

## Herbarium book: Learning media in medicinal plants lecture

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### ABSTRACT

This study aims to (1) determine the types of medicinal plants used in Teluk Kayu Putih village, (2) describe the development of the herbarium book media for medicinal plants lecture, (3) determine the validity and (4) the readability test of the herbarium book of medicinal plants as a learning media. The ADDIE development model research consists of 2 stages of research. The first stage of qualitative research is to obtain data on the types of medicinal plants in Teluk Kayu Putih Village. The second stage of media development is making a herbarium book. Field data collection methods include observation and documentation (first stage) and questionnaire (second stage). The results obtained are: (1) The types of plants used as medicine in Teluk Kayu Putih Village are 27 species grouped into 25 families; the most plant species came from Family Euphorbiaceae, Myrtaceae, and Zingiberaceae, each with 2 species, (2) The media developed are specimens of medicinal plants originating from Teluk Kayu Putih village, including plant parts that have been dried using a pressing technique, arranged in a scrapbook with a black base color derived from black cardboard, the specimens are pasted one by one and then identified, as well as put together and bound in a spiral to form a book, (3) The validity test from material experts and media experts on the media produced obtained a score of 81,35% and 85,26%, while the validity test score obtained a score of 86,31% (very feasible), (4) The readability test of the herbarium book by 23 respondents obtained an average percentage score of 92,6%, means that the media is suitable to use.

**Keywords:** herbarium book, learning media, medicinal plants

### INTRODUCTION

Higher education as a formal institution is required to play an active role in preparing professional and competent teachers. Institutions that prepare prospective teachers are universities (Rama, 2011). Higher education aims to create students who believe in God Almighty, are pious, have high morals, are physically and spiritually healthy, knowledgeable, competent, have creativity, are independent, competent, and understand their culture in the context of national and state independence, to create scholars who are experts in science and technology through research that respects and implements human values to increase the nation's competitiveness and progress of the nation, civilization, and human welfare.

Learning is a series of student-teacher interactions to achieve goals (Rachmawati & Daryanto, 2015), in the learning process, the components involved are learners, educators, the community, and parents interacting with each

other to achieve educational goals. Lecturers and educators, in carrying out their duties as educators, mentors, trainers, and even as parents are required to be able to understand various sides of one's behavior or the behavior of others following their duties. Students can take an active role in the learning process effectively, and play a role in achieving the goals of the college (Suralaga, 2021).

In principle, lecturers have responsibilities and duties to carry out humanitarian rules and norms and not make this a moral burden for themselves. One of them is motivating students to actively participate in the learning process so that the learning process becomes fun and active to achieve learning goals during lectures (Maunah & Agustina, 2019). At the learning stage, disturbances sometimes arise in the process of interaction between students and lecturers, in the sense that the teaching materials provided to students cannot be understood properly by students, therefore not all teaching materials

provided can be studied entirely. Therefore, lecturers must be able to convey real learning in managing the learning process. Lecturers must be able to convey material in real terms so that students can easily understand it. What is needed to present material in a real way in the learning process at the university level is the use of effective learning media as needed.

Learning media are media and resources that can be used to create educational goals. Lecturers as the delivery of learning material will transfer learning material through media that is loaded in the form of visual symbols that can be absorbed by the sense of sight (Sardiman et al., 2014). Visual model learning media must be able to foster student motivation in learning to increase interest in learning the material presented. There are several materials, one of which is medicinal plants in the Biology Department.

The lecture on medicinal plants is part of biology, as a field in the realm of plant science, namely higher plants, and changes in plant forms. Therefore, the use of visual learning media is very necessary for students to learn. According to the findings of the needs analysis for lecturers and students who have gone through the lecture process, the use of visual media can help students understand the material because teaching materials delivered to students must be understood and seen in real terms. From that description, one of the visual learning media that can be used besides picture media is a dry herbarium to increase student responsiveness in certain subjects by displaying a visualization of the material to be taught.

