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Woody Species Composition, Structure and Diversity of Trees-Based Agroforestry System in the Mid-Highlands, Konawe Regency, Southeast Sulawesi Province, Indonesia

Agus Setiawan[1,2,*], Husna[2], La Baco Sudia[3] and Nur Arafah[2]

[1]Doctoral Program in Agricultural Science Department, Halu Oleo University, Kendari 93231, Indonesia; [2]Department of Forestry, Faculty of Forestry and Environment Science, Halu Oleo University, Kendari 93231, Indonesia; [3]Department of Environmental Science, Faculty of Forestry and Environment Science, Halu Oleo University, Kendari 93231, Indonesia
*Corresponding author's e-mail: agus.setiawan@uho.ac.id

This study aims to examine woody species composition, structure, and diversity of Tree-based agroforestry systems in the mid-highlands, Konawe Regency, Southeast Sulawesi Province, Indonesia. Data was collected in each observation plot in the agroforestry patterns. The total number of observation plots was thirty-three. The plot sizes for saplings 5m x 5m, poles 10m x 10m, and trees 20m x 20m. The results found there were 31 plant species composition belonging to 18 families. Plant species at the tree level 73%, herbaceous 10% and shrubs 17%, native endemic species 74%, and introduced 26%. A total of 77% of plant species were planted and 23% of species grew wild. The structures tree level vegetation with the highest importance value index (IVI) was the *Tectona grandis* species with IVI 144.9, the pole layers were Tectona grandis with IVI 126.7, and the sapling layers were *Theobroma cacao* with IVI 94.0. While the structures tree level vegetation with the lowest IVI was Artocarpus heterophyllus with IVI 13.4, the pole layers were Mangifera indica with IVI 13.2, and the sapling layers were *Syzygium polyanthum* and *Citrus aurantiifolia* with IVI 15.5. The highest species diversity index in the agroforestry of community forest was 1.7. Species richness index (M') and evenness index (E') were evenly distributed all in the agroforestry patterns with moderate criteria. The findings research show that agroforestry systems in the study area are diverse, with the different wood species compositions and structures.

Keywords: Agroforestry, composition, community forest, konawe regency, species diversity, structure, southeast Sulawesi, vegetation.

INTRODUCTION

Lowland and upland communities have historically used agroforestry methods. Forest farmers need these methods to sustainably manage land resources for their livelihoods. Humans have used integrated land-use systems to address daily subsistence demands while balancing agricultural output and ecological preservation (Rezekiah *et al.,* 2022). Global issues like deforestation, land degradation, and unsustainable ecosystem management threaten these communities and often lead to land disputes (Carius *et al.,* 2018). These issues can affect crop yields and farmer incomes. In agroforestry, land resources are crucial because community forest farmers' revenue depends on the size and variety of plants they raise (Fitri, 2020). Global climate change gives a rare opportunity for agroforestry to store large volumes of atmospheric carbon dioxide and enhance carbon stocks above and below ground (Tesfay, 2022). To reduce land clearance and increase carbon storage, trees can be planted in agricultural settings. By supplying diversified and stable food, fuel, and income for rural communities, agroforestry practices improve food security (Mbow, 2014). These systems support the SDGs, which promote food security and sustainable agriculture by maintaining ecosystems and biodiversity. Beyond carbon sequestration and food security, agroforestry benefits the ecosystem. Plant diversity in these systems protects biodiversity and provides habitat for many wildlife species (Reed *et al.,* 2017). Agroforestry increases agricultural landscape biodiversity relative to monoculture (Bardhan *et al.,* 2012). Agroforestry systems increase soil fertility, water retention, and erosion prevention through plant diversification (Molla *et al.,* 2023).

