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An annotated list of trees of Rajshahi city, Bangladesh

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Abstract
Enumeration of trees in the Rajshahi city was carried out from July 2018 to June 2019. A total of 140 species belonging to 48 families were encountered. The major families of tree species were Caesalpiniaceae, Mimosaceae and Moraceae. Among total number of the species, 42 plants were found to be wild and 8 plants were newly acclimatized. Besides this 18 "Star Tree" have also been found. On the basis of uses, 52 trees as ornamental, 39 trees as edible fruits and 21 as timber yielding plants were found. *Alangium salviifolium* (L.f.) Wangerin, *Haldina cordifolia* (Roxb.) Ridsdale, *Artocarpus lacucha* Buch.-Ham, *Grevillea robusta* A.Cunn ex R.Br, *Putranjiva roxburghii* Wall. and *Suregada multiflora* (A.Juss.) Baill found vulnerable in the study area. However, the present work will be helpful to the researcher for the estimation of tree species diversity in the Rajshahi City.

Keywords: tree, star tree, Rajshahi, Bangladesh

Introduction
Trees have been venerated since time immemorial. To the ancient Celts, certain trees, especially the oak, ash and thorn, held special significance as providing fuel, building materials, ornamental objects and weaponry. Other cultures have similarly revered trees, often linking the lives and fortunes of individuals to them or using them as oracles. In Greek mythology, dryads were believed to be shy nymphs who inhabited the trees. Some Ancient Indian tree deities, such as Puliyidaivalaiyamman, the Tamil deity of the tamarind tree, or Kadambariyamman, associated with the kadamba tree were seen as manifestations of a goddess who offer her blessings by giving fruits in abundance. According to The Vedic astrology, in our planetary system there are 27 stars and 9 planets. Every star has a symbolic tree or plant that defines its connection with eternal nature and this symbolic tree or plant is called "Star Tree". So there are 27 star trees or plants on the earth [15]. In botany, a tree is a perennial plant with an elongated stem, or trunk, supporting branches and leaves in most species. Trees are not a taxonomic group but include a variety of plant species that have independently evolved a woody trunk and branches as a way to tower above other plants to compete for sunlight. Trees tend to be long-lived, some reaching several thousand years old. In wider definitions, the taller palms, tree ferns, bananas, and bamboos are also trees. Trees are also an important part of the terrestrial ecosystem, providing essential habitats including many kinds of forests for communities of organisms. On the ground underneath trees there is shade, and often there is undergrowth, leaf litter, and decaying wood that provide other habitat. Cultivated trees are planted and tended by humans, usually because they provide foods (fruits or nuts), ornamental beauty, or some type of wood products that benefit the people. Unfortunately, the number of such types of plant species is rapidly decreasing due to urbanization. As a result many species of trees especially grown naturally are now extinct or nearly extinct. Therefore, an enumeration of tree occurring in Rajshahi City is much wanting. Definitely, such a list would help researchers to distinguish the distribution and diversity of tree species in this city. The importance of studying local floristic diversity has been realized and carried out in deferent location by several researchers [2-4, 8-10, 12-14, 16]. Thus the present study was made tree species diversity in the Rajshahi city, Bangladesh

Materials and Methods
Study Area
Geographically Rajshahi is situated within Barind Tract, 23 m above sea level, lies in between 24'20' and 24'24' north latitudes and in between 88'32' and 88'40' East longitudes. The area of Rajshahi City is 95.56 sq km and It is bounded by Paba upazila on all sides [6] (Figure 1). Under Koppen climate classification, Rajshahi has a tropical wet and dry climate [5].

***Source*:** http:// en. banglapedia.org/images/thumb /4/45/ Rajshahi City Corporation.jpg/800px-RajshahiCityCorporation.jpg)

Fig 1: The map of study area

Floristic survey

An organized survey was carried out for the enumeration of tree species in entire City and its surroundings (excluding Botanical garden of the University of Rajshahi) from July 2018 to June 2019. Trees were identified up to species with the help of Ahmed *et al* [1] and the relevant literatures. The identification of the plant specimens was verified by matching with the images of pertinent type specimens available in the websites of international herbaria. The up-to-date nomenclature has been cited based on Pasha and Uddin [11].

