Booklet Types of Macroscopic Fungi Riverbanks Nature Tourism Kembang River for Senior High School

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Abstract

Media in biology learning is one of the means so that students understand the concept of biology in a broad sense. This encourages researchers to develop learning media in the form of macroscopic fungi booklets. This study aims to describe the characteristics and identify the types of macroscopic fungi found on the banks of the Kembang River natural tourism river and to describe the results of the validity of the macroscopic fungi booklet on the banks of the Kembang River natural tourism river as a learning medium for high school students. This research uses the descriptive method and 4D development method. The results showed that the characteristics of macroscopic fungi can be seen from the shape of the hood, the surface of the hood, its hymenophores, the shape of the stem, color, presence or absence of annulus and odor, and the type of substrate where the fungus grows. Macroscopic fungi found on the banks of the Sungai Kembang Nature Tourism river are divided by taxon level into 2 divisions, 3 classes, 4 orders, 6 familia, 8 genera, and 17 species. Utilization of research results on types of macroscopic fungi on the banks of the Kembang River natural tourism river is then presented in the form of a booklet (learning media) which gets an average expert validity of 82.10% with very valid criteria and suitable for use as a learning medium.

Abstrak

Media dalam pembelajaran Biologi merupakan salah satu sarana agar peserta didik memahami konsep pada Biologi secara luas. Hal tersebut mendorong peneliti untuk mengembangkan media pembelajaran berupa *booklet* materi jamur makroskopis. Penelitian ini bertujuan untuk mendeskripsikan karakteristik dan mengidentikasi jenis jamur makroskopis yang ditemukan di bantaran sungai wisata alam Sungai Kembang serta mendeskripsikan hasil validitas *Booklet* jamur makroskopis di bantaran sungai wisata alam Sungai Kembang sebagai media pembelajaran siswa SMA. Penelitian ini menggunakan metode deskriptif dan metode pengembangan model 4D. Hasil penelitian menunjukkan bahwa karakteristik jamur makroskopis dapat dilihat dari bentuk tudung, permukaan tudung, hymenophorenya, bentuk batang, warna, ada tidaknya annulus dan bau, serta jenis substrat tempat tumbuhnya jamur. Jamur makroskopis yang ditemukan di bantaran sungai Wisata Alam Sungai Kembang yang terbagi berdasarkan tingkatan taksonnya menjadi 2 divisio, 3 kelas, 4 Ordo, 6 Familia, 8 genus, dan 17 species. Pemanfaatan hasil penelitian jenis-jenis jamur makroskopis di bantaran sungai wisata alam Sungai Kembang kemudian disajikan dalam bentuk *booklet* (media pembelajaran) yang mendapat hasil rata-rata validitas ahli 82,10% dengan kriteria sangat valid dan layak digunakan sebagai salah satu media belajar.

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A. Introduction

Kalimantan Island is the largest island in Indonesia which still has a lot of extraordinary biodiversities. The abundance of exotic flora and fauna is interesting to be used as a learning resource for various ages and groups. One area that has a diversity of flora and fauna is the Kembang River Nature Tourism. Located in West Bangkal Awang, Kec. Karang Intan, Kab. Banjar, South Kalimantan. Located at an altitude of approximately 250m above sea level with a row of shady trees and a river in the middle, this area has the potential to grow a variety of fungi because naturally, fungi require moist conditions and lack of sunlight. However, some fungi can grow in cold and hot climates with an optimum temperature between 20˚C-30˚C (Administrator, 2016). Apart from being a natural decomposer, some fungus has medicinal and food sources. This is certainly interesting to learn.

Rahma (2018) has used the results of macroscopic fungi research to examine the characteristics of macroscopic fungi in Oil Palm Plantation, Meureubo District, West Aceh, and obtained 40 species of macroscopic fungi which are then used as supporting material for kingdom fungi learning at SMA Negeri 1 Meureubo. Rahmadani (2019) examined the characteristics of macroscopic fungi at the Soraya Research Station in the Leuser Ecosystem and found 158 species dominated by the Basidiomycota division which were then used as learning media on fungi material in the form of booklets.

Macroscopic fungi material is included in the material of fungi Biology in class X at KD 3.6 in the 2013 Curriculum which is one of the subjects of Biodiversity. The students are expected to be able to apply the principle of classification to classify fungi based on their characteristics and reproductive methods through careful and systematic observation.

Based on the results of observations to class X students at SMA Negeri 10 Banjarmasin, one of the reasons for students having difficulty understanding the concept of fungi is the lack of local potential-based references that are directly related to student life. The reason why local potential-based learning has not been implemented is due to limited information and time difficulties in making it, and determining learning materials that are relevant to the potential, while the characteristics of the 2013 curriculum emphasize that learning is applied in everyday life in the hope that it can train students' skills in socializing and learning to identify local potential problems in the area, independently.

