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A SURVEY OF MULTIPURPOSE TREE SPECIES IN THE FOREST NURSERIES OF SOUTHERN TAMIL NADU

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ABSTRACT
A survey was carried out in different forest nurseries of Tamil Nadu State Government located in Madurai district. A total of 70 species, belonging to 55 genera of 29 families have been reported. The most important family was Caesalpiniaceae with 10 species belonging to 7 genus, followed by Apocyanaceae and Bignowdaszcniaceae with 4 genera and 4 species and Mimosaceae with 6 species belonging to 3 genera and Fabaceae with 5 species belonging to 3 genus. The highest numbers of species were recorded in Caesalpiniaceae, followed by Mimosaceae, Fabaceae, Apocyanaceae and Bignoniaceae families. Among the 29 families, 28 families were belonging to dicotyledons and only one family was in monocotyledon group. All the species are commercially important and multipurpose uses such as medicinal, fodder, timber, ornamental and avenue trees.

KEY WORDS: Forest nursery, Multipurpose trees, Seedlings survey.

INTRODUCTION

Plants especially trees are an important part of every community. Since the beginning, trees have furnished us with two of life's essentials, food and oxygen. Besides these, they provided additional necessities such as shelter, medicine, architectural, sound barriers, engineering functions and tools. Trees contribute to their environment by improving air quality, climate amelioration, conserving water, preserving soil, and supporting wildlife. They also lower the air temperature and reduce the heat intensity of the greenhouse effect by maintaining low levels of carbon dioxide. Trees are easily grown in all types of soils and extreme climatic conditions. Tree species could be used in many ways such as paper pulp, shade, furniture making, nitrogen fixation, internal decoration, fuel purpose, agriculture implements, ornamental and fodder for Livestock. Many drugs that come from trees generally have been replaced by more potent synthetic ones; trees remain a source for some drug ingredients. Many plants possess antimicrobial activities and are used for the treatment of different diseases (Arora and Kaur, 1999), use of plants as a source of remedies for the disease curing therapies. Coincidentally the last decade has also witnessed increasing intensive studies on extracts and biologically active compounds isolated from plants species used for natural herbal medicine (Rios and Recio, 2005). Excessive industrial exploitation, clearing of land for agricultural purposes and procurement of firewood and medicinal plants in India have led to deforestation during recent decades (Bandyopadhyay and Shyamsundar, 2004). Planting of trees along road sides, on degraded lands is being practiced for environmental protection and economic gain. Forest tree species largely cultivated as monoculture or in combination with agricultural crops under agro forestry system. In Agro forestry and farm forestry projects, many different tree species are planted because of its economic importance and to prevent wind and rain erosion and to control many diseases through their products. Keeping in view of the above advantages tree species are being cultivated by the state government, non-government organizations and medicinal plant cultivators have planted in various places of Tamil Nadu especially in the forest areas, as avenue trees in the public land in urban area, road sides, high ways and waste land through the agro-forestry program. The main reason for the preference of the tree species are comparatively more profitable than annual crops, it needs low water requirements, drought tolerance, easy management and low lab our requirement for planting and maintenance. The comprehensive studies of the plants growing in a particular area are known as flora. A flora may cover any suitable area form a small patch of forest to a taluk, city, district, state, country or even a continent. Floristic studies may be a simple complied check list or an elaborate analysis of the taxa of that area. Forests are especially important in the carbon balance of the Earth. Even though forests comprise only 30% of the terrestrial ecosystems, they store 86% of the above-ground carbon and 73% of the world's soil carbon (Sedjo, 1993). On average, forests store two-thirds of their carbon in soils, where much of it is protected against turnover in soil aggregates or in chemical complexes (FAO, 2006). The intense exploitation of tropical forests has led to degradation of once stable ecosystems. There has been a change in abiotic and biotic soil properties, which hampers the re-establishment of proper vegetation cover (Miller, 1987). Agroforestry, a land-use system and technology in which trees are deliberately planted on the same units of land with agricultural crop andor animals, has been recognized as one of the most promising strategy for rehabilitating the

already degraded areas. The benefits of agroforestry includes the amelioration of soil chemical and physical properties, the reduction of soil erosion, improved weed control and increased availability of fuel wood and fodder (Young, 1997). The degree to which an agroforestry system can provide the above benefits partially depends on the quantity of biomass an agroforestry tree species can produce. Commercial production of tree seedlings routinely includes a biocide treatment of the planting media for pest control. Such treatments also eliminate beneficial organisms such as mycorrhizal fungi which may be highly sensitive to biocides (Trappe *et al*., 1984). The objectives of the present study are: (i) To survey and tabulate the available tree seedlings raised in state forest nurseries of Madurai district (ii) to gather information on scientific names, family name and the multipurpose use of a given plant species (iii) to establish any association between the nursery managers and the public.

