

# 國立嘉義大學九十七學年度 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. Long-term observations of adult populations of the aquatic Genji firefly, *Luciola cruciata* (Coleoptera: Lampyridae), were conducted using a simple flash counting method from 1975 to 2006 at four locations in Kyoto City, Japan. The relative population sizes of adult *L. cruciata* at these sites fluctuated almost synchronously, indicating the influence of large-scale environmental phenomena such as weather conditions on population dynamics. Rainfall in September and the latter half of July caused a significant decrease in the population size. The frequent rainfall during these months may have caused considerable drift in the emergence of early instars of firefly larvae and a decrease in their foraging activity. (25%)
2. Preventing invasive species from becoming established can be more cost effective than restoring an injured ecosystem. Controlling established invasive species is costly and difficult, and complete eradication is almost impossible. Prevention can avoid the potentially permanent species losses that may result from a pest invasion. Nearly half of the species currently listed as threatened or endangered under the US Federal Endangered Species Act are in jeopardy primarily due to invasive species. Initial changes in ecosystem processes and interactions may be undetectable, depending upon the specific species, prior to devastating impacts of invasions. The design and successful implementation of essential preventive actions in the public sector should be the result of coordinated efforts between both public and private groups, such as commodity producers, conservation interest groups, and private individuals. Programs that offer incentives and encourage private sector participation should be encouraged in the design, development, and implementation of any comprehensive action plan for invasive species management. (25%)
3. Both theoretical and empirical treatments suggest that habitat fragmentation caused by human activities have negative effects on population persistence and genetic variability of populations residing in fragmented landscapes. In line with theoretical predictions, several studies have provided evidence for reduced genetic variability in small and isolated populations. However, empirical evidence for causal relationship between loss of genetic variability and reduced mean fitness is still rather scanty, as is the evidence for reduced evolutionary potential in small populations in the wild. In fact, because of complex dynamics of additive vs. nonadditive effects in small populations and the apparent lack of correlation in genetic variability in neutral marker genes and variation in genes coding quantitative traits, it is currently unclear whether reduced marker diversity in a given population tells us anything about the adaptive potential of that population. This difficulty is further accentuated by the inability of small numbers of genetic markers to capture genome-wide patterns of genetic variability. (25%)
4. Apomixis, the formation of asexual seeds in plants, leads to populations that are genetically uniform maternal clones. The transfer of apomixis to crop plants holds great promise in plant breeding for fixation of heterozygosity and hybrid vigour because it would allow the propagation of hybrids over successive generations. Apomixis involves the production of unreduced (diploid) female gametes that retain the genotype of the parent plant (apomeiosis), followed by parthenogenetic development of the egg cell into an embryo and the formation of functional endosperm. The molecular mechanisms underlying apomixis are unknown. (25%)