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Identification of plant species around the environment of senior high school 1 Palu and their utilization as learning resource

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Abstract

This study aims to identify and describe the types of plants found around the environment of SMA Negeri 1 Palu and determine the feasibility of flipbook regarding the identification of plant species around the environment of SMA Negeri 1 Palu as a learning resource. This research is a study that uses a qualitative descriptive research approach with survey methods and exploration techniques. This research was conducted around the environment of SMA Negeri 1 Palu in May 2024. The results showed that the types of plants found were 50 species, including *Maranta arundinaceous*, *Alocasia macrorrhizos*, *Euphorbia tithymaloides*, *Alocasia cucullata, Pilea microphylla, Oxalis corniculata, Peperomia pellucida, Graptophyllum pictum, Tabernaemontana divaricata, Syzygium polyanthum, Aglaonema rotundum*, *Drimiopsis maculata*, *Ledebouria socialis, Chlorophytum comosum, Homalomena rubescens, Zamioculcas zamiifolia, Chlorophytum orchidastrum, Heliconia rostrata, Clitoria ternatea, Syzygium oleana, Macaranga tanarius, Euphorbia umbellata, Tradescantia pallida, Pseuderanthemum maculatum, Acalypha indica, Dypsis lutescens, Cycas revoluta, Asplenium nidus, Ixora coccinea, Codiaeum variegatum, Catharanthus roseus, Bougainvillea glabra, Bougainvillea buttiana, Adenium obesum, Excoecaria cochinchinensis, Polyscias scutellaria, Duranta erecta, Pterocarpus indicus, Asystasia gangetica, Mangifera indica, Monoon longifolium, Ehretia microphylla, Musa acuminata, Dracaena trifasciata, Dracaena angolensis, Aglaonema commutatum, Cordyline fruticosa, Agave demeesteriana, Alocasia micholitziana*, and *Dracaena hyacinthoides*. The plants were divided into 24 families and 5 habitus, both wild and cultivated plants. The results showed that wild plants found consisted of 5 families, namely as many as 5 species and cultivated plants found consisted of 21 families, namely as many as 45 species. The results of this study can be used as a learning resource in the form of a flipbook. Based on the percentage of feasibility assessments conducted by 3 expert validator lecturers (content, design, and media) and trials to students, it shows that the results of the feasibility validation of learning resource in the form of flipbook are very feasible to use as learning resource in learning with a percentage of 89%.

Keywords: Plants; SMA Negeri 1 Palu; Learning Resource; Wild plants

1. Introduction

Plants are a group of multicellular organisms that exist on earth. Plants have body parts that can be divided into roots, stems, leaves, and flowers. Plant sizes vary, ranging from small trees without wood to large trees (Wahyuningsih., et al. 2019). Plants are unique among all living things because plants are creatures that can make their own food. Plants can make their own food through the process of photosynthesis. There are various kinds of plant species and each plant has a certain name and classification system (Naisila., et al. 2024). Plants also have an important role in human life, including as a source of food, medicine, financial support, decoration, and education (Wahyuni., et al. 2023).

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In the world of education, plants can be used as a learning resource, especially for schools that have many types of plants around the environment that can be utilized for learning purposes, especially in biology subjects. Therefore, it is necessary to have a learning resource that contains complete information about the plant.

The results of preliminary observations at SMA Negeri 1 Palu showed that there were many types of plants around the environment, both those around the classroom, the teacher's room, and those around the field. The plants found around the environment of SMA Negeri 1 Palu consist of herbaceous plants, shrubs, bushes, and trees. However, the various plants around the school environment are not fully known and their potential has not been utilized as a learning resource. Therefore, students' knowledge about the types of plants found around the environment of SMA Negeri 1 Palu is still lacking. For this reason, it is very necessary to identify plants found around the environment of SMA Negeri 1 Palu, so that they can be utilized as learning resource.

