

I. Single-Answer Multiple Choice (2 points each): Circle the one solution that best answers each question or completes each sentence.

1. Optimum soil pH for nutrient availability to plants is

- a. 6 to 7.
- b. 4 to 5.
- c. alkaline conditions.
- d. all of the above
- e. both a and b

2. Nutrient levels in your garden are best determined by

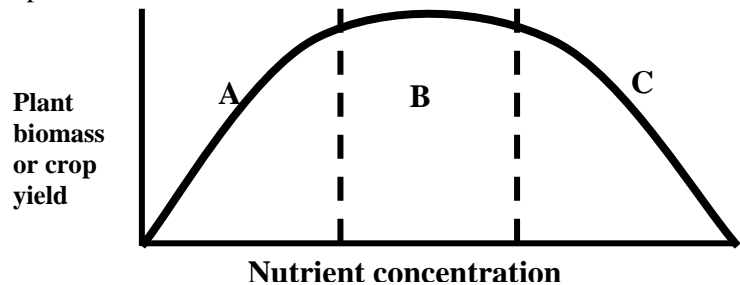
- a. plant deficiency symptoms.
- b. soil testing.
- c. types of weeds present.
- d. rate of puddling or runoff of irrigation water.
- e. both a and c.

3. Lab analyses of soil nutrients in your garden

- a. tell you the total amount of each element in the soil.
- b. estimate the amount of each nutrient available to plants.
- c. should be performed at a different lab each year.
- d. all of the above.
- e. both a and b.

4. In the graph to the right, region C represents

- a. Deficiency
- b. Sufficiency
- c. Optimum supply
- d. Toxicity



5. In the graph above, if your soil phosphorus is within the “A” range and soil nitrogen is within the “A” range, you should

- a. add N.
- b. add P.
- c. add both N and P.
- d. retest the soil, as it is abnormal to have nutrients at similar levels.

6. Generally speaking, the best time to analyze your soil for nutrients is in the

- a. spring.
- b. summer.
- c. fall.
- d. anytime.

7. Concerning macronutrients and micronutrients,
- phosphorus is a macronutrient.
 - macronutrients are needed in larger quantities than micronutrients.
 - micronutrients improve growth but are not essential.
 - all of the above.
 - both a and b.
8. Compared to chemical (inorganic) fertilizers, organic fertilizers
- generally have lower nutrient contents per unit weight than do chemical fertilizers.
 - generally contribute less organic matter to the soil.
 - generally must be decomposed to inorganic nutrient ions before nutrient absorption can take place by plants.
 - all of the above.
 - both a and c.
9. The principle, which states that the level of plant production can be no greater than that allowed by the most limiting of the essential plant growth factors, is called
- the nutrient-carrier hypothesis.
 - the essential principle.
 - the selective factor.
 - the law of the minimum.
10. When microcubes breakdown fresh organic material, ____ of the carbon is incorporated into microbial cell tissue while the rest of the carbon is exhaled as carbon dioxide.
- 20%.
 - 25%.
 - 33%.
 - 50%.
 - 75%.
11. Which of the following is not a function of roots?
- Manufacturing of carbohydrates (food).
 - Absorption of water.
 - Anchoring of plants.
 - Respiration.
12. The name of the person who developed the binomial system for naming plants is
- Linnaeus
 - Jenny
 - Darwin
 - Hortus
13. Which of the following is provided for a plant by its leaves?
- Production of carbohydrates (food)
 - Anchoring of plants
 - Photosynthesis
 - Both a and c
 - All of the above

14. The main function of stems is

- a. to absorb water/nutrients from the soil and anchor the plant.
- b. to transport water/nutrients and to support plant parts.
- c. to manufacture carbohydrates and store it for future use.
- d. to provide food for humans and animals.

15. The four main parts of a complete flower are the

- a. pollen, ovary, pistil, and stamen.
- b. pollen, ovary, sepals, and petals.
- c. sepals, pistil, ovary, and stigma.
- d. sepals, petals, stamen, and pistil.

16. Bulbs and corms reproduce by a process known as

- a. division.
- b. budding.
- c. offshoots.
- d. separation.

17. The pistil is

- a. the female part of the flower.
- b. the male part of the flower.
- c. the bright, showy part of the flower that attracts pollinators.
- d. the pollen producing part of the flower.

18. When two separate parent plants are involved in the pollination process, it is known as

- a. self pollination
- b. cross-pollination
- c. bisexual pollination
- d. asexual pollination

19. The first part of the new plant to emerge from the seed is the

- a. stem.
- b. leaf.
- c. root.
- d. endosperm.

20. _____ are plants that have bulbs.

- a. Tulips.
- b. Potatoes.
- c. Strawberries.
- d. Lettuces.

