

11. Natural Farming: Need for Future

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Abstract:

Natural Farming (NF) is championed as a highly promising method for crop cultivation aimed at significantly slashing production costs by lessening reliance on purchased critical inputs. To gain deeper insights into natural farming practices and the financial benefits reaped by farmers it's crucial to understand its implementation. It embodies an ecological and sustainable approach to agriculture aligning with nature by minimizing human interference and synthetic chemicals. It encompasses strategies such as biodiversity promotion, soil enhancement via organic techniques like composting and minimal tillage and the adoption of natural pest control methods all geared towards establishing self-sustaining agricultural ecosystems. The core principles prioritize observing and learning from natural processes advocating for a comprehensive enduring methodology to foster resilient and balanced farming systems while diminishing reliance on external resources. This paradigm shift towards natural farming signifies a deliberate embrace of environmentally sound and regenerative agricultural practices nurturing a harmonious coexistence between humanity and the natural world.

Keywords:

Natural farming, chemical free, organic techniques and sustainable agriculture.

11.1 Introduction:

Masanobu Fukuoka a Japanese farmer and philosopher introduced this farming approach through his book "**The One-Straw Revolution**" published in 1975. Natural farming also recognized as the "**do-nothing**" farming approach is an agro-ecological method that emphasizes cultivating crops in harmony with nature. This practice encompasses various eco-friendly agricultural techniques such as organic farming, sustainable agriculture, agroecology, agroforestry, eco-agriculture, permaculture and fertility farming.

In India, the majority of farmers approximately 85% are smallholders managing an average land size of 0.38 hectares (ha) totaling over 100 million farmers. The shift towards modern chemical-based agriculture has led to increased production costs, reduced productivity and the depletion of environmental resources (Singh *et al.*, 2011). Continuous usage of these chemicals has resulted in the decline of soil micro and macro fauna potentially impacting the C-N ratio, soil enzymatic activities and nutrient availability for plants (Shaikh and Gachande, 2015).

Moreover, the heavy reliance on pesticides and chemical fertilizers particularly those containing heavy metals like Cd, Cu, Mn and Zn has led to soil pollution and the leaching of these substances into groundwater (Barabasz *et al.*, 2002). The primary objective of natural farming is to produce food and medicinal products while emphasizing aesthetic or spiritual values which contribute to the nurturing and improvement of human beings.

Its ideology revolves around enhancing nutrient quality and minimizing the use of harmful chemicals. Furthermore, it serves as an effective method to prevent water pollution, biodiversity loss and soil erosion while ensuring an ample supply of nutritious food or nutraceuticals (Anderson 2005). Natural farming adopts a farmer-centric approach rather than focusing solely on production.

It advocates for sustainability, efficient use of resources, the production of healthy and safe foods streamlined supply chains and increased farmer income. This agro-ecological approach relies on utilizing on-farm resources and inputs (Palekar, 2014). Key practices such as crop diversification, legume intercropping, mulching, seed priming and reduced tillage leading to enhanced water retention are anticipated to boost crop yields and adaptability in response to changing climatic conditions (Khadse *et al.*, 2019).

By substituting chemical inputs with natural alternatives in specific ecosystems natural farming promotes the development of robust and well-distributed root systems along with fostering interactions with beneficial soil microorganisms. This in turn contributes to soil, crop and seed health elevates product quality ensures stable yield levels and supports yield stability.

11.2 Principles of Natural Farming:

The fundamental principles of natural farming encompass:

Minimal or no soil disturbances: Conventional farming practices often entail ploughing or turning the soil but natural farming emphasizes minimal disturbance. Allowing the earth to cultivate itself naturally through plant root penetration, microorganisms, small creatures and earthworm activity is essential.

Elimination of chemical fertilizers and pesticides: Human intervention in nature leads to long-lasting damage. Careless farming depletes vital nutrients from the soil each year. Left undisturbed soil maintains its fertility in harmony with the natural cycle of plant and animal life. Disease and insect control are approached sensibly by cultivating robust crops in a healthy environment.

