PLSC 368 - Plant Propagation
Spring Semester, 2003

GUIDELINES FOR EXAMINATION II

I. Composition
1. Essay questions (8 questions, 5 points each) ........................................ 40 points
2. Short answers, matching or fill-in type (14 questions, various points) ......... 40 points
3. Multiple choice and true/false (10 questions, 2 points each) .................... 20 points

Total 100 points

II. Suggested Areas of Study

A. Methods of Seed Propagation (Chapter 8, lecture notes)

1. List four parameters used in seed testing?
2. List four different ways by which seed viability is determined and explain each with examples.
3. Why does a red color develop in the viable seed tissues when they are exposed to triphenyl tetrazolium chloride (TTC) during water imbibition?
4. Discuss three different ways of scarifying seeds.
5. What type of seed dormancy is overcome by scarification?
6. Outline the procedures of stratifying deciduous woody plant seeds by refrigeration.
7. Discuss the natural way of stratifying seeds using the outdoor planting procedure.
8. List growth regulators and other chemical stimulants used to enhance seed germination.
9. What is meant by seed priming?
10. Outline procedures for priming seeds by an osmotically adjusted solution and organic solvent infusion method.
11. Describe how seeds can be protected against pathogens: use of disinfestants, disinfectants, protectants.
12. Define 4 different stages of seedling development in plug production.

B. Selection and Management of Clones in Vegetative Propagation (Chapter 16, Lectures)

1. What are the advantages of vegetative propagation over seed propagation?
2. Why are apples, pears and peaches commonly propagated by grafting rather than by cutting?
3. Show, with gene symbols, how asexual propagation differs from seed propagation in the segregation of certain traits.
4. What would you expect if ‘Red Delicious’ apple and ‘Bartlett’ pear are propagated by seed?
5. What would be the disadvantage of monoclonal plantations?
6. Show how you can shorten time required from planting to maturity by vegetative propagation.
7. Know how long it takes to flower orchids from seed and from protocorm culture.
8. Define, with illustration if necessary, the following terms used in vegetative propagation: ramet, ortet, true-to-type, off-type.
9. Contrast genetic variation vs. epigenic variation.
10. What is meant by phenotypic variation and periphysis?
11. What is cyclophysis? Define homoblastic phase change and heteroblastic phase change.
12. Draw a mature tree and designate the relative degree of juvenility and maturity on different parts of the tree.
13. Show how the ‘hormonal exhaustion’ concept for the cause of juvenility can be demonstrated by certain grafting combinations of Hedera helix (English ivy).
14. Suggest ways by which plants can be rejuvenated.
15. What is meant by topophysis? Explain it with an example.
16. List four different types of changes that cause mutations in plants.
17. Contrast point mutation vs. chromosomal changes.
18. What is a sport and how does it occur?
20. Define a chimera.
21. Why is the origin of chimera always traced back to the meristematic growing point?
22. Distinguish, with illustration, different types of chimeras: periclinal, mericlinal, sectoral.
23. Draw the longitudinal section of a meristematic region and show the locations of four different histogenic layers ($L_1$, $L_2$, $L_3$, $L_4$).
24. Know which parts (epidermis, gametes, roots, internal tissues) will show mutant characteristics if genetic changes occurred in a meristem at different histogenic layers.
25. Why are certain plants of periclinal chimera not visually detectable?
27. Illustrate and explain how one can construct a chimeric plant by grafting.
28. Show how a virus infected plant can be ‘cleaned.’
29. Why is tissue culture used as a means of eliminating viruses?
30. Discuss plant quarantine procedures for vegetatively propagated plant materials.
31. Difference between plant patents and plant variety protection act.

C. Principles of Propagation by Cuttings (Chapter 9, Lectures)

1. What is meant by totipotency?
2. What is meant by dedifferentiation?
3. What is an adventitious root?
4. Four stages of de novo adventitious root formation.
5. Describe how roots form in response to wounding.
6. Draw a cross section of a herbaceous plant stem and show vascular bundles, cortex tissue and sites of adventitious root initiation.
7. Draw a cross section of a woody stem and indicate the site of adventitious root primordia formation.
8. Relationship between callusing and adventitious root formation.
10. Name plants that can be propagated by leaf cuttings with primary meristems.
11. Know three plants that can be propagated by leaf cuttings via secondary meristems.
12. Site of bud formation on root cuttings.
13. Why some plants generated from root cuttings show a mutant phenotype more readily than those generated form stem cuttings?
14. How can you demonstrate there is a polarity effect on rooting cuttings?
15. Define a phytohormone and a plant growth regulator.
16. Know the functions of auxins, cytokinins, gibberellins, abscisic acid and ethylene in rooting of cuttings.
17. List three different auxin compounds and show their relative stability.
18. Know names of a natural cytokinin, and two synthetic cytokinins.
19. How can you demonstrate the fact that buds present a stem cutting stimulates rooting and that auxin is involved in root formation.
20. Know factors that affect the success of cutting: environmental, physiological, timing and plant materials.
D. Techniques of Propagation by Cuttings (Chapter 10, Lectures)

1. Know the advantage and proper time of using hardwood cuttings in plant propagation.
2. Know the types of hardwood cuttings: straight, heel, mallet.
3. Contrast the difference between semi-hardwood cutting and softwood cutting.
4. Reason why the presence of leaf on herbaceous cuttings is beneficial.
5. Describe, with illustration, procedures for propagating African violets by leaf cutting.
6. What is meant by single-eye nodal cuttings and double-eye nodal cuttings?
7. Know the directions of distal and proximal ends in the stem and root cuttings.
8. Name 5 plants that can be propagated by root cuttings.
9. Discuss how stock plants can be manipulated in order to enhance rooting of cuttings obtained from them.
10. Know proper conditions for rooting media.
11. List 3 plants that respond well to wounding during cutting propagation.
12. Illustrate the procedure for preparing a one-liter solution of 2,000 ppm IBA in 50% ethanol.
13. Advantages and disadvantages of using the powder and liquid forms of rooting hormone.
14. Know different methods of rooting hormone application for cutting: a) use of powder form, b) the quick-dip method, c) soaking, d) tooth-pick method.
15. Procedures for using surface disinfectants and fungicides during cutting propagation.
16. Why is bottom heat beneficial during cutting propagation?
17. Discuss the advantages and disadvantages of the mist systems and fogging system in cutting propagation.
18. List two algicides used in cutting propagation.
19. What do you know about fertilizer requirements during cutting propagation?