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# DIGITAL DICTIONARY APPLICATION OF MEDICINAL PLANTS AND THEIR BENEFITS AGAINST DISEASES CAUSED BY MICROORGANISMS BASED ON ANDROID

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## Abstract

Infectious diseases are diseases caused by pathogenic microbes and are the main cause of high morbidity and mortality in hospitals. Bacteria that often cause nosocomial infections are Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella sp. These microbes are transmitted through food, medicine, medical equipment, or direct contact (Konoralma, 2019). Medicinal plants or commonly called herbal plants are plants that have medicinal properties and are used as medicines in healing and preventing diseases (Suwandi & Mildawani, 2018). Android-Based Medicinal Plants Encyclopedia Application Engineering is research that aims to provide information about medicinal plants using the Rational Unified Process and UML modeling as the research method (Sari, Puspasari, and Sunardi, (2018). Supported by research by Lutfiah, and Taurusta, (2022) SIDOTA or what is called Simplisia and Traditional Medicine is an android application that provides information about simplisia and herbal medicine recipes. The application of family medicinal plants can be applied on android-based smartphones because smartphones and gadgets based on android are communication and multimedia devices that are most widely used by the public today, therefore in its application this application can provide benefits and knowledge about the benefits of medicinal plants (Hanifuddin, (2017) Digital dictionaries are dictionaries that are used by the public. Based on the description above, the researchers will create a digital dictionary application of medicinal plants and their benefits against diseases caused by android-based microorganisms that presents information on traditional medicine processing both in text and video, as well as their benefits for treating diseases caused by microorganisms. This application is expected to make it easier for users to find out traditional medicinal plants and can process visually displaying the materials needed in the processing of traditional medicine effectively and efficiently for the prevention and treatment of diseases caused by microorganisms. The system development method used in this research is Multimedia Development Life Cycle (MDLC) methodology. The result is creating an android-based digital dictionary application of medicinal plants and their benefits against diseases caused by microorganisms and increase public knowledge in understanding medicinal plants and their benefits against diseases caused by android-based microorganisms. There were 30 out of 40 respondents felt that their knowledge increased about medicinal plants and their benefits against diseases caused by android-based microorganisms. Because the digital dictionary of onat plants provides knowledge that can be read repeatedly and implemented. This application is also easy to use and useful as a non-academic book for students in Biology Study Programs at Universitas Terbuka.

Keywords: Digital dictionary app, Medicinal plants, Benefits, Microorganism diseases, Android

# 1 INTRODUCTION

Research by Santoso, Jumari, and Utami (2023) found 18 types of medicinal plants, consisting of 13 families, which are used to treat nine diseases. The three most commonly used plants for treating infectious diseases are Eurycoma longifolia Jack, Achasma coccineum (Blume) Valeton, and Tinospora crispa (L.) Hook. F & Th. The most commonly treated infectious disease with medicinal plants is diarrhea/fluid discharge (32%). The Dayak Tomun community often uses herbal remedies for infectious diseases from leaves (39%), boiling them (52%), and drinking them (75%). Local knowledge about the use of plants to treat infectious diseases must continue to be applied and preserved to prevent extinction.

Technology is developing rapidly, especially information and communication technology on mobile devices. Various modern features such as image and video processing, document processing, social networking applications, and so on have been embedded in today's mobile phones or smartphones. With the increasing development of science and technology, several types of herbal plant books available in libraries or circulating in several bookstores are still considered to be inadequate to meet human needs and are less practical to use because of their thick form. Many sources of information on traditional medicine exist, such as books and websites. These sources are considered inefficient because accessing them is expensive and time-consuming. Imagine if people were in a hurry to find traditional medicine, they would have to buy books at quite expensive prices and not necessarily comprehensive. Furthermore, accessing a website requires an internet connection, and people are still confused about how to use these resources (Najmatullail, 2019). Existing research only provides information on traditional medicine, specifically about plants, their benefits, and how to process them in text form.

