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Floristic Diversity and Carbon Sequestration in Shade-Grown Coffee Agroforestry Systems of Chikkamagaluru, Western Ghats

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ABSTRACT

Coffee-based agroforestry systems offer a synergistic blend of ecological and economic benefits, especially in biodiversity-rich regions like the Western Ghats of India. This study, conducted at the Central Coffee Research Institute (CCRI), Balehonnuru, Chikkamagaluru district, Karnataka, to assess the floristic diversity, aboveground biomass and carbon storage potential in coffee-based agroforestry systems. A total of 115 tree species were identified, indicating high floristic diversity, with species richness ranging from 59 to 80 across the blocks. Total enumeration of tree species above 30 cm GBH was performed across four blocks (A–D), encompassing a total area of 90.8 ha. Species richness varied significantly, with Block D exhibiting the highest diversity (80 species) and Block B the lowest (59 species). The Shannon–Wiener diversity index (H') ranged from 2.65 (Block B) to 3.44 (Block D), while Simpson's index (D) confirmed the highest heterogeneity in Block D (D = 0.36). Tree density ranged from 93.5 to 116.0 stems ha^{-1}, with Block A showing the highest basal area (34.04 m^2 ha^{-1}) and Block C the lowest (20.25 m^2

ha^{-1}). Aboveground biomass varied from 91.4 t ha^{-1} (Block C) to 113.9 t ha^{-1} (Block A), translating into carbon stocks of 45.7 to 57.0 Mg ha^{-1}, respectively. Notably, although Block D exhibited the highest species diversity, it stored only 46.0 Mg ha^{-1} of carbon, indicating a potential trade-off between biodiversity and biomass. Importance Value Index (IVI) analysis revealed *Grevillea robusta* as the most dominant species (IVI = 35.80), followed by *Ficus virens* (IVI = 27.43), reflecting both structural and ecological significance. These findings highlight the multi functionality of coffee agroforestry systems, where structurally mature stands like Block A contribute significantly to carbon sequestration, and biodiverse stands like Block D bolster ecological resilience. This dual role emphasizes the importance of integrated management approaches that balance productivity with biodiversity conservation in agroforestry landscapes.

Keywords: Agroforestry, Floristic Diversity, Aboveground Biomass, Carbon Stock, Coffee Plantations.

INTRODUCTION

Agroforestry, the integration of trees with agricultural crops and/or livestock, is widely recognized for its potential to enhance biodiversity, support rural livelihoods, and contribute to climate change mitigation. Among the various agroforestry systems practiced globally, coffee-based agroforestry systems stand out for their multifunctional benefits—ranging from economic profitability to ecological sustainability (Nair, 1993; Jose, 2009). These systems are particularly prominent in the Western Ghats region of India, a global biodiversity hotspot and a critical region for conservation.

Chikkamagaluru, located in the state of Karnataka, is one of the leading coffee-growing districts in India. The region lies within the Western Ghats and exhibits rich ecological diversity due to its varied topography, rainfall, and forest influence. Coffee plantations in this region are traditionally maintained under shade, incorporating a wide variety of indigenous and exotic tree species that create a complex and dynamic agroecosystem. These tree components not only support the primary crop *Coffea arabica* and *Coffea canephora* but also provide essential ecosystem services such as nutrient cycling, erosion control, habitat provision and microclimate regulation (Perfecto *et al*., 1996; Bhagwat *et al.,* 2008).

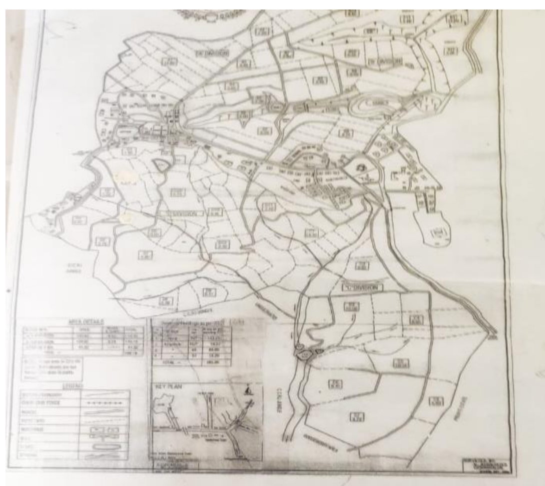
One of the pressing global challenges today is climate change, driven by excessive greenhouse gas emissions, particularly carbon dioxide (CO_2). Forested landscapes, including agroforestry systems, act as important carbon sinks by sequestering atmospheric CO_2 into plant biomass and soil organic matter. Therefore, biomass estimation and carbon storage assessment in coffee-based agroforests can play a crucial role in informing climate-smart land use practices and supporting national and international climate targets (IPCC, 2006; Montagnini & Nair, 2004).