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Strategic plant species diversity management in these systems helps sustain ecosystem health and resilience. Agroforestry has several social and economic benefits. It improves farmer income and provides various livelihoods (Yasin *et al.*, 2023). By cycling nutrients, agroforestry improves soil fertility, reduces chemical fertilizer use, and makes agricultural systems more sustainable (Molla *et al.*, 2023). Agroforestry facilitates sustainable and productive farming by conserving and increasing land quality (Setiawan *et al.*, 2015). This comprehensive approach supports rural communities' social and economic fabric and sustains farming traditions. Many research has examined how agroforestry protects biodiversity and sustains agriculture. According to Haryanto *et al*. (2015), Gayo coffee producers employ lamtoro (Leucaena leucocephala) as a shade tree, demonstrating the adaptive use of agroforestry to optimize crop output. Agroforestry systems can maintain somewhat diversified plant species, according to Mahari *et al*. (2024). Another study by Oktavia *et al*. (2021) studied home garden agroforestry systems' woody species composition and structure, raising its biodiversity conservation relevance. Legesse and Negash (2021) illustrated how species diversity, composition, and management in agroforestry systems provide food and money, highlighting their multifunctional benefits.

Despite its many benefits, human-induced pressures have been reducing natural forest cover. Forest lands have been diminished by rapid population increase, agricultural clearing, overgrazing, and unsustainable fuelwood and construction material extraction. Poor forest management and replanting worsen this loss (Samson, 2010). Altitude, slope, and aspect affect tree species distribution and forest composition in addition to anthropogenic activities (Yetebitu, 2010). Collectively, these issues harm forest ecosystems and agroforestry systems. To address these difficulties, agroforestry methods must be better understood, especially in countries where they are important for local livelihoods and biodiversity protection. In the mid-highlands of Konawe Regency, Southeast Sulawesi Province, Indonesia, this study examined plant diversity and composition to identify tree-based agroforestry systems. Focusing on woody species composition, structure, vegetation, and variation in community forests helps explain how these systems contribute to ecological and economic sustainability.

In Konawe Regency's mid-highlands, various tree species support ecosystems. This study displays the region's unique flora through tree species and structure (Seid and Kebebew, 2022;Sumarhani and Kalima, 2015; Tiurmasari, 2016; Ura, 2017). Sustainable land management requires understanding land vegetation ecology, which is measured by vegetation diversity and composition. The studies aim to improve ecological understanding and agroforestry practices that protect biodiversity and boost productivity.

Mid-highland agroforestry integrates trees, crops, and cattle for sustainable land use. Reduces land degradation by reducing erosion and increasing soil fertility. These methods also restore deforested and land-use-changed areas with diverse trees. Rural sustainable development research promotes economically and ecologically sustainable agroforestry.

This study illuminates mid-highlands agroforestry in Konawe Regency and influences research and policy. Understanding agroforestry tree species composition and variation can help design sustainable land management strategies that satisfy community requirements, protect biodiversity, and mitigate climate change. The study emphasizes improving agroforestry systems with traditional and modern expertise.

MATERIALS AND METHODS

***Description of the study site*:** The research was conducted in the moist mid-highlands, Konawe Regency, Southeast Sulawesi Province, Indonesia. Geographically, the district is located between 03.74’89’’ latitude and 121.91’55’’ longitude. The total area is 18.749 hectares, the distance from the capital district to the regency is 21 km, and the distance to the province is 91 km. The elevation ranges between 60 m and 138 m asl. Topography is hilly, and then soil type podzolic and lithosol. The study area is also a buffer zone around the forest area.

Sampling and data collection design: Data was collected in each observation plot agroforestry pattern in Abuki District, Konawe Regency, Southeast Sulawesi Province, Indonesia. Determining agroforestry patterns was based on the different tree compositions (Setiawan *et al.*, 2015). The plot sizes are 5m x 5m for sapling layers, 10m x 10m for poles layers, and 20m x 20m for tree layers (Sudia, 2012). The parameters observed in this study included the plant species name, number of individuals, and diameter. The data were recorded in a tally sheet for observation. For identification of species in the field, vernacular names using key informants and literature were used (Woldemichael *et al.*,2010). The obtained data were tabulated for relative density, relative frequency, relative dominance, and Importance Value Index and then vegetation analysis, diversity analysis, The Shannon-Wiener was used to determine the degree of diversity index, the level of species richness with Margalef, and the level of species evenness with the species evenness index formula.

