

# Soil Science Reviewer

By Agriculture Review

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**1. Who is universally recognized as the 'Father of Soil Science' for his pioneering work in soil genesis and classification?**

- a) Hans Jenny
- b) Justus von Liebig
- c) V.V. Dokuchaev
- d) Jethro Tull

**2. According to Hans Jenny's equation of soil formation, which of the following is NOT considered an independent, state factor?**

- a) Climate
- b) Topography
- c) Fertilizer application
- d) Parent material

**3. In a soil profile, which master horizon is characterized by the maximum illuviation (accumulation) of silicate clays, iron, and aluminum oxides?**

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

**4. Which master horizon is known as the zone of maximum eluviation, typically appearing lighter in color due to the leaching of clay and organic matter?**

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

**5. Which horizon is dominated by organic material in various stages of decomposition and is commonly found in forested areas?**

- a) O horizon
- b) A horizon
- c) C horizon
- d) R horizon

**6. Soil texture refers to the relative proportions of which three soil separates?**

- a) Sand, silt, and clay
- b) Gravel, sand, and loam
- c) Sand, loam, and clay
- d) Humus, silt, and clay

**7. The mechanical analysis of soil texture using the hydrometer method is fundamentally based on which scientific principle?**

- a) Boyle's Law
- b) Stokes' Law
- c) Darcy's Law
- d) Fick's Law

**8. For accurate textural determination via Stokes' Law, soil particles are assumed to be:**

- a) Spherical and smooth
- b) Irregular and rough
- c) Platy and charged
- d) Cubic and porous

**9. What is the standard instrument used universally to determine and describe soil color?**

- a) Spectrophotometer
- b) Colorimeter
- c) Munsell Color Chart
- d) Litmus Paper

**10. In the Munsell Soil Color notation, what does 'Value' represent?**

- a) The dominant spectral color
- b) The lightness or darkness of the color
- c) The purity or strength of the color
- d) The moisture content of the soil

**11. How is soil bulk density defined?**

- a) Mass of dry soil per unit volume of soil particles only
- b) Mass of dry soil per unit volume of soil, including pore spaces
- c) Mass of wet soil per unit volume of water
- d) Volume of pore spaces divided by the total soil volume

**12. What is the universally accepted average particle density of most mineral soils?**

- a) 1.33 g/cm<sup>3</sup>
- b) 2.00 g/cm<sup>3</sup>
- c) 2.65 g/cm<sup>3</sup>
- d) 3.15 g/cm<sup>3</sup>

**13. Which type of soil structure is most highly desirable for agricultural seedbeds because it promotes excellent infiltration and aeration?**

- a) Platy
- b) Prismatic
- c) Blocky
- d) Granular

**14. In an ideal loam soil configured for optimal plant growth, what percentage of the total soil volume is occupied by pore space (air and water)?**

- a) 10%
- b) 25%
- c) 50%
- d) 75%

**15. Which form of soil water is held against the pull of gravity in micropores and is considered the primary source of water available to plants?**

- a) Gravitational water
- b) Capillary water
- c) Hygroscopic water
- d) Structural water

**16. What is the approximate soil moisture tension at Field Capacity?**

- a) 1/3 bar
- b) 1 bar
- c) 15 bars
- d) 31 bars

- 17. At what soil moisture tension does the Permanent Wilting Point (PWP) typically occur?**
- a) 1/3 bar
  - b) 5 bars
  - c) 10 bars
  - d) 15 bars
- 18. Standard pH meters measure the hydrogen ion concentration in the soil solution. What type of acidity is this?**
- a) Active acidity
  - b) Exchangeable acidity
  - c) Residual acidity
  - d) Total acidity
- 19. In highly acidic mineral soils (pH below 5.0), the toxicity of which element becomes a primary limiting factor for plant growth?**
- a) Calcium
  - b) Magnesium
  - c) Aluminum
  - d) Potassium
- 20. Which of the following is the most common material applied to ameliorate soil acidity?**
- a) Gypsum
  - b) Calcium carbonate
  - c) Elemental sulfur
  - d) Ammonium nitrate
- 21. A saline soil is officially characterized by which of the following chemical properties?**
- a)  $EC > 4 \text{ dS/m}$ ,  $ESP < 15\%$ ,  $pH < 8.5$
  - b)  $EC < 4 \text{ dS/m}$ ,  $ESP > 15\%$ ,  $pH > 8.5$
  - c)  $EC > 4 \text{ dS/m}$ ,  $ESP > 15\%$ ,  $pH > 8.5$
  - d)  $EC < 4 \text{ dS/m}$ ,  $ESP < 15\%$ ,  $pH < 8.5$
- 22. What is the standard chemical amendment used in the reclamation of sodic soils to replace sodium on the exchange complex?**
- a) Agricultural lime
  - b) Elemental sulfur
  - c) Gypsum
  - d) Urea

**23. Under the USDA Soil Taxonomy, which soil order is formed from volcanic ash and is known for its high phosphorus fixing capacity?**

- a) Alfisols
- b) Andisols
- c) Entisols
- d) Spodosols

**24. Which soil order is characterized by a high content of shrinking and swelling clay (smectite), causing deep cracks during dry seasons?**

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

**25. Which soil order represents the most highly weathered soils, typically red or yellowish, commonly found in tropical environments like the Philippines?**

- a) Mollisols
- b) Aridisols
- c) Oxisols
- d) Gelisols

**26. Which of the following is considered the youngest soil order, exhibiting little to no profile development and lacking a B horizon?**