Furthermore, maintaining floristic diversity in such systems is essential for ecological resilience. Diverse agroforests are more likely to withstand biotic and abiotic stresses, maintain productivity, and support higher levels of biodiversity, including pollinators and beneficial microorganisms (Tscharntke *et al.,* 2011). The species richness, composition and structural diversity of shade trees influence not only biodiversity conservation but also carbon storage potential, since different species vary in growth rates, wood density and biomass allocation.

Despite the ecological and economic importance of coffee-based agroforestry, there is limited site-specific data available on the floristic composition, aboveground biomass and carbon storage potential of these systems in Chikkamagaluru. Most studies either focus on conventional coffee yield optimization or are regionally generalized, failing to capture the spatial heterogeneity of species composition and ecosystem services in different plantation types and elevations. Therefore, present study was conducted at coffee-based agroforestry in Balehonnuru, Chikkamagaluru, Karnataka to determine floristic diversity and the biomass and carbon stock of trees in coffee-based agroforestry by calculating basal area, volume, above ground biomass and carbon stock by measuring the GBH at a height of 1.37 m and assessing the floristic diversity of the area.

MATERIAL AND METHODS

The study on "Assessment of floristic diversity, estimation of biomass and carbon storage potential in coffee-based agroforestry Chikkamagaluru, Karnataka" was conducted at Central Coffee Research Institute (CCRI) Balehonnuru, during 2023-24. The CCRI located in 13° 22' latitude in North direction and 75° 25' longitude in East direction. The mean annual temperature, humidity and annual rainfall recorded during the study period were 35.0^{o} C, 14% and 1762 mm respectively. The map of the study area is depicted in Fig.1. During the study, measuring tape, garmin GPS, tailors tape, data sheets, pascal key book, trees of coffee agroforestry systems in Kodagu and Tin plates were used.



To assess the amount of carbon sequestered in the vegetation non-destructive method of biomass estimation was followed. Total enumeration was carried out in four different blocks of coffee-based agroforestry which are block A-20.4ha, block B- 20.4ha, block C-30h and block D-20ha of adjoining area and measured the height of entire tree species above 30cm girth at a breast height of 1.37m by using 'girth tape' and height is measured by using height measuring instrument 'hypsometer' and latitude and longitude of each tree species noted using 'Garmin GPS' and all the data were recorded in the 'data sheets' and entered data into the MS-EXCEL sheet. Volume was obtained by multiplying the basal area, height of tree and form factor. Above ground biomass was calculated by multiplying volume and wood density values of particular species obtained from the Forest Research Institute (FRI, 1996). Total AGB is expressed in Mg-dry wt. ha^{-1}. Biomass was converted into carbon stock by multiplying with 0.5 as per Mac Dicken

(1997). To identify tree we used field books such as 'trees of coffee agroforestry systems in Kodagu' and a field keys of J P Pascal and B R Ramesh. Species Diversity was calculated using 'Shannon–Wiener diversity index'. Shannon–Wiener diversity index (H') is the measure of the average degree of uncertainty of predicting to what species individuals chosen at random from a collection of 'S' species, 'N' individuals will belong. The Importance Value Index (IVI) for each species was computed and expressed as the sum of relative density (Rd), relative dominance (RD), and relative frequency (RF) of the species present in given area.

Plate 2: Measurement of girth at breast height

RESULT AND DISCUSSION

Species Diversity and Composition

Species richness exhibited notable variation across the four forest blocks, with the highest number of tree species recorded in Block D (80 species) and the lowest in Block B (59 species) (Table 1). Intermediate values were observed in Block A (74) and Block C (79). These differences reflect the heterogeneous ecological conditions and potentially distinct disturbance regimes across the blocks. Richness alone, however, does not fully capture community complexity.

