Rare tree species	**Family**	**Status**
Pleiogynium timoriense (DC.) Leenh.	Anacardiaceae	*A new addition to the flora of Pakistan*
Garuga pinnata Roxb.	Burseraceae	*Rare*
Millingtonia hortensis L.f.	Bignoniaceae	*Rare*
Handroanthus impetiginosus (Mart. ex DC.) Mattos		*A new addition to the flora of Pakistan*
Tabebuia aurea (Silva Manso) Benth. & Hook.f. ex S.Moore		*A new addition to the flora of Pakistan*
Alangium salviifolium (L.f.) Wangerin	Cornaceae	*Rare*
Anogeissus acuminata (Roxb. ex DC.) Wall. ex Guill. & Perr.	Combretaceae	*A new addition to the flora of Pakistan*
Croton mangelong Y.T. Chang.	Euphorbiaceae	*Rare*
Acacia seyal Delile	Fabaceae	*Rare*
Acacia stenophylla A.Cunn.		*Rare*
Bauhinia racemosa Lam.		*Rare*
Discladium obtusatum (DC.) Tiegh.		*A new addition to the flora of Pakistan*
Callicarpa macrophylla Vahl	Lamiaceae	*Rare*
Firmiana simplex (L.) W.Wight	Malvaceae	*Rare*
Syzygium heyneanum (Duthie) Gamble	Myrtaceae	*A new addition to the flora of Pakistan*
Sapindus saponaria L.	Sapindaceae	*A new addition to the flora of Pakistan*
Pittosporum angustifolium Lodd.	Pittosporaceae	*A new addition to the flora of Pakistan*
Holoptelea integrifolia (Roxb.) Planch.	Urticaceae	*Rare*

Fig. 6: Some of the new addition to Pakistan is *Anogeissus acuminata* (a) *Sapindus Saponaria* (b) *Tabebuia aurea* (c) *Discladium obtusatum* (d).

DISCUSSION

About 430 tree species are reported from Pakistan, dispersed in 82 plant families (Baquar, 1995). The University of the Punjab, Lahore harbors 220 (51%) of the trees reported in Pakistan. Trees planted on two campuses and the botanical garden of the university represents the tree flora of the Lahore region. Siddiqui *et al.,* (2016) recorded 94 tree species belonging to 43 families in different parks of Lahore. Similarly, Shah *et al.* (2016) listed 100 tree species from Sargodha district of the Punjab, and all these species are also represented in present work from the PU campus area.

The tree diversity of the A.I. campus was low as compared to the Quaid-e-Azam campus probably due to the smaller overall land area of the A.I. campus. A total of 55 tree species were present in A.I. campus which constitutes only 26% of the total plants present in Quaid-e-Azam campus.

However, one medium native tree, *Dodonaea viscosa* (L.) Jacq. was only present in A.I campus.

The botanical garden represents 87% (191 species) of the total trees and harbours a rich diversity of flora like other botanical gardens around the world. Among families, it was observed that 93% belonged to Angiosperms with Fabaceae being the most common family e.g. *C. fistula*, *D. sissoo*, *B. variegata* in the Quaid-e-Azam campus.

Some large woody shrubs, for example, *Nerium oleander* L., *Jatropha integerrima* Jacq., *Caesalpinia pulcherrima* (L.) Sw., *Lawsonia inermis* L., *Syzygium aromaticum* (L.) Merr. & L.M.Perry, *Erythrina bidwillii* Lindl., *Hamelia patens* Jacq., *Rosa banksiae* W. T. Aiton are also included in the list (Table I). All these woody shrubs are in the gardens of different academic departments, botanical garden or along the university avenues. The most common species planted in the campus along roadsides are *Alstonia scholaris* (L.) R.Br., *Eucalyptus camaldulensis* Dehnh., *Syzygium cumini* (L.) Skeels, *Bauhinia variegata* L., *Polyalthia longifolia* (Sonn.) Thwaites, *Ficus benjamina* L., *Cassia fistula* L., *Erythrina suberosa* Roxb., *Morus alba* L. and *Putranjiva roxburghii* Wall. Some of the planted species (8%) also grow in wild condition across Pakistan i.e. *Acacia modesta* Wall., *Prosopis cineraria* (L.) Druce, *Dodonaea viscosa* Jacq.,*Olea ferruginea*, *Tamarix aphylla* (L.), and *Capparis decidua* (Forssk.) Edgew.

