

國立嘉義大學九十五學年度  
生物資源學系碩士班招生考試試題

科目：專業英文

閱讀與表達，意譯或直譯皆可：(每題 25 分，共 100 分)

- 1、 The rhizosphere soil is the thin layer of soil adhering to a root system after shaking has removed the loose soil. The size of the rhizosphere depends on the particular plant root structure, but generally the contact area with soil is very large. Per total plant biomass, the fibrous root structure of grassy plants provides a larger surface area than root systems characterized by a taproot. Rhizosphere characterized as a relatively thick soil cylinder that adheres to the plant roots. The formation of rhizospheres is typical in some desert grasses but also occurs in some grass species that grow under less extreme conditions. The rhizosphere appears to be an adaptation for moisture conservation, but it undoubtedly also provides an environment for extensive root-microbe interactions.
- 2、 Exotic organisms – aliens introduced into habitats where they are not native – are one of the greatest threats to biodiversity worldwide. Exotics can be thought of as biological pollution. Freed from the predators, parasites, pathogens, and competition that kept them in check in their native home, formerly mild-mannered species can turn into superaggressive “weedy” invaders in a new habitat. Also, successful exotics tend to be prolific, opportunistic species. Many ecologists consider exotic species invasions the most pressing hazard for biological communities in the coming century.
- 3、 One of the most valuable tools available to evolutionary biologists is the comparative method. The comparative method examines the characteristics of different species or populations of organisms in a way that attempts to isolate a particular variable or characteristic of interest, such as sociality, while randomizing the influence of confounding, or confusing, variables on the variable of interest. The comparative method has been used to study the evolution of eusociality among a wide variety of animal species including leafcutter ants and naked mole rats, both of which live in social groups in which individuals are divided among castes that engage in very different activities. Compared to other ant species, leafcutter ant colonies have a larger number of castes that engage in a wider variety of behaviors. In contrast to leafcutter ant colonies, where all workers are females, both males and females work in naked mole rat colonies. However, as in leafcutter ant colonies, work in naked mole rat colonies is divided among members according to their size. Many factors have likely contributed

to the evolution of eusociality in leafcutter ants and naked mole rats, including kin selection and ecological constraints.

- 4、 Unlike most animals, most plants generally do not require sodium and, moreover, cannot survive in brackish waters or saline soils. In such environments, the solution surrounding the roots often has a higher solute concentration than the cells of the plants, causing water to move out of the roots by osmosis. Even if the plant is able to absorb water, it faces additional problems from the high level of sodium ions. If the plant takes up water and excludes sodium ions. The solution surrounding the roots becomes even saltier, increasing the likelihood of water loss through the roots. The salt may eventually become so concentrated that it forms a crust around the roots, effectively blocking the supply of water to them. Another problem is that sodium ions may enter the plant in preference to potassium ions, depriving the plant of an essential nutrient and inhibiting some enzyme systems.

Some plants—known as halophytes—can grow in saline environments such as deserts, salt marshes, and coastal areas. All of these plants have evolved mechanisms for dealing with high sodium concentration, and for some of them sodium appears to be a required nutrient. The adaptations of a sodium-potassium pump seems to play a major role in maintaining a low sodium concentration within the cells, while simultaneously ensuring that a sufficient supply of potassium ions enters the plant. In some species, the pump operates primarily in the root cells, pumping sodium back to the environment and potassium into the root. The presence of calcium ions ( $\text{Ca}^{++}$ ) in the soil solution is thought to be essential for the effective functioning of this mechanism.