

國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：植物生理學【生科系碩士班乙組選考】

題號：4041
共 1 頁 第 1 頁

一、 Please answer the following questions (100 points)

1. Please explain the following terms: (30 points)

Abscission layer; bulk flow; casparian strip; circadian rhythm; climacteric fruit; vivipary; cytoplasmic male sterility; microRNA; thigmotropism; aerenchyma.

2. Plant root gravitropism is affected by the columella cells of root cap and is associated with auxin transport and distribution. Please explain the possible mechanism for root gravitropism. (10 points)
3. Triple response consists of inhibition and swelling of the hypocotyls, and exaggeration of the apical hook in *Arabidopsis*. Ethylene is the key regulator of triple response. Please explain how ethylene mediates triple response in germinating seedling. (10 points)
4. In deep-water rice, plant growth regulators including ethylene and GA have been implied in association with the promotion of stem elongation during flooding. Please provide the possible explanation for the flooding-mediated promotion of stem elongation in deep-water rice. (10 points)
5. Abscisic acid (ABA) and blue light are two key regulators associated with stomata closure and opening, respectively. Please explain how ABA and blue light affect stomata closure and opening. (10 points)
6. Please explain (a) what is photorespiration? and (b) why C_3 plant exhibits higher photorespiration compared to C_4 and CAM plants? (10 points)
7. Plant roots absorb mineral nutrients from soil. Factors including soil particle (size and charge), soil pH, soil mycorrhizal fungi and proton excretion from root system may affect soil mineral nutrient availability and absorption. Please explain how these factors affect soil mineral nutrient availability and absorption. (10 points)
8. Plants generally have to develop different defense mechanisms against biotic stress for survival. Systemin, jasmonic acid and proteinase inhibitor have been indicated to play important roles against herbivore damage in local and systemic leaves. Please explain how plants defend themselves against herbivore damage. (10 points)