A herbarium is a collection of preserved plant species, most of which are attached to and mounted on sheets of paper. For a botanist, plant specimens or types are of greatest value because they can be examined microscopically, have dimensions and can provide material for chemical tests, for example for DNA analysis (Flannery, 2013). In line with what was said (Vechiu & Dincă, 2019) Herbarium can also provide information regarding plants and areas, propagation over a long time which can also help

in the study of taxonomy, biodiversity, ecology, anatomy, morphology and others. The creation of herbarium specimens is important in botanical studies, but it is often not done (Herbarium Specimens, 2018). The stored specimen is an important record of what plants grew where over time (the University of Melbourne Herbarium School of BioSciences, 2018). The herbarium is used as a collection of specimens that have been preserved and stored for a long time (Nissa et al., 2019). A herbarium was also made to show where the plant was taken and explain how the plant developed (Kachova et al., 2020). A good herbarium should display well-dried plant parts to provide a representative picture over a long period (Takano et al., 2019).

Plant herbarium is plant material that has gone through a preservation process that is carried out by drying or also known as dried herbarium specimens. These specimens are useful as learning and research support materials, for example as a source of information on biology that discuss flora and plant ecology (Mertha et al., 2018).

The herbarium is also used for teaching media materials in a medicinal plants lecture related to the types of medicinal plants and the morphology of these plants so that they can be used as aids in medicinal plants lecture. This media is a specimen of plant species that have undergone artificial drying, then affixed to special paper, labeled containing information about the dried plants, preserved, and stored in special storage containers (Murni et al., 2015).

For the herbarium to be used in the study and used as a learning medium, the researcher designed a dry herbarium in the form of a herbarium book, as a collection of several types of medicinal plants which were dried, then glued on A4 paper, combined and bound to form a practical herbarium book. The herbarium is made into book form, which contains material regarding the meaning of the herbarium and descriptions of plant species. This media is used in learning medicinal plants when learning about the types of plants used in medicine, so students use this

herbarium book to be used as a medium of learning.

Visual learning media, namely dry herbarium, is a learning media that can help convey material in a real way, by showing various types of preserved dried plants, so that they are more practical in their use. The process of designing this media uses tools that are very practical and easily available. This herbarium book is used in learning by displaying real examples of the material presented.

In this regard, several studies on the development of herbarium books have been carried out, several studies related to the development of herbarium books such as the Development of a Fern Herbarium Book at Putuk Truno Waterfall as Learning Media for Plantae Materials (Ula & Dewi, 2021) and the Development of a Herbarium Book of Ferns as a Learning Media for Science Classification of Living Things for Grade VII Students (Rahmawati, 2020). Teluk Kayu Putih Village, in general, are well acquainted with the types of traditional medicinal plants and their use as medicines almost all people use these plants as medicine and it is very important to know which plants are used as medicine. Researchers think there is a need to develop a herbarium book that can be used as a learning medium by displaying concrete specimen examples, practical to carry, making it easier for lecturers to create a fun learning process and provide real learning experiences to students. This research is different from existing research, the dry herbarium design was made using the scrapbook model after which it was documented and made in the form of a herbarium book.

## METHOD

This research is research and development research (Sugiyono, 2014). This research consisted of two stages: The first stage, using a type of qualitative research was used to collect samples and identify medicinal plants native to Teluk Kayu Putih Village. The second stage uses the type of development research, namely designing the Herbarium Book. The instruments

used were expert validation questionnaires, and student response questionnaires to the developed media. The research phase is carried out as follows:

### **Stage 1 (Identification of medicinal plant types)**

In the first stage, the types and designs used were to describe the qualitative data obtained descriptively, namely in the form of an explanation of the types of medicinal plants in Teluk Kayu Putih Village, then the results of the collection of medicinal plants were identified at the Horticultural Food Crops and Food Security Service, the Agricultural Extension Center, District VII Koto Tebo Regency. Samples are plants used by the community as medicine by observing (recording data and collecting samples), and documentation. The identification process is carried out by matching plants according to a particular taxonomy. Then with the help of herbarium/ botanists or based on books on taxonomy/ dendrology as well as books on plant taxonomy of Spermatophyta, Thallophyta, Bryophyta, Pteridophyta, and Flora books.

