Name:___________________________

AGRONOMY 354
Test 1
February 4, 2009

INDICATE THE ONE BEST RESPONSE.

1. An understanding of Baule units is important in Agron 354 because of its underlying principle use, which is:
   a) the most limiting nutrient controls plant growth regardless of what that nutrient might be.
   b) the soil affects plant growth, often enhancing uptakes of specific nutrients.
   c) carbon dioxide in the air often restricts plant growth.
   d) two limiting nutrients are often more limiting that a single limiting nutrient.
   e) weed pressure in a field limits nutrient uptake by the desirable plant.

2. Endomycorrhizae involve fungi that:
   a) end growth abruptly after reaching a certain size.
   b) end growth when they reach an air-water interface.
   c) grow between but not inside root cells.
   d) grow partly inside root cells.
   e) mainly grow in association with trees and shrubs.

3. Anion micronutrients often serve as structural parts of:
   a) carbohydrates.   b) cell walls.   c) enzymes.   d) nucleoproteins.   e) nucleic acids.

4. Sodium as a plant nutrient:
   a) may increase growth.
   b) is an essential element.
   c) may partially substitute for P.
   d) is considered a "free" element.

5. A high level of N for sugarcane production likely will:
   a) produce lots of sugar and lots of cane biomass.
   b) produce lots of cane biomass and little sugar.
   c) produce little sugar and little cane biomass.
   d) produce little cane biomass and lots of sugar.

6. The saturated sponge demonstration flat vs. on its end in lecture showed:
   a) the change of gravity in the two directions.
   b) the change of pore size in the two directions.
   c) the change of pore length in the two directions.
   d) the change of pore constrictions in the two directions.

7. A fertility level 20% above optimum is most likely to:
   a) cause no problem at all.
   b) damage the environment.
   c) reduce crop quality.
   d) reduce crop yield.
   e) more than one is correct.

8. As N is added during growth of wheat, at what rate of N would you reasonable predict the least amount of growth response per unit N applied? (Values are in pounds of N added per acre.)
   a) 30   b) 60   c) 90   d) 120   e) 150

9. This nutrient is normally present in large amounts and is involved in the structural part of the plant.
   a) magnesium   b) zinc   c) potassium   d) copper   e) calcium

10. Bray's equation for plant responses to fertilization probably fits best:
    a) when low level of nutrients are applied in a soil that is extremely deficient in that nutrient.
    b) when excessive levels of nutrients are applied.
    c) when nutrients are added that move readily in the soil.
    d) when nutrients are added that are partially absorbed by soil particles.

11. Cobalt is not an essential element but:
    a) may increase stem strength.
    b) may substitute for Cl.
    c) may be required by microorganisms that aid plants.
    d) may buffer plant pH.

12. An oat crop has an adequate supply of all growth factors except that N is only 60% of optimum and P is 75% of optimum. According to current concepts, P fertilizer:
    a) will not increase oat production.
    b) will increase the oat crop only if N is raised above 75% of optimum.
    c) will be of some help even without more N.
    d) is required to be above 90% of optimum to increase yield.

13. Plant tissue is known to <u>contain</u> _____ different chemical elements.
    a) 10   b) 17 (18 for legumes)   c) about 25   d) over 50

14. The highest concentrations of K in plants are usually found in:
    a) plant sap.   b) protoplasm.   c) structural parts.
    d) all above locations in approximately equal concentrations.

15. According to your reading, water only moves freely though pores wider than about ____, which also are large enough to allow young roots of many plants easy entry.
    a) 2 mm   b) 0.7 mm   c) 0.5 mm   d) 0.3 mm   e) 0.1 mm

16. Identify the true statement about root hairs.
    a) commonly extend up to 20 cm outward from the root.
    b) are formed in the zone of most rapid cell division.
    c) usually last for only a few days on annual crops.
    d) rarely exceed 10 mm of total root hair length per mm of root.

17. According to Mitscherlich's equation, when plants are supplied with adequate amounts of all but one nutrient--x, then plant growth:
    a) increases in direct proportion to any added amount of x.
    b) bears little relationship to added amounts of x since the other nutrients will compensate for its absence.
    c) decreases in direct proportion to any added amount of x.
    d) increases with added amounts of x, but to a progressively smaller extent with successive additions of x.

18. The nutrient deficiency symptoms first show at the top of the plant. Knowing this, you could conclude these might be the possible deficient nutrients?
    a) N or K   b) Ca or Cu   c) P or Zn   d) Mg or N   e) K or S

19. The most important reason that growers in the same soil association should use individualized fertilizer programs for the same crop is:
    a) different crop varieties are used.
    b) rainfall is different from farm to farm.
    c) diseases are different.
    d) weeds to be controlled vary.
    e) soils are variable.

20. Which one of these problems is most closely related to poor soil tilth?
    a) A soil crust prevents seedling emergence.
    b) A very sandy soil holds little water for plant growth.
    c) Cold soil causes slow root development.
    d) Decomposing plant residues cause a nitrogen deficiency.

21. Your textbook defines the 'critical range' as the nutrient concentration in the plant:
    a) below which a yield response to added nutrients occurs.
    b) at which maximum plant growth occurs.
    c) above which plant growth is reduced.
    d) which must be present as the minimum for the plant tissue to even exist.
    e) that is transitional between the Steenberg effect and deficiency.

22. Identify the true statement about soil compaction.
    a) Is more serious in a soil dominated by sand than by clay.
    b) Is a process that usually develops slowly.
    c) Usually results in greater loss of air-filled pores than total porosity on a percentage basis.
    d) Usually is more serious when cultivation occurs in a dry, hard soil.

23. Clear polyethylene spread on the ground can be used with high-latitude crops to:
    a) raise soil temperatures.
    b) reduce weed competition.
    c) reduce fertilizer requirements.
    d) increase crop quality.
    e) reflect light.

POSSIBLE POINTS ARE INDICATED IN THE LEFT-HAND COLUMN.

24. In the growth of most plants, what four (4) elements are usually required in greatest amounts regardless of the source?

(4)

25. The plant doesn't look healthy and you suspect a lack of N. What would you look for that is <u>specific</u> for N deficiency?

(3)

26. Describe to a U. of Iowa graduate (i.e., keep it simple) how you would suggest changing fertilizer recommendations for a grower with poor management versus a grower with superior management. Why the difference?

(5)

27. Concerning soil structure,

a) how does it form?

(3)

b) why it is so important for plant growth?

(3)

28. After you start work after graduation, the company you are working for discovers a mineral-organic complex that increases grape production by 40% above controls. Your later discover the responsive element is thallium. Would you conclude thallium is an 'essential' element for grapes? Explain.

(6)

Part 1 _______

Part 2 _______

Total _______