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Plantae Diversity in Bangkalan Agro-Educational Tourism as a Source of Local Potential-Based Biology Learning

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ABSTRACT

Biodiversity is one of the natural resources that plays an important role in supporting ecosystem sustainability and serves as a contextual learning resource for students. However, the use of local potential such as biodiversity in the surrounding area as a learning resource is still limited in schools. Based on this, this study aims to identify the diversity of plant species in the Agro Edu Wisata Kebun Bang Jani Bangkalan and analyze its potential as teaching material in science learning. This study uses a mixed-method approach that combines qualitative and quantitative data, using Shannon-Wiener diversity index analysis and inductive analysis to strengthen the research results. The results show that there are 89 plant species from various families, such as *Myrtaceae, Euphorbiaceae, Apocynaceae,* and *Sapotaceae*, spread across the Bang Jani Agro Edu Tourism Garden area. These findings indicate that the area has quite high biodiversity, which can be utilized in the development of learning media such as modules, flipbooks, booklets, and outdoor learning-based field trips to improve students' conceptual understanding, scientific process skills, learning motivation, and environmental literacy. This study shows that the diversity of local plant resources can support the enhancement of learning in the implementation of the Independent Curriculum and the strengthening of the Pancasila Student Profile.

Keywords: biodiversity, local potential, biologi learning, Bangkalan

INTRODUCTION

The diversity of climate, soil types, and environmental factors give Indonesia a high level of ecosystem diversity (Setiawan, 2022). National Geographic Indonesia (2019), states that Indonesia ranks second in the world after Brazil in terms of terrestrial biodiversity, and when combined with its marine wealth, Indonesia becomes the country with the highest biodiversity in the world. Biology is a subject that is closely related to everyday life because it studies living things and their environment (Gusti & Syamsurizal, 2021). Biology learning in schools does not only require students to memorize material, but also emphasizes the ability to

understand, apply, and analyze scientific concepts so that they can be used in solving real-life problems (Aqil, 2017; Aripin & Suryaningsih, 2019). This is in line with the requirements of the 2013 Curriculum, which emphasizes the importance of students' active role in gathering information from various sources and then reorganizing it into a more meaningful understanding (Azizah & Alberida, 2021). Thus, mastery of biology material is not only measured by cognitive abilities but also by students' skills in relating concepts to everyday phenomena.

Facts on the ground show that biology education still faces various problems. Many teachers still focus on using general textbooks without linking learning to local potential or real phenomena around students (Hadi & Ahied, 2017; Mubarok et al., 2025). This also has an impact on students' low conceptual understanding and the emergence of misconceptions in the learning process (Nasution & Nasution, 2024). For example, research by Erliza et al. (2020), at SMAN 1 Rupat Utara found that only 25.7% of students truly understood the concept of biodiversity, while 65.8% did not understand it, and 8.59% had misconceptions. This condition shows that although biology learning requires in-depth understanding, in practice, students still find it difficult to students learn soil pH measurement, biodiversity index, water quality analysis, and ecosystem interactions. Therefore, learning based on local potential is needed to improve learning outcomes and learning activities with contextual learning.

One of the local potentials that can be utilized is the Bang Jani Farm Agro-Educational Tourism located in Langkap Village, Burneh District, Bangkalan Regency. This Agro-Educational Tourism is the first destination in Madura that carries the concept of integrated agriculture with elements of education and tourism (Andini, 2024). According to Mubarok et al., (2025) and Gusti et al., (2025), a local potential-based approach can serve as an innovative and contextual learning method. In addition, the existence of various types of plants in the tourist garden area can provide opportunities for students to directly observe the diversity of Plantae (Eriawati, 2017). Thus, the educational tourism concept has been promoted to foster environmental awareness in the younger generation while providing a more meaningful learning experience. The utilization of plant diversity at Bang Jani Agro Edu Tourism is also aligned with strengthening environmental literacy and the Pancasila student profile, particularly in terms of global diversity, critical thinking, and collaboration (Badan Standar, Kurikulum, dan Asesmen Pendidikan, 2024). In this context, students can be encouraged to identify environmental issues, such as threats to biodiversity, pollution, and climate change, and to develop project-based conservation ideas (Putra et al., 2024). Therefore, learning does not only focus on cognitive aspects but also fosters environmental awareness and responsible decision-making regarding sustainability. However, this potential remains underutilized by teachers in biology lessons, particularly in areas such as plant biodiversity, plant physiology, ecology, and the study of unique or endemic species found in the area.

