

PORTFOLIO

**COURSE:
PERENNIAL CROPS CULTIVATION
(PAG 205216)**



TEACHING TEAM:

Dr. Ir. M. Umar Harun, MS.

Dr.Ir. Erizal Sodikin.

Dr.Ir. Yakup, MS

Dr.Ir. Marlina, MSi

**AGRONOMY STUDY PROGRAM
FACULTY OF AGRICULTURE
UNIVERSITAS SRIWIJAYA**

A. COURSE IDENTITY

Module designation	<i>Perrenial Crop Cultivation</i>	
Semester (s) in which the module is taught	4 th semester/2 nd year	
Person responsible for the module	<ol style="list-style-type: none"> 1. Dr.Ir. M. Umar Harun, MS 2. Dr.Ir. Erizal Sodikin 3. Dr.Ir. Yakup, MS 4. Dr.Ir. Marlina, MSi 	
Language	Indonesian	
Relation to curriculum	Compulsory Course	
Type of teaching, contact hours	<ol style="list-style-type: none"> 1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester 	
Workload (incl. Contact hours, self-study hours)	<ol style="list-style-type: none"> 1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester 	
Credit points	3 credits (equivalent with 4.36 ECTS)	
Requirements according to the examination regulations	A student must have attended the lecture at least 85% of total lectures and submitted all the assignments prior to join the final exam	
Module objectives/intended learning outcomes CLO=Course Learning Outcomes	After completing this course, a student is expected to:	
	CLO1	understand and be able to explain ecology of perennial crop
	CLO2	understand and be able to explain nurseries of perennial crop
	CLO3	understand and be able to explain crop cultivation of perennial crop
	CLO4	understand and be able to explain harvesting and post-harvesting of perennial crop

Content	<ol style="list-style-type: none"> 1. Introduction and scope area of perennial crop. 2. Ecology, Cultivation, Maintenance, Harvest and post-harvest of oil palm 3. Ecology, Cultivation, Maintenance, Harvest and post-harvest of rubber plant 4. Ecology, Cultivation, Maintenance, Harvest and post-harvest of oil coconut 5. Ecology, Cultivation, Maintenance, Harvest and post-harvest of coffee 6. Ecology, Cultivation, Maintenance, Harvest and post-harvest of pepper 7. Ecology, Cultivation, Maintenance, Harvest and post-harvest of tea 8. Ecology, Cultivation, Maintenance, Harvest and post-harvest of cocoa
Examination forms	Quiz, Mid-terms and Final Examination
Media employed	LCD, whiteboard, websites
Reading List	<ol style="list-style-type: none"> 1. Aik Chin Soh., S. Mayes., and J.A. Robert. 2017. Oil Palm breeding. CRC Press. ISBN: 1498715443.9781498.715447. USA 2. Corley. R.H.V., and P.B Tinker. 2015. The Oil Palm. Fifth edition. Wiley-Black well. ISBN: 978-1-405-18939-2. USA 3. Chowdappa, P., V. Niral., B.A. Jerard, and K. Samsudeen. 2017. Coconut. Daya Publishing House. ISBN: AST 002258. New Delhi. IND 4. Haryanto, B. 2020. Budidaya karet unggul. Seri Pekebun modern. Yogyakarta. INA 5. Iyung, P. 2021. Panduan budidaya kelapa sawit untuk pekebun. Penebar swadaya. E-ISBN: 978-623-225-121-2 Cimanggis, Depok. INA 6. Jean, N.W. 2012. Coffee: Growing, processing, sustainable production. Second eds. Wiley-UCH. ISBN: 978-3527332533. London. UK 7. Kodoth, P.N. 2020. The geography of black pepper. Springer. ISBN: 978-3-030-52864.5. Swedia. SWE 8. Jokov. E.A., and E.L. Ngo-Sannick. 2012. Cocoa. CTA. ISB: 978-92-9082-566-2 Wageningen, Netherland. NTD. 9. Mawardin, M., Simpala., S. Darman., dan B, Rafik. 2022. Budidaya kelapa yang baik. Andi. ISBN: 978-623-7667-80-5. Tangerang. INA 10. Pritan. G. 2019. Modern techniques of rubber cultivation. Lambert. India. INA. 11. Panda, H. 2016. Cultivation and manufacture of Tea. Asis pacific business Press Inc. ISBN: 9788178331683. New Delhi. IND

	<ol style="list-style-type: none">12. Puji, R. 2021. Panduan berkebun kopi. Penebar swadaya. Cimanggis. Depok. INA13. Rukmana, R., dan H. Yudirachman. 2017. Agribisnis Teh. Lyli. ISBN: 978-979-29-4663-5. Malang. INA14. Susanto. F.X. 2012. Tanaman kakao : budidaya dan pengolahan hasil. Kanisius. Bandung. INA15. Yusnu, I. dan Nurhakim. 2010. Budidaya dan bisnis Lada. BCC media. Bogor. INA
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B. STUDY LEARNING PLAN

Course Name : Perennial Crops Cultivation

Code/Credits : PAG 205216

Course Status : Compulsory

Short Description

This course explains the specific ecological conditions of plants to produce economically from each plantation crop commodity in South Sumatra and Indonesia, planting material and production of plantation plant seeds, aspects of plant cultivation and maintenance, and systems and harvesting techniques of each plantation commodity

Objectives

After the completion of this course, students will be able to understand, describe and applied the knowledge Ecological conditions, origin of planting material and seed production for nursery, cultivation techniques, maintenance and harvesting techniques of the perennial crop commodities (plantation) of South Sumatra and Indonesia.

Mapping of Course Learning Outcomes (CLO)-Program Learning Outcomes (PLO)

CLO	Description	PLO*			
		AV	KC	GS	SS
CLO1	understand and be able to explain ecology of perennial crop	8; 9; 10	1; 2; 3	1; 2; 3	1; 2
CLO2	understand and be able to explain nurseries of perennial crop	8; 9; 10	1; 2; 4	1; 2; 3	1; 3; 4; 5
CLO3	understand and be able to explain crop cultivation of perennial crop	8; 9; 10	1; 2; 4	1; 2; 3	1; 3; 4; 5
CLO4	understand and be able to explain harvesting and post-harvesting of perennial crop	8; 9; 10	1; 2; 4	1; 2; 3	1; 3; 4; 5

AV = Attitude and Value; **KC** = Knowledge competence; **GS** = General Skills; **SS** = Specific Skills