***Data analysis*:** Measurement of tree until sapling diversity was based on an inventory of all woody species above 20 cm height in the sample plot (Negash, 2013). All plant species recorded in the observation sites were tabulated and calculated for the parameters of relative density (RD) based on their individual numbers per area, relative frequency (RF) based on their occurrences across plots, and relative dominance (RB) based on their basal area. The three parameters were then used to obtain the Importance Value Index (IVI) (Albasri *et al.*, 2023). There are three biodiversity indicators that were used, namely Diversity index H’

[Shannon-Wiener] With a classification of H' > 3 = high species diversity in an area; 2) 1 ≤ H' ≤ 3 = moderate species diversity; 3) H' < 1 = low species diversity. Species richness index [Margalef M'] with the criteria: if R > 3.0, it is high; R = 1.5 - 3.0 is moderate; and R < 1.5 is low. Species Evenness Index (E') with criteria for the values of the species evenness index: E < 0.31; low species evenness level, 0.31 < E < 1 = moderate species evenness level E > 1 = high species evenness level.

RESULTS AND DISCUSSION

***Plant Species Composition*:** Total 31 plant species belonging to 30 genera and 18 families were identified in the study area (Table 1). Of the 18 plant families recorded, Moraceae and Lamiaceae were the most dominant families (Table 1) shows that the plant species at the tree level amounted to 73%, herbs 10% and shrubs 17% (Table 1). This result is different from the research findings of (Guyasa, 2013) who recorded 40 plant species in various agroforestry forest ecosystems in the Tigray region of Ethiopia. However, this figure is higher than (Setiawan *et al.*, 2015) who recorded 12 plant species in agroforestry patterns Abuki District, Konawe Regency, Southeast Sulawesi Province, Indonesia. The origin of plant species in the study area consists of native species and exotic species. The plant species recorded 42% were native plants and 58% the remaining were exotic plants (Table 1). It was recorded that 77% of plant species were species planted and 23% of plant species were species that grew wild (Table 1). List of the recorded scientific name, local name, family, life-form, origin and uses in the study area on Table 1.

The results found that the plant families with the largest number of species in the community forest in Konawe District. Moraceae and Lamiaceae were the most dominant families represented by 4 species. Both of its families were due to the preference of the farming community to plant plant species that can be consumed as vegetables, for health as medicinal plants and commodities of economic value.

Table 1. List of the recorded scientific name, local name, family, life-form, origin and uses in the studi area.

