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Avenue tree diversity in the urban area of Coimbatore District, Tamil Nadu, India

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Abstract. *Aravindhan V, Jeevith S, Aruna R, Ramachandran VS, Gopal G. 2024. Avenue tree diversity in the urban area of Coimbatore District, Tamil Nadu, India. Asian J For 8: 72-80.* The flowering plant is the major natural source of human companion with biodiversity in the whole plant kingdom. The present study aimed to determine the arborescent plant species of an urban stretch in selected highway routes of Coimbatore District, Tamil Nadu, India. The present investigation is based on the plant's flowering type, economic uses, and their role in the ecosystem. The current survey recorded the arboreal species and found that 107 species belonging to 83 genera and 35 families are listed. The dominant families are the Fabaceae, Bignoniaceae, Meliaceae, Moraceae, Rutaceae, Malvaceae, Myrtaceae, and Sapindaceae. Among the 107 taxa, 62 are found to be native species, and 45 are introduced. The general use category of avenue trees was analyzed as ornamental plants (23%), medicinal plants (21%), timber plants (14%), pollution-reducing plants (14%), pollen/nectar-providing plants (10%), edible plants (8%), frugivory (6%) and toxic (4%). Considering the rapidly changing urban land use in Coimbatore, a sub-urban area, much attention should be paid towards creating tree islands by planting more native trees, which would help reduce dust pollution and air pollution, produce oxygen and consume carbon dioxide-free of cost, and improve wildlife. Also, this study presented an updated checklist of avenue trees in the Coimbatore urban area.

Keywords: Air pollution, remnant biodiversity, tree islands, urban greening

INTRODUCTION

Vegetation plays an aesthetic link between man and the environment. Plants enhance the quality of the environment by influencing life-supporting systems (Shukla and Chandel 1972). The trees are considered nature's air conditioners and reduce annual cooling energy by 10% to 50 % and electricity by 23% in California (Simpson and Pherson 1996). Vegetation plays an effective role in the urban environment, supporting many fundamental issues, viz., hydrological cycles, nutrient cycles, and gas balance. So, the above all play an essential role in function as a whole.

In recent days, most of the vegetation covers have been severely affected by various human-induced activities. This increased CO_2 accumulation in the atmosphere, ultimately increasing global warming worldwide. This kind of change severely altered many plant species distribution, composition, genetic structure and even extinction of many useful plants (Chandra and Joshi 2002). Species diversity is an important criterion for any vegetation study (Dattaraja 1992). Species diversity is the number and variety of species found in an urban area in a region (Sharma 1975).

The tree, present along the roadside, is known as the avenue tree, including the city and highway. These trees maintain a healthy environment, reduce pollution levels, and increase the greenery and beauty of the place. Avenue trees are directly connected with biodiversity. It plays a dynamic role in maintaining the ecological equilibrium (Nazaneen et al. 2015; Jeevith and Manjunath 2023). These trees play a vital role in the maintenance of the ecosystem and provide natural, social, and physiological services while balancing nature compositions and enhancing air quality (Smith 1981). Presently, the world faces high environmental problems that ultimately disturb the ecosystem. The unornamented reasons behind global warming are floods, droughts, toxic gases, etc.

Every tree plays multiple biodiversity functions (Kohli et al. 1998). In recent years, carbon dioxide acceleration in urban cities has been directly connected with population and amplifies vehicular traffic followed by industrial pollution. Avenue trees protect the environment from climate change, water conservation, attracting biodiversity, reducing carbon levels and other pollutants. The reason behind planting avenue trees in cities and along the roadsides is that we believe that no road or street is dressed or furnished until it has been planted to furnish shade, frame vistas of outlying beauty, and prevent natural calamities.

India is witnessing towering levels of air pollution and a considerable population of tree species were felled due to construction, industrialization, and urbanization

development (Tejashri and Nandikar 2012; Prakash et al. 2020). The purposes of avenue trees in the cities are mainly ornamental, shade, aesthetic, and medicinally valuable. Planting wild and exotic trees in urban landscapes has succeeded in many parts of the world. The homogenous stand of the plants never fulfils the functions mentioned above in a given area, and species diverseness not only renders the above needs as well as to withstand for the long run. Therefore, species diversity and their proportion availability in a given area are highly needed to manage urban greening better.

Although vast bio-geographical areas are effectively preserved by various levels of policies and intensive research studies, microenvironments such as avenue trees and social forestry were less attempted for research. But these micro-environment's role in high carbon polluted cities is remarkable. Recent plant explorations in the Coimbatore district revealed plant diversity changes in various urban and forest landscapes. In this context, the present study attempted to exhibit the need to establish avenue trees in the urban area in selected highway routes of Coimbatore City, where the avenue trees are highly warranted to absorb the pollution. Hence, the present study aimed to provide information about avenue tree diversity in the region.

