TABLE OF CONTENT

EDUCATION, CULTURE, RESEARCH AND TECHNOLOGY
UNIVERSITY LAMPUNG FACULTY
OF TEACHER TRAINING AND EDUCATION
Jl. Prof. Dr. Sumantri Brojonegoro No.1GedongMeneng-Bandar LampungTelp./Fax:(0721)704624
e- mail:fkip@unila.ac.id,laman:http://fkip.unila.ac.id

A. MODULE HANDBOOK

Module Name	**Medicinal Plant Biology**
Module Level, if Applicable	-
Code	KB0616309
Sub-Heading, (*if Applicable)	-
Classes, (*if Applicable)	-
Semester	7th
Module Coordinator	Dr. Pramudiyanti, M.Si
Lecturers	Dr. Pramudiyanti, M.Si Rini Rita T Marpaung, S.Pd., M.Pd.
Language	Bilingual (English and Bahasa)
Classification Within the Curriculum	Compulsory
Teaching Format/Class Hours Per Week During the Semester	Contact hours: 14 weeks x 100 minutes Structured learning: 14 weeks x 120 minutes Independent study: 14 weeks x 120 minutes
Teaching methods	Lectures (100 minutes)
Workfload	Contact hours: 14 weeks x 100 minutes
Credit Points	2 SKS = (1.28*2) = 2.56 ECTS Contact hours: 14 meeting x 100 minutes 2 meeting for Mid Exam and Final Exam
Prerequisites Courses	This course has no prerequisites
Course Outcomes (CO)	General Skill: ● Able to apply logical, critical, systematic, and innovative thinking in the Learning of Medicinal Plant Biology and apply humanitarian values in Biology education; ● Able to demonstrate independent, quality, and measurable performance in Learning Medicinal Plant Biology; ● Able to make appropriate decisions in the context of problem-solving in the field of Medicinal Plant Biology education based on the analysis of information and data; Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism. Knowledge: ● Able to apply Medicinal Plant Biology and utilize science and technology in solving problems related to medicinal plants, and able to adapt to the situations encountered. Master the theoretical concepts in the field of Medicinal Plant Biology in depth, and be able to formulate

	procedural problem-solving solutions. ● Able to make appropriate decisions based on the analysis of information and data obtained in the cultivation of medicinal plants, and able to provide guidance in selecting various alternative solutions both independently and in groups. Responsible for individual tasks and can be entrusted with the responsibilities for achieving group work results. Competences: ● Able to communicate politely with fellow colleagues and lecturers in group work as well as in presentations of coursework. ● Able to design and carry out the cultivation of a type of medicinal plant. ● Able to write a cultivation plan for medicinal plants and a report on the results of medicinal plant cultivation. Master basic theories of medicinal plant cultivation. ● Able to plan entrepreneurial ventures in medicinal plants in the fields of agriculture or marketing of medicinal plants.
Content	This lecture discusses the types of plants that contain medicinal compounds, both for traditional medicine, precursors, and raw materials for drugs. The study includes: morphology, taxonomy, habitat, efficacy, chemical content, methods of use, and cultivation and preservation techniques of medicinal plants.
Study/Exam Achievements	Persentation (100%): Mid Exam (10%) Final Exam (10%) Class Participations (10%) Presentation and report (40%) Assignment (30%)
Examination Methods	written test and presentation
Forms of Media	Virtual Class (www.v-class.unila.ac.id) Powerpoint Presentation Materials
Literature	1. Nugroho, L. H., & Hartini, Y. S. (2021). Pharmacognosy of medicinal plants: a specific study of the genus Piper. UGM PRESS. 2. Evizal, R. (2013). Spice plants and phytopharmaceuticals. Bandar Lampung: Research Institute of the University of Lampung. 3. Mindarti, S., & Nurbaeti, B. (2015). Pocket book of family medicinal plants (TOGA). 4. Dharma, A.P. 1985. Traditional Medicinal Plants of Indonesia. Balai Pustaka. Jakarta. 5. Heyne, K. 1987. Useful Plants of Indonesia. Research and Development Agency for Forestry. Ministry of Forestry. Jakarta. 6. Klopenburg, Versteegh. 1988. Plants in Indonesia and Their Efficacy as Traditional Medicines CD. R, S Bhettesda and Andi Offset. Yogyakarta. 7. National Biological Institute. 1980. Medicinal Plants. Balai Pustaka. Bogor. 8. Murniatno, G. 1992. Traditional Medicine of the Special Region of Yogyakarta. Department of Education and Culture. 9. Notoatmodjo, S. 1997. Public Health Science. Rineka Cipta. Jakarta. 10. Sastroatmijojo, S. 1980. Indigenous Medicines of Indonesia. Sinar Harapan. Jakarta. 11. Supriadi. 2011. Medicinal Plants of Indonesia. Popular Medicinal Books. Jakarta. 12. Tjitrosoepomo, G. 1994. Taxonomy of Medicinal Plants. Gadjah Mada

