

Vol. 13, No. 1, February, 2023

Bi-Annual

ISSN No. 2278-8379

# TOURISM INNOVATIONS

An International Journal of Indian Tourism and Hospitality Congress (ITHC)

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Tourism Innovations: An International Journal of Indian Tourism and Hospitality Congress (ITHC)

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ISSN : 2278-8379

VOLUME : 13

NUMBER : 1

**Publication Schedule:**

Twice a year : August-December

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Published by: Bharti Publications in Association with Indian Tourism and Hospitality Congress (ITHC)

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## Editor's Note

As of February 2023, the global tourism industry continues its journey towards recovery from the unprecedented challenges posed by the COVID-19 pandemic. While the sector has made significant strides, it remains in a state of flux, with several key trends and developments shaping its trajectory.

The tourism industry has shown resilience and adaptability in the face of the pandemic. Many countries have eased travel restrictions, leading to a gradual increase in tourism activities, both domestically and internationally. However, recovery rates vary across regions. Domestic tourism has been a lifeline for the industry. Travelers have been exploring their own countries, contributing to the revival of local tourism economies. This trend is expected to continue as people prioritize safety and convenience. The vaccination campaigns worldwide have been a critical factor in reopening borders and restoring traveler confidence. Vaccine passports and proof of vaccination are becoming commonplace for international travel.

The digital transformation of the tourism sector has accelerated. Online booking platforms, contactless payments, and virtual experiences have become standard, enhancing both convenience and safety for travelers. Environmental and social sustainability have gained prominence. Travelers are increasingly interested in eco-friendly and responsible tourism options, pushing the industry to adopt more sustainable practices.

Traveler behavior has shifted, with a greater emphasis on health and wellness. Wellness tourism, outdoor activities, and remote destinations have seen increased interest. The integration of technology, including artificial intelligence (AI) and augmented reality (AR), has enhanced the travel experience. AI-driven chatbots and AR-enhanced tours are examples of these innovations. The aviation sector has seen a gradual recovery in passenger numbers. Airlines have implemented safety measures, such as improved air filtration systems, to mitigate health risks during flights. Challenges persist, including uncertainty about the emergence of new variants, sporadic travel restrictions, and a need for industry-wide standardization of health and safety protocols.

The tourism industry's recovery journey is ongoing, marked by a mix of optimism and caution. While the path ahead may still be uncertain, the industry's ability to adapt, embrace sustainability, and prioritize traveler safety positions it well for future growth and resilience. Monitoring the evolving landscape and embracing innovation will continue to be essential in the months to come.

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# The Future of Sustainable Food Production: A Focus on Natural Farming

Raj Kumar, Harpreet Singh & Arun Singh Thakur

## Abstract

*This research study centers on the topic of sustainable agriculture, specifically examining natural methods that aim to achieve zero production costs for all crops. As there are no external purchases to be made. The root zone encompasses all the necessary elements for the growth and development of plants. Plants derive approximately 1.5% to 2.0% of their required nutrients from the soil, while the remaining 98% to 98.5% is obtained from the surrounding air, water, and sun radiation. According to scientific research, it has been determined that around 98% of the composition of crop bodies consists of air and water. What is the necessity of including external fertilizers in this context? Each green leaf has the ability to generate sustenance through the process of photosynthesis, yielding an average of 4.5 grammes of carbohydrates per square foot of surface area. Chemical fertilizers are rendered ineffective. The soil in our region possesses a significant abundance of minerals. However, these nutrients exist in a form that is not readily useable. The application of toxic chemicals, such as chemical fertilizers and pesticides, has resulted in the destruction of microorganisms responsible for converting these nutrients into a usable form. Now, the inquiry comes as to how we might render it practical and functional? The utilization of biological fertilizers and biological insecticides is crucial. The process of soil nourishment involves the enrichment of the soil by the introduction of microorganisms. Furthermore, it serves to decrease the financial commitment of farmers while concurrently safeguarding the land against degradation.*

*Food is an essential requirement for the sustenance of the human species. The significance of sustainable food consumption is a crucial component within the broader context of sustainable development in the realms of food and tourism. Unhealthy dietary patterns present a more substantial threat to morbidity and death when compared to the combined risks associated with hazardous sexual practices, alcohol consumption, drug abuse, and tobacco use. Due to a significant portion of the worldwide population experiencing insufficient nutrition and the detrimental impact of food production on many environmental systems and processes, there is an immediate and imperative need for a comprehensive overhaul of the global food system.*