The learning resource that will be developed in this study is a digital book (flipbook). Flipbook is a digital book that is able to present text, images, audio, and video that are designed as interestingly as possible to increase students' enthusiasm and understanding in the teaching and learning process (Andini., et al. 2024). The author also chooses to make learning resource in the form of flipbook, namely in order to make it easier for students and teachers to obtain information about identifying plant species, because flipbook is relatively easy to access via the internet.

Novita (2019) has conducted a study entitled Plant Species in the SMP Negeri 20 Palu Area and Their Utilization as Biology Learning Media. Based on the research that has been done, it shows that the plant species found are 37 species consisting of 34 *families* and 33 orders. The results of the study are used as learning media in the form of pocket books. Based on the results of the validation that has been done, it shows that the pocket book is suitable to be used as a learning medium. However, this research still has some shortcomings, such as in terms of design, media, and content in the resulting pocket book, because there are several obstacles in finding the complete information needed. So it is necessary to conduct similar research, but in different research locations.

Based on the description above, this research is considered important to do. The research conducted was on the identification of plant species around the environment of SMA Negeri 1 Palu. The final result of this research is made into a learning resource in the form of a flipbook that can be utilized by students at SMA Negeri 1 Palu.

2. Methods

This research is a study that uses a descriptive qualitative research approach, which aims to provide an overview of the description of the types of plants found around the environment of SMA Negeri 1 Palu, which will then be utilized as a learning resource in the form of a flipbook.

This research was conducted around the environment of SMA Negeri 1 Palu. The research time was 10 months (November 2023 - August 2024). The object of this research is the types of plants around the environment of SMA Negeri 1 Palu.

The research design in this study is using survey method with exploring technique. Sampling of various plant species was carried out by the author at the research location, through a direct observation process by exploring around the environment of SMA Negeri 1 Palu. Then, the plants that have been found are taken pictures (roots, stems, leaves, and flowers) for identification purposes and making learning resource in the form of flipbook.

3. Results

3.1. Plant Observation Results

Based on the research that has been done, a total of 50 plant species were found around the environment of SMA Negeri 1 Palu. The types of plants can be seen in Table 1 below.

Table 1 Types of Plants Around the Environment of SMA Negeri 1 Palu

No.	Familia	Species Name	Local Name	Habitus
1	Acanthaceae	*Graptophyllum pictum* (L.) Griff.	Batik Leaf	Shrubs

		Pseuderanthemum maculatum (G.Lodd.) I.M.Turner	Japanese Jasmine	Bushes
		Asystasia gangetica (L.) T.Anderson	Sungsang Charcoal	Herbs
2	Anacardiaceae	*Mangifera indica* L.	Mango	Trees
3	Annonaceae	*Monoon longifolium* (Sonn.) B.Xue & R.M.K Saunders	Glodokan Tiang	Trees
4	Apocynaceae	*Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.	Wari Flower	Shrubs
		Catharanthus roseus (L.) G.Don	Tapak Dara	Shrubs
		Adenium obesum (Forssk.) Roem. & Schult.	Cambodia Japan	Shrubs
5	Araceae	*Alocasia macrorrhizos* (L.) G.Don	Bira	Herbs
		Alocasia cucullata (Lour.) G.Don	Chinese taro	Herbs
		Aglaonema rotundum N.E.Br.	Sri Rejeki	Herbs
		Homalomena rubescens (Roxb.) Kunth	Nampu taro	Herbs
		Zamioculcas zamiifolia (G.Lodd.) Engl.	Dollar Leaf	Herbs
		Aglaonema commutatum Schott	Sri Rejeki	Herbs
		Alocasia micholitziana Sander	Neon caladium	Herbs
6	Araliaceae	*Polyscias scutellaria* (Burm.f.) Fosberg	Mangkokan	Shrubs
7	Arecaceae	*Dypsis lutescens* (H.Wendl.) Beentje & J.Dransf.	Yellow Palm	Shrubs
8	Asparagaceae	*Drimiopsis maculata* Lindl. & Paxton	Frog's caladium	Herbs
		Ledebouria socialis (Baker) Jessop	Frog's Tongue	Herbs
		Chlorophytum comosum (Thunb.) Jacques	Lili Paris	Herbs
		Chlorophytum orchidastrum Lindl.	Orange Spider	Herbs
		Dracaena trifasciata (Prain) Mabb.	Aloe Vera	Herbs
		Dracaena angolensis (Welw. Ex Carriere)	Aloe Vera	Herbs
		Cordyline fruticosa (L.) A.Chev.	Hanjuang	Shrubs
		Agave demeesteriana Jacobi	Agave Crown	Bushes
		Dracaena hyacinthoides (L.) Mabb.	Aloe Vera	Herbs
9	Aspleniaceae	*Asplenium nidus* L.	Bird's Nest Spikes	Epiphytes
10	Boraginaceae	*Ehretia microphylla* Lam.	Hokianti	Shrubs
11	Commelinaceae	*Tradescantia pallida* (Rose) D.R.Hunt	Purple Heart	Herbs
12	Cycadaceae	*Cycas revoluta* Thunb.	Japanese Sikas	Bushes
13	Euphorbiaceae	*Euphorbia tithymaloides* L.	Zig-Zag	Bushes
		Macaranga tanarius (L.) Mull.Arg.	Mara	Trees
		Euphorbia umbellata (Pax) Bruyns	African Milk Bush	Bushes
		Acalypha indica L.	Fierce Cat	Herbs
		Codiaeum variegatum (L.) Rumph. ex A.Juss.	Puring Garuda	Shrubs
		Excoecaria cochinchinensis Lour.	Blood Sambang	Shrubs
14	Fabaceae	*Clitoria ternatea* L.	Palm Flower	Herbs
		Pterocarpus indicus Willd.	Angsana	Trees