	University Press. Yogyakarta.

B. Course Program

A. IDENTITY

COURSE TITLE	**: Medicinal Plant Biology**
COURSE CODE/CREDIT	**: KB0616309/ 2 (2-0) credits**
DEPARTMENT/PROGRAM	**: PMIPA/P. Biologi**
LECTURERS	**: 1. Dr. Pramudiyanti, M.Si**
	2. Rini Rita T. Marpaung, S.Pd., M.Pd
SEMESTER	**: ODD/2024-2025**
SCHEDULE	**: Thursday at 10:15-11.45**
MEETING PLACE	**: Building G7 PMIPA-FKIP UNILA**

B. Course Learning Outcomes/PLO/Competencies

After taking this the types of plants that contain medicinal compounds, both for traditional medicine, precursors, and raw materials for drugs. The study includes: morphology, taxonomy, habitat, efficacy, chemical content, methods of use, and cultivation and preservation techniques of medicinal plants.

General competency
Able to apply logical, critical, systematic, and innovative thinking in the Learning of Medicinal Plant Biology and apply humanitarian values in Biology education; Able to demonstrate independent, quality, and measurable performance in Learning Medicinal Plant Biology; Able to make appropriate decisions in the context of problem-solving in the field of Medicinal Plant Biology education based on the analysis of information and data; Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.

Special Competencies
Able to apply Medicinal Plant Biology and utilize science and technology in solving problems related to medicinal plants, and able to adapt to the situations encountered. Master the theoretical concepts in the field of Medicinal Plant Biology in depth, and be able to formulate procedural problem-solving solutions. Able to make appropriate decisions based on the analysis of information and data obtained in the cultivation of medicinal plants, and able to provide guidance in selecting various alternative solutions both independently and in groups. Responsible for individual tasks and can be entrusted with the responsibilities for achieving group work results.

Attitude
Able to communicate ideas scientifically, both orally and in writing in the field of Medicinal Plant Biology

C. Course Description

Studying the types of plants that contain medicinal compounds, both for traditional medicine, precursors, and raw materials for drugs. The study includes: morphology, taxonomy, habitat, efficacy, chemical content, methods of use, and cultivation and preservation techniques of medicinal plants.

D. Learning Strategy

Learning with the Project Based Learning model

E. Lecture Method

Group discussions and presentations. Project Based Learning

F. Course Assignments

Group assignments.

G. **Lecture Material/Reading Material**

1. Nugroho, L. H., & Hartini, Y. S. (2021). Pharmacognosy of medicinal plants: a specific study of the genus Piper. UGM PRESS.
2. Evizal, R. (2013). Spice plants and phytopharmaceuticals. Bandar Lampung: Research Institute of the University of Lampung.
3. Mindarti, S., & Nurbaeti, B. (2015). Pocket book of family medicinal plants (TOGA).
4. Dharma, A.P. 1985. Traditional Medicinal Plants of Indonesia. Balai Pustaka. Jakarta.
5. Heyne, K. 1987. Useful Plants of Indonesia. Research and Development Agency for Forestry. Ministry of Forestry. Jakarta.
6. Klopenburg, Versteegh. 1988. Plants in Indonesia and Their Efficacy as Traditional Medicines CD. R, S Bhettesda and Andi Offset. Yogyakarta.
7. National Biological Institute. 1980. Medicinal Plants. Balai Pustaka. Bogor.
8. Murniatno, G. 1992. Traditional Medicine of the Special Region of Yogyakarta. Department of Education and Culture.
9. Notoatmodjo, S. 1997. Public Health Science. Rineka Cipta. Jakarta.
10. Sastroatmijojo, S. 1980. Indigenous Medicines of Indonesia. Sinar Harapan. Jakarta.
11. Supriadi. 2011. Medicinal Plants of Indonesia. Popular Medicinal Books. Jakarta.
12. Tjitrosoepomo, G. 1994. Taxonomy of Medicinal Plants. Gadjah Mada University Press. Yogyakarta.

