

PLSC 422-Greenhouse Production and Management

Spring Semester, 2008

Final Exam: Monday, May 5, (8:00-10:00 a.m.)

GUIDELINES FOR FINAL EXAMINATION

I. COMPOSITION

The final exam will be composed of 50 questions of short-answer, matching, true and false, and multiple-choice type.

II. SUGGESTED AREAS OF STUDY

A. Old Materials

One or two questions from materials covered in each chapter (chapters 1, 2, 3, 17, 18) and old lecture and handouts.

B. Greenhouse Cooling (Chapter 4, 5, lectures)

1. Five objectives of greenhouse cooling
2. Know 6 different methods of greenhouse cooling
3. Know the difference between dry-bulb and wet-bulb temperatures.
3. Why is the wet-bulb temperature important in greenhouse cooling?
5. Principles of the pad-and-fan cooling evaporative cooling system.
6. Know the difference between the cross-flow and longitudinal-flow system of arranging a pad-and-fan cooling system.
7. Know how to calculate CFM requirements for greenhouses with known dimension and adjustment factors.
8. Maximum allowable distance between exhaust fans installed on the same greenhouse wall.
9. Under what conditions the velocity (F_{vel}) is used in place of the house factor (F_{house})?
10. Importance of using automatic shutters on the fan.
11. Advantages and disadvantages of using aspen pad and Kool-cel pad.
12. Know how to arrange pad and fan locations for known summer wind directions and interfering adjacent buildings.
13. Know how to determine the required pad area and the heights for known CFM requirements
14. What are the advantages of using horizontal pads over vertical pads?
15. Why are overhead baffles used in longitudinally arranged evaporative cooling systems?
16. Know the components of the pad-and-fan evaporative cooling system.
17. Know how ventilation system works for greenhouses installed with the fan-jet system.
18. Discuss how a package evaporative cooler works for hobby greenhouses and how it is installed (pp. 179-180, textbook).

C. Growing Media (Lectures, Chapters 6 and 7)

1. Explain three functional phases of soil.
2. Advises on selecting soils for use in greenhouse crop production.
3. Explain what is meant by cation exchange capacity (CEC) and anion exchange capacity (AEC); how are CEC and AEC measured?
4. Know the nutrient holding, water retention, buffering and other horticultural characteristics of soil amendments: sphagnum peat, vermiculite, perlite, bark, sand, sawdust, calcined clay,

- rockwool, etc.
5. Discuss the advantages and disadvantages of using soilless media.
 6. Contrast the Cornell Peat-lite mix and the UC mix for their composition, advantages and disadvantages as potting medium.
 7. Define field capacity, container capacity, and water holding capacity of a growing medium.
 8. Reason why optimum soil pH is important for nutrient uptake by plants.
 9. Know the names of chemical fumigants and recommendations for their use.
 10. Compare chemical sterilization and steam sterilization for effectiveness, advantages and safety in use.
 11. Describe general procedures for steam sterilization.
 12. What are the problems of steam sterilization? (manganese toxicity, reduced water retention capacity, etc.).
 13. Explain why ammonium toxicity develops in soils that have been steam sterilized. (Illustrate the decay and nitrification process with associated microbial actions to be specific).
 14. Know chemicals used to raise or lower soil pH.
 15. Know two flower crops that prefer low soil pH for normal growth.
 16. What is meant by electrical conductivity (EC) and why is it used?
 17. Conversion of electrical conductivity (mmho/cm, μ mho/cm) to the concentration of total soluble salts TDS). (lab exercise)
 18. Importance and method of salinity control for greenhouse crops.

D. Fertilization (Chapter 9, labs, lectures)

1. Know the macro- and micronutrients essential to plants.
2. Know the chemical forms (ions) of macro- and microelements that are actually absorbed by plants.
3. Know the functions of macro- and micronutrients in plant metabolism.
4. What is meant by a commercial analysis or elemental analysis? Know how to convert commercial analysis to elemental analysis.
5. Contrast molecular weights and equivalent weights in handling commercial fertilizer concentrations.
6. Two examples of acidic fertilizers and basic fertilizers.
7. Relationship between ppm and meq/liter concentrations.
 8. Know difference between mM and meq/liter concentrations.
9. Given the molecular weights of NH_4NO_3 and MgSO_4 and their ppm concentrations, calculate the concentrations of NH_4^+ , NO_3^- , Mg^{+2} , and SO_4^{-2} in meq/liter.
10. Why are two separate stock tanks used in fertilizer injection? What fertilizers can not be mixed together in the same stock tank and why?
11. Know how to calculate amount of a fertilizer needed to fill a stock tank connected to a proportioner which will deliver a given concentration of the fertilizer in the final solution.
12. Why is the method of ion balancing according to water analysis important in fertilizing greenhouse crops?
13. Know the general principles of fertilizer application.
14. Discuss factors that affect nutrient uptake by plants (environmental, growing media, etc.).
15. Explain what is meant by a luxury consumption of nutrients and how should the nutrient levels be optimized.
16. Discuss three different methods of fertilization: preplant application, dry application, and liquid feeding.
17. Difference between constant feeding and intermittent feeding.
18. Know how to balance a nutrient solution, using the result of water analysis.

E. Other materials

Miscellaneous information obtained during video presentations, lab practices, and field trips will also be on the exam.