Results and Discussion

A total of 140 flowering tree species belonging to 48 families were observed in the study area. Perusal Table 1, it revealed that 2 species were gymnosperms, 14 species were monocots and the rests were diocots. Earlier, Rahman [12] reported 113 tree species from entire Rajshahi district including city area. In the present investigation, Caesalpiniaceae and Mimosaceae were found as a major family consisting of twelve genera each followed by and Moraceae consisting of eleven genera. On the other hand, genus *Ficus* consisting of seven species was found as a major genus followed by *Terminalia* and *Bambusa* consisting of five species each. Among the recorded tree species, 42 species were found wild and 8 were found as a newly introduced species. During this study it was observed that the highest numbers of tree species were planted for beautification followed by edible fruits (including major and minor edible) and the number were 52 and 39 respectively. Out of 37 economically important species, 21 species were found as timber yielding, nine were medicinal and 7 were commercially important. It is very much natural that the city dweller likes ornamental plant that gives flowers, beautification or shadow in the road, garden or in front of residence. So the city greenery comprises many ornamental species. As a result most of the trees were found at various premises of the institution, park, graveyard, embankment side, railway side, and road side and very scanty was grown naturally in around the house also. In this city, the Hindu community uses various flowers in their worship, but they respect the *Aegle marmelos* and the *Ficus benghalensis* as a sacred plant and plant it in the temple premises. According to Indian or Vedic Astrology, 27 tree species [15] were ranked as "Star Tree" and out of them, 18 star trees were foundin this area. Rahman [13] reported 54 tree species from selected graveyard of this city.

Table 1: List of the Tree species

Sl no	Family name	Scientific name	Local name	Category	Uses
1	Alangiaceae	*Alangium salviifolium* (L.f.) Wangerin	Akarkanta	W	
2	Anacardiaceae	*Lannea coromandelica* (Houtt.) Merr.	Jiga	W	
3	Anacardiaceae	*Mangifera indica* L.	Amm	[Star Tree]	E
4	Anacardiaceae	*Spondias dulcis* Parkinson.	Bilatiamra		E
5	Anacardiaceae	*Spondias pinnata* (L.f) Kurz.	Amra	W	E
6	Annonacea	*Polyalthia longifolia* (Sonn.)Thwaites	Debdaru		O
7	Annonaceae	*Annona reticulata* L.	Nona	W	E
8	Annonaceae	*Annona squamosa* L.	Ata	W	E
9	Apocynaceae	*Alstonia scholaris* (L.) R. Br.	Chatim	W	O, M
10	Apocynaceae	*Plumeria alba* L.	Kathgolap		O
11	Apocynaceae	*Plumeria rubra* L	Lalkathgolap		O
12	Apocynaceae	*Thevetia peruviana* (Pers.) K. Schum.	Haldekorobi		O
13	Araucariaceae	*Araucaria columnaris* (Frost.) Hook.	X-mas tree		O
14	Arecaceae	*Areca catechu* L.	Supari		E
15	Arecaceae	*Borassus flabellifer* L.	Tal	W	E
16	Arecaceae	*Caryota urens* L.	Fishtel pum		O
17	Arecaceae	*Cocos nucifera* L.	Narikel		E
18	Arecaceae	*Dypsis lutescens* (H. Wendl) Beentje & J.Dransf	Arekapum		O