### **Stage II (The design of medicinal plants herbarium book)**

The type of research used is research and development (R&D), using the ADDIE methodology (Analysis, Design, Development, Implementation, and Evaluation). This stage is a systematic stage that aims to design and develop effective and efficient products (Sari et al., 2017).

## RESULTS AND DISCUSSION

### **Stage I (Identification of medicinal plants in Teluk Kayu Putih Village)**

In the first stage, researchers collected samples of medicinal plants from Teluk Kayu Putih Village and carried out the identification process. The results of the classification can be seen in Table 1.

Table 1. Types of medicinal plants in Teluk Kayu Putih Village.

No	Family	Scientific name
1	Acanthaceae	<i>Graptophyllum pictum</i> Griff.
2	Annonaceae	<i>Annona muricata</i> L.
3	Apocynaceae	<i>Catharanthus roseus</i> (L.) G. Don.

4	Araceae	<i>Acorus calamus</i>
5	Asterales	<i>Blumea balsamifera</i>
6	Caricaceae	<i>Carica papaya</i> L.
7	Clusiaceae	<i>Garcinia mangostana</i> L.
8	Euphorbiaceae	<i>Jatropha curcas</i> L.
9	Euphorbiaceae	<i>Jatropha multifida</i> L.
10	Fabaceae	<i>Clitoria ternatea</i> L.
11	Lamiaceae	<i>Peronema canescens</i> Jack
12	Fabaceae	<i>Senna alata</i> (L.) Roxb.
13	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.
14	Manispermaceae	<i>Tinospora cordifolia</i>
15	Melastomataceae	<i>Melastoma malabathricum</i> L.
16	Moringaceae	<i>Moringa oleifera</i> L.
17	Myrtaceae	<i>Psidium guajava</i> L.
18	Myrtaceae	<i>Syzygium polyanthum</i>
19	Oxalidaceae	<i>Averrhoa bilimbi</i> L.
20	Piperaceae	<i>Piper betle</i> L.
21	Rubiaceae	<i>Morinda citrifolia</i> L.
22	Rutaceae	<i>Citrus aurantifolia</i> (Christm.) Swingle
23	Sapindaceae	<i>Nephelium lappaceum</i> L.
24	Sapotaceae	<i>Manilkara zapota</i> (L.) P. Royen
25	Solanaceae	<i>Brugmansia arborea</i> (L.) Steud
26	Thymelacaceae	<i>Phaleria macrocarpa</i> (Scheff.) Boerl
27	Zingiberaceae	<i>Curcuma longa</i> L.

Plants used as medicine in Teluk Kayu Putih Village, VII Koto District, Tebo Regency, there are 27 plant species grouped into 25 families, most plant species coming from Euphorbiaceae, Myrtaceae, and Zingiberaceae, each of which has 2 plant species. Each of the 27 plant species is common in residential areas and can be found in gardens and yards. Tribal and village shamans deliberately plant several types of plants in preparation if needed for treatment.

### **Stage II (Development of herbarium book) Analysis**

Before the herbarium book was developed, the researchers conducted a need analysis by conducting interviews with one lecturer in charge of the class and distributing needs analysis questionnaires to biology education students at UIN Sulthan Thaha Saifuddin Jambi, a total of 23 students via Google form who took the medicinal

plants lecture. The statement contains whether learning media have been developed in the form of a herbarium of medicinal plants for learning material in medicinal plants lecture. Table 2 is a media needs analysis questionnaire statement.

Table 2. Analysis of student needs.