Weed management without chemicals: Weeds contribute to building soil fertility and maintaining balance in the biological community. Instead of eradicating them natural farming focuses on controlling weeds. Employing these principles helps reduce labor costs and allows for the easy cultivation of various food items from nature, such as rice, barley, citrus and medicinal herbs.

These practices offer a sustainable approach that promotes sound agricultural sustainability.

11.3 Characteristic Features of Natural Farming:

- Environmentally friendly approach.
- Respect for life and opposition to human exploitation.
- Production of high-quality, flavorful and increased yield agricultural products.
- Avoidance of pesticide usage.
- Elimination of herbicide application.
- Utilization of native weeds rather than eradication.
- Abstinance from chemical fertilizers. Approximately 98 to 98.5% of nutrients are sourced from air, water and solar energy. The remaining 1.5% of nutrients acquired from the soil are obtained freely derived from enriched and prosperous soil containing these essential elements.
- Absence of wastewater emissions.
- Consideration of the nutritive cycle theory.
- Sustained growth of native soil microorganisms.

11.4 Natural Farming in India:

A. In Karnataka, ZBNF (Zero Budget Natural Farming) is being piloted across all ten agro climatic zones in an area spanning 2000 hectares. These initiatives are undertaken in collaboration with relevant State Agriculture/Horticulture Universities conducting demonstrations and scientific experiments within farmers' fields and the research facilities of respective universities.

B. Himachal Pradesh has been implementing the Prakritik Kheti Khusha Kisan program financed by the state since May 2018. Studies conducted by the state revealed that ZBNF practices significantly improved soil quality within a single cropping season. Furthermore, the incidence of invasive leaf miners was notably lower in the ZBNF system compared to both organic and conventional farming methods.

C. In Kerala, efforts to generate interest among farmers for ZBNF involve conducting awareness campaigns, workshops and training sessions.

D. Andhra Pradesh introduced ZBNF under the Rashtriya Krishi Vikas Yojana in September 2015. Collaborating with entities such as the University of Reading, the UK World Agroforestry Centre in Nairobi, FAO and various resource NGOs/Civil Society Organizations like the Centre for Sustainable Agriculture (CSA) in Hyderabad the state has been actively promoting and implementing ZBNF practices.

Table 11.1: Components of Natural Farming

Farming components	Soil and water conservation strategies	Nutrient and fertility conservation	Pest/disease/weed control
<p>Rice, maize, millets, vegetables, pulses and oilseeds along with indigenous breeds of cows, buffaloes and goats are part of agricultural practices. Farm mechanization, utilization of fodder within farm fences cultivation of various multipurpose trees (such as Tree bean, Moringa, Mango, Jackfruits, Alder, etc.) as well as crops like banana and pineapple are actively promoted. Additionally, there is an emphasis on cultivating indigenous or underutilized crops engaging in apiculture (beekeeping) and establishing compost units for sustainable agricultural practices.</p>	<p>Mulching, rainwater harvesting, simultaneous sowing of 18 crops (Navadanya) intercropping methods, the system of rice intensification, establishment of farm ponds, use of cover crops, composting techniques, hedge row planting, ploughing or sowing along slopes in hilly terrain, practices with minimal soil disturbance or no-till and employing minimum tillage are various agricultural methods and techniques in use.</p>	<p>Utilization of crop residue recycling, composting, application of dravajivamrit (200 liters per acre), Ghanajivamrit, incorporation of legumes in crop rotation, utilization of cow dung, beejamrit, Panchagavya and similar methods form part of agricultural practices.</p>	<p>Utilization of kashayam, botanicals, herbal extracts, trap crops, bird perches, neem extracts, sticky cards, leaf clipping, crop rotation, pheromone traps and light traps are methods employed in agriculture.</p>

(Source: NITI Ayog, 2022, Das *et al.*, 2022)

