

Improved Soil Management Can Boost Yields in Bihar

Research shows that improving soil health can increase crop yields in rice-wheat systems

Study Overview

In order to assess the effects of soil management practices on soil health and crop yields in rice-wheat cropping systems, TCI researchers analyzed soil samples from three long-term trials in Bihar. Plots of land were subject to different tillage practices and treated with various amounts of crop residues and manure. The researchers measured soil health using a comprehensive set of 15 indicators for biological, physical and chemical properties.

Background

As the largest cropping system in India, rice-wheat accounts for 18% of total cropped area across the country, especially in the Indo-Gangetic Plain, a large fertile valley that spans northern India and stretches into Nepal and Pakistan. In Bihar, 70% of farmland is devoted to rice and wheat, but productivity is significantly lower than in other states. The intensive tillage and flood irrigation used in these cropping systems compromises soil health. There is insufficient cycling of organic materials like crop residues and manure because they are used for animal feed and cooking. Climate change and declining groundwater supplies in the region also threaten to reduce crop yields.

RESULTS

In their assessment of the trials, the researchers consistently identified positive impacts on soil health from the addition of residue and manure, along with no-till farming practices. The biological properties were most responsive to techniques involving greater organic inputs, and the soils' physical properties were notably improved through less tillage. Chemical properties exhibited slower improvements, including improved pH and increased nutrient uptake. The researchers also found that zero-tillage and the addition of residue and manure significantly increased yields in connection with the improvements in soil health.

POLICY RECOMMENDATIONS

- Incentivize farmers to use improved soil management practices, including no-till farming and cycling organic materials.
- Use extension networks to raise awareness of the link between soil health and yields.

Krishnan, K., van Es, H., McDonald, A. *et al.* Organic inputs and tillage differentially impact soil health and yield in rice-wheat systems in the eastern gangetic plain. *Plant Soil* (2026). <https://doi.org/10.1007/s11104-026-08965-y>.

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