*Details are in the Study Program Curriculum file

Course Outlines:**Face-to-Face:**

No.	Course materials	Duration (face-to-face) (minutes)	CLO			
			1	2	3	4
1	Ecology, Breeding and Nurseries of Oil Palm	110	v	v		
2	Cultivation and Maintenance, Harvest and post-harvest of oil palm	110			v	v
3	Ecology, Breeding and Nurseries of rubber plant	110	v	v		
4	Cultivation and Maintenance, Harvest and post-harvest of rubber plant	110			v	v
5	Evaluation (1-4)	110	v	v	v	v
6	Ecology, Breeding and Nurseries of coffee	110	v	v		
7	Cultivation and Maintenance, Harvest and post-harvest of coffee	110			v	v
8	Ecology, Breeding and Nurseries of coconut	110	v	v		
9	Cultivation and Maintenance, Harvest and post-harvest of coconut	110			v	v
10	Ecology, Breeding and Nurseries of pepper	110	v	v		
11	Evaluation (6-10)	110	v	v	v	v
12	Cultivation and Maintenance, Harvest and post-harvest of pepper	110			v	v
13	Ecology, Breeding and Nurseries of tea	110	v	v		
14	Cultivation and Maintenance, Harvest and post-harvest of tea	110			v	v
15	Ecology, Breeding and Nurseries of cocoa	110	v	v	v	v
16	Evaluation (11-15)	110	v	v	v	v

Outcomes and Assessment

No.	Week	Sub-CLO	Assessment	Percentage of score weight to final score (%)
1	I	1. Understand and be able to explain ecology of oil palm 2. Understand and be able to explain plant breeding, nursery techniques for oil palm	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly	
2	II	3. Understand and be able to explain land clearing for cultivation 4. Understand and be able to explain cultivation for oil palm 5. Understand and be able to explain harvest system for oil palm	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly Assignment on searching and reviewing scientific article	
3	III	6. Understand and be able to explain ecology of rubber plant 7. Understand and be able to explain plant breeding, nursery techniques for rubber	Ask and answer questions (face-to-face). At least 5% of students in the class are able to answer the question correctly Assignment	
4	IV	8. Understand and be able to explain land clearing for cultivation for rubber 9. Understand and be able to explain cultivation for rubber 10. Understand and be able to explain harvest system for rubber	Ask and answer questions (face-to-face). At least 5% of students in the class are able to answer the question correctly.	
5	V	EVALUATION I (I to IV)	Essay exams Discussion on the answers of the essay exams	25
6	VI	11. Understand and be able to explain ecology of coffee 12. Understand and be able to explain plant breeding, nursery techniques for coffee	Ask and answer questions (face-to-face). Assignment	
7	VII	13. Understand and be able to explain land clearing for cultivation for coffee 14. Understand and be able to explain cultivation for coffee	Ask and answer questions (face-to-face). Assignment	

		15. Understand and be able to explain harvest system for coffee		
8	VIII	16. Understand and be able to explain ecology of coconut 17. Understand and be able to explain plant breeding, nursery techniques for coconut	Ask and answer questions (face-to-face). Assignment	
9	IX	18. Understand and be able to explain cultivation for pepper 19. Understand and be able to explain harvest system for pepper	Ask and answer questions (face-to-face). Assignment	
10	X	20. Understand and be able to explain land clearing for cultivation for pepper 21. Understand and be able to explain cultivation for pepper 22. Understand and be able to explain harvest system for pepper	Ask and answer questions (face-to-face). Assignment	
11	XI	EVALUATION II (VI-X)		35
12	XII	23. Understand and be able to explain cultivation for tea 24. Understand and be able to explain harvest system for tea	Ask and answer questions (face-to-face). Assignment	
13	XIII	25. Understand and be able to explain land clearing for cultivation for tea 26. Understand and be able to explain cultivation for tea 27. Understand and be able to explain harvest system for tea	Ask and answer questions (face-to-face). Assignment	
14	XIV	28. Understand and be able to explain cultivation for cocoa 29. Understand and be able to explain harvest system for cocoa	Ask and answer questions (face-to-face).	
15	XV	30. Understand and be able to explain land clearing for cultivation for cocoa 31. Understand and be able to explain cultivation for cocoa 32. Understand and be able to explain harvest system for cocoa	Ask and answer questions (face-to-face). Assignment	
16	XVI	EVALUATION III (XII-XV)		40

Assignment

No.	Week	Assignment Instructions	Submission Methods	Weight (%)	CLO			
					1	2	3	4
1	II	Students search, discuss and review a scientific article regarding Ecology, Breeding and Nurseries of Oil Palm. The selected papers are those published in international journals. The results of the review are written on a power point slide of a maximum of 5 pages.	Print out	20% to total score in the Evaluation I	v	v		
2	III	Students search literature for cultivation and harvest of rubber, and summarize it in five pages of writing	Print out	20% to total score in the Evaluation I			v	v
3	VI	Summarizing article related to breeding and clones of rubber (no more than 200 words)	Soft file in CD	4% to total score in the Evaluation II	v			
4	VII	Summarizing article related to flowering and fruiting of coffee tree	Soft file in CD	4% to total score in the Evaluation II	v			
5	VIII	Explaining biosynthesis of fat in coconut fruit (typed in a doc file)	Soft file in CD	4% to total score in the Evaluation II	v			
6	IX	Summarizing the properties of seedling technique of pepper	Soft file in CD	4% to total score in the Evaluation II	v	v		
7	X	Explaining cultivation and harvesting of pepper	Soft file in CD	4% to total score in the Evaluation II			v	v
8	XII	Reviewing video related to harvesting of tea. Students are asked to explain the type of technique harvesting (max 5 pages in a doc file)	Upload in E-Learning	10% to total score in the Evaluation III			v	v
9	XIII	Students are asked to calculate the need for cacao seeds to be used as seeds, embroidery, and plants for planting an area of 10 hectares	Upload in E-Learning	10% to total score in the Evaluation III			v	v
10	XV	students were asked to predict the future appearance of trees from oil palm, rubber, pepper, and cacao	Upload in E-Learning	10% to total score in the Evaluation III			v	v

Field Practicum:

No.	Topics	Duration	CLO				Activities in the Field
			1	2	3	4	
1	Introduction of shading, temperature, and open space for seedling plantation commodities	170	v				Pre-test, explanation from assistant, practice according to the practical manual,
2	Technique of nursery for rubber plant	170	v	v			

3	Technique of nursery for oil palm	170	v	v			writing the results in worksheet, approval by assistant.	
4	Application practice for fertilization and watering the nursery of rubber plant	170		v	v			
5	Application practice for fertilization and watering the nursery of oil palm	170		v	v			
6	Application practice for Symptoms of nutrient deficiency based on leaf observations of oil palm, rubber, and coffee	170		v	v			
7	Application practice for fertilization of oil palm, rubber, coffee, and coconut in field (I)	170		v	v			
8	Application practice for fertilization of oil palm, rubber, coffee, and coconut in field (II)	170		v	v			
9	Application practice for fertilization of oil palm, rubber, coffee, and coconut in field (III)	170		v	v			
10	Application practice for harvesting of oil palm	170			v	v		
11	Application practice for harvesting of rubber	170			v	v		
12	techniques for making slabs from rubber plant sap	170		v	v	v		
<p>Distribution of weight in field practicum score: Pre-Test (20%), practicum report (20%), participation (10%), final practicum exam (50%). All student should have 100% of presence in the field, and for those who are unable to attend field practicum, she/he must take a follow-up practicum at another time. Percentage of score weight of field practicum to final score is 25%.</p>								

