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World Soil Day 2024 and Sustainable Soil Management

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Soil is the foundation of life, essential for food production, water filtration, carbon storage, and biodiversity. It plays a critical role in growing over 95% of the food we consume. However, soil is increasingly under threat from urbanization, industrial agriculture, deforestation, and climate

change. According to the United Nations Food and Agriculture Organization (FAO), nearly one-third of the world's soils are degraded, with this trend accelerating, particularly in countries like Pakistan, where agriculture forms the backbone of the economy.

World Soil Day 2024, with the theme "Caring for Soils: Measure, Monitor, Manage," focuses on the importance of soil health and the need for more effective soil management practices. The theme encourages three key actions: Measure, Monitor, and Manage. These steps are essential to understand soil conditions and ensure sustainable soil use for food security, climate change mitigation, and ecosystem protection.

The first step in soil management is measurement. Soil health can be gauged by testing for nutrients, organic matter, pH, and compaction. Regular soil testing provides farmers with crucial information on the soil's condition, enabling informed decisions to improve soil fertility. In Pakistan, the excessive use of chemical fertilizers has caused nutrient imbalances, including a depletion of micronutrients such as zinc, boron, and manganese, which are vital for plant health. Testing for these micronutrients ensures that soils are optimized for crop production.

Soil pH is another critical factor, as it affects nutrient availability to plants. Monitoring and adjusting soil pH ensures plants can absorb the right nutrients. In Pakistan, where high soil salinity is a challenge, regular soil testing is crucial to maintain balanced pH levels for optimal crop

growth.

Technological advancements are helping farmers monitor soil health effectively. Internet of Things (IoT) sensors, Time Domain Reflectometry (TDR), and remote sensing technologies, such as satellite imagery and drones, allow real-time monitoring of key soil parameters like moisture, temperature, and nutrient levels. These tools enable farmers to optimize irrigation, fertilization, and crop management. In regions like Pakistan, where water scarcity is a pressing issue, technologies like IoT moisture sensors can help reduce water waste by monitoring soil moisture in real time.

Once soil conditions are measured and monitored, the next step is effective management. Practices such as conservation tillage, organic matter enhancement, and efficient irrigation help maintain soil health. Reduced tillage minimizes soil disturbance, preserving soil structure and moisture retention, while enhancing organic matter through compost and manure improves soil fertility. These practices are especially crucial in Pakistan, where soil erosion and water scarcity threaten agricultural productivity.

In conclusion, World Soil Day 2024 highlights the urgent need to care for soil. By measuring, monitoring, and managing soil health, we can combat soil degradation and ensure sustainable food production. In countries like Pakistan, where agriculture is vital to the economy and food

security, protecting and restoring soil health is crucial for a prosperous future.