Previous studies have examined the use of local potential in biology learning using various approaches. Wulandari & Djukri, (2021), showed that the use of local resources in learning can improve learning outcomes and students' positive attitudes towards biology. This

is in line with the statement by Wilujeng et al., (2024), which shows that the lack of utilization of the surrounding environment by educators, namely integrating local potential as a learning resource for students, is a major problem. However, according to Satriani et al., (2021), local plants have great potential as learning resources, but their use is still limited to the school environment. In addition, Ritonga et al. (2023) states that through the development of media based on local potential, it was found that contextual teaching materials can increase student engagement, even though existing textbooks do not optimally highlight local potential. Referring to Etika et al., (2024), a meta-analysis proves that media based on local potential is effective in improving conceptual understanding, but existing research is still partial and fragmented. Meanwhile, Ie et al., (2025), emphasizes that even though there are innovations in teaching materials based on local potential in ecosystem material, its use in learning practices is still not widespread. However, the use of specific local objects, such as those in the Agro Edu Wisata Bang Jani, has been minimally researched. In fact, the concrete utilization of local resources such as using the study area for field-based learning holds great potential for helping students overcome difficulties in understanding abstract material, particularly the concept of the plant kingdom. Therefore, these limitations form the basis of this study.

This study aims to identify and describe the diversity of Plantae found in Bang Jani Agro Edu Tourism as a local potential-based learning resource. The presence of diverse plant species at this site supports experiential learning through field-based activities, particularly in the areas of plant biodiversity and ecology. This approach enables students to learn directly through observation and interaction with their environment, providing a more contextual alternative to textbook-based learning. Therefore, the findings of this study are expected to help address challenges in biology learning, especially in the Kingdom Plantae material, which is often considered abstract and difficult for students to understand.

METHOD

Research Location

This research was conducted at Bang Jani Agro-Educational Tourism, Langkap Village, Bangkalan Regency in July-August 2025.

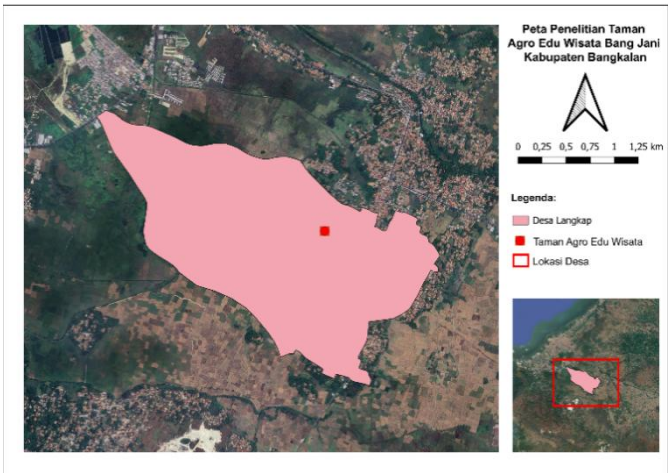

Figure 1. Location Map of Bang Jani Agro-Educational Tourism Bangkalan

Research Design

This study employed a mixed-method approach that combined qualitative and quantitative data (Creswell & Creswell, 2018). Mixed-method research is an approach that integrates qualitative and quantitative methods. This approach involves philosophical assumptions, the application of qualitative and quantitative approaches into one study (Ulinniam et al., 2021).

Instrument and Data Collection

Data collection for this study was conducted in two stages. Stage 1 consisted of an initial survey, determination of sampling locations, and inventory of local potential using the PlantNet application. The identification results were then verified using relevant literature, including taxonomic references and scientific articles on Indonesian flora, as well as studies related to vegetation in the study area. Stage 2 involved analyzing the potential of plant diversity as a biology learning resource through a literature review. The instrument used in this study was a semi-structured interview guide for the surrounding community.

Data Analysis

Data analysis in this study used two approaches, namely quantitative and qualitative approaches. Quantitative data in this study were observations obtained and then analyzed based on the number of species obtained using index analysis, namely the Diversity Index, using Excel.

Species diversity was measured using the diversity index (H'). The diversity index (H') is high when individuals are distributed across different species. The diversity index is calculated using the Shannon-Wienner formula (Rizky et al., 2023):

$$H' = -\Sigma\, pi \ln pi \; ; \; pi = ni / N$$

Description:

Pi = Proportion of type

N = Total of individuals of all species

ni = Quantity of i-th individual
H'= Shannon-Wiener diversity index

Criteria for the species diversity index based on Shanonn-Wiener are as follows (Fachrul, 2007):

1 < H' : low species diversity
1 < H'< 3 : moderate species diversity
H' > 3 : high species diversity

Meanwhile, qualitative data was analyzed using an inductive approach by analyzing findings in the field, interviews with the community around the Agro-Educational Tourism Park, and literature sources. The literature review in this article was written based on aspects of plant diversity and the need for interactive learning resources based on local potential. Data analysis was conducted using an inductive approach, which began with facts found in the field, followed by analysis to develop statements related to theory, laws, or other relevant findings. This approach emphasizes the analysis of field data from the researcher's perspective to draw conclusions. According to Amelia et al., (2024), the inductive approach is based on field findings, followed by analysis and drawing conclusions from the researcher's point of view.