15	Heliconiaceae	*Heliconia rostrata* Ruiz & Pav.	Ornamental Banana	Herbs
16	Marantaceae	*Maranta arundinacea* L.	Garut	Herbs
17	Musaceae	*Musa acuminata* Colla	Stone Banana	Herbs
18	Myrtaceae	*Syzygium polyanthum* (Wight) Walp.	Greetings	Trees
		Syzygium oleana Wight.	Red Shoots	Trees
19	Nyctaginaceae	*Bougainvillea glabra* Choisy	Pink Paper Flower	Shrubs
		Bougainvillea buttiana Holtum & Standl.	White Paper Flower	Shrubs
20	Oxalidaceae	*Oxalis corniculata* L.	Small Tamarind Leaf	Herbs
21	Piperaceae	*Peperomia pellucida* (L.) Kunth	Chinese Betel	Herbs
22	Rubiaceae	*Ixora coccinea* L.	Asoka	Shrubs
23	Urticaceae	*Pilea microphylla* (L.) Liebm.	Katumpangan	Herbs
24	Verbenaceae	*Duranta erecta* L.	Naughty Sinyo	Shrubs

3.2. Learning Resource Feasibility Criteria Validation Results

Based on the percentage of feasibility assessments conducted by expert validator lecturers (content, design, and media) and trials to students, it states that the results of the validation of the feasibility criteria for learning resource in the form of flipbook are very feasible to use as one of the learning resource that can be utilized in the learning process. The total percentage obtained is 89%. The assessment results are presented in Table 2 below.

Table 2 Results of Validation of Learning Resource Feasibility Criteria

No.	Validator	Percentage (%)
1	Content Expert	85
2	Design Expert	96
3	Media Expert	93
4	Student Testing	84
	Total	358
	Average	89

4. Discussion

Based on the research that has been done, a total of 50 species of plants were found around the environment of SMA Negeri 1 Palu which are divided into 24 families and 5 habitus, both plants that grow wild and cultivated plants. The results showed that the wild plants found consisted of 5 families, including the Urticaceae family 1 species namely *Pilea microphylla* (L.) Liebm, Oxalidaceae family 1 species namely *Oxalis corniculata* L., Piperaceae family 1 species namely *Peperomia pellucida* (L.) Kunth, Euphorbiaceae family 1 species namely *Acalypha indica* L., and Acanthaceae family 1 species namely *Asystasia gangetica* (L.) T.Anderson. The wild plants found were all Herbs habitus.