Many of the reported woody species have medicinal or economic importance, and local people utilize different plant parts for medicine, food, and timber. For example, seeds of *Jatropha curcas* are the source of oil for biodiesel production (Koh & Ghazi, 2011; Fuentes *et al.,* 2018). *Cupressus sempervirens* is a well-known commercial timber producing tree (Mark *et al*., 2014). The wood of *Acacia nilotica* and *Albizia lebbeck* is used as firewood and timber (Kataki & Konwer, 2002). Some of the trees planted along the roadsides such as *Polyalthia longifolia* (ulta ashok), *Ficus* spp. and *Mangifera indica* are good sound absorbers and they help in reducing the noise pollution (Ghosh *et al.,* 2008; Dixit *et al.,* 2014). *Eucalyptus citriodora*, a pollution tolerant tree (Joshi & Swami, 2007), is planted widely in the campus and Lahore. The wood of *Tectona grandis* is also quite valuable due to its durability and colour (Kokutse *et al.,* 2004; Thulasidas *et al.,* 2006).

Some of the introduced species planted on campus or botanical garden have now been naturalized or became invasive in Pakistan (Shahzadi, 2018). For example, *Broussonetia papyrifera*, *Prosopis juliflora*, *Leucaena leucocephala* and *Sapium sebiferum* are highly invasive trees in Pakistan (Shabbir and Bajwa 2006, Malik and Husain 2007, Qureshi et al. 2014, Qayyum et al. 2018) and they have been reported to reduce the species diversity of the natural ecosystems (Zou *et al.,* 2006; Akhtar *et al.,* 2014; Tian *et al.,* 2017). Many other planted species may not be a threat in Pakistan at this stage but they are well recognized invasive species in other parts of the world, for example, *Ligustrum lucidum* in the USA (Ferreras *et al.,* 2015), *Schinus terebinthifolius* in Florida (Williams *et al.,* 2007), and *Pistacia chinensis* in Australia and Texas (Mcwilliams, 1991; Smith *et al.,* 2000). It is, therefore, important to keep a watch and discourage their plantations in the future.

Some newly introduced trees viz. *Tabebuia aurea*, *Terminalia ivorensis*, *Wodyetia bifurcata*, *Phoenix roebelenii* and *Conocarpus lancifolius* are widely planted as ornamentals in the campus as well as in other parts of Pakistan. However, no risk assessment has been carried out before their introduction to Pakistan. Consequently, *Conocarpus lancifolius* has become a troublesome plant for the environment as well as humans in Karachi (Al Zarooni & Gokulan, 2012; Al-Shatti *et al.,* 2014; Hamid, 2018).

There are also some rare trees planted in the botanical garden of PU, not previously reported from Pakistan. For example, family Anacardiaceae consists of 8-9 genera in Pakistan (Nasir, 1983) but *Pleiogynium timoriense* a member of the same family, planted at PU campus as well as Jinnah Garden, Lahore, has not been recorded from Pakistan. Sabnis (1940) included this tree in the flora of Punjab but its authenticity was not confirmed by any specimen (Nasir, 1983). Another species *Discladium obtusatum* (Syn. *Ochna obtusata*) belonging to Ochnaceae is planted in PU botanical garden. Only one species of this genus, *Ochna serrulata* (Hochst.) Walp. was reported previously from Badshahi Mosque Lahore (Ajaib & Khan, 2010). All of the above species and *Pittosporum angustifolium, Handroanthus impetiginosus, Syzygium heyneanum, Sapindus saponaria*, *Anogeissus acuminata* are new additions to the Flora of Pakistan.

CONCLUSION

University of the Punjab, Lahore harbors a large number of plant species at its botanical garden and campuses.These species represent the tree flora of the Lahore district and about half of

total tree flora of Pakistan. Although most trees are planted as ornamentals several rare species have also been planted some of which are not even recorded in the Flora of Pakistan. The rich diversity of trees planted at the PU is representative of the regional flora and this provides opportunities for research and recreation and needs to be conserved.

DECLARATION

We thank Jag Mohan Garg and members of his eFloraIndia group for help with the identifications. Nevertheless, we are responsible for the names used. Please let us know of changes in taxonomy or errors. We also thank PU gardeners for the interest they showed and the assistance they gave us.

REFERENCES

Ajaib, M. and Khan., Z.D., 2010. *Diospyros malabarica* (Desr.) Kostel. of Family Ebenaceae and *Ochna serrulata* (Hochst.) Walp. of Family Ochnaceae: Addition to the flora of Pakistan. *Biologia*., 56(1&2): 17-21.

Al Zarooni, M. and Gokulan, D., 2012. The menace of the Damas tree. Retrieved from: https://www.khaleejtimes.com/article/20121007/ARTICLE/310079851/1036

Akhtar, S., Bangash, N., Asghar, R., Munir, M. and Khalid, N., 2014. Allelopathic assessment of selected invasive species of Pakistan. *Pak. J. Bot.,* 46(5): 1709-1713.