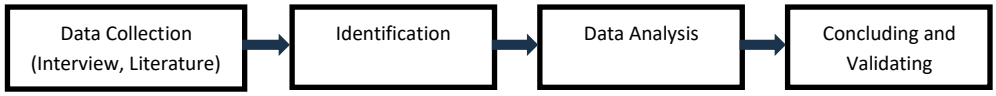

Figure 2. Steps qualitative data analysis

RESULT AND DISCUSSION

Results of the Study

Field observations conducted at Bang Jani Agro-Educational Tourism identified 89 plant species within the research area. The results of the observations that had been identified and classified into several levels are presented in Table 1.

Table 1. Plant species identified at different sampling locations in Bang Jani Agro Edu Tourism, Bangkalan

Local Name	Phylum	Class	Order	Family	Genus	Species
Pucuk merah	Magnoliophyta	Magnoliopsida	Myrtales	Myrtaceae	Syzygium	*Syzygium myrtifolium Walp.*
Nanas kerang	Magnoliophyta	Liliopsida	Commelinales	Commelinaceae	Tradescantia	*Tradescantia spathacea Sw.*
Sawo kecik	Magnoliophyta	Magnoliopsida	Ebenales	Sapotaceae	Manilkara	*Manilkara kauki* (L.) *Dubard*
Ginje	Magnoliophyta	Magnoliopsida	Gentianales	Apocynaceae	Cascabela	*Cascabela thevetia* (L.) *Lippold*
Puring jari kuning	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum*

Local Name	Phylum	Class	Order	Family	Genus	Species
anting hitam						*variegatum* (L.) *Rumph.*
Puring terang bulan	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring tombak hijau kuning	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring gelatik merah	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring debu emas	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring bali merah	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring rupadatu	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring arjuna	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring nuri	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Puring gold dust	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Codiaeum	*Codiaeum variegatum* (L.) *Rumph.*
Jambu biji	Magnoliophyta	Magnoliopsida	Myrtales	Myrtaceae	Psidium	*Psidium guajava* L.
Pepaya jepang	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	*Cnidoscolus*	*Cnidoscolus aconitifolius (Mill.) I.M.Johnst.*
Kemboja penganti n	Magnoliophyta	Magnoliopsida	Gentianales	Apocynaceae	Plumeria	*Plumeria pudica Jacq.*
Jambu kristal	Magnoliophyta	Magnoliopsida	Myrtales	Myrtaceae	Psidium	*Psidium guajava* L.
Tombak afrika	Magnoliophyta	Liliopsida	Asparagales	Asparagaceae	Dracaena	*Dracaena angolensis*
Alpukat mentega	Streptophyta	Equisetopsida	Laurales	Lauraceae	Persea	*Persea americana Mill.*
Caringi n	Magnoliophyta	Magnoliopsida	Urticales	Moraceae	Ficus	*Ficus benjamina* L.
Anggrek biru	Magnoliophyta	Liliopsida	Orchidales	Orchidaceae	Vanda	*Vanda coerulea G riff.*
Bromeli a	Magnoliophyta	Equisetopsida	Poales	Bromeliaceae	Aechmea	*Aechmea caudata Lindm*
Kencan a ungu	Magnoliophyta	Magnoliopsida	Scrophulariales	Acanthaceae	Ruellia	*Ruellia simplex C.Wright*
Iris kuning	Magnoliophyta	Liliopsida	Liliales	Iridaceae	Trimezia	*Trimezia martinicensis (Jacq.) Herb.*
Lidah mertua	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Sansevieria	*Sansevieria trifasciata hahnii.*