No	Questions	Answers
1	Do you have a handbook on the Medicinal Plants lecture?	21 answered "Yes" 2 answered "No"
2	Is the current learning media sufficient to achieve knowledge in the Medicinal Plants lecture?	10 answered "yes" and 13 answered "no"
3	Do you have difficulty studying the material in the Medicinal Plants lecture?	19 answered "yes" and 4 answered "no"
4	Is the current learning media sufficient if used in understanding the content of the Medicinal Plants lecture?	16 answered "yes" and 7 answered "no"
5	Identification of plants makes it easier to find out the types of medicinal plants used	21 answered "yes" 2 answered "no"
6	Do you know the herbarium?	19 answered "yes" and 4 answered "no"
7	Do you know how to make a herbarium?	10 answered "yes" and 13 answered "no"
8	Do you know Medicinal Plants?	13 answered "yes" and 10 answered "no"
9	Have you found the herbarium used as a learning medium?	5 answered "yes" 18 answered "no"
10	Do you agree that learning media is developed in the form of a herbarium of medicinal plants for learning material in Medicinal Plants lecture?	23 answered "yes" 0 answered "no"

The results of the student need questionnaire analysis based on the responses that have been filled out show that students do not understand real plant species, then students also do not know how to make a herbarium book that is designed using the scrapbook model, so from the results of the needs analysis carried out, the researcher designed the media. The plants in Herbarium Book were taken from Teluk Kayu Putih Village and selected plants that were often used by the community as medicine.

## Design

### a. Collection of resources

#### 1) Media resources

Making the media parts requires an application that helps to design it. The application used is Canva to design herbarium books, from the cover to the bibliography. Before the herbarium book is designed using Canva, the dried samples are first arranged and made using the scrapbook model. To make a dry herbarium, you need plant samples, glue, 70% alcohol, masking tape, label paper, mattress thread, newspapers, paperweights, mounting paper, scissors, a knife, and laminating. After the herbarium was made with the scrapbook model earlier, it was then photographed one by one and then designed using Canva so that it formed a herbarium book.

#### 2) Materials resource

The material in the herbarium book contains a brief description of dry herbarium explanations and an explanation of each plant's description, namely a description of leaves, stems, flowers, and fruit, then also explains the chemical substances and their benefits, which consist of 27 types of medicinal plants. Many of the references used come from national articles, of them (Widiyastuti et al., 2016) and some from books on medicinal plants, one of the reference books used (Dalimartha, 1999).

#### 3) Additional resource

Supplementary resources, such as those that assisted in the design of this product, such as photos, supplies, and supplies needed for scrapbooking materials.

### b. Create a storyboard

Storyboards describe the content that will be included on each media page. There will be a title page, pictures, and text on the storyboard. The shape and order of the pages are also explained on the storyboard. The details of the components made are herbarium book cover, preface, table of

contents, material for herbarium books & medicinal plants, herbarium specimens for medicinal plants, bibliography, and author biography.

## Development

### a. Development of medicinal plants in Teluk Kayu Putih Village

The parts of medicinal plants used by researchers to make dried herbariums are generally only the leaves and stems, but some plants also have other parts with flowers. Preserved plant parts are sprayed using 70% alcohol. Then the organ is preserved by natural drying technique by making a sack to provide weight to the sample so that the sample dries quickly.

### b. Development of the herbarium book of medicinal plants in Teluk Kayu Putih Village

The herbarium book that was developed was made using the Canva application to design its appearance with A4 paper size using portrait orientation. Then it was printed using A4 paper with a thickness of 80 gsm for the front and back covers printed using Samson Kraft Paper A4 with a thickness of 350 Gsm. There has not been much innovation in the field of educational scrapbooks, which typically feature concise explanations of the subject matter and more attractive designs are achieved through careful consideration of factors such as font size, image quality, and color schemes.

Several factors must be considered in making this herbarium book, which includes three important parts, namely the introduction, contents, and supporting parts. The editorial book herbarium, preface, and table of contents are in the introduction section. The bibliography and appendices are supporting parts (Ali, 2021), this herbarium book is designed to be used as a learning resource, so it is written with clear and interesting information while still including an introduction, contents section, and supporting sections.



