Soil Science Reviewer

By Agriculture Review

1. Which of the following processes involves the physical disintegration and chemical decomposition of rocks and minerals to form soil?

a. Leaching

b. Weathering

c. Illuviation

d. Podzolization

2. In a typical soil profile, which master horizon is characterized primarily by an accumulation of organic matter, typically found at the very surface in forest soils?

a. A horizon

b. B horizon

c. O horizon

d. C horizon

3. Soil texture is determined by the relative proportions of which three fundamental soil separates?

a. Sand, silt, and loam

b. Sand, silt, and clay

c. Gravel, sand, and clay

d. Loam, silt, and clay

4. For most agricultural crops, the maximum availability of essential soil nutrients occurs within which pH range?

a. 4.5 to 5.5

b. 5.5 to 6.0

c. 6.0 to 7.0

d. 7.5 to 8.5

5. Which primary macronutrient is most heavily responsible for promoting vigorous vegetative growth and dark green foliage in plants?

a. Nitrogen

b. Phosphorus

c. Potassium

d. Calcium

6. What specific genus of bacteria forms a symbiotic relationship with the roots of leguminous plants to fix atmospheric nitrogen?

a. Azotobacter

b. Nitrosomonas

c. Bacillus

d. Rhizobium

7. The detachment and movement of soil particles specifically caused by the force of wind is known as:

a. Fluvial erosion

b. Aeolian erosion

c. Glacial erosion

d. Tillage erosion

8. According to the USDA soil classification system, a soil particle must be smaller than what diameter to be classified as clay?

a. 0.05 mm

b. 0.02 mm

c. 0.005 mm

d. 0.002 mm

9. Rocks formed directly from the cooling and solidification of molten magma or lava are classified as:

a. Igneous rocks

b. Sedimentary rocks

c. Metamorphic rocks

d. Limestone rocks

10. The specific arrangement or grouping of primary soil particles into secondary units or aggregates is termed:

a. Soil texture
b. Soil consistence
c. Soil structure
d. Soil porosity

11. The biological process wherein organic forms of nitrogen are converted by soil microbes into plant-available inorganic forms (like ammonium) is called:

a. Mineralization
b. Immobilization
c. Denitrification
d. Volatilization

12. Which pair of active ions is primarily responsible for causing soil acidity when present in high concentrations on soil colloids and in the soil solution?

a. Calcium and Magnesium
b. Hydrogen and Aluminum
c. Sodium and Potassium
d. Iron and Manganese

13. In the USDA Soil Taxonomy, which soil order represents the most highly weathered tropical and subtropical soils, rich in iron and aluminum oxides?

a. Inceptisols
b. Mollisols
c. Aridisols
d. Oxisols

14. Which specific fraction of soil water is held against the pull of gravity but is easily extracted by plant roots?

a. Gravitational water
b. Hygroscopic water
c. Capillary water
d. Chemically bound water

15. A soil conservation practice that involves performing tillage and planting operations perpendicular to the slope of the land is called:

a. Terracing
b. Contour farming
c. Strip cropping
d. Crop rotation

16. The highly stable, dark-colored, complex organic material that remains in the soil after extensive decomposition of plant and animal residues is known as:

a. Humus
b. Lignin
c. Cellulose
d. Peat

17. Which of the following is an essential micronutrient, required in small quantities for enzyme activation and auxin synthesis?

a. Sulfur
b. Magnesium
c. Calcium
d. Zinc

18. Soils formed primarily from volcanic ash and ejecta, known for high water-holding capacity and phosphorus fixation, belong to which order?

a. Gelisols
b. Andisols
c. Spodosols
d. Ultisols

19. The downward movement of liquid water entirely through the soil profile, often leading to groundwater recharge, is termed:

a. Infiltration
b. Evaporation
c. Percolation
d. Runoff

20. The excessive runoff of which specific fertilizer nutrient into surface waters is the primary catalyst for algal blooms and freshwater eutrophication?

