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DIVERSITY OF ANGIOSPERMIC TREE SPECIES WITH THEIR ECONOMIC UTILIZATION IN J.P. NAGAR (AMROHA) DISTRICT OF UTTAR PRADESH, INDIA.

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Abstract

A wide-ranging field assessment was carried out with aim to observe the diversity of tree species of Angiosperm in J.P. Nagar (Amroha) district. In this study, total 102 plants species were recorded covering 34 families. Out of 102 species, 97 species were belonged from 78 genera of Dicot families while 5 species from 5 genera of Monocot family. The ratio of family to genus was 1: 2.44; family to species was 1: 3 and a genus to species was 1: 1.22. Family Fabaceae marked as dominant with 24 species in distribution, followed by Moraceae with 12, Rutaceae with 7, while Apocynaceae and Myrtaceae represent with 6 species in the study area. Most of the angiospermic tree species planted for avenue and ornamental purpose, while their parts are used for rural crafts making, fuel, fodder, fibre, timber, dye, medicine, oils, tannin, vegetables and fruits.

Key words: Trees, Angiosperm, Economic utilization, J. P. Nagar (Amroha).

Introduction

The history of forest is linked with the history of civilization. The diversity of plant life is an essential part of most terrestrial ecosystem. India is rich in medicinal wealth, having different plant species of known medicinal value. India is thus endowed with one of the worlds riches biodiversity and cultural traditions is respects of medicinal plants (Mishra and Pal, 2010). Trees are the principal constituent of the jungle as well as a substantial part of our environment. These are the habitats of lower organisms and biota; provide a shielding environment and decrease pollutants. Trees are the most valuable assets, furnishing many of our continuing needs. Countless industrial products derived wholly or partially from trees in a variety of ways. We depend on trees for dyes, tannins, waxes, resins, flavourings and medicines etc. Trees are very fast vanishing and become more vulnerable compared to other plant species due to rapid urbanization and utilization as raw materials in various products (Kishor *et al.*, 2011). Ambasta, (1986) reported nearly 5000 economic plants species in book 'The useful plants of India'. Brandis, (1906) done the first organized description on 4,400 tree species including trees, shrubs and woody climbers, in his famous book 'Indian Trees'. Kishor *et al.*, (2011) described the trees of Uttar Pradesh includes 410 species under 227 genera and 66 families.

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Other notable work done on tree species in Uttar Pradesh and adjacent areas were carried out by several workers like Gamble, (1922); Blatter and Millard, (1954); Champion and Seth, (1968); Cowen, (1970); Paliwal and Singh, (1982); Singh, (1982); Singh and Anand, (1994); Sahni, (1998); Khanna *et al.*, (1999); Srivastava, (2006); Santapau, (2008); Khurana, (2009); Vardhana, (2009); Bajpai *et al.*, (2015); Chaudhary *et al.*, (2015); Khanna, (2017) and Singh *et al.*, (2018). Considering the scantiness of information on the study of economic value of tree species; present study was conducted with objective to enlist economic data of tree species growing in the study area. This information will be helpful for sustainable utilization of tree species.

Study Area

District Jyotiba Phule Nagar (Amroha) is located north-west of district Moradabad in Uttar Pradesh (Fig. 1). The district named Amroha (Aam-Rohu) because of its Mango (Hindi- Aam) and *Labeo rohita* (Rohu fish) production. The study area extended from Latitude 28° 54' North to 39° 06' North and Longitude 78° 28' East to 78° 39' East and its geographical area is about 2470 Sq. Km. The average height from sea level is 211 meters. The temperature increases up to 42° in summer season, while decreases to 4° in winters. The average precipitation is about 990 mm. District J.P. Nagar is surrounded by district Bijnor from north, Sambhal from the south and

