



Subject Module
 Department of Agrotechnology
 Faculty of Agriculture
 University of Islam Malang

Module Handbook

Module Title	Plant Physiology
Module Level, if available	Undergraduate Study Program of Agrotechnology
Course Code	MKW60606
Headings, if available	-
Course (MK)	-
Semester	2
Course Coordinator	Dr. Ir. Istirochah Pujiwati, MP.
Teaching Team	Novi Arfarita, SP., MP., M.Sc., Ph.D.
Language of instruction	Indonesian language/English
Linkages with the Curriculum	Study Program : Agrotechnology Specialization: Agrotechnology Type: Compulsory/elective
Learning Methods and Duration	1. Lecture: 100 minutes/meeting (14 meetings) 2. Practicum 170 minutes/meeting (8 meetings) 3. Structured Assignments/individual and group Assignments presentation
Student Study Load	1. Lecture: 100 minutes/meeting (14 meetings) 2. Practicum: 170 minutes/meeting (8 meetings) 3. Structured Assignments/quiz/group presentation 4. Attendance: 75% of total attendance
Credit Weight	3 credits or 5.1 ECTS
Requirements for Passing the Course	<ul style="list-style-type: none"> Attendance >75% The final score of all the components of the learning evaluation >44 The final score component: <ul style="list-style-type: none"> 20% Midterm Exam 20% Final Exam 30% Practicum 20% Structured Assignments (individual and group) 10% Presence
Prerequisite Courses	-
Learning Outcomes	The expected learning outcomes are: <ol style="list-style-type: none"> Have a good and deep knowledge in the field of basic agricultural sciences that support agrotechnology (ILO 3) Able to work independently or in a team, and use various methods of communication (ILO 4) Able to solve problems that arise in the field of agrotechnology and related fields of science (ILO 5)
Learning Content	After completing this course students are able to:

1. understand the general conceptual understanding of plant physiology
2. understand the physiological processes of plants, including: absorption and translocation of water and nutrition, transpiration, photosynthesis, respiration
3. analyze plant growth problems related to the physiological process of plants
4. provide solutions to plant growth problems related to the plant physiology

The topics include:

1. Fundamentals of Plant Physiology:
 - Understanding Plant Physiology
 - The Purpose of studying Plant Physiology
 - Crop and Plant Physiology
 - Field of Science Related to Plant Physiology
2. Diffusion and Osmosis
 - The nature of particle motion
 - Definition of Diffusion & Osmosis
 - Properties of Cell Membranes
 - Factors Affecting the Potential of Osmosis
 - Movement of Water Between Cells
3. Relationship between Plants and Water
 - Diffusion, Osmosis and Imbibition
 - Plasmolysis and Deplasmolysis
 - The Role of Water for Plants
 - Physiological Water Type
4. Water Absorption and Transport
 - Organs that Absorb Water
 - Mechanism of Water Absorption
 - Factors Affecting Absorption
 - Theory of Water Transport Mechanism
5. Transpiration
 - Definition of Transpiration, Evaporation and Guttation
 - Measurement of Transpiration in Plants
 - Factors Affecting Transpiration
 - Transpiration Mechanism
 - The Importance of Transpiration
6. Nutrients in Plants
 - Nutrients that Plants Need
 - Sources and Roles of Nutrients in Plants
 - Absorption of Nutrients
 - Absorption of Mineral Salts by Plant Roots
 - Displacement of Solutes
 - Factors Affecting the Transport of Minerals
7. Phytoremediation
 - Definition of Phytoremediation
 - Applications of Phytoremediation
 - Phytoremediation Process based on Plant Physiology
 - Advantages and disadvantages of Phytoremediation Technology
8. Photosynthesis dan Chemosynthesis I
 - Understanding of Metabolism

	<ul style="list-style-type: none"> • Understanding of Photosynthesis • Mechanism of Photosynthesis • C₃, C₄ and CAM Photosynthetic Pathways <p>9. Photosynthesis dan Chemosynthesis I</p> <ul style="list-style-type: none"> • Factors Affecting Photosynthesis • Photorespiration • Chemosynthesis <p>10. Respiration I</p> <ul style="list-style-type: none"> • Definition of Respiration • Type of Respiration • Stages of Respiration <p>11. Respiration II</p> <ul style="list-style-type: none"> • Factors Affecting the Rate of Respiration • Difference Between Respiration and Photosynthesis • Respiratory Inhibitors <p>12. Sonic Bloom Technology</p> <ul style="list-style-type: none"> • Understanding of Sonic Bloom • Sonic Bloom Technology Development • Factors Affecting The Success of The Sonic Bloom Application <p>13. Plant Growth and Development</p> <ul style="list-style-type: none"> • Definition of Plant Growth and Development • Phase of Plant Growth and Development • Balance of Vegetative and Reproductive Phases <p>14. Dormancy, Aging and Senescense</p> <ul style="list-style-type: none"> • Understanding of Dormancy • Type of Dormancy • Breaking Seed Dormancy
Test Terms and Forms	<p>Examination requirements: A minimum of 75 % attendance to attend the final exam</p> <p>Forms of examination: Essay</p>
Learning Media	<p>Projector and screen, Zoom application, daring.unisma.ac.id, e-book, WA Group</p>
References	<p>Main References :</p> <ol style="list-style-type: none"> 1. Carlson, P.S. 1980. The Biology of Crop Productivity. Academic Press. New York-London-Sydney-San Fransisco. 199 hal 2. Gardner, F.P., R.B. Pearce dan R.L. Mitchell. 1991. Fisiologi Tanaman Budidaya. Universitas Indonesia Press. Jakarta. 424 hal 3. Mohr, H. dan P. Schopfer. 1995. Plant Physiology. Springer. 4. Pujiwati, I. 2018. Pengantar Fisiologi Tumbuhan. Intelegensia Media. Malang. 78 hal 5. Rost. Barbour. Stocking. Murphy. 2006. Plant Biology. Second Edition. Thompson Brooks/Cole. Canada. 5. Salisbury, F.B. dan Ross, C.W. 1995. Plant Physiology. Third Edition. Wadsworth Publishing Co. Belmont California. 6. Sinha, R. K. 2004. Modern Plant Physiology. Alpha Science International Ltd. Pangbourne England. 7. Taiz, L. & E. Zeiger. 2002. Plant Physiology. Third Edition. Sinauer Associates, Inc. Massachusetts. <p>Supporting References :</p> <ol style="list-style-type: none"> 1. Arfarita, et.al. 2011. Screening of Soil-Born Fungi from Forest Soil Using Glyphosate Herbicide as the Sole Source of Phosphorus. <i>Journal of Water and Environment Technology</i>, 9, 391-400.

	<p>2. W.H. Utomo, Retno Suntari, Novi Arfarita, Suhartini, E. Handayanto. 2014. Rehabilitation of Artisanal Small-Scale Gold Mining Land in West Lombok, Indonesia: 3. Exploration of Indigenous Plant Species and the Associated Mycorrhiza for Phytomycoremediation of Mercury Contaminated Soils. <i>American-Eurasian Journal of Sustainable Agriculture</i>, 8(1), 34-41.</p>
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