Table 1: Different parameters of floristic diversity, above ground biomass and carbon stock in different blocks of coffee-based agroforests.

Parameters	Block A	Block B	Block C	Block D
Area in ha	20.4	20.4	30	20
Species richness	74	59	79	80
Shannon–Wiener diversity index (H')	2.91	2.65	3.36	3.44
Simpson index (D)	0.43	0.41	0.38	0.36
Tree density (stems ha^{-1})	115.4	116.0	93.5	112.8
Basal area (m^2 ha^{-1})	34.04	32.33	20.25	27.00
Aboveground biomass (t ha^{-1})	113.9	104.4	91.4	92.1
Carbon stock (Mg ha^{-1})	57.0	52.2	45.7	46.0

To better assess diversity, the Shannon–Wiener index (H') and Simpson's index (D) were also calculated. The H' values ranged from 2.65 in Block B to 3.44 in Block D, indicating that Block D not only has high richness but also high evenness. The lowest H' in Block B suggests both reduced species richness and greater dominance of a few species. These findings are further corroborated by the Simpson index, where lower values indicate higher diversity Block D showed the lowest D value (0.36), confirming its high species heterogeneity. The variation in these indices underscores the importance of using multiple metrics when evaluating forest diversity (Magurran, 2004).

Forest Structure: Tree Density and Basal Area

Tree density and basal area reflect both the maturity and productivity of forest stands. Tree densities were relatively similar across Blocks A (115.4 stems ha^{-1}) and B (116.0 stems ha^{-1}), slightly lower in Block D (112.8 stems ha^{-1}), and markedly lower in Block C (93.5 stems ha^{-1}). Despite the high density in Blocks A and B, Block A had a significantly higher basal area (34.04 m^2 ha^{-1}), suggesting the dominance of larger and possibly older trees. In contrast, Block C, despite lower tree density, recorded the lowest basal area (20.25 m^2 ha^{-1}), indicative of a younger or more open forest structure. Such structural differences are essential for understanding forest functionality. Higher basal area is often linked to increased biomass and carbon sequestration capacity (Brown, 1997). This is evident in Block A, which combined high basal area with the greatest aboveground biomass, implying a greater contribution to ecosystem carbon dynamics.

Aboveground Biomass and Carbon Stock

Aboveground biomass ranged from 91.4 t ha^{-1} in Block C to 113.9 t ha^{-1} in Block A. Similarly, carbon stock estimates followed the same trend, with Block A sequestering the highest carbon (57.0 Mg ha^{-1}) and Block C the lowest (45.7 Mg ha^{-1}). This is consistent with studies indicating that structural variables like basal area and tree size play a more direct role in determining biomass than species diversity alone (Poorter et al., 2015; Chave et al., 2005). Interestingly, Blocks C and D, which exhibited the highest species diversity, did not correspondingly show higher biomass or carbon stocks. For instance, Block D, with the highest Shannon–Wiener index, stored 46.0 Mg ha^{-1} of carbon, which was significantly lower than Block A. This decoupling of biodiversity and biomass reinforces findings that while species richness enhances ecosystem resilience and multifunctionality, it does not necessarily predict aboveground carbon storage (van der Sande et al., 2017).

These findings illustrate a trade-off between biodiversity and biomass/carbon storage. Block A, though moderately diverse, is structurally mature and stores the highest carbon, while Block D maintains high diversity but comparatively lower biomass. These outcomes suggest that management strategies aimed at maximizing ecosystem services must consider both structural and compositional forest attributes. High-biomass forests like Block A are critical for carbon sequestration, whereas biodiverse forests like Block D are essential for conservation and ecological resilience.