**Keywords:** Food, Fertilizers, Soil, Chemical, Sustainable.

## Introduction

Sustainable food production holds profound significance in addressing the multifaceted challenges posed by conventional agriculture. At its core, sustainable food production prioritizes environmental stewardship, aiming to safeguard the planet's invaluable natural resources (J. Park, 1996). By minimizing soil degradation, reducing water pollution, and promoting biodiversity,

sustainable agriculture contributes to the preservation of ecosystems, ensuring their health and resilience for future generations. Moreover, sustainable practices play a pivotal role in mitigating climate change by reducing greenhouse gas emissions and enhancing carbon sequestration. This climate-conscious approach not only helps combat global warming but also ensures the long-term viability of farming systems in an increasingly unpredictable climate. Furthermore, sustainable food

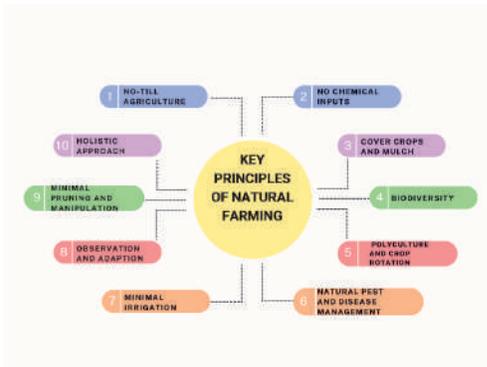
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production bolsters food security by enhancing crop yields and nutritional diversity, crucial for feeding a growing global population. It fosters resource efficiency, resulting in cost savings for farmers and a reduction in resource pressure, aligning with the imperatives of a resource-constrained world. In contrast, conventional agriculture faces a multitude of challenges, including resource depletion, environmental degradation, contributions to climate change, food safety concerns, economic pressures on farmers, and the erosion of rural communities. In light of these challenges, sustainable food production emerges as a vital paradigm shift, offering a path toward a more resilient, equitable, and harmonious food system that can nourish both people and the planet.

### Key Principles of Natural Farming

The concept of natural farming, commonly linked to the teachings of Japanese farmer and philosopher Masanobu Fukuoka, covers a fundamental set of principles that prioritize a comprehensive and environmentally conscious approach to agricultural practices. The underlying concepts of this approach centre on the emulation of natural ecosystems and the reduction of human involvement. The following are the fundamental ideas that underpin natural farming:



Source- Raj Kumar

1. **No-till Agriculture:** Natural farming promotes a strict no-till approach, meaning that the soil is left undisturbed by plowing, tilling, or excessive cultivation. This preserves soil structure, minimizes erosion, and retains moisture.
2. **No Chemical Inputs:** Natural farming avoids the use of synthetic chemicals such as chemical fertilizers and pesticides. Instead, it relies on natural processes to maintain soil fertility and control pests and diseases.
3. **Cover crops and mulch:** Cover crops and mulch are essential components of natural farming. Cover crops protect the soil from erosion, fix nitrogen, and improve soil structure. Mulch helps retain soil moisture, suppress weeds, and regulate soil temperature.

4. **Biodiversity:** Natural farming encourages biodiversity in both crops and the surrounding ecosystem. By cultivating a variety of crops and allowing wild plants to grow alongside them, it creates a balanced and resilient ecosystem.
5. **Polyculture and crop rotation:** Rather than monoculture (growing a single crop), natural farming promotes polyculture and crop rotation. Mixing different crops together and rotating them helps reduce the risk of pests and diseases while enhancing soil health.
6. **Natural pest and Disease Management:** Instead of relying on chemical pesticides, natural farming uses integrated pest management (IPM) techniques. Beneficial insects and natural predators are encouraged to control pest populations, and plants are selected for their ability to resist diseases.
7. **Minimal Irrigation:** Natural farming aims to reduce reliance on irrigation by selecting drought-resistant crops and using water-saving techniques such as mulching and rainwater harvesting.
8. **Observation and Adaption:** Farmers practicing natural farming emphasize careful observation of nature and their own fields. They adjust their practices based on the specific conditions and needs of their crops and ecosystems.
9. **Minimal Pruning and Manipulation:** Natural farming minimizes pruning and other forms of plant manipulation, allowing plants to grow in their natural forms. This reduces stress on the plants and simplifies the farming process.
10. **Holistic Approach:** Perhaps the most fundamental principle of natural farming is its holistic perspective. It views the farm as a self-sustaining ecosystem where all elements are interconnected, emphasizing the need to work with, rather than against, nature.