According to Sari, Puspasari, and Sunardi (2018), the Android-Based Medicinal Plant Encyclopedia Application Engineering aims to provide information about medicinal plants using the Rational Unified Process and UML modeling as research methods. Supported by research by Lutfiah and Taurusta (2022), SIDOTA, also known as Simplisia dan Obat Tradisional (Simplicity and Traditional Medicine), is an Android application that provides information about herbal medicines and herbal recipes. This application can assist pharmacy students in pharmacognosy and provide the public with insight into herbal recipes that have begun to disappear in the modern era. The application was developed using the waterfall

method, which includes analysis, system design, and application implementation. Furthermore, black-box testing demonstrated that the application can be used as intended.

Research by Qur'ania, Triastinurmiatiningsih, and Ikhbal (2014) examined the identification of medicinal plants using leaf images with fractal coding techniques. This research did not address the efficacy and uses of medicinal plants. Currently, searching for information on medicinal plant efficacy is still done manually, typically through books or literature, which requires considerable time. In the digital age, with advances in computer technology, a mobile-based application is needed that can help people find information quickly and accurately, tailoring what users are searching for.

The research by Qur'ania, Triastinurmiatiningsih, and Ikhbal (2020) aims to create a mobile-based digital dictionary on medicinal plant efficacy, which includes a search feature based on disease keywords or medicinal plant names. In the rapidly advancing mobile era, information about the efficacy of medicinal plants has been developed in the form of applications that make it easier for the general public to find the benefits and how to use medicinal plants to treat diseases with natural ingredients. The medicinal plant efficacy dictionary application was built with the help of a computer programmed using the Rocchio search algorithm, which will search based on data that has been input into the database system. The output is detailed plant names and efficacy, as well as how to use them, and which parts of the plant can be used to treat diseases. The Rocchio algorithm used in data retrieval techniques is based on relevance feedback capabilities using the Vector Space Model, which is based on the assumption that users in data searches have a general concept of which documents can be declared relevant or irrelevant. Research related to the development of the Rocchio method includes Najib, (2018) who produced Final Project Document Similarity Using the Rocchio Method, a method that can be used to compare documents for similarity in content between data by representing all data in a term vector. Rocchio has a general concept of relevant and non-relevant documents as a means of improving searches to determine the similarity of documents with other documents. Based on the description above, the researcher will create an Android-based digital dictionary application for medicinal plants and their benefits for diseases caused by microorganisms that presents information on traditional medicine processing in both text and video, as well as its benefits for treating diseases caused by microorganisms. This application is expected to make it easier for users to learn about traditional medicinal plants and can process and visually display the ingredients needed in the

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processing of traditional medicines effectively and efficiently for the prevention and treatment of diseases caused by microorganisms.

## 2 METHODOLOGY

The system development method used in this study is the Multimedia Development Life Cycle (MDLC) methodology. In (Sintaro et al., 2020), according to Sutopo, who modified Luther's method, argues that the multimedia software development method consists of six stages, namely concept, design, material collecting, assembly, testing, and distribution.

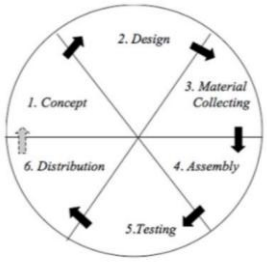


Figure 1 MDLC Method

Step 1 concept, this stage determines the program's objectives and users (audience identification). It also determines the type of application and its purpose. Step 2 design, this stage creates specifications regarding the program's architecture, style, appearance, and material requirements for the program. Step 3 material Collection, this stage involves gathering materials that meet the requirements. This stage can be done in parallel with the assembly stage. Step 4 assembly, this stage involves creating all multimedia objects or materials. Application development is based on the design stage. Step 5 testing, this stage is carried out after completing the assembly stage by running the application and checking for errors. This stage is also called the testing stage. Step 6 distribution, this stage involves storing the application on a storage medium. If the storage medium is insufficient to accommodate the application, compression is performed.