According to Situmorang (2016), the large number of local potentials that are interpreted in

biology learning affects educators to be able to develop biology as a tool in presenting biological material that is suitable for everyday life. According to Susilo (2018), the use of locally-based learning materials and media is still limited to the school environment and has not made use of local potential. Most students consider it necessary to integrate local potential and wisdom in biology learning.

Media in biology learning is one of the means so that students understand the concept of biology in a broad sense. Many types of learning media exist to understand the material, require teachers to pay more attention to accuracy, suitability, convenience, and attractiveness in choosing media. As has been done by Amintarti *et al*. (2019), to improve the ability of the practitioner to find microscopic algal objects in the observations made, image media is made as a guide. The results of the research made in the form of textbooks (teaching media) and used for the learning process will greatly help students later in understanding the material. Its use can make students more interested in learning and can improve learning outcomes. (Rahma, 2018).

As printed media, booklets have the advantage of being concise in their presentation so that they are attractive and easy to use. Following Andreansyah's (2015) statement, the information in the Booklet is written in concise language, and is intended to be easy to understand in a short time, and aims to attract attention and be printed on good quality paper. According to Tari (2019) booklets are usually used, to increase knowledge, because booklets provide more specific information. It is hoped that the development of booklets for fungi material can attract students' interest in learning these materials.

B. Materials and Method

This study uses 2 types of methods, namely the descriptive method which aims to describe the identification of macroscopic fungi species using the roaming method (exploratory survey) and sampling with the selected sample method, based on the presence of microscopic fungi that are considered to represent the area.

Then proceed with the development method, 4D. This research was conducted to develop a booklet for the types of macroscopic fungi on the banks of the Kembang River natural tourism river as a learning medium that refers to the material in the biology subject for class X SMA. According to Thiagarajan (1974), the 4D model consists of 4 stages, namely: define, design, development, and disseminate. In this research, the stage carried out is

only up to development. The results of the validation of the developed Booklet were then analyzed using the calculation of the expert validation score which refers to table 1.

$$V\text{-}ah = \frac{TSe}{TSh} \times 100\%$$

Information:
V-ah = Expert Validity
TSe = Total Empirical Score achieved
TSh = the maximum score expected

The validity results of which the percentage is known can be matched with the validity criteria as presented in the following table:

Table 1 Expert Validity Criteria

Score (%)	Validity	Information
80 - 100	Very valid	No revision
60 - <80	Valid	Minor revision
40 - <60	Quite valid	Big revision
20 - <40	Less valid	Total revision
0 - <20	Invalid	Not used

(Adaptation Akbar, 2015)

C. Results and Discussions

Morphologically, the characteristics of macroscopic fungi studied on the banks of the Kembang River Nature Tourism are visible. These characteristics can be seen from the color of the fungus, the shape of the hood, having lamellae or porus, and also the substrate where the fungus grows.

According to Rahma (2018), the characteristics of fungi, macroscopic are the outer morphological forms of the fungus, seen from the shape of the hood, the edge of the hood, the color of the hood, the shape of the fruit stalk/body, the length of the trunk, the surface of the fruit body/stalk, the presence or absence of volva, the presence or absence of lamellae and type of substrate. Then according to Rahmadani (2019), macroscopic fungi have characteristics that are unique to each species, the shape and color of the hood, the edge of the hood, the volva, and also the stalk.

The results of the research and identification data obtained from the riverbanks of Wisata Alam Sungai Kembang found 17 types of macroscopic fungi. Macroscopic fungi found on the banks of the Sungai Kembang Nature Tourism river are divided by taxon level into 2 divisions, 3 classes, 4 orders, 6 familia, and 8 genera. The most common macroscopic fungi found included in the division Basidiomycota, class Agaricomycetes, order Agaricales, family Marasmiaceae, namely 6 species. This is because the substrate that is overgrown has high humidity which is suitable as a habitat for the family. The macroscopic fungi found can be seen in table 2 and the substrate of the found fungi can be seen in table 3.

