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Floristic composition and diversity of trees in Chillaballapur district of eastern dry zone of Karnataka

¹Sanjeev Kyatappanavar, ²Rajesh CM, ³Kamble AS, ⁴Naveen DV, ⁵Venkatachelapathi V, ⁶Ramakrishna Naika, ⁷Venkatesh L and ⁸Syed Ali

^{1, 2, 3, 4}College of Sericulture, Chintamani, UAS, Bangalore, Karnataka, India

⁵Agricultural Research Station, Chintamani, UAS, Bangalore, Karnataka, India

^{6, 7, 8}College of Forestry, Sirsi, Uttara Kannada, UAS, Dharwad, Karnataka, India

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Corresponding Author: Sanjeev Kyatappanavar

Abstract

Trees play an important role in maintaining ecological balance, biodiversity, and microclimatic conditions. The present study was conducted to assess the diversity, floristic composition, and density of trees and saplings across different blocks and functional units in College of Sericulture, Chintamani. The objective was to understand the variation in species distribution and plantation patterns across locations. The study was carried out using a systematic field survey and tree enumeration method, where all tree species were identified, counted, and recorded block-wise. In addition, the presence and absence of species were documented to analyze floristic composition, and the collected data were compiled and analysed using simple descriptive statistics. The results revealed that a total of 45 tree species were recorded across the study area. Among these, 11 species were present in all three blocks, while 14 species occurred in two blocks and 20 species were restricted to a single block, indicating variation in adaptability and distribution. In terms of density, a total of 5991 trees and saplings were recorded across all units, with CoS accounting for 2433 trees (40.6%), followed by ARS with 2202 trees (36.7%) and ICAR-KVK with 1356 trees (22.6%). Among plantation crops, cashew showed the highest density (1693 trees, 28.3%), followed by mango (966 trees, 16.1%) and tamarind (496 trees, 8.3%), while sapota (244), guava (98), and coconut (61) were present in smaller numbers. Dominant species such as Silver oak (471), Nilagiri (336), Neem (288), and Teak (182) contributed significantly to the total tree population, reflecting a pattern where economically important and adaptable species are more widely distributed, while several other species remain localized to specific blocks.

Keywords: Species composition, enumeration, block, diversity, density

Introduction

Floristic composition and tree diversity are important indicators of the structure, composition, and ecological health of forest and agroforestry ecosystems. Floristic composition refers to the variety and abundance of tree species present in a particular area, while tree diversity describes the richness, evenness, and distribution of these species within the ecosystem. Assessing floristic composition helps in understanding species dominance, regeneration patterns, and the influence of environmental factors such as climate, soil, and management practices on vegetation. Tree diversity plays a crucial role in maintaining ecosystem stability, enhancing biodiversity conservation and improving nutrient cycling, supporting wildlife habitats, and increasing resilience against pests, diseases, and climate change. Therefore, the study of floristic composition and diversity provides essential baseline information for sustainable forest management, conservation planning, and the evaluation of agroforestry systems. Hence the study on Floristic Composition and Diversity of trees in Chillaballapur district of Eastern Dry Zone of Karnataka has been carried out.

Materials and Methods

The present study was conducted to assess the diversity, floristic composition and density of trees and saplings across different blocks and functional units at Agricultural Research Station (ARS) in the College of Sericulture campus Chintamani, Chikkaballapur district, University of Agricultural Sciences, Bangalore, which is located at 13.4355° N latitudes and 77.7315° E longitude to understand the variation in species distribution.

The study was carried out during 2026 using a systematic field survey and tree enumeration method, where all tree species were identified, counted, and recorded block-wise. In addition, the presence and absence of species were documented to analyse floristic composition, and the collected data were compiled and analysed using simple descriptive statistics.

Results and Discussion

The enumeration of trees revealed substantial diversity and density of tree species across the different blocks, indicating a well-established vegetation structure. A total of 45 tree species were recorded in the study area, showing