Al-Shatti, A. H., Redha, A., Suleman, P. and Al-Hasan, R., 2014. The Allelopathic Potential of *Conocarpus lancifolius* (Engl.) Leaves on Dicot (*Vigna sinensis* L.), Monocot (*Zea mays* L.) and Soil-Borne Pathogenic Fungi. *Amer. J. Pla. Sci.,* 5(19): 2889.

Kokutse A.D, Bailleres, H., Stokes, A. and Kokou, K., 2004. Proportion and quality of heartwood in Togolese teak (*Tectona grandis* L.f). *For. Ecol. Man.,* 189(1): 37- 48.

Baquar, S. R., 1995. *Trees of Pakistan: Their natural history, characteristics and utilization*. Royal Book Company, Karachi.

Bushra. 2016. *Taxonomic study of the tree flora of Botanical garden, University of the Punjab, Lahore*. M.Sc. thesis, University of the Punjab Lahore, Pakistan, 17 pp.

Dawson, W., Mndolwa, A., Burslem, F. R. P., and Hulme, P. H., 2008. Assessing the risks of plant invasions arising from collections in tropical botanical gardens. *Bio. Cons.,* 17(8): 1979-1995.

Dixit, P., Mishra, T., Pala, M. A. H. E. S. H., Rana, T.S. and Upreti, D. K., 2014. *Polyalthia longifolia* and its Pharmacological Activities. *Int. J. Sci. Inno. Res.,* 2(1): 17-25.

Eisenman, T.S., Churkina, G., Jariwala, S.P., Kumar, P., Lovasi, G.S., Pataki, D.E., Weinberger, K.R. and Whitlow, T.H., 2019. Urban trees, air quality, and asthma: an interdisciplinary review. *Lan. Urb. Pla.*, 187:47-59.

Faraji, L. and Karimi, M., 2020. Botanical gardens as valuable resources in plant sciences. *Bio. Con*, 29(1): 1-22.

Ferreras, A. E., Giorgis, M.A., Tecco, P.A., Cabido M.R., and Funes, G., 2015. Impact of *Ligustrum lucidum* on the soil seed bank in invaded subtropical seasonally dry woodlands (Córdoba, Argentina). *Bio. Inv.,* 17(12): 3547-3561.

Fuentes, A., García, C., Hennecke, A. and Masera, O., 2018. Life cycle assessment of *Jatropha curcas* biodiesel production: a case study in Mexico. *Cle. Tech. Envi. Pol.*, 20(7): 1-13.

Ghosh, A., Das, B.K., Chatterjee, S.K. and Chandra, G., 2008. Antibacterial potentiality and phytochemical analysis of mature leaves of *Polyalthia longifolia* (Magnoliales: Annonaceae). *The. Sou. Pac. J. Nat. App. Sci.,* 26(1): 68-72.

Hamid, M. 2018. The Conocarpus Disaster, Karachi. Retrieved from: http://hamidtreefoundation.org/the-conocarpus-disaster-karachi

Joshi, P. C. and Swami, A., 2007. Physiological responses of some tree species under roadside automobile pollution stress around city of Haridwar, India. *The. Envi.*, 27(3): 365-374.

Kataki, R., and Konwer, D., 2002. Fuelwood characteristics of indigenous tree species of north-east India. *Bio. Bioe.,* 22(6): 433-437.

Khoury, C.K., Greene, S.L., Krishnan, S., Miller, A.J. and Moreau, T., 2019. Botanic Garden-Agriculture Research Collaborations around North America's Crop Wild Relatives and Wild Utilized Plants. The J. Ame. Pub. Gar. Ass., 34 (4): 6-10

Koh, M. Y. and Ghazi, T.I.M., 2011. A review of biodiesel production from *Jatropha curcas* L. oil. Ren. *Sust. Ene. Rev.,* 15(5): 2240-2251.

Laverne, R. J. and Geideman, K.W., 2003. The influence of trees and landscaping rental rates at office building. *J. Arbo.*, 29(5): 281-289.

Malik, R. N. and Husain, S.Z., 2007. *Broussonetia papyrifera* (L.) L'hér. Ex Vent.: an environmental constraint on the himalayan foothills vegetation. *Pak. J. Bot.,* 39(4): 1045.

Mark, J., Newton, A.C., Oldfield, S. and Rivers, T., 2014. A Working List of Commercial Timber Tree Species. Botanic Gardens Conservation International; United Kingdom. pp 40.

McWilliams, E., 1991. The impending naturalization of *Pistacia chinensis* (Anacardiaceae) in east Texas. *Con. Bot*., 14(3): 508-511.