- a) Entisols
- b) Inceptisols
- c) Alfisols
- d) Histosols

**27. Which soil order is unique because it is composed primarily of organic materials (peats and mucks) rather than mineral matter?**

- a) Vertisols
- b) Histosols
- c) Spodosols
- d) Andisols

**28. What diagnostic subsurface horizon is characterized by a significant accumulation of illuvial silicate clay?**

- a) Cambic horizon
- b) Spodic horizon
- c) Argillic horizon
- d) Oxic horizon

**29. Cation Exchange Capacity (CEC) is a critical indicator of soil fertility. How is CEC defined?**

- a) The ability of the soil to hold and exchange anions
- b) The capacity of soil to retain water
- c) The total quantity of negative charges available to attract positively charged ions
- d) The rate at which water infiltrates the soil surface

**30. Among the following soil colloids, which typically exhibits the highest Cation Exchange Capacity (CEC)?**

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

**31. Who postulated the 'Law of the Minimum', stating that plant growth is dictated not by total resources available, but by the scarcest resource?**

- a) Hans Jenny
- b) V.V. Dokuchaev
- c) Jethro Tull
- d) Justus von Liebig

**32. How many essential chemical elements are universally recognized as necessary for the growth and reproduction of most higher plants?**

- a) 12
- b) 14
- c) 17
- d) 21

**33. Which essential macronutrient is primarily responsible for osmoregulation and the opening and closing of stomata in plants?**

- a) Nitrogen
- b) Potassium
- c) Phosphorus
- d) Calcium

**34. Which secondary macronutrient occupies the central position of the chlorophyll molecule, making it indispensable for photosynthesis?**

- a) Sulfur
- b) Iron
- c) Magnesium
- d) Zinc

**35. Because Nitrogen is a highly mobile nutrient within the plant, its deficiency symptoms first appear as chlorosis in which part of the plant?**

- a) Older, lower leaves
- b) New, emerging leaves
- c) The main stem
- d) The apical meristem

**36. What biological process describes the microbial conversion of ammonium ( $\text{NH}_4^+$ ) into nitrate ( $\text{NO}_3^-$ )?**

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

**37. Which genus of bacteria is responsible for forming symbiotic nitrogen-fixing root nodules in leguminous plants?**

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

**38. To favor the rapid net mineralization of nitrogen in the soil, the Carbon-to-Nitrogen (C:N) ratio of incorporated organic residues should ideally be:**

- a) Less than 20:1
- b) Between 30:1 and 40:1
- c) Between 50:1 and 60:1
- d) Greater than 80:1

**39. Mycorrhizal fungi form symbiotic relationships with plant roots primarily to enhance the absorption of which relatively immobile nutrient?**

- a) Nitrogen
- b) Phosphorus
- c) Potassium
- d) Calcium

**40. In highly acidic soils, the availability of Phosphorus is strictly limited due to its fixation by which two elements?**

- a) Calcium and Magnesium
- b) Sodium and Potassium
- c) Iron and Aluminum
- d) Zinc and Copper

**41. Conversely, in alkaline and calcareous soils, Phosphorus fixation is primarily driven by its reaction with which element?**

- a) Iron
- b) Aluminum
- c) Calcium
- d) Manganese

**42. In commercial fertilizers, what does the fertilizer grade '14-14-14' specifically represent?**

- a) 14% Total N, 14% Available P, 14% Water-Soluble K
- b) 14% Total N, 14% Available P<sub>2</sub>O<sub>5</sub>, 14% Water-Soluble K<sub>2</sub>O
- c) 14 kg N, 14 kg P<sub>2</sub>O<sub>5</sub>, 14 kg K<sub>2</sub>O per ton
- d) 14 parts N, 14 parts P, 14 parts K

**43. Urea is the most widely used solid nitrogen fertilizer. What is its standard percentage of elemental nitrogen?**

- a) 21%
- b) 33%
- c) 46%
- d) 82%

**44. Muriate of Potash (MOP) is the standard commercial fertilizer for potassium. What is its chemical formula?**

- a)  $K_2SO_4$
- b)  $KNO_3$
- c)  $KCl$
- d)  $K_2O$

**45. What is recognized as the very first stage in the water erosion process, occurring when raindrops hit bare soil?**

- a) Sheet erosion
- b) Splash erosion
- c) Rill erosion
- d) Gully erosion

**46. In the Universal Soil Loss Equation (USLE),  $A = RKLSCP$ , what does the factor 'K' represent?**

- a) Rainfall erosivity
- b) Crop management factor
- c) Soil erodibility factor
- d) Slope length factor

**47. Which widely recommended soil conservation practice involves plowing, planting, and cultivating parallel to the natural topography of a slope rather than up and down?**

- a) Strip cropping
- b) Contour farming
- c) Terracing
- d) Crop rotation

**48. Which term describes the dark, complex, highly stable, and relatively degradation-resistant fraction of soil organic matter?**

- a) Fulvic acid
- b) Humus
- c) Lignin
- d) Cellulose

**49. When determining bulk density, soil samples must be completely dried. What is the standard laboratory oven temperature used for drying soils to a constant weight?**

- a) 60°C
- b) 85°C
- c) 105°C
- d) 150°C

**50. Which of the following is considered a primary mineral, highly resistant to weathering, and forms the major component of sand?**

- a) Calcite
- b) Gypsum
- c) Quartz
- d) Biotite

## Answer Key

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