MATERIALS & METHODS

Study site

The study area selected is in Madurai, Tamil Nadu located at10^0 05' N latitude and 78^0 16' E longitude. The elevation of the study area ranges from 100-132 M above Mean Sea level. The temperature ranges from 21^0 C during winter and about 39^0C during summer. The study area of Madurai received the annual rain fall of about 300-750 mm. Average annual precipitation ranges between 750 and 850 mm. The climate is sub-humid to semi-arid. Soil type is sandy- loamy. The pH of the soil ranges from 6.9 to 7.8.

Survey

A survey was carried out of plants were growing in State government Forest nurseries located different regions in Madurai district, Tamil Nadu, during the period of April 2010 - April 2011 (12 months). The known and familiar plants were recorded on the nursery spot itself. The unknown and doubtful plants were collected and brought to the Department of Botany, Thiagarajar College, Madurai for identification. The nomenclatures of the plants were identified with the help of the regional floras like Flora of Presidency of Madras (I-III Vols.) (Gamble and Fischer, 1957), Flora of Tamilnadu Carnatic (Matthew, 1981-83), Flora of Tamilnadu (Vol. I) (Nair and Henry, 1983), Flora of Tamilnadu (Vol.II) (Henry, Kumar and Chitra, 1987) and (Vol.III) (Henry, Chitra and Balakrishnan, 1989) and An Excursion Flora of Central Tamilnadu, India (Matthew, 1991).

RESULTS AND DISCUSSION

In present survey study investigation, the various tree plant species were identified with the help of the sources mentioned in the methodology. Among the habits of the plants recorded. All species are ranging from small tree to large tree type in all the areas which were mentioned in earlier. Totally there are 70 different types of tree species seedlings belonging to 56 genera distributed among 29 families were recorded. A complete date list is presented in the Table 1.

TABLE 1: Commonly raised seedlings in the forest nurseries of Madurai District, Tamil Nadu

Sl.No	Plant name (Botanical name)	Family	Uses
1	*Alangium salviifolium* Wangerin	Alangiaceae	Fodder and medicinal
2	*Annona cherimola* Miller	Annonaceae	Medicinal plants
3	*Alstonia scholaris* R. Br.	Apocyanaceae	Medicinal plants
4	*Holarrhena pubescens* Wallich		Medicinal plants
5	*Stereospermum tetragonum* DC.		Medicinal plants
6	*Wrightia tinctoria* R. Br.		Medicinal plants
7	*Jacaranda mimosifolia* D. Don.	Bignoniaceae	Ornamental Plants
8	*Kigelia pinnata* DC.		Ornamental plants
9	*Millingtonia hortensis* L. f		Ornamental Plants
10	*Spathodea campanulata* P. Beauv.		Ornamental Plants
11	*Adansonia digitata* L.	Bombacaceae	Medicinal plants
12	*Bombax ceiba* L.		Avenue trees
13	*Cordia rothii* Roemer & Schultes	Boraginaceae	Medicinal plants
14	*Bauhinia purpurea* L.	Caesalpiniaceae	Medicinal plants
15	*Caesalpinia coriaria* Willd		Medicinal plants
16	*Cassia fistula* L.		Ornamental and Medicinal
17	*Cassia siamea* Lam.		Wind breaker
18	*Delonix regia* Raf.		Ornamentalandnitrogen fixing
19	*Hardiwickia binata* Roxb.		Ornamental Plants
20	*Leucana leucacephala* (Lam.) de wit		Fodder and Fire wood
21	*Tamarindus indica* L.		Timber and medicinal
22	*Bauhinia racemosa* Lam.		Beedi production
23	*Bauhinia variegata* L.		Ornamental Plants
24	*Trema orentalis* (L.) Blume	Cannabaceae	Fodder, paper pulp, nitrogen fixing and timber
25	*Crataeva religiosa* Forster f.	Capparaceae	Food plants for insects and Herbivores
26	*Casuarina equisetifolia* Forster & Forster	Casuarinaceae	Paper pulp, wind breaker, and Nitrogen fixing
27	*Terminalia chebula* Retz.	Combretaceae	Medicinal plants
28	*Terminalia arjuna* (Roxb. Ex DC) Wight & Arn.		Medicinal plants
29	*Terminalia bellirica* (Gaertn.) Roxb.		Avenue trees and Medicinal plants
30	*Terminalia catappa* L.		Ornamental, and timber
31	*Shorea roxburghii* G. Don. Ger.	Dipterocarpaceae	Timber yielding
32	*Phyllanthus acidus* (L.) Skeels	Euphorbiaceae	Fruit yielding and Medicinal plants

