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

Module Handbook

Module Title	Soil and Crop Management
Module Level, if available	Undergraduate Study Program of Agrotechnology
Subject Code	MKW 60626
Headings, if available	-
Subject (MK)	Soil and Crop Management
Semester	3
Subject Coordinator	Dr. Ir. Nurhidayati, MP.
Teaching Team	-
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. Research Based Learning through Practicum greenhouse experiment : 170 minutes/meeting (8 meetings) 3. Structured Assignments/individual and group Assigments 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 Subject	• Attendance >75% • The final score of all the components of the learning evaluation >44 The final score component: • 20% Midterm Exam • 20% Final Exam • 30% Practicum • 20% Structured Assignments (individual and group) • 10% Presence
Prerequisite Subjects	Basic Soil Science
Learning Outcomes	The expected learning outcomes are: 1. Have an attitude of creative and innovative thinking in their work in accordance with professional ethics in the field of agriculture (ILO 1) 2. Able to solve problems that arise in the field of agrotechnology and related fields of science (ILO 5) 3. Able to apply agricultural practices based on *Good Agricultural Practices* (ILO 8) 4. Able to manage crop production systems (ILO 9)

	5. Able to work independently or in a team, and use various methods of communication (ILO 4)
Learning Content	After completing this Subject students are able to: 1. assess soil performance as a growing medium in crop production systems 2. identify soil management problems found in the field and determine solutions to solve the problems 3. apply soil management strategies to various types of soil for an effective crop production system 4. recommend the best management practices in crop production systems to consider aspects of ecology The topics include: **1. Introduction** • Definition of soil and crop management • The importance of soil and crop management in crop production system • Several indicators of soil properties that are important in soil management **2. How does soil work as a growing medium for plants and indicators that can be used to assess soil performance** • Soil morphological and physical characteristics that determine soil performance • Indicators used to assess soil performance • Development of soil structure and its problems in the field • Nutrient cycles and its problems in the field • Water cycle and its problems in the field • Life cycle and its problems in the field **3. The problem of soil degradation in agricultural land and its causes** • Various physical damage to the soil • Various chemical soil damage • Various biological soil damage • Causes of soil damage **4. Soil management practices that improve soil performance** • Addition of organic matter to cropland impacts on soil performance • Soil tillage and nutrient application and their impact on crop production systems **5. Soil management and soil tillage** • Impact of conventional tillage on soil physical condition • Tillage systems that reduce soil compaction (No-Till, Strip-Till, Ridge-Till, Mulch-Till Vs. Conventional Tillage) **6. Soil management practices to reduce erosion and improve soil quality** • Types of soil erosion • Erosion due to tillage • Benefits of conservation tillage in crop production systems **7. Soil and Nutrient Management** • Effect of soil pH on plant fertilizer requirements • Soil pH improvement management • Determine fertilizer requirements based on soil nutrient status **8. Cover crop management to increase crop productivity** • The purpose of using the cover crop. • Use of cover crop for erosion control

	• Use of cover crop to improve soil quality • Use of plant and animal residues to increase crop production **9. Integrated Crop Management** • Concepts and definitions of integrated crop management • The main components of integrated crop management which include Integrated Nutrient Management, Integrated Pest Management, Integrated Desease Management, Integrated Weed Management. • Strategy for Integrated crop management **10. Effective and efficient soil and crop management** • Nutrient management from organic fertilizers • Application of non-conventional soil amendment for effective and efficient nutrient management • Effect of compost and vermicompost on soil quality and crop production **11. Plant and fertilizer management practices to reduce nitrate leaching** • Soil and water factors that enhance leaching • What to do for soils with high leaching potential • N fertilizer management to improve synchronization between nutrient requirements and nutrient N release **12. Types of planting systems** • Crop rotation • Strip cropping • Intercropping • Planting along contour (Contour cropping, alley cropping) **13. Integrated pest and plant disease management** • Organic management methods for pest control • Organic management for disease control • Companion planting management for pest and diseases control **14. Best Management Practices (BMPs)** • The importance of BMPs to reduce soil and nutrient losses • BMPs for an effective and efficient crop production system
Test Terms and Forms	Examination requirements: A minimum of 75 % attendance to attend the final exam Forms of examination: Essay
Learning Media	Projector and screen, Zoom application, Google Classroom, e-book, WA Group, Practical guide book, soil and plant samples for research-based learning
References	**Main References :** 1) Koç Mehmet Tuğrul. 2019. Soil Management in Sustainable. Book Chapter of Agriculture Sustainable Crop Production. Book Department. Intechopen.com. *DOI: http://dx.doi.org/10.5772/intechopen.88319* 2) Ann Lewandowski. 2015. Soil Management. Soil Quality Institute, Natural Resources Conservation Service, United States Department of Agriculture Soil Management Minnesota Institute for Sustainable Agriculture misamail@tc.umn.edu http://www.misa.umn.edu. 3) Sam D. Angima and Thomas A. Terry. 2011. Best Management Practices for Maintaining Soil Productivity in the Douglas-fir Region Archival copy. For current information, see the OSU Extension Catalog:

