

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. Compost tea can be added directly

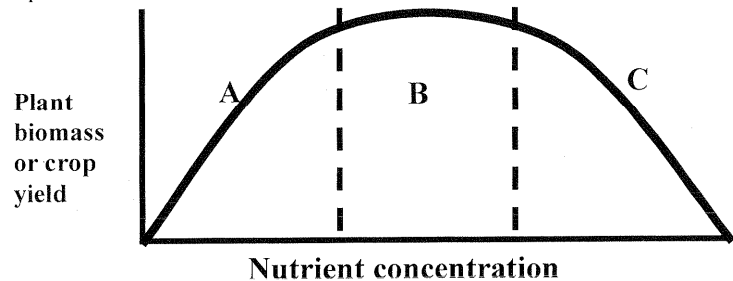
- a. to the plant to add nutrients.
- b. to the soil to add nutrients.
- c. to the plant which has been shown to suppress disease.
- d. all of the above.
- e. both a and b.

3. Biodynamics was created by

- a. Fritz Haber.
- b. Rudolf Steiner.
- c. Carl Bosch.
- d. Hans Biodyn.

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

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



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

- a. add N.
- b. add P.
- c. add both N and P.
- d. not need to add any N and P this growing season.

6. When making compost tea in a plastic container,

- a. it is best to prevent aerobic conditions.
- b. there is usually more water than compost in the container.
- c. one can add growth stimulants or microbial food to the container.
- d. all of the above.
- e. both b and c.

7. In 1990, things changed for Cuba when it could not import all the oil and agrochemicals from
- the United States.
 - China.
 - Europe.
 - the Soviet Union.
8. Generally speaking, the best time to analyze your soil for nutrients is in the
- spring.
 - summer.
 - fall.
 - anytime.
9. Concerning macronutrients and micronutrients,
- manganese is a macronutrient.
 - macronutrients are needed in larger quantities than micronutrients.
 - micronutrients are just as essential as macronutrients.
 - all of the above.
 - both b and c.
10. Compared to chemical (inorganic) fertilizers, organic fertilizers
- generally have lower nutrient contents per unit weight than do chemical fertilizers.
 - generally contribute more 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.
11. 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.
 - diffusion.
 - the law of the minimum.
12. When microbes breakdown fresh organic material, ____ of the carbon is exhaled as carbon dioxide while the rest of the carbon is incorporated into microbial cell tissue.
- 20%.
 - 25%.
 - 33%.
 - 50%.
 - 67%.
13. Types of composting include
- carcass composting.
 - two-bin system.
 - windrow composting.
 - all of the above.
 - both a and b.

14. Biomass makes up on average about 3 percent of the organic fraction of soil. In an acre of land to a depth of 6 inches, which group of organisms makes up on average the largest part of this biomass?
- Earthworms and nematodes
 - Bacteria and fungi
 - Actinomycetes
 - Algae
15. Minimum internal temperature for pathogen reduction in a compost pile is
- 105°F.
 - 110°F.
 - 122°F.
 - 131°F.
 - 155°F.
16. In the thermophilic stage in composting,
- heat-loving organisms take over.
 - temperatures in the compost pile get their hottest.
 - pathogens are killed.
 - all of the above.
 - both a and b.
17. Concerning composting,
- turning the compost pile stimulates decomposition.
 - both oxygen and water are needed to compost efficiently.
 - composting is also called microbe farming.
 - all of the above.
 - both a and c.
18. Nutrient levels in your garden are best determined by
- plant deficiency symptoms.
 - soil testing.
 - types of weeds present.
 - rate of puddling or runoff of irrigation water.
 - both a and c.
19. Lab analyses of soil nutrients in your garden
- tell you the total amount of each element in the soil.
 - estimate the amount of each nutrient available to plants.
 - should be performed at a different lab each year.
 - all of the above.
 - both a and b.
20. Compost teas and biodynamic preparations may suppress disease in plants by
- stimulating plant resistant responses.
 - containing inhibitory compounds.
 - stimulating the plant defense system.
 - all of the above.
 - both a and c.

21. According to the film we saw on Cuba, the ultimate oil peak (when half of all the oil is used up) will occur in
- a. 2010.
 - b. 2020.
 - c. 2030.
 - d. 2050.
22. Possible disadvantages to composting include
- a. it being costly and time consuming.
 - b. it requiring adequate space.
 - c. the need to manage odors in urban areas.
 - d. all of the above.
 - e. both b and c.
23. Stages in the composting process include the _____ stage.
- a. mesophilic
 - b. thermophilic
 - c. hydrophilic
 - d. all of the above
 - e. both a and b
24. An advantage of producing seedlings in a greenhouse compared to direct seeding them in the garden is that
- a. it extends the growing season.
 - b. environmental conditions can be better controlled.
 - c. a lot of plants can be managed in a small place.
 - d. all of the above.
 - e. both a and c.
25. Which of the following has the lowest C/N ratio?
- a. Alfalfa
 - b. Straw
 - c. Soil humus
 - d. Animal carcass
26. _____ are bacteria that infest roots of legume plants forming root nodules.
- a. Mycorrhizae
 - b. Rhizobia
 - c. Amoeba
 - d. Autotrophs
 - e. 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. From the film "Life in the Soil", we learned that

27. the film took place in Korea.