Cultivated plants found consisted of 21 families, including the Acanthaceae family 2 species namely *Graptophyllum pictum* (L.) Griff. and *Pseuderanthemum maculatum* (G.Lodd.) I.M..Turner, family Anacardiaceae 1 species namely *Mangifera indica* L, family Annonaceae 1 species namely *Monoon longifolium* (Sonn.) B.Xue & R.M.K Saunders, family Apocynaceae 3 species namely *Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.., *Catharanthus roseus* (L.) G.Don, and *Adenium obesum* (Forssk.) Roem. & Schult, family Araceae 7 species namely *Alocasia macrorrhizos* (L.) G.Don, *Alocasia cucullata* (Lour.) G.Don, *Aglaonema rotundum* N.E.Br., *Homalomena rubescens* (Roxb.) Kunth, *Zamioculcas zamiifolia* (G.Lodd.) Engl., *Aglaonema commutatum* Schott, and *Alocasia micholitziana* Sander, Araliaceae family 1 species, *Polyscias scutellaria* (Burm.f.) Fosberg, Arecaceae family 1 species, *Dypsis lutescens* (H.Wendl.) Beentje & J.Dransf, family Asparagaceae 9 species namely *Drimiopsis maculata* Lindl. & Paxton, *Ledebouria socialis* (Baker) Jessop,

Chlorophytum comosum (Thunb.) Jacques, *Chlorophytum orchidastrum* Lindl., *Dracaena trifasciata* (Prain) Mabb., *Dracaena angolensis* (Welw. Ex Carriere), *Cordyline fruticosa* (L.) A.Chev., *Agave demeesteriana* Jacobi, and *Dracaena hyacinthoides* (L.) Mabb, family Aspleniaceae 1 species namely *Asplenium nidus* L., family Boraginaceae 1 species namely *Ehretia microphylla* Lam., family Commelinaceae 1 species namely *Tradescantia pallida* (Rose) D.R.Hunt, family Euphorbiaceae 5 species namely *Euphorbia tithymaloides* L., *Macaranga tanarius* (L.) Mull.Arg., *Euphorbia umbellata* (Pax) Bruyns, *Codiaeum variegatum* (L.) Rumph. ex A.Juss., and *Excoecaria cochinchinensis* Lour., family Fabaceae 2 species namely *Clitoria ternatea* L. and *Pterocarpus indicus* Willd., family Heliconiaceae 1 species namely *Heliconia rostrata* Ruiz & Pav .., family Marantaceae 1 species namely *Maranta arundinacea* L., family Musaceae 1 species namely *Musa acuminata* Colla., family Myrtaceae 2 species namely *Syzygium polyanthum* (Wight) Walp. and *Syzygium oleana* Wight., family Nyctaginaceae 2 species namely *Bougainvillea glabra* Choisy and *Bougainvillea buttiana* Holtum & Standl .., family Rubiaceae 1 species, namely *Ixora coccinea* L., and family Verbenaceae 1 species, namely *Duranta erecta* L. The cultivated plants found consisted of 5 habitus, namely herbs 19 species, shrubs 14 species, bushes 6 species, epiphytes 1 species, and trees 6 species.

The type of plant that is most commonly found around the environment of SMA Negeri 1 Palu is from the Asparagaceae family consisting of 9 species and plants found around the school are also more herbaceous plants because of the fertile soil conditions and the habitat of herbaceous plants that also include shady places.