Natural farming principles aim to create a balanced and regenerative agricultural system that sustains both the land and its farmers while minimizing the negative impacts on the environment. It places a strong emphasis on harmony with nature, simplicity, and the reduction of human intervention in the farming process.

### Benefits of Natural Farming

Natural farming stands as a promising agricultural approach that provides several significant advantages in terms of soil health, reduced environmental impact, and resilience to climate change. One of its foremost merits lies in its profound enhancement of soil health. Through practices such as no-till farming and the use of cover crops, natural farming preserves soil structure, prevents erosion, and encourages the development of robust, fertile soils rich in organic matter and microbial diversity.

This not only boosts crop yields but also diminishes the reliance on synthetic fertilizers, thus benefiting long-term soil health.

Furthermore, natural farming significantly reduces its environmental footprint. By abstaining from synthetic pesticides and fertilizers, it curtails chemical runoff into water bodies and mitigates harm to non-target organisms, leading to cleaner and healthier ecosystems. The lower energy consumption associated with reduced mechanization and synthetic inputs contributes to diminished greenhouse gas emissions, aligning with climate-conscious goals. Moreover, the promotion of biodiversity in natural farming systems enhances overall ecosystem resilience, benefiting both wildlife and agriculture.

Crucially, natural farming exhibits a remarkable resilience to climate change. Its capacity for carbon sequestration in the soil aids in mitigating climate change by capturing atmospheric carbon dioxide. Additionally, the selection of drought-resistant crop varieties and the incorporation of adaptable farming strategies render natural farming well-suited to cope with the challenges posed by unpredictable weather patterns. The diversified crop and mixed farming systems reduce vulnerability to extreme weather events, contributing to overall agricultural stability. Moreover, natural farming's holistic approach, rooted in observation and adaptation to nature's cues, equips farmers with the flexibility necessary to address shifting climate conditions effectively.

In essence, natural farming presents a holistic and sustainable approach that not only bolsters soil health but also reduces environmental harm and enhances resilience to climate change. Its alignment with natural processes and ecosystem dynamics holds promise for creating a more sustainable and climate-resilient agricultural system, addressing the pressing challenges of our time.

### **Biodiversity and Ecosystem Services**

Natural farming practices champion the promotion of biodiversity within agricultural ecosystems, yielding a multitude of associated benefits, notably in the realms of natural pest control and pollination. By fostering a diverse array of crops, wild plants, and beneficial organisms, natural farming creates a balanced and harmonious ecosystem reminiscent of natural landscapes. This rich biodiversity provides a haven for beneficial insects, birds, and other wildlife that play pivotal roles in maintaining ecosystem equilibrium.

One of the notable advantages of this biodiversity is natural pest control. Predatory insects, such as ladybugs, lacewings, and parasitoid wasps, thrive in diversified environments, where they feed on pests that might otherwise harm crops. By reducing the populations of harmful pests, these natural predators act as biological control agents, obviating the need for synthetic pesticides.

This, in turn, mitigates the environmental and health risks associated with chemical pesticide use.

Moreover, natural farming's vibrant biodiversity enhances pollination services—a critical component of successful crop production. A diverse ecosystem attracts a wide range of pollinators, including bees, butterflies, and other insects, as well as some birds and bats. These pollinators facilitate the transfer of pollen between flowers, ensuring the fertilization of crops and the production of fruits and seeds. The increased fruit set and yield resulting from effective pollination directly contribute to higher agricultural productivity.

In summary, natural farming practices prioritize biodiversity within agricultural ecosystems, reaping a host of benefits. From the promotion of natural pest control by beneficial insects to the vital role of diverse pollinators in enhancing crop yield, the cultivation of a rich and balanced ecosystem not only reduces the need for synthetic inputs but also bolsters the sustainability and resilience of agricultural systems, aligning with the principles of ecological harmony and environmental stewardship.

### **Case Study and Success Stories**

India has seen several successful natural farming initiatives in different regions, demonstrating the potential and benefits of adopting sustainable and organic farming practices. Here are a few notable examples:

1. **Subhash Palekar's Zero Budget Natural Farming (ZBNF):** Subhash Palekar, an agricultural scientist from Maharashtra, pioneered the Zero Budget Natural Farming (ZBNF) method. ZBNF has gained popularity in several Indian states, including Andhra Pradesh, Karnataka, and Himachal Pradesh. This method promotes the use of natural inputs and minimal external resources. Farmers have reported increased yields, reduced production costs, improved soil health, and higher incomes.
2. **Sikkim's Organic Farming Initiative:** The state of Sikkim, in northeastern India, made headlines by becoming India's first fully organic state in 2016. Sikkim's government actively promoted organic farming practices, including the prohibition of synthetic pesticides and fertilizers. This transition has improved soil health, reduced the environmental impact of agriculture, and boosted the income of farmers.
3. **Tamil Nadu's Community-Based Farming:** In Tamil Nadu, community-based natural farming initiatives have gained momentum. Organizations and groups of farmers have adopted natural farming practices and shared their experiences. The focus is on building farmer communities and sharing knowledge to enhance the adoption of sustainable methods.