Species Dominance and Importance Value Index (IVI)

The Importance Value Index (IVI) is a comprehensive ecological metric that reflects a species' relative ecological dominance within a community by integrating three parameters: relative frequency (RF), relative density (RD), and relative dominance (Rd). Table 2 presents the IVI values of the top 10 tree species in the study area. Grevillea robusta emerged as the most ecologically dominant species, exhibiting the highest IVI value of 35.80. This dominance is primarily driven by its exceptionally high relative dominance (Rd = 21.68), indicating its substantial basal area contribution relative to other species. Additionally, its balanced performance in RF (1.35) and RD (12.77) underscores its widespread occurrence and numerical abundance. The high IVI suggests that G. robusta, though an introduced species in many tropical regions, plays a major structural and functional role in the forest stand. Its dominance could have implications for native species regeneration and ecosystem processes (Lugo, 2004).

Table 2: IVI value of top 10 tree species

Tree species name	RF	Rd	RD	IVI
Grevillea robusta	1.35	21.68	12.77	35.80
Ficus virens	1.35	8.24	17.83	27.43
Artocarpus heterophyllus	1.35	6.32	6.08	13.76
Terminalia bellirica	1.35	5.51	6.84	13.70
Ficus nervosa	1.01	2.95	8.22	12.19
Ficus racemosa	1.35	4.23	5.14	10.72
Terminalia alata	1.01	4.05	4.63	9.69
Bischofiajavanica	1.35	4.33	2.99	8.67
Terminalia paniculata	0.68	2.59	2.53	5.79
Meynalaxi flora	1.35	1.43	2.75	5.52

Ficus virens, with an IVI of 27.43, ranks second. While it shares the same RF (1.35) as *G. robusta*, its higher RD (17.83) and moderate Rd (8.24) reflect its prevalence in the community through stem count rather than basal area. This indicates that while it may not be as physically dominant in terms of biomass, its population density contributes significantly to the forest's ecological structure. Other important species include *Artocarpus heterophyllus* (IVI = 13.76), *Terminalia bellirica* (13.70), and *Ficus nervosa* (12.19). These species maintain relatively balanced values across RF, Rd, and RD, indicating consistent representation across the sampled plots. Notably, *F. nervosa*, though exhibiting a lower RF (1.01) and Rd (2.95), has a relatively high RD (8.22), suggesting its numerical abundance, possibly through clumped distribution or regenerative success.

The dominance of multiple *Ficus* species in the top 10, including *F. virens*, *F. nervosa* and *F. racemosa*, underscores their ecological importance. *Ficus* species are keystone resources in tropical forests due to their year-round fruiting and support of frugivore populations (Shanahan et al., 2001). Their relatively high IVI values affirm their crucial role in maintaining trophic interactions and biodiversity.

Species such as *Terminalia alata*, *Bischofia javanica*, and *Terminalia paniculata* exhibit lower IVI values (9.69, 8.67, and 5.79, respectively), yet still contribute significantly to forest composition. Their presence reflects diversity in functional traits and successional strategies, with *T. alata* and *T. paniculata* often associated with mid- to late-successional stages (Parrotta, 1999). *Meyna laxiflora*, with the lowest IVI among the top 10 (5.52), shows limited dominance but contributes to understory diversity. Its low Rd (1.43) and RD (2.75) suggest that while present, it plays a minor structural role, potentially indicating a more specialized ecological niche or sensitivity to competition.

The distribution of IVI values suggests a forest stand characterized by a few dominant species, with *Grevillea robusta* and *Ficus virens* playing foundational roles, while a suite of other species contribute to biodiversity and structural complexity. The presence of multiple *Ficus* and *Terminalia* species, combined with both native and introduced taxa, indicates a mixed forest community likely shaped by natural regeneration and anthropogenic influence.

High IVI values of select species could imply competitive exclusion of less dominant species, leading to skewed community composition. Management strategies should thus balance conservation of dominant structural species with the promotion of species diversity to maintain ecological resilience and functional diversity (Poorter *et al.,* 2015). The IVI-based assessment of tree species in the coffee-based agroforestry system provides valuable insights into the structure, management preferences, and ecological functionality of the landscape. The observed IVI patterns suggest a heterogeneous community with both farmer-selected and naturally regenerating species, reflecting a blend of economic utility and ecological compatibility. The highest IVI was recorded for *Grevillea robusta* (35.8), followed by *Ficus virens* (27.4). Other species exhibited lower IVI values, indicating varying levels of ecological significance and presence (Fig.2).