C. Assesment Rubric

Project Assessment

No	Aspect	Score (1-5)				
		1	2	3	4	5
1	**Planning:** Preparation Title Formulation					
2	**Implementation:** a. Writing systematics b. Accuracy of data/information sources c. Authenticity of data sources d. Data analysise e. Drawing conclusions					
3	**Project Report:** Performance Presentation/mastery					

Product Assessment

No.	Stages	Score (1-5)*
1	Material Planning Stage.	
2	Stages of the Manufacturing Process: a. preparation of tools and materials, b. processing techniques, c. Occupational Health and Safety (OHS), security, and cleanliness.	
3	Final Stage (Product Results) a. Physical form b. Innovation	
Total Score		

D. Course Evaluation and Development

In determining the final grade, the following weighting will be used:

No.	Assessment Criteria	Percentage of value
1	Task a. Independent: Learning b. Structured: Presentation, Discussion	100
2	Midterm Exam	
3	Final Examination	
4	Exercise Questions	

LAMPUNG UNIVERSITY

FACULTY OF TEACHER TRAINING AND EDUCATION
DEPARTMENT OF MATHEMATICS AND NATURAL SCIENCES
BIOLOGY EDUCATION STUDY PROGRAM
SEMESTER LEARNING PLAN

Course Name	Course Code	Credit	Semester	Date of preparation
Biology of Medicinal Plants	KBO 616309	2 (2-0)	7	7 Juli 2024

Authorization	Name of Development Coordinator RPS	Field of expertise coordinator	Head of the study program
	Dr. Pramudiyanti, M.Si Rini Rita T. Marpaung, S.Pd., M.Pd.	Dr. Pramudiyanti, M.Si	Rini Rita T. Marpaung, S.Pd., M.Pd.

Learning Outcomes (LO)	CPL-PRODI (Learning Outcomes of the Study Program) that is Imposed on the Course	
	CPL1(S1)	Be devoted to God Almighty and able to demonstrate a religious attitude;
	CPL2(S6)	Collaborating and having social sensitivity and concern for the community and the environment.
	CPL3(S8)	Internalizing values, norms, and academic ethics;
	CPL4(S9)	Demonstrating a sense of responsibility for work in his/her area of expertise independently;
	CPL6(K1)	Applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that considers and applies humanistic values appropriate to their field of expertise.
	CPL7(K2)	Demonstrating independent, quality, and measurable work;
	CPL8(P1)	Mastering facts, concepts, principles, laws, theories, and procedures in the field of Medicinal Plant Biology in depth and their applications.
	CPL9(P2)	Having sensitivity in identifying problems related to Medicinal Plant Biology
	CPL11(KU1)	Applying logical, critical, systematic, and innovative thinking in Herbal Plant Biology.
	CPL12(KU2)	Demonstrating independent, quality, and measurable performance;
	CPL13(KU3)	Examining the implications of the development or implementation of science and technology that considers and applies humanistic values according to its expertise based on principles, procedures, and scientific ethics in order to produce solutions, ideas, designs, or artistic critiques;
	CPL14(KU4)	Compile the scientific description of the above study results in the form of a thesis or final project report and upload it on the college's website;
	CPL15(KU5)	Making precise decisions in the context of problem-solving in his/her field of expertise, based on the analysis of information and data;
	CPL16(KU6)	Maintaining and developing a network of work with teachers and colleagues both inside and outside the classroom;