4. **Amrita Bhoomi-Karnataka:** The Amrita Bhoomi Agroecology Center in Karnataka has been a hub for promoting natural farming and agroecological practices. It conducts training programs, workshops, and demonstrations to educate farmers about sustainable agriculture. Farmers trained here have seen increased crop yields, reduced input costs, and improved soil fertility.
5. **Navdanya-Uttarakhand:** Navdanya, an organization founded by environmental activist Vandana Shiva, has been actively promoting organic and natural farming practices in the Uttarakhand region. It focuses on seed conservation, biodiversity protection, and sustainable agriculture. Farmers working with Navdanya have reported improved soil health and reduced reliance on synthetic inputs.
6. **Rythu Sadhikara Samstha (RySS), Andhra Pradesh:** RySS is an initiative by the Government of Andhra Pradesh that promotes sustainable farming practices, including zero-budget natural farming. It aims to transition 6 million farmers to natural farming methods. Farmers who have adopted these practices have experienced increased crop yields, reduced production costs, and improved soil fertility.

These successful natural farming initiatives in India demonstrate that sustainable and organic farming practices can lead to improved soil health, increased yields, reduced input costs, and better livelihoods for farmers. They serve as examples of how adopting ecologically sound farming methods can contribute to a more sustainable and resilient agricultural sector.

### Challenges and Barriers

The widespread adoption of natural farming, despite its many benefits, faces a series of challenges and barriers that hinder its progress. One of the foremost obstacles is the inherent resistance to change within the agricultural community. Traditional farming practices, deeply ingrained over generations, can be difficult to challenge and replace. Farmers may be hesitant to abandon familiar methods in favor of less conventional ones, particularly when they fear potential disruptions to their livelihoods and uncertainties about the outcomes.

Lack of knowledge and awareness also poses a significant barrier. Many farmers are unaware of the principles and techniques of natural farming, as well as its potential benefits. They may not have access to training, resources, or support systems that facilitate the transition to sustainable practices. Additionally, the perceived complexity of natural farming methods can deter farmers who are accustomed to more straightforward and input-intensive approaches.

Economic considerations play a crucial role in adoption as well. Conventional agriculture often relies on the use of synthetic inputs, which may seem more cost-effective in the short term. Natural farming, with its emphasis on reducing external inputs, may require an initial investment in training, organic matter, and new equipment, which some farmers may be unable or unwilling to afford.

Policy and market factors can either facilitate or hinder the adoption of natural farming. Inadequate policy support, including the absence of incentives or regulatory frameworks that promote sustainable agriculture, can act as a deterrent. Likewise, a lack of market demand and premium pricing for organic and sustainably grown produce can reduce the economic motivation for farmers to transition to natural farming practices.

In conclusion, while natural farming offers a host of environmental and economic advantages, its widespread adoption faces several formidable challenges. Resistance to change, lack of knowledge and awareness, economic constraints, and policy and market factors all contribute to the complexity of transitioning to sustainable agricultural practices. Addressing these barriers requires a concerted effort involving education, policy support, and market incentives to encourage and facilitate the shift towards more environmentally friendly and resilient farming methods.

### Conclusion

Natural farming emerges as a powerful and environmentally friendly approach to food production with significant potential for sustainability. At its core, this method harnesses the wisdom of nature, relying on minimal synthetic inputs and embracing practices that mimic natural ecosystems. This approach bears the promise of cultivating a more harmonious relationship between agriculture and the environment. By prioritizing soil health, natural farming not only enhances fertility and reduces erosion but also minimizes the use of synthetic pesticides and fertilizers, thereby mitigating chemical runoff and preserving water quality. Additionally, the promotion of biodiversity within these farming systems fosters natural pest control and efficient pollination, reducing the need for external interventions. As climate change continues to challenge traditional agriculture, the resilience of natural farming stands out, with its ability to sequester carbon in soils and adapt to shifting weather patterns. In an era of resource constraints and environmental concerns, natural farming offers a sustainable and ecologically sensitive path forward, heralding a more responsible and harmonious approach to food production that respects both nature and the well-being of future generations.

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