a. Potassium

b. Phosphorus

c. Calcium

d. Sulfur

21. What term describes the mutually beneficial association between specific soil fungi and the roots of higher plants, which greatly enhances water and phosphorus uptake?

a. Mycorrhiza

b. Nematodes

c. Actinomycetes

d. Cyanobacteria

22. Which macro-organism is famously referred to as 'nature's plowman' due to its ability to aerate the soil and mix organic matter through cast production?

a. Termite

b. Centipede

c. Earthworm

d. Dung beetle

23. In soil morphology, a strictly gray or highly mottled soil color is a strong visual indicator of:

a. High organic matter

b. Accumulation of calcium carbonate

c. Excellent aeration and drainage

d. Prolonged waterlogging and reducing conditions

24. Nutrient loss via downward leaching is most severe and rapid in soils possessing which textural class?

a. Sandy soils

b. Clayey soils

c. Silty soils

d. Loamy soils

25. Adequate soil aeration is critical for root health because roots require which specific gas from the soil pores for respiration?

a. Carbon dioxide

b. Oxygen

c. Nitrogen

d. Methane

26. Which of the following represents the correct formula for calculating soil Bulk Density?

a. Weight of wet soil / Volume of solids

b. Weight of dry soil / Volume of solids

c. Weight of oven-dry soil / Total volume of soil

d. Volume of voids / Total volume of soil

27. Cation Exchange Capacity (CEC) is a critical measure of soil fertility. How is CEC fundamentally defined?

a. The speed at which water moves through soil pores

b. The total capacity of a soil to hold exchangeable positively charged ions

c. The amount of calcium carbonate present in the topsoil

d. The ratio of carbon to nitrogen in soil organic matter

28. Isomorphic substitution within the crystal lattice of silicate clay minerals directly results in which fundamental property?

a. A permanent negative charge on the clay particle

b. A decrease in soil bulk density

c. The destruction of the crystalline structure

d. An increase in soil pH

29. Which critical soil moisture constant is defined as the moisture content retained by soil when subjected to a tension of -15 bars (1500 kPa)?

a. Field Capacity

b. Saturation Point

c. Hygroscopic Coefficient

d. Permanent Wilting Point

30. Which soil order is characterized by a high content of expanding (shrink-swell) smectitic clays, leading to deep cracks during dry periods?

a. Entisols
b. Vertisols
c. Alfisols
d. Histosols

31. In the nitrogen cycle, Nitrosomonas and Nitrobacter bacteria sequentially facilitate the oxidation of ammonium (NH_4^+) into nitrate (NO_3^-). This process is known as:

a. Ammonification
b. Denitrification
c. Nitrification
d. Nitrogen fixation

32. Calculate the porosity (%) of a soil sample that has a Bulk Density of 1.33 g/cm3 and an assumed Particle Density of 2.66 g/cm3.

a. 25%
b. 50%
c. 75%
d. 100%

33. When reclaiming structurally degraded sodic soils (high in exchangeable sodium), which chemical amendment is most commonly applied to displace the sodium?

a. Agricultural lime
b. Anhydrous ammonia
c. Potassium chloride
d. Gypsum (Calcium sulfate)

34. A plant exhibiting a dark green color with distinct purpling along the margins of its older, lower leaves is most likely suffering from a deficiency of:

a. Nitrogen
b. Potassium
c. Phosphorus
d. Iron

35. Denitrification, the biological reduction of nitrate to nitrogen gases (N2, N2O), occurs most rapidly under which soil environmental condition?

a. Anaerobic, waterlogged soils

b. Well-aerated, dry soils

c. Highly acidic, sandy soils

d. Soils with extremely low organic carbon

36. The rate of downward movement of water through a saturated soil column is mathematically described by which fundamental physical law?

a. Stokes' Law

b. Darcy's Law

c. Fick's Law

d. Boyle's Law

37. Who formulated the foundational equation of soil genesis stating that soil is a function of climate, organisms, relief, parent material, and time [s = f(cl, o, r, p, t)]?

