



BRAWIJAYA UNIVERSITY

FACULTY OF AGRICULTURE

DEPARTMENT OF PLANT PESTS AND DISEASES / MASTER OF AGRICULTURAL ENTOMOLOGY STUDY PROGRAM

SEMESTER COURSE PLAN

COURSES	CODE	CLUSTERS OF COURSES	CREDIT (SKS)	SEMESTER	Date of Preparation
Tropical Agroecosystem Biodiversity	PTH81102	Agricultural Entomology	2 2,34 ECTS	odd	8 June 2021
AUTHORIZATION	Course Developer Lecturer		Course Coordinator		Head of Study Program
Department of Plant Pests and Diseases	1. Dr. Akhmad Rizali, SP, M.Si 2. Dr. Ir. Aminudin Affandhi, MS 3. Dr. Anton Muhibudin, SP., MP		Name Signature		Dr. Akhmad Rizali, SP, M.Si Signature
Learning Outcomes	ILO STUDY PROGRAM				
	1	Mastering concepts, theories and methods in the field of agricultural entomology			

	2	Have skills in developing the concept of development in agriculture, especially continuous plant pest control.
	3	Have skills in developing innovations and applications that are tested for problem solving in the community in the field of agricultural entomology in an inter/multidisciplinary manner within the framework of sustainable agriculture.
	CLO	
	1	After taking this course, students are able to master, solve problems, and manage research on tropical agroecosystem biodiversity, including the role of biodiversity ecology, problems and challenges of biodiversity management, and the use of biodiversity in controlling OPT to realize sustainable agriculture.
	2	Able to explain the role of microbial diversity and its use in pest control
	3	Able to apply the concept of biodiversity management both at the land scale and landscape scale to realize sustainable agriculture.
Brief Description of MK	This course discusses biodiversity in agroecosystems, their roles and functions, the transformation of ecosystems into agroecosystems and their ecological consequences based on agroecological principles, agroecosystem management, and mitigation programs in the context of managing pests and plant diseases towards sustainable agricultural programs.	
Learning Material / Subject	<ol style="list-style-type: none"> 1) Introduction to biodiversity in agroecosystems 2) The role of biodiversity ecology in agroecosystems 3) The complexity of biodiversity ecology 4) Biodiversity population dynamics 5) Problems and challenges of biodiversity management 6) The role of microbial diversity in soil and plants 7) The influence of habitat conditions on microbes 8) Microbial diversity management 9) Utilization of microbial diversity in pest control 10) Interaction and synergism of insect and microbial diversity 11) Biodiversity management at land and landscape scale 12) Economic value and biodiversity conservation 13) Impact of agroecosystem management policies on biodiversity 	

14) Case study of biodiversity management in tropical agroecosystem																																	
Relationship of CLO and ILO	<table border="1"> <thead> <tr> <th></th> <th>A1</th> <th>K1</th> <th>K2</th> <th>K3</th> <th>S1</th> <th>S2</th> <th>S3</th> </tr> </thead> <tbody> <tr> <td>CLO 1</td> <td>0,2</td> <td>0,2</td> <td>0,2</td> <td>0</td> <td>0</td> <td>0,2</td> <td>0,2</td> </tr> <tr> <td>CLO 2</td> <td>0,2</td> <td>0,1</td> <td>0,2</td> <td>0</td> <td>0</td> <td>0,1</td> <td>0,4</td> </tr> <tr> <td>CLO 3</td> <td>0,1</td> <td>0,2</td> <td>0,2</td> <td>0</td> <td>0</td> <td>0,2</td> <td>0,3</td> </tr> </tbody> </table>		A1	K1	K2	K3	S1	S2	S3	CLO 1	0,2	0,2	0,2	0	0	0,2	0,2	CLO 2	0,2	0,1	0,2	0	0	0,1	0,4	CLO 3	0,1	0,2	0,2	0	0	0,2	0,3
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CLO 3	0,1	0,2	0,2	0	0	0,2	0,3																										
Reference	<p>Main</p> <ol style="list-style-type: none"> 1) Collins WW, Qualset CO. 1998. Biodiversity in Agroecosystems (Advances in Agroecology). 2) Altieri M, Nicholls C. 2004. Biodiversity and Pest Management in Agroecosystem. 3) Gurr GM, Wratten SD, Synder WE, Read DMY. 2012. Biodiversity and Insect Pests. 4) Lemaire G, Carvalho P, Kronberg S, Recous S. 2018. Agroecosystem Diversity. Reconciling Contemporary Agriculture and Environmental Quality <p>Supporting References</p> <ol style="list-style-type: none"> 1) Perfecto I, Vandermeer J. 2008. Biodiversity Conservation in Tropical Agroecosystems. 2) Moonen A-C, Bàrberi P. 2008. Functional Biodiversity: An Agroecosystem Approach. 3) Kazemi H, Klug H, Kamkar B. 2018. New Services and Roles of Biodiversity in Modern Agroecosystems: A Review. 4) Buchori D, ..., Rizali A, <i>et al.</i> Beekeeping and Managed Bee Diversity in Indonesia: Perspective and Preference of Beekeepers. Diversity 14(1): 52. 5) Rizali A, Karindah S, Windari A, Rahardjo BT, Nurindah, Sahari B. 2020. Ant and termite diversity in Indonesian oil palm plantation: Investigating the effect of natural habitat existence. Biodiversitas 21: 1326-1331. 																																
Learning Media	<p>Software:</p> <p>Hardware:</p>																																