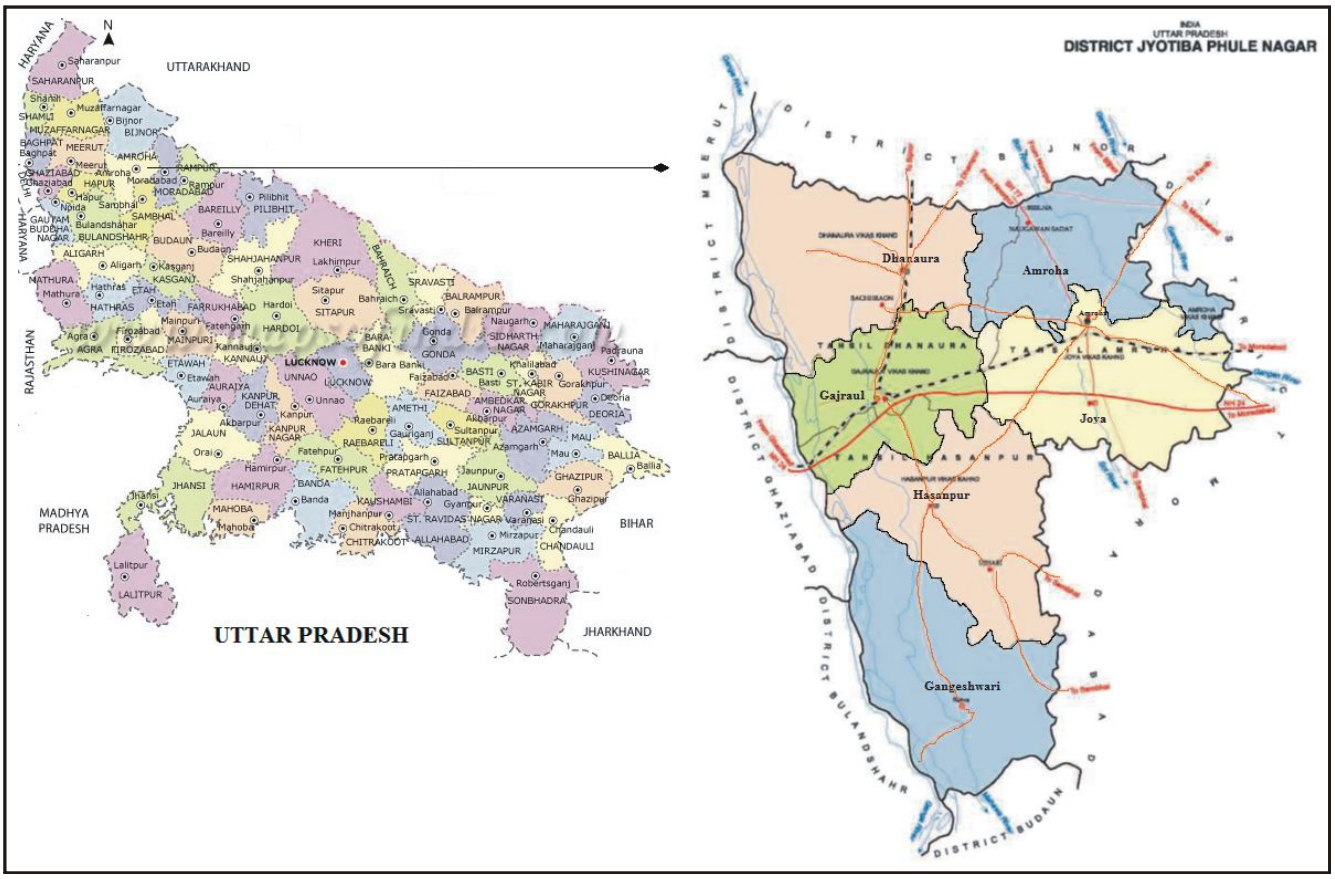

Fig. 1: Map of Study area (Jyotiba Phule Nagar).

Moradabad from the east. While, the Ganga river separates it from western side by district Hapur, Meerut and Bulandshahr. Beside Ganga, Mahawa and Sot are the main rivers of the study area.

Material and Methods

Wide-ranging field survey was conducted during 2017-2019 to evaluate the diversity of angiospermic tree species and their economic utilization in J.P. Nagar district. The specimens were collected for each species and recognized with the help of available literatures *i.e.* (Hooker, 1872-1897); (Duthie, 1903-1929) and (Singh *et al.*, 2016). After identification plants were arranged according to Bentham and Hooker's classification (1862-83), with some modification in families according to latest APG IV classification. Taxonomic categories genera and species were placed alphabetically. For modernized nomenclature and accurate citation of angiospermic tree species the online database, IPNI has been used. During fields visits, economic data and versatile use of tree species have been evaluated by questioning the local peoples and from other available literatures.