MATERIALS AND METHODS

Study area

Coimbatore is an inland district of the southern part of the Indian Peninsula, elongates from north to south between longitude 76° 39' and 77°56' E, latitude 10°12' and 11°57' N (Figure 1). Coimbatore region played a prominent role in the Second Poligar War in 1801; it was later established as the capital of the newly formed Coimbatore District in 1804. In 1866, the district was accorded municipality status with the first chairman, Mr. Robert Stanes. The district takes pride in abundant varieties of industrialization, once ruled by the Sangam Cheras. After several decades, the district was developed with textiles, industrial and commercial sectors, educational and research institutions, information technology, healthcare, eco-parks, etc. In recent years, the Coimbatore City extent of the area around 15,602 sq km. The urban area has many shopping complexes, residential areas, hospitals, etc. The population of Coimbatore urban has nearly growth rate of 46.25% with 274.04 sq km. The district's soil is chiefly red sand and gravel with a moderate area of red loam, black loam, or sometimes black clay. During the study period, the temperature was maximum (31°C) in September and minimum (17°C) in December.

Data collection

The extensive survey was carried out from 2018 to 2022 and was performed on four different highway routes in the urban environment of the Coimbatore District (Figure 1). The data on avenue trees along the highways of Narasimanayakanpalayam to Kavundapalayam (10 km), Thudiyalur, Coimbatore (North) was selected, which is a small portion and developing urban area of Coimbatore city, followed by Gandhipuram to Saravanampatti (8 km), Lakshmi Mills to Neelambur (12 km), and Ukkadam to Sulur (19 km). The data on avenue plants, mainly tree species, were collected from road/transect surveys through selected routes. Only observation and field notes were taken during the study, and some typical trees with phenology flowering and fruiting were photographed for identification and future reference.

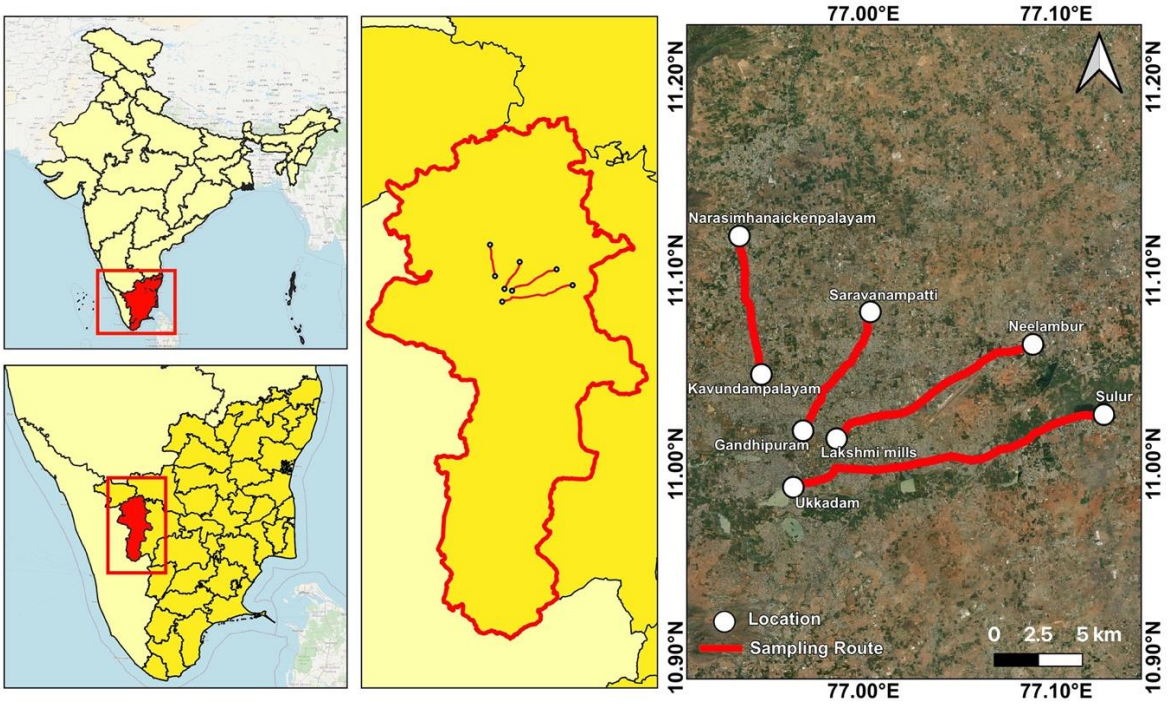

Figure 1. Map showing the selected routes in Coimbatore District, Tamil Nadu, India

Data analysis

With the help of the collected samples (twigs of the plant with flowers and fruits) along with periodic documentation, the avenue trees of the study area were identified for their taxonomic position following Gamble and Fischer (1956), Mathew (1983), and Chandrabose and Nair (1988). Botanical nomenclature and classification systems were used according to APG-IV and WFO (https://www.worldfloraonline.org/). A total number of tree species was noted, and of these, three dominant tree species were recorded based on their occurrence. Habitat preference, status, and trend of each tree species were categorized and tabulated.

