

## Natural Farming: Paving the way to Sustainable Ecosystems

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### Abstract

Healthy soil serves as the fundamental cornerstone of sustainable agricultural practices. Agricultural methodologies diverge significantly based on soil inputs and crop protection strategies. Conventional chemical farming practices characterized by the indiscriminate application of chemical fertilizers and pesticides, not only disrupt the beneficial soil microbiota but also alter soil composition, thereby escalating crop production costs. Moreover, the contamination of soil with heavy metals poses a considerable risk as these pollutants may permeate the food chain, leading to adverse health consequences. Embracing conventional techniques in agriculture is detrimental for both soil fertility and human well-being, often plunging farmers into financial debt. Consequently, addressing this escalating predicament necessitates the adoption of Zero Budget Natural Farming (ZBNF) or Natural Farming. The term "budget" in ZBNF signifies abstaining from credit reliance and refraining from expenditure on purchased inputs. In essence, ZBNF entails farming in harmony with nature, devoid of chemical interventions. This methodology is proving to be beneficial for soil health, human well-being, and overall ecosystem.

**Keywords:** natural farming, soil health, sustainability, ZNBF

### Introduction

The neo liberalization of the Indian economy has precipitated a profound agrarian crisis, rendering small-scale farming economically unfeasible. The privatization of seeds, inputs, and markets has rendered them inaccessible and prohibitively expensive for peasants. This has plunged Indian farmers into a relentless cycle of debt, exacerbated by high production costs, exorbitant credit interest rates, volatile market crop prices, escalating fuel-based input costs,

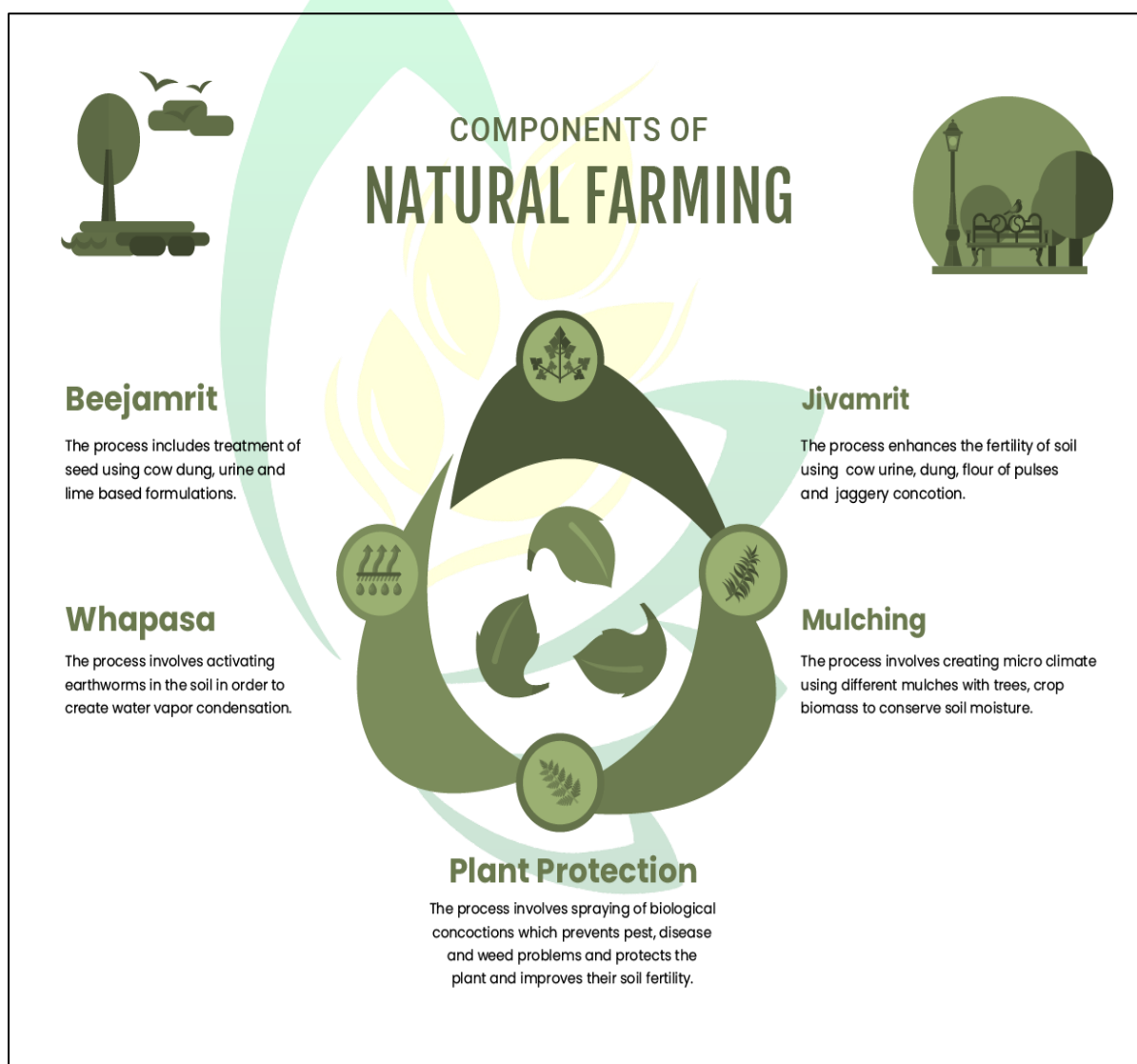
and the expense of private seeds. The dire consequences of this crisis are evident in the alarming rate of farmer suicides, which have surpassed a quarter of a million. This pervasive issue afflicts farmers across India, underscoring a serious challenge within the agriculture industry. The pervasive use of pesticides and chemicals in conventional farming practices poses significant risks to human health. Consequently, in response to the detrimental effects of chemical farming, there has been a burgeoning interest among farmers in zero budget natural farming (ZBNF), also known as Natural Farming. ZBNF has gained significant traction in southern India, particularly in Karnataka, where it originated (Kumar, 2012). Its adoption is swiftly spreading across India.