Table 2 Types of Macroscopic Fungi Found

No.	Divisio	Class	Order	Familia	Genus	Species
1.	Ascomycota	Ascomycetes	Pezizales	Sarcoscyphaceae	Cookeina	*Cookeina* sp
						Cookeina tricholoma
		Sordariomycetes	Xylariales	Xylariaceae	Daldinia	*Daldinia childiae*
2.	Basidiomycota	Agaricomycetes	Agaricales	Mycenaceae	Mycena	Species 1
					Hymemicena	Species 2
				Marasmiaceae	Maramius	*Marasmius elegans*
						Species 3
						Species 4
						Species 5
						Species 6
						Species 7
				Tricholomataceae	Clitocybe	Species 8
						Species 9
			Polyporales	Polyporaceae	Trametes	Species 10
						Species 11
						Trametes gibbosa
					Pycnoporus	*Pycnoporus coccineus*

The existence of macroscopic fungi is influenced by several factors, one of which is the type of substrate. The substrate is the place, attachment, and growth of fungi which is the main source for fungal life. Different types of substrates can affect the number and types of macroscopic fungi that grow. Most types of macroscopic fungi found on the banks of the Kembang River nature

tourism river are on dead stems or rotten wood. Other habitats are leaf litter and soil. This is following the opinion of Fuhrer (2011) in Nasution (2018) which states that macroscopic fungi found in forests generally grow on dead/decayed trees and soil/leaf litter. Fungi are organisms that do not have chlorophyll so that in their growth, they require food substances from the decay of other dead organisms (Nasution, Rahayu Prasetyaningsih, & Ikhwan, 2018).

Table 3 Macroscopic Fungi Substrates Found

No.	Species	Substrate
1.	*Cookeina* sp	Soil
2.	*Cookeina tricholoma*	Weathered wood
3.	*Daldinia childiae*	Weathered wood
4.	Species 1	Leaf litter
5.	Species 2	Weathered wood
6.	*Marasmius elegans*	Soil
7.	Species 3	Weathered wood
8.	Species 4	Soil
9.	Species 5	Weathered wood
10.	Species 6	Weathered wood
11.	Species 7	Weathered wood
12.	Species 8	Leaf litter
13.	Species 9	Leaf litter
14.	Species 10	Weathered wood
15.	Species 11	Weathered wood
16.	*Trametes gibbosa*	Weathered wood
17.	*Pycnoporus coccineus*	Weathered wood

Based on Table 2, it is known that from the results of research on the riverbanks, the Kembang River Nature Tourism has quite a lot of species. The Basidiomycota division is a member of the species that is very much found because macroscopic fungi are generally included in the Basidiomycota division. Divisio Ascomycota only two classes were found, this is also because only a few Ascomycota fungi are included in macroscopic fungi. This is following the statement of Santoso (2004) that the Basidiomycota division is often presented as *Booklet* macroscopic fungi. This statement is supported by Dwidjoseputro (1978) who explained that the characteristics of Basidiomycota, among others, are mostly macroscopic. Dwidjoseputro (1978) also suggested that most Ascomycota are microscopic, only a small part are macroscopic and have fruit bodies.

The results of the research will be used as a learning medium in the form of a booklet that discusses macroscopic fungi in general and the characteristics of macroscopic fungi found on the banks of the Kembang River Nature Tourism. The booklet will be used in teaching materials for fungi class X SMA.

Figure 1 Developed booklet cover design

Figure 2 List of contents of the developed booklet

Then tested its validity by 2 validators. The validity test is carried out to determine whether the product is suitable for use as a learning medium or not. The results of the validation tests that have been carried out can be seen in Table 4.

The average percentage of results from the expert's assessment of the booklet is then adjusted to the predetermined category. Based on Table 4, shows that the validity of the booklet that has been determined by the validator obtained a total score of 82.10% with very valid criteria and is suitable for use as a learning medium following the provisions of Akbar (2015). There are several suggestions from the validator regarding the booklet being developed. The suggestions from the validator are then used as a reference for improving the booklet being developed so that the booklet is suitable for use in learning.

The results of the validation of the relevance aspect of the two validators obtained a score of 80%, which means that the material in the booklet is considered relevant to the competencies that must be mastered by students and the description in the booklet has met the demands of the curriculum. The preparation of the material in the booklet must be adjusted to the indicators and learning objectives

contained in the syllabus so that the delivery is right on target and the learning process can run effectively (Paramita, 2018). As well the preparation of appropriate media and the learning objectives can maximize the main function of the media, namely as a learning aid (Titin and Dara, 2016). Because according to Istifarida *et al.* (2017) content in learning media must be clear so that learning material can be conveyed effectively. The results of the validation of the accuracy aspect of the validator 1 obtained a score of 93, 33% which means that the material in the booklet is considered under scientific truth and is presented by student development and is presented by daily life because it uses examples that can be found in the student's life and uses original photos. Meanwhile, validator 2 obtained a score of 80%, which means that the material in the booklet is considered to be presented by scientific truth, but examples that exist in the student environment have not been included.