RESULTS AND DISCUSSION

The avenue trees were recorded in the present study and documented about 107 plant species belonging to 83 genera and 35 families. The complete list of the documented avenue trees is shown in Table 1. The most represented families were Fabaceae, Bignoniaceae, Meliaceae, Moraceae, Rutaceae, Malvaceae, Myrtaceae, Sapindaceae, Apocynaceae Arecaceae, Rubiaceae, and Sapotaceae. The dominant family, Fabaceae, listed 17 genera and 25 species, followed by Bignoniaceae, recorded 7 genera and 8 species; Meliaceae, 5 genera and 7 species, Moraceae 2 genera and 5 species; Rutaceae with 4 genera and 4 species; Malvaceae, Myrtaceae, and Sapindaceae with 3 genera and 4 species each. Family Apocynaceae, Arecaceae, Rubiaceae, and Sapotaceae with 3 genera and 3 species, respectively. Annonaceae, Capparaceae, and Simaroubaceae reported 2 genera and 3 species, respectively, and the family Combretaceae listed one genus and 3 species; one species represented sixteen families.

Information on the plant families with a high number of genera and species is presented in Table 1. These avenue trees can be planted/cultivated in the home or backyard gardens, growing along urban roads or irrigation canals and on lakes, ponds, etc. Based on the utilization, the avenue trees are categorised under Timber Plants (TP), Medicinal Plants (MP), Edible Plants (EP), Pollen/Nectar Providing plants (PP), pollution-reducing plants (PR), Ornamental Plants (OP), Frugivory (Fr) and Toxic (Tc) were given in Figure 2. Selected avenue trees of flowers and fruits were given as plates (Figures 3 and 4).

The most important timber-yielding plants are *Albizia amara*, *Azadirachta indica*, *Ficus recemosa*, *Gmelina arborea*, *Mangifera indica*, *Morinda pubescens*, *Peltophorum pterocarpum*, *Pithocellobium dulce*, *Swietenia macrophylla*, *Terminalia arjuna*, *T. bellirica* and *Tamarindus indica*. *Melia dubia* and *Pterocarpus indicus* are used in plywood industries, whereas *G. arborea* is used in making pulp in paper industries. Some of the important medicinal plants are *Aegle marmelos*, *Annona muricata*, *A. indica*, *Calophyllum inophyllum*, *Cassia fistula*, *Ficus racemosa*, *M. indica*, *Mimusops elengi*, *Oroxylum indicum*, *Pongamia pinnata*, *P. indicus*, *Syzygium cumini*, *T. arjuna*, *T. bellirica* and *Thespesia populnea*.

It is interesting to know that some plants are edible and birds utilize them widely. They are *A. indica*, *C. inophyllum*, *Ficus benghalensis*, *F. recemosa*, *F. religiosa*, *M. indica*, *M. elengi*, *Muntingia calabura*, *P. dulce*, *S. cumini* and *Terminalia catappa*. These fruits and value-added products like dry materials of flowers, fruits, leaves, barks, seeds, and roots are commercially sold in traditional shops and by herbal medical practitioners. Some of the plants provide nectar/pollen to the insects, and some of them are *A. amara*, *C. inophyllum*, *C. fistula*, *G. arborea*, *Melaleuca citrine*, *Millingtonia hortensis*, *M. elengi*, *P. pinnata*, *Morinda citrifolia*, *M. calabura*, *P. pterocarpum*, *P. dulce*, *S. cumini* and *T. catappa*.

Moreover, plants bearing tannins and latex are capable of absorbing more carbon dioxide and helping reduce pollution. They are *C. inophyllum*, *Cascabela thevetia*, *F. benghalensis*, *Ficus benjamina*, *F. racemosa*, *F. religiosa*, *M. indica*, *Monoon longifolium*, *P. indicus*, *S. cumini*, *Simarouba glauca*, and *T. catappa*. Although many trees are planted as avenue trees, they provide shelter and aesthetic value and serve as ornamental trees. They are: *C. fistula*, *Cordia sebestena*, *Callistemon lanceolatus*, *Adenanthera pavonina*, *Bauhinia purpurea*, *Filicipium descipiens*, *F. benjamina*, *Delonix regia*, *Jacaranda mimosifolia*, *P. pterocarpum*, *Pisonia grandis*, *Plumeria rubra*, *M. longifolium* and *Tecoma stans*.

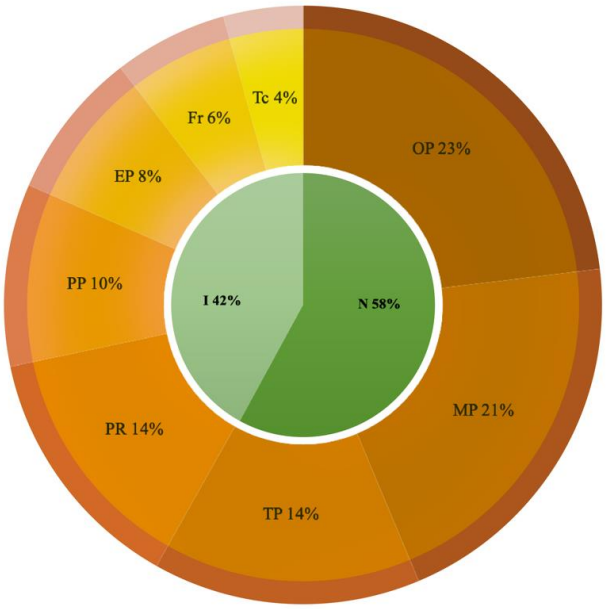

Figure 2. A general use of avenue trees (N-Native, I-Introduced). TP: Timber Plant, MP: Medicinal Plant, EP: Edible Plant, PP: Pollen Producing Plant, PR: Pollen Reducing Plant, OP: Ornamental Plant, Fr: Frugivory, Tc: Toxic