	CPL17(KU7)	Able to be accountable for the achievements of the group's work results and to conduct a self-evaluation process for the work group under his responsibility.
	CPL18(KU9)	Documenting, storing, securing, and retrieving work results in the form of a portfolio to ensure authenticity and prevent plagiarism.
	CPL19(KK4)	Publishing ideas and research results;
	CPMK (Course Learning Outcomes)	
	CPMK1	Have faith in God Almighty and be able to demonstrate a religious attitude.
	CPMK2	Internalizing values, norms, and scientific ethics and being able to develop them through the course of Medicinal Plant Biology.
	CPMK3	Collaborating and demonstrating a responsible attitude in the field of Medicinal Plant Studies
	CPMK4	Internalizing the spirit of independence and resilience and being able to develop it through the study of Medicinal Plant Biology.
	CPMK5	Applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that considers and applies humanistic values relevant to the field of Medicinal Plant Biology.
	CPMK6	Demonstrating independent, quality, and measurable performance through Medicinal Plant Biology
	CPMK7	Examining the implications of the development or implementation of science and technology that considers and applies humanistic values according to the field of Medicinal Plant Biology based on principles, procedures, and scientific ethics in order to produce solutions, ideas, and designs.
	CPMK8	Compose a scientific description of the results of the Medicinal Plant Biology study in the form of an investigation report.
	CPMK9	In-depth analysis of the Biology of Medicinal Plants from the students' objectives, breadth and depth of teaching materials, and misconceptions.
	CPMK10	Maintaining and developing a network of work with teachers and colleagues both inside and outside the classroom;
	CPMK11	Responsible for achieving the results of the group work and conducting self-evaluation of the work group under their responsibility.
	CPMK12	Documenting, storing, securing, and retrieving work results in the form of a portfolio to ensure authenticity and prevent plagiarism.
	CPMK13	Mastering the concepts and materials of Medicinal Plant Biology
	CPMK14	Having sensitivity in discovering, analyzing, and solving problems about Medicinal Plant Biology through the application of knowledge and technology by adhering to the principles of the scientific method.
	CPMK15	Applying logical, critical, systematic, and innovative thinking in the context of solving problems related to Medicinal Plant Biology
	CPMK16	Communicating recommendations for problem-solving in the context of Medicinal Plant Biology based on implementation and research.
	CPMK17	Responsible for planning, implementing, and evaluating work both independently and in groups in the development and management of the field of Medicinal Plant Biology.
Brief Description of the Course	This lecture discusses the types of plants that contain medicinal compounds, both for traditional medicine, precursors, and raw materials for drugs. The study includes: morphology, taxonomy, habitat, efficacy, chemical content, methods of use, and cultivation and preservation techniques of medicinal plants.	

Study Materials / Learning Materials	1. Morphology 2. Taxonomy 3. Habitat 4. Chemical Content 5. Cultivation Techniques 6. Uses 7. Conservation of Medicinal Plants 8. Types of Medicinal Plants
List of References	**Main:** Nugroho, L. H., & Hartini, Y. S. (2021). Pharmacognosy of medicinal plants: a specific study of the genus Piper. UGM PRESS. Evizal, R. (2013). Spice plants and phytopharmaceuticals. Bandar Lampung: Research Institute of the University of Lampung. Mindarti, S., & Nurbaeti, B. (2015). Pocket book of family medicinal plants (TOGA). **Supporter** Relevant textbook
Lecturer	Dr. Pramudiyanti, M.Si Rini Rita T. Marpaung, S.Pd., M.Pd.
Prerequisite courses	-

Minggu Ke-	**Sub-CPMK (Final competency at each stage of learning)**	**Assessment**		**Learning Materials, Learning Methods, Student Assignments, [Time Estimate]**		**Sources and Learning Media**	**Assessment Weight (%)**
		Indicator	**Kriteria & Bentuk**	**offline**	**Online**		
1, 2, & 3	Analyzing the Morphology and Taxonomy of Medicinal Plants	1. Detailing the Morphology and Taxonomy of Medicinal Plants 2. Explaining the Morphology and Taxonomy of Medicinal	1. Written test: Midterm and Final Exam Scoring Guidelines	The students are having a discussion about the lecture contract presented by the educator.	Searching for assisted information from LKM according to the study material..	Lecture Contract Reference: Nugroho, L. H., & Hartini,	

		Plants 3. Explaining the functioning of the Morphology and Taxonomy of Medicinal Plants	2. Non-test: a. Individual structured assignment:Practice questions, Learning Journal, Portfolio, b. Group activities: Material presentation, Argumentation. Midterm and final exams as well as assignment submissions using the Activity tools in the Unila Virtual Class	The lecturer explains the steps in problem-solving that will be used in this semester's classes. Discussion and practice 1) Based on the Minister of Education Regulation No. 3 of 2020, 1 credit equals 50 minutes of face-to-face lectures, thus 2 credits equal 100 minutes of face-to-face lectures consisting of: 1) 80 minutes of group discussion 2) 20 minutes of completing a self-quiz.	Discussing the Morphology and Taxonomy of Medicinal Plants Communicating the results of the discussion	Y. S. (2021). Pharmacognosy of medicinal plants: a specific study of the genus Piper. UGM PRESS. Evizal, R. (2013). Spice plants and phytopharmaceuticals. Bandar Lampung: Research Institute of the University of Lampung. Mindarti, S., & Nurbaeti, B. (2015). Pocket book of family medicinal plants (TOGA).	