A comprehensive floristic inventory of shade-grown coffee agroforestry systems in Chikkamagaluru, located within the Western Ghats biodiversity hotspot, recorded a total of 115 tree species belonging to diverse genera and families. The observed species exhibit a wide range of ecological characteristics and conservation statuses, contributing significantly to the overall biodiversity of the agroecosystem.

The conservation status of the recorded tree species was evaluated based on the International Union for Conservation of Nature (IUCN) Red List categories. Among the 115 species documented 6 species (5.2%) were listed under threatened categories, which include Vulnerable (VU) viz., *Actinodaphne malabarica*, *Dalbergia latifolia*, *Kingiodendron pinnatum*, *Pterocarpus marsupium*, Rare (R) (as locally assessed) viz., *Acrocarpus fraxinifolius*, Data Deficient (DD) *viz.*, *Diospyros ebenum*, *Mangifera indica*. Further 8 species (7.0%) were categorized as Least Concern (LC) *viz., Acacia pinnata*, *Albizia amara*, *Alstonia scholaris*, *Butea monosperma*, *Calophyllum inophyllum*, *Delonix regia*, *Erythrina indica*, *Hydnocarpus pentandra*, *Pongamia pinnata*, *Toona ciliata*, *Vateria indica.*

The remaining 101 species (87.8%) were listed as Not Evaluated (NE) under the IUCN Red List. This high proportion highlights a substantial data gap in the global conservation status of species commonly found in agroforestry landscapes.

The predominance of species classified as "Not Evaluated" (NE) underscores a significant knowledge gap in our understanding of the conservation needs of tropical agroforestry tree species. This pattern is not unique to the study area but is indicative of a broader global issue, where lesser-known or regionally specific species are underrepresented in global conservation databases (Mace et al., 2008; Rodrigues et al., 2006). Notably, four tree species *Dalbergia latifolia*, *Pterocarpus marsupium*, *Actinodaphne malabarica* and *Kingiodendron pinnatum* are listed as Vulnerable (VU). These species are of high conservation concern and require immediate attention for in-situ conservation strategies within agroforestry landscapes. Their presence in coffee plantations also highlights the potential of shade-grown coffee systems to serve as refuges for threatened species, aligning with findings from Bhagwat et al. (2005) who noted that traditional coffee agroforestry systems can harbor significant native biodiversity.

Only 12 species were listed as Least Concern (LC), indicating that a small fraction of the species is currently considered to have stable populations. The presence of Data Deficient (DD) species like *Diospyros ebenum* and *Mangifera indica* suggests that even some economically important species lack sufficient data for conservation assessment. Furthermore, one species, *Acrocarpus fraxinifolius*, was classified as Rare (R) based on regional assessments. Local conservation priorities should consider such regional classifications in the absence of global data.

These findings highlight the importance of floristic inventories and conservation assessments in agroforestry landscapes, especially in biodiversity hotspots such as the Western Ghats. There is an urgent need to undertake systematic evaluations of lesser-known species and to incorporate these findings into agroforestry and landscape management plans. Agroforestry systems, when properly managed, could play a key role in conserving biodiversity alongside providing economic benefits to local communities (Perfecto et al., 1996; Tscharntke et al., 2011).

CONCLUSION

This study indicated that coffee-based agroforestry systems in Chikkamagaluru are ecologically rich and structurally complex landscapes capable of supporting both biodiversity conservation and carbon sequestration. The presence of 115 tree species, including threatened and rare taxa, highlights the conservation value of these agroecosystems. While Blocks with higher basal area and structural maturity—such as Block A—contribute more significantly to carbon storage, blocks with higher species diversity—like Block D—are critical for maintaining ecological resilience and functional diversity. The dominance of species like *Grevillea robusta* reflects both anthropogenic influence and adaptive management practices that shape forest structure and function. The disparity between biodiversity and biomass across blocks reveals that optimizing one ecosystem service may come at the cost of another, stressing the importance of multi-functional landscape management. Furthermore, the significant proportion of tree species with unknown conservation status calls for enhanced research efforts and inclusion in global biodiversity databases. Overall, coffee agroforestry systems offer a viable pathway for synergizing climate action with biodiversity conservation, provided that nuanced, site-specific management strategies are implemented.