11.5 Zero Budget Natural Farming (ZBNF):

It is a method rooted in low-input climate-resilient practices that encourage farmers to utilize natural resources while completely abstaining from chemical fertilizers and pesticides. ZBNF stands out for its ability to mitigate high labor costs, environmental concerns, unpredictable monsoon-related challenges and food scarcity issues. Originating from the efforts of **Subhash Palekar** who introduced it as "**Krishi ka Rishi**". ZBNF boasts several unique characteristics:

- A commitment to sustainability through agricultural practices.
- Farming without incurring expenses thereby minimizing financial burdens.
- Utilization of minimal electricity and water resources for farming.

- Production of high-quality toxin-free food.
- Reduction in external labor requirements.
- Implementation of multi-cultivation techniques aimed at maximizing profits through bio-entrepreneurship.

11.5.1 The Four Pillars of ZNBF:

- Jivamrita
- Bijamrita
- Mulching
- Whapasa-Moisture

A. Jivamrita: Jeevamrita is a fermented microbial culture renowned for its ability to nourish soil and stimulate microorganism activity while boosting earthworm populations.

Preparation: Start by placing 200 liters of water in a barrel. Introduce 10 kilograms of fresh local cow dung along with 5 to 10 liters of aged cow urine.

Add 2 kilograms of Jaggery (a type of brown sugar), 2 kilograms of pulse flour and a handful of soil from the farm bund.

Thoroughly mix the solution and allow it to ferment for 48 hours in a shaded area. This will render the jeevamrutha ready for application.

Application: Use the jeevamrutha twice a month either by mixing it in irrigation water or as a 10% foliar spray on the crops. Approximately 200 liters of jeevamrutha is adequate for one acre of land.

B. Bijamritha: Bijamrita serves as a protective treatment specifically designed for seeds, seedlings and various planting materials. Its efficacy lies in shielding young roots against fungal, soil-borne and seed-borne diseases that commonly afflict plants post-monsoon.

Comprised of ingredients similar to jeevamrutha (local cow dung, a potent natural fungicide, cow urine known for its strong antibacterial properties, lime and soil).

Application: It can be utilized across all types of crops. Initially ensure thorough coating of the seeds by hand incorporating bijamrita evenly.

Subsequently, allow the coated seeds to dry adequately in shaded conditions to prevent direct exposure to solar radiation before using them for sowing. For leguminous seeds a swift dip in the solution is sufficient followed by a drying process.

C. Mulching: Mulching stands as a vital cultural practice aimed at conserving soil moisture. By utilizing abundant byproducts like wheat straw, grass clippings and leaf debris which are often treated as waste requiring disposal producers can employ a cost-effective method to preserve water, moderate soil temperature, reduce waste and enhance soil health.

Mulches Serve as Essential Soil Coverings for Various Purposes:

- Retaining soil moisture
- Trapping heat effectively
- Minimizing runoff losses
- Enhancing germination rates
- Improving soil structure
- Preventing and managing weed growth
- Safeguarding roots from fluctuating and extreme temperatures
- Aiding in the control of soil erosion.

D. Whapasa-Moisture: Palekar challenges the conventional notion that plant roots necessitate copious amounts of water thereby challenging the prevalent dependency on irrigation in green revolution agriculture. He says that what roots truly require is water vapor. Whapasa, as described by Palekar, denotes the presence of both air and water molecules in the soil. He advocates for a reduction in irrigation practices suggesting the implementation of watering exclusively at noon and adopting alternate furrow irrigation. ZBNF (Zero Budget Natural Farming) practitioners have reported a substantial decrease in the requirement for irrigation as a result of implementing these practices.

11.6 Insects and Pest Management Within ZBNF (Zero Budget Natural Farming):

Palekar introduced three formulations known as Agniastra, Brahmastra, and Neemastra.