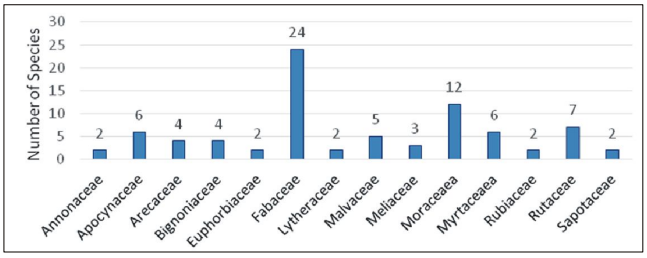

Fig. 2: Dominant families of angiospermic tree species.

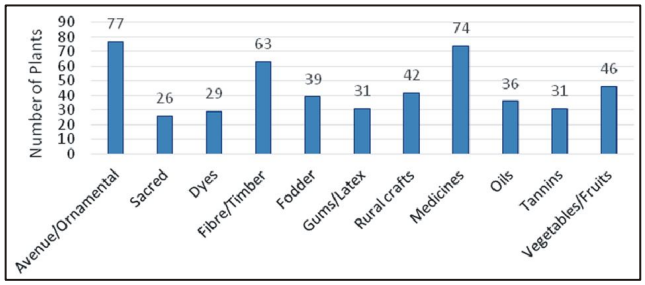

Fig. 3: Economic utilization of angiospermic tree species.

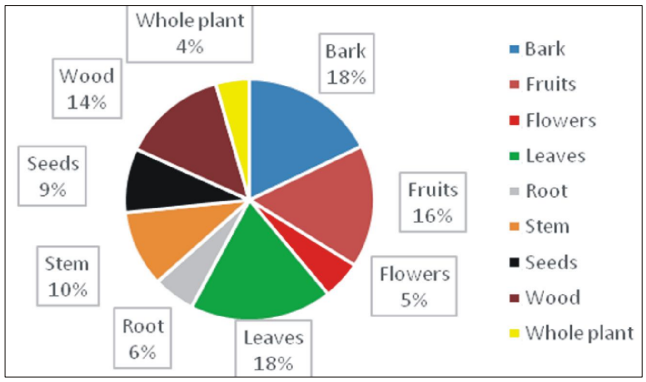

Fig. 4: Plant parts used for various economic aspects.

Table 1: Tree species of J. P. Nagar (Amroha) district showing their economic utilization.