*c. Validator test results*

The product being developed is in the form of a herbarium book media for medicinal plants which is validated to ensure its feasibility. Material experts, media experts, and supporting lecturers validate materials and media to check product quality. The validators came from a lecturer in Biology Education, at Jambi University and a lecturer in Tadris Biology, Sulthan Thaha Saifuddin Jambi State Islamic University. The results of the expert validation are presented in Table 3.

Table 3. Expert validation test results.

Validator	Total Score	Total Ideal Score	Percentage
Material Experts	158	190	83,15 %
Media Experts	81	95	85,26%
Lecturers	164	190	86,31%

Based on the results of the material expert validation, the herbarium book media obtained a score of 158 out of a total ideal score of 190, with a score percentage of 83.15%. Based on the material validation criteria, it can be concluded that the herbarium book developed is classified as very feasible.

Based on the validation results of the herbarium book media expert, an average score of 81 out of a total score of 95 was obtained, with a percentage of 85.26%.

Based on the media validation criteria, it can be concluded that the herbarium book developed is classified as very feasible.

The herbarium book of medicinal plants that have been validated by the supporting lecturers obtained a score of 164 out of a total score of 190, with a percentage of 86.31%. Based on the validity criteria, the herbarium book developed is classified as very feasible.

**Implementation**

Tadris Biology students at UIN Sulthan Thaha Saifuddin Jambi with a total of 23 students taking the Medicinal Plants lecture filled out a questionnaire to assess the readability of the herbarium book media.

From the results of the questionnaire assessment, 23 students majoring in biology at UIN Sulthan Thaha Saifuddin Jambi received a combined score of 92.6%. The developed herbarium book has a high usability rating on the scale provided. With an average score of 84.90% on the validation test and 92.6% on the readability test, it can be concluded that the herbarium book media is suitable for limited use without revision because a score percentage of > 62.50% is the minimum limit for this to happen (Mulyatiningsih, 2013). Overall suggestions and improvements from the validator are presented in Table 4.

Table 4. Product revisions from validators.

Suggestions for Improvement	Before	After
	In the previous view, the book did not include a description of the medicinal plants used as herbarium specimens, the validator provided an improvement by adding a brief description of the plants used as specimens.	

Add the description for the plant

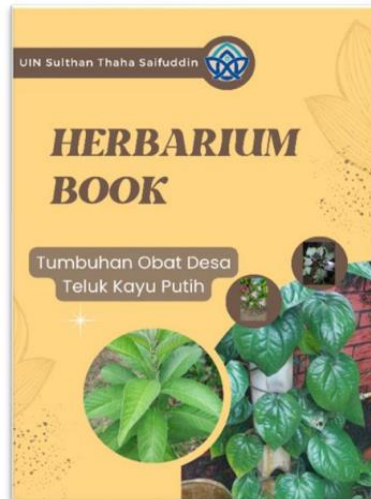


Inaccurate and Untidy Writing of Scientific Names



In some of the specimen descriptions, the writing of the classification is still not neat and the writing of the scientific name should be italicized.

Add the Name of the Author of the Herbarium Book on the Cover



Add Recent Reference Sources



The validator provides suggestions for using the latest reference sources so that the data presented is up-to-date and reliable

It needs to be tidier.



In the previous view, it seems that it has not been neatly arranged, it is better to add improvements by tidying up and redesigning the herbarium book that has been made so that it attracts the attention of other students.

Add Specimen Collection Date



Previously: no sampling date. The display after the sampling date is added.



Even so, improvements and changes are still being made because many suggestions can improve this research.

### Evaluation

Revision of product validation test results from material experts, media experts, supporting lecturers, and respondents, the herbarium book media for medicinal plants needs to be updated in six main areas. The improvements that have been made are as follows: (a) Add a description of the plant, (b) the scientific name is still written inaccurately and sloppy, (c) add the name of the herbarium book author on the cover, (d) add the latest reference source, (e) tidy up the appearance of the herbarium book, (f) add the date of specimen collection.