Contribution of Course Assessment to PLO

Course Assessment	AV	KC	GS	SS	Type
Assignments	8, 10	1, 2, 4	1, 2, 4	4, 10, 11	Formative
Questions in Quiz	8, 10	1, 2, 4	1, 2, 4	4, 10, 11	Summative
Questions in Mid-Term	8, 10	1, 2, 4	1, 2, 4	4, 10, 11	Summative
Questions in Final Exam	8, 10	1, 2, 4	1, 2, 4	4, 10, 11	Summative
Field Practicum	5, 7, 8, 10	1, 2, 4	1, 2, 4, 7, 8	4, 9, 11	Formative

Assignment Assessment Rubric

No.	Criteria	Weight (%)	Score			
			≥ 86	71-85.99	56-70.99	40-55.99
			Excellent	Good	Enough	Bad
1	Format and presentation of written assignment	10	The assignment is presented in accordance	There are parts (10%) of the assignment	There are parts (25%) of the assignment not in accordance	There are half of the assignment not in

			with the instructions	not in accordance with the instructions	with the instructions	accordance with the instructions
2	Discussion in the written assignment	50	Information to support the discussion in the assignment is adequate, and the discussion is well organized	Information to support the discussion in the assignment is adequate; however the information is not well written	Information to support the discussion in the assignment is adequate; however the information is copied and pasted in the assignment without paraphrasing	There is not enough information in the assignment. It is just a compilation of information derived from internet searching
3	Publication year of literature cited in the assignment	15	Most of literatures cited are up-to date (≤ 5 years)	Most of literatures cited are between 5-10 years	Most of literatures cited are (≥ 10 years)	There is no literature cited
4	Number of literatures cited in the assignment	15	There are ≥ 3 literature cited	There are ≤ 3 literature cited	One literature cited	There is no literature cited
5	Submission time	10	Assignment is submitted before the deadline	Assignment is submitted one day after the deadline	Assignment is submitted two days after the deadline	Assignment is submitted after two days from deadline

Benchmark for Scoring

No.	Range of Score	Grade	Description
1	86.00 - 100.00	A	Excellent
2	71.00 – 85.99	B	Good
3	56.00 – 70.99	C	Fair
4	40.00 – 55.99	D	Bad
5	<40.00	E	Worst

Remedial Exam:

Students are allowed to join Remedial Exam if the score is under 60 out of 100.

Course materials samples in Power Point Slides :

Course 1.

Ecology, Breeding and Nurseries of Oil Palm

M. UMAR HARUN
AGRICULTURE DEPARTMENT
AGRICULTURE FACULTY

1

Morphological of Tree

2

The global palm oil market size was valued at USD 63.7 billion in 2021 and is anticipated to grow at a compound annual growth rate (CAGR) of 5.1% in terms of revenue from 2022 to 2030. The market is driven by exponentially growing demand from the food, beverage, biofuel, energy, personal care, and cosmetics industries.

3

Based on the results of the discussion and analysis of demand and supply of palm oil in foreign markets as described and stated earlier, it can be drawn some conclusions and suggestions as follows:

- The price of palm oil negatively affected the demand of palm oil in foreign markets. Whereas the income and demand of the previous year had a significant positive effect on the demand for palm oil in foreign markets;
- The price of palm oil, land area and the previous year's supply positively affects the supply of palm oil in foreign markets;
- The price of palm oil and palm oil stocks in the previous year have a significant effect on palm oil stocks;
- The price of palm oil is significantly affected by the cumulative stock of palm oil.

from: <https://www.researchgate.net/publication/311173708> AN ANALYSIS OF PALM OIL PRICE FLUCTUATION IN THE FOREIGN MARKET

4

Oil palms have a predominantly net negative effect on ecosystem functions when compared to primary and secondary rainforest. Net effects do not imply that all effects on a given ecosystem function are positive or negative, but that the majority or most dominant effects are in the given direction. For additional details with greater resolution. Estimates of net effect direction and correlation are qualitative based on the summary presented in this review.

5

Ecological of oil Palm

- Oil palm requires evenly distributed annual rainfall of 2000 mm without a defined dry season. In areas with dry spell, a deep soil with high water holding capacity and a shallow water table augmented with copious irrigation will satisfy the water requirement of the palm.
- Temperature can be a limiting factor for oil palm production. Best oil palm yields are obtained in places where a maximum average temperature of 29-33°C and minimum average temperature of 2-24°C are available.
- Higher diurnal temperature variation causes floral abortion in regions with a dry season.
- The crop requires 1800-2000 sunlight hours annually, more than 300 cal/cm² per day, constant sunlight of atleast 5 hours per day for better oil palm yield.
- Moist, deep and well drained medium textured soils rich in humus content are considered ideal.
- Gravelly and sandy soils, particularly the coastal sands are not ideal for oil palm cultivation. Heavy clay soils with poor drainage properties may pose problems of aeration during rainy seasons.

6

Breeding for oil palm

- The pivotal question is indeed to stabilize or – even better – increase palm oil production under constraints brought by climate change.
- Such constraints will impact the environment of the current cultivated areas and/or induce the extension of plantations to new areas. It will also challenge the capacity for adaptation of various oil palm cropping systems (industrial estates and smallholders).
- Climate-related constraints will consequently shape the panel of oil palm ideotypes targeted by ongoing and future breeding programs.
- As for many other crops, climate change will impact the conditions of oil palm cultivation through a range of expected abiotic (amount and repartition of rainfall, temperatures, carbon dioxide concentration, soil salinity) and biotic (diseases, pests, pollinators, associated crops) stresses.

from: <https://www.researchgate.net/publication/314111996> Breeding the oil palm. Flexibility: access: source for climate change

7

8

Cultivar of oil palm (commerciel)

- Based on the fruit structure, oil palm is classified into dura (thick shell; less mesocarp), pisifera (shell-less; embryo rarely formed), and the commercially cultivated tenera, the D x P hybrid (thin shell; more mesocarp) with oil content.
- Conventional crosses between dura and pisifera cultivars have typically improved oil palm productivity, particularly oil yield. Tenera, the F1 hybrid resulting from this cross, exhibits desirable traits from both parents.
- Additionally, there is a high scope for increasing the oil palm yield to a greater extent. After a three-year immature period, the yield per tree increases progressively with age until it peaks around 20 years.