Table 1. List of avenue trees in the urban area, Coimbatore district, Tamil Nadu, India

Scientific name	N/I	Family	TP	MP	EP	PP	PR	OP	Fr	Tc
Adenanthera pavonina L.		Fabaceae						✢		
Aegle marmelos (L.) Corrêa		Rutaceae		✢	✢			✢		✢
Ailanthus excelsa Roxb.		Simaroubaceae	✢	✢				✢		
Ailanthus triphysa (Dennst.) Alston		Simaroubaceae	✢	✢				✢		
Alangium salviifolium (L.f.) Wangerin		Cornaceae		✢			✢	✢	✢	
Albizia amara (Roxb.) Boivin		Fabaceae		✢		✢		✢		✢
Alstonia scholaris (L.) R.Br.		Apocynaceae		✢		✢	✢	✢		✢
Annona muricata L.		Annonaceae		✢	✢		✢	✢		
Annona squamosa L.		Annonaceae		✢	✢		✢	✢		
Araucaria heterophylla (Salisb.) Franco		Araucariaceae					✢	✢		
Areca catechu L.		Arecaceae	✢	✢	✢		✢	✢		
Artocarpus altilis (Parkinson) Fosberg		Moraceae		✢	✢			✢		
Azadirachta indica A.Juss.		Meliaceae	✢	✢	✢				✢	
Bauhinia purpurea L.		Fabaceae						✢		
Bauhinia racemosa Lam.		Fabaceae		✢				✢		
Bauhinia tomentosa L.		Fabaceae		✢				✢		
Bauhinia variegata L.		Fabaceae		✢				✢		
Bergera koenigii L.		Rutaceae		✢	✢	✢	✢	✢	✢	
Borassus flabellifer L.		Arecaceae	✢	✢	✢		✢	✢		
Calophyllum inophyllum L.		Clusiaceae	✢	✢		✢	✢		✢	
Capparis divaricata L.f.		Capparaceae		✢			✢	✢		
Carica papaya L.		Caricaceae		✢	✢		✢	✢	✢	
Cascabela thevetia (L.) Lippold		Apocynaceae					✢			✢
Cassia fistula L.		Fabaceae		✢	✢	✢		✢		✢
Cassia grandis L.f.		Fabaceae				✢				
Casuarina equisetifolia L.		Casuarinaceae	✢					✢		
Chukrasia tabularis A.Juss.		Meliaceae	✢	✢				✢		
Cocos nucifera L.		Arecaceae	✢	✢	✢			✢		
Cordia dichotoma G.Forst.		Boraginaceae						✢		
Cordia sebestena L.		Boraginaceae						✢		
Couroupita guianensis Aubl.		Lecythidaceae	✢	✢			✢	✢		
Crateva adansonii DC.		Capparaceae		✢						
Crateva religiosa G.Forst.		Capparaceae		✢						
Dalbergia lanceolaria L.f.		Fabaceae	✢	✢		✢				
Dalbergia latifolia Roxb.		Fabaceae	✢			✢				
Dalbergia sissoo Roxb. ex DC.		Fabaceae						✢		
Delonix elata (L.) Gamble		Fabaceae	✢			✢		✢		
Delonix regia (Bojer ex Hook.) Raf.		Fabaceae		✢	✢			✢		
Dichrostachys cinerea (L.) Wight & Arn.		Fabaceae		✢		✢				
Erythrina variegata L.		Fabaceae		✢		✢	✢	✢		
Eucalyptus tereticornis Sm.		Myrtaceae	✢	✢				✢		✢
Ficus benghalensis L.		Moraceae	✢		✢		✢		✢	
Ficus benjamina L.		Moraceae					✢	✢		
Ficus racemosa L.		Moraceae	✢	✢	✢		✢		✢	
Ficus religiosa L.		Moraceae					✢		✢	
Filicium decipiens (Wight. & Arn.) Thw.		Sapindaceae						✢		
Gmelina arborea Roxb. ex Sm.		Lamiaceae	✢			✢			✢	
Hibiscus tiliaceus L.		Malvaceae						✢		
Holoptelea integrifolia (Roxb.) Planch.		Ulmaceae	✢		✢		✢			✢
Jacaranda mimosifolia D.Don		Bignoniaceae		✢				✢		
Kigelia africana (Lam.) Benth.		Bignoniaceae					✢	✢		
Lagerstroemia speciosa (L.) Pers.		Lythraceae						✢		
Leucaena leucocephala (Lam.) de Wit		Fabaceae	✢	✢		✢				
Limonia acidissima L.		Rutaceae		✢	✢		✢	✢		

