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POPULAR ARTICLE

Organic and natural farming: pathways towards healthy soil and sustainable agriculture

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Intricacies of the subject

Indian agriculture has achieved major gains in food production through improved crop varieties, irrigation, fertilizers and crop-protection technologies. However, long-term agricultural productivity also depends on maintaining the health of the soil, conserving water and protecting biological diversity. Excessive or imbalanced use of external inputs can contribute to nutrient imbalance, declining soil quality and increasing cultivation costs. These concerns have increased interest in farming systems that make greater use of biological processes and locally available resources. Organic farming and natural farming are two approaches that give greater importance to soil health, recycling of farm resources, biodiversity and biological processes. Organic farming commonly uses compost, farmyard manure, green manures, crop rotations, biofertilizers and biological pest-management methods. Natural farming places greater emphasis on ecological interactions, soil cover, locally prepared biological formulations and reduced dependence on external inputs. ICAR's 2026 outreach programmes have repeatedly emphasized soil testing and balanced nutrient management alongside natural farming practices. For example, ICAR-DFR, Pune demonstrated scientific soil sampling in Maharashtra during Khet Bachao Abhiyan 2026

Organic vs natural farming

Organic farming mainly emphasizes organic matter, compost, manure, biofertilizers, crop rotation and permitted organic inputs, whereas natural farming gives greater importance to ecological interactions, soil cover and farm-derived biological resources. Both aim to improve soil health and ecosystem sustainability, but they differ in philosophy and input requirements.

Role of microorganisms and biotechnology

Beneficial soil microorganisms contribute to nitrogen fixation, phosphorus solubilization, potassium mobilization, decomposition, nutrient cycling, plant growth promotion and biological suppression of some pathogens. Biofertilizers and microbial consortia can support sustainable nutrient management. Biotechnology can strengthen these systems through screening beneficial microorganisms, developing microbial consortia, improving biofertilizers, molecular identification, improving biofertilizers, molecular identification, studying plant-microbe interactions, developing biological crop-protection products, producing disease-free planting material and microbial decomposers.

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Fig. 1: Soil Health



Fig.2: Organic farming

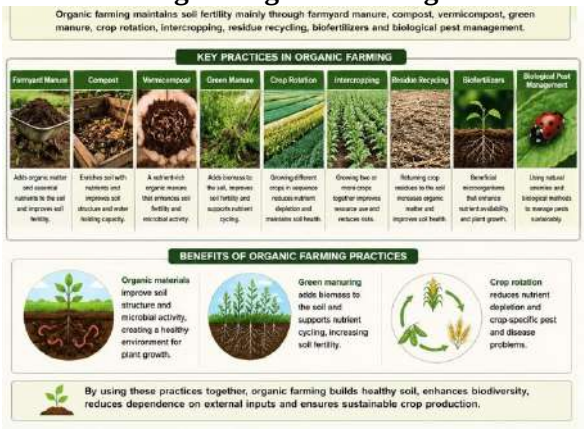


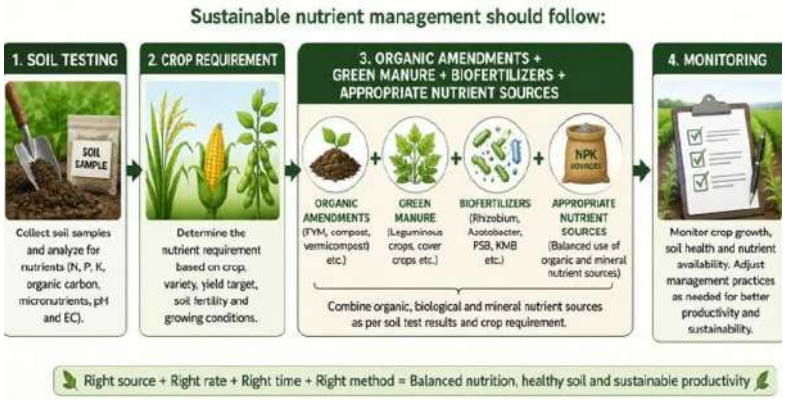
Fig. 3: Natural farming



Residue recycling and nutrient management

Crop residues should be treated as valuable resources rather than waste. They can be incorporated into soil, composted, used as mulch or processed with microbial decomposers. Pusa Decomposer is an ICAR microbial consortium developed to accelerate agricultural residue decomposition.

Fig.4: Sustainable Nutrient Management



Pest and water management

Sustainable pest management emphasizes healthy planting material, crop rotation, field sanitation, crop diversification, beneficial insects, biological control, botanical

preparations and regular monitoring. Correct identification of pests and diseases is essential before selecting a management method. Healthy soil also supports efficient water management. Organic matter and mulching improve soil moisture conditions and reduce evaporation. Suitable irrigation, drainage, crop selection, soil conservation and rainwater management should be combined according to local conditions.

Economic opportunities and challenges

Organic and natural farming may reduce dependence on purchased inputs when farmyard manure, crop residues, livestock resources and local biomass are available. However, profitability depends on crop type, labour, input costs, biomass availability, transition period, market access, product price and certification. Major challenges include nutrient management, inadequate biomass, weed control, pest and disease pressure, lack of technical knowledge, and certification and market requirements. Proper training and scientific planning are therefore important.

Future prospects and Indian applications

The growing emphasis on natural farming and soil health in ICAR programmes indicates increasing institutional attention to this integrated approach. The June 2026 Khet Bachao Abhiyan, for example, combined natural farming with balanced nutrient management, green manuring, organic amendments, crop-residue recycling and climate-resilient technologies.

Conclusion

Organic and natural farming promote soil health, biological activity, resource recycling and ecological balance. However, sustainable agriculture should not simply mean avoiding synthetic inputs. Balanced nutrition, soil testing, crop diversification, efficient water management, residue recycling and appropriate pest management are equally important. An integrated approach combining traditional farmer knowledge with soil science, microbiology and biotechnology can help develop healthier soils, efficient resource use, resilient farming systems and sustainable agricultural livelihoods in India.

Key facts did you know?

- Natural farming described in recent Indian Farming literature includes Beejamrit, Jivamrit, Acchadana, Whapasa and plant-protection measures as major components.
- During Khet Bachao Abhiyan 2026, ICAR-NBAIM promoted microbial biofertilizers and emphasized soil testing and integrated nutrient management.
- ICAR's Bio-NPK formulation combines microorganisms associated with nitrogen fixation, phosphorus solubilization and potassium solubilization.
- ICAR-CIRCOT conducted natural-farming and soil-health outreach across 16 villages of Raigad district, Maharashtra, in June 2026.
- Pusa Decomposer is a microbial consortium developed by ICAR-IARI for accelerating decomposition of residues.

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