Local Name	Phylum	Class	Order	Family	Genus	Species
sarang burung						
Delima	Magnoliophyta	Magnoliopsida	Myrtales	Lythraceae	Punica	*Punica granatum* L.
Srikaya	Magnoliophyta	Magnoliopsida	Magnoliales	Annonaceae	Annona	*Annona squamosa* L.
Sawo duren	Magnoliophyta	Magnoliopsida	Ebenales	Sapotaceae	Chrysophyllum	*Chrysophyllum cainito* L.
Jeruk nipis	Magnoliophyta	Magnoliopsida	Sapindales	Rutaceae	Citrus	*Citrus × aurantiifolia (Christm.) Swingle*
Ceri barbados	Magnoliophyta	Magnoliopsida	Polygalales	Malpighiaceae	Malpighia	*Malpighia emarginata DC.*
Kopi arabika	Magnoliophyta	Magnoliopsida	Rubiales	Rubiaceae	Coffea	*Coffea arabica* L.
Serai wangi	Magnoliophyta	Equisetopsida	Poales	Poaceae	Cymbopogon	*Cymbopogon nardus* (L.) *Rendle*
Tabebuya kuning	Magnoliophyta	Magnoliopsida	Scrophulariales	Bignoniaceae	Tabebuia	*Tabebuia aurea Tabebuia aurea (Silva Manso)*
Pisang nangka	Magnoliophyta	Liliopsida	Zingiberales	Musaceae	Musa	*Musa x paradisiaca* L.
Tapak dara	Magnoliophyta	Magnoliopsida	Gentianales	Apocynaceae	Catharanthus	*Catharanthus roseus* (L.) *G.Don*
Ketul	Magnoliophyta	Magnoliopsida	Asterales	Asteraceae	Bidens	*Bidens pilosa* L.
Bunga kertas	Magnoliophyta	Magnoliopsida	Asterales	Asteraceae	Zinnia	*Zinnia peruviana* L.
Rambutan	Magnoliophyta	Magnoliopsida	Sapindales	Sapindaceae	Nephelium	*Nephelium lappaceum* L.
Melinjo	Gnetophyta	Gnetopsida	Gnetales	Gnetaceae	Gnetum	*Gnetum gnemon* L.
Lidah mertua	Magnoliophyta	Liliopsida	Asparagales	Asparagaceae	Dracaena	*Dracaena hyacinthoides* (L.) *Mabb.*
Senjuang wangi	Magnoliophyta	Liliopsida	Asparagales	Asparagaceae	Dracaena	*Dracaena fragrans* (L.) Ker Gawl.
Kembang Telang	Magnoliophyta	Magnoliopsida	Fabales	Fabaceae	Clitoria	*Clitoria ternatea L.*
Bayam merah	Magnoliophyta	Magnoliopsida	Caryophyllales	Amaranthaceae	Alternanthera	*Alternanthera brasiliana* (L.) *Kuntze*
Jeruk Manis	Magnoliophyta	Magnoliopsida	Sapindales	Rutaceae	Citrus	*Citrus × aurantium* L.
Ubi jalar	Magnoliophyta	Magnoliopsida	Solanales	Convolvulaceae	Ipomoea	*Ipomoea batatas* (L.) *Lam.*
Singkong	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Manihot	*Manihot esculenta Crantz*
Mengkudu	Magnoliophyta	Magnoliopsida	Rubiales	Rubiaceae	Morinda	*Morinda citrifolia* L.
Sawo manila	Magnoliophyta	Magnoliopsida	Ebenales	Sapotaceae	Manilkara	*Manilkara zapota* (L.) *P.Royen*
Sablo	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbiaceae	Acalypha	*Acalypha wilkesiana*

Local Name	Phylum	Class	Order	Family	Genus	Species
						Müll.Arg.
Lengkeng new kristal	Magnoliophyta	Magnoliopsida	Sapindales	Sapindaceae	Dimocarpus	*Dimocarpus longan Lour.*
Lengkeng merah	Magnoliophyta	Magnoliopsida	Sapindales	Sapindaceae	Dimocarpus	*Dimocarpus longan Lour.*
Lengkeng matalada	Magnoliophyta	Magnoliopsida	Sapindales	Sapindaceae	Dimocarpus	*Dimocarpus longan Lour.*
Labu madu	Magnoliophyta	Magnoliopsida	Cucurbitales	Cucurbitaceae	Cucurbita	*Cucurbita moschata Duchesne*
Terung	Magnoliophyta	Magnoliopsida	Solanales	Solanaceae	Solanum	*Solanum melongena* L.
Temurui	Magnoliophyta	Magnoliopsida	Sapindales	Rutaceae	Murraya	*Murraya koenigii* (L.) *Spreng.*
Nangka	Magnoliophyta	Magnoliopsida	Urticales	Moraceae	Artocarpus	*Artocarpus heterophyllus Lam.*
Mentimun	Magnoliophyta	Magnoliopsida	Cucurbitales	Cucurbitaceae	Cucumis	*Cucumis sativus* L.
Jagung	*Magnoliophyta*	*Equisetopsida*	*Poales*	*Poaceae*	*Zea*	*Zea mays* L.
Pepaya callina	*Magnoliophyta*	*Magnoliopsida*	*Violales*	Caricaceae	Carica	*Carica papaya* L.
Melati	*Magnoliophyta*	*Magnoliopsida*	*Scrophulariales*	*Oleaceae*	*Jasminum*	*Jasminum sambac* (L.) *Aiton*
Kembang sepatu	*Tracheophyta*	*Magnoliopsida*	*Malvales*	*Malvaceae*	*Hibiscus*	*Hibiscus rosa-sinensis* L.
Kitolod	*Magnoliophyta*	*Magnoliopsida*	*Campanulales*	*Campanulaceae*	*Hippobroma*	*Hippobroma longiflora* (L.) *G.Don*
Cabai	*Magnoliophyta*	*Magnoliopsida*	*Solanales*	*Solanaceae*	*Capsicum*	*Capsicum annuum* L.
Tomat	*Magnoliophyta*	*Magnoliopsida*	*Solanales*	*Solanaceae*	*Solanum*	*Solanum lycopersicum* L.
Kacang panjang	*Magnoliophyta*	*Magnoliopsida*	*Fabales*	*Fabaceae*	*Vigna*	*Vigna unguiculata* (L.) *Walp.*
Takokak	*Magnoliophyta*	*Magnoliopsida*	*Solanales*	*Solanaceae*	*Solanum*	*Solanum torvum Sw.*
Asoka	*Magnoliophyta*	*Magnoliopsida*	*Rubiales*	*Rubiaceae*	*Ixora*	*Ixora chinensis Lam.*
Cermai	*Streptophyta*	*Equisetopsida*	*Malpighiales*	*Phyllanthaceae*	*Phyllanthus*	*Phyllanthus acidus* (L.) *Skeels*
Jamblang	*Magnoliophyta*	*Magnoliopsida*	*Myrtales*	*Myrtaceae*	*Syzygium*	*Syzygium cumini* (L.) *Skeels*
Murbei	*Magnoliophyta*	*Magnoliopsida*	*Urticales*	*Moraceae*	*Morus*	*Morus nigra* L.
Rukam	*Magnoliophyta*	*Magnoliopsida*	*Salicales*	*Salicaceae*	*Flacourtia*	*Flacourtia rukam Zoll. & Moritzi*
Bintaro	*Magnoliophyta*	*Magnoliopsida*	*Gentianales*	*Apocynaceae*	*Cerbera*	*Cerbera manghas* L.
Lidah naga	*Magnoliophyta*	*Liliopsida*	*Asparagales*	*Asparagaceae*	*Agave*	*Agave americana* L.
Tapakuala	*Magnoliophyta*	*Magnoliopsida*	*Rhamnales*	*Rhamnaceae*	*Rhamnus*	*Rhamnus saxatilis Jacq.*
Buas-buas	*Streptophyta*	*Equisetopsida*	*Lamiales*	*Lamiaceae*	*Premna*	*Premna serratifolia* L.

