

Soil Science Reviewer By Agriculture Review.

1. Which of the following elements is classified as a secondary macronutrient essential for chlorophyll formation and enzyme activation in plants?

- a) Magnesium (Mg)
- b) Molybdenum (Mo)
- c) Iron (Fe)
- d) Boron (B)

2. The criteria of essentiality of plant nutrients were proposed by Arnon and Stout in which year?

- a) 1935
- b) 1942
- c) 1939
- d) 1950

3. Phosphorus availability to plants is maximum when soil pH is approximately within the range of:

- a) 4.0 – 4.5
- b) 5.0 – 5.5
- c) 6.0 – 7.0
- d) 8.0 – 8.5

4. Which of the following fertilizers is classified as a complex fertilizer supplying both nitrogen and phosphorus?

- a) Ammonium sulfate
- b) Urea
- c) Diammonium phosphate (DAP)
- d) Muriate of potash (MOP)

5. Nitrogen in the form of ammonium (NH_4^+) is more likely to be lost from the soil through which process under anaerobic conditions?

- a) Nitrification
- b) Denitrification
- c) Volatilization
- d) Leaching

6. Calcitic lime primarily provides which nutrient element to the soil during neutralization of acidity?

- a) Magnesium (Mg)
- b) Calcium (Ca)
- c) Potassium (K)
- d) Sulfur (S)

7. Which clay mineral generally exhibits the highest cation exchange capacity (CEC)?

- a) Kaolinite
- b) Illite
- c) Montmorillonite
- d) Chlorite

8. The soil condition characterized by high sodium adsorption ratio (SAR) and poor structure is referred to as:

- a) Saline soil
- b) Sodic soil
- c) Saline-sodic soil
- d) Acidic soil

9. Boron deficiency in plants typically leads to which visible symptom?

- a) Interveinal chlorosis on older leaves
- b) Cracking and death of growing points
- c) Purpling of leaves
- d) Yellowing along leaf margins

10. In soil taxonomy, soils that are newly formed with little profile development are classified as:

- a) Entisols
- b) Alfisols
- c) Oxisols
- d) Vertisols

11. The release of ammonium from organic matter during decomposition is termed as:

- a) Immobilization
- b) Mineralization
- c) Nitrification
- d) Denitrification

12. In acid soils with pH below 5.0, phosphorus is primarily fixed by which of the following compounds?

- a) Calcium carbonates
- b) Aluminum and iron oxides
- c) Manganese oxides
- d) Silicate clays

13. The fertilizer grade "14-14-14" indicates that the fertilizer contains:

- a) 14% N, 14% P_2O_5 , and 14% K_2O
- b) 14% N, 14% P, and 14% K
- c) 14% NH_4^+ , 14% PO_4^{3-} , 14% K^+
- d) 14% N, 14% P_2O_3 , and 14% K_2O

14. When ammonium sulfate $[(NH_4)_2SO_4]$ is continuously applied to soil, what is the most probable long-term effect?

- a) Increase in soil pH due to sulfur oxidation
- b) Decrease in soil pH due to acid-forming reaction
- c) Increase in exchangeable Ca
- d) Decrease in available S

15. Among the following, which nutrient is relatively immobile in plants but highly mobile in soil, leading to frequent foliar application?

- a) Potassium (K)
- b) Iron (Fe)
- c) Nitrogen (N)
- d) Boron (B)

16. The gypsum requirement of a sodic soil is primarily determined to replace which cation from the exchange complex?

- a) Calcium (Ca^{2+})
- b) Sodium (Na^+)
- c) Potassium (K^+)
- d) Magnesium (Mg^{2+})

17. Among the following soils, which is expected to exhibit the lowest cation exchange capacity (CEC)?

- a) Clay loam with high organic matter
- b) Sandy soil with low humus content
- c) Vertisol rich in montmorillonite
- d) Andisol with allophane clays

18. The plant symptom known as “whip-tail” in cauliflower is due to deficiency of which micronutrient?

- a) Molybdenum (Mo)
- b) Zinc (Zn)
- c) Boron (B)
- d) Copper (Cu)

19. In the cation exchange process, the replacement of one cation by another on the colloidal surface occurs primarily by:

- a) Electrostatic attraction without permanent bond formation
- b) Covalent bonding between ions and colloids
- c) Formation of insoluble precipitates
- d) Adsorption by hydrogen bonding

20. Among the following soil orders, which typically shows strong accumulation of iron and aluminum oxides, characteristic of highly weathered tropical soils?

