Class : 9th

Chapter : 6

MANAGEMENT OF SOIL AND WATER PROBLEMS

Exercise Solved

purpose of leaching in soil management is to _____
a) Add nutrients to the soil
✓ **b) Wash away excess salts from the soil**
c) Increase soil compaction
d) Reduce soil erosion

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2. Which crop is suitable for growing in saline soils?
a) Rice
✓ **b) Barley**
c) Sugarcane
d) Cotton

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3. What is the main cause of waterlogging in soils?
a) Excessive use of fertilizers
✓ **b) Poor drainage systems**
c) Overuse of pesticides
d) High soil pH

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4. Which of the following is a mechanical method to control soil erosion?
a) Mulching
✓ **b) Terracing**
c) Crop rotation
d) Agroforestry

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5. What is the role of gypsum in reclaiming sodic soils?
a) It adds nitrogen to the soil
✓ **b) It replaces sodium with calcium**
c) It increases soil acidity
d) It reduces soil compaction

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6. Which practice helps reduce water loss through evaporation?
a) Deep plowing
✓ **b) Mulching**
c) Overgrazing
d) Frequent tilling

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7. What is the primary benefit of using organic manure in soil reclamation?
a) It increases soil salinity
✓ **b) It improves soil structure and water retention**
c) It reduces water-holding capacity
d) It hardens the soil surface

8. Which of the following is a cause of soil compaction?
a) Adding organic matter
b) Using drip irrigation
✓ **c) Heavy machinery**
d) Planting cover crops

📝 Solved Short Questions – Chapter: Management of Soil and Water Problems

1. What is the role of gypsum in reclaiming saline soils?
Gypsum helps replace sodium ions in saline and sodic soils with calcium. This process improves soil structure, increases permeability, and reduces alkalinity, making the soil suitable for agriculture.

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2. How does mulching help in water conservation?
Mulching covers the soil surface with organic or synthetic material. It reduces evaporation,

maintains soil moisture, prevents erosion, and controls weed growth — all of which help conserve water.

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3. What are the causes of soil compaction?
Soil compaction occurs due to the use of heavy machinery, frequent tillage, excessive livestock movement, and working on wet soil. Compaction reduces pore space, limits root growth, and affects water infiltration.

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4. What is the significance of contour plowing in soil conservation?
Contour plowing is the practice of plowing along the natural contours of the land. It slows down water runoff, reduces soil erosion, and increases water absorption, especially on sloped fields.

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5. How does organic manure improve soil fertility?
Organic manure adds essential nutrients to the soil, enhances microbial activity, and improves soil structure. It increases water retention, aeration, and overall fertility, leading to better crop growth.

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6. What is the purpose of installing drainage systems in waterlogged soils?
Drainage systems remove excess water from the root zone in waterlogged areas. This improves air circulation in the soil, prevents root rot, enhances soil strength, and creates favorable conditions for plant growth.

🕮 Long Question 1: Explain the methods used to reclaim saline and sodic soils.

Introduction:
Saline and sodic soils contain high levels of salts or sodium that affect plant growth, reduce soil permeability, and damage structure. Reclaiming these soils is essential for sustainable agriculture.

🔄 Methods to Reclaim Saline and Sodic Soils

1. Leaching:

- Involves flushing the soil with good-quality water to dissolve and remove excess salts.
- Requires proper drainage systems to avoid waterlogging.

2. Application of Gypsum (Calcium Sulfate):

- Gypsum replaces sodium ions with calcium, helping to improve soil structure and permeability.
- Especially effective for sodic soils.

3. Deep Plowing:

- Breaks up compacted soil layers and mixes salts deeper into the soil profile.
- Improves aeration and drainage.

4. Organic Matter Addition:

- Manure and compost improve microbial activity and enhance soil structure.
- Reduces the impact of salts on plant roots.

5. Growing Salt-Tolerant Crops:

- Crops like **barley, sugar beet, and cotton** can be grown during reclamation to utilize affected land.