Local Name	Phylum	Class	Order	Family	Genus	Species
Anggur bawang putih	*Magnoliophyta*	*Magnoliopsida*	*Scrophulariales*	*Bignoniaceae*	*Mansoa*	*Mansoa alliacea (Lam.) A.H.Gentry*
Rambutan rapiah	*Magnoliophyta*	*Magnoliopsida*	*Sapindales*	*Sapindaceae*	*Nephelium*	*Nephelium lappaceum* L.
Jambu air	*Magnoliophyta*	*Magnoliopsida*	*Myrtales*	*Myrtaceae*	*Syzygium*	*Syzygium aqueum (Burm.f.) Alston*
Belimbing	*Magnoliophyta*	*Magnoliopsida*	*Geraniales*	*Oxalidaceae*	*Averrhoa*	*Averrhoa carambola* L.
Andong	*Magnoliophyta*	*Liliopsida*	*Asparagales*	*Asparagaceae*	*Cordyline*	*Cordyline fruticosa* (L.) *A.Chev.*
Anggur silang	*Magnoliophyta*	*Magnoliopsida*	*Scrophulariales*	*Bignoniaceae*	*Bignonia*	*Bignonia capreolata* L.
Paku epifit pyrrosia	*Pteridophyta*	*Pteridopsida*	*Polypodiales*	*Polypodiaceae*	*Pyrrosia*	*Pyrrosia piloselloides* (L.) *M.G.Price*
Taiwan beauty	*Magnoliophyta*	*Magnoliopsida*	*Myrtales*	*Lythraceae*	*Cuphea*	*Cuphea hyssopifolia Kunth*
Semak salju	*Streptophyta*	*Equisetopsida*	*Malpighiales*	*Phyllanthaceae*	*Breynia*	*Breynia disticha J.R.Forst. & G.Forst.*
Asem londo	*Magnoliophyta*	*Magnoliopsida*	*Fabales*	*Fabalaceae*	*Pithecellobium*	*Pithecellobium dulce (Roxb.) Benth.*
Seligi	*Streptophyta*	*Equisetopsida*	*Malpighiales*	*Phyllanthaceae*	*Phyllanthus*	*Phyllanthus buxifolius (Blume) Müll.Arg.*
Kepel	*Magnoliophyta*	*Magnoliopsida*	*Magnoliales*	*Annonaceae*	*Stelechocarpus*	*Stelechocarpus burahol (Blume) Hook.f. & Thomson*

Based on the results of the analysis, the diversity index of all plants successfully identified during the observation at the Bang Jani Bangkalan Agro-Educational Tourism Park is presented in Table 2.