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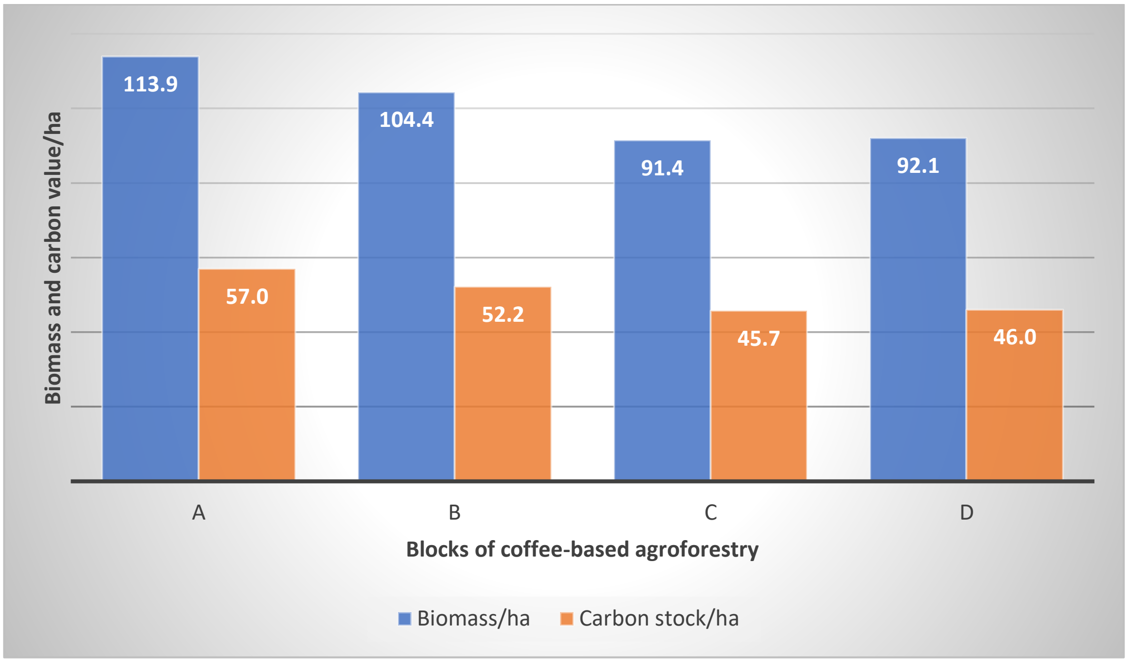

Figure 1: Biomass and Carbon stock value of different coffee-based agroforest blocks