21. Biomass makes up on average about ____ percent of the organic fraction of soil.

- a. 3
- b. 8
- c. 12
- d. 15

22. The stamen is
- the male part of the flower.
 - the part of the flower that produces pollen.
 - the part of the flower that holds the stigma.
 - all of the above.
 - both a and b.
23. Pollination is a sexual process in which pollen is deposited on the stigma of the plant. It starts the process of
- fertilization.
 - seed formation.
 - production of a fruit or seed coat.
 - all of the above.
 - both b and c.
24. An advantage of producing seedlings in a greenhouse compared to direct seeding them in the garden is that
- it extends the growing season.
 - environmental conditions can be better controlled.
 - a lot of plants can be managed in a small place.
 - all of the above.
 - both a and c.
25. Which of the following has the lowest C/N ratio?
- Alfalfa
 - Straw
 - Humus
 - Soil microorganisms
26. _____ are bacteria that infest roots of legume plants forming root nodules.
- Mycorrhizae
 - Rhizobia
 - Actinomycetes
 - Autotrophs
 - Aerobes

II. Multiple-Answer Multiple Choice (1 point for each answer): In each set, at least one answer listed is correct but two, three, or four of the answers may be correct. Mark "T" (for true) for each answer that solves the problem correctly and "F" (for false) for each answer that is incorrect.

27-30. The 12 fruits and vegetables that have the highest pesticide residues include

____ 27. apples

____ 28. peaches.

____ 29. strawberries.

____ 30. sweet bell peppers.

31-34. Advantages of organic fertilizers (over inorganic fertilizers) include

- 31. their ability to increase the nutrient storage capacity of the soil by increasing the organic matter content of the soil.
- 32. their ability to improve soil structure.
- 33. their availability to release nutrients quickly to plants once applied.
- 34. their ability to be added in large doses that are never toxic to plants.

35-38. Earthworms

- 35. eat the tissues of living plants.
- 36. excrete casts, which are good for the soil.
- 37. can make up a significant portion by weight of the biomass of a healthy garden soil.
- 38. generally have a favorable effect on soil productivity.

39-42. A good soil sample

- 39. contains the same amount of soil from the 0-1" depth as from the 4-5" depth.
- 40. contains no more than 3 subsamples.
- 41. can be taken at a 0-6" or 0-8" depth.
- 42. contains numerous subsamples that represent an area with similar environmental conditions, such as slope.

43-46. Concerning soil fertility and plant nutrition,

- 43. soil fertility is the capacity of the soil to supply nutrients for maximum plant growth.
- 44. there are at least 16 essential elements for plant growth.
- 45. plants in natural settings, such as grasslands, obtain their phosphorus directly from the soil.
- 46. nutrients are absorbed by plants primarily as organic molecules.

47-50. Soil fungi

- 47. are smaller than bacteria.
- 48. fix nitrogen and give some to the plant.
- 49. grow in long, finely branched networks called mycellia.
- 50. decompose organic matter.

51-54. Soil macroorganisms include

- 51. earthworms.
- 52. algae.
- 53. spiders.
- 54. ants.

55-58. Which of the following is important when "hardening off" plants?

- 55. Lowering the greenhouse temperatures
- 56. Increasing light levels
- 57. Increasing water applications
- 58. Increasing nutrient applications

59-62. Which of the following would be important for propagating cuttings?

- 59. Healthy parent material
- 60. Frequent mist
- 61. Bottom heat
- 62. Treatment of cuttings with auxins

63-66. Concerning fertilizers,

- 63. organic and inorganic fertilizers have different effects on soil quality.
- 64. their costs are one of the smaller inputs of money that go into producing a crop on a farm.
- 65. most are mined from renewable sources.
- 66. their use is responsible for much of the productivity of intensive agriculture.

67-70. Plant parts used in asexual reproduction include

- 67. flowers.
- 68. leaves.
- 69. stems.
- 70. roots.

71-74. Seeds can be comprised of the

- 71. endosperm
- 72. cotyledons
- 73. embryo
- 74. seed coat

75-78. Mycorrhiza

- 75. fixes nitrogen.
- 76. is a fungus-root association.
- 77. is bacteria that beneficially infect roots.
- 78. benefits the host plants.

79-82. Soil microorganisms have many beneficial effects on soils and plants that include

- 79. soil aggregate stabilization.
- 80. antagonistic action against plant pathogens.
- 81. humus formation.
- 82. nutrient cycling.

83-86. The narrower or smaller the C/N ratio of a freshly added organic residue to the soil,

- 83. the longer the nitrate depression period.
- 84. the faster the suitable planting time for the grower.
- 85. the faster the decay rate of the organic residue.
- 86. the lower the N content relative to the C content in the residue.

III. Fill-Ins (2 points for each space): Fill-in each space below with the correct word or words.

87. A good time to add compost to your garden is when the C/N ratio of the compost is about _____ .
25/1
88. The more stable, slow-decomposing portion of soil organic matter is _____ . humus
89. _____ are the 'seed leaves' of flowering plants that are the food storage structure
seedlings rely on before being able to produce food through photosynthesis. Cotyledons
90. _____ is the pigment in the chloroplasts of the leaves that captures the energy
from light during the process of photosynthesis. Chlorophyll
91. The three types of leaf arrangements used to describe simple leaves are (1) opposite, (2)
_____, and (3) _____. alternate; whorled
92. A _____ is an underground stem. rhizome
93. Nitrogen fixation is the conversion of _____ to organic nitrogen utilizable in
biological processes. Gaseous or atmospheric nitrogen (N_2)
94. The main function of flowers is _____. reproduction
95. _____ are plants that require two growing seasons to complete their life cycles. Biennials
96. Soil cores for a field can be collected in a random pattern or in a _____ pattern which is
particularly useful for site-specific management. Grid
97. The nutrient most commonly deficient in plants and most often needed to apply as a fertilizer is
_____. nitrogen or N