Table 2. Plant Diversity Index at Bang Jani Agro-Educational Tourism Bangkalan

No	Species	Quantity (n)	Pi (ni/N)	Ln Pi	H'
1	Syzygium myrtifolium Walp.	6	0,008064516	-4,820281566	-0,038873238
2	Tradescantia spathacea Sw.	37	0,049731183	-3,001123122	-0,149249403
3	Manilkara kauki (L.) Dubard	3	0,004032258	-5,513428746	-0,022231568
4	Cascabela thevetia (L.) Lippold	3	0,004032258	-5,513428746	-0,022231568
5	Codiaeum variegatum (L.) Rumph.	5	0,00672043	-5,002603122	-0,033619645
6	Codiaeum variegatum (L.) Rumph.	1	0,001344086	-6,612041035	-0,008887152
7	Codiaeum variegatum (L.) Rumph.	1	0,001344086	-6,612041035	-0,008887152
8	Codiaeum variegatum (L.) Rumph.	2	0,002688172	-5,918893854	-0,015911005
9	Codiaeum variegatum (L.) Rumph.	1	0,001344086	-6,612041035	-0,008887152
10	Codiaeum variegatum (L.) Rumph.	3	0,004032258	-5,513428746	-0,022231568
11	Codiaeum variegatum (L.) Rumph.	1	0,001344086	-6,612041035	-0,008887152
12	Codiaeum variegatum (L.) Rumph.	1	0,001344086	-6,612041035	-0,008887152
13	Codiaeum variegatum (L.) Rumph.	1	0,001344086	-6,612041035	-0,008887152
14	Codiaeum variegatum (L.) Rumph.	2	0,002688172	-5,918893854	-0,015911005
15	Codiaeum variegatum (L.) Rumph.	2	0,002688172	-5,918893854	-0,015911005
16	Psidium guajava L.	1	0,001344086	-6,612041035	-0,008887152
17	Cnidoscolus aconitifolius (Mill.)	5	0,00672043	-5,002603122	-0,033619645

No	Species	Quantity (n)	Pi (ni/N)	Ln Pi	H'
	I.M.Johnst.				
18	Plumeria pudica Jacq.	4	0,005376344	-5,225746674	-0,028095412
19	Psidium guajava L.	2	0,002688172	-5,918893854	-0,015911005
20	Dracaena angolensis	2	0,002688172	-5,918893854	-0,015911005
21	Persea americana Mill.	3	0,004032258	-5,513428746	-0,022231568
22	Ficus benjamina L.	2	0,002688172	-5,918893854	-0,015911005
23	Vanda coerulea Griff.	2	0,002688172	-5,918893854	-0,015911005
24	Aechmea caudata Lindm	21	0,028225806	-3,567518597	-0,100696089
25	Ruellia simplex C.Wright	24	0,032258065	-3,433987204	-0,110773781
26	Trimezia martinicensis (Jacq.) Herb.	27	0,036290323	-3,316204169	-0,120346119
27	Sansevieria trifasciata hahnii.	10	0,01344086	-4,309455942	-0,057922795
28	Punica granatum L.	3	0,004032258	-5,513428746	-0,022231568
29	Annona squamosa L.	3	0,004032258	-5,513428746	-0,022231568
30	Chrysophyllum cainito L.	2	0,002688172	-5,918893854	-0,015911005
31	Citrus × aurantiifolia (Christm.) Swingle	3	0,004032258	-5,513428746	-0,022231568
32	Malpighia emarginata DC.	5	0,00672043	-5,002603122	-0,033619645
33	Coffea arabica L.	2	0,002688172	-5,918893854	-0,015911005
34	Cymbopogon nardus (L.) Rendle	15	0,02016129	-3,903990834	-0,078709493
35	Tabebuia aurea Tabebuia aurea (Silva Manso)	2	0,002688172	-5,918893854	-0,015911005
36	Musa x paradisiaca L.	7	0,009408602	-4,666130886	-0,043901769
37	Catharanthus roseus (L.) G.Don	23	0,030913978	-3,476546819	-0,107473894
38	Bidens pilosa L.	46	0,061827957	-2,783399638	-0,172091913
39	Zinnia peruviana (L.) L.	5	0,00672043	-5,002603122	-0,033619645
40	Nephelium lappaceum L.	5	0,00672043	-5,002603122	-0,033619645
41	Gnetum gnemon L.	5	0,00672043	-5,002603122	-0,033619645
42	Dracaena hyacinthoides (L.) Mabb.	23	0,030913978	-3,476546819	-0,107473894
43	Dracaena fragrans (L.) Ker Gawl.	7	0,009408602	-4,666130886	-0,043901769
44	Clitoria ternatea L.	7	0,009408602	-4,666130886	-0,043901769
45	Alternanthera brasiliana (L.) Kuntze	37	0,049731183	-3,001123122	-0,149249403
46	Citrus × aurantium L.	25	0,033602151	-3,39316521	-0,114017648
47	Ipomoea batatas (L.) Lam.	15	0,02016129	-3,903990834	-0,078709493
48	Manihot esculenta Crantz	7	0,009408602	-4,666130886	-0,043901769
49	Morinda citrifolia L.	2	0,002688172	-5,918893854	-0,015911005
50	Manilkara zapota (L.) P.Royen	2	0,002688172	-5,918893854	-0,015911005
51	Acalypha wilkesiana Müll.Arg.	5	0,00672043	-5,002603122	-0,033619645
52	Dimocarpus longan Lour.	3	0,004032258	-5,513428746	-0,022231568
53	Dimocarpus longan Lour.	4	0,005376344	-5,225746674	-0,028095412
54	Dimocarpus longan Lour.	2	0,002688172	-5,918893854	-0,015911005
55	Cucurbita moschata Duchesne	15	0,02016129	-3,903990834	-0,078709493
56	Solanum melongena L.	55	0,073924731	-2,60470785	-0,192552328
57	Murraya koenigii (L.) Spreng.	2	0,002688172	-5,918893854	-0,015911005
58	Artocarpus heterophyllus Lam.	2	0,002688172	-5,918893854	-0,015911005
59	Cucumis sativus L.	21	0,028225806	-3,567518597	-0,100696089
60	Zea mays L.	50	0,067204301	-2,700018029	-0,181452825
61	Carica papaya L.	7	0,009408602	-4,666130886	-0,043901769
62	Jasminum sambac (L.) Aiton	5	0,00672043	-5,002603122	-0,033619645
63	Hibiscus rosa-sinensis L.	3	0,004032258	-5,513428746	-0,022231568
64	Hippobroma longiflora (L.) G.Don	17	0,022849462	-3,778827691	-0,086344181
65	Capsicum annuum L.	25	0,033602151	-3,39316521	-0,114017648
66	Solanum lycopersicum L.	15	0,02016129	-3,903990834	-0,078709493
67	Vigna unguiculata (L.) Walp.	14	0,018817204	-3,972983705	-0,074760446
68	Solanum torvum Sw.	9	0,012096774	-4,414816457	-0,053405038
69	Ixora chinensis Lam.	5	0,00672043	-5,002603122	-0,033619645
70	Phyllanthus acidus (L.) Skeels	5	0,00672043	-5,002603122	-0,033619645
71	Syzygium cumini (L.) Skeels	1	0,001344086	-6,612041035	-0,008887152