considerable floristic diversity. The distribution of trees varied across the blocks, with Block I showing the highest tree density (1273 trees), followed by Block II (653 trees) and Blocks III & IV (507 trees). This pattern suggests that Block I supports a more developed vegetation cover and possibly represents an area with older plantations or a greater diversity of planted species. Among the recorded species, Silver oak (*Shorea robusta*) emerged as the most dominant species with 471 individuals, accounting for a substantial proportion of the total tree population. This was followed by Nilagiri (*Eucalyptus tereticornis*) with 336 trees, Neem (*Azadirachta indica*) with 288 trees, and Teak (*Tectona grandis*) with 182 trees. Other relatively abundant species included Honge (*Pongamia pinnata*) (145 trees), Hebbevu (*Melia dubia*) (134 trees), and Mulberry (*Morus alba*) (120 trees). The dominance of these species indicates their widespread use as timber, shade, and multipurpose plantation trees, which are commonly planted in managed landscapes due to their economic and ecological importance. The species diversity distribution further shows that a few species contribute a large proportion of the total population, while many other species occur in smaller numbers. The pie chart illustrates that Silver oak alone contributes a major share of the tree population, followed by Nilagiri and Neem. However, nearly 28% of the total trees belong to a group of other less abundant species, reflecting a good level of species diversity rather than complete dominance by a few species. This pattern indicates a mixed

plantation structure, which is beneficial for ecological stability and biodiversity conservation.

The block-wise species richness analysis also indicates clear variation in diversity across locations. Block I recorded the highest species richness with 45 species, whereas Block II contained 23 species and Blocks III & IV had 13 species. This suggests that Block I not only has the highest number of trees but also supports greater species diversity, while the other blocks appear to have more concentrated or selective plantations of certain species such as Eucalyptus, Neem, and Honge. The presence of fruit and multipurpose tree species such as Mango (*Mangifera indica*), Jamun (*Syzygium cumini*), Jackfruit (*Artocarpus integrifolia*), Tamarind (*Tamarindus indica*), and Amla (*Phyllanthus emblica*) enhances the ecological value of the vegetation by contributing to food resources, biodiversity support, and environmental sustainability. In contrast, species such as Bilva (*Aegle marmelos*), Hardwickia (*Hardwickia binata*), and *Terminalia tomentosa* were represented by very few individuals, indicating limited distribution and possibly specific planting purposes such as conservation or ornamental value. These results are in accordance with the findings of Joshi and Tiwari (1990)^[1], Verghese and Menon (1999), Venkatesh *et al* (2000)^[3] who stated that the sand density of moist decidus forest stands ranged between 70 to 740 individuals per hectare and that of evergreen forest ranged between 126 to 11480 individuals per hectare

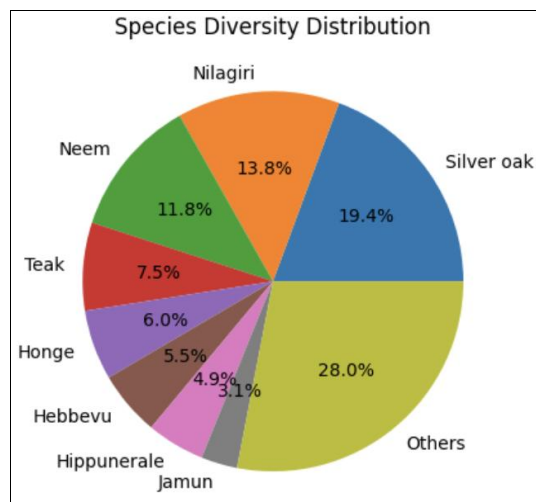
Table 1: Tree Density at in different Blocks of Agricultural Research Station Chintamani

Sl. No	Common Name	Scientific Name	Block I	Block II	Block III&IV	Total
1	Acacia	<i>Acacia auriculiformis</i>	28	2	18	48
2	Aralimara	<i>Ficus religiosa</i>	10	-	-	10
3	Ashoka	<i>Polialthia longifolia</i>	10	-	-	10
4	Attimara	<i>Ficus recemosa</i>	3	-	-	3
5	Baage mara	<i>Albizzia lebbek</i>	6	-	15	21
6	Basvanapada	<i>Bauhinia purpurea</i>	23	-	-	23
7	Bettadanelli	<i>Phyllanthus emblica</i>	2	6	-	8
8	Bilvapatre mara	<i>Aegle marmelos</i>	1	-	-	1
9	Cashew trees	<i>Anacarium occidentale</i>	5	-	-	5
10	Cherry	<i>Muntingia calabura</i>	8	-	-	8
11	Chigare mara	<i>Albizzia amara</i>	2	1	-	3
12	Chistmus trees	<i>Araucaria columnaris</i>	6	3	-	9
13	Coconut trees	<i>Cocos nucifera</i>	22	36	-	58
14	Devakanagale mara	<i>Plumeria alba</i>	2	-	-	2
15	Doddamara	<i>Ailanthus excelsa</i>	4	-	-	4
16	Drumstic trees	<i>Moringa oleifera</i>	4	3	-	7
17	Fern tree	<i>Filicium decipiens</i>	47	15	-	62
18	Fountain tree	<i>Spathodia companulata</i>	29	-	-	29
19	Hebbevu	<i>Melia dubia</i>	102	16	16	134
20	Hippunerale mara	<i>Morus alba</i>	120	-	-	120
21	Honge	<i>Pongamia pinnata</i>	22	14	109	145
22	Huvarasi mara	<i>Thespesia populnea</i>	10	1	-	11
23	Jackfruit tree	<i>Artocarpus integrifolia</i>	9	5	8	22
24	Jamun tree	<i>Syzygium cumini</i>	58	15	2	75
25	Kadubadam	<i>Terminalia catappa</i>	6	16	-	22
26	Kaduhalaadi huvina mara	<i>Tabebuia argentea</i>	1	2	-	3
27	Kamara mara	<i>Hardwickia binata</i>	1	-	-	1
28	Karimatti	<i>Terminalia tomentosa</i>	1	-	-	1
29	Mahogany	<i>Sweitenia mahogani</i>	17	-	-	17
30	Mango	<i>Mangifera indica</i>	19	20	1	40
31	Neem	<i>Azadirachta indica</i>	136	78	74	288
32	Nilagirimara	<i>Eucalyptus tereticornis</i>	68	125	143	336
33	Royal Palm tree	<i>Roystonea regia</i>	25	44	-	69