6. Installation of Subsurface Drainage:

- Helps remove salty water from the root zone after leaching.

Conclusion:
A combination of chemical (gypsum), mechanical (drainage, plowing), and biological (salt-tolerant crops, manure) methods ensures effective reclamation of saline and sodic soils.

🕮 Long Question 2: Discuss the causes of soil erosion, and describe agronomic and mechanical practices to control it.

Introduction:
Soil erosion is the removal of topsoil due to wind, water, or human activities. It reduces soil fertility and negatively impacts agriculture and the environment.

⚠ Causes of Soil Erosion

- **Water Runoff:** From rainfall or irrigation on sloped land
- **Wind:** Especially in dry, bare fields
- **Deforestation:** Loss of vegetation exposes soil
- **Overgrazing:** Animals remove protective cover
- **Poor Farming Practices:** Over-tilling and lack of rotation

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🌿 Agronomic Practices to Control Soil Erosion

1. **Contour Plowing:**
    - Follows land contours to slow runoff.
2. **Cover Cropping:**
    - Growing plants to cover bare soil, preventing erosion.
3. **Crop Rotation:**
    - Maintains soil health and structure.
4. **Mulching:**
    - Covers soil surface, reducing rain impact and evaporation.

🛠 Mechanical Practices to Control Soil Erosion

1. **Terracing:**
    - Creating step-like platforms on slopes.
2. **Bunds and Check Dams:**
    - Barriers to slow water flow and trap sediments.
3. **Windbreaks:**
    - Rows of trees or shrubs that reduce wind speed.

Conclusion:
Effective soil erosion control requires both **farming techniques** and **engineering structures**. When used together, these practices preserve soil health and boost farm productivity.

🕮 Long Question 3: How can farmers manage water loss in agriculture? Explain the role of drip irrigation, rainwater harvesting, and mulching in water conservation.

Introduction:
Water is a critical input in agriculture, and its efficient use is necessary due to increasing scarcity. Farmers can manage water loss by adopting smart techniques.

💧 Techniques for Managing Water Loss

1. Drip Irrigation:

- Delivers water directly to plant roots through pipes.
- Reduces evaporation and runoff.
- Saves 30–70% water compared to traditional irrigation.
- Ideal for row crops, orchards, and vegetables.

2. Rainwater Harvesting:

- Collects and stores rainwater from rooftops or open fields.
- Used during dry seasons for irrigation.
- Reduces dependence on groundwater.
- Increases water availability in rural areas.

3. Mulching:

- Soil cover using straw, leaves, plastic sheets, etc.
- Reduces evaporation and keeps soil moist.
- Prevents weed growth and regulates soil temperature.

Conclusion:
Combining **drip irrigation**, **rainwater harvesting**, and **mulching** ensures efficient water use, reduces wastage, and promotes sustainable agriculture.

🕮 Long Question 4: Describe the role of organic and chemical amendments in improving soil health. Provide examples of each and explain their benefits and limitations.

Introduction:
Soil amendments are materials added to soil to enhance its physical, chemical, and biological properties. These include **organic** (natural) and **chemical** (synthetic) substances.

🌿 Organic Amendments

Examples:

- Farmyard manure (FYM)
- Compost
- Green manure
- Crop residues

Benefits:

- Improve soil structure and water-holding capacity
- Enhance microbial activity
- Release nutrients slowly
- Eco-friendly and sustainable

Limitations:

- Nutrient content is low compared to fertilizers
- Require large quantities
- Decompose slowly

□ Chemical Amendments

Examples:

- Urea (Nitrogen)
- DAP (Phosphorus)
- Potash (Potassium)
- Gypsum (for sodic soils)

Benefits:

- Supply specific nutrients quickly
- Increase crop yield rapidly
- Easy to handle and apply

Limitations:

- Overuse can cause pollution and soil degradation
- Expensive for small farmers
- Reduces microbial activity over time

Conclusion:
Both organic and chemical amendments are important. A **balanced approach**, using **integrated nutrient management**, provides sustainable and productive soil health improvement.