Madhuca longifolia (L.) J.F.Macbr.		Sapotaceae	✢	✢				✢		
Magnolia champaca (L.) Baill. ex Pierre		Magnoliaceae	✢	✢			✢	✢	✢	
Majidea zanguebarica Kirk ex Oliv.		Sapindaceae						✢		
Mangifera indica L.		Anacardiaceae	✢					✢		
Manilkara zapota (L.) P.Royen		Sapotaceae		✢	✢		✢	✢	✢	✢
Melaleuca citrina (Curtis) Dum.Cours.		Myrtaceae				✢		✢		
Melia azedarach L.		Meliaceae	✢			✢		✢		✢
Melia dubia Cav.		Meliaceae		✢		✢		✢	✢	
Millingtonia hortensis L.f.		Bignoniaceae	✢	✢		✢		✢		
Mimusops elengi L.		Sapotaceae				✢			✢	
Mitragyna parvifolia (Roxb.) Korth.		Rubiaceae	✢	✢						
Monoon longifolium (Sonn.) B.Xue & R.M.K.Saunders		Annonaceae	✢				✢	✢		
Morinda citrifolia L.		Rubiaceae		✢				✢		
Moringa oleifera Lam.		Moringaceae	✢	✢	✢			✢		✢
Muntingia calabura L.		Tiliaceae		✢				✢		
Murraya paniculata (L.) Jack		Rutaceae		✢		✢	✢	✢	✢	✢
Neolamarckia cadamba (Roxb.) Bosser		Rubiaceae	✢	✢			✢	✢		
Oroxylum indicum (L.) Kurz		Bignoniaceae	✢	✢			✢			
Parkinsonia aculeata L.		Fabaceae					✢	✢		
Peltophorum pterocarpum (DC.) Backer ex K.Heyne		Fabaceae	✢			✢		✢		
Phyllanthus acidus (L.) Skeels		Phyllanthaceae		✢	✢					
Phyllanthus emblica L.		Phyllanthaceae		✢	✢			✢		
Pisonia grandis R.Br.		Nyctaginaceae		✢		✢				
Pithecellobium dulce (Roxb.) Benth.		Mimosaceae	✢	✢			✢		✢	
Plumeria rubra L.		Apocynaceae						✢		
Pongamia pinnata (L.) Pierre		Fabaceae					✢	✢		
Pterocarpus indicus Willd.		Fabaceae						✢	✢	
Pterocarpus marsupium Roxb.		Fabaceae	✢	✢		✢	✢	✢		
Samanea saman (Jacq.) Merr.		Fabaceae	✢			✢				
Santalum album L.		Santalaceae	✢	✢			✢	✢	✢	
Sapindus emarginatus Vahl		Sapindaceae	✢					✢	✢	
Sapindus trifoliatus L.		Sapindaceae	✢				✢			
Saraca asoca (Roxb.) W.J.de Wilde		Fabaceae		✢		✢	✢	✢		
Simarouba glauca DC.		Simaroubaceae	✢	✢				✢		
Spathodea campanulata P.Beauv.		Bignoniaceae	✢	✢	✢	✢	✢	✢		
Sterculia foetida L.		Malvaceae		✢						✢
Sterculia guttata Roxb.		Malvaceae		✢						
Swietenia macrophylla King		Meliaceae	✢	✢						
Swietenia mahagoni (L.) Jacq.		Meliaceae	✢				✢	✢		
Syzygium cumini (L.) Skeels		Myrtaceae	✢	✢	✢	✢	✢		✢	
Syzygium jambos (L.) Alston		Myrtaceae	✢	✢	✢	✢	✢	✢	✢	
Tabebuia aurea (Silva Manso) Benth. & Hook.f. ex S.Moore		Bignoniaceae				✢	✢	✢		
Tabebuia rosea (Bertol.) DC.		Bignoniaceae				✢	✢	✢		
*Tabernaemontana divaricat*a (L.) R.Br. ex Roem. & Schult.		Apocynaceae		✢		✢		✢		
Tamarindus indica L.		Fabaceae	✢	✢	✢		✢	✢		
Tecoma stans (L.) Juss. ex Kunth		Bignoniaceae		✢		✢	✢	✢		
Tectona grandis L.f.		Lamiaceae	✢			✢	✢	✢		
Terminalia arjuna (Roxb. ex DC.) Wight & Arn.		Combretaceae		✢	✢					
Terminalia bellirica (Gaertn.) Roxb.		Combretaceae	✢	✢						✢
Terminalia catappa L.		Combretaceae	✢	✢	✢					
Thespesia populnea (L.) Sol. ex Corrêa		Malvaceae					✢			
Toona ciliata M.Roem.		Meliaceae	✢					✢		
Vachellia leucophloea (Roxb.) Maslin, Seigler & Ebinger		Fabaceae		✢						✢

Note: **:** Native tree (N), : Introduced (I). TP: Timber Plant, MP: Medicinal Plant, EP: Edible Plant, PP: Pollen Producing Plant, PR: Pollen Reducing Plant, OP: Ornamental Plant, Fr: Frugivory, Tc: Toxic (Thothathri et al. 1985)