34	Sampige mara	<i>Michelia champaka</i>	6	3	-	9
35	Sandal trees	<i>Santalum album</i>	12	4	-	16
36	Sankeshwara mara	<i>Delonix regia</i>	33	-	-	33
37	Seemetangadi	<i>Cassia siamea</i>	22	-	-	22
38	Shisham	<i>Dabergia sissoo</i>	3	-	-	3
39	Silver oak	<i>Shorea robusta</i>	165	228	78	471
40	Simrouba	<i>Simaroub glouca</i>	20	-	27	47
41	Subabul	<i>Luecana leucocephoa</i>	4	9	15	28
42	Survey mara	<i>Caurina equisetifolia</i>	2	-	-	2
43	Tamarind	<i>Tamarindus indica</i>	12	7	1	20
44	Teak	<i>Tectona grandis</i>	182	-	-	182
45	Umbrella trees	<i>Terminalia mantaly</i>	5	-	-	5
	Total		1268	646	507	2433

Table 2: Comparative account of Floristic Composition (Trees) of College of Sericulture campus in different Blocks of Agricultural Research Station (ARS) Chintamani

Sl. No	Common Name	Scientific Name	Block I	Block II	Block III&IV
1	Acacia	<i>Acacia auriculiformis</i>	+	+	+
2	Aralimara	<i>Ficus religiosa</i>	+	-	-
3	Ashoka	<i>Polialthia longifolia</i>	+	-	-
4	Attimara	<i>Ficus recemosa</i>	+	-	-
5	Baage mara	<i>Albizzia lebbek</i>	+	-	+
6	Basvanapada	<i>Bauhinia purpurea</i>	+	-	-
7	Bettadanelli	<i>Phyllanthus embliia</i>	+	+	-
8	Bilvapatre mara	<i>Aegle marmelos</i>	+	-	-
9	Cashew trees	<i>Anacarium occidentale</i>	+	-	-
10	Cherry	<i>Muntingia calabura</i>	+	-	-
11	Chigare mara	<i>Albizzia amara</i>	+	+	-
12	Chistmus trees	<i>Araucaria columnaris</i>	+	+	-
13	Coconut trees	<i>Cocus nucifera</i>	+	+	-
14	Devakanagale mara	<i>Plumeria alba</i>	+	-	-
15	Doddamara	<i>Ailanthus excelsa</i>	+	-	-
16	Drumstic trees	<i>Moringa oleifera</i>	+	+	-
17	Fern tree	<i>Filicium decipiens</i>	+	+	-
18	Fountain tree	<i>Spathodia companulata</i>	+	-	-
19	Hebbevu	<i>Melia dubia</i>	+	+	+
20	Hippunale mara	<i>Morus alba</i>	+	-	-
21	Honge	<i>Pongamia pinnata</i>	+	+	+
22	Huvarasi mara	<i>Thespesia populnea</i>	+	+	-
23	Jackfruit tree	<i>Artocarpus inegrifolia</i>	+	+	+
24	Jamun tree	<i>Syzugium cumini</i> 58	+	+	+
25	Kadubadam	<i>Terminalia catappa</i>	+	+	-
26	Kaduhalladi huvina mara	<i>Tabebuia argentea</i>	+	+	-
27	Kamara mara	<i>Hardwickia binata</i>	+	-	-
28	Karimatti	<i>Terminalia tometosa</i>	+	-	-
29	Mahogany	<i>Sweitenia mahogani</i>	+	-	-
30	Mango	<i>Mangifera indica</i>	+	+	+
31	Neem	<i>Azadiracth indica</i>	+	+	+
32	Nilagirimara	<i>Eucaliptus teriticornis</i>	+	+	+
33	RoyalPalm tree	<i>Roystonea regia</i>	+	+	-
34	Sampige mara	<i>Michelia champaka</i>	+	+	-
35	Sandal trees	<i>Santalum album</i>	+	+	-
36	Sankeshwara mara	<i>Delonix regia</i>	+	-	-
37	Seemetangadi	<i>Cassia siamea</i>	+	-	-
38	Shisham	<i>Dabergia sissoo</i>	+	-	-
39	Silver oak	<i>Shorea robusta</i>	+	+	+
40	Simrouba	<i>Simaroub glouca</i>	+	-	+
41	Subabul	<i>Luecana leucocephoa</i>	+	+	+
42	Survey mara	<i>Caurina equisetifolia</i>	+	-	-
43	Tamarind	<i>Tamarindus indica</i>	+	+	+
44	Teak	<i>Tectona grandis</i>	+	-	-
45	Umbrella trees	<i>Terminalia mantaly</i>	+	-	-
	ToTal		45	23	13