No.	Scientific name	Local name	Family	LF	Origin	W/P	Uses
1	*Albizia chinensis*	Sengon	Fabaceae	Tree	E	P	7, 9, 19
2	*Annona muricata*	Sirsak	Annonaceae	Tree	E	P	3, 8, 9
3	*Areca catechu*	Pinang	Arecaceae	Tree	E	P	8, 12
4	*Artocarpus heterophyllus*	Nangka	Moraceae	Tree	E	P	2, 3, 8, 9, 17
5	*Canarium indicum* L.	Kenari	Plantae	Tree	N	P	1, 2, 3, 8, 9
6	*Citrus aurantiifolia*	Jeruk nipis	Rutaceae	Tree	E	P	6, 8
7	*Cocos nucifera*	Kelapa	Arecaceae	Tree	E	P	1, 2, 3, 8, 9, 13
8	*Coffea arabica*	Kopi	Rubiaceae	Tree	E	P	1, 4, 6
9	*Coleus galeatus* Vahl.	Miana	Lamiaceae	Herb	N	P	4, 13
10	*Curcuma domestica* Val.	Kunyit	Zingiberaceae	Herb	E	P	8, 9, 13
11	*Cymbopogon citratus*	Serei	Poaceae	Herb	N	P	8, 9, 13
12	*Cynodon dactylon*	Rumput	Poaceae	Shrub	N	W	4, 18
13	*Cyperus rotundus*	Rumput teki	Cyperaceae	Shrub	N	W	4, 16, 17
14	*Durio zibethinus*	Durian	Malvaceae	Tree	E	P	8, 17, 19
15	*Ficus benjamina*	Beringin	Moraceae	Tree	N	W	2, 3, 15
16	*Ficus racemosa* L.	Loa	Moraceae	Tree	N	W	2, 3, 15
17	*Ficus Variegata* Bl.	Libo	Moraceae	Tree	N	W	2, 3, 17
18	*Gmelina arborea*	Gmelina	Verbenaceae	Tree	E	P	7, 9, 19
19	*Imperata cylindrica*	Alang-alang	Poaceae	Shrub	N	W	4, 11
20	*Lansium domesticum*	Langsat	Meliaceae	Tree	E	P	2, 3, 8, 9
21	*Mangifera indica*	Mangga	Anacardiaceae	Tree	E	P	1, 7, 8, 9, 14, 15, 17
22	*Nauclea orientalis*	Bangkal	Rubiaceae	Tree	N	P	1, 13
23	*Neolamarckia cadamba*	Jabon	Rubiaceae	Tree	E	P	9, 10, 17, 19
24	*Psidium guajava* Val.	Jambu batu	Myrtaceae	Tree	E	P	8, 9, 10, 13
25	*Stachytarpheta jamaicensis*	Pecut kuda	Verbenaceae	Herb	N	W	4, 13
26	*Syzygium polyanthum*	Salam	Myrtaceae	Tree	E	P	8, 9, 13
27	*Tectona grandis*	Jati	Lamiaceae	Tree	E	P	7, 9, 10, 15, 19, 20
28	*Theobroma cacao*	Cokelat	Malvaceae	Tree	N	P	8, 9
29	*Vitex cofassus*	Bitti	Lamiaceae	Tree	E	P	7, 9, 10
30	*Coleus galeatus* Vahl.	Congkok	Lamiaceae	Herb	N	P	11, 13
31	*Zingiber officinale*	Jahe	Zingiberaceae	Herb	E	P	13

Local names: konawe name; LF:life-name; Origin; N=Native species; E=Exotic species; W=Wild; P=Planted. Uses source from Bekele-tesemma (2007); Bekele-Tesemma *et al.* (1993), 1:bee forage, 2:beehives contruction, 3:beehives hanging, 4:fodder, 5:farm tools, 6:flavouring drink, 7:building materials, 8:fruit/food, 9:fuelwood, 10: household's utensils, 11:insecticide, 12:live fences, 13:medicine, 14:ornamental, 15:shade, 16:soil fertility, 17:soil conservation, 18:stimulus, 19:timber/poles, 20:industry.

Another fact that happened in the research location about tree species is more dominant, not native. This shows that the effectiveness of native flora conservation is not a dominant proportion in agroforestry practices because the types of crops planted by farmers consider the aspect of utility. The types of plants planted based on the purpose utility, for example for the needs of wood products as building materials, household needs, health and medicine (Table 1). The plants are designated as building materials such as *Vitex cofassus, Albizia chinensis, Neolamarckia cadamba, Gmelina arborea* and *Tectona grandis*. For food needs such as *Mangifera indica and Lansium domesticum*, household needs Cocos nucifera, *Coffea Arabica*, *Syzygium polyanthum* and *Artocarpus heterophyllus* as well as health and medicinal needs such as *Zingiber officinale, Coleus galeatus* Vahl., *Cymbopogon citratus*, *Curcuma domestica* Val.and *Psidium guajava* Val. The developments of study on Indonesian agroforestry were highly related with the role of local or indigenous people. Almost all of the traditional agroforestry in Indonesia was initiated by opening natural forests, followed by crop cultivation for two to four years, and continued with forest-tree and fruit-tree planting (Budiadi *et al.,* 2021).