Nasim, G., 2010. *Identification Guide and Colour Atlas for flora of Punjab University, Quaid-e-Azam Campus.* University of the Punjab RT Printers, Lahore Pakistan. 360 pp.

Nasir, Y.J., 1983. Anacardiaceae. *In:* Nasir, E. and Ali, S.I (Eds.). *Flora of Pakistan*, Islamabad, Pakistan. 152 pp.

Nasir, Y.J., 1983. Anacardiaceae. *In*: E. Nasir and S.I. Ali. (Eds.) *Flora of Pakistan* No.152. Department of Botany University of Karachi, and Pakistan Agricultural Research Council, Islamabad. 1-22 pp.

Primack, R. B. and Rushing. M.A.J., 2009. The role of botanical gardens in climate change research. *New. Phyt.,* 182(2): 303-313.

Qing, C. H. E. N., 2011. Application of Local Trees in Landscaping University Garden. *Nor. Hort.,* 8: 055.

Qayyum, A., Rafiq, M.K., Zahara, K., Bibi, Y., Sher, A., Rafiq, M.T., Aziz, R. and Manaf, A., 2018. Allelopathic Effects of Invasive *Prosopis juliflora* on Grass Species of Potohar Plateau, Pakistan. *Pla. Dan.,* 36: 60-64.

Qureshi, H., Arshad M., and Bibi, Y., 2014. Invasive flora of Pakistan: a critical analysis. *Int. J. Bio.*, 4(1): 407-424.

Sabnis, T. S., 1940. A contribution to the flora of Punjab plains and the associated Hill Regions. *J. Bom. Nat. His. Soc.*, 42: 3-4

Shah, A., Rahim, S., Bhatti, K. H., Khan, A., Din, N., Imran, M., Mohsin, M., Ishtiaq, M., Nabila, A., Ansari, A., Hussain, S., Zafar, M., Mushtaq, M., Mumtaz, E. and Iqbal, J., 2016. Ethnobotanical study and conservation status of trees in the district Sargodha, Punjab, Pakistan. *Phy. Int. J. Exp. Bot.,* 84(1): 34-44.

Sidra, S., Ali, Z. and Chaudry, M.N., 2013. Avian diversity at new campus of Punjab University in relation to land use change. *Pak. J. Zoo.,* 45(4): 1069-1082.

Sekar, K. C., 2012. Invasive alien plants of Indian Himalayan region—diversity and implication. *Ame. J. Pla. Sci.,* 3(2): 177-184.

Siddiqui, S., Shirazi, S.A. and Ali, A., 2016. A Floristic Analysis of Selected Parks in Lahore, Pakistan. *J. Pun. Uni. Hist. Soc.,* 29(2): 182-195.

Shabbir, A. and Bajwa, R., 2006. Distribution of parthenium weed (*Parthenium hysterophorus* L.), an alien invasive weed species threatening the biodiversity of Islamabad. *Wee. Bio. Man.*, 6(2): 89-95.

Shahzadi, M., 2018. *A Check List and Risk Assessment of Invasive Species of Pakistan*. BS. thesis. University of the Punjab Lahore, Pakistan. pp 64.

Smith, J. M. B., Borgis, S. and Seifert, V., 2000. Studies in Urban Ecology: the First Wave of Biological Invasion by *Pistacia Chinensis* in Armidale, New South Wales, Australia. *Aust. Geo. Stu.,* 38(3): 263-274.

Stewart, R. R., 1972. An Annotated Catalogue of the Vascular Plants of West Pakistan and Kashmir. *In:* E. Nasir and S.I. Ali (Eds.) *Flora of West Pakistan*, Karachi. pp. 1-364.

Thulasidas, P. K., Bhat, K.M. and Okuyama, T., 2006. Heartwood colour variation in home garden teak (*Tectona grandis*) from wet and dry localities of Kerala, India. *J. Tro. For. Sci.,* 18(1): 51-54.

Tian, N., Fan, Z., Matne, T.G. and Schultz, E.B., 2017. Growth and stem profiles of invasive *Triadica sebifera* in the Mississippi coast of the United States. *For. Sci.,* 63(6): 569-576.

Williams, D. A., Muchugu, E., Overholt, W. A. and Cuda, J.P., 2007. Colonization patterns of the invasive Brazilian pepper tree, *Schinus terebinthifolius*, in Florida. *Her.,* 98(5): 284-290.

Zou, J., Rogers, W.E., DeWalt, S. J. and Siemann, E., 2006. The effect of Chinese tallow tree (*Sapium sebiferum*) ecotype on soil–plant system carbon and nitrogen processes. *Oeco.,* 150(5): 272-28