The comparative analysis of floristic composition shows clear variation in the distribution of tree species across the different blocks. A total of 45 tree species were recorded in the study area. The presence-absence analysis indicates that Block I contained all 45 species, demonstrating the highest level of floristic diversity. In comparison, Block II contained 23 species, while Blocks III & IV recorded only 13 species. This indicates that Block I represents the most diverse vegetation zone, whereas the other blocks contain comparatively fewer species and appear to have more selective or concentrated plantations. The distribution pattern of species further reveals that only 11 species were common to all three blocks, indicating their wider adaptability and uniform distribution across the landscape. These widely distributed species include *Acacia auriculiformis*, Hebbevu (*Melia dubia*), Honge (*Pongamia pinnata*), Jackfruit (*Artocarpus integrifolia*), Jamun (*Syzygium cumini*), Mango (*Mangifera indica*), Neem (*Azadirachta indica*), Nilagiri (*Eucalyptus tereticornis*), Silver oak (*Shorea robusta*), Subabul (*Leucaena leucocephala*), and Tamarind (*Tamarindus indica*). The presence of these species in all blocks suggests their high adaptability, ecological resilience, and importance as multipurpose plantation species.

Further analysis shows that 14 species were present in two blocks, indicating moderate distribution across the study area. These species may have been planted in selected locations depending on management practices or ecological suitability. In contrast, 20 species were found only in a single block, mainly concentrated in Block I. This suggests that certain species such as Ashoka, Mahogany, Bilva, Cashew, Cherry, Teak, and several ornamental or multipurpose trees were planted in specific locations rather than widely distributed.

The floristic composition indicates a mixed vegetation structure consisting of timber species, fruit trees, ornamental trees, and multipurpose species. Species such as Neem, Nilagiri, Silver oak, and Honge are well known for their timber value, shade, and ecological services, while species like Mango, Jackfruit, Jamun, Tamarind, and Amla contribute to the food and ecological diversity of the landscape. The dominance and wide distribution of certain species suggest planned plantation activities and long-term vegetation establishment. Overall, the floristic composition demonstrates a diverse tree population with a combination

of dominant plantation species and scattered minor species, contributing to biodiversity conservation, ecological balance, and landscape sustainability. The higher species richness observed in Block I indicates that this block serves as a major reservoir of tree diversity, whereas Blocks II and III & IV represent areas with more restricted species distribution and possibly specialized plantation patterns. The results of the present investigation are in line with the findings of Rai and Sexena (1997) ^[4] who stated that the higher frequency values may be due to more number of matured trees and low incidence of fire.

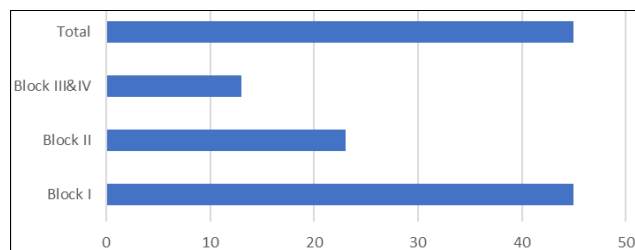


Fig 2: Floristic Composition (Trees/Saplings) of College of Sericulture campus in different Blocks

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