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Karakteristik Varietas Kelapa Sawit Produksi PPKS

Karakteristik	Dumpy	SP140	Yongambi	Lanjut	540 NG
Rendita Jumlah Tandak (tandan/pohon/tahun)	8	14	13	13	14
Rendita Berat Tandak (kg/tandan)	25,0	17,3	20,0	19,0	15,4
Rendita Produksi TBS (ton/ha/tahun)	27,2	28,3	26,5	27,5	28,1
Potensi TBS (ton/ha/tahun)	28,6	32,4	33,1	32,3	31,1
Rendemen OER (%)	28,8	31,5	29,0	29,9	30,8-32,1
Rendemen OER (%)	24,6	27,0	25,3	26,3	26,5-27,4
Rendita Produksi CPO (ton/ha/tahun)	6,7	7,8	7,7	7,2	7,5-8,1
Potensi CPO (ton/ha/tahun)	8,2	10,2	9,6	9,7	9,3
Umur Buah (bulan setelah tanam)	24	18	14	22	18
Umur Mulai Panen (bulan setelah tanam)	30	28	28	28	28
Laju Pertumbuhan Meninggi (cm/tahun)	40-50	70-80	60-75	75-80	70-80
Panjang Pelekap (meter)	6,2	5,5	6,0	5,3	5,5
Kepadatan Tanam (pohon/ha)	130-136	136-143	130-136	136-143	136-143
Adaptasi pada Daerah Marjinal	Baik	Sangat Baik	Baik	Baik	Baik

11

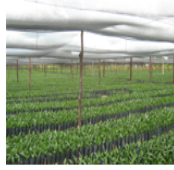
12

Nursery of oil palm

1. Prenursery

The prenursery stage spans the 4 months following germination, during which the seedling grows. It passes through the following stages:

- the germinated seed, complete with radicle and plumule, is planted,
- in the first month the first two leaves and adventitious roots appear,
- a month after planting, the first lanceolate leaf appears, together with the first primary root,
- at 4 months, the seedling has three to four leaves with la lanceolate lamina. The root system is well developed with primary, secondary and tertiary roots. The plant is now autotrophic and ready to be transferred to the nursery.



3

Nursery of oil palm

1. Main nursery

- The nursery stage lasts 12-24 months, after which plants are finally transferred to the field.
- in Main nursery about 9-21 months
- During this period, the palm loses its juvenile appearance and its leaves begin to resemble true fronds. During the nursery stage the plants remain in polybags but without shade



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Required palms per hectare in the plantation (palm density)	150 palms
- Loss at planting	8 palms
- Loss of seedlings in the main nursery	165
Required seedlings in the main nursery	167
- Loss of seedlings in the pre-nursery	155
Required seedlings in the pre-nursery	196
Calculation of the required land	
Pre-nursery	Land area for 196 seedlings
Pre-nursery (palm density: 560 000 oil palm seedlings per hectare, duration three months)	0.87 m ² /yr
Main nursery	Land area for 167 seedlings
Main nursery (palm density: 12 500 oil palm seedlings per hectare, duration: 10 months)	260.5 m ² /yr
Total land use per replanting	261 m ² /yr
Total land use relating to one year out of 25 years	10 m ² /yr

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Figure 1.1. Fertilizer requirements and nutrient application schedule for the main nursery (g per seedling).

Weeks after transplanting	N	P ₂ O ₅	K ₂ O	MgO
1	0.8	0.8	0.3	0.2
3	0.8	0.8	1.2	0.1
5	1.1	1.1	0.4	0.3
7	1.2	1.2	1.7	0.2
10	1.5	1.5	0.6	0.4
13	1.2	1.2	1.7	0.2
16	2.3	2.3	0.9	0.6
19	1.8	1.8	2.6	0.3
22	3.0	3.0	1.2	0.6
25	2.4	2.4	3.4	1.3
28	2.4	2.4	3.4	1.3
32	3.0	3.0	4.3	1.4
36	3.0	3.0	16.3	2.0
40	3.0	3.0	4.3	2.0
44	3.6	3.6	5.1	2.0
48	3.6	3.6	5.1	2.0
52	3.6	3.6	5.1	4.0
56	3.6	3.6	5.1	3.3
Total	41.9	41.9	62.7	24.4

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Thanks



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Course 2.

Cultivation, Maintenance, Harvest and post Harvest of oil palm

M. UMAR HARUN
AGRONOMY DEPARTEMENT
AGRICULTURE FACULTY

1

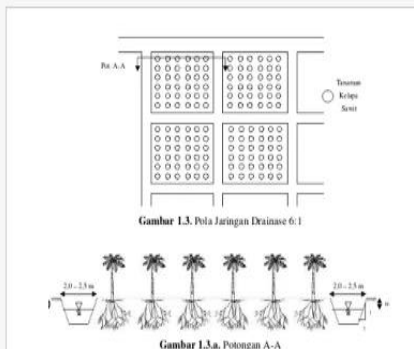
Cultivation Preparation

1. Land preparation (plantation coordinate position, land clearing)
2. Block and road preparation (main roads, supporting roads, surrounding roads, canals and watergates)
3. Preparation of planting land (Land clearing, extraction of wood roots, collection of wood waste)

2



3



4



5

Oil palm Cultivation Activities

1. installation of planting stakes (7.8 x 7.8 x 7.8 m)
2. making planting holes (60 x 60 x 50 cm)
3. seedling transportation (one hole one seedling)
4. liming the planting hole (0.5 – 2.0 kg dolomit)
5. Planting

6



7

2. Maintenance of oil palm crop

- 1. Planting cover crop legume
- 2. Plant fertilization refers to the age of the plant
- 3. Weed control
- 4. Pest and disease control
- 5. Soil erosion control

8

Cover crop legume on oil palm plantation



9

NUTRITION FOR OIL PALM

	N	P	K	Ca	Mg	S	B	Cu	Fe	Mn	Mo	Zn
SEEDLING GROWTH	A	A	A	A	A	A	A					
FROND NUMBER	A											
BUNCH NUMBER	A		A									
FFB YIELD	A	A	A			A	A					A
OIL CONTENT	V				A							A
BUNCH WEIGHT	A	A	A		A							
DISEASES	A	A	V	V				V				

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Table 9
Common Macronutrient Application Rates
Mature Oil Palm - Malaysia

References	Nutrient demand (kg/ha/year)				
	N	P ₂ O ₅	K ₂ O	MgO	CaO
Hansen, 1999	114	34	149-290	33	32
Patrick, et al., 1999	162	49	279	-	49
Poohparajah and Chew, 1998	192	59	251	89	61
Ng, S.K., 1977	192	59	251	-	61
Tan, 1977	191-267	33-42	287-387	48-67	85-114
Average rate (United Plantation, Berhad, Malaysia)	145	35	257	27	-

11

Umur (Bulan)/ Ladang tanaman	Dosis Pupuk (gram/pohon)				
	Urea	Rock Phosphate	MOP (KCl)	Dolomit	HGF-B
3	100	150	200	100	-
6	150	150	250	100	-
9	150	200	250	150	25
12	200	300	300	150	-
16	250	300	300	200	25
20	300	300	350	250	-
24	350	300	350	300	50
28	350	450	450	350	50
32	450	450	500	350	-

Kelompok Umur (Tahun)	Dosis Pupuk (gram/pohon)				
	Urea	SP-36	MOP (KCl)	Kieserite	Jumlah
3-8	2.00	1.50	1.50	1.00	6.00
9-13	2.75	2.25	2.25	1.50	8.75
14-20	2.50	2.00	2.00	1.50	7.75
21-25	1.75	1.25	1.25	1.00	5.25

12



13

Concept of IPM- Integrated Pest Management

A. holistic approach where ecological and biological knowledge and monitoring techniques are integrated with Physical or Cultural, Chemical & Biological Methods to manage pest in a sustainable manner.