S. No.	Plant name	Family	Local name	Flowering and Fruiting period	Part use	Avenue/Orn.	Sacred trees	Dyes	Fibres/Timber	Fodder	Gums/Latex	Rural crafts	Medicines	Oils	Tannin	Veg./Fruits
1.	*Acacia auriculiformis* Benth.	Fabaceae	Ear leaf acacia	Aug–Jan	B, S, Sd	-	-	+	+	-	-	-	-	+	-	-
2.	*Acacia farnesiana* (L.) Willd.	Fabaceae	Babul	Nov–Mar	S, W	+	-	-	+	-	+	-	-	-	-	-
3.	*Acacia nilotica* (L.) Delile	Fabaceae	Babul	May–Apr	L, S, W	-	-	-	+	+	+	-	+	-	-	-
4.	*Aegle marmelos* (L.) Corrêa.	Rutaceae	Bel	Mar–Dec	F, L	+	+	+	+	+	+	-	+	-	-	+
5.	*Ailanthus excelsa* Roxb.	Simaroubaceae	Maharukh	Jan–Sept	B, L, R, W	+	-	-	+	+	+	-	+	-	-	-
6.	*Albizia lebbeck* (L.) Benth.	Fabaceae	Siris	Apr–Oct	S, W	+	-	-	+	-	+	-	-	-	+	-
7.	*Alstonia scholaris* (L.) R.Br.	Apocynaceae	Saptparni	Dec–May	B, S, Fl	+	-	-	+	-	-	-	+	+	+	-
8.	*Annona squamosa* L.	Annonaceae	Sharifa	June–Jan	F, S	+	-	+	-	-	-	-	+	+	-	+
9.	*Artocarpus heterophyllus* Lam.	Moraceae	Kathal	Feb–July	F, L	+	+	+	+	+	-	-	-	-	-	+
10.	*Artocarpus lacucha* Buch.-Ham.	Moraceae	Badhar	Apr–June	F, L	-	-	-	-	+	-	-	-	-	-	+
11.	*Averrhoa carambola* L.	Oxalidaceae	Kamrakh	Apr–Aug	F, S	+	-	-	+	-	-	-	-	-	-	+
12.	*Azadirachta indica* A.Juss.	Meliaceae	Neem	Feb–Sept	Wp	+	+	+	+	+	+	-	+	+	-	-
13.	*Bambusa vulgaris* Schrad.	Poaceae	Bans	Once in life time	L, S	-	+	-	+	-	-	+	-	-	-	+
14.	*Barringtonia acutangula* (L.) Gaertn.	Lecythidaceae	Hijjal	May–Jan	B, L, R	+	-	-	+	+	-	-	+	-	+	-
15.	*Bauhinia purpurea* L.	Fabaceae	Lal kachnar	Aug–Mar	Wp	+	-	-	+	+	+	-	+	+	+	+
16.	*Bauhinia racemosa* Lam.	Fabaceae	Jhinjheri	July–Mar	L, S	+	-	-	+	-	+	-	+	-	-	-
17.	*Bauhinia variegata* L.	Fabaceae	Kachnar	Sept–Apr	B, Fl, L, R	+	-	-	+	+	+	-	+	-	+	+
18.	*Bombax ceiba* L.	Malvaceae	Semal	Feb–June	F, Fl, L, S, Sd	+	-	-	+	-	+	-	-	+	-	+
19.	*Borassus flabellifer* L.	Arecaceae	Tad	Feb–Apr	L, S, Sd	+	-	-	+	-	+	+	-	-	-	-
20.	*Butea monosperma* (Lam.) Taub.	Fabaceae	Dhak	Feb–June	F, L, R, S	+	+	+	+	-	+	+	+	+	+	-
21.	*Caesalpinia pulcherrima* (L.) Sw.	Fabaceae	Puti karanj	Aug–Mar	L, R	+	-	-	-	-	-	-	+	-	+	-
22.	*Caesalpinia pulcherrima* f. *flava* (O. Deg.) H. St. John	Fabaceae	Puti karanj	Aug–Mar	L, R	+	-	-	-	-	-	-	+	-	+	-
23.	*Calliandra haematocephala* Hassk.	Fabaceae	-	Feb–June	-	+	-	-	-	-	-	-	-	-	-	-
24.	*Callistemon lanceolatus* (Sm.) Sweet	Myrtaceae	Bottle brush	Year-around	L	+	-	-	-	-	-	-	-	+	-	-
25.	*Carica papaya* L.	Caricaceae	Papita	Year- around	F	-	+	-	-	+	+	-	+	+	-	+
26.	*Carissa carandas* L.	Apocynaceae	Karaunda	Feb–May	F, L, R	+	-	-	-	-	-	+	+	-	-	+
27.	*Cascabela thevetia* (L.) Lippold	Apocynaceae	Peli Kaner	Year-around	L, R	+	-	-	-	-	-	-	+	-	-	-
28.	*Cassia fistula* L.	Fabaceae	Amaltas	Year- around	B, F, R	+	+	-	+	-	-	+	+	-	+	-
29.	*Casuarina equisetifolia* L.	Casuarinaceae	Jangli saru	Dec–Mar	B, W	+	-	+	+	-	-	+	+	-	+	-
30.	*Citrus aurantiifolia* (Christm.) Swingle	Rutaceae	Kaghzi Nimbu	Year- around	F	-	-	-	-	-	-	-	+	-	-	+

Table 1 Continue ...

Continue table 1 ...