**System Development Software**, Pranata's research (2019) describes several software tools used to develop augmented reality applications. Some of the software tools used are as follows: Unity 3D is an integrated development software for creating video games or other content such as architectural visualizations or real-time 3D animations. Unity 3D can be used on Microsoft Windows, Mac OS X, and the resulting games can run on Windows, Mac OS, Xbox 360, PlayStation 3, Nintendo Wii, iPad, iPhone, Android, and Linux. Unity 3D can also generate browser games using the Unity Web Player plugin. Unity 3D also has the ability to export games built for Adobe Flash 3D functionality. Vuforia SDK is an AR-based software

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development kit that uses a mobile device's screen as a "magic lens" or mirror to view into an augmented world where the real and virtual worlds coexist. This application creates a live camera preview on the smartphone's screen to represent a view of the physical world. 3D objects will appear directly on the smartphone screen, making it appear as if they are in the real world. The Vuforia SDK consists of two main components: the QCAR library and the target management system.

The Android SDK is the API (Application Programming Interface) tools required to start developing applications on the Android platform using the Java programming language. Android is a subset of mobile software released by Google, encompassing an operating system, middleware, and core applications. The Android SDK (Software Development Kit) provides tools and APIs for developing applications on the Android platform using the Java programming language. As an application-neutral platform, Android allows you to create applications that are not native to your phone. The Java Development Kit is software used to compile Java code into bytecode that can be understood and executed by the Java Runtime Environment (JRE). The Java Development Kit must be installed on the computer where Java-based applications will be created. However, the Java Development Kit is not required to be installed on a computer that will run applications built using Java. Sketchup is a program for creating three-dimensional models. Sketchup was developed by the startup company @Last Software in Boulder, Colorado, and was founded in 1999. Sketchup was released in August 2000 as a general-purpose, easy-to-use 3D content creation tool that requires no drawing skills. Adobe Photoshop CS6 is professional software for digital image processing, offering customizable quality, effects, and a variety of adjustments. Adobe Photoshop CS6, produced by Adobe Systems, is the latest version of Photoshop. CS6 is also known as the 13th version of Adobe Photoshop.

## 3 FINDINGS AND DISCUSSION

The result is the creation of an Android-based digital dictionary application for medicinal plants and their benefits for diseases caused by microorganisms, increasing public knowledge in understanding medicinal plants and their benefits for diseases caused by microorganisms.