No	Species	Quantity (n)	Pi (ni/N)	Ln Pi	H’
72	Morus nigra L.	3	0,004032258	-5,513428746	-0,022231568
73	Flacourtia rukam Zoll. & Moritzi	2	0,002688172	-5,918893854	-0,015911005
74	Cerbera manghas L.	2	0,002688172	-5,918893854	-0,015911005
75	Agave americana L.	2	0,002688172	-5,918893854	-0,015911005
76	Rhamnus saxatilis Jacq.	1	0,001344086	-6,612041035	-0,008887152
77	Premna serratifolia L.	3	0,004032258	-5,513428746	-0,022231568
78	Mansoa alliacea (Lam.) A.H.Gentry	3	0,004032258	-5,513428746	-0,022231568
79	Nephelium lappaceum L.	5	0,00672043	-5,002603122	-0,033619645
80	Syzygium aqueum (Burm.f.) Alston	1	0,001344086	-6,612041035	-0,008887152
81	Averrhoa carambola L.	1	0,001344086	-6,612041035	-0,008887152
82	Cordyline fruticosa (L.) A.Chev.	12	0,016129032	-4,127134385	-0,066566684
83	Bignonia capreolata L.	2	0,002688172	-5,918893854	-0,015911005
84	Pyrrosia piloselloides (L.) M.G.Price	3	0,004032258	-5,513428746	-0,022231568
85	Cuphea hyssopifolia Kunth	3	0,004032258	-5,513428746	-0,022231568
86	Breynia disticha J.R.Forst. & G.Forst.	5	0,00672043	-5,002603122	-0,033619645
87	Pithecellobium dulce (Roxb.) Benth.	3	0,004032258	-5,513428746	-0,022231568
88	Phyllanthus buxifolius (Blume) Müll.Arg.	1	0,001344086	-6,612041035	-0,008887152
89	Stelechocarpus burahol (Blume) Hook.f. & Thomson	1	0,001344086	-6,612041035	-0,008887152
		744			3.84

Table 2 shows that the total plant diversity index at Bang Jani Agro-Educational Tourism was 3.84, indicating high biodiversity. According to (Fachrul, 2007), when H' = 0, the diversity index is very low because the community consists of only one species, and when H' is in the range of >1<3, the diversity index is moderate, indicating that community productivity is quite good, the ecosystem is relatively balanced, and ecological pressure is moderate. Meanwhile, if H' exceeds 3, the community's diversity is classified as high because more than one species is present, productivity is high, and ecosystem conditions are optimal. The level of diversity of a plant community is greatly influenced by the number of species present and the number of individuals for each species (species richness). In addition, this shows that the level of plant diversity in the Bang Jani agro-edu-tourism park is still very good, as evidenced by the large number of species found and the wide variety of individuals of each species. This finding is supported by Wirakusumah, (2003), who stated that the higher the diversity value of an area, the more stable the community in that area.

