

UNIT II - WATER RESOURCES AND ENVIRONMENT MICROBIOLOGY

2.5 HYDRO PHONICS

1. What is Hydroponics?

- Hydroponics is a method of growing plants without soil.
 - Plants are grown in nutrient-rich water or inert mediums like sand, gravel, or clay pellets.
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2. How Does Hydroponics Work?

- Nutrients essential for plant growth (like nitrogen, phosphorus, and potassium) are dissolved in water.
 - Plant roots absorb these nutrients directly from the water.
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3. Types of Hydroponic Systems

1. Nutrient Film Technique (NFT):
 - A thin film of nutrient solution flows over the plant roots.
 2. Deep Water Culture (DWC):
 - Plant roots are submerged in oxygenated nutrient-rich water.
 3. Drip System:
 - Nutrients are delivered to plant roots through a drip system.
 4. Aeroponics:
 - Roots are suspended in air and misted with nutrient solution.
 5. Wick System:
 - Nutrients are drawn to the plant roots using a wick.
 6. Ebb and Flow (Flood and Drain):
 - Nutrient solution floods the root zone periodically and then drains.
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4. Benefits of Hydroponics

1. Efficient Use of Resources:
 - Saves water (up to 90% less than traditional farming).
2. No Soil Needed:
 - Can be used in areas with poor or no soil.
3. Faster Growth:
 - Plants grow faster due to direct nutrient absorption.
4. Space-Saving:
 - Vertical hydroponic systems maximize limited space.
5. Pest and Disease Control:
 - Reduces soil-borne pests and diseases.
6. Year-Round Cultivation:
 - Can grow crops indoors with controlled environments.

5. Challenges of Hydroponics

1. High Initial Cost:
 - Setting up hydroponic systems can be expensive.
 2. Technical Knowledge:
 - Requires understanding of nutrient balance, water pH, and system maintenance.
 3. Power Dependency:
 - Needs electricity for pumps, lights, and aerators.
 4. Risk of System Failure:
 - Malfunctioning equipment can harm plants quickly.
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6. Popular Crops Grown Using Hydroponics

- Leafy greens (lettuce, spinach, kale).
 - Herbs (basil, mint, cilantro).
 - Tomatoes, cucumbers, peppers, and strawberries.
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7. Importance of Hydroponics

- Helps grow food in urban areas and deserts.
- Conserves water and reduces agricultural land usage.
- Contributes to food security and sustainable farming practices.