Agniastra: Comprising 10 liters of local cow urine, 1 kilogram of tobacco, 500 grams of green chili, 500 grams of local garlic and 5 kilograms of neem leaves pulp (crushed in urine) this mixture is particularly effective against pests such as leaf roller, stem borer, fruit borer and pod borer.

Brahmastra: Prepared by crushing and boiling neem leaves, custard apple leaves, lantern camellia leaves, guava leaves, pomegranate leaves, papaya leaves and white dhatura leaves in urine. Brahmastra serves as a potent remedy targeting sucking pests, pod borers, fruit borers and similar insects.

Neemastra: Consisting of 5 liters of local cow urine, 5 kilograms of cow dung, and 5 kilograms of fermented neem leaves and neem pulp for 24 hours. Neemastra is specifically formulated to combat sucking pests and mealy bugs.

11.7 Benefits of Natural Farming:

Natural farming surpasses chemical-based farming in various aspects:

- **Crop Yield:** Natural farming demonstrates higher productivity compared to chemical-based methods.

- **Cost Reduction:** Producing inputs directly on the farm significantly decreases costs for farmers.
- **Income and Livelihood:** This approach minimizes cultivation expenses while commanding premium prices for the produce enhancing both income and livelihood.
- **Soil Health:** Natural farming preserves essential nutrients (such as nitrogen, phosphorus, potassium, iron, manganese, zinc and copper), organic carbon and the soil's rhizosphere micro biome. This sustains soil health unlike conventional chemical practices that deplete these elements.
- **Environmental Impact:** Natural farming reduces carbon emissions, fosters carbon sequestration, enhances soil respiration and supports the growth of beneficial organisms like earthworms, soil enzymes and microbial biomass.
- **Water-Use Efficiency:** Employing natural farming methods optimizes soil moisture utilization, leading to increased water table levels, preventing groundwater over-extraction and facilitating aquifer recharge.
- **Food Quality:** Natural farming boosts nutrient content and enhances the physical attributes of vegetables like tomatoes, cabbage and cowpeas resulting in superior market prices.

11.8 Challenges of Natural Farming:

- Sikkim, India's pioneering organic state has experienced a decline in yields after a few years of adopting organic practices.
- Policy makers currently express concerns about the nation's food security and are hesitant to implement significant changes in the agricultural sector.
- The chemical inputs-based industry supported by a lucrative multi-million-dollar agro-chemical sector opposes any shift away from chemical-based farming fiercely defending its use in agriculture.
- Within the scientific community despite acknowledging the health and environmental advantages of natural agriculture there is a lack of consensus regarding its impact on crop yields.

11.9 Government Initiatives on Natural Farming:

In pursuit of doubling farmers' income by 2022 the Government of India (GOI) is actively promoting natural farming across the country through dedicated schemes like the **Paramparagat Krishi Vikas Yojana (PKVY)** and the **Rashtriya Krishi Vikas Yojana (RKVY)**.

According to a survey conducted by NITI Aayog, the zero-budget farming technique has led to noteworthy improvements in crop yields. For instance, in the year 2016-17 it resulted in an 11% increase in cotton yields, 12% in paddy, 23% in groundnut and an impressive 34% increase in chillies all achieved at less than half the cost of traditional cultivation methods.

The success of this method has been particularly pronounced in southern India notably in Karnataka where it was initially developed and has gained significant traction.

11.10 Conclusion:

The shift towards natural farming methods has resulted in substantial savings on seed, fertilizer and plant protection chemical costs. This is primarily attributed to the consistent integration of organic residues and the ongoing restoration of soil fertility fostering sustained soil health. Moreover, this novel farming approach has liberated farmers from the burden of debt fostering a renewed confidence in making agriculture a financially viable pursuit. It has prompted a call for agricultural scientists in India to reassess their strategies emphasizing farming practices in harmony with nature. Furthermore, there's a global necessity for a transition towards a more resilient and sustainable agricultural model that reduces reliance on agrochemicals and prioritizes natural biological and ecosystem processes.

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