4, 5, 6	Explaining the habitat, chemical content, and cultivation techniques of medicinal plants.	Explaining each habitat, chemical content, and biological cultivation techniques of medicinal plants.	1. Written test: Midterm and Final Exam Scoring Guidelines 2. Non-test: a. Individual structured assignment:Practice questions, Learning Journal, Portfolio, b. Group activities: Material presentation, Argumentation. Midterm and final exams as well as assignment submissions using the Activity tools in the Unila Virtual Class	Students present the topic of habitat, chemical content, and biological cultivation techniques of medicinal plants. Discussing topics that feature habitats, chemical content, and the biological cultivation techniques of medicinal plants. Provide reflections on the topics that have been presented. Discussion and practice	● Discuss LKM in groups about various types of concentration units ●Communicate the discussion results ● Seek information with the help of LKM according to the study material.	*online e-learning* *https://classroom.google.com/c/MTE0NTg2Nzg4MTc* Media: ppt Learning Source: e-book	
7	**MIDTERM EXAM** 100 minutes (Essay test)						10

8,9,10	Explaining the use and preservation	Explaining the definition of plant fertility Creating products Creating hygienic and attractive product packaging	1. Written test: Midterm and Final Exam Scoring Guidelines 2. Non-test: a. Individual structured assignment:Practice questions, Learning Journal, Portfolio, b. Group activities: Material presentation, Argumentation. Midterm and final exams as well as assignment submissions using the Activity tools in the Unila Virtual Class	Plant fertility, total fresh weight and dry weight of the harvest. Hygienic and attractive product packaging. Number of products sold. Lecture-discussion training.		*e-learning* online https://classroom.google.com/c/MTE0NTg2Nzg4MTc3 Media: ppt Learning Source: e-book	

11 & 12	Explaining the use and preservation	1. Explaining the definition of plant fertility 2. Creating products Creating hygienic and attractive product packaging	1. Written test: Midterm and Final Exam Scoring Guidelines 2. Non-test: a. Individual structured assignment:Practice questions, Learning Journal, Portfolio, b. Group activities: Material presentation, Argumentation. Midterm and final exams as well as assignment submissions using the Activity tools in the Unila Virtual Class	Plant fertility, total fresh weight and dry weight of the harvest. Hygienic and attractive product packaging. Number of products sold. Lecture-discussion training.	Using Vclas at the address: https://vclass.unila.ac.id/course/view.php?id=27777 dan https://vclass.unila.ac.id/course/view.php?id=27782# Learning Methods SGD, RPS, DL, SDL, CoL, CbL, CtL, PjBL, PBL. Reading materials and watching learning videos Group discussions using forums or other media Completing quizzes on supporting references YouTube Slides Journals	*e-learning* online https://classroom.google.com/c/MTE0NTg2Nzg4MTc3 Media: ppt Learning Source: e-book	

13 & 15	Explaining the types of medicinal plants	1. Explaining the definition of plant fertility 2. Creating products Creating hygienic and attractive product packaging	1. Written test: Midterm and Final Exam Scoring Guidelines 2. Non-test: a. Individual structured assignment:Practice questions, Learning Journal, Portfolio, b. Group activities: Material presentation, Argumentation. Midterm and final exams as well as assignment submissions using the Activity tools in the Unila Virtual Class	Plant fertility, total fresh weight and dry weight of the harvest. Hygienic and attractive product packaging. Number of products sold. Lecture-discussion training.	Using Vclas at the address: https://vclass.unila.ac.id/course/view.php?id=27777 dan https://vclass.unila.ac.id/course/view.php?id=27782# Learning Methods SGD, RPS, DL, SDL, CoL, CbL, CtL, PjBL, PBL. Reading materials and watching learning videos Group discussions using forums or other media Completing quizzes on supporting references YouTube Slides Journals	*e-learning* online https://classroom.google.com/c/MTE0NTg2Nzg4MTc3 Media: ppt Sumber Belajar: e-bok	
16	**Final Semester Exam** 100 minutes (Essay test)						10

