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Natural Farming and Soil Health: A Sustainable Partnership

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Abstract

Natural farming has emerged as a transformative approach to sustainable agriculture, emphasizing a harmonious relationship between farming practices and ecological processes. Central to its philosophy is the enhancement of soil health through the use of organic amendments, biological nutrient cycling, and minimal soil disturbance. This article explores the intricate partnership between natural farming and soil health, examining scientific evidence and field studies that demonstrate improvements in soil fertility, microbial diversity, nutrient cycling, and crop productivity. The discussion highlights natural farming's role in reducing dependence on synthetic inputs, mitigating environmental degradation, and fostering resilience in agroecosystems. The article concludes with an assessment of challenges, future prospects, and recommendations for scaling up natural farming as a sustainable soil management strategy.

Keywords: Natural farming, soil health, microbial diversity, nutrient cycling, sustainable agriculture, organic amendments, ecological resilience

Introduction

Soil health forms the foundation of sustainable agriculture, influencing crop productivity, ecosystem services, and environmental quality. Over the past century, conventional farming—characterized by intensive tillage, monocropping, and heavy reliance on synthetic fertilizers and pesticides—has led to widespread soil degradation, loss of organic matter, and declining fertility. These trends threaten food security, biodiversity, and climate resilience.

Natural farming, rooted in indigenous wisdom and ecological science, offers a compelling alternative. By eschewing synthetic inputs and prioritizing soil-building practices, natural farming seeks to restore soil vitality, enhance nutrient cycling, and support diverse microbial communities. Practices such as mulching, use of bio-inoculants (e.g., Jeevamrit, Beejamrit), cover cropping, and minimal tillage are central to this approach. As more states and farmers adopt natural farming, there is a growing need for scientific validation of its impacts on soil health and productivity.

This article explores the mechanisms, outcomes, and broader implications of the partnership between natural farming and soil health.

Results

Mechanisms of soil health improvement in natural farming:

- **Organic amendments and bio-inoculants:** Natural farming relies on organic inputs like compost, farmyard manure, Jeevamrit, and Beejamrit. These amendments stimulate soil microbial activity, enhance organic matter content, and foster nutrient cycling³⁷.

- **Minimal soil disturbance:** Reduced tillage preserves soil structure, protects soil organisms, and prevents erosion, contributing to long-term fertility and stability⁶.
- **Crop diversification and intercropping:** Integrating legumes and diverse crops improves nitrogen fixation, stabilizes yields, and supports a resilient soil ecosystem¹⁷.
- **Mulching and cover cropping:** These practices maintain soil moisture, suppress weeds, and enhance humus formation through increased decomposition activity³.
- **Natural pest and disease management:** By avoiding chemical pesticides and fostering ecological balance, natural farming supports beneficial soil fauna and suppresses pathogens⁶⁸.

Empirical Evidence

- **Soil microbial health:** Field studies show that natural farming inputs significantly increase soil microbial biomass carbon and nitrogen, as well as populations of bacteria, fungi, and actinomycetes, compared to conventional and even organic fertilizer treatments⁴⁶.
- **Soil enzymatic activity:** Natural farming enhances key soil enzymes (dehydrogenase, β -glucosidase, urease), which are critical for nutrient mineralization and organic matter decomposition⁴.
- **Nutrient cycling and fertility:** Improved biological activity leads to better nutrient availability and uptake, particularly nitrogen, phosphorus, and potassium. Conjoint use of cereal-legume intercropping and natural farming maintains soil fertility and yield stability¹⁷.
- **Yield and productivity:** While some studies note a modest reduction in yield compared to integrated nutrient management, natural farming systems typically provide stable yields with lower input costs and improved soil health over time⁴⁷.
- **Nutrient density of crops:** Crops grown in healthy, organically managed soils exhibit higher levels of micronutrients and phytochemicals, which are beneficial for human health⁵².

Environmental and economic outcomes:

- **Reduction in Synthetic Input Dependency:** Natural farming can reduce the need for synthetic fertilizers by 30–50%, lowering production costs and mitigating environmental degradation⁷³.
- **Greenhouse Gas Mitigation:** By eliminating chemical fertilizers and promoting organic matter build-up, natural farming reduces methane and nitrous oxide emissions, contributing to climate change mitigation³⁸.
- **Economic Viability:** Lower input costs, improved soil fertility, and stable yields enhance farm profitability and sustainability⁷.

Discussion

The sustainable partnership: natural farming and soil health

Natural farming's focus on soil health is not only ecological but also economic and social. Healthy soils are more resilient to drought, pests, and climate extremes, providing a stable foundation for food security. The partnership between natural farming and soil health is characterized by several key

synergies:

- **Microbial diversity and ecosystem services:** By nurturing a diverse soil microbiome, natural farming enhances nutrient cycling, disease suppression, and plant growth. This biological foundation is critical for long-term productivity and ecosystem resilience⁶⁴.
- **Reduction of environmental footprint:** Avoiding synthetic inputs and promoting organic matter accumulation reduces pollution, conserves water, and supports biodiversity both above and below ground³⁸.
- **Human and animal health:** Healthier soils produce more nutrient-dense crops and pasture, leading to improved human and animal health outcomes⁵.
- **Cultural and traditional knowledge integration:** Natural farming often draws on indigenous practices, fostering cultural continuity and community empowerment⁶.

Challenges and Limitations

- **Yield Gaps:** Some studies report lower yields in the initial years of transition compared to high-input systems, though these gaps often close as soil health improves⁴.
- **Knowledge and training needs:** Successful adoption of natural farming requires farmer education, extension support, and participatory research to optimize practices for local conditions⁷.
- **Policy and market support:** Wider adoption depends on supportive policies, incentives, and development of markets for naturally grown produce⁸.

Future Prospects

- **Research and Innovation:** Continued research is needed to optimize bio-input formulations, application methods, and cropping systems for diverse agroecological zones⁷.
- **Scaling Up:** State and national policies, such as the National Mission on Natural Farming, are crucial for scaling up adoption and ensuring long-term sustainability⁸.
- **Integration with other sustainable practices:** Combining natural farming with agroecological and regenerative practices can further enhance soil health and resilience⁵⁶.

Conclusion

Natural farming and soil health form a sustainable partnership that addresses the ecological, economic, and social dimensions of agriculture. By prioritizing organic amendments, microbial diversity, and minimal disturbance, natural farming restores soil vitality, supports stable yields, and reduces environmental impacts. While challenges remain in scaling and optimizing these systems, the evidence strongly supports natural farming as a cornerstone of sustainable soil management and resilient food systems. Continued investment in research, education, and policy support will be essential to unlock the full potential of this partnership for future generations.

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