## 3.1 DIGITAL DICTIONARY APPLICATION DISPLAY

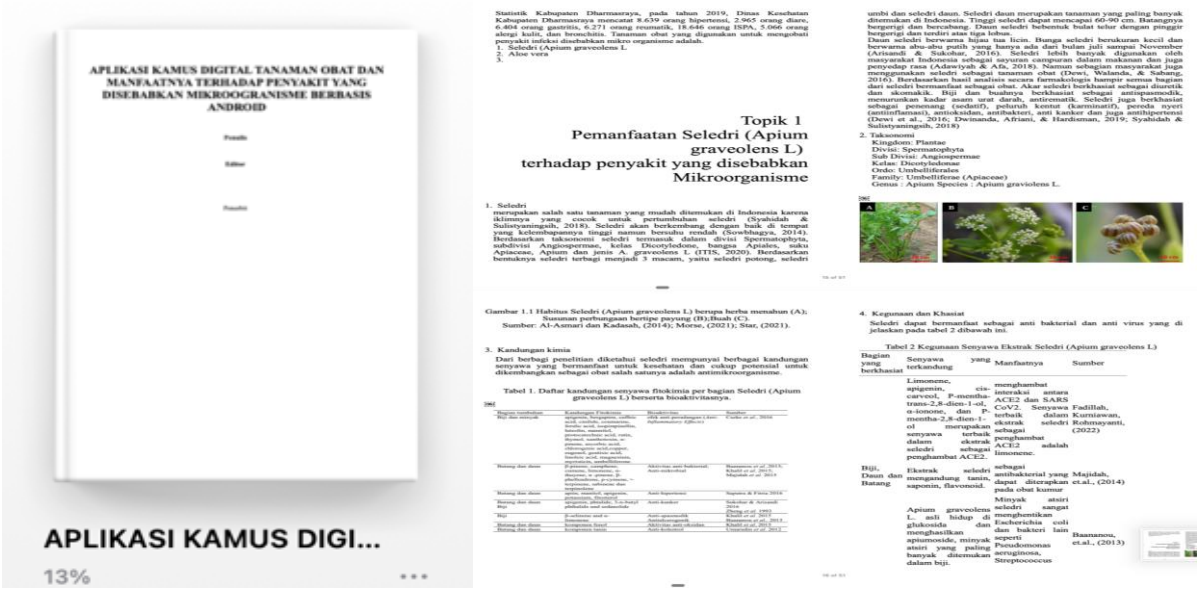
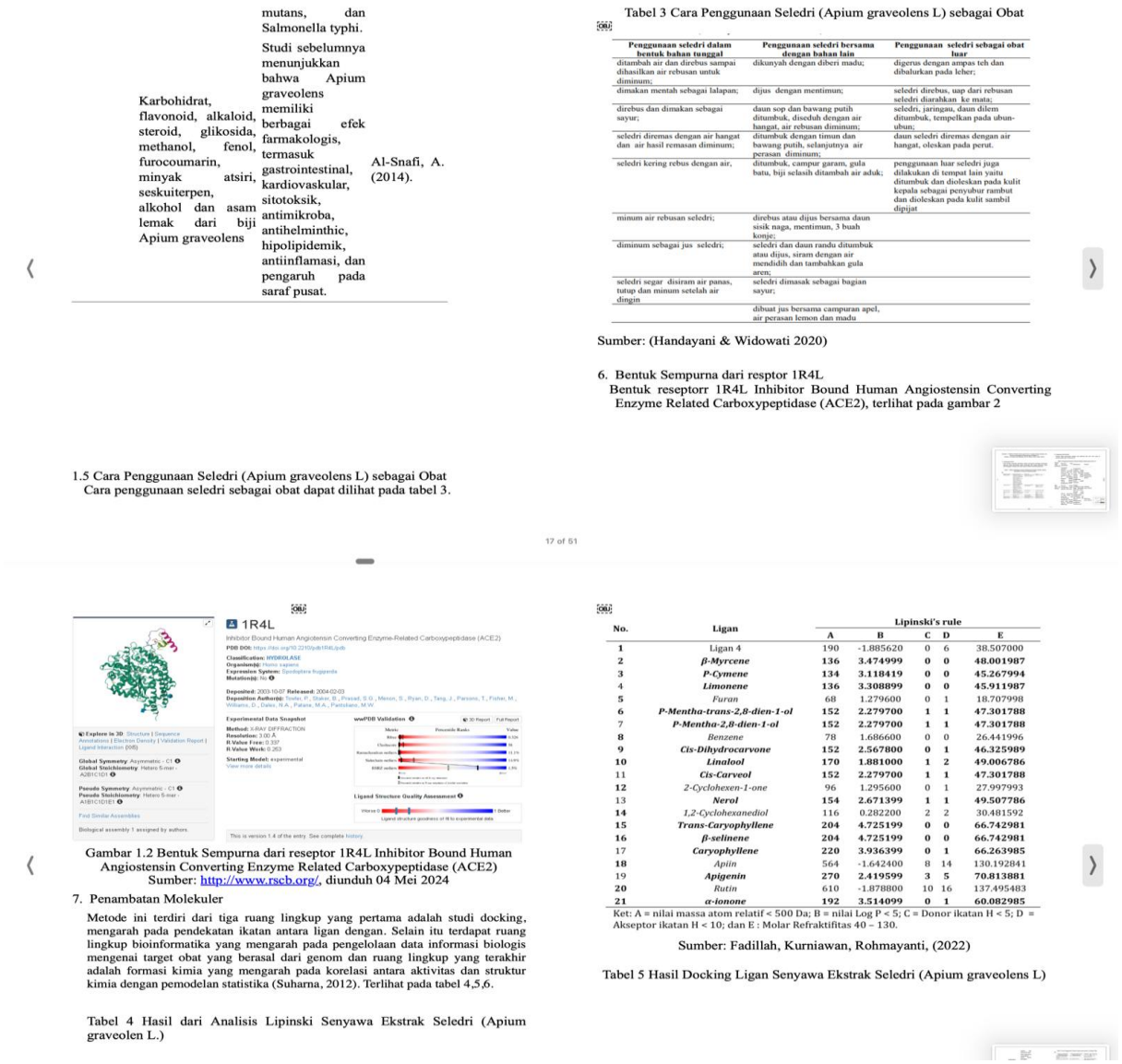