The number of plant species found around the environment of SMA Negeri 1 Palu is not much different from the number found from the results of research that has been done before in different schools. This is proven in accordance with research conducted by Ginting (2022), regarding the types of plants in the area of SMA Negeri 1 Sindue and their utilization as a medium for learning biology. Based on the research, it is said that 54 plant species have been found in the SMA Negeri 1 Sindue area, including 49 genus and 35 *family*. Herbaceous plants totaled 18 species, shrubs totaled 5 species, bushes totaled 14 species, trees totaled 9 species, epiphytes totaled 3 species, and lianas totaled 5 species. However, although the total number of plant species found is not much different, of course the two studies must have differences. The difference will certainly be seen clearly when viewed from each type of plant found, it could be that plants found around the environment of SMA Negeri 1 Palu were not found in the SMA Negeri 1 Sindue area and vice versa. For example, plants found around the environment of SMA Negeri 1 Palu are not only from the division of Magnoliophyta, but also from the division of Cycadophyta and Polypodiophyta. While in the area of SMA Negeri 1 Sindue, no plants from the division of Cycadophyta were found. The difference can also be seen from two factors both from the environmental factors themselves and from the treatment factors given when cultivating plants around the school environment.

4.1. Utilization of Plants Around the Environment of SMA Negeri 1 Palu as a Learning Resource

The environment around the school is one of the places that can be used as a learning resource, especially for schools that have many plants around them. Learning resources are anything that can be utilized to inform the teaching and learning process (Sitangggang & Hermawati, 2015). In developing learning resource, of course, maximum effort is needed, so that the learning resource developed are also maximized.

Learning resource that have been made based on the results of this study are in the form of digital book (flipbook). The flipbook referred to in this study is a digital book that is easily accessible anytime and anywhere, so that it can facilitate anyone who will access it. This flipbook has a letter size (8.5 × 11 *inches*) which contains information in the form of images, classification, and description (morphological form) of each plant species found around the environment of SMA Negeri 1 Palu.

The stage of making learning resource in the form of flipbook is initially designing learning resource through the Canva application by entering the identification results of each type of plant found. After the flipbook has been designed, the next stage is to validate the learning resource. Flipbook was validated by 3 validator lecturers, namely content expert, design expert, and media expert. Then, the next stage is to revise the learning resource, and after being revised the flipbook can be tested on 30 students of SMA Negeri 1 Palu by sharing the flipbook link along with a *google form* link to fill in several predetermined assessment aspects.

Based on the results of feasibility validation that has been carried out by 3 expert validator lecturers (content, design, and media) and the results of the feasibility trial of learning resource to students, it shows that learning resource in the form of flipbook are very feasible to use as learning resource that can be used in the learning process. The results of validation conducted by content expert validator obtained a percentage of 85% (very feasible), design expert validator obtained a percentage of 96% (very feasible), media expert validator obtained a percentage of 93% (very feasible), and

for the results of the feasibility trial of learning resource to students obtained a percentage of 84% (very feasible). Then, based on the results of the validation of the learning resource feasibility criteria, an average percentage of 89% was obtained with very feasible criteria. This is in accordance with what is explained by Arikunto (2009), which states that the criteria for the percentage of feasibility at a percentage of 81% - 100% include very feasible criteria. Thus, based on the results of the validation of the learning resource feasibility criteria, the learning resource in the form of a flipbook can be declared very feasible to use as a learning resource that can be utilized in the learning process.

This learning resource in the form of a flipbook has advantages and disadvantages both in terms of content, design, and media. As for the advantages of this flipbook, it can make it easier for students to find out various types of plants in the school environment. As for the shortcomings of this flipbook, namely the location of the writing that is still not appropriate, the technique of taking pictures of each type of plant found is still less thorough, and the use of letters and the amount of letters in the flipbook is still not appropriate so that the validator suggests to pay more attention to the location of the writing, be more careful in taking pictures, and adjust the amount of letters in the flipbook

5. Conclusion

Based on the results of the research that has been carried out, it can be concluded that

- The types of plants found around the environment of SMA Negeri 1 Palu are 50 species which are divided into 24 families and 5 habitus, both plants that grow wildly and cultivated plants. The results showed that wild plants found consisted of 5 families of 5 species and cultivated plants found consisted of 21 families of 45 species.

- The results of this study can be used as a learning resource in the form of a flipbook. This has been proven in accordance with the results of the percentage of feasibility assessments conducted by 3 expert validator lecturers (content, design, and media) and trials to students, which state that the results of the feasibility validation of learning resource in the form of flipbook are very feasible to use as learning resource in the learning process with a percentage of 89%.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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