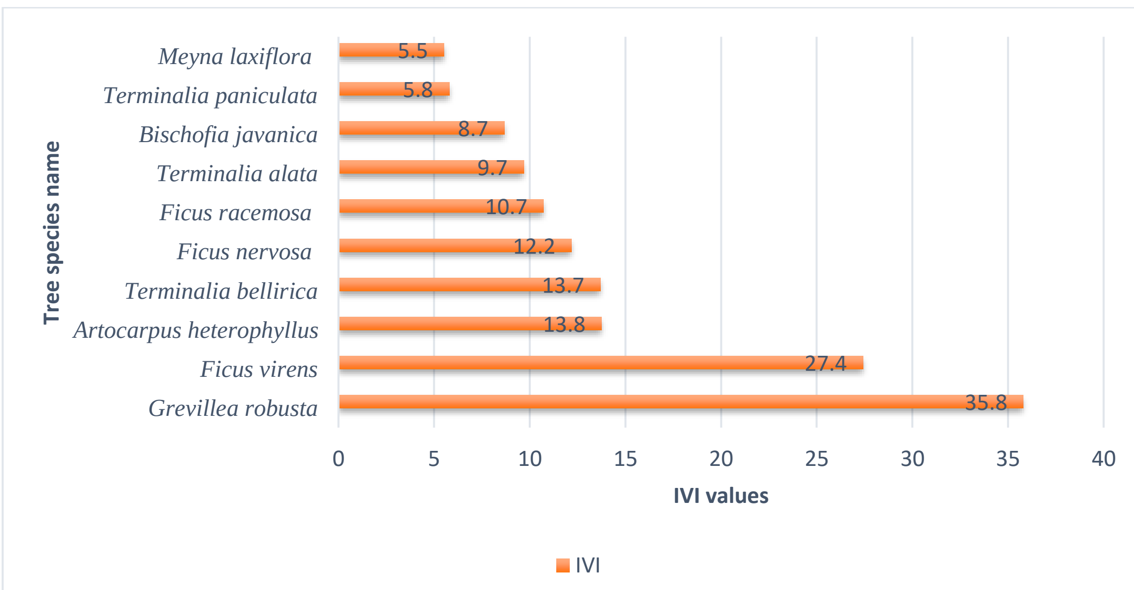

Figure 2: IVI value of top different tree species in total area of coffee-based-agroforests

List of tree species recorded during PWD work

Sl. No.	Scientific name	IUCN Status
1	*Acacia pinnata*	Least Concern (LC)
2	*Acrocarpousfraxinifolius*	Rare (R)
3	*Actinodaphnemalabarica*	Vulnerable (VU)
4	*Adenantherapavonina*	Not Evaluated (NE)
5	*Ailanthus excelsa*	Not Evaluated (NE)
6	*Albiziaamara*	Least Concern (LC)
7	*Albizia chinensis*	Not Evaluated (NE)

8	*Albiziajulibrissin*	Not Evaluated (NE)
9	*Albizialebbeck*	Not Evaluated (NE)
10	*Albiziaodoratissima*	Not Evaluated (NE)
11	*Alstoniascholaris*	Least Concern (LC)
12	*Aporosalindleyana*	Not Evaluated (NE)
13	*Aquilariaagallocha*	Not Evaluated (NE)
14	*Artocarpusgomezianus*	Not Evaluated (NE)
15	*Artocarpus heterophyllus*	Not Evaluated (NE)
16	*Artocarpushirsutus*	Not Evaluated (NE)
17	*Bauhinia racemose*	Not Evaluated (NE)
18	*Bischofiajavanica*	Not Evaluated (NE)
19	*Bixa Orellana*	Not Evaluated (NE)
20	*Bombax ceiba*	Not Evaluated (NE)
21	*Butea monosperma*	Least Concern (LC)
22	*Calophylluminophyllum*	Least Concern (LC)
23	*Canarium strictum*	Not Evaluated (NE)
24	*Careyaarborea*	Not Evaluated (NE)
25	*Caryotaurens*	Not Evaluated (NE)
26	*Cassia montana*	Not Evaluated (NE)
27	*Cassia renigera*	Not Evaluated (NE)
28	*Castranospermumaustrale*	Not Evaluated (NE)
29	*Cauroupitaguianensis*	Not Evaluated (NE)
30	*Ceiba pentandra*	Not Evaluated (NE)
31	*Celtistetrandra*	Not Evaluated (NE)
32	*Chionanthusmalabarica*	Not Evaluated (NE)
33	*Chrysophyllumroxburghii*	Not Evaluated (NE)
34	*Cinnamomummalabatrum*	Not Evaluated (NE)
35	*Citharexylumquadrangulare*	Not Evaluated (NE)
36	*Citrus maxima*	Not Evaluated (NE)
37	*Citrus sinensis*	Not Evaluated (NE)
38	*Cordiamyxa*	Not Evaluated (NE)
39	*Dalbergia latifolia*	Vulnerable (VU)
40	*Dalbergia paniculate*	Not Evaluated (NE)
41	*Delonixregia*	Least Concern (LC)
42	*Dilleniapentagyna*	Not Evaluated (NE)
43	*Diospyros ebenum*	Data Deficient (DD)
44	*Diospyrosmontana*	Not Evaluated (NE)
45	*Diospyros sylvatica*	Not Evaluated (NE)
46	*Emblicaofficinalis*	Not Evaluated (NE)
47	*Erythrina indica*	Least Concern (LC)
48	*Erythrinasubumbrans*	Not Evaluated (NE)
49	*Euodialunu-ankenda*	Not Evaluated (NE)
50	*Ficus amplissima*	Not Evaluated (NE)
51	*Ficus aspermia*	Not Evaluated (NE)
52	*Ficus asperina*	Not Evaluated (NE)
53	*Ficus macrocarpa*	Not Evaluated (NE)
54	*Ficus mysorensis*	Not Evaluated (NE)
55	*Ficus nervosa*	Not Evaluated (NE)

