



Soil resilience; Managing soil quality challenges in modern agriculture

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Abstract

Soil is a critical resource that supports global food security and ecosystem health. But current agricultural methods, like intense tillage and heavy reliance on chemical fertilisers and pesticides, have degraded soil and lowered soil resilience. In order to enhance soil resilience, this article explores the problems with soil quality in contemporary agriculture and provides solutions. In order to promote soil resilience, the article emphasises the use of soil management techniques such as crop rotation, cover crops, decreased tillage, and integrated pest management. The article also discusses the need for policies that support sustainable agricultural practices to promote soil health and resilience.

Introduction

Soil is the foundation of agriculture and supports food production and ecosystem health. However, modern agricultural practices have put pressure on soil quality, resulting in soil degradation and reduced soil resilience. Soil resilience refers to the ability of soil to maintain its productivity and support ecosystem functions despite disturbances or stresses. Maintaining soil resilience is critical for sustainable agriculture, as it enables soils to continue supporting food production and ecosystem services. This article discusses the challenges to soil quality in modern agriculture and strategies for managing these challenges to promote soil resilience.

Intensive tillage, monoculture, and heavy reliance on chemical fertilisers and pesticides have all contributed to soil deterioration and decreased soil resilience. Excessive tillage damages soil organic matter and disturbs soil structure, which reduces soil fertility and speeds up soil erosion. Monoculture, or the practice of growing a single crop continuously, depletes soil nutrients and increases the risk of pest and disease outbreaks. Heavy use of chemical fertilizers and pesticides can also degrade soil quality by reducing soil biodiversity and increasing soil acidity.



Managing Soil Quality Challenges

Agricultural practises that put soil health and biodiversity first are crucial for promoting soil resilience. Crop rotation, or the process of growing several crops in succession, can assist to preserve soil fertility and ward off illnesses that are spread via the soil. Increase soil organic matter, lessen soil erosion, and enhance soil structure by growing cover crops in between cash crops. Reducing soil disturbance through less tillage helps protect soil structure and boost soil organic matter. Biological control is one of many pest control approaches that can be used in integrated pest management to reduce the demand for chemical pesticides and improve soil quality. biodiversity.

Conclusion

Maintaining soil resilience is critical for sustainable agriculture and ecosystem health. Modern agricultural practices have put pressure on soil quality, resulting in soil degradation and reduced soil resilience. To manage these challenges, agricultural practices that prioritize soil health and biodiversity are essential. Crop rotation, cover cropping, reduced tillage, and integrated pest management are all strategies that can promote soil resilience. Additionally, policies that support sustainable agricultural practices are necessary to ensure the long-term health and productivity of our soils.

Strategies for managing soil quality challenges also include nutrient management and soil testing. Soil testing can help farmers determine the nutrient needs of their crops and apply fertilizer more efficiently, reducing the risk of over-fertilization and nutrient runoff. Precision agriculture technologies, such as variable-rate fertilization and soil mapping, can also help farmers apply fertilizers and other inputs more precisely, reducing input costs and environmental impacts. Additionally, practices such as agroforestry and conservation agriculture, which integrate trees and other perennial vegetation into agricultural landscapes, can promote soil health and resilience.

In addition to agricultural practices, policies that support sustainable agricultural practices are critical for promoting soil resilience. Policies that incentivize the adoption of sustainable agricultural practices, such as conservation programs and subsidies for cover cropping and reduced tillage, can help farmers adopt practices that promote soil health and biodiversity. Policies that support research and development of sustainable agricultural practices can also help to identify new strategies for managing soil quality challenges.

Finally, promoting soil resilience also requires collaboration and knowledge sharing between farmers, researchers, and policymakers. Farmers can benefit from access to information and technical



assistance on sustainable agricultural practices, while researchers can benefit from input from farmers and insights into on-the-ground challenges. Policymakers can facilitate collaboration and knowledge sharing through funding for research and extension programs and by fostering partnerships between farmers, researchers, and other stakeholders.

In conclusion, soil resilience is critical for sustainable agriculture and ecosystem health, but modern agricultural practices have put pressure on soil quality, resulting in soil degradation and reduced soil resilience. Managing soil quality challenges requires agricultural practices that prioritize soil health and biodiversity, such as crop rotation, cover cropping, reduced tillage, and integrated pest management, as well as policies that support sustainable agricultural practices. Strategies such as nutrient management, precision agriculture technologies, agroforestry, and conservation agriculture can also promote soil health and resilience. Collaboration and knowledge sharing between farmers, researchers, and policymakers are critical for promoting soil resilience and ensuring the long-term health and productivity of our soils.

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