https://catalog.extension.oregonstate.edu/em9023

4) Robertson, G.A. 2001. Soil *Management for Sustainable Agriculture*. Resource Management Technical Report No.95. Department of Agriculture Western Australia 2001
5) Hugh M. Coxe and Mark F. Hedrich. 2007. Manual of Best Management Practices For Maine Agriculture. Maine Department of Agriculture, Food & Rural Resources. Division of Animal Health & Industry.

Supporting References :

1) Omar A. Abdi, Edinam K. Glover, Olavi Luukkanen. 2013. Causes and Impacts of Land Degradation and Desertification: Case Study of the Sudan. International Journal of Agriculture and Forestry, 3(2): 40-51.
2) Ann Verdoodt. 2012.Soil Degradation. Compilation of Subject notes. Faculty of Bioscience Engineering. Universiteit Gent.
3) Rutgers, 2016. Soil and Nutrient Management. The State University of New Jersey, U.S. Department of Agriculture.
4) Richard Ogoshi, Vethaiya Balasubramanian, Michael Jones.2007. Integrated crop management (ICM). The United States Agency for International Development (USAID)
5) Amir Kassam, Gottlieb Basch, Theodor Friedrich, Francis Shaxson, Tom Goddard, Telmo J. C. Amado, Bill Crabtree, Li Hongwen, Ivo Mello, Michele Pisante, and Saidi Mkomw. 2010. Sustainable Soil Management Is More than What and How Crops Are Grown. Book Chapter of Principles of Sustainable Soil Management in Agroecosystems.
6) Team of LSUAg Center. 2010. Environmental Best Management Practices for Agronomic Crops. LSUAg Center. Research and Extention. LSU AgCenter pub. 2805
7) Ross H. McKenzie. 2010. Crops and cropping systems In Conservation Agriculture. Alberta Agriculture and Rural Development Lethbridge, Alberta. October 2010 Agdex 510-1. Website: www. agriculture.alberta.ca.
8) Marcello Pagliai. 2010. SOIL CRUSTING. Istituto Sperimentale per lo Studio e la Difesa del Suolo, MiPAF. Piazza D'Azeglio 30, 50121 Firenze (Italy).
9) F. William Simmons and Emerson D. Nafziger 2015. Soil Management and Tillage. *Illinois Agronomy Handbook.*
10) Krishna R. Tiwari, Bishal K. Sitaula, Roshan M. Bajracharya, Trond Børresen. 2019. Effects of soil and crop management practices on yields, income and nutrients losses from upland farming systems in the Middle Mountains region of Nepal. Nutr Cycl Agroecosyst. DOI 10.1007/s10705-009-9289-0.
11) Anonymous. 2010. Important of crop rotation. Agronomic Spotlight. Seminis Grow Forward.
12) Vijay Pooniya, Anil K Choudhary, Anchal Dass, R S Bana, K S Rana5, D S Rana, V K Tyagi And M M Puniya. 2015. Improved crop management practices for sustainable pulse production: An Indian perspective (Review Article). *Indian Journal of Agricultural Sciences* 85 (6): 747–58.
13) Farooq Shah and Wei Wu. 2019. Review Soil and Crop Management Strategies to Ensure Higher Crop Productivity within Sustainable Environments. *Sustainability* 2019, 11, 1485; doi:10.3390/su11051485.

	14) Kavita Rani, Pankaj Sharma, Sandeep Kumar, Leela Wati, Rakesh Kumar, Dhara Singh Gurjar, Dileep Kumar, and Rakesh Kumar. 2019. Legumes for Sustainable Soil and Crop Management. Springer Nature Singapore Pte Ltd. 2019 193. R. S. Meena et al. (eds.), *Sustainable Management of Soil and Environment*, https://doi.org/10.1007/978-981-13-8832-3_6 . 15) Stephen Nutsugah. 2015. Developing Resilient Farming Systems in Northern Ghana. CSIR-Savanna Agricultural Research Institute. 16) Randall Reeder. 2006. Soil Management Practices to Reduce Erosion and ImproveSoil Quality. Managing Agricultural Landscapes for Environmental Quality Conference. Ohio State University Columbus, Ohio