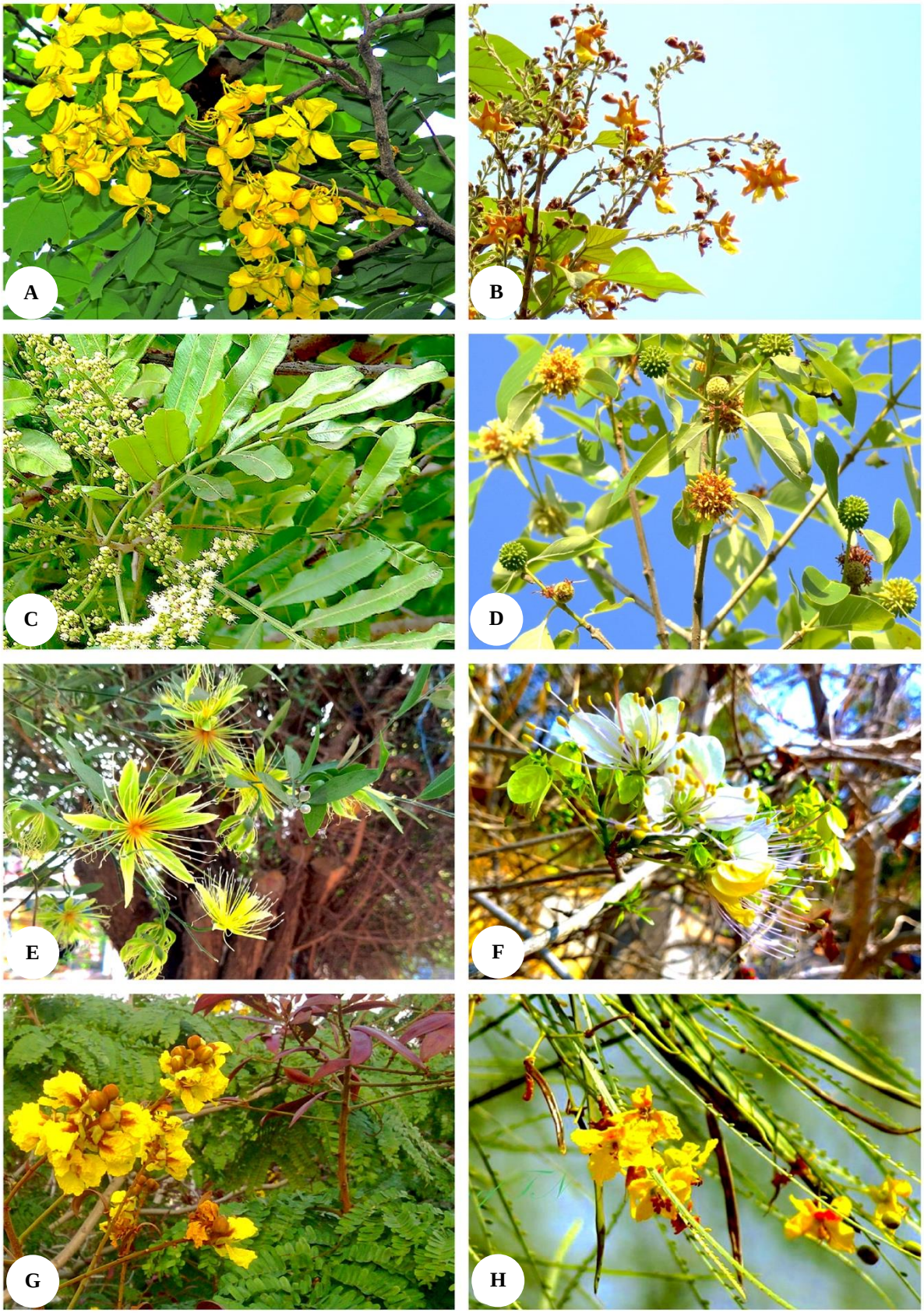

Figure 3. Selected flowers of avenue trees from the study area: A. *Cassia fistula* L. B. *Gmelina arborea* Roxb. ex Sm. C. *Filicium decipiens* (Wight. & Arn.) Thw. D. *Mitragyna parvifolia* (Roxb.) Korth. E. *Capparis divaricata* L.f. F. *Crateva adansonii* DC. G. *Peltophorum pterocarpum* (DC.) Backer ex K.Heyne H. *Parkinsonia aculeata* L.

