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**Department of PlantProtection**

**College of Agricultural Engineering Sciences University of Salahaddin**

**Subject: Mushroom Cultivation- Elective**

**Course Book – (4th  class)**

**Theory Lecturer's name: Majid Hassan Mustafa, PhD**

**Lecturer's name**

**Academic Year: 2023/2024**

**Course Book**

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| **1. Course name** | **Mushroom Cultivation- Elective** |
| **2. Lecturer in charge** | **Dr. Majid Hassan Mustafa** |
| **3. Department/ College** | **Department of PlantProtection/ College of Agricultural Engineering Sciences University of Salahaddin** |
| **4. Contact** | **e-mail: majid.mustafa@su.edu.krd****Tel: 0750 4439693** |
| **5. Time (in hours) per week** | **Theory: 2** |
| **6. Office hours** |  **8:30 – 2:00 from Sunday to Thursday** |
| **7. Course code** |  |
| **8. Teacher's academic profile** | **Majid Hassan Mustafa:**Doctor of philosophy (PhD) in Disease resistance, graduated in Milan university, Italy, 2022. My thesis title was “Brown Rot disease development in peach P. persica L. Batsch): from fungal biology to high throughput on field phenotyping”. I obtained my Master of Science in Integrated pest management (IPM) of Mediterranean fruit, in Istituto Agronomico Mediterraneo di Bari (IAMB), Italy, 2015. Thesis title “Investigation into Auchenorrhyncha species, putative vectors of "Bois noir" and "Flavescence dorée", in Apulian vineyards using different molecular techniques”. My bachelor’s degree (BSc) in Plant Protection, University of Salahaddin-Erbil, Iraq, 2010. |
| **9. Keywords** | Mushroom cultivation, Spawn, Common diseases and pests, Mushroom types  |
| **10. Course overview:** This comprehensive course on Mushroom Cultivation is designed to introduce students to the fascinating world of fungi, focusing on the biological, ecological, and practical aspects of growing mushrooms. The course begins with a general introduction to mushrooms, their significance, and the various species that are commonly cultivated. Students will explore the life cycle of mushrooms, learning about the necessary equipment and collection tools required for mushroom cultivation. Detailed instruction will be provided on the preparation of media for raising pure cultures and the techniques for isolating fungi. As the course progresses, students will delve into the specifics of spawn preparation, compost preparation, and the composting process essential for successful mushroom cultivation. They will also learn about non-composted substrates, bulk substrates, and casing, which are critical for creating optimal growing conditions.In addition to the technical aspects of mushroom cultivation, the course will cover the stages of mushroom formation, providing a thorough understanding of the growth process from spore to mature fruiting body. Students will be introduced to various common cultivated mushrooms, enhancing their knowledge of different species and their specific cultivation requirements. The course also addresses practical challenges faced in mushroom farming, including common problems, diseases, and pests that affect mushroom crops. By the end of the course, students will have acquired the skills and knowledge needed to successfully cultivate mushrooms, manage common cultivation issues, and apply integrated pest and disease management practices in real-world settings. This course is ideal for those interested in commercial mushroom production, mycology, or sustainable agriculture. |
| **11. Course objective:** The Mushroom Cultivation course aims to equip students with comprehensive knowledge and practical skills in the field of mushroom farming. By the end of the course, students will be able to:1. Understand and explain the biological and ecological significance of mushrooms.
2. Identify and describe the life cycle of mushrooms, including the necessary equipment and collection tools for their cultivation.
3. Prepare various media for raising pure mushroom cultures and apply effective isolation techniques.
4. Demonstrate proficiency in spawn preparation and the composting process required for mushroom cultivation.
5. Utilize non-composted substrates, bulk substrates, and casing to create optimal growing conditions for different mushroom species.
6. Recognize and describe the stages of mushroom formation from spore to mature fruiting body.
7. Identify common cultivated mushrooms and understand their specific growth requirements.
8. Diagnose and manage common problems, diseases, and pests affecting mushroom crops.
9. Develop and implement integrated disease and pest management strategies in mushroom cultivation.
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| **12. Student's obligation** Students are expected to attend all lectures and laboratory sessions, actively participate in class discussions, and complete all assigned readings and coursework on time. They must conduct laboratory experiments safely and responsibly, maintain accurate lab records, and submit detailed laboratory reports. Regular quizzes and exams will assess their understanding of theoretical concepts, while a final project involving a comprehensive case study analysis and presentation will demonstrate their practical skills. Students are also required to engage in group activities and contribute to collaborative projects, ensuring a thorough grasp of integrated disease management strategies. |
| **13. Forms of teaching**Effective teaching is essential for providing students with a well-rounded and interesting education. To give students with a well-rounded learning experience, we will use the following teaching methods in our classes:1- PowerPoint presentations: To offer a summary of each course, we will utilize data show presentations in the form of PowerPoint slides. The lecturer will give extra in-depth information through narration, while the slides will define the process of each lesson.2- Using a whiteboard: A white board is also necessary for teaching and explaining different topics.3- Laboratory sessions: For the practical portion, we will have laboratory sessions in the Department of Plant Protection's plant pathology laboratory. Through this hands-on method, students allowed to gain a thorough understanding of the material, providing a useful and interactive learning experience.4- Field visits: to forests, parks (i.e., GirdaRasha). |
| **14. Assessment scheme**Students must pass four tests, two of which are theoretical and two of which are practical. The writing examination is worth 100 points, including 65% for theoretical tests and 35% for practical assessments. The theoretical tests consist of a 15% monthly exam and a 50% final exam. The practical section is divided into two monthly examinations of 15% each, and daily quizzes and interactions with laboratory tasks for 5%. |
| **15. Student learning outcome:**B By the end of this course, students should be able to:* Explain the biological and ecological significance of mushrooms.
* Describe the life cycle of mushrooms and identify necessary cultivation tools.
* Prepare media for raising pure mushroom cultures and apply isolation techniques.
* Demonstrate spawn preparation and composting processes.
* Utilize non-composted and bulk substrates, and casing for mushroom growth.
* Recognize and describe stages of mushroom formation.
* Identify and cultivate common mushroom species.
* Diagnose and manage common mushroom problems, diseases, and pests.
* Implement integrated disease and pest management strategies.
* Apply sustainable and efficient practices in mushroom cultivation.
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| **16. Course Reading List and References‌:**1. "Growing Gourmet and Medicinal Mushrooms" by Paul Stamets (2000)
2. "The Mushroom Cultivator: A Practical Guide to Growing Mushrooms at Home" by Paul Stamets and J.S. Chilton (1983)
3. "Organic Mushroom Farming and Mycoremediation: Simple to Advanced and Experimental Techniques for Indoor and Outdoor Cultivation" by Tradd Cotter (2014)
4. "Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact" by Philip G. Miles and Shu-Ting Chang (2004)
5. "Mycelium Running: How Mushrooms Can Help Save the World" by Paul Stamets (2005)
6. "Edible and Medicinal Mushrooms of New England and Eastern Canada" by David L. Spahr (2009)
7. "Mushroom Cultivation: An Illustrated Guide to Growing Your Own Mushrooms at Home" by Tavis Lynch (2018)
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| **17. The Topics:** | **Lecturer's name** |
| Lecture 1: General Introduction to the Course and MushroomsLecture 2: Life Cycle of Mushrooms and Some Equipment and Collection ToolsLecture 3: Preparation of Media for Raising of Pure Culture and Isolation TechniquesLecture 4: Spawn PreparationLecture 5: Compost Preparation and Composting for Mushroom Cultivation1st ExamLecture 6: Non-Composted Substrates and Bulk Substrate and CasingLecture 7: Mushroom Formation StagesLecture 8: Common Cultivated MushroomsLecture 9: Mushroom Common ProblemsLecture 10: Mushroom Common DiseasesLecture 11: Mushroom Common Pests2nd Exam |  **Majid Hassan Mustafa (2 hrs each)** |
| **18. Practical Topics (If there is any)** |  |
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| **19. Examinations:****Section 1: **Define the following concepts:***** Spore print
* Grain spawn
* Compost
* Compost supplements
* Pasteurization
* Mycelium
* Substrate
* Sterilization
* Agar media

