

I、植物真菌學 (25 分)

※注意：請於試卷內之「選擇題作答區」依序作答。

Please select the best answer from the choices provided.

一、Core fungal biology (2 marks each)

- Which statement best describes fungi as a group?
 - They obtain carbon primarily by photosynthesis
 - They ingest food by phagocytosis like amoebae
 - They absorb nutrients after external digestion
 - Their cell walls are always made of cellulose
 - They are all strictly unicellular
- A polymer that yields **N-acetylglucosamine** after hydrolysis is most likely:
 - cellulose
 - lignin
 - chitin
 - pectin
 - starch
- Compared to bacteria, filamentous fungi are often strong decomposers of wood because they can efficiently break down:
 - hemicellulose only
 - lignin and cellulose
 - proteins only
 - DNA and RNA only
 - chitin only
- The immediate advantage of hyphal branching is mainly:
 - producing diploid nuclei faster
 - increasing surface area for absorption and exploration
 - preventing spore dispersal
 - eliminating competition with plants
 - allowing photosynthesis
- In many fungi, a extended delay between plasmogamy and karyogamy results in:
 - cells with only diploid nuclei
 - cells without nuclei
 - dikaryotic/heterokaryotic cells
 - spores that are always diploid
 - immediate meiosis
- In **ascomycetes**, meiosis typically occurs in the:
 - basidium
 - ascus
 - conidiophore
 - rhizoid
 - zoospore
- Which fungal structure is most directly responsible for **substrate penetration** and nutrient uptake?
 - chloroplast
 - hyphal tip growth
 - flagellum
 - seed coat
 - stomata

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8. Chemical signals that help compatible fungal strains locate each other for mating are called:
- A) allelochemicals
 - B) antibiotics
 - C) pheromones
 - D) toxins
 - E) pigments
9. A lichen is best defined as:
- A) a fungus feeding on algae as prey
 - B) a mutualistic partnership between a fungus and a photosynthetic partner
 - C) a plant disease caused by fungi
 - D) a bacterial biofilm on rocks
 - E) a fungus that cannot form spores
10. If decomposer fungi in a forest soil suddenly decline, the most likely short-term effect is:
- A) faster recycling of leaf litter
 - B) slower decomposition and nutrient release
 - C) immediate increase in photosynthesis in the soil
 - D) elimination of bacteria
 - E) disappearance of all plants within days

二、 Plant pathology / important pathogens (1 mark each)

11. Rice blast disease is caused by:
- A) *Botrytis cinerea*
 - B) *Magnaporthe oryzae*
 - C) *Puccinia graminis*
 - D) *Fusarium oxysporum*
 - E) *Ustilago maydis*
12. Grey mold on many fruits and vegetables is commonly caused by:
- A) *Botrytis cinerea*
 - B) *Penicillium expansum*
 - C) *Magnaporthe oryzae*
 - D) *Colletotrichum gloeosporioides*
 - E) *Puccinia graminis*
13. The organism responsible for potato late blight (Irish Potato Famine) is:
- A) *Alternaria solani*
 - B) *Phytophthora infestans*
 - C) *Botrytis cinerea*
 - D) *Fusarium oxysporum*
 - E) *Magnaporthe oryzae*
14. Wheat stem rust is caused by:
- A) *Puccinia graminis*
 - B) *Ustilago maydis*
 - C) *Penicillium* sp.
 - D) *Magnaporthe oryzae*
 - E) *Botrytis cinerea*
15. Blue mold of apples/pears is most strongly associated with:
- A) *Botrytis*
 - B) *Penicillium*

C) *Colletotrichum*

D) *Fusarium*

E) *Puccinia*

II、植物病毒學 (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。

一、請解釋下列名詞 (每小題 2 分，共 8 分)

1. Non-persistent transmission
2. subgenomic RNA
3. Virus replication complex
4. Virus induced gene silencing

二、請說明如何針對植物病毒病害進行柯霍氏法則 (4 分)

三、請說明植物對病毒病的其中一種抗性機制，並舉例說明一種以此機制為基礎的抗病毒防治策略。(7 分)

四、請簡述 2 種植物病毒的主要檢測方式，說明其基本原理，並比較不同方法在靈敏度、專一性與實務應用上的優缺點。(6 分)

III、植物細菌學 (25 分)

一、寫出造成以下作物病害之病原菌學名。(每題 2 分，共計 20 分)

1. Bacterial wilt of tomato
2. Bacterial speck of tomato
3. Bacterial canker of tomato
4. Bacterial leaf blight of rice
5. Bacterial foot rot on rice
6. Bacterial grain rot in rice
7. Bacterial leaf streak of rice
8. Bacterial black rot of crucifers
9. Bacterial angular leaf spot of strawberry
10. Fire blight of apple

二、芽胞桿菌屬為常用之微生物製劑，列舉兩種由芽胞桿菌屬(*Bacillus spp.*)產生之抗生物質。(5 分)

IV、植物線蟲學 (25 分)

一、請說明兩種從土壤中分離線蟲的方法。每一種方法可包含：分離原理、操作流程重點、適用的線蟲類型或樣本，以及優點與限制。(8 分)

二、請以分子層級描述植物寄生線蟲成功寄生的關鍵步驟。作答時請說明線蟲分泌物或效應因子的輸送方式、其對植物免疫訊號的影響，以及植物端的辨識與防禦反應。(10 分)

三、請分別列舉真菌與細菌在防治植物寄生線蟲時的主要作用機制，各至少三項。對於每一項機制，請用一句話說明其作用原理，並指出其主要抑制目標位點(例如：線蟲卵、二齡幼蟲、成蟲)。(7 分)