According to [Djuwita \(2011\)](#), Plants in the form of a herbarium are very important as collection material for research and learning purposes, so the herbarium book that has been developed can be used as a learning medium besides making direct observations to see the original plant. Herbarium specimens can serve as useful teaching tools, and the museum itself can be used to enhance classroom discussion and learning ([Hasanah & Daesusi, 2019](#)). The dried herbarium created by the students will inspire them to think outside the box when interpreting plant species, ([Hafida et al., 2020](#)). The herbarium book media used in learning can be used to convey information and can also assist students in learning about medicinal plants. The results of the development carried out by [Dahlia \(2020\)](#) by making a herbarium book said that the media created aims to make it easier to understand and remember the information conveyed in learning. In line with what was said by [Asra et al., \(2019\)](#), herbarium specimen objects which are simple learning media have several benefits including providing direct experience, presenting concrete and nonverbal information, clarity of objects that can be displayed, and knowing the natural habitat of plants. Not only in learning, the herbarium can also be used for student practicum activities ([Syamwisna, 2012](#)). Using media effectively can

help students in many ways, including academic achievement, emotional well-being, and the ability to think and act independently ([Sulistiyani, 2013](#)).

The test results are used to determine whether the Herbarium book developed as a biology teaching material meets the required standards. This herbarium book is designed using the ADDIE model, which includes learning analysis, selecting appropriate strategies, media, and materials, implementing these strategies and materials, involving student participation in the process, as well as evaluating and perfecting the final product. The first is the need analysis stage for biology students. The research was conducted to provide an overview of the condition of lecturers and learning media. Based on the questionnaire that was filled in by students via the Google form, it was concluded that Medicinal Plants lectures require media that show real examples of the material explained by the lecturer. Thus, from the results of the analysis, the researcher developed it by making a media, namely in the form of a recorded plant herbarium or commonly called a herbarium book. The goal is to help students better absorb the information presented in class by providing authentic biology learning media.

The second stage is the researcher determines the material in the Medicinal Plants lecture. Real examples are used because they will make the classification more transparent. This herbarium book can help both students' understanding of the material and the lecturer's ability to convey it.

The third stage is the stage of preparing the herbarium book media to be used. The first step in preparing the media is to select a sample of dried leaves. Materials that have been processed to become a herbarium are called specimens and are stored for 1-2 weeks ([Primawati et al., 2021](#)). Drying can also be done in an oven to allow the plant to dry completely, as complete drying keeps the specimen free of mold ([Asra et al., 2019](#)), then using a press tool, newsprint to store the specimens, then after drying attach the dried specimens to black cardboard and then affix them



researchers must make improvements by including all plant parts to be used as herbariums so that the herbarium book made is better and more complete.

## CONCLUSION

Medicinal plant specimens of Teluk Kayu Putih Village, District VII Koto, Tebo Regency include 27 plant species grouped into 25 families, with the most plant species coming from Euphorbiaceae, Myrtaceae, and Zingiberaceae each with 2 plant species.

The herbarium book of medicinal plants being developed is a medicinal plant specimen originating from Teluk Kayu Putih Village which includes parts of the plants that have been dried and then arranged using a scrapbook model, put together and bound in a spiral to form a book. After that, the books were photographed one by one and designed using the Canva application, starting from the cover to the bibliography so that all students could have this herbarium book media.

For the benefit of the campus, especially the Tadris Biology department, this herbarium book for medicinal plants in Teluk Kayu Putih Village can add to the collection of learning resources for the campus which provides information about the types of medicinal plants that are often used by the people of Teluk Kayu Putih Village. For other researchers, this herbarium book of medicinal plants can be used as a reference for conducting similar research such as research on the development of other herbariums, and can add insight and train skills in observation or research.

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