33	*Phyllanthus emblica* L.		Fruit yielding and Medicinal plants
34	*Butea monosperma* (Lam.) Taub.	Fabaceae	Fodder and timber yielding
35	*Dalbergia latifolia* Roxb.		Timber yielding plants
36	*Dalbergia sissoo* Roxb.		Fire wood and timber yielding
37	*Pongamia glabra* Vent.		Wind breaker and Fencing
38	*Pongamia pinnata* (L.) Pierre Fl. For.		Wind breaker, Fencing, Nitrogen fixing and medicinal plants
39	*Couroupita guianensis* Aubl.	Lecythidaceae	Medicinal plants
40	*Michelia champaca* L.	Magnoliaceae	Ornamental and timber yielding
41	*Thespesia populnea* Cav.	Malvaceae	Timber yielding plants
42	*Hibiscus tiliaceus* L.		Fire wood, Wind breaker, and Fencing plants
43	*Azadirachta indica* Adr. Juss.	Meliaceae	Timber yielding and medicinal plants
44	*Melia azedarach* L.		Timber yielding and medicinal plants
45	*Cedrella toona* Roxb. Ex Rottler		Timber yielding plants
46	*Acacia auriculiformis* A.Cunn. ex Benth.	Mimosaceae	Fire wood, paper pulp and timber yielding
47	*Acacia catechu* (L.f) Willd.		Fodder and timber yielding plants
48	*Acacia nilotica* (Lam.) Wild.		Fodder, timber yielding
49	*Albizia amara* Boivin.		Fodder, firewood & timber
50	*Albizia lebbeck* Benth.		Fodder yielding plants
51	*Samanea saman* (Jacq.) Merr.		Avenue trees
52	*Ficus religiosa* L.	Moraceae	Ornamental plants
53	*Ficus glomerata* Roxb.		Medicinal plants
54	*Eucalyptus globulus* Labill.	Myrtaceae	Paper pulp and Timber
55	*Syzygium cumini* L.		Fruit and medicinal plants
56	*Dendrocalamus strictus* Willd	Poaceae	Paper pulp and timber
57	*Grevillea robusta* A. Cunn. Ex R. Br.	Proteaceae	Wind breaker, fencing and timber yielding
58	*Adina cordifolia* Hook. f.	Rubiaceae	Timber yielding plants
59	*Aegle marmelos* Corr. Serr.	Rutaceae	Fruit yielding plants
60	*Feronia elephantum* Corr. Serr.		Fruit yielding plants
61	*Santalum album* L.	Santalaceae	Timber yielding plants
62	*Arfeuillea arborescens* Pierre ex Radlk	Sapindaceae	Avenue trees
63	*Filicium decipiens* Thwaites		Ornamental and timber
64	*Achras sapota* L.	Sapotaceae	Fruit yielding plants
65	*Madhuca indica* J. F. Gmel.		Medicinal plants
66	*Madhuca longifolia* (J.Konig) FF. Macbr.		Timber yielding plants
67	*Mimusops elengi* L.		Fruit and timber
68	*Gmelina arborea* Roxb.	Verbenaceae	Avenue tree and timber
69	*Gmelina asiatica* L.		Timber yielding
70	*Tectona grandis* L.f.		Timber yielding