B. Integrated Pest Management (IPM) uses pest and environmental information with correct pest control methods to prevent unacceptable levels of damage by the most cost-effective means and with minimum possible hazard to man, non-target organisms, and the environment.

3. Key principles includes the establishment of thresholds for the pest population & economic loss of crop.

14

15



(a) algal leaf spot, (b) basal stem rot, (1) the oldest fronds have died and collapsed, (2) frilling body of Gamoderma boninensis, (3) the bogging of infected tissues, (4) Mycotia of G. boninensis in diseased tissues, (c) spear rot of oil palm, (1,2) the spear leaf and next youngest leaves discolored or collapsed (3) yellowing and rotting of spear leaf, (d) bunch end rot and (e) sooty mold on the pinnate.

16

Soil Erosion on field

Abstract: Soil losses from hill slopes in oil palm plantation in Sedenak Estate, Johor were measured using runoff plot and rainfall simulator. The plot was designed to be manageable but the size was fixed at 0.8 x 3.75m. Four types of surface covers were investigated for the plots, i.e. half bare soil and half grass cover (HGC), half bare soil and half dry frond (HDF), fully grass cover (FG), and fully bare soil (BS). The influence of initial soil moisture, saturated hydraulic conductivity, Ks, bulk density and slope on rates of soil loss were also evaluated. The rainfall simulator produced rainfall intensities between 90 and 160 mm/hr with durations from 45 to 60 min per run. BS plot exhibited the highest Ks value among all plots but the percentage of initial soil moisture on this surface was low. BS plot recorded the highest runoff coefficient (C) and soil loss values of 73.6 ± 4 percent and 5.26 ± 3.2 t/ha respectively, while the lowest was from plot FG with 41.7 ± 5.7 percent and soil loss of 2.85 ± 2.1 t/ha. Meanwhile, the results suggested that the ground cover had the ability to reduce soil loss by 67% and 17%, respectively for plots BS-HGC and BS-HDF. Overall, soil erosion control such as surface is effective measures in reducing level of runoff and soil erosion.

<https://ojs.ump.edu.my/article/view/10.1088/1751-891X/136/1/012086/pdf>

17

3. Harvesting for Oil Palm



18

Good harvesting

- To result in large quantities of fresh fruit bunches harvested, high oil extraction rates, and good quality oil. Good harvesting practices include:
 - ▣ Harvesting using correct procedures (frond cutting, bunch cutting);
 - ▣ Harvesting only ripe bunches;
- Good and fast transport of the bunches to the mill;
- Harvesting, grading, transport
- Limited loss of loose fruits in the field or during transport (loose fruits have an oil content of more than 40 percent)

19

HARVESTING Goal

- Be able to cut and collect all ripe fruit bunches in a plantation;
- Be able to harvest fresh fruit bunches without damaging the fruit and the palm;
- Be able to get fresh fruit bunches with excellent oil content and quality;
- Be able to get maximum profit from harvested fresh fruit bunches

20

Standard

- All ripe fruit bunches are harvested at every harvesting round;
 - ▣ Harvesting is done at least once every 10 days;
- Bunches are harvested at the right time and ripeness and in the right way, without causing damage to the bunch and the palm;
- The minimum ripeness standard of 1-4 loose fruits per bunch is followed (only if harvesting is done at least every ten days);
 - ▣ Stalks are cut to less than 2 cm in length;
- The quantity of harvested fresh fruit bunches is correctly recorded at each harvest.

21

Frequency

- **Once every 7-10 days;**
- Note: Many farmers harvest once every two weeks, but this will not give the maximum bunch yield. Some bunches will get overripe during the waiting period, and loose fruits are more likely to get scattered on the ground, so they take more time to collect and some will be lost amongst the weeds. Harvesting more frequently is the fastest and easiest way to improve the yield.

22

For good transportation

- the roads need to be maintained. While road maintenance can require large investments, bad conditions can make transportation of the harvest slow and more expensive. To avoid loss of fruit bunches or oil quality during its transport to the mill, the cooperatives, farmer groups or traders should set clear rules which include:
 - ▣ Quality of the truck;
 - ▣ Speed of transportation;
 - ▣ Covering of full trucks with a net.

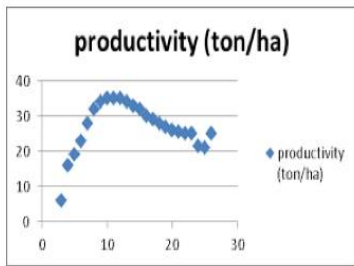
23

How does the government calculate the price for fresh fruit bunches?

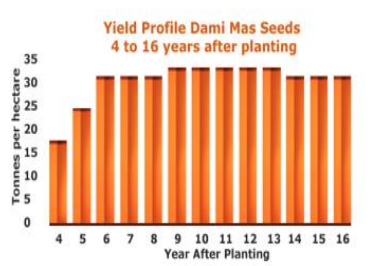
$$PFFB = k \times ((PCPO \times OER) + (PPKO \times OERK))$$

Where: PFFB = Price of fresh fruit bunches at the mill gate; k = Percentage of returns given to fresh fruit bunch producers (farmers, plantations); PCPO = CPO price; OER = Oil extraction rate for CPO; PPKO = PKO price; OERK = Palm kernel oil extraction rate.

24



25



26

Thanks



27

Course3.

Ecology, Breeding and Nurseries of Rubber Crop

M. UMAR HARUN

1

Introduction

- Rubber is harvested mainly in the form of the latex from the rubber tree (*Hevea brasiliensis*) or others.
- The latex is a sticky, milky and white colloid drawn off by making incisions in the bark and collecting the fluid in vessels in a process called "tapping".
- The latex then is refined into the rubber that is ready for commercial processing. In major areas, latex is allowed to coagulate in the collection cup. The coagulated lumps are collected and processed into dry forms for sale.

2

- *Hevea brasiliensis* is a species of rubberwood that is native to rainforests in the Amazon region of South America, including Brazil, Venezuela, Ecuador, Colombia, Peru, and Bolivia.
- These trees are generally found in low-altitude moist forests, wetlands, riparian zones, forest gaps, and disturbed areas. It is a quick growing tree, often the first to establish itself when a gap in the canopy is produced but may be shaded out as more trees fill in the canopy opening.
- Today, commercially-produced rubber can also be found throughout much of Southeast Asia and Western Africa.