Figure 1 Digital Dictionary Application Display

Primary Source, 2024.



| | | | |
|---|---|---|---|
| | | mutans, dan Salmonella typhi. | |
| Karbohidrat, flavonoid, alkaloid, steroid, glikosida, methanol, fenol, furocoumarin, minyak atsiri, seskuiterpen, alkohol dan asam lemak dari biji Apium graveolens | | Studi sebelumnya menunjukkan bahwa Apium graveolens memiliki berbagai efek farmakologis, termasuk gastrointestinal, kardiovaskular, sitotoksik, antimikroba, antihelminthic, hipolipidemik, antiinflamasi, dan pengaruh pada saraf pusat. | Al-Snafi, A. (2014). |

Tabel 3 Cara Penggunaan Seledri (Apium graveolens L) sebagai Obat

| Penggunaan seledri dalam bentuk bahan tunggal | Penggunaan seledri bersama dengan bahan lain | Penggunaan seledri sebagai obat luar |
|---|---|---|
| ditambah air dan direbus sampai dihasilkan air rebusan untuk diminum; | dikunyah dengan diberi madu; | digerus dengan ampas teh dan dibalurkan pada leher; |
| dimakan mentah sebagai lalapan; | dijus dengan mentimun; | seledri direbus, uap dari rebusan seledri diarahkan ke mata; |
| direbus dan dimakan sebagai sayur; | daun sop dan bawang putih ditumbuk, diseduh dengan air hangat, air rebusan diminum; | seledri, jaringau, daun dilem ditumbuk, tempelkan pada ubun-ubun; |
| seledri diremas dengan air hangat dan air hasil remasan diminum; | ditumbuk dengan timun dan bawang putih, selanjutnya air perasan diminum; | daun seledri diremas dengan air hangat, oleskan pada perut. |
| seledri kering rebus dengan air, | ditumbuk, campur garam, gula batu, biji selasih ditambah air aduk; | penggunaan luar seledri juga dilakukan di tempat lain yaitu ditumbuk dan dioleskan pada kulit kepala sebagai penyubur rambut dan dioleskan pada kulit sambil dipijat |
| minum air rebusan seledri; | direbus atau dijus bersama daun sisik naga, mentimun, 3 buah konje; | |
| diminum sebagai jus seledri; | seledri dan daun randu ditumbuk atau dijus, siram dengan air mendidih dan tambahkan gula aren; | |
| seledri segar disiram air panas, tutup dan minum setelah air dingin | seledri dimasak sebagai bagian sayur; | |
| | dibuat jus bersama campuran apel, air perasan lemon dan madu | |

Sumber: (Handayani & Widowati 2020)

6. Bentuk Sempurna dari resptor 1R4L

Bentuk reseptorr 1R4L Inhibitor Bound Human Angiostensin Converting Enzyme Related Carboxypeptidase (ACE2), terlihat pada gambar 2

1.5 Cara Penggunaan Seledri (Apium graveolens L) sebagai Obat

Cara penggunaan seledri sebagai obat dapat dilihat pada tabel 3.

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Gambar 1.2 Bentuk Sempurna dari reseptor 1R4L Inhibitor Bound Human Angiostensin Converting Enzyme Related Carboxypeptidase (ACE2)
Sumber: http://www.rscb.org/, diunduh 04 Mei 2024

7. Penambatan Molekuler

Metode ini terdiri dari tiga ruang lingkup yang pertama adalah studi docking, mengarah pada pendekatan ikatan antara ligan dengan. Selain itu terdapat ruang lingkup bioinformatika yang mengarah pada pengelolaan data informasi biologis mengenai target obat yang berasal dari genom dan ruang lingkup yang terakhir adalah formasi kimia yang mengarah pada korelasi antara aktivitas dan struktur kimia dengan pemodelan statistika (Suharna, 2012). Terlihat pada tabel 4,5,6.