B. Task and Assessment Plan

1. Task

No.	Task		Time	Results of Assignments and Assessment Criteria
1.	Independent	Studying the curriculum exploration textbook for junior high school and other learning resources. Practice questions	2 x 100	Answers to the exercise questions, the accuracy of the answers to the Learning Journal questions
2	Structured	Preparing a presentation for discussion materials in the form of a proper, clear, and creative ppt according to the assigned material in groups.	2 x 100	Creativity, Material accuracy, Presentation, Activity in discussions the way of expressing opinions in discussions. Having the character of a researcher in practice, a written investigation report. Argumentation Scheme

2. Assessment

No.	Indicator	Assessment		
		Type	Form	Criteria
1.	Mastering theoretical concepts	Written test	Rubric	Jawaban benar dan lengkap = 4 Jawaban benar dan kurang lengkap = 3 Jawaban benar dan tidak lengkap = 2 Jawaban benar dan sangat tidak lengkap = 1 Jawaban salah/tidak ada = 0
2	Skilled in conducting investigations.	Observing the behavior of characters in practice	Observation Sheet	Honesty = 18%, discipline = 24%, responsibility = 12%, creativity = 29%, and care = 18% with criteria according to the attached rubric.

MID-SEMESTER EXAM QUESTION (UTS) ON MEDICINAL PLANT BIOLOGY

ACADEMIC YEAR 2024/2025

Day/Date :
Time :
Name :
Class :
NPM :

Write your answer on the provided answer sheet by writing the letter B for true statements and S for false statements.

1. Turmeric (*Curcuma longa*) contains the main substance curcumin, which has anti-inflammatory properties.
2. The Aloe Vera plant (*Aloe vera*) belongs to the Zingiberaceae family.
3. The natural habitat of Pegagan plants (*Centella asiatica*) is usually in wet areas such as riverbanks and swamps.
4. Ginger plant (*Zingiber officinale*) can be identified by its bright red stem morphology and dense hair.
5. Alkaloid chemical compounds are usually found in medicinal plants and function as drug precursors.
6. The cultivation technique of the plant Temulawak (*Curcuma xanthorrhiza*) involves planting using seeds.
7. The Dewa Leaves plant (*Gynura divaricata*) is known to have properties for treating hypertension and diabetes.
8. The traditional use of medicinal plants is always safe regardless of the dosage used.
9. Kencur (*Kaempferia galanga*) is a plant that is widely used as raw material for traditional medicine because it contains essential oil.
10. The conservation of medicinal plants can be carried out using ex-situ methods such as planting in nurseries or collection gardens.

Answer Key

1. True
2. False
3. True
4. False
5. True
6. False
7. True
8. False
9. True
10. True

FINAL SEMESTER EXAM QUESTIONS (UAS) FOR THE MEDICINAL PLANT BIOLOGY

ACADEMIC YEAR 2024/2025

Day/Date :
Time :
Name :
Class :
NPM :

Essay Question

Instruction: Answer the following 10 essay questions completely and clearly.

1. Explain the morphology and taxonomy of the turmeric plant (Curcuma longa) and mention the main chemical compounds that have medicinal properties in that plant!
2. Name and explain the natural habitat and cultivation methods of the ginger plant (Zingiber officinale) to produce optimal quality rhizomes!
3. Describe the chemical content and benefits of the centella plant (Centella asiatica) in traditional medicine!
4. Explain effective conservation techniques for medicinal plants that are rare and how these can support biodiversity conservation!
5. Compare the use of medicinal plants in traditional forms with modern extracts, including their advantages and disadvantages!
6. Explain the morphology of the aloe vera plant (Aloe vera) and mention the chemical components that play a role in cosmetics and medicine!
7. The temulawak plant (Curcuma xanthorrhiza) is known as a raw material for traditional medicine. Explain the taxonomy aspects and habitat of this plant as well as its cultivation techniques!
8. Explain the role of alkaloid, flavonoid, and saponin compounds in medicinal plants and provide examples of plants that contain each of these compounds!
9. Explain how vegetative propagation techniques in medicinal plants such as Kencur (Kaempferia galanga) can support the mass production of medicinal raw materials!
10. Discuss the importance of preserving the natural habitat of medicinal plants and the negative impacts that may occur if that habitat is damaged or lost!