3

Achievement of CLO (Indralaya Class)

STUDY PROGRAM : AGRONOMY (INDRALAYA CLASS)
 ACADEMIC YEAR : 2021/2022 (EVEN)
 COURSE : PERENNIAL CROPS CULTIVATION (3 CREDITS)
 ROOM : ROOM B
 SCHEDULE : MONDAY (11:10 - 12:50 WIB)

NO.	NIM	NAME	EV1	EV2	EV3	FINAL SCORE	GRADE	OVERALL ASSESSMENT
1	05091181823001	M. JODY FAHREZA	88	92,5	90	90,15	A	Achieved
2	05091182025001	JUWINDA	86	96	100	94,60	A	Achieved
3	05091182025002	WINA YOHANA PUTRI HUTASOIT	86	98	85	89,20	A	Achieved
4	05091182025003	PUTRI OLIVIA ANGGRAIN	90	96	100	95,80	A	Achieved
5	05091182025004	REIDHATUL AZNI	88	98	100	95,80	A	Achieved
6	05091182025005	HERDAYANTI	85	97	90	90,60	A	Achieved
7	05091182025006	MUHAMMAD HIDAYAT	86	98	90	91,20	A	Achieved
8	05091182025007	GALUH MAWARTI	86	90	95	90,80	A	Achieved
9	05091182025008	JUNIAR FITRIA	85	90	85	86,50	A	Achieved
10	05091182025009	EPIKA MELA ATMI	86	92	85	87,40	A	Achieved
11	05091182025010	RADHITA DINDA KIRANA	90	90	85	88,00	A	Achieved
12	05091182025011	SEPHYTA MAWARNI BILQIS	90	98	85	90,40	A	Achieved
13	05091182025012	ANANDA PRANSISKA	88	92	85	88,00	A	Achieved
14	05091182025013	DIAN WAHYU FITRIANI	86	90	90	88,80	A	Achieved
15	05091182025014	BIBIT SETIYANTO	88	98	90	91,80	A	Achieved
16	05091182025015	YENI ANGGRAIN	86	98	85	89,20	A	Achieved
17	05091182025016	SEPTA PUTRI ANGGRAIN	85	92	90	89,10	A	Achieved
18	05091182025017	SITI SOLEHA	86	89	90	88,50	A	Achieved
19	05091182025018	WAHYUNI LESTARI	88	87	85	86,50	A	Achieved
20	05091282025019	IMAS AMELIA	86	87	100	91,90	A	Achieved
21	05091282025020	MEDITA JULYANA	86	85	85	85,30	B	Not Achieved
22	05091282025021	RIFKA ANNISA	86	90	90	88,80	A	Achieved
23	05091282025023	YUNIA WIDYANINGSIH	90	98	90	92,40	A	Achieved
24	05091282025024	MUH. ABBY ASADDILLA	86	90	85	86,80	A	Achieved
25	05091282025025	YUGO GUSNADI	90	98	85	90,40	A	Achieved
26	05091282025026	SISKA SEPTI MEILANI PUTRI	86	92	85	87,40	A	Achieved
27	05091282025027	ANDRIANSYAH	88	98	85	89,80	A	Achieved
28	05091282025028	NYAYU AMALIAH	86	90	85	86,80	A	Achieved
29	05091282025029	PEBRIAN RICARDO SIMANUNGKALIT	85	89	85	86,20	A	Achieved
30	05091282025030	RATNA TRIASA KENCANA	86	98	90	91,20	A	Achieved
31	05091282025031	APRI PRAYOGA	90	90	100	94,00	A	Achieved
32	05091282025032	NABILA HAZI KURNIA	86	90	90	88,80	A	Achieved
33	05091282025033	MEISYA ANDESTA	86	90	100	92,80	A	Achieved
34	05091282025034	MAHARANI	84	94	90	89,40	A	Achieved
35	05091282025035	TYA AULIA	85	90	100	92,50	A	Achieved
36	05091282025036	RISMA CIKAL AMANDA YASIR	86	90	85	86,80	A	Achieved
37	05091282025037	GILANG SYAHIBUL RIDHO	86	90	100	92,80	A	Achieved
38	05091282025038	AISYAH ZAHRANI SASKIA FITRI	86	70	85	80,80	B	Not Achieved
39	05091282025039	MERRY LESTARY	84	98	85	88,60	A	Achieved
40	05091282025040	ALDEN DANISWARA	86	90	85	86,80	A	Achieved
41	05091282025042	DESNITA	90	92	90	90,60	A	Achieved
42	05091282025043	PUSDIKASIWI TRISNAULI NAINGGOLAN	86	98	90	91,20	A	Achieved
43	05091282025044	DINI NUR ASYIFA ZAHWA	90	90	100	94,00	A	Achieved
44	05091282025045	KHOIRUL EFENDI	86	80	85	83,80	B	Not Achieved
45	05091282025046	KHO IRUL ANWAR	90	87	100	93,10	A	Achieved
46	05091282025047	RAGIL RIZKI PRAYOGA	86	90	90	88,80	A	Achieved
47	05091282025048	ANNISA AULIA	86	90	90	88,80	A	Achieved
48	05091282025049	MULLAH RASELAH SALSABILA	86	90	100	92,80	A	Achieved
49	05091282025050	NOFITA YULIANA SARI	86	98	85	89,20	A	Achieved
50	05091282025051	MONICA CANIA	86	98	85	89,20	A	Achieved
51	05091282025053	MUHAMMAD FIKRI	86	87	90	87,90	A	Achieved
52	05091282025054	SILVIA JUNI CHRISTI PARDEDE	86	90	85	86,80	A	Achieved
53	05091282025055	DESTI ANNISA	86	98	90	91,20	A	Achieved
54	05091282025056	IHSAN MAJULANA	86	98	90	91,20	A	Achieved
55	05091282025057	LILI ANDINI PERMATA SARI	86	87	90	87,90	A	Achieved
56	05091282025058	SUVIANA FEBY IRNALIA	86	90	90	88,80	A	Achieved
57	05091282025059	M HAFIZH AMWANAYA	86	98	90	91,20	A	Achieved
58	05091282025061	I MADE YOGA WEDHASMARA	86	90	85	86,80	A	Achieved
59	05091282025062	LINNY JEHONISSI	86	90	90	88,80	A	Achieved
60	05091282025063	JULIANTO	86	90	90	88,80	A	Achieved
61	05091382025064	KIAGUS SHOBRIE AJIMULYA IRAWAN	86	98	90	91,20	A	Achieved
62	05091382025065	MICHAEL KEVIN JONATHAN SIJABAT	86	90	100	92,80	A	Achieved
63	05091382025067	NUR AISYAH	86	75	80	80,30	B	Not Achieved
64	05091382025073	SINDY PUSPITA MARSELLA	86	90	90	88,80	A	Achieved
65	05091382025076	MUHAMMAD IKHWAN PRATAMA	86	87	90	87,90	A	Achieved
66	05091382025079	NADIYAH AGUSTINA	90	98	100	96,40	A	Achieved
67	05091382025082	RENALDY	86	92,5	90	89,55	A	Achieved
		AVERAGE PER CLASS	86,64	91,79	90,07	89,56		
		ACHIEVEMENT	Achieved	Achieved	Achieved	Achieved		