ZBNF or natural farming offers solutions to various challenges, including food insecurity, farmers' distress, health issues stemming from pesticide and fertilizer residue in food and water, as well as global warming, climate change, and natural disasters. Natural farming, as its name suggests, embodies the art, practice, and increasingly, the science of harmonizing with nature to achieve more with less. Unlike conventional farming, natural farming does not necessitate financial expenditure on essential inputs such as seeds, fertilizers, and plant protection chemicals from the market. Pioneered by Subhash Palekar, ZBNF is underpinned by various theories, principles, and methodologies. Zero budget farmers employ a range of techniques including mulching, soil protection strategies, as well as natural pesticides and fertilizers. Key methods of ZBNF encompass crop rotation, utilization of green manures and compost, adoption of biological pest control measures, and mechanical cultivation. The ZBNF framework is anchored by four pillars: *Jivamrita*, *Bijamrita*, *Acchadana*, and *Whapasa*, which are widely recognized and implemented within the ZBNF framework (Palekar, 2006). Figure 1 provides a visual depiction of the various components utilized in ZBNF or natural farming, while Table 1 delineates their preparation methods and associated benefits. Although still in its nascent stages, natural farming is yielding increasingly positive results and is being embraced by farmers with optimism. Some farmers report drastic reductions in labor and production costs ranging from 14% to 45% (Chandel et al., 2021).

In India, natural farming is promoted under the Bharatiya Prakritik Krishi Paddhati Programme (BPKP) as part of the centrally sponsored scheme Paramparagat Krishi Vikas Yojana (PKVY). BPKP aims to promote traditional indigenous practices that reduce reliance on externally purchased inputs. Natural farming products are known for their superior taste,

high quality, improved yield, and enhanced nutritional content (Korn, 2001). In addition to the four pillars of ZBNF, other significant principles include intercropping, the furrow method of cropping, contour and bunds system, and the use of local species of earthworms. The pest management in ZBNF or natural farming is achieved by using different formulation which is described by Palekar, including the *Agniastra*, the *Brahmastra*, and the *Neemastra*. Table 2 presents the formulations, composition and their benefits in managing pests in ZBNF or natural farming.

**Figure 1: Components of Natural Farming**



**Table 1: Basic four pillars of ZBNF, their preparation and benefits (Palekar, 2006)**

| S. No | Methods                   | Preparation   | Benefits  |
|-------|---------------------------|---|---|
| 1     | <i>Jivamrita</i>          | <i>Jivamrita</i> is prepared from a combination of cow dung (20 kg), urine (5-10 liters), jaggery (20 kg), and flour (2 kg). This mixture is applied to crops with each irrigation cycle. | It serves as a source of nutrients while also acting as a catalytic agent, stimulating microbial activity in the soil and enhancing earthworm activity. Additionally, it aids in the prevention of fungal and bacterial diseases. |
| 2     | <i>Bijamrita</i>          | <i>Bijamrita</i> essentially consists of water (20 liters), cow dung (5 kg), urine (5 liters), lime (50 g), and a handful of soil.  | It serves as a seed treatment, effectively shielding young roots from fungal infections, as well as protecting against soil-borne and seed-borne diseases.  |
| 3     | <i>Acchadana Mulching</i> | It can be accomplished through soil mulching or straw mulching techniques.  | It conserves soil moisture by minimizing evaporation.   |
| 4     | <i>Whapsa mositure</i>    | Irrigation should be minimized, and a practice of irrigating at noon in alternate furrows should be adopted.  | It is the condition where air molecules and water molecules coexist within the soil.  |

