

16a) What is meant by *N uptake efficiency*?

b) What are factors that lead to low N uptake efficiencies?

17) Explain the following terms with respect to soil nutrient levels and how they relate to each other:

a) deficiency range

b) sufficiency range

c) luxury consumption

d) toxicity range

18) Explain why adding greater amounts of fertilizer does not necessarily generate a greater profit. (*You may want to draw a graph similar to that shown in lecture as part of your answer.*)

19) Roots are only able to take up nutrients that are present in the soil solution (in available form) adjacent to the root itself. Describe how the nutrient supply next to the root is replenished (that is, what are the different mechanisms by which nutrients move through the soil)?

20) What is the *Law of the Limiting* concept in soil fertility?

21) Under what circumstances does it make sense to soil test for inorganic N? (conversely, when does it not make sense?)

22a) In what pH range is phosphorous the most available to plants?

- b) Why is it unavailable at pH's above this range?
 - c) Why is it unavailable at pH's below this range?
- 23) Besides P, which other essential elements have their availability to plants strongly affected by soil pH?
- 24) Explain why applied phosphorus tends to remain at the soil surface in no-till farming situations, while applied nitrogen will redistribute through the rooting depth.
- 25) What is *nutrient management*?
- 26) What are the important environmental concerns related to nutrient management?
- 27) Are the waterways listed in the WA State "303d list of impaired waters" mainly east or west of the Cascade mountains, or both?
- 28) When should land applications of manure be based on manure N concentration compared to P concentration?
- 29) What is the phosphorous index, and what is it used for?
- 30) What are the source factors in the phosphorous index?
- 31) What are *Best Management Practices* (BMPs)?
- 32) What do the three numbers represent that are mandated by law for fertilizers (e.g., 23-10-0)?
- 33) Compare and contrast the properties, advantages, and disadvantages of synthetic vs. organic fertilizer sources.
- 34) Deficiencies of which macronutrients will show up in the youngest leaves? Why?