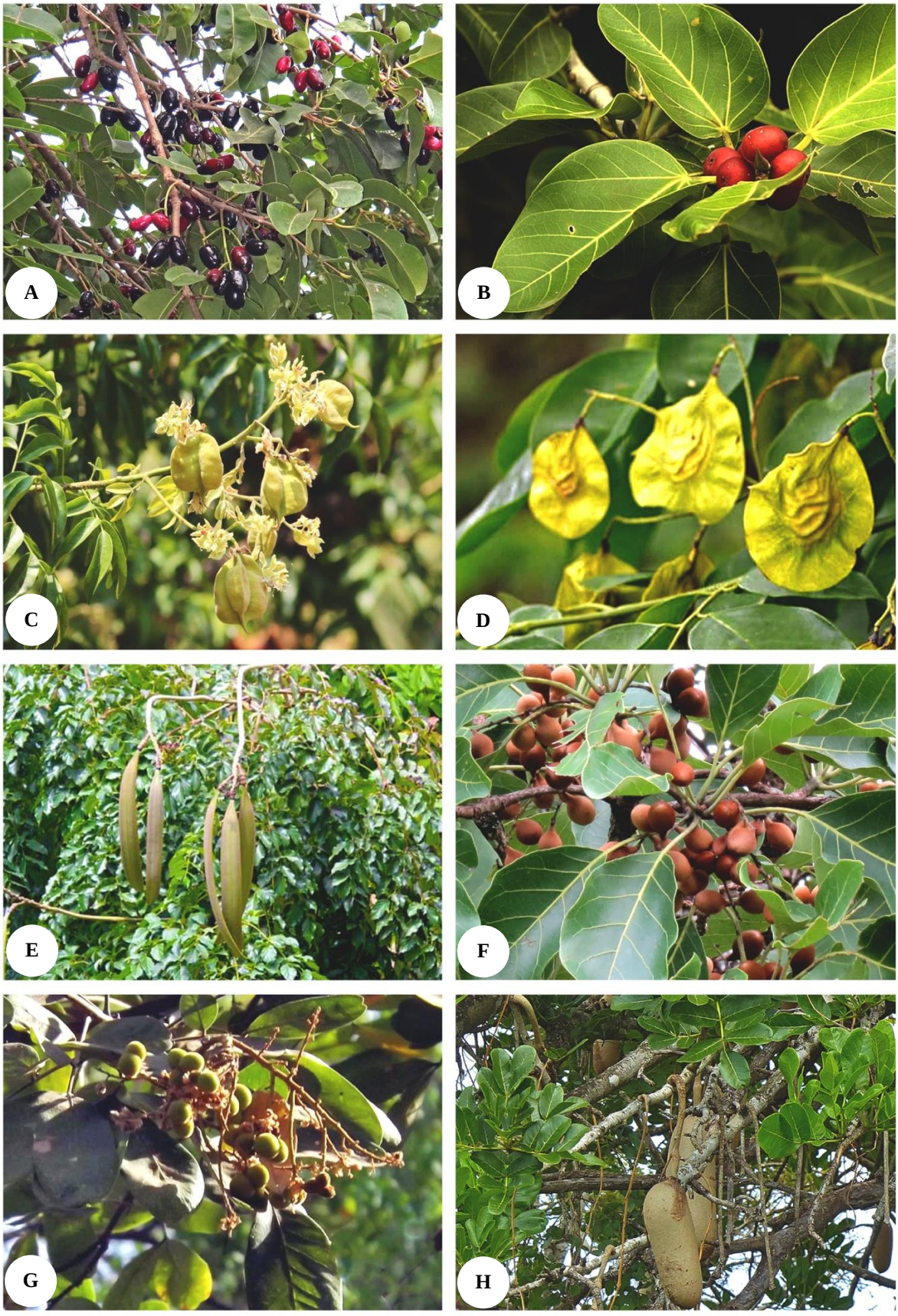

Figure 4. Selected fruits of avenue trees from the study area: A. *Syzygium cumini* (L.) Skeels B. *Ficus benghalensis* L. C. *Majidea zanguebarica* Kirk ex Oliv. D. *Pterocarpus indicus* Willd. E. *Oroxylum indicum* (L.) Kurz F. *Terminalia bellirica* (Gaertn.) Roxb. G. *Sapindus trifoliatus* L. H. *Kigelia africana* (Lam.) Benth.

Some of the trees yield fruits such as *A. indica, C. inophyllum, F. benghalensis, F. religiosa, F. racemosa, M. dubia, M. elengi, P. dulce, P. indicus* and *S. cumini*. Various birds like Asian Koel, Red-vented Bulbul, Common Myna, Rose-ringed Parakeet, and House Crow feed on them whenever available. Tree species with large canopies were used for nesting and roosting purposes by bats and urban birds mainly Black Kites, followed by Brahminy Kite, Cattle Egret, Pond Heron, Crows, Mynas, Bulbuls, Parakeets, Pigeons and passerines. Some of the native trees are *A. marmelos, A. indica, B. purpurea, C. inophyllum, C. fistula, F. benghalensis, F. benjamiana, F. religiosa, F. descipiens, G. arborea, M. indica, M. dubia, M. elengi, M. citrifolia, P. pinnata, P. grandis, P. indicus, S. cumini, T. arjuna, T. bellirica, T. indica* and *T. populnea*.

The exotic trees were introduced due to their quick growth, dense foliage, attractive flowers, etc. Along with native trees, the following exotic plants are planted: *A. pavonina, A. amara, C. thevetia, C. sebestena, D. regia, J. mimosifolia, Melia azedarach, Melaleuca citrina, M. hortensis, M. calabura, P. dulce, M. longifolium, S. glauca, Spathodea campanulata, S. macrophylla* and *S. mahagoni.*

Discussion

With the increase in urbanization, studies on urban ecology focus have developed rapidly in recent years (Celesti-Grapow et al. 2006). Floristically, cities have been observed to be richer than adjoining areas owing to high habitat heterogeneity and the presence of exotic species (Pysek et al. 2006; Primack and Miller-Rushing 2009; Kitha and Lyth 2011). Urban forestry includes the management of individual and group trees and incorporates arboriculture along with landscapes as one important component of their subject.