Structure Vegetation

***Tree Layers*:** Total there were thirteen species at the tree layers of the three in agroforestry patterns, namely; *Tectona grandis, Lansium domesticum, Cocos nucifera, Ficus benjamina, Durio zibetinus, Neolamarckia cadamba, Albizia chinensis, Mangifera indica, Nauclea orientalis, Gmelina arborea, Vittex cofassus, Areca catechu, Artocarpus heterophyllus*. AF-A and AF-B agroforestry patterns have five tree species while AF-C has seven tree species (Table 2). Based on the vegetation structures for tree layers with the highest important value index (IVI) in agroforestry pattern A (AF-A) was *Tectona grandis* with IVI 144.9 and the lowest IVI was *Durio zibethinus* with IVI 22.9. At the agroforestry pattern B (AF-B) was *Neolamarckia cadamba* with IVI 124 and the lowest IVI was *Nauclea orientalis* with IVI 29.2. At the agroforestry pattern C (AF-C) was *Gmelina arborea* with IVI 102.2 and the lowest IVI was *Artocarpus heterophyllus* with IVI 13.4. The plant *Tectona grandis* species in agroforestry pattern A has the highest IVI compared to plants in agroforestry patterns B and C. Structure vegetation and important value index (IVI) for tree layers are shown in Table 2.

***Pole Layers*:** In total, there were twelve species at the pole layers in agroforestry patterns, namely; *Tectona grandis, Areca catechu, Lansium domesticum, Syzygium polyanthum, Psidium guajava* Val, *Mangifera indica, Theobroma cacao, Neolamarckia cadamba, Annona muricata, Gmelina arborea, Coffea arabica, Ficus racemosa* L. AF-B and AF-C agroforestry patterns have five tree species, while AF-A has six tree species (Table 3). Based on the vegetation structures for pole layers the highest important value index (IVI) in agroforestry pattern A (AF-A) was *Tectona grandis* with IVI 126.7 and the lowest IVI was *Mangifera indica* with IVI 13.2. At the agroforestry pattern B (AF-B) was *Theobroma cacao* with IVI 116 and the lowest IVI was *Annona muricata* with IVI 24. At the agroforestry pattern C (AF-C) was *Theobroma cacao* with IVI 79.8 and the lowest IVI was *Ficus racemosa* L. with IVI 28.6. The plant *Tectona grandis* species in agroforestry pattern A (AF-A) is the highest IVI compared to plants in agroforestry patterns B (AF-B) and C (AF-C).

Table 2. Structure vegetation and important value index (IVI) for tree layers.

Agroforestry pattern	Species	Family	RD	FR	RDm	IVI
AF-A	*Tectona grandis*	Lamiaceae	53.1	35.7	56.1	144.9
	Lansium domesticum	Meliaceae	18.8	28.6	10.4	57.7
	Cocos nucifera	Arecaceae	18.8	21.4	8.4	48.6
	Ficus benjamina	Moraceae	3.1	7.1	15.6	25.8
	Durio zibethinus	Malvaceae	6.3	7.1	9.5	22.9
AF-B	*Neolamarckia cadamba*	Rubiaceae	50.0	25.0	49.0	124.0
	Albasia chinensis	Fabaceae	23.7	25.0	18.2	66.9
	Cocos nucifera	Arecaceae	13.2	25.0	5.5	43.6
	Mangifera indica	Anacardiaceae	7.9	15.0	13.4	36.3
	Nauclea orientalis	Rubiaceae	5.3	10.0	13.9	29.2
AF-C	*Gmelina arborea*	Verbenaceae	37.1	19.2	45.8	102.2
	Vitex cofassus	Lamiaceae	19.4	19.2	13.6	52.2
	Cocos nucifera	Arecaceae	16.1	19.2	10.4	45.7
	Lansium domesticum	Meliaceae	11.3	19.2	12.3	42.8
	Areca catechu	Arecaceae	9.7	11.5	3.7	24.9
	Nauclea orientalis	Rubiaceae	3.2	7.7	7.9	18.8
	Artocarpus heterophyllus	Moraceae	3.2	3.8	6.4	13.4

Note: AF-A; Agroforestry pattern A. AF-B; Agroforestry pattern B. AF-C; Agroforestry pattern C.

Table 3. Structure vegetation and important value index (IVI) for pole layers.