a. Justus von Liebig

b. Vasily Dokuchaev

c. Eugene Hilgard

d. Hans Jenny

38. Incorporating crop residues with a very high Carbon-to-Nitrogen (C:N) ratio, such as wheat straw, typically results in which immediate biological process in the soil?

a. Nitrogen immobilization (tie-up)

b. Rapid nitrogen mineralization

c. Increased soil pH

d. Immediate release of ammonium

39. Which type of soil structure is predominantly found in healthy A horizons, resembling cookie crumbs, and is considered highly ideal for seedbed preparation?

a. Platy

b. Prismatic

c. Granular

d. Columnar

40. The intrinsic ability of a soil to resist sudden or drastic changes in pH when acidic or alkaline substances are added is referred to as its:

a. Electrical conductivity

b. Buffering capacity

c. Base saturation

d. Flocculation state

41. In the USDA Soil Taxonomy, a soil temperature regime where the mean annual soil temperature at a depth of 50 cm is 22°C or higher is classified as:

a. Hyperthermic

b. Mesic

c. Thermic

d. Frigid

42. In the Universal Soil Loss Equation (A = R K L S C P), the 'K' factor specifically represents:

a. Rainfall erosivity

b. Crop management practices

c. Soil erodibility

d. Slope length and steepness

43. The three definitive 'Criteria of Essentiality' used to determine if a nutrient element is absolutely required by a plant were established by:

a. Sprengel and Liebig

b. Arnon and Stout

c. Brady and Weil

d. Dokuchaev and Jenny

44. Total soil water potential dictates the direction of water flow. Which component of total potential is triggered by the presence of dissolved salts in the soil solution?

a. Matric potential

b. Gravitational potential

c. Pressure potential

d. Osmotic potential

45. When measuring soil pH using a standard glass electrode in a water-soil slurry, what specific type of soil acidity is being measured?

a. Active acidity in the soil solution

b. Exchangeable (salt-replaceable) acidity

c. Residual (reserve) acidity

d. Total potential acidity

46. An agriculturist needs to apply 120 kg of actual Nitrogen per hectare. Using Urea, which contains 46% N, precisely how much bulk Urea fertilizer must be applied per hectare?

a. 55.2 kg

b. 260.8 kg

c. 174.0 kg

d. 200.0 kg

47. A given soil sample has a mass wetness (gravimetric moisture content) of 20% and a measured bulk density of 1.5 g/cm3. What is the volumetric water content of this soil?

a. 13.3%

b. 21.5%

c. 30.0%

d. 35.0%

48. Which phyllosilicate clay mineral is characterized by a 2:1 non-expanding lattice structure where potassium (K+) ions fit snugly into the hexagonal holes of the tetrahedral sheets, effectively fixing the layers together?

a. Illite (Fine-grained mica)

b. Montmorillonite

c. Kaolinite

d. Chlorite

49. During Biological Nitrogen Fixation (BNF) within legume nodules, the nitrogenase enzyme complex is highly sensitive and irreversibly destroyed by the presence of which element?

a. Molybdenum

b. Iron

c. Hydrogen

d. Oxygen

50. In advanced soil morphological classification, a diagnostic subsurface (B) horizon characterized by a significant, measurable accumulation of illuvial silicate clay is officially termed an:

a. Albic horizon

b. Argillic horizon

c. Spodic horizon

d. Kandic horizon

Answer Key

1. b
2. c
3. b
4. c
5. a
6. d
7. b
8. d
9. a
10. c
11. a
12. b
13. d
14. c
15. b
16. a
17. d
18. b
19. c
20. b
21. a
22. c
23. d
24. a
25. b
26. c
27. b
28. a
29. d
30. b
31. c
32. b
33. d
34. c
35. a
36. b
37. d
38. a
39. c
40. b
41. a
42. c
43. b
44. d
45. a
46. b
47. c
48. a
49. d
50. b