31.	*Citrus maxima* (Burm.) Merr.	Rutaceae	Chakotra	Year- around	F	-	-	-	-	-	-	-	+	+	-	+
32.	*Citrus limon* (L.) Osbeck.	Rutaceae	Nimbu	Year- around	F	-	-	-	-	-	-	-	+	+	-	+
33.	*Cordia dichotoma* G.Forst.	Boraginaceae	Lasora	Feb–May	F	-	-	-	-	-	-	+	+	-	-	+
34.	*Corymbia citriodora* (Hook.) K.D.Hill & L.A.S.Johnson	Myrtaceae	Safeda	Aug–Dec	L, S, W	+	-	-	+	-	-	+	-	+	+	-
35.	*Dalbergia sissoo* DC.	Fabaceae	Sisham	Feb–July	Fl, L, W	+	+	-	+	+	-	-	-	-	-	-
36.	*Delonix regia* (Hook.) Raf.	Fabaceae	Gulmohar	Apr–Aug	S, Sd, W	+	-	-	+	-	+	-	-	-	-	-
37.	*Erythrina variegata* L.	Fabaceae	Dhaul dhak	Mar–Apr	B, L, Sd	+	-	+	+	+	-	-	+	+	-	+
38.	*Eucalyptus camaldulensis* Dehnh.	Myrtaceae	Safeda	Sept–Dec	L, S	+	-	-	+	-	+	-	+	+	-	-
39.	*Eucalyptus tereticornis* Sm.	Myrtaceae		Aug–Dec	L, S	+	-	-	+	-	+	-	+	+	-	-
40.	*Fernandoa adenophylla* (Wall. ex G.Don) Steenis	Bignoniaceae	Marorphali	Jan–Mar	F, Sd	-	-	-	+	-	-	-	-	-	+	-
41.	*Ficus benghalensis* L.	Moraceae	Bargad	Mar–July	L, R, S	+	+	-	-	+	+	+	+	-	+	-
42.	*Ficus benjamina* L.	Moraceae	Weeping ficus	Feb–Apr	B, L, W	+	-	-	+	-	-	+	+	-	-	-
43.	*Ficus carica* L.	Moraceae	Anjeer	Year- around	F	-	-	-	-	-	+	-	+	-	-	+
44.	*Ficus elastica* Roxb. ex Hornem.	Moraceae	Rubber	Mar–May	L, S	+	-	-	-	+	+	-	-	-	-	-
45.	*Ficus racemosa* L.	Moraceae	Gular	Feb–Oct	B, F	-	-	-	-	+	+	-	+	-	+	+
46.	*Ficus religiosa* L.	Moraceae	Pipal	Apr–Sept	B, F, L	+	+	+	+	+	-	+	+	-	+	+
47.	*Ficus virens* Aiton	Moraceae	Pakar	Oct–Mar	B, L	+	+	-	-	+	-	-	+	-	-	-
48.	*Grevillea robusta* A.Cunn. ex R.Br.	Proteaceae	Silver Oak	Mar–May	B, W	+	-	-	+	-	+	-	-	-	+	-
49.	*Grewia asiatica* L.	Malvaceae	Phalsa	Jan–Sept	B, F, S	-	-	-	+	-	-	+	+	-	-	+
50.	*Helicteres isora* L.	Malvaceae	Marod phali	May–Oct	Wp	+	-	-	+	+	-	-	+	-	-	+
51.	*Holoptelea integrifolia* (Roxb.) Planch.	Ulmaceae	Chilbil	Feb–May	B, Sd, W	+	-	-	+	-	-	+	-	+	-	-
52.	*Jacaranda mimosifolia* D.Don.	Bignoniaceae	Nili gulmohar	Mar–June	B, L, Fl, W	+	-	-	+	-	-	+	+	-	-	-
53.	*Jatropha curcas* L.	Euphorbiaceae	Ratanjot	Sept–Nov	B, L, Sd	+	-	+	-	-	+	-	+	+	+	-
54.	*Kigelia africana* (Lam.) Benth.	Bignoniaceae	Balam khira	Mar–July	B, F, Sd	-	-	-	+	-	-	-	+	-	-	+
55.	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	Jarul	Apr–Dec	B, F, L	+	-	-	+	-	-	+	+	-	-	-
56.	*Leucaena leucocephala* (Lam.) de Wit	Fabaceae	Subabul	Aug–Apr	B, L, W	+	-	+	+	+	+	-	-	-	+	-
57.	*Limonia acidissima* Groff	Rutaceae	Kaith	Mar–June	F, L, W	-	+	+	+	+	+	-	+	+	-	+
58.	*Litchi chinensis* Sonn.	Sapindaceae	Litchi	Mar–July	B, F, Sd	+	-	-	-	-	-	-	+	-	+	+
59.	*Livistona chinensis* (Jacq.) R.Br. ex Mart.	Arecaceae	Palm	Feb–June	L	+	-	-	-	-	-	+	-	-	-	-
60.	*Madhuca longifolia* var. *latifolia* (Roxb.) A.Chev.	Sapotaceae	Mahua	Mar–May	B, Fl, Sd, W	-	+	+	+	-	-	+	+	+	-	+
61.	*Mallotus philippensis* (Lam.) Müll.Arg.	Euphorbiaceae	Rohini	Sept–Dec	F, L, Sd, W	+	-	+	+	+	-	+	-	+	+	-
62.	*Mangifera indica* L.	Anacardiaceae	Aam	Mar–July	B, F, L, Sd, W	+	+	-	+	+	-	+	+	-	-	+
63.	*Melia azedarach* L.	Meliaceae	Chiku	Mar–July	Wp	+	-	-	+	+	+	+	+	+	-	-
64.	*Michelia champaca* (L.) Baill. ex Pierre	Magnoliaceae	Champa	Apr–July	Wp	-	+	+	+	-	-	-	+	+	+	+
65.	*Mimusops elengi* L.	Sapotaceae	Maulsari	Jan–Apr	B, F, Fl, W	+	-	+	+	+	-	+	+	-	-	+

Table 1 Continue ...