Agroforestry pattern	Species	Family	RD	RF	RDm	IVI
	Tectona grandis	Lamiaceae	48.3	27.8	50.7	126.7
AF-A	*Areca catecu*	Arecaceae	17.2	27.8	11.4	56.5
	Lansium domesticum	Meliaceae	13.8	11.1	14.9	39.8
	Syzygium polyanthum	Myrtaceae	10.3	16.7	11.5	38.5
	Psidium guajava Val	Myrtaceae	6.9	11.1	7.3	25.3
	Mangifera indica	Anacardiaceae	3.4	5.6	4.2	13.2
AF-B	*Theobroma cacao*	Malvaceae	45.7	27.8	42.5	116.0
	Neolamarckia cadamba	Rubiaceae	28.6	27.8	26.8	83.2
	Areca catecu	Arecaceae	8.6	22.2	15.5	46.3
	Syzygium polyanthum	Myrtaceae	14.3	11.1	5.1	30.5
	Annona muricata	Annonaceae	2.9	11.1	10.0	24.0
AF-C	*Theobroma cacao*	Malvaceae	26.1	23.8	29.9	79.8
	Gmelina arborea	Verbenaceae	28.3	23.8	22.1	74.1
	Coffea arabica	Rubiaceae	26.1	23.8	22.8	72.6
	Areca catechu	Arecaceae	13.0	14.3	17.6	44.9
	Ficus racemosa L.	Moraceae	6.5	14.3	7.8	28.6

Note: AF-A=Agroforestry pattern A; AF-B=Agroforestry pattern B; AF-C=Agroforestry pattern C.

Table 4. Structure vegetation and important value index (IVI) for sapling layers.

Agroforestry pattern	Species	Family	RD	RF	RDm	IVI
A	*Tectona grandis*	Lamiaceae	50.0	42.0	62.0	92.0
	*Kotiwu**	-	21.0	25.0	2.6	46.0
	Psidium guajava Val.	Myrtaceae	14.0	17.0	18.0	31.0
	Syzygium polyanthum	Myrtaceae	7.1	8.3	9.8	16.0
	Citrus aurantiifolia	Rutaceae	7.1	8.3	7.5	16.0
B	*Theobroma cacao*	Malvaceae	55.6	38.5	58.0	94.0
	Ficus Variegata Bl.	Moraceae	27.8	38.5	24.3	66.2
	Ficus racemosa L.	Moraceae	16.7	23.1	17.7	39.7
C	*Theobroma cacao*	Malvaceae	35.0	28.6	40.0	63.6
	Coffee arabica	Rubiaceae	25.0	21.4	28.8	46.4
	Coleus galeatus Vahl.	Lamiaceae	15.0	21.4	7.2	36.4
	Psidium guajava Val.	Myrtaceae	15.0	14.3	13.6	29.3
	Ficus racemosa L.	Moraceae	10.0	14.3	10.4	24.3

Note: *Local name. AF-A; Agroforestry pattern A. AF-B; Agroforestry pattern B. AF-C; Agroforestry pattern C.

Structure vegetation and important value index (IVI) for pole layer showed on the Table 3.

***Sapling Layers*:** In total, there were ten species at the sapling layers, namely; *Tectona grandis, Kotiwu*, Psidium guajava* Val, *Syzygium polyanthum*, *Citrus aurantiifolia, Theobroma cacao*, *Ficus vareagata* BI, *Ficus racemosa* L, *Coffea arabica, Coleus galeatus* Vahl. AF-A and AF-C agroforestry patterns have five tree species while AF-C has just three tree species (Table 4). AF-B and AF-C agroforestry patterns have five tree species, while AF-A has just three tree species (Table 4). Based on the vegetation structures for sapling layers with the highest important value index (IVI) in agroforestry pattern A (AF-A) was *Tectona grandis* with IVI 92 and the lowest IVI was *Citrus aurantiifolia* with IVI 16. At the agroforestry pattern B (AF-B) was *Theobroma cacao* with IVI 94 and the lowest IVI was *Ficus racemosa* L. with IVI 39.7. At the agroforestry pattern C (AF-C) was *Theobroma cacao* with IVI 63.6 and the lowest IVI was *Ficus racemosa* L. with IVI 24.3. Structure vegetation and important value index (IVI) for sapling layers showed on the Table 4.

