

10. If a fertilizer is labeled as 8-32-16, the second number is:
- Olson soluble P_2O_5 .
 - citrate soluble P_2O_5 .
 - total P_2O_5 .
 - Bray P1 soluble P_2O_5 .
 - hot water soluble P_2O_5 .
11. Concerning N uptake by plants,
- few plants can use both NH_4^+ and NO_3^- .
 - most plants appear to grow best when provided both NH_4^+ and NO_3^- .
 - plants need NO_3^- early in their growth cycle and NH_4^+ late.
 - plants need NH_4^+ early in their growth cycle and NO_3^- late.
 - plants grow best when supplied organic forms of N.
12. The nitrogen supply for soybeans growing in a field near Ames is provided mostly by ____ bacteria.
- Azotobacter*
 - Clostridium*
 - Nitrobacter*
 - Bradyrhizobium*
 - Fungal*
13. As the amount of available N in the soil increases, the amount of N fixed by a legume usually:
- decreases.
 - increases.
 - increases or decreases depending on available P.
 - remains nearly constant.
14. Sewage sludge can be a good source of organic N for plant growth but one must be careful of:
- excessive Fe.
 - a high grit content.
 - a wide Ca:Mg ratio.
 - immobilization.
 - heavy metals.
15. Phosphorus in soil is usually unavailable at low pH's (4.5-5.5) because of complexing with:
- Na and K.
 - Ca and Mg.
 - Fe and Al.
 - clays.
 - silt.
16. A soil containing 3½% OM and having a CEC of 25 meq/100g likely would have approximately ____ lbs of total N per acre-furrow-slice.
- 5000
 - 4250
 - 3500
 - 2500
 - none of these is within 1000 pounds.
17. Your text discusses N mineralization from organic materials and concludes over a 12-wk period that the rate of decomposition is most rapid:
- near the beginning.
 - during the middle period.
 - near the end.
 - uniform over the whole period.
18. Plants can have a beautiful dark green color in spite of a deficiency of:
- N.
 - Fe.
 - P.
 - Zn.
 - K.
19. Identify the true statement.
- one would expect more than 500 lbs of exchangeable NH_4^+ per acre
 - the inorganic N in Midwest soils usually exceeds the organic N
 - nitrite is usually present at lower concentrations than nitrate in soil
 - the organic forms of N are usually the most available for use by growing plants

20. One reason swine manure in Iowa has so much P is that:
- a) pigs do not digest the large amounts of P that accompanies the protein added to their diet.
 - b) P is specifically added to activate antibiotics in their diet.
 - c) the large amounts of added starch ties up P in their diet.
 - d) pigs cannot effectively digest phytin.
 - e) farmers add way too much P, well beyond dietary needs.
21. Lightning is thought to cause which of these nitrogen transformations:
- a) NH_3 to amine.
 - b) N_2 to oxides of nitrogen.
 - c) NH_3 to oxides of nitrogen.
 - d) oxides of nitrogen to N_2 .
 - e) N_2 to NH_3 .
22. Which of the following processes would increase available soil nitrogen?
- a) mineralization
 - b) nitrification
 - c) immobilization
 - d) denitrification
23. Water solubility in phosphorus materials is important when applied to the soil in all of the following but one. Select the incorrect answer.
- a) cold wet soils (early planting)
 - b) short season crops (radish)
 - c) phosphorus applications applied in large enough amounts for a 2- to 3-year period of crops
 - d) banded applications
 - e) phosphorus applied in alkaline pH soils

POSSIBLE POINTS ARE INDICATED IN THE LEFT-HAND COLUMN.

24. Fixation is often a confusing word in soil science involving plant nutrition. Briefly explain:

a) ammonium fixation.
(3)

b) nitrogen fixation.
(3)

c) phosphorus fixation.
(3)

25. Explain to a U of Iowa graduate when adding a plant residue to soil with a wide C:N ratio:
a) what reasonable assumptions you would make when considering decomposition in a 12-wk period.

(3)

b) why plants growing in this soil would likely have problems.

(3)

26. Briefly outline how these commercial fertilizers are commonly manufactured (include the source of the element and the processes used).

a) anhydrous ammonia

(5)

b) potash

(4)

Part 1 _____

Part 2 _____

Total _____