- a) Mollisols
- b) Alfisols
- c) Oxisols
- d) Inceptisols

21. A soil sample has a bulk density of 1.40 g cm^{-3} and a particle density of 2.65 g cm^{-3} . What is the approximate total porosity of the soil (percent)?

- a) 33%
- b) 47%
- c) 52%
- d) 60%

22. Which soil textural class typically has the highest plant-available water capacity (AWC) per unit depth and is therefore often recommended for water-efficient cropping?

- a) Sand
- b) Clay
- c) Loamy sand
- d) Silt loam

23. A high plasticity index (PI) and pronounced shrink-swell behavior in a soil profile are most characteristic of which clay mineral group?

- a) Kaolinite
- b) Montmorillonite (smectite)
- c) Illite
- d) Chlorite

24. Which laboratory procedure is most commonly used to quantify soil aggregate stability against rapid wetting and breakdown (an index of structural resilience)?

- a) Wet sieving method
- b) Hydrometer method
- c) Walkley-Black oxidation method
- d) pH titration

25. Which soil texture is expected to have the highest saturated hydraulic conductivity (K_{sat}) under similar bulk density conditions?

- a) Silty clay
- b) Clay loam
- c) Sandy soil
- d) Silty clay loam

26. In the Munsell colour system, a soil horizon showing very low chroma values (e.g., 1 or 2) and grayish hues most likely indicates which soil condition?

- a) High organic matter and well aerated
- b) Recent addition of iron oxides
- c) High calcium carbonate accumulation
- d) Reducing (poorly drained, gleyed) conditions

27. Soil compaction caused by heavy machinery most directly results in which of the following changes to soil physical properties?

- a) Decrease in macroporosity and decrease in saturated hydraulic conductivity
- b) Increase in total porosity and increase in aeration
- c) Increase in aggregate stability and higher infiltration
- d) Conversion of sand fraction into silt fraction

28. Which surface condition most commonly causes a sharp reduction in infiltration rate immediately after a heavy rain event?

- a) Presence of surface crop residues
- b) Formation of a compacted surface crust
- c) Increased macroporosity due to bioturbation
- d) Deep macropore networks from earthworms

29. For fine-textured soils (<2 mm fraction), which laboratory method is most appropriate for determining particle size distribution (sand, silt, clay) including the dispersion of clay?

- a) Loss-on-ignition
- b) Wet aggregate stability test
- c) Hydrometer (or pipette) method after chemical dispersion
- d) Kjeldahl digestion

30. In an unsaturated upland soil under typical cropping conditions, which component of soil water potential usually dominates plant water uptake behavior?

- a) Gravitational potential
- b) Osmotic potential due to salts
- c) Hydrostatic pressure from groundwater
- d) Matric potential (capillary & adsorptive forces)

31. The acidity that is directly measured in the soil solution by a pH meter is referred to as:

- a) Reserve acidity
- b) Active acidity
- c) Exchangeable acidity
- d) Potential acidity

32. Which of the following statements about soil buffering capacity is TRUE?

- a) Sandy soils have higher buffering capacity than clay soils.
- b) Buffering capacity increases with higher cation exchange capacity (CEC).
- c) Organic matter decreases buffering capacity.
- d) Buffering capacity is not influenced by soil colloids.

33. Dolomitic limestone is preferred over calcitic lime when:

- a) Soil is deficient in magnesium
- b) Soil has excess calcium carbonate
- c) Soil pH is above 7.5
- d) Magnesium toxicity is suspected

34. A saline soil is characterized by an electrical conductivity (EC) of the saturation extract greater than:

- a) 2 dS m⁻¹
- b) 4 dS m⁻¹
- c) 8 dS m⁻¹
- d) 15 dS m⁻¹

35. Which index is used to indicate the relative proportion of sodium to calcium and magnesium in soil solution that affects soil structure stability?

