DISCUSSION QUESTIONS: CHAPTER 5

1. List the two "types" of colloids in soils, based on how they develop their electric charge. Give examples of each, and describe (briefly) how they generate this charge>

2. Clay minerals are often referred to as "layer alumino-silicates" Why is this name appropriate? How does the structure of clay minerals determine their behavior?

3. Explain isomorphous substitution; give examples of how it occurs in clay minerals, and describe how it results in permanent negative charge.

4. Define "pH"; show how (H^{\dagger}) and pH are different in acid and alkaline solutions.

5. Use a hydroxyl (-OH) functional group to show how both positive and negative charge can develop on variable charge colloids at different pH's.

6. What is the most important charged functional group on humus? Show how it develops negative charge, and explain why this charge is pH-dependent.

7. Define % base saturation, and give the formula for how to calculate it.

8. Explain what a "milliequivalent" is; what is the meq weight (in mg/meq) of Zn⁺² if its atomic mass is 65?

9. Explain the similarity between parts per million (ppm) and lbs per acre-furrow slice (lbs/afs). How can you easily convert from one of these units to the other?

10. Explain to someone who knows nothing about soil or chemistry what CEC is, and why it is important in plant production and environmental sciences.

DISCUSSION QUESTIONS CHAPTER 6

1. Who is Justus von Liebig? Why is he important in the study of soils and plant growth?

2. Is there any relationship between the total amount of any given nutrient in the soil compared to the amount taken up by plants? Explain why this is the case.

3. In reference to question 2) above, what factor(s) explain how plants take up nutrients from soils, in general?

4. Summarize briefly the general "idea" of nutrient cycling; what does this have to do with the "great circle of life" taught to us in *The Lion King*?

5. For each of the 3 macro-nutrients, briefly state the important factors affecting their plant availability in typical agricultural soils.

6. How are CEC, %BS, and plant-available Ca and Mg related?

7. Tell the basic story of acid rain, gypsum, and sulfur nutrition of plants (as told by Dr. Miller in lecture).

8. List the micro-nutrient cations. What factors determine their plant-availability? Under what soil conditions are they deficient vs. toxic?

9. List the micro-nutrient anions. What factors determine their plant-availability? Under what soil conditions are they deficient vs. toxic?

10. List several soil contaminants that act like micro-cations, and two that act like micro-anions. How would you reduce the solubility of these contaminants in soils to reduce their plant uptake and/or leaching to groundwater?