Continue table 1 ...

66.	*Mitragyna parvifolia* (Roxb.) Korth.	Rubiaceae	Kaim, kadamb	Mar–Sept	B, S, L, W	+	+	-	-	+	-	+	+	-	+	-
67.	*Moringa oleifera* Lam.	Moringaceae	Sehjan	Feb–July	Wp	+	-	-	-	+	+	-	+	+	-	+
68.	*Morus alba* L.	Moraceae	Sahtut	Feb–May	B, F, L, W	+	-	-	+	+	-	+	+	-	-	+
69.	*Morus macroura* Miq.	Moraceae	Sahtut	Mar–May	B, F, L, W	+	-	-	+	+	-	+	+	-	-	+
70.	*Morus nigra* L.	Moraceae	Sahtut	Feb–May	B, F, L, W	+	-	-	+	+	-	+	+	-	-	+
71.	*Murraya koenigii* (L.) Spreng.	Rutaceae	Kari patta	Mar–Aug	B, L, R, W	+	-	-	-	+	-	+	+	+	-	+
72.	*Murraya paniculata* (L.) Jack	Rutaceae	Kamini	Apr–July	Fl, L, R, W	+	-	-	+	-	-	+	+	+	-	-
73.	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae	Kadamb	July–Dec	B, F, W	+	+	-	+	-	-	+	+	+	-	+
74.	*Nyctanthes arbor-tristis* L.	Oleaceae	Harsingar	Aug–Mar	B, Fl, Sd	+	+	+	-	-	-	-	+	+	-	-
75.	*Parkinsonia aculeata* L.	Fabaceae	Ram babul	Mar–July	B, Sd, W	+	-	-	+	+	-	-	-	-	-	+
76.	*Phoenix sylvestris* (L.) Roxb.	Arecaceae	Khajur	Mar–Nov	F, L, R, W	+	-	-	+	-	+	+	-	-	-	+
77.	*Phyllanthus emblica* L.	Phyllanthaceae	Avla	Feb–Nov	B, F, L, Sd, W	-	+	+	-	+	-	+	+	-	+	+
78.	*Pithecellobium dulce* (Roxb.) Benth.	Fabaceae	Jangal jalebi	Jan–May	B, F, L, Sd	+	-	-	+	+	+	+	-	+	+	+
79.	*Plumeria alba* L.	Apocynaceae	Champa	May–Aug	F, S	+	-	-	-	-	-	-	+	-	-	-
80.	*Plumeria rubra* L.	Apocynaceae	Champa	May–Aug	F, S	+	-	-	-	-	-	-	+	-	-	-
81.	*Polyalthia longifolia* (Sonn.) Thwaites	Annonaceae	Ashok	Mar–Oct	S, W	+	-	-	+	-	-	+	-	-	-	-
82.	*Pongamia pinnata* (L.) Pierre	Fabaceae	Karanj	Apr–Feb	B, W	+	-	+	+	-	-	+	+	+	-	-
83.	*Populus alba* L.	Salicaceae	Poplar	May-July	B, S, W	-	-	-	+	-	-	+	+	-	-	-
84.	*Prosopis juliflora* (Sw.) DC.	Fabaceae	Jangli kikar	Apr–Feb	Wp	+	-	-	+	+	+	-	-	-	+	-
85.	*Prunus persica* (L.) Batsch	Rosaceae	Aadhu	Jan–June	Wp	-	-	+	-	-	-	-	+	+	-	+
86.	*Psidium guajava* L.	Myrtaceae	Amrud	July–Mar	B, F, L	+	-	+	-	-	-	-	+	+	+	+
87.	*Pterospermum acerifolium* (L.) Willd.	Malvaceae	Kanak champa	Mar–Oct	Fl, L, W	+	-	-	-	-	-	+	+	-	-	+
88.	*Punica granatum* L.	Lythraceae	Anar	Year- around	B, F, Fl	-	-	+	-	-	-	-	+	-	+	+
89.	*Putranjiva roxburghii* Wall.	Putranjivaceae	Putrajiva	Year- around	F, L, Sd, W	+	+	-	+	+	-	-	+	+	-	-
90.	*Roystonea regia* (Kunth.) O.F.Cook	Arecaceae	Royal palm	Year- around	L, Sd	+	-	-	-	-	-	+	-	+	-	-
91.	*Saraca asoca* (Roxb.) Willd.	Fabaceae	Sita ashok	Mar–July	Wp	+	+	-	+	-	-	-	+	-	-	-
92.	*Senna surattensis* (Burm.f.) H.S.Irwin & Barneby	Fabaceae	-	Year- around	-	+	-	-	-	-	-	-	-	-	-	-
93.	*Sesbania grandiflora* (L.) Pers.	Fabaceae	Agati	Aug–Mar	B, L, P	-	-	-	-	+	-	-	+	-	+	-
94.	*Syzygium cumini* (L.) Skeels	Myrtaceae	Jamun	Mar–Aug	B, F, L, W	+	+	+	-	+	-	+	+	-	-	+
95.	*Tamarindus indica* L	Fabaceae	Imli	Apr–June	Wp	+	+	+	+	+	-	+	+	-	+	+
96.	*Tecoma stans* (L.) Juss. ex Kunth	Bignoniaceae	Piliya	Year- around	L, R, S	+	-	-	-	-	-	-	+	+	-	-
97.	*Tectona grandis* L.f.	Verbenaceae	Sagaun	June–Dec	Wp	+	-	+	+	-	-	-	+	+	+	-
98.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	Arjun	Apr–Dec	B, F, L, W	+	+	+	+	-	-	+	+	-	-	-
99.	*Thespesia populnea* (L.) Sol. ex Corrêa	Malvaceae	Paras pipal	Apr–June	B, L, F, Fl, Sd	+	+	+	-	+	+	+	+	-	-	-
100.	*Toona ciliata* M.Roem.	Meliaceae	Toona	Mar–July	B, Fl, W	-	-	+	+	-	-	-	+	+	-	-
101.	*Wrightia tinctoria* R.Br.	Apocynaceae	Indrajou	July–Sept	B, F, L, Sd, W	-	-	+	+	-	+	+	+	-	-	+
102.	*Ziziphus jujuba* Mill.	Rhamnaceae	Ber	Jan–Apr	B, F, S, Sd	-	+	-	-	-	-	+	+	-	+	+