Answer Key

1. **Turmeric** (*Curcuma longa*) has a thick rhizome, bright yellow in color, with elongated lance-shaped leaves and parallel veins. Its taxonomy is: Kingdom Plantae, Family Zingiberaceae, Genus Curcuma. The main content is curcumin which has anti-inflammatory and antioxidant properties.
2. **The natural habitat** of *Ginger* is tropical areas with loose soil and good drainage. Cultivation techniques include planting rhizomes in fertile soil with adequate moisture and moderate sunlight for optimal rhizome growth.
3. **Gotu Kola** (*Centella asiatica*) contains triterpenoid saponins that function to improve blood circulation and accelerate wound healing. Its main properties are as a wound healer, anti-inflammatory, and cognitive function enhancer.
4. **Conservation techniques** include ex-situ (collection gardens, tissue culture) and in-situ (protecting the original habitat). This conservation maintains genetic diversity and ensures the sustainability of rare medicinal plants.
5. **Traditional use usually** involves using parts of fresh/dried plants directly, which is practical and natural but difficult to measure the exact dose. Modern extracts are more standardized and easier to consume but the process is expensive and may lose certain active compounds.
6. ***Aloe Vera*** has fleshy leaves with a thick, clear sap. Its chemical composition includes polysaccharides and enzymes that are beneficial as moisturizers and wound healers in cosmetics and medicine.
7. **Temulawak** has a golden-yellow rhizome, with broad and large leaves. Its taxonomy is in the *Zingiberaceae* family. Its habitat is in tropical lowlands with fertile soil. Cultivation is done through rhizome propagation and loose soil.
8. **Alkaloids** (for example: caffeine in coffee) act as stimulants; **Flavonoids** (for example: quercetin in centella) act as antioxidants; **Saponins** (for example: in centella) act as anti-inflammatory and cholesterol-lowering agents.
9. Vegetative propagation of Kencur is done by cutting the sprouted rhizomes. This method preserves the traits of the parent plant and accelerates the mass production of quality medicinal plants.
10. Maintaining natural habitats is important to preserve the population and genetic diversity of medicinal plants. Habitat destruction can lead to local extinction, a decrease in sources of medicinal raw materials, and disruption of ecosystems.

Project Section Medicinal Plant Biology Course

Assessment Aspects	Description	Weight	Scoring Criteria (1–4)
1. Project Planning	Clarity of objectives, problem formulation, and relevance to medicinal plant biology	15%	4: Clear objectives, sharp problem formulation, relevant. 3: Objectives are fairly clear, problems are relevant but lack depth. 2: Objectives are unclear, problems are less relevant. 1: No objectives/problem formulation.
2. Literature Review & Theoretical Framework	Quality and completeness of the literature used (journals, scientific books)	15	4: Up-to-date, comprehensive, highly relevant literature. 3: Fairly up-to-date and relevant literature. 2: Limited literature, some of which is less relevant. 1: Minimal literature, irrelevant.
3. Methodology	Accuracy of methods (data collection, plant identification, experiments, etc.)	15	4: Methods are clear, accurate, and appropriate for the objectives. 3: Methods are fairly accurate, with minor shortcomings. 2: Methods are inaccurate and unsystematic. 1: Methods are absent or arbitrary.
4. Data Analysis / Project Results	Quality of analysis (compound identification, morphological description, herbarium documentation, etc.)	20	4: In-depth analysis, accurate, supported by complete data. 3: Analysis is fairly good, data is fairly complete. 2: Superficial analysis, limited data. 1: No analysis.
5. Creativity & Innovation	Originality of ideas, new approaches, or presentation methods	10%	4: Highly creative and innovative. 3: Fairly creative. 2: Less creative. 1: No creativity.
6. Written Report	Structure, scientific language, completeness (abstract, introduction, methodology, results, discussion, conclusion, references)	15	4: Very neat, systematic, good scientific language. 3: Fairly systematic, minor shortcomings. 2: Less systematic, less scientific language. 1: Does not meet report format requirements.
7. Presentation/Product	Presentation of project results (presentation, poster, herbarium, processed medicinal plant products)	10	4: Very communicative, visually appealing, easy to understand. 3: Fairly communicative, adequate media. 2: Less communicative, visuals unclear. 1: Not communicative.