19	Arecaceae	*Elaeis guineensis* Jacq.	Oil pum		O
20	Arecaceae	*Livistona chinensis* (Jacq.) R.Br.*ex* Mart	China pum		O
21	Arecaceae	*Phoenix sylvestris* (L.) Roxb.	Khejur	W	E
22	Arecaceae	*Roystonea regia* (Kunth) O.F. Cook	Bottle pum		O
23	Bignoniaceae	*Crescentia cujete* L.	Duggugi		
24	Bignoniaceae	*Jacaranda mimosifolia* D. Don.	Jacaranda	N	O
25	Bignoniaceae	*Oroxylum indicum* (L.) Kurz	Kanidingi	W	
26	Bignoniaceae	*Tecoma stans* (L.) Juss. *ex* Kunth	Sonapati		O
27	Bixaceae	*Bixa orellana* L.	Sidur		O
28	Bombacaceae	*Bombax ceiba* L.	Simul	W[Star Tree]	U
29	Bombacaceae	*Ceiba pentandra* (L.) Gaertn.	Kapuk		O
30	Boraginaceae	*Cordia dichotoma* G.Frost.	Balla	W	
31	Caesalpiniaceae	*Bauhinia purpurea* L.	Deb-kanchan		O
32	Caesalpiniaceae	*Bauhinia acuminata* L.	Sadakanchan		O
33	Caesalpiniaceae	*Bauhinia variegate* L.	Lal kanchan		O
34	Caesalpiniaceae	*Brownea cocconea* Jacq.	Pakhi ful		O
35	Caesalpiniaceae	*Cassia fistula* L.	Badarlathi	W	O, M
36	Caesalpiniaceae	*Cassia javanica* L.	Java sonalu		O
37	Caesalpiniaceae	*Cassia renigera* Benth.	Burma sonalu		O
38	Caesalpiniaceae	*Delonix regia* (Hook.) Raf.	Krisnachura		O
39	Caesalpiniaceae	*Peltophorum pterocarpum* (DC.) K.Heyne	Konokchura		O
40	Caesalpiniaceae	*Saraca indica* L.	Asoke		O
41	Caesalpiniaceae	*Senna siamea (*Lam.) H.S. Irwin & Barneby	Minjiri		T
42	Caesalpiniaceae	*Tamarindus indica* L.	Tentul	W	E
43	Casuarinaceae	*Casuarina equisetifolia* L.	Jhau		O
44	Clusiaceae	*Mesua ferrea* L.	Nageswar	[Star Tree]	O
45	Combretaceae	*Terminalia arjuna* (Roxb. *ex* DC) Wight.& Arn.	Arjun	[Star Tree]	M
46	Combretaceae	*Terminalia bellirica* (Gaertn.) Roxb.	Bohera		M
47	Combretaceae	*Terminalia catappa* L.	Kathbadam		O
48	Combretaceae	*Terminalia chebula* (Gaertn.) Retz.	Haritaki		M
49	Combretaceae	*Terminalia citrine* (Gaertn) Roxb. *ex* Fleming	Hatial		M
50	Cycadaceae	*Cycas pectinata*Buch.-Ham.	Moniraj		O
51	Dilleniaceae	*Dillenia indica* L.	Chalta		E
52	Dipterocarpaceae	*Shorea robusta* Gaertner f.	Sal		T