[B = Bark, L = Leaves, F = Fruits, R = Roots, S = Stem, Sd = Seeds, Fl = Flowers, W = Wood, Wp = Whole plant]

Result and Discussion

During the survey of study area, a total of 102 angiospermic tree species were documented under 83 genera and 34 families (Table 1). The ratio of family to genus is 1: 2.44; family to species is 1: 3 and a genus to species is 1: 1.22. Dominant families of angiosperm tree species are Fabaceae (24), Moraceae (12), Rutaceae (7), Apocynaceae (6), Myrtaceae (4), Malvaceae (5), Bignoniaceae (4) and Arecaceae (4) from the study area (Fig. 2). Most of the angiospermic tree species planted for avenue, while their parts are used for worships, fuel, fruits, fibre, dye, medicine, ornamental, rural crafts making, tannin, timber and vegetables (Table 1 & Fig. 3). Plants parts like Leaves (18%), Bark (18%), Fruits (16%), Wood (14%), Stems (10%), Seeds (9%), Roots (6%), Flowers (5%) and Whole plant (4%) used for various economic aspects (Fig. 4). Dominant genera are *Ficus* (7 spp.), *Bauhinia, Acacia, Citrus, Morus* (3 species each). *Albizia lebbeck, Dalbergia sissoo, Alstonia scholaris, Bombax ceiba, Bauhinia* spp., *Cassia fistula, Eucalyptus tereticornis*, three species of *Ficus* (*F. virens, F. benghalensis, F. religiosa*), *Holoptelea integrifolia, Mangifera indica, Morus alba, Neolamarckia cadamba, Psidium guajava, Pongamia pinnata* and *Terminalia arjuna* are frequently distributed over the entire study area, whereas *Barringtonia acutangula, Kigelia africana, Mimusops elengi, Saraca asoca* are less common trees of J.P. Nagar (Amroha) district.

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