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## Natural Farming for Sustainable Agriculture

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Over the past decades, India has become food secure by using high-yielding varieties of seeds, fertilizers to nourish soils, pesticides to protect crops from pests, and herbicides to manage weeds. However, this progress has come with environmental damage due to the overuse of agrochemicals. Furthermore, the use of costly agricultural inputs like chemical fertilizers, pesticides, and seeds has increased the cost of cultivation. Combined with the effects of climate change, these factors have led to greater farmer indebtedness, exacerbating India's farm crisis. In addition, the indiscriminate use of synthetic fertilizers, pesticides, and herbicides has led to soil and environmental pollution and has adversely impacted human health.

To address these life-threatening issues, natural farming has gained popularity in recent years as an alternative to chemical-based farming systems worldwide. Natural farming builds on the natural or ecological processes present in and around farms. The most critical aspect of natural farming is to allow nature to play a dominant role to the greatest extent possible. It relies on the dynamic and balanced interactions of sunlight, water, soil, animals, plants, and microorganisms in natural ecosystems. In natural farming, the laws of nature are applied to agricultural practices.

### What is Natural Farming?

In a forest, plants grow continuously, and a cycle of "life-death-decomposition-life" persists. Everything that comes from the soil eventually returns to it in some form. Learning from "Mother Nature" and her forests suggests that crops can grow naturally without external intervention. This forms the basic concept of natural farming. Natural farming is an ecologically sustainable and economically viable method that relies on locally available resources and the rich traditional knowledge of farmers. It imitates nature, working alongside the natural biodiversity of each farmed area to encourage the thriving of complex living organisms (both plants and animals) along with agricultural crops. Therefore, natural farming is also considered an 'agroecology-based diversified farming system,' which integrates crops, trees, and livestock with functional biodiversity. The major goal of natural farming is to reduce externally purchased inputs. It largely excludes all synthetic chemical inputs (fertilizers, pesticides, and herbicides). In other words, natural farming focuses on the use of bio-inputs prepared from the farm and local ecosystems instead of purchasing any products from outside. Thus, commercial-level farming can be done on a minimal budget by using locally available and farm-based resources.

Essentially, natural farming involves growing crops without fertilizer, pesticides, herbicides, tillage, weeding, or even pruning. Rather, it is simply farming with nature. It's not

that the farmer isn't working; rather, the farmer isn't interfering with the crops by using chemical substances or tampering with their growth, leaving most of the work to nature.

### **The History Behind Natural Farming**

Natural farming is an ecological farming approach established by Masanobu Fukuoka (1913–2008), a Japanese farmer and philosopher. He introduced this concept in his 1975 book *The One-Straw Revolution*. The title referred not to a lack of effort but to the avoidance of manufactured inputs and equipment. Fukuoka suggested that farmers could benefit from closely observing local conditions. Natural farming is a closed system, one that demands no human-supplied inputs and mimics nature. Fukuoka argued for simply harnessing the energy of the local environment to grow nutrient-rich foods. Fukuoka himself successfully raised rice, winter grain, and citrus crops without plowing his fields for more than thirty years. According to him, a farmer should carefully observe the cycles of nature and work with those patterns rather than try to conquer and tame them. Today, there are many working models of natural farming around the world.

### **How to Practice Natural Farming?**

According to natural farming principles, plants obtain 98% of their nutrients from the air, water, and sunlight. The remaining 2% can be fulfilled by good quality soil with plenty of friendly microorganisms, similar to those in forests and natural systems. Therefore, farm biodiversity, integration of symbiotic farm components, and soil protection through cover cropping play essential roles in natural farming.

### **Some key features of natural farming include:**

- **No Cultural Operations:** Natural farming is performed in the same way as it would occur in any natural ecosystem.
- **Minimum Tillage:** Tillage should be minimized since plowing the soil alters its natural environment and promotes weed development.
- **No Weeding:** Weeds can be suppressed by spreading straw over freshly sown land and growing ground cover. Natural farming recognizes that nature has a balancing ability, which suppresses the growth of one species over another through allelopathic interactions. In natural farming, weeds are also considered as mulch layers.
- **No External Inputs:** No agrochemicals or organic materials from external sources should be applied.
- **No Fertilizers:** Since the continuous application of fertilizers deteriorates soil health and reduces inherent soil fertility, no external sources of chemical or organic fertilizers are applied in natural farming.
- **No Pesticides or Herbicides:** Chemical pesticides and herbicides contain harmful or toxic chemicals that are detrimental to food, soil, human, and environmental health. Therefore, no plant protection chemicals are applied.
- **Bio-cultures and Biopesticides:** Natural inputs, including cow dung, cow urine, jaggery, lime, neem, and datura, are commonly used for agricultural management in natural farming. Farm-made bio-cultures like 'Jivamrut' and 'Bijamrut' are added to the soil instead of fertilizers to improve soil microflora. Jivamrut and Bijamrut are derived from the dung and urine of indigenous cow breeds. Natural, farm-made pesticides like Dashparni Ark and Neem Astra can be used to control pests and diseases.
- **Bijamrut for Seed Preparation:** The ingredients for Bijamrut are water (20 liters), dried cow dung (5 kg), cow urine (5 liters), lime (100 grams), and compost soil (200 grams). All the ingredients should be mixed well in a bucket and left for 24 hours, stirring twice during this time in a clockwise direction. After this, Bijamrut will be ready and can be mixed with the seeds uniformly, followed by drying in the shade.