Achievement of CLO (Palembang Class)

STUDY PROGRAM : AGRONOMY (PALEMBANG CLASS)
 ACADEMIC YEAR : 2021/2022 (EVEN)
 COURSE : PERENNIAL CROPS CULTIVATION (3 CREDITS)
 ROOM : ROOM 08
 SCHEDULE : THURSDAY (11:10 - 12:50 WIB)

NO.	NIM	NAME	EV1	EV2	EV3	FINAL SCORE	GRADE	OVERALL ASSESSMENT
1	05091382025066	MUHAMMAD RIFKY DAFA	86	82,5	90	86,38	A	Achieved
2	05091382025068	GALINDRI CAHYANING RAMADHANI	86	88	90	88,30	A	Achieved
3	05091382025069	BAGUS ABDURRAHMAN NUR	88	77	85	82,95	B	Not Achieved
4	05091382025070	AHMAD ARRAFI ARIIQ	86	77	90	84,45	B	Achieved
5	05091382025071	HASYIFAH RIZKI FADILA PUTRI	90	88	90	89,30	A	Achieved
6	05091382025072	NURUL FHADILAH	90	88	95	91,30	A	Achieved
7	05091382025074	FAUZAN ARAHMAN	90	99	90	93,15	A	Achieved
8	05091382025075	MUHAMMAD ANDRIANSYAH	90	82,5	90	87,38	A	Achieved
9	05091382025077	SYAHRUL SYAKBAN	86	90	85	87,00	A	Achieved
10	05091382025078	HIJAZI GAMI ALFAQIH	88	86	85	86,10	A	Achieved
11	05091382025080	MULKI MANAN	90	88	85	87,30	A	Achieved
12	05091382025081	LEO CANDRA ADI PUTRA	90	85	86	86,65	A	Achieved
		AVERAGE PER CLASS	88,33	85,92	88,42	87,52		
		ACHIEVEMENT	Achieved	Achieved	Achieved	Achieved		

Percentage of CLO Achievement (Indralaya Class)

No.	Evaluation	Max. Score	Score	CLO1	CLO2	CLO3	CLO4
1	QUIZ	100	86.64	√	√	√	√
2	MID-TERM	100	91,79	√	√	√	√
3	FINAL EXAM	100	90,07	√	√	√	√
	Total	300	268.51	268.51	268.51	268.51	268.51
				89.50	89.50	89.50	89.50
	Minimum achievement is 80			√	√	√	√

Percentage of CLO Achievement (Palembang Class)

No.	Evaluation	Max. Score	Score	CLO1	CLO2	CLO3	CLO4
1	QUIZ	100	88.33	√	√	√	√
2	MID-TERM	100	85.92	√	√	√	√
3	FINAL EXAM	100	88.42	√	√	√	√
	Total	300	262.67	262.67	262.67	262.67	262.67
				87.56	87.56	87.56	87.56
	Minimum achievement is 80			√	√	√	√



**UNIVERSITAS SRIWIJAYA FAKULTAS PERTANIAN
JURUSAN BUDIDAYA PERTANIAN
PROGRAM STUDI AGRONOMI**

RENCANA PEMBELAJARAN SEMESTER (RPS)

A. IDENTITAS MATA KULIAH

Mata kuliah S	: Budidaya Tanaman Tahunan	Kode PAG 205216	Semester: 4	3 (2-1)
Bahan kajian	: Kondisi ekologis, asal bahan tanam dan produksi bibit, teknik budidaya, pemeliharaan dan teknik panen dari komoditi tanaman tahunan (perkebunan) utama sumsel dan Indonesia			
Deskripsi mata kuliah	Mata kuliah ini menjelaskan kondisi spesifik ekologis tanaman untuk berproduksi secara ekonomis dari masing-masing komoditi tanaman perkebunan di sumsel dan Indonesia; bahan tanam dan produksi bibit tanaman perkebunan; aspek budidaya tanaman dan pemeliharannya; persyaratan, system dan Teknik panen dari masing-masing komoditi perkebunan			
CPMK	CPMK-1: Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen kelapa sawit (oil palm) CMPK-2 : Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen karet (rubber crop) CPMK 3: Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen kopi (coffee crop) CPMK-4: Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen kelapa (coconut) CPMK-5: Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen lada (pepper crop) CPMK-6: Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen the (tea crop) CPMK-7: Memahami ekologis, pembibitan, budidaya tanaman, pemeliharaan spesifik, panen dan pascapanen kakao (cocoa)			
Dosen pengampu:	Dr. Ir. M. Umar Harun, MS (MUH) Dr. Ir. Erizal Sodikin (ESN) Dr.Ir. Marlina, M.Si (MLA) Dr.Ir. Yakup, MS (YKP)	Dosen Penanggung jawab : Dr. Ir. M. Umar Harun, MS (MUH)		

B. PROGRAM PEMBELAJARAN

CPMK	Kemampuan Akhir yang diharapkan di setiap tahapan pembelajaran (Sub-CPMK)	Pokok bahasan	Referensi	Metode pembelajaran dan waktu	Deskripsi tugas mandiri	Indikator	Bobot (%)	Dosen
CPMK-1	Sub-CPMK1: Mampu menjelaskan ekologi kelapa sawit, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kelapa sawit.	Ekologi, Pemuliaan, dan Pembibitan Kelapa Sawit	1;2;5	Kuliah tatap muka (diskusi dan tanya jawab) [TM: 1x(1x50')]	Tugas mencari dan menghimpun beberapa informasi tentang teknik pembibitan kelapa sawit dari buku dan website. (2x60')	Ketepatan dalam menjelaskan ekologi kelapa sawit, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kelapa sawit.	5,0	MUH/ESN
	Sub-CPMK2: Mampu menjelaskan tahapan pembukaan lahan dan budidaya tanaman kelapa sawit, serta system panennya	Budidaya dan Pemeliharaan, Panen dan pasca panen kelapa sawit	1;2;5	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50')]	Tugas mencari dan mempelajari proses-proses pembukaan lahan dan tanam kelapa sawit dari buku dan website. (2x60')	Ketepatan dalam menjelaskan tentang budidaya tanaman kelapa sawit dan pemanenan tandan buah	5,0	MUH/ESN
CPMK-2	Sub-CPMK3: Mampu menjelaskan ekologi karet, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan tanaman karet	Ekologi, Pemuliaan, dan Pembibitan tanaman karet	4;10	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50')]	Tugas mencari dan mempelajari ekologi dan pemuliaan karet pada buku dan website. (3x60')	Ketepatan dalam menjelaskan ekologi karet, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan tanaman karet	7,5	MUH/ESN
	Sub-CPMK4: Mampu menjelaskan tahapan pembukaan lahan dan budidaya	Budidaya dan Pemeliharaan, Panen	4;10	Kuliah metode diskusi kelompok (diskusi dan tanya jawab)	Tugas mencari dan mempelajari masalah khusus tanaman karet	Ketepatan dalam menjelaskan tahapan pembukaan lahan, budidaya dan pembibitan karet	7,5	MUH/ESN