There were 70 species recorded from study area, dicotyledons were represented by 69 species of 55 genera belonging to 28 families and monocotyledons were only one species of a single genera belonging to single family. Among 29 families (28 families of dicots and 1 family of monocot) listed 13 families were represented by a single genus and single species, 5 families were represented by two genus and two species, two families were represented by four genus and four species, one family (Meliaceae) was represented by three genus and three species similarly one family (Caesalpiniaceae) were represented by six genus and six species and remaining seven families represented more genera less species or less genera and more species vice versa. Among dicotyledons, Fabaceae was found to be dominant and largest family comprising nine species among five genera. Caesalpiniaceae and Mimosaceae shared the second largest family status, both of these caesalpiniaceae were comprising six species among six genera whereas Mimosaceae comprising six species among three genera and considered to be co-dominant families. The third largest families were Apocyanaceae (4 species among 4 genera), Bignoniaceae (4 species among 4 genera), Combretaceae (four species among a single genus) and Sapotaceae (four species among three genera). Among this Terminalia of Combretaceae was represented by four species which was found to be the dominant genus. The genus Acacia of Mimosaceae (represented by 3 species) was recorded as co-dominant genera whereas the genera Bauhinia, Phyllanthus, Pongamia, Gmelina, Madhuca, Ficus, Albizia and Dalbergia of different families (both of them are represented by 2 species) were recorded as sub-dominant genera (Table 1). In the case of monocotyledons, Poaceae was found to be dominant family because it has been only one genus and single species. No other monocot member was found in all the nurseries located in Madurai district. Among the 70 species of tree seedlings such as *Millingtonia hortensis, Delonix regia, Tamarindus indica, Casuarina equisetifolia, Terminalia catappa, Pongamia glabra, Cassia fistula, Pongamia pinnata, Thespesia populnea, Hibiscus tiliaceus, Azadirachta indica, Albizia lebbeck, Eucalyptus globules, Syzygium cumini, Aegle marmelos, Feronia elephantum, Samanea saman, Achras sapota, Mimusops elengi, Madhuca longifolia* and *Tectona grandis* are commonly raised seedlings in all the four sites of forest nurseries located in Madurai district. The only species of *Arfeuillea arborescens* present in only one site. A surveillance study was undertaken reveals species of Caesalpiniaceae family predominantly seedlings raised in the forest nurseries of Madurai district. Under the auspicious of the urban forestry programmes, the seedlings of the Caesalpiniaceae family are planted in multitude

because they are fairly preferred as avenue, ornamental and decorative trees in educational institutions, corporate companies and home gardens to beautify the atmosphere. Moreover, the same species are planted all along the road sides too. It because essential to produce yet more number of the seedlings of the same species. Mimosaceae and Fabaceae species tree seedlings are in succession next to Caesalpiniaceae. Mimosaceae family species are planted especially in and around the outskirts of the lake of Madurai district. Among them a higher number of species was recorded in the family of Caesalpiniaceae, followed by Mimosaceae and Fabaceae members. All the tree seedlings were important multipurpose usage and preferably planted in avenue, agro and social forestry programme. The present survey clearly shows that the above mentioned species were luxuriantly grown in the nursery of semi arid regions. The investigation about the seedlings grown in above said climatic conditions will be definitely useful to the nursery managers and silviculturist for the establishment of nurseries in similar agro-climatic conditions. Most genera of the tribe Mimosaceae can nodulate and fix nitrogen, although there are some important exceptions (Sprent, 2001). Furthermore they can establish mutualistic symbiosis with arbuscular-mycorrhizal fungi (AMF), which may result in reciprocal transfer of P from the fungus to the plant in exchange for carbon from the plant to the fungus (Ezawa *et al*., 2002). Relatively few leguminous trees have nodulation or nitrogen fixation ability (Sprent, 2001) and it can manage symbiotic fungal and rhizobial associations more effectively (Marques *et al.,* 2001). The woody legume species such as *Albizia lebbeck* (Faria *et al*., 1995), *Dalbergia nigra* (Santiago *et al*., 2002), *Centrolobium tomentosum* (Marques *et al*., 2001) and some forest tree species used in enrichment planting and in agro-forestry systems (Montagnini *et al*., 1997).

It has also long been used as a shade tree and green manure (Tilki and Fisher 1998), and used in carpentry and as an ornamental species (Lorenzi, 1992). Forest trees used for wood and as an ornamental, mainly along the streets and avenue trees. It also helps to reduce environmental pollution (Lorenzi, 1994). Among many woody species well adapted and commonly used multipurpose fruit trees intensively exploited for fruits, seeds, fodder, wood and traditional medicine (Okafor, 1991). Moreover, fruit tree species contribute to overcome nutritional problems and are important sources of income for rural communities (Ambé, 2001). The documentation thus gathered, served to give scientific names, families and multi uses of a given species.

CONCLUSION

Of the 70 tree species seedlings surveyed in the Madurai district of Tamil Nadu have been used in multipurpose such as medicinal, timber value, fodder, food, ornamental and avenue trees. It can be planted in various places of educational institutes, industries and public places.

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