- **Jivamrut for Enhancing Soil Microbial Activity:** The required ingredients for Jivamrut preparation are cow dung (10 kg), cow urine (5 to 10 liters), jaggery (1 to 2 kg), pulses like arhar, mung, or biri (1 to 2 kg), compost (a handful), and water (200 liters). All these ingredients are mixed well and allowed to ferment for 2 to 3 days, covered with a cloth or jute sack. Stirring should be done twice during this time in a clockwise direction. This mixture should be used within 7 days. The Jivamrut can be put in the irrigation channel to reach the plant roots with the irrigation water. It is not manure in itself but acts to increase the action of manures like cow dung and compost. After applying Jivamrut or Bijamrut, the cow dung is covered with a layer of leaf, grass, or straw mulch.
- **On-farm Biomass Recycling and Biomass Mulching:** Covering the soil with organic mulch (which creates humus and encourages the growth of friendly microorganisms) is a key principle of natural farming. The decomposition of organic matter by microbes and earthworms is encouraged on the soil surface to enrich the organic carbon status of the soil. Multi-cropping (crop diversification) is encouraged over single-crop methods. Crop diversification in natural farming aims to restore and rebuild natural cycles in the soil. Green manuring and incorporating legumes into crop rotation are key components of natural farming.

### Is Natural Farming the Same as Organic Farming?

Natural farming and organic farming both fall under agroecological practices and are often used interchangeably in India. However, there are similarities and differences between the two:

**Similarities:** Natural and organic farming are both chemical-free and poison-free farming methods. Both discourage the use of chemical fertilizers, pesticides, or herbicides in all agricultural practices. They encourage using local seed breeds and native (indigenous) varieties of vegetables, grains, pulses, and other crops. Both methods promote nonchemical and homemade pest control techniques.

#### Differences

- **Inputs:** In organic farming, organic fertilizers and manures like compost and vermicompost are used and added to farmlands from external sources. Farmers might use external agricultural inputs such as rock phosphate, biopesticides, and biofertilizers. However, in natural farming, neither chemical nor organic fertilizers are added to the soil. Natural farming believes that these external applications are unnecessary as the farm itself can generate much of the required inputs.
- **Cultural Operations:** Organic farming still requires basic agronomic practices like plowing, tilling, mixing manures, and weeding. In natural farming, there is no plowing, tilling, or weeding of the soil.
- **Cost:** Organic farming is more expensive due to the need for bulk manures and costly organic ingredients, which also have ecological impacts on surrounding environments. In contrast, natural farming is an extremely low-cost method, completely integrating local biodiversity, making it a better alternative.

### What Are the Benefits of Natural Farming?

If performed effectively, natural farming can offer the following benefits:

- **Restoring Soil Health:** Natural farming helps restore soil fertility, improve soil microbial biodiversity, reduce soil pollution, and promote overall soil health in the long run. Cover cropping and mulching help prevent soil erosion. Better soil health leads to higher crop production over time.
- **Protecting the Health of Food Growers and Consumers:** Since no agrochemicals are used, natural farming significantly reduces the risks to farmers' health and provides poison-free, healthier, and nutrient-rich food to consumers.



- **Improving Soil and Crop Quality:** Natural farming improves soil structure, fertility, porosity, and water retention capacity. It also enhances crop quality, making crops more drought-tolerant and climate-resilient.
- **Sequestering Carbon in Soil:** Natural farming increases carbon sequestration and reduces greenhouse gas emissions by encouraging minimum tillage, reducing the use of synthetic fertilizers, and recycling organic biomass into the soil.
- **Reducing Water Consumption:** Since natural farming discourages plowing, the soil's ability to retain moisture is improved, leading to reduced water consumption and irrigation needs.
- **Addressing Environmental Issues:** Natural farming reduces air, water, and soil pollution, mitigates biodiversity loss, and promotes ecological balance.
- **Reducing Costs:** The cost of cultivation is minimized since no expensive agrochemicals are purchased. Farmers can cultivate crops with minimal inputs, improving their profitability.\*\*

### Challenges of Natural Farming

Despite its benefits, natural farming poses several challenges:

- **Unavailability of Farm Animals:** Livestock is a key component of natural farming, but their availability has decreased over time. Livestock is needed to provide dung and urine for natural inputs like Jivamrut, which are vital for natural farming practices.
- **Lack of Knowledge:** There is a lack of awareness and knowledge about natural farming principles and practices among farmers, making it difficult to implement on a larger scale.
- **Lack of Infrastructure:** Farmers often lack the infrastructure required for natural farming practices, such as mulching, cover cropping, or managing diverse crops.
- **Initial Yield Loss:** Farmers might experience an initial reduction in yield when transitioning from chemical to natural farming, which can deter them from adopting natural farming practices.
- **Labor-Intensive:** Natural farming requires more labor, especially during the initial stages, as it involves managing diverse crops, cover cropping, and mulching. This can increase the cost of production.
- **Limited Market Access:** Farmers practicing natural farming often face challenges in accessing markets that value and pay a premium for their naturally grown products.
- **Climate and Regional Suitability:** The success of natural farming can be affected by regional climatic conditions and the availability of local resources, which may not always be favorable.

Natural farming is increasingly being viewed as a promising alternative to chemical-based agriculture, offering multiple benefits, especially for smallholder farmers. However, the widespread adoption of natural farming will depend on addressing these challenges and creating supportive policies and infrastructure.