- a) EC (Electrical Conductivity)
- b) SAR (Sodium Adsorption Ratio)
- c) ESP (Exchangeable Sodium Percentage)
- d) RSC (Residual Sodium Carbonate)

36. The gypsum requirement of sodic soils is mainly based on which of the following chemical reactions?

- a) $\text{Na}_2\text{CO}_3 + \text{CaSO}_4 \rightarrow \text{CaCO}_3 + \text{Na}_2\text{SO}_4$
- b) $\text{NaCl} + \text{CaCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{CaCl}_2$
- c) $\text{Na}_2\text{SO}_4 + \text{MgCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{MgSO}_4$
- d) $\text{NaHCO}_3 + \text{FeSO}_4 \rightarrow \text{Fe(OH)}_3 + \text{Na}_2\text{SO}_4$

37. Excess exchangeable sodium in soils generally causes which of the following physical effects?

- a) Improved permeability and aggregation
- b) Dispersion of clay particles and reduced infiltration
- c) Increased aeration and drainage
- d) Enhanced flocculation and aggregate stability

38. The soil pH at which maximum nutrient availability occurs for most field crops is approximately:

- a) 4.5 to 5.0
- b) 5.5 to 6.5
- c) 6.5 to 7.5
- d) 7.5 to 8.5

39. Which of the following is NOT a typical characteristic of sodic soils?

- a) High pH, often >8.5
- b) Low exchangeable sodium percentage (ESP < 15%)
- c) Poor structure and crust formation
- d) Reduced hydraulic conductivity

40. Which of the following management practices is least effective in reclaiming saline soils?

- a) Application of gypsum
- b) Adequate leaching with good-quality water
- c) Improving surface and subsurface drainage
- d) Addition of sodium bicarbonate to neutralize acidity

41. The decomposition of crop residues and organic matter in soil is primarily accelerated by:

- a) Low temperature and waterlogging
- b) Warm temperature and adequate aeration
- c) High salinity and anaerobic conditions
- d) High soil acidity and low microbial activity

42. In the soil carbon cycle, which of the following microbial processes converts organic nitrogen into ammonium (NH_4^+)?

- a) Nitrification
- b) Ammonification
- c) Denitrification
- d) Nitrogen fixation

43. The C:N ratio of organic residues most favorable for rapid mineralization and release of plant-available nitrogen is approximately:

- a) 10:1 to 15:1
- b) 25:1 to 30:1
- c) 40:1 to 50:1
- d) 60:1 to 80:1

44. Which group of microorganisms is primarily responsible for biological nitrogen fixation in association with legumes?

- a) Azotobacter
- b) Rhizobium
- c) Clostridium
- d) Nitrosomonas

45. A soil with a dark A horizon rich in humus overlying a clay-rich B horizon developed under grassland vegetation is most likely classified as a/an:

- a) Alfisol
- b) Mollisol
- c) Ultisol
- d) Oxisol

46. Which soil-forming process involves the downward movement of clay and other materials from the upper to the lower horizons?

- a) Eluviation
- b) Illuviation
- c) Laterization
- d) Podzolization

47. Andisols, a common soil order in volcanic regions of the Philippines, are mainly characterized by:

- a) High base saturation and clay translocation
- b) High organic matter and amorphous clay minerals such as allophane
- c) Strongly weathered oxides of Fe and Al
- d) Weak horizon development and shallow depth

48. Which soil order typically exhibits vertic properties such as deep cracks and self-mulching behavior during wetting and drying cycles?

- a) Oxisols
- b) Vertisols
- c) Entisols
- d) Ultisols

49. Which soil horizon is primarily composed of partially decomposed organic matter found at the soil surface in forested ecosystems?

- a) A horizon
- b) O horizon
- c) E horizon
- d) B horizon

50. In the USDA Soil Taxonomy, the classification hierarchy from the most general to the most specific is:

- a) Series → Family → Subgroup → Great Group → Suborder → Order
- b) Order → Suborder → Great Group → Subgroup → Family → Series
- c) Order → Family → Suborder → Subgroup → Great Group → Series
- d) Subgroup → Suborder → Great Group → Series → Family → Order

Answer Key

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