	tanaman karet, serta system panen	dan pasca panen karet		[TM: 1x(2x50') dan pembuatan video penyadapan tanaman karet (2x60').	rakyat pada jurnal ilmiah dan website. (3x60').			
CPMK-3	Sub-CPMK5: Mampu menjelaskan ekologi kopi, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kopi.	Ekologi, Pemuliaan, dan Pembibitan tanaman kopi	6;11	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50')]	Mencari, mempelajari dan mengkaji video Teknik grafting kopi pada website. (3x60')	Ketepatan dalam menjelaskan ekologi kopi, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kopi.	7,5	MUH/ESN
	Sub-CPMK6: Mampu menjelaskan tahapan pembukaan lahan dan budidaya tanaman kopi, serta system panen	Budidaya dan Pemeliharaan, Panen dan pasca panen kopi	6;11	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50')] dan pembuatan video penanaman bibit kopi (2x60').	Tugas melaksanakan, membuat video, dan mepresentasikan dalam kelompok tentang penanaman kopi (3x60').	Ketepatan dalam menjelaskan secara menyeluruh kegiatan budidaya kopi dan sistem panen buah kopi	7,5	MUH/ESN
UJIAN TENGAH SEMESTER								
CPMK-4	Sub-CPMK7: Mampu menjelaskan ekologi kelapa, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kelapa.	Ekologi, Pemuliaan, dan Pembibitan tanaman kelapa	3;9	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50')]	Tugas mencari dan mempelajari publiikasi yang menggunakan dan menjelaskan manfaat tanaman kopi (3x60').	Ketepatan dalam menjelaskan ekologi kelapa, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kelapa.	7,5	YKP/MLA

	<p>Sub-CPMK8:</p> <p>Mampu menjelaskan tahapan pembukaan lahan dan budidaya tanaman kelapa, serta system panen</p>	Budidaya dan Pemeliharaan, Panen dan pasca panen kelapa	3;9	<p>Kuliah metode diskusi kelompok (diskusi dan tanya jawab)</p> <p>[TM: 1x(2x50')]</p>	Tugas mencari dan mempelajari publiikasi yang menjelas pengaruh pemupukan terhadap produktivitas kelapa (3x60').	Ketepatan dalam menjelaskan budidaya kelapa dan sistem panen buah kelapa	7,5	YKP/MLA
CPMK-5	<p>Sub-CPMK9:</p> <p>Mampu menjelaskan ekologi lada, arah kebijakan pemuliaan tanaman, dan teknik pembibitan lada</p>	Ekologi, Pemuliaan, dan Pembibitan tanaman lada	7;15	<p>Kuliah metode diskusi kelompok (diskusi dan tanya jawab)</p> <p>[TM: 1x(2x50'), dan menonton proses budidaya lada</p>	Tugas mencari dan mempelajari publiikasi yang terkait dengan hama dan penyakit penting lada pada jurnal dan website.(3x60').	Ketepatan dalam menjelaskan ekologi lada, arah kebijakan pemuliaan tanaman, dan teknik pembibitan lada	7,5	YKP/MLA
	<p>Sub-CPMK10:</p> <p>Mampu menjelaskan tahapan pembukaan lahan dan budidaya tanaman lada, serta system panen lada</p>	Budidaya dan Pemeliharaan, Panen dan pasca panen tanaman lada	7;15	<p>Kuliah metode diskusi kelompok (diskusi dan tanya jawab)</p> <p>[TM: 1x(2x50')]</p> <p>dan menonton video proses produksi lada hitam dan lada putih</p>	Tugas mencari dan mempelajari publiikasi pengaruh pemupukan terhadap hasil lada pada jurnal dan website. (3x60').	Ketepatan dalam menjelaskan Budidaya dan Pemeliharaan, Panen dan pasca panen tanaman lada	7,5	YKP/MLA
CPMK-6	<p>Sub-CPMK11:</p> <p>Mampu menjelaskan ekologi teh, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan teh.</p>	Ekologi, Pemuliaan, dan Pembibitan tanaman teh	11;13	<p>Kuliah metode diskusi kelompok (diskusi dan tanya jawab)</p> <p>[TM: 1x(2x50')]</p> <p>dan menonton video proses produksi bibit teh.</p>	Mencari dan mempelajari publikasi yang berkaitan dengan penggunaan fitohormon untuk pembibitan tehpada buku dan website (3x60')..	Ketepatan dalam menjelaskan ekologi teh, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan teh.	7,5	YKP/MLA

	Sub-CPMK12 Mampu menjelaskan tahapan pembukaan lahan dan budidaya tanaman teh, serta system panen tanaman teh	Budidaya dan Pemeliharaan, Panen dan pasca panen tanaman teh	11;13	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50'), dan menonton teknik panen teh	Mencari dan mempelajari publikasi yang menjelaskan standart dan kualitas teh melalui buku dan website (3x60')..	Ketepatan dalam menjelaskan tentang budidaya tanaman teh, serta system panen tanaman teh		YKP/MLA
CPMK-7	Sub-CPMK13 Mampu menjelaskan ekologi kelapa kakao, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kakao	Ekologi, Pemuliaan, dan Pembibitan kakao	8;14	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) [TM: 1x(2x50')]	Mencari dan mempelajari publikasi yang berkaitan dengan contoh-contoh hormone untuk pembungaan tanaman kakao melalui buku dan website (3x60')..	Ketepatan dalam menjelaskan ekologi kelapa kakao, arah kebijakan pemuliaan tanaman, dan Teknik pembibitan kakao	7,5	YKP/MLA
	Sub-CPMK14 Mampu menjelaskan tahapan pembukaan lahan dan budidaya tanaman kakao, serta system panennya	Budidaya dan Pemeliharaan, Panen dan pasca panen tanaman kakao	8;14	Kuliah metode diskusi kelompok (diskusi dan tanya jawab) tentang polikultur kakao [TM: 1x(2x50')].	Mencari dan mempelajari publikasi tentang jenis-jenis senyawa metabolic skunder pada buah kakao melalui buku dan website (3x60')..	Ketepatan dalam menjelaskan tentang budidaya tanaman kakao dan system panen buah kakao	7,5	YKP/MLA
UJIAN AKHIR SEMESTER (120')								

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