Exam 2 **Plant Ecology** **29 October 2003**

Name: _____

Fill in the Blank (*each blank is worth 2 points; this section totals 24 points*)

1. The relationship between an epiphyte (such as Spanish moss) and its host tree (such as live oak) is an example of a(n) _____.

2. Members of the plant families Cactaceae and Euphorbiaceae that live in hot, dry climates often appear quite similar with spines, succulent stems, and CAM photosynthesis. This is an example of _____ evolution.

3. The reproductive structures of gymnosperms are _____.

4. Chance variation in the fate of individuals that has a greater effect on smaller populations than on larger populations is _____ stochasticity.

5. _____ is the specific term used to describe the process by which a plant produces seeds without fertilization occurring first.

6. _____ are horizontal, belowground stems that produce new ramets in some clonal plants.

7. A _____ is a group of populations in a landscape linked by migration and extinction.

8. A weedy, annual species that produces many seeds per flower would be considered to be _____-selected according to Grime's triangular model.

9. The seasonal timing of growth and reproductive events of a plant population is known as _____.

10. Clausen, Keck & Heisey conducted a _____ experiment when they transplanted individual plants from three sites along an altitudinal gradient into each of the other sties to determine if the populations represented distinct ecotypes. *["field" is not an acceptable answer]*

11. A _____ plant has female flowers on one plant and male flowers on a separate plant.

12. The cells responsible for growth of a plant at the tip of the root and shoot comprise the _____ meristem.

Short Answer

13. Define/describe: (4 each)

a) adaptive plasticity

b) polyploidy

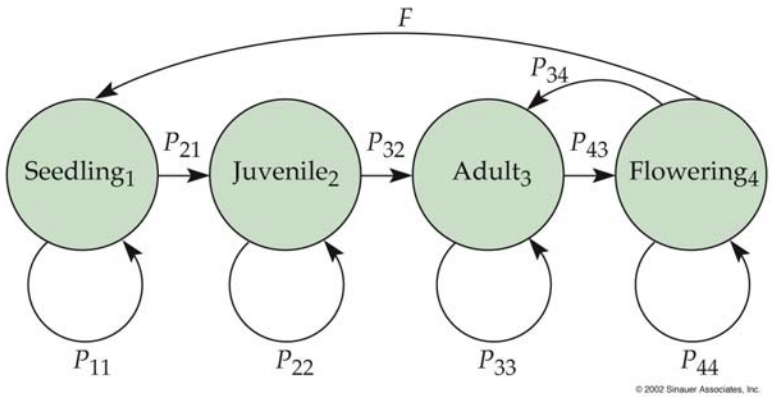
c) facilitation

14. Describe the usual spatial pattern of pollen dispersal (both wind and animal) in a population. How does this pattern affect gene flow within that population? (4)

15. Give one way that the presence of a seed bank may affect the evolution of that population.(3)

16. a) Describe two differences frequently found between evergreen and deciduous leaves. (4)

b) Are evergreens or deciduous plants usually adapted to living on nutrient-poor or dry soils? How are the leaf characteristics related to these adaptations? (6)



17. The life cycle graph above is for *Agyroxiphium sandwicense* (Hawaiian silversword).

a) Give the equation you would use to calculate the number of adults in stage class 3 at time t+1. (4)

$n_3(t+1) =$

b) You have studied one population of this plant for three years and are now able to put numbers to the transition probabilities in the life cycle graph. What assumptions would you have to make to use those numbers and this graph to calculate the population size at time t+50? (4)

Short Essay

18. Choosing either the Montiel & Montaña (2000) paper or the Egerova et al. (2003) paper, write a brief synopsis of the objective of the study and what the authors found. Then outline a hypothesis for what you would do next to further investigate the ecological questions they were examining. As in the first exam and the optional rewrite, clearly state the hypothesis you would test, briefly outline the methods you would use/the experiment(s) you would conduct, and describe the kind of results you would need to find to accept your hypothesis. (21 points)

19. Choose ONE of the following to answer. If you answer more than one, you will receive no credit for this question. (18 points)

a) Many plant species are able to self-fertilize and outcross. Describe advantages and disadvantages of selfing and outcrossing for the individual and the population. How do plants that primarily reproduce asexually compare with selfers and outcrossers in terms of the advantages and disadvantages you listed?

b) Describe the "ideal" characteristics of seed production (size and number) for a hypothetical plant. Why might we expect a trade-off to exist between seed size and number? Is there an optimal combination of these two traits found across species growing in natural habitats? Include in your answer how maternal and seed fitness are involved.

c) Annual species and long-lived, semelparous species often co-exist in deserts. Describe these two very different life history strategies. What adaptations allow the persistence of both life histories in such a severe environment? Include in your answer the types of adaptations that are generally required by plants to survive in desert environments, and how they may relate to these two life history strategies.

d) Describe MacArthur's concept of r- and K- selection. Include in your answer how these ideas relate to population growth, predictions of the characteristics selected for by both types of selection, and how useful these predictions are for understanding different life histories among plant species

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