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國立臺灣大學114學年度碩士班招生考試試題

科目：植物病原微生物學

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1. ※ 注意：請於試卷內之「選擇題作答區」依序作答。

Please answer all the questions.

Please select the best answer from the choices provided.

1. What does absorptive nutrition in fungi involve? (2 marks)

- a. Taking in CO₂ and N₂ from the atmosphere as nutrients.
- b. Ingesting food and digesting it internally within the cytoplasm.
- c. Releasing enzymes to externally decompose organic matter for absorption.
- d. Refusing to break down complex compounds into simpler substances.

2. Which of the following best describes hyphae? (2 marks)

- a. Filamentous structures primarily associated with true fungi.
- b. Structures divided by septa in organisms like slime molds.
- c. Structures with septa commonly observed in Oomycota.
- d. Typically encased by a rigid cell wall.

3. Which of the following is NOT true about haustoria produced by plant pathogenic fungi? (2 marks)

- a. They form specialized simple or branched projections.
- b. They penetrate the host tissue.
- c. They contain nuclei and a high concentration of mitochondria.
- d. They rupture the host cell's protoplasmic membrane.

4. Which of the following statements about appressoria is correct? (2 marks)

- a. They are produced by all fungi.
- b. They have a specialized cell wall composed only chitin.
- c. They are dome-shaped cells used to penetrate hosts by breaching the cuticle layer directly.
- d. They rely only on turgor pressure for penetration.

5. Which of the following is a common mechanism used by plant-pathogenic fungi to infect their host plants? (2 marks)

- a. Production of haustoria to extract nutrients directly from host cells.
- b. Secretion of toxins to disrupt host cellular functions.
- c. Deployment of enzymes to degrade the host's cell wall.
- d. All of the above.

6. Which characteristic is common to both chytrids and other true fungi? (2 marks)

- a. Possession of flagella.
- b. Autotrophic nutrition.
- c. Use of chitin as a structural component in their cell walls.
- d. Use of the α -aminoacidic acid pathway for lysine synthesis.

7. What is considered the universal barcoding region for fungi? (2 marks)

- a. Largest subunit of RNA polymerase II (RPB1).
- b. Second largest subunit of RNA polymerase II (RPB2).
- c. Minichromosome maintenance protein.
- d. Internal transcribed spacer (ITS).
- e. Cytochrome oxidase subunit 1 (CO1).

見背面

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8. Where do both *Fusarium* and *Colletotrichum* produce asexual spores? (2 marks)

- a. Asci
- b. Zygosporangia
- c. Rhizoids
- d. Conidiophores

9. Which of the following statements about contact necrotrophs is correct? (2 marks)

- a. They do not penetrate the host mycelium.
- b. Hyphae of the parasite coil around the hyphae of the host.
- c. A strong cell wall proliferation occurs at the site of coiling.
- d. A and B only.
- e. All of the above.

10. Which of the following is a characteristic feature of biotrophic plant pathogenic fungi? (2 marks)

- a. They kill host cells to obtain nutrients.
- b. They form symbiotic relationships with their host plants, living inside host tissues.
- c. They rely on external sources of organic matter for nutrition.
- d. They penetrate host tissues but do not form specialized structures like haustoria.

11. Which fungus is the causal agent of rice blast disease? (2 marks)

- a. *Colletotrichum gloeosporioides*
- b. *Magnaporthe oryzae*
- c. *Puccinia graminis*
- d. *Botrytis cinerea*
- e. *Phytophthora infestans*

12. Which of the following is a key factor in the virulence of plant pathogenic fungi? (3 marks)

- a. The production of secondary metabolites that cause disease symptoms.
- b. The ability to form biofilms that protect the fungus from environmental stress.
- c. The ability to acquire nutrients from host tissues through specialized structures like haustoria.
- d. The production of chitinase to degrade the host's cell wall and facilitate infection.

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II. 植物病毒學部分 (25分)

※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之大題及小題題號。

1. 請解釋下列名詞 (每小題 2 分，共 8 分)

- a. Local lesion
- b. Inclusion body
- c. Baltimore classification
- d. Infectious cDNA clone

2. 請繪圖舉例說明任一種病毒的基因表達策略 (4 分)

3. 請描述胡瓜嵌紋病毒 (cucumber mosaic virus) 之病毒顆粒型態、核酸特性與組成、傳播方式與防治策略 (7 分)

4. 請說明植物 RNA 干擾 (RNA interference) 機制如何抵抗植物病毒入侵 (6 分)

III.

1. 請問病原細菌如何逃避寄主免疫以成功感染植物? 請簡要說明之。(5 分)

2. 病原細菌感染植物可引起增生型病徵，請舉例說明之。(5 分)

3. 請問下列植物細菌性病害的診斷要領為何?(9 分)

- (1) 水稻白葉枯病
- (2) 番茄青枯病
- (3) 馬鈴薯瘡痂病

4. 請問下列植物病原細菌的傳播方式為何?(6 分)

- (1) *Xanthomonas euvesicatoria*
- (2) *Xylella fastidiosa*

IV、植物線蟲學 (25分)

1. 請舉例一種利用分子生物學鑒定線蟲的方法，寫出其原理，以及操作方式。(10 分)

2. 請列舉並解釋三種非藥劑防治線蟲的方法。(9分)

3. 請描述根瘤線蟲造成植物根瘤之機制。(6分)