53	Ebenaceae	*Diospyros montana* Roxb.	Tamal		O
54	Ebenaceae	*Diospyros blancoi* A. DC.	Bilatigab		E
55	Ebenaceae	*Diospyros malabarica* (Desr.) Kostel.	Gab	W	U,E
56	Elaeocarpaceae	*Elaeocarpus floribundus* Blume	Jalpai		E
57	Euphorbiaceae	*Mallotus nudiflorus* (L.) Kulju &Welzen	Batul	W	
58	Euphorbiaceae	*Phyllanthus acidus* (L.) Skeels	Arbori		E
59	Euphorbiaceae	*Phyllanthus emblica* L.	Amloki	[Star Tree]	E, M
60	Euphorbiaceae	*Putranjiva roxburghii*.Wall.	Ghurnifal	W	
61	Euphorbiaceae	*Suregada multiflora* (A.Juss.) Baill.	Bon naranga	W	
62	Fabaceae	*Butea monosperma* (Lam.) Taub.	Palas	[Star Tree]	O
63	Fabaceae	*Dalbergia sissoo* DC.	Sissoo		T
64	Fabaceae	*Erythrina fusca* Lour	Kanta madar	W	
65	Fabaceae	*Erythrina variegata* L. var. *variegata*	Madar		
66	Fabaceae	*Pongamia pinnata* (L.)Pierre	Koronja		O
67	Fabaceae	*Sesbania grandiflora* (L.) Pers.	Bakphul		O
68	Lauraceae	*Cinnamomum nitidum* Blume	Kabab		
69	Lauraceae	*Litsea glutinosa* (Lour.)C.B.Rob	Kukurchita	W	
70	Lecythidaceae	*Barringtonia acutangula* (L.) Gaertn	Hijol		O
71	Lecythidaceae	*Couroupita guianensis* Aubl.	Nagliggom	N	O
72	Lythraceae	*Lagerstroemia speciosa* (L.) Pers.	Jarul		O
73	Magnoliaceae	*Magnolia champaca* (L.) Baill. *ex* Pierre	Shornochapa		O
74	Magnoliaceae	*Magnolia grandiflora* L.	Udaypadma		O
75	Malvaceae	*Thespesia populnea* (L.) Soland. ex Correa.	Parashpipul		O
76	Meliaceae	*Aphanamixis polystachya* (Wall.) R.Parker.	Pitraj	W	
77	Meliaceae	*Azadirachta indica* A. Juss.	Neem	W[Star Tree]	T
78	Meliaceae	*Khaya anthotheca* (Welw.) C.DC.	Lombu	N	T
79	Meliaceae	*Melia azederach* L.	Ghoraneem		T
80	Meliaceae	*Swietenia macrophylla* King.	Boromehagoni		T
81	Meliaceae	*Swietenia mahagoni* (L.) Jacq.	Mahagoni		T
82	Meliaceae	*Toona ciliata* Roemer.	Toon	W	
83	Mimosaceae	*Acacia auriculiformis* Benth.	Akasmoni		T
84	Mimosaceae	*Acacia catechu* (L. f.) Willd.	Khair	W[Star Tree]	U
85	Mimosaceae	*Acacia mangium* Willd.	Mangium		T
86	Mimosaceae	*Acacia nilotica* (L.) Del.	Babla	W	T