IVI is also an important parameter that reveals the prioritizing of species for conservation (Berhanu *et al.*, 2016). Species with high IVI value need low priority for conservation effort whereas those with low IVI value need high conservation effort. Therefore, the indigenous woody species values and hence, need conservation priority. The tree layer vegetation structure in agroforestry patterns A (AF-A), B (AF-B) and C (AF-C) is dominated by woody plant species. Namely, *Tectona grandis, Neolamarckia cadamba* and *Gmelina arborea* were planted species and exotic plant species.

***Species Diversity of Pattern Agroforestry*:** The highest species diversity index was recorded at the tree and pole layers of each agroforestry pattern. For agroforestry pattern A (AF-A) the diversity index at the tree layers was recorded at 1,2 H' while at the pole layers it was recorded at 1,5 H'. For agroforestry pattern B, the diversity index at the tree and pole layers was recorded at 1,3 H' and for agroforestry pattern C, the diversity index at the tree layers was recorded at 1,7 H' while the pole layers were 1,5 H'. The results of analysis showed that Shannon-Wiener (H') species diversity index of each agroforestry pattern at the tree and sapling layers is classified as moderate. The average value of tree and sapling layers diversity index is 1,4 H'. While at the poles layers and lower plants in low criteria with an average diversity index value of 0,6 H'. The results of analysis on richness index (M') indicated that the plant species were evenly distributed across all pattern with criteria moderat. Moderat richness index (M') on the agroforestry pattern B (AF-B) site just recorded for tree dan pole layers, except for sapling and seedling layers which had low evenness index. Meanwhile on the agroforestry pattern C (AF-C) site just recorded pole and seedling layers with low criteria and then moderat richness index (M') on the agroforestry pattern C site just recorded for tree dan sapling layers. The result of analysis on evenness index (E') indicated that the plant species were evenly distributed across all agroforestry pattern A (AF-A). High evenness index (E') for tree and pole layers was recorded on the Agroforestry Pattern C (AF-C) location with index value 0,9 E'. Meanwhile, on the sapling and seedling layers, moderate criteria were recorded with an index value of 0,4 E'. Low evenness index (E') just recorded seedling layers was recorded on the agroforestry pattern B (AF-B) location with index value 0,3 E'. There are differences in species diversity of the three agroforestry patterns caused by land management and farmers' handling in maintaining plant species. The differences in diversity are caused by the size of land ownership, species preference, farmers' opportunity to maintain plant species and management in maintaining plant species (Legesse and Negash, 2021).

Conclusion**:** Vegetation on the community agroforestry land in Abuki District, Konawe Regency, Souteast Sulawesi Province, Indonesia there were 31 species of plants found from 18 families. The plant species at the tree level amounted to 73%, herbs 10% and shrubs 17%. The origin of plant species in the study area consists of native or endemic 74% and introduced species 26%. The highest important value index (IVI) for structure vegetation tree layers was *Tectona grandis* and the lowest IVI of *Artocarpus heterophyllus*. The highest important value index (IVI) for pole layer was *Tectona grandis* and the lowest was *Mangifera indica*. The highest important value index (IVI) for sapling layer was *Theobroma cacao* and the lowest was *Syzygium polyanthum and Citrus aurantiifolia*. The highest species diversity index was recorded at the tree and pole levels. The over all for species diversity index Shannon-Wiener, richness index and evenness index indicated that as moderate.

Authors contributions statement**:** A. Setiawan conceived the idea, designed the study, collect data, run the analyses and wrote the article; Husna and L. B. Sudia review and editing. N. Arafah reviewed and finalized the draft.

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SDG's addressed**:** Zero Hunger, Good health and Well-being, Decent Work and Economic Growth

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