Based on the research findings, several plant species were found in low (1–<5), moderate (6–15), and high (>15) numbers, reflecting a stable pattern of species abundance distribution within ecological communities. This is supported by the statement by Gao et al., (2025), that in every ecosystem, plant communities are dominated by a few abundant species, while the majority of other species are rare or few in number, and follow a hollow S-shaped curve pattern. This holds universally across various spatial scales, habitat types, and taxonomic groups. In addition, diversity indices are useful for mathematically representing the structure of an organism population to facilitate the analysis of information on the number of individuals of each plant species in a community. If the diversity index is high, then the diversity is more varied and not dominated by one or more of the species obtained (Kautsar et al., 2015). Therefore, species diversity can be used to measure community stability, which is the ability of

a community to remain stable despite disturbances to its components (Mokodompit et al., 2022).

Application in learning

Diversity of plant species at Agro Edu Wisata Kebun Bang Jani Bangkalan can be implemented into science education, especially biology, namely the subject of biodiversity. Biodiversity material is included in junior high and high school curricula. The results of plant identification at Agro Edu Wisata Kebun Bang Jani show that there are 89 plant species spread across various families, including *Myrtaceae, Euphorbiaceae, Apocynaceae*, and *Sapotaceae*. Teachers can integrate this biodiversity content into classroom learning by creating modules, flipbooks, or booklets on the theme of biodiversity at Agro Edu Wisata Bang Jani Bangkalan, as well as field trips.

Creation of modules, flipbooks, or booklets on the theme of biodiversity at Agro Edu Wisata Bang Jani Bangkalan as a learning resource for students is one of the steps taken by teachers to improve the quality of student learning in science subjects. These media provide material containing images or real visuals of the surrounding environment and are equipped with colorful, easy-to-understand, and interesting summaries of the material presented. Through these media, students may become more engaged in the learning process that only contain text without any images or real visuals. Research by Safitri et al., (2025), states that flipbook learning media on biodiversity is effective in improving student learning outcomes. Teachers may also organize field trips using an outdoor learning approach by visiting Agro Edu Wisata Kebun Bang Jani, if possible, so that students can directly observe various types of plants there.

Teachers can use student-centered learning strategies such as assigning projects to identify plant types and then writing reports on their findings. Through direct observation, students will have a contextual learning experience that can increase their motivation and learning outcomes. In line with research conducted by Hartik et al., (2023) and Zulfirman, (2022), outdoor learning can increase student motivation. Meanwhile, research by Thaariq et al., (2023) states that student learning outcomes improve after learning with an approach that explores the surrounding nature. Additionally, project-based learning, such as creating identification reports, can train students' science skills, which is in line with the research by Pratiwi et al., (2020), where students' science process skills improved after learning with the PjBL model.

The findings of this study, which identified 89 plant species, demonstrate the strong potential of Bang Jani Agro Edu Tourism as a resource for contextual learning. This potential can support environmental literacy as well as the development of students' critical thinking and collaboration skills (Badan Standar, Kurikulum, dan Asesmen Pendidikan, 2024). The presence of 89 diverse plant species allows teachers to adapt the learning process to local characteristics, thereby helping students feel more connected to the material being studied. This approach makes it easier for students to connect biodiversity theory with its application in daily life, such

as the use of plants as food sources and traditional medicine. This strategy aligns with the curriculum's direction, which emphasizes the importance of environment-based learning to deepen understanding of concepts and reduce misconceptions regarding biodiversity material (Iwan et al., 2025). Additionally, students can be encouraged to analyze biodiversity issues and propose conservation-based solutions (Putra et al., 2024).

CONCLUSION

This study identified 89 plant species from various families in the Agro Edu Wisata Kebun Bang Jani Bangkalan, showing that the area has high biodiversity and is suitable for use as a contextual learning resource on biodiversity in junior high and high school biology lessons. These results indicate that integrating local potential in the form of teaching materials such as modules, flipbooks, booklets, field trips, and plant identification projects can improve students' conceptual understanding, motivation, scientific process skills, and environmental literacy, while also supporting the implementation of the Merdeka Curriculum and strengthening the Pancasila Student Profile. However, this study has limitations in terms of scope, as it only focuses on one area and has not directly tested the impact of using these teaching materials on student learning outcomes. Therefore, further research is needed to expand the scope of observation and conduct implementation tests on students in order to obtain more accurate data.

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