56	*Ficus racemose*	Not Evaluated (NE)
57	*Ficus tsjahela*	Not Evaluated (NE)
58	*Ficus virens*	Not Evaluated (NE)
59	*Garcinia gummigutta*	Not Evaluated (NE)
60	*Garcinia indica*	Not Evaluated (NE)
61	*Gliricidiasepium*	Not Evaluated (NE)
62	*Gmelina arborea*	Not Evaluated (NE)
63	*Grevillearobusta*	Not Evaluated (NE)
64	*Grewiatilifolia*	Not Evaluated (NE)
65	*Haldinacardifolia*	Not Evaluated (NE)
66	*Heveabrasilensis*	Not Evaluated (NE)
67	*Holigarnaarnottiana*	Not Evaluated (NE)
68	*Hydnocarpuspentadra*	Least Concern (LC)
69	*Kingiodendronpinnatum*	Vulnerable (VU)
70	*Lagerstroemia lanceolata*	Not Evaluated (NE)
71	*Lagerstroemia speciosa*	Not Evaluated (NE)
72	*Leucaenaleucocephala*	Not Evaluated (NE)
73	*Litsea floribunda*	Not Evaluated (NE)
74	*Macaranga peltate*	Not Evaluated (NE)
75	*Maesopsiseminii*	Not Evaluated (NE)
76	*Mallotusphilippensis*	Not Evaluated (NE)
77	*Mallotustetrococcus*	Not Evaluated (NE)
78	*Mangifera indica*	Data Deficient (DD)
79	*Meliadubia*	Not Evaluated (NE)
80	*Meynalaxiflora*	Not Evaluated (NE)
81	*Micheliachampaka*	Not Evaluated (NE)
82	*Mimosopselengi*	Not Evaluated (NE)
83	*Moringa oleifera*	Not Evaluated (NE)
84	*Oleo dioica*	Not Evaluated (NE)
85	*Peltophorumpterocarpum*	Not Evaluated (NE)
86	*Perseamacrantha*	Not Evaluated (NE)
87	*Pongamia pinnata*	Least Concern (LC)
88	*Psidiumgaujava*	Not Evaluated (NE)
89	*Pterocarpus marsupium*	Vulnerable (VU)
90	*Samaneasaman*	Not Evaluated (NE)
91	*Sapindus emarginatus*	Not Evaluated (NE)
92	*Schleicheraoleosa*	Not Evaluated (NE)
93	*Senna spectabilis*	Not Evaluated (NE)
94	*Simarouba glauca*	Not Evaluated (NE)
95	*Spathodeacampanulata*	Not Evaluated (NE)
96	*Spondias pinnata*	Not Evaluated (NE)
97	*Sterculiafoetida*	Not Evaluated (NE)
98	*Stereospermumpersonatum*	Not Evaluated (NE)
99	*Strychnosnux-vomica*	Not Evaluated (NE)
100	*Swieteniamahagoni*	Not Evaluated (NE)
101	*Syzygium cumini*	Not Evaluated (NE)
102	*Syzygiumjambos*	Not Evaluated (NE)
103	*Syzygiumlaetum*	Not Evaluated (NE)

104	*Tabernaemontanaheyneana*	Not Evaluated (NE)
105	*Terminalia alata*	Not Evaluated (NE)
106	*Terminalia arjuna*	Not Evaluated (NE)
107	*Terminalia bellirica*	Not Evaluated (NE)
108	*Terminalia catappa*	Not Evaluated (NE)
109	*Terminalia chebula*	Not Evaluated (NE)
110	*Terminalia paniculate*	Not Evaluated (NE)
111	*Toona ciliate*	Least Concern (LC)
112	*Tremaorientale*	Not Evaluated (NE)
113	*Trichiliaconnaroides*	Not Evaluated (NE)
114	*Vateriaindica*	Least Concern (LC)
115	*Vitex altissima*	Not Evaluated (NE)