Urban forestry is also not restricted to planted trees. Many urban trees may have been established naturally, but in an environment where competition for land is high, they are unlikely to survive long unless actively cultivated and managed. Thus, as noted above, urban forestry also included the management of forests at the urban fringe. Urbanization constitutes one of the most significant drivers of global environmental change today, with more than 50% of the world's population living in urban areas (United Nations 2011).

Recent urbanization rapidly accelerated with unauthorized developments, and land use changes for agriculture in rural and urban areas in many districts of the region were reported (Harini and Divya 2011; Divakara et al. 2022; Jeevith and Manjunath 2023). The creation and expansion of cities put transformative pressure on the surrounding landscapes, leading to drastically increasing population densities. There will be cleaner and cooler air by planting more trees in the urban areas; in exchange for giving oxygen, trees absorb carbon dioxide produced from the combustion of various fuels. Balasubramanian et al. (2018) reported the air pollution tolerance index of urban trees in selected areas of Coimbatore. They revealed that *T. populnea* and *P. pinnata* were excellent performers in urban forests. Trees remove or freak, decreasing dust, ash, pollen, and smoke from the air, providing shade for people, and conserving soil carbon energy.

Trees provide numerous benefits to urban forests, especially in mitigating air pollution in urban areas and positively impacting human health. Similarly, Shanmugam et al. (2020) reported 54 urban trees in the Madurai District to treat 35 ailments regarding ethnomedicinal uses. The common trees were *Azadiracta indica, M. elengi, Morinda tinctoria, Parkinsonia aculeata, Alstonia scholaris, M. indica, M. hortensis, P. pinnata* were utilized in multiple disorders. Urban noise is reduced by trees' sound waves absorbent. Trees also provide wildlife habitats for many species, especially for birds. Many of the trees planted on the roadsides are exotic, i.e., from other countries. Most of the trees have bright and colourful flowers and different trees flower in different seasons. Some striking are *D. regia* with red flowers, *Albizia saman* with pink flowers, *P. pterocarpum* with yellow flowers *S. campanulata* with bright scarlet red flowers during summer months. Indian cork tree *M. hortensis* with long white flowering from August to September, and *J. mimosifolia* with brilliant bluish violet flowers.

Along with exotics, we also have native (originating from India) trees: about 26 species are of Indian origin, for example, Indian Laburnum (*C. fistula*) dangling yellow flowers, *M. dubia* with white flowers, *M. azedarach* with white with violet tinge flowers, *P. indicus* with yellow flowers, *M. elengi* with fragrant white flowers. The most common species of trees planted are *C. sebestena*, *T. stans*, *B. purpurea*, *F. benghalensis*, *F. benjamina*, and *M. calabura* (Jamaican cherry). Some of the tree species are very few, for example, *Filicium decipiens* (Fern tree) besides *M. indica*, *A. marmelos* (Indian Bael tree) and *Swietenia mahagoni* (American Mahogany).

Recently, several authors reported avenue trees from the country. Kohli et al. (1998) reported 66 tree species along the roadsides of Chandigarh, which provides multiple benefits; Harini and Divya (2010) studied the tree diversity in urban parks of Bangalore and reported 80 tree species. The common ornamental tree *Polyalthia longifolia* was largely planted in most urban areas due to its attractive drooping foliage. Pandey and Kumar (2018) recorded 64 plant species in urban green spaces of Allahabad city, Uttar Pradesh. Prakash et al. (2020) reported 113 avenue tree species in Tiruppur City with species-rich genera *Ficus, Terminalia, Acacia, Plumeria, Albizia*, and *Bauhinia.*

Several native and indigenous tree species were planted in urban scapes in different regions of the country. These wild and ornamental potential trees play a different role in the environment and benefit local communities. The knowledge of avenue plants and their potential value strongly relates to the urban community people for multiple purposes. Avenue plants, mainly in botanical gardens, parks, institutions, hospitals, home gardens, industrial areas, and highways, are essential sites for plant diversity conservation. The present study indicates that exploring urban plants and their ornamental potential value in different microhabitats of the city should be designed for country urban conservation.

In conclusion, due to rapid urbanization, there is a drastic reduction in urban biodiversity in and around the cities. Therefore, to mitigate atmospheric pollution, there is an urgent need to plant more trees on the roadsides that will help us to reduce the CO_2 level in the air; at the same time, the avenue trees also provide shade, habitat for birds, and other economic benefits derived from these trees. Recently, carbon credits have been promoted by commercials and corporate companies for the restoration of degraded invasive forests, landfills, abundant mimes, and monoculture plantations to natural forests.

The overall result suggests that urban trees are unique carbon biomass producers. In this paper, we have developed a catalog of avenue trees of the Coimbatore district, which can help the urban eco-gardens, planters, and restoration ecologists to select the high ornamental potential value tree species for planting urban and rural biodiversity development. Hence, it is advocated that planting more trees in urban areas will benefit humanity. In general, this study strongly suggests to urban management action plan for developing long-term management plans and stewardship agreements to ensure the maintenance and monitoring of restoring native trees for green development. Encouraging landowners and local stakeholders to adopt sustainable agro-farming and land management practices that support the country in a long-term healthy and productive native forest ecosystem.

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