87	Mimosaceae	*Adenanthera pavonina* L.	Lal chandan		
88	Mimosaceae	*Albizia lebbek* (L.) Benth	Sirish		T
89	Mimosaceae	*Albizia procera* (Roxb.) Benth.	Koroi		T
90	Mimosaceae	*Albizia richardiana* (Voigt) King & Prain	Gagansirish		O
91	Mimosaceae	*Albizia saman* (Jacq.) Merr.	Rain tree		T
92	Mimosaceae	*Leucaena leucocephala* (Lam.) de Wit	Ipil ipil	W	U
93	Mimosaceae	*Pithecellobium dulce* (Roxb.) Benth	Jilapiphol	W	E
94	Mimosaceae	*Xylia xylocarpa* (Roxb.) Taub.	Lohakat		T
95	Moraceae	*Artocarpus chama* Buch.-Ham. *ex* Wall.	Capalis	N	
96	Moraceae	*Artocarpus heterophyllus* Lam.	Kathal	[Star Tree]	E, T
97	Moraceae	*Artocarpus lacucha* Buch.-Ham.	Deua	W	E
98	Moraceae	*Ficus benghalensis* L.	Bot	W[Star Tree]	S
99	Moraceae	*Ficus benjamina* L.	Benjamin bot		O
100	Moraceae	*Ficus elastica* Roxb. *ex* Hornem.	Bharotiorubber		O
101	Moraceae	*Ficus hispida* L.f.	Kakdumur	W	M
102	Moraceae	*Ficus racemosa* L.	Jogadumur	W[Star Tree]	E
103	Moraceae	*Ficus religiosa* L.	Pakur	W[Star Tree]	
104	Moraceae	*Ficus rumphii*. Blume	Gay assoth	W	
105	Moraceae	*Streblus asper* Lour.	Saowra	W	
106	Moringaceae	*Moringa oleifera* Lam.	Sajena		E
107	Myrtaceae	*Callistemon citrinus* (Curtis) Skeels	Bottlebrass		O
108	Myrtaceae	*Eucalyptus alba* Reinw	Eucalyptus		O,T
109	Myrtaceae	*Psidium guajava* L.	Piyara	W	E
110	Myrtaceae	*Syzygium cumini* (L.) Skeels.	Jam	W[Star Tree]	E, T
111	Myrtaceae	*Syzygium jambos* (L.) Alston.	Golapjam		E
112	Myrtaceae	*Syzygium samarangense* (Blume.) Merr.&L.M.Perry.	Jamrul		E
113	Oleaceae	*Nyctanthes arbor-tristis* L.	Seule		O
114	Oxalidaceae	*Averrhoa carambola* L.	Kamranga		E
115	Paulowniaceae	*Paulownia tomentosa* (Thunb.) Sieb. & Zucc.*ex* Stud.	Paulownia	N	T
116	Poaceae	*Bambusa balcooa* Roxb.	Valka Bans		U
117	Poaceae	*Bambusa microvulgaris*	Kanchi Bans		O
118	Poaceae	*Bambusa tulda* Roxb.	Tolla Bans		U
119	Poaceae	*Bambusa vulgaris* Schrad.	Baejja Bans		U
120	Poaceae	*Bambusa vulgaris var. striata*	Sonali Bans	N	O
121	Polygonaceae	*Coccoloba uvifera* L.	Not known	N	O
122	Proteaceae	*Grevillea robusta* A.Cunninghum. *ex* R.Br.	Silky oak		O
123	Rhamnaceae	*Zizyphus mauritiana* Lam.	Kul, boroi	W	E
124	Rubiaceae	*Haldina cordifolia* (Roxb.) Ridsdale	Kali kadam		
125	Rubiaceae	*Neolamarckia cadamba* (Roxb.) Bosser	Kadam	W[Star Tree]	
126	Rutaceae	*Aegle marmelos* (L.) Corr. Serr.	Bel	W[Star Tree]	E, S
127	Rutaceae	*Citrus maxima* (Burm.f) Merr.	Jambura		E
128	Rutaceae	*Limonia acidissima* L	Kothbel	W[Star Tree]	E
129	Sapindaceae	*Dimocarpus longan* Lour.	Ashphal		E
130	Sapindaceae	*Litchi chinensis* Sonn.	Lichu		E
131	Sapindaceae	*Schleichera oleosa* (Lour.) Merr.	Kusum		T
132	Sapotaceae	*Madhuca longifolia* (J. Konig *ex* L.) F. Macbr.	Mahua	[Star Tree]	O
133	Sapotaceae	*Manilkara zapota* (L.) P.Royen	Sofeda		E
134	Sapotaceae	*Mimuspos elengi* L.	Bokul	[Star Tree]	O
135	Sterculiaceae	*Sterculia foetida* L.	Box badam	N	E
136	Strelitziaceae	*Ravenala madagascariensis* Sonn.	Panthopadop		O
137	Tiliaceae	*Grewia asiatica* L.	Falsa	W	E
138	Tiliaceae	*Muntingia calabura* L.	Jamica cherri	W	
139	Ulmaceae	*Trema orientalis* (L.) Blume.	Gobra	W	
140	Verbenaceae	*Tectona grandis* L.f.	Segun		T

Category: W= Wild, N=New; Uses: E= Edible Fruit, M= Medicinal, S= Sacred plant, T= Timber yielding, O= Ornamental, U= Useful.

Conclusion

There are 140 species of the trees belonging to 48 families recorded for the Rajshahi city. Among these, only 42 species were found wild while 8 tree species were found as new species, which have recently acclimatized in the city. Some wild trees are becoming vanished due to anthropogenic pressure and urbanization or replaced by exotic ornamental species. Suitable native trees should be selected for afforestation programmes. The wild and old trees of the city need to be protected as they provide glimpse of indigenous flora and a good habitat to several animals, bird species and many other associated species on them.

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