28. adding organic matter helps build the soil.

29. fungi eat fungi and nematodes.

30. the pathogenic fungi, *Fusarium*, can be controlled by mixed cultivation (growing two or more crops together at the same time).

31-34. Advantages of adding compost vs. synthetic fertilizers to your garden soil include

31. its ability to increase the nutrient storage capacity of the soil by increasing the organic matter content of the soil.

32. its ability to improve soil structure.

33. its ability to increase the water storage capacity of the soil.

34. its ability to be added in large doses that are never toxic to plants.

35-38. Earthworms

35. eat the tissues of dead plants.

36. excrete casts, which are good for the soil.

37. help to aerate the 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" 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 20 essential elements for plant growth.

45. a small proportion of some nutrients can be taken up by plants in organic forms.

46. N, P, and S are considered the three primary fertilizer nutrients for plants.

47-50. Soil fungi

47. can cause disease in some plants.

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

T 51. earthworms.

___ 52. algae.

T 53. spiders.

T 54. ants.

55-58. After 1990 when Cuba was forced to begin a period of survival agriculture,

T 55. Cubans started gardens in vacant lots in cities.

T 56. Cubans grew food in gardens on rooftops.

___ 57. most Cuban farmers kept relying heavily on chemical fertilizers.

T 58. Cuba began to develop biopesticides and biofertilizers.

59-62. According to the film we saw on Cuba,

___ 59. the average Cuban now uses about the same amount of energy as the average American.

T 60. Cubans eat more vegetables now than they did in the 1980s.

T 61. the life expectancy of a Cuban is about the same as that of an American.

T 62. Cuba is a low-input country with relatively little coming in from the outside world.

63-66. Continual additions of organic matter to the soil

T 63. increase soil fertility.

___ 64. generally have little effect on soil structure.

T 65. generally increase water infiltration rates.

___ 66. can alter soil texture after five years.

67-70. Concerning fertilizers,

T 67. organic and inorganic fertilizers have different effects on soil quality.

___ 68. their costs are one of the smaller inputs of money that go into producing a crop on a farm.

T 69. most are mined from nonrenewable sources.

T 70. their use is responsible for much of the productivity of intensive agriculture.

71-74. Home composting

T 71. can create a valuable soil amendment.

___ 72. will degrade the herbicides approved for use on lawns.

___ 73. is successfully done in smaller spaces by compacting the compost pile.

T 74. benefits from a bin or enclosure that provides insulation

75-78. Things **not** to compost for addition to one's vegetable garden generally include

T 75. dog and cat wastes.

___ 76. food scraps.

T 77. meat and dairy wastes.

___ 78. grass clippings

79-82. Mycorrhiza

 79. fixes nitrogen.

T 80. is a fungus-root association.

 81. is bacteria that beneficially infect roots.

T 82. benefits the host plants.

83-86. Soil microorganisms have many beneficial effects on soils and plants that include

T 83. soil aggregate stabilization.

T 84. antagonistic action against plant pathogens.

T 85. humus formation.

T 86. nutrient cycling.

87-90. The narrower or smaller the C/N ratio of a freshly added organic residue to the soil,

T 87. the shorter the nitrate depression period.

T 88. the faster the suitable planting time for the grower.

 89. the slower the decay rate of the organic residue.

T 90. the higher 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.

91. A good time to add compost to your garden is when the C/N ratio of the compost is about 25/1^{30/1}.

92. When animals such as cows die, they can be buried or composted. They can also be

rendered. which is a process that converts animal carcasses or byproducts into useful value-added materials (like lard). rendered

93. Making compost is basically making humus. humus

94. The ideal moisture content of a compost pile is usually around 50-60 percent. 50-60

95. In a carcass compost pile, a good carbon source, such as sawdust or straw, is needed to mix with the animal carcass. Straw, silage, wood chips

96. With Preparation 500, cow manure is buried in the ground in a female cow horn in the fall.

97. Nitrogen fixation is the conversion of N₂ to forms of nitrogen utilizable in biological processes. Gaseous or atmospheric nitrogen (N₂)

98. Soil cores from a field can be collected in a grid pattern or in a random pattern which is particularly useful for site-specific management. random

99. The nutrient most commonly deficient in plants and most often needed as a fertilizer is

N. nitrogen or N

100. The name for biodynamically certified products is Demeter. Demeter

101. Incorporating organic matter with a C:N ratio of 20:1 will cause net mineralization.
mineralization

102. The use of earthworms to breakdown organic waste into compost is called vermicomposting.
vermicomposting