Table 4 Validation Test Results

No.	Validated Indicators / Aspects	Validator	
		I	II
1.	Relevance	80%	80%
2.	Accuracy	93.33%	80%
3.	Completeness of Serving	92%	76%
4.	Serving Systematics	80%	80%
5.	The suitability of the presentation with the demands of student-centered learning	93.33%	66.67%
6.	The suitability of the language with good and correct Indonesian rules	80%	80%
7.	Readability and communicativeness	80%	80%
8.	Media Suitability	100%	80%
9.	The ability of the media as a learning stimulus	80%	80%
10.	Ease of media in learning practice	100%	70%
11.	Media design	80%	80%
12.	Media quality	80%	80%
Average		**82.10%**	

The results of the validation of the completeness aspect of validator 1 obtained a score of 92%, which means that the presentation of the material in the booklet is considered to have provided the benefits and importance of mastering competencies for student life and is following the competencies that must be mastered by students. Meanwhile, validator 2 obtained a score of 76%, which means that the presentation of the material in the booklet is considered to be following the competencies that must be mastered by students, but still needs to add an explanation regarding the importance of learning the concept of fungi. The presentation of information in the booklet has been compiled from the front cover, introduction, table of contents, study instructions, macroscopic fungi material, conclusions, bibliography, and glossary. According to Panjaitan (2020), the booklet components which are arranged sequentially aim to make it easier to build readers' thinking power in reading booklets. Following the opinion of Rizawayani *et al.* (2017) that the systematics of the presentation will lead to the thinking power of the reader in absorbing knowledge information from the object being read.

The results of the validation of the systematic indicators of the two validators obtained a score of 80%, which means that the material

systematic in the booklet is considered to contain a flow of thought from simple to complex and the design presentation is following the material description so that students can adjust to their flow of thinking. The results of the validation of the suitability aspect of the presentation with the demands of student-centered learning from validation 1 obtained a score of 93.33%, which means that the booklet is considered appropriate and can greatly motivate students' curiosity. While validation 2 obtained a score of 66.67%, which means that the suitability of the presentation with the demands of student-centered learning still needs to be improved and it is necessary to add work instructions where students can learn for themselves about the fungi that are around so that they can improve student learning outcomes. the use of booklets can improve student learning outcomes. Booklet media can also strengthen student character education (Rehusisma *et al.*, 2017).

The results of the validation of the aspects of the suitability of the language with good and correct Indonesian rules and the legibility and communicative aspects of the two validators obtained a score of 80%, which means that they are considered to be following the rules of the Indonesian language and are in accordance with the students' understanding. While the results of the

validation of the media suitability aspect of the validator 1 obtained a score of 100% which means that it is considered very suitable. Meanwhile, validator 2 obtained a score of 80%, which means that it is considered appropriate but there are improvements. According to Setiawan *et al* (2018), poor sentences can cause readers to misunderstand the material contained in the booklet. The accuracy of the use of language in the booklet is seen from the selection of language that is straightforward, communicative, and understandable so that it does not cause multiple interpretations. and can help readers learn and understand information (Panjaitan, 2020). In addition to having text and images to improve understanding in learning, booklets can also train the language development of the readers (Setyaningsih, 2019).

The results of the validation of the aspect of the ability of the media as a learning stimulus from the two validators obtained a score of 80%, which means that they are considered capable of stimulating students in learning and for the results of the validation of the aspect of "media ease in learning practice" which is related to the efficiency of the media on the cost of making and using labor. According to validator 2, it is not efficient enough because the manufacturing costs are quite high, even though it can be minimized by printing using ordinary HVS paper, this causes a decrease in the quality of the images and colors in the booklets so that they are less attractive and the use of developed booklets still needs an explanation from the teacher. According to Setiawan *et al* (2018), it is very important to improve images and materials so that there are no misunderstandings in the contents of the booklet.

The results of the validation of the media design aspects and media quality aspects obtained a score of 80% from the two validators, which means that the proportions and color composition are appropriate, the appearance of media design consistency, cover appearance, images, and illustrations on attractive media as well as the quality and size of the paper as well as the print and binding results good. Following the opinion of Paramita *et al* (2018), the presentation of a clear image display in the booklet is needed so that the learning message is conveyed effectively. The color that matches the original condition of the fungi presented will also make it easier for users to find them and look more attractive, and according to Lia *et al*. (2016) learning media that is full of color attracts the attention of students. Then the type and size of the letters used in the booklet are also easy to read. Following the opinion of Fadli *et al*. (2017) which states that it is better if letters in the media

are arranged in letters that are not too small to consider whether the writing is legible or not.

D. Conclusion

Based on the results describing the identification of macroscopic fungi characteristics seen from the shape of the hood, the surface of the hood, its hymenophores, stem shape, color, presence or absence of annulus and odor, as well as the type of substrate obtained 17 species divided by taxon level into 2 divisions, 3 classes, 4 orders, 6 familia, and 8 genera. Then the results are presented in the form of a booklet that can be used by teachers and students of class X SMA as a learning medium for fungi material with an average score of 82.10% expert validation with very valid and feasible criteria so that it can be used as a learning medium.

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F. References

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