

# 臺灣綜合大學系統 114 學年度學士班轉學生聯合招生考試試題

科目名稱	普通植物學	類組代碼	A05.C15
		科目碼	A0501
※本項考試依簡章規定所有考科均「不可」使用計算機。		本科試題共計 1 頁	
<p>1. Describe in detail the structural components of the plant cell wall and its main functions within the plant cell and the entire plant body. Compare the differences between the primary and secondary cell walls. (10 point)</p> <p>2. Compare the main structural differences between monocot and dicot plants in their roots, stems, and leaves. Explain how these structural differences influence their growth patterns and adaptations. (15 point)</p> <p>3. Plant hormones play crucial roles in plant growth, development, and responses to the environment. Choose at least three important plant hormones (e.g., auxin, cytokinin, gibberellin, ethylene, abscisic acid), and describe their main functions and specific roles in the plant life cycle in detail. (15 point)</p> <p>4. In some higher plants, the C4 photosynthetic pathway has evolved, exhibiting higher photosynthetic efficiency under specific environmental conditions compared to plants solely possessing the C3 pathway. Please elaborate on:(A) The key biochemical steps of the C4 photosynthetic pathway and its spatial separation in cells. (B) How the C4 pathway overcomes the limitation imposed by photorespiration on net photosynthetic rate in the C3 pathway. (C) In which typical ecological environments do C4 plants have a greater competitive advantage, and explain their physiological basis. (15 point)</p> <p>5. Genetic variation is the basis of evolution. Discuss the main mechanisms that generate genetic variation in plants, including mutation, genetic recombination, and chromosomal variation. Explain how genetic variation plays a role in plant evolution. (15 point)</p> <p>6. Plants have various types of interactions with other organisms. Provide examples of common mutualistic, parasitic, and competitive relationships between plants and other organisms, and explain how these relationships affect plant survival and evolution. (15 point)</p> <p>7. Please briefly explain the meaning of the following abstract and describe what your next step would be if you were the author?</p> <p>“Aluminum (Al) toxicity in acid soils poses a significant threat to rice, which exhibits highly complex genetic mechanisms for both external detoxification and internal tolerance among cereal crops. Although several genes involved Al tolerance have been identified, the molecular mechanisms underlying Al tolerance in rice remain to be fully explored. Here, we functionally characterized the gibberellin-stimulated transcription gene OsGASR1, which encodes a small cysteine-rich peptide localized to the nucleus and cytoplasm and plays a significant role in Al tolerance in rice. The expression of OsGASR1 is rapidly up-regulated by Al in rice root tips but not in the shoots. Its expression is not regulated by the central regulator Aluminum Resistance Transcription Factor 1 (ART1), indicating that OsGASR1 functions as a novel gene in rice Al resistance independent of ART1. Knockout of OsGASR1 reduced root length but did not affect Al tolerance in rice, whereas overexpression of OsGASR1 enhanced Al tolerance without affecting Al distribution and accumulation and promoted the accumulation of reactive oxygen species (ROS) in the root tips. RNA-seq analysis revealed that overexpression of OsGASR1 upregulated the expression of genes associated with cell wall modification, oxidative stress, and Al tolerance. Collectively, these findings suggest that OsGASR1 is involved in Al tolerance in rice independently of ART1, and the up-regulation of this gene is necessary for rice Al tolerance.”(Reference: <i>Plant Sci.</i> 2025 Jan;350:112294. doi: 10.1016/j.plantsci.2024.112294. Epub 2024 Oct 15.) (15 points)</p>			