**Section 2: Answer the Following Questions (Processes and Techniques)*** What is the purpose of composting? Explain.
* Describe the steps involved in preparing a mushroom growing substrate.
* Explain the process of spawn preparation and its importance in mushroom cultivation.
* What are the benefits of adding gypsum (calcium sulfate) to the compost?
* Outline the steps for pasteurizing mushroom substrate.
* Describe the method for creating a spore print.
* Compare and contrast primary and secondary decomposers.
* Differentiate between saprophytic, mycorrhizal, and parasitic mushrooms with examples.
* What is the difference between aerobes and anaerobes organisms during composting?
* Describe the role of microorganisms in the composting process.
* Explain the ecological importance of mycorrhizal fungi.
* Provide 5 general rules and advice for collecting mushrooms.
* Discuss common problems encountered in mushroom cultivation and their solutions.

**Section 3: Fill in the Blanks*** Mushrooms reproduce through the release of \_\_\_\_\_\_\_\_\_\_.
* The main body of a mushroom that grows underground is called \_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_ is the process of heating the substrate to kill unwanted organisms.
* A common supplement added to mushroom compost to enhance growth is \_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_ is a technique used to create pure mushroom cultures in a lab setting.
* Mushrooms that form a symbiotic relationship with plant roots are called \_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ are two common diseases that affect mushroom crops.
* To control humidity during mushroom cultivation, growers often use \_\_\_\_\_\_\_\_\_\_.
* The first step in preparing mushroom compost is \_\_\_\_\_\_\_\_\_\_.
* One of the main pests in mushroom cultivation is \_\_\_\_\_\_\_\_\_\_.
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| **20. Extra notes:*** When an exam postponed by a student, whatever be the reason, he/she has to do the exam within one week. It is the student's responsibility to contact the lecturer with the frame time to rearrange for an alternative exam. Failure to do so in a timely fashion may result in a zero grade for the missed exam.
* Students are requested to attend practical courses with lab coats.
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|  **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ**I thereby approve that the course is comprehensive and cover all aspects of the course. The subjects are arranged sequentially that enable the students to learn gradually step by step.Name:Degree:Specialty:Signed:**Date:** |