

Soil management approach for climate smart agriculture

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Abstract

Due to factors including biodiversity loss, land degradation, and climate change, soil is becoming one of the most vulnerable resources on the planet. Resolving the degradation of land and soil is a fundamental task for sustainable development. Climate change-related sustainable land and soil management. It offers technical expertise on the principles of sustainable soil management and looks at how widespread adoption of climate-smart land and soil management techniques could improve mitigation and adaptation to climate change. The interactions between soil, water, livestock, and plants can be improved through sustainable soil and land management techniques that are tailored to the regional biophysical and socioeconomic conditions. This can help to prevent, slow, or stop soil degradation and lessen the effects of climate change.

Keywords: Climate smart agriculture, Soil health, Soil management and Sustainable agriculture

Introduction

Climate Smart Agriculture (CSA) is an integrated landscape management approach that assists in adjusting farming practices, livestock, and crops to the current anthropogenic climate change and, when feasible, mitigating it through the reduction of greenhouse gas emissions, all the while accounting for global population growth and food security. As a result, both sustainable agriculture and raising agricultural output are priorities. Climate change is a constant challenge in our continually changing world.

Urgent action is required in response to the increasing temperatures, unpredictable weather, and environmental problems.

Climate-smart agriculture involves practices that increase agricultural productivity, resilience to climate change, and reduce greenhouse gas emissions. Soil management is a critical component of climate-smart agriculture.

The importance of managing land and soil to mitigate climate change is one of these concerns that is receiving more and more attention. In addition to being crucial for

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agricultural sustainability and food security, climate-smart soil and land management techniques are also the key to halting climate change and its far-reaching effects. systems, priyal, an herb, is used as a medication. It is used to treat skin conditions and is reported to have tonic, cardiogenic and astringent qualities. In India, the fruit is primarily gathered and traded by tribal people. In addition to being commonly found in Uttar Pradesh, this tree is scattered throughout the states of Madhya Pradesh, Bihar, Orissa, Andhra Pradesh, Chhattisgarh, Jharkhand,

Importance of soil:

There is various importance of soil which are as follow:-

1. Many different kinds of organisms use soil as their thriving home. Numerous micro- and macroorganisms, including worms, insects, fungi, and bacteria, are found in its complex habitat.
2. The primary growing medium for plants and crops is soil. In addition to giving vital nutrients and water, it anchors plants and offers them physical support.
3. The role of soil in the global carbon cycle is crucial. By absorbing and retaining carbon dioxide from the atmosphere, it acts as a carbon storage device. This procedure lowers the atmospheric concentration of carbon dioxide, a greenhouse gas, which helps to slow down climate change.

4. Soil serves as a nutrient recycling hub. It converts organic stuff into vital nutrients that plants may then consume by breaking it down. The term "nutrient cycling" refers to this process.

Soil Management practices for Climate Smart Agriculture:

1. **Conservation Agriculture:** Emphasizes minimal soil disturbance through reduced tillage, maintaining permanent soil cover with crop residues, and diversified crop rotations. This helps in retaining soil moisture, improving soil structure, and reducing erosion.
2. **Cover Cropping:** Planting cover crops during fallow periods or between cash crops helps in preventing erosion, improving soil fertility, reducing weed growth, and enhancing carbon sequestration.
3. **Agroforestry:** Integrating trees with crops or livestock on the same piece of land helps in improving soil fertility, enhancing biodiversity, providing shade, and sequestering carbon.
4. **Crop Rotation and Diversification:** Rotating different crops helps in breaking pest and disease cycles, improving soil structure, and nutrient cycling. Diversification can also enhance resilience to climate extremes.

5. **Integrated Nutrient Management:** Using organic sources of nutrients like compost, manure, biofertilizers, and incorporating them with inorganic fertilizers helps in maintaining soil fertility while reducing the environmental impact.
6. **Soil Conservation Measures:** Implementing practices like terracing, contour plowing, and building bunds or grass strips helps in preventing soil erosion and retaining water.
7. **Smart Irrigation Practices:** Employing efficient irrigation methods such as drip or sprinkler irrigation reduces water wastage, maintains soil moisture, and supports sustainable agriculture.
8. **Soil Carbon Sequestration:** Enhancing the storage of carbon in soils through practices like agroforestry, cover cropping, and no-till farming helps in mitigating climate change by reducing atmospheric carbon dioxide.
9. **Soil Health Monitoring:** Regularly assessing soil health through soil testing helps in understanding nutrient levels, pH, organic matter content, and guides in applying suitable management practices.
10. **Adaptive Strategies:** Developing strategies that adapt to changing climate patterns and extreme weather events by adjusting planting times, choosing more

resilient crop varieties, and modifying farming practices accordingly.

Benefits of soil management practices for climate smart agriculture:

1. **Carbon Sequestration:** Climate-smart practices play a major role in reducing greenhouse gas emissions, which in turn helps to combat climate change. They do this by absorbing and storing carbon in the soil.
2. **Biodiversity and Ecosystem Health:** By encouraging healthier ecosystems and maintaining essential ecological functions, these activities help conserve biodiversity.
3. **Sustainable Agricultural Production:** By implementing climate-smart techniques, soil fertility and health are improved, increasing crop yields and lowering reliance on outside inputs.

Conclusion

There are obstacles to the widespread implementation of climate-smart soil and land management, despite the obvious advantages. However, the path to global adoption may be paved by the inclusion of these methods in financing for research, regulatory frameworks, and farmer empowerment through assistance and education. It is imperative that we take action to stop climate change. Climate-smart soil and land management techniques provide some promise in the face of these difficulties. These programmes offer a more resilient and

climate-friendly earth in addition to a more sustainable future for agriculture by changing our perspective on land use and agriculture.

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