Tabel 4 Hasil dari Analisis Lipinski Senyawa Ekstrak Seledri (Apium graveolen L.)

| No. | Ligan | Lipinski's rule | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | E |
| 1 | Ligan 4 | 190 | -1.885620 | 0 | 6 | 38.507000 |
| 2 | *β-Myrcene* | 136 | 3.474999 | 0 | 0 | 48.001987 |
| 3 | *P-Cymene* | 134 | 3.118419 | 0 | 0 | 45.267994 |
| 4 | *Limonene* | 136 | 3.308899 | 0 | 0 | 45.911987 |
| 5 | *Furan* | 68 | 1.279600 | 0 | 1 | 18.707998 |
| 6 | *P-Mentha-trans-2,8-dien-1-ol* | 152 | 2.279700 | 1 | 1 | 47.301788 |
| 7 | *P-Mentha-2,8-dien-1-ol* | 152 | 2.279700 | 1 | 1 | 47.301788 |
| 8 | *Benzene* | 78 | 1.686600 | 0 | 0 | 26.441996 |
| 9 | *Cis-Dihydrocarvone* | 152 | 2.567800 | 0 | 1 | 46.325989 |
| 10 | *Linalool* | 170 | 1.881000 | 1 | 2 | 49.006786 |
| 11 | *Cis-Carveol* | 152 | 2.279700 | 1 | 1 | 47.301788 |
| 12 | *2-Cyclohexen-1-one* | 96 | 1.295600 | 0 | 1 | 27.997993 |
| 13 | *Nerol* | 154 | 2.671399 | 1 | 1 | 49.507786 |
| 14 | *1,2-Cyclohexanediol* | 116 | 0.282200 | 2 | 2 | 30.481592 |
| 15 | *Trans-Caryophyllene* | 204 | 4.725199 | 0 | 0 | 66.742981 |
| 16 | *β-selinene* | 204 | 4.725199 | 0 | 0 | 66.742981 |
| 17 | *Caryophyllene* | 220 | 3.936399 | 0 | 1 | 66.263985 |
| 18 | *Apiin* | 564 | -1.642400 | 8 | 14 | 130.192841 |
| 19 | *Apigenin* | 270 | 2.419599 | 3 | 5 | 70.813881 |
| 20 | *Rutin* | 610 | -1.878800 | 10 | 16 | 137.495483 |
| 21 | *α-ionone* | 192 | 3.514099 | 0 | 1 | 60.082985 |

Ket: A = nilai massa atom relatif < 500 Da; B = nilai Log P < 5; C = Donor ikatan H < 5; D = Akseptor ikatan H < 10; dan E : Molar Refraktifitas 40 – 130.

Sumber: Fadillah, Kurniawan, Rohmayanti, (2022)

Tabel 5 Hasil Docking Ligan Senyawa Ekstrak Seledri (Apium graveolens L)

Figure 2 Digital Dictionary Application Content

Primary Source, 2024.

The results of the community service activities of Idris et al. (2023) facilitated access to knowledge about TOGA, provided information about TOGA types and their benefits, and provided the ability to make traditional medicine recipes for the treatment and prevention of diseases independently. In addition, people learned the importance of cultivating their own medicinal plants in their yards. The results of the study by Qur'ania, Triastinurmiatiningsih, and Ikhbal (2020) used a search method with the Rocchio algorithm with relevance feedback techniques to evaluate the proximity of questions to the average relevant document with a

similarity calculation level. With a total of 200 medicinal plants, the stages of tokenizing, filtering, stemming, and term weighting were carried out.

SIDOTA, also known as Simplisia dan Obat Tradisional (Simplicity and Traditional Medicine), is an Android application that helps pharmacy students in pharmacognosy classes by providing information about simplisia and traditional herbal recipes, which are starting to disappear in today's world. The process of creating this application includes the analysis stage, the system design stage, and the application implementation stage; testing using the blackbox method shows that the application can be used as intended (Lutfiah and Taurusta, 2022). To help users find plant names, this application has features such as a list of plants with scientific names equipped with an A-Z alphabetical menu, plant categories, and a search feature. The results, as shown by search speed tests conducted based on page load time with the microtime function, the sequential search algorithm has the ability to search data quickly for relatively small or not too large amounts of data (Rahmanto, Alfian, Damayanti, and Borman, 2021).