		Computer, LCD
Team Teaching	Dr. Akhmad Rizali, SP, MSi Dr. Ir. Aminudin Afandhi, MS Dr. Anton Muhibudin, SP, MP	
Required Courses	1) None	

Week	Sub-CLO (as expected final capability)	Indicator	Criteria & Forms of Assessment	Learning Methods (Lectures / Assignments / other forms of learning)	Time (Duration)	Learning Materials / [References]	Proportion (%)
1	Students are able to understand comprehensively about biodiversity in tropical agroecosystems.	Ability to master material about biodiversity in tropical agroecosystems.	Criteria: The ability of students to explain about biodiversity in tropicalecosystems. Form of Assessment: active	Discussion	100 minutes Self-study (2x60 minutes)	Understanding agroecosistem and discussion Agroecosystem problems in Indonesia: (soil and water, hpt, emissions, impact on crop production)	5 %

			participation of students in discussions			Book:	
2	Understand the role of biodiversity ecology in agroecosystems	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	<p>Criteria:</p> <p>The ability of students to explain the functions and roles of agroecosystem components, as well as analyze the importance of agroecosystem stability</p> <p>Assessment form: Quizzes and assignments</p>	Discussion and practice	<p>100 minutes</p> <p>Self-study (2x60 minutes)</p>	The function of agroecosystems, hierarchy (food & energy chain) in agroecosystems, and the economic value of agroecosystems	
3	Understand agricultural ecology and pest control	Ability to respond to learning materials, participate in	<p>Criteria:</p> <p>Students are able to explain the</p>	Discussion and practice	100 minutes	Criteria and indicators of soil aspects, including: soil organic matter,	

		learning activities and skills to identify OPT and carry out tasks	criteria and indicators of soil aspects in relation to soil fertility Form of assessment: Quizzes and assignments		Self-study (2x60 minutes):	soil density, nutrient availability, population dynamics in relation to soil fertility	
4	Understanding plant diversity and insect stability in agroecosystems	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Criteria: Able to measure and compile criteria and indicators of HPT aspects, including: population dynamics of microflora and mesophuna in relation to pest	Discussion and practice	100 minutes Learn to take a bath(2x60 minutes): soil formation process	Criteria and indicators of HPT aspects, including: population dynamics of microflora and mesophuna in relation to pest and disease management	

			and disease management Form of assessment: Quizzes and assignments				
5	Understanding insect manipulation through weed management	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to identify, measure and compile criteria for components of the crop production process and plant aspect indicators Form of assessment: Quizzes and assignments	Discussion and practice	100 minutes Self-study (2x60 minutes):	Criteria and indicators of plant aspects, including: plant growth patterns, plant biodiversity, planting patterns, and crop production	

6	Understand the influence of habitat conditions on insect populations	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to plan and manage biotic and abiotic environmental factors Form of assessment: Quizzes and assignments	Discussion and practice	560 minutes	Management of biotic environmental factors – abiotic (understanding, problems and management), especially Land and Water Management (dry and wet land)	
7	Understand insect population dynamics in agroforestry systems			Discussion and practice			
8	Understand the economic value of using biodiversity in pest control	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to compile planning and management of biotic and abiotic environmental factors Form of assessment:	Discussion and practice	560 minutes	Management of biotic environmental factors – abiotic (understanding, problems and management), especially Land and Water Management (dry and wet land)	

			Quizzes and assignments				
9	Understanding natural habitats as a "source" of biodiversity in agroecosystems	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to plan and manage biotic and abiotic environmental factors Form of assessment: Quizzes and assignments	Discussion and practice	560 minutes	Analysis of management success from social, environmental and economic aspects	
10	Understand the relationship between soil fertility, biodiversity and pest management	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to compile planning and management of factors biotic and abiotic environmental factors Form of assessment:	Discussion and practice	560 minutes	Case studies of failed agroecosystems include: integrated crop management, integrated pest management, and integrated soil fertility management	

			Quizzes and assignments				
11	Understanding biodiversity and defense: plant-herbivore interactions at various tropical levels			Discussion and practice			
12	Understand the concept of SLOSS (single large or several small) in biodiversity management			Discussion and practice			
13	Understand the concepts of wildlife-friendly farming and land-sparing			Discussion and practice			
14	Understand designing biodiversity to suppress pests in agroecosystems			Discussion and practice			