**Table 2:** Pest management formulation in ZBNF, their composition and benefits (Palekar, 2006)

| Sr. No. | Formulae          | Composition   | Benefits   |
|---------|-------------------|---|--|
| 1       | <i>Agniastra</i>  | It is composed of 10 liters of local cow urine, 1 kilogram of tobacco, 500 grams of green chili, 500 grams of local garlic, and 5 kilograms of crushed neem leaves pulp mixed in urine. For spraying purposes, 2 liters of Brahmastra are diluted in 100 liters of water. | It is effective against pests such as leaf roller, stem borer, fruit borer, and pod borer. |
| 2       | <i>Brahmastra</i> | It is prepared by crushing and boiling neem leaves, custard apple leaves, guava leaves, lantern camellia leaves, pomegranate leaves, papaya leaves, and white datura leaves in urine.   | It is utilized to control all sucking pests, fruit borers, and pod borers.                 |
| 3       | <i>Neemastra</i>  | It is made up of local cow urine (5 liters), cow dung (5 kilograms), and neem leaves and neem pulp (5 kilograms), fermented for 24 hours.   | It is employed for controlling   |

|  |  |  |                                    |
|--|--|--|------------------------------------|
|  |  |  | sucking<br>pests and<br>mealybugs. |
|--|--|--|------------------------------------|

### Advantages of ZBNF or Natural Farming

1. Natural farming, devoid of synthetic chemicals, eliminates associated health risks. Consequently, the produced food exhibits higher nutritional density, offering superior health advantages.
2. Natural farming fosters enhanced soil biology, improved agrobiodiversity, and prudent water usage, resulting in reduced carbon and nitrogen footprints.
3. By reducing costs, mitigating risks, maintaining similar yields, and generating additional revenue from intercropping, natural farming endeavors to elevate farmers' net incomes, thereby making farming more economically viable.
4. Natural farming generates employment opportunities through input production enterprises, value addition activities, and localized marketing endeavors, with surplus investments benefiting the local community.
5. Through the cultivation of diverse crops that mutually benefit and soil covering to minimize evaporation, natural farming optimizes water utilization, achieving greater crop yield per unit of water consumed.
6. Natural Farming endeavors to significantly reduce production expenses by encouraging the utilization of on-farm, natural, and locally sourced resources for preparing essential biological inputs.
7. Natural farming eliminates the excessive application of synthetic fertilizers, pesticides, herbicides, and weedicides, thereby preserving soil biology, structure, and organic carbon content.
8. Natural farming exerts an immediate positive impact on soil biology, fostering the proliferation of beneficial microbes and organisms like earthworms, thereby enhancing overall soil health.
9. The incorporation of livestock within natural farming systems contributes to ecosystem restoration. Eco-friendly bio-inputs, such as *Jivamrita* and *Bijamrita*, derived from cow dung, urine, and other natural sources, further bolster sustainability efforts.

### Disadvantages of ZBNF or Natural Farming



1. Natural farming relies on the availability of indigenous cow dung and urine, which may pose challenges in sourcing and consistency of supply.
2. Natural food production typically occurs in smaller quantities, leading to challenges in marketing and distribution efficiency. Limited scale may hinder access to broader markets and affect profitability.
3. Successful implementation of natural farming techniques necessitates farmers to possess sufficient knowledge and skills. Lack of expertise in natural farming practices may impede productivity and effectiveness.
4. Crops cultivated through natural farming methods may be more vulnerable to diseases, which can disrupt production processes and lower overall yields. Adequate disease management strategies and vigilance are essential to mitigate risks.

### Conclusion

The indiscriminate application of chemical fertilizers and pesticides poses significant threats to soil and environmental health, leading to alterations in soil composition, contamination, groundwater pollution, and depletion of soil microflora. Numerous investigations have highlighted the adverse impacts of these practices. Conversely, studies suggest that natural farming, characterized by minimal external inputs and the use of supplements like *Jivamrita*, promotes soil fertility by enhancing soil microflora and nutrient availability. This approach also fosters biodiversity of both micro and macro flora and encourages practices such as multi-cropping. Moreover, natural farming leads to reductions in labor and production costs, rendering it environmentally friendly and economically sustainable. Notably, intercropping with leguminous crops emerges as a critical component of natural farming, enhancing crop productivity and soil fertility through atmospheric nitrogen fixation. However, it is imperative to acknowledge that existing studies on natural farming are in preliminary stages, necessitating further research to validate its benefits across various crops. Moreover, the efficacy of indigenous pesticides such as *Neemastra* and *Brahmastra*, as well as the duration required for soil enrichment in polluted environments, warrant further investigation.

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