In conclusion, the Android-based digital dictionary application for medicinal plants and their benefits for diseases caused by microorganisms presents information on traditional medicine processing in both text and video, as well as its benefits for treating diseases caused by microorganisms. This application is the creation of an Android-based digital dictionary application for medicinal plants and their benefits against diseases caused by microorganisms and increasing public knowledge in understanding medicinal plants and their benefits against diseases caused by microorganisms based on Android.

### 3.2 APPLICATION TEST RESULTS

Table 1. Application Test Results on Respondents

| Category | Responden | | Presentation | |
|---|---|---|---|---|
| | Agree | Disagree | Agree | Disagree |
| Increasing knowledge about medicinal plants | 30 | 10 | 75% | 25% |
| Increasing knowledge of the benefits of medicinal plants for microbial diseases | 30 | 10 | 75% | 25% |
| Easy-to-use digital dictionary | 30 | 10 | 75% | 25% |

| | | | | |
|---|---|---|---|---|
| application for family medicinal plants | | | | |
| Useful as a non-teaching material book | 30 | 10 | 75% | 25% |

Source: Primary data, (2024).

Table 1 shows that 30 out of 40 respondents agreed that their knowledge of medicinal plants and their benefits against diseases caused by microorganisms based on Android has increased. This is because the digital dictionary of medicinal plants provides knowledge that can be read repeatedly and implemented. Furthermore, this digital dictionary application is easy to use and useful as a non-teaching textbook. In the development process of this scientific plant dictionary application, a sequential search algorithm was used as the search feature. This algorithm performs searches by sequentially matching all available data. To help users find plant names, the application includes features such as a plant list with scientific names, complete with an A-Z alphabetical menu, plant categories, and a search feature (Rahmanto, Alfian, Damayanti, and Borman, 2021).

The results of the search speed test using page load time with the microtime function show that the sequential search algorithm has the ability to search for relatively small or not too much data quickly (Rahmanto, Alfian, Damayanti, and Borman, 2021). The results of this study are in line with the findings of the study by Tuzzahra, Kasrina, and Ansori (2020), which tested validity and response. The environment-based spore-bearing plant dictionary application was designed to support the Plant Taxonomy I course on spore-bearing plant material. Research by Luthfiah and Taurusta (2022) showed that the application can be used according to its objectives in its testing using the black box method. Digital dictionaries have been widely used to facilitate word processing and word searches through digital media such as mobile phones. The digital medicinal plant dictionary application uses the Rocchio algorithm and relevance feedback techniques to determine how close the request is to the average. documents related to the level of similarity calculation through the process of tokenizing, filtering, stemming, and metric considerations with a data amount of 200 medicinal plants (Qur'ania, Triastinurmiatiningsih, and Ikhbal, 2020).

## 4 CONCLUSION

Researchers will create a digital dictionary application of medicinal plants and their benefits for diseases caused by microorganisms based on Android that presents information on the processing of traditional medicines in the form of text and video, as well as their benefits for

treating diseases caused by microorganisms. This application is expected to make it easier for users to know traditional medicinal plants and can process visually display the ingredients needed in the processing of traditional medicines effectively and efficiently for the prevention and treatment of diseases caused by microorganisms. The system development method used in this study is the Multimedia Development Life Cycle (MDLC) methodology. The result is the creation of an Android-based digital dictionary application of medicinal plants and their benefits for diseases caused by microorganisms and increasing public knowledge in understanding medicinal plants and their benefits for diseases caused by microorganisms based on Android. Out of 40 respondents, 30 agreed that they know more about medicinal plants and their benefits against diseases caused by Android microorganisms. This is because knowledge that can be read and used again is provided by the digital dictionary of medicinal plants. Selain itu, this digital dictionary application is user-friendly and useful as a non-teaching textbook for students in Biology Study Programs at Universitas Terbuka.

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