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Zero Budget Natural Farming (ZBNF): A Sustainable Agricultural Model

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Agriculture is the backbone of India's economy, supporting over half the population. While the Green Revolution boosted food production, it also led to environmental degradation due to excessive chemical use. This has harmed soil fertility and raised health concerns. To address these issues, Natural Farming has gained prominence as a sustainable, low-cost alternative. Popularized globally by Masanobu Fukuoka and in India by Subhash Palekar through Zero Budget Natural Farming (ZBNF), this method promotes eco-friendly practices, reduces input costs, and improves farm income—ensuring long-term agricultural sustainability and rural well-being.

Introduction

Agriculture forms the bedrock of India's economy, offering employment to a significant portion of the population and contributing substantially to the national GDP. This sector's resilience was particularly evident during the COVID-19 pandemic, maintaining a growth rate of 3.4% in 2020–21 despite global economic disruptions. India has not only achieved self-sufficiency in food grain production but also ranks among the top producers of several crops worldwide. However, the extensive use of chemical fertilizers and pesticides over the decades has led to severe environmental degradation and socio-economic challenges. The liberalization of the Indian economy exacerbated the agrarian crisis, rendering small-scale farming increasingly unsustainable. Farmers face high costs for seeds and agrochemicals, volatile market prices, mounting debts, and unpredictable weather conditions. These hardships have driven many into distress, with a tragic rise in farmer suicides. Today, the agricultural sector confronts critical challenges, including food and nutrition security, climate change, and resource conservation. To overcome these issues, farming practices must shift toward low-cost, environmentally sound methods. As consumer demand for chemical-free, nutritious food rises, sustainable farming approaches are gaining momentum. Organic farming offers one path, yet the complex certification process makes it difficult for all farmers to adopt. In contrast, Natural Farming, especially the Zero Budget Natural Farming (ZBNF) model, presents a more accessible, cost-effective, and climate-resilient alternative.

Subhash Palekar's Natural Farming Model:

Natural farming is especially beneficial to India's large population of small and marginal farmers—over 80% of whom own less than one hectare of land. Pioneered by Padmashri Subhash Palekar and drawing from the natural farming philosophy of Masanobu Fukuoka, this approach rejects synthetic inputs in favour of natural resources, particularly those derived from indigenous cattle.

ZBNF operates on four key (fig.1) principles:

1. **Beejamrit** – A natural seed treatment
2. **Jeevamrit** – A microbial soil enhancer
3. **Achhadana** – Mulching to retain soil moisture
4. **Whapasa** – Maintaining soil moisture balance

This system is built on the belief that the soil inherently possesses all necessary nutrients, and microbial activity is sufficient to unlock them. With the use of native cow dung, urine, and buttermilk, the soil's fertility and biological health are restored.

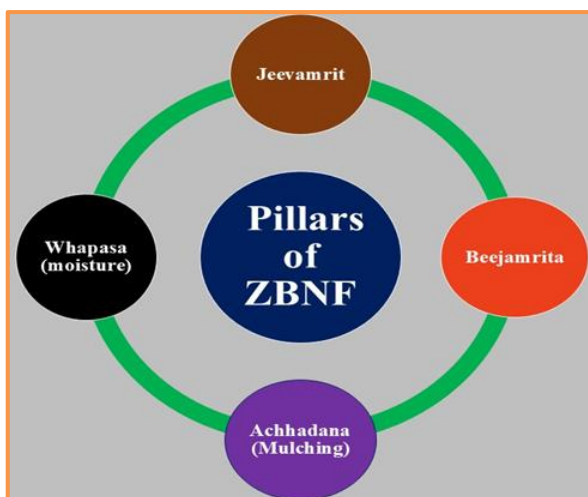


Fig.1. Four pillars of ZBNF

1. **Jeevamrit:** A bio-enriched solution made from water, indigenous cow dung and urine, jaggery, pulse flour, and soil. Fermented for 48 hours, it fosters aerobic and anaerobic microbes that boost soil fertility, enhance earthworm activity, and protect plants from disease. Palekar emphasized that it activates nutrients already present in the soil and is mainly needed for the first 3–4 years until the farm ecosystem becomes self-sustaining.
2. **Beejamrit:** This seed treatment comprises cow dung, urine, lime, and soil, fermented in water. It enhances seed germination, protects against fungal and bacterial infections, and promotes healthy rhizosphere activity. It is not a nutrient supplement but a microbial stimulant critical for early plant growth.
3. **Achhadana (Mulching):** This technique improves soil structure, conserves moisture, and enhances microbial activity. ZBNF promotes:
 - *Soil Mulch* to prevent tillage and preserve microbial life.
 - *Straw Mulch* using dried biomass and decomposed matter to form humus.
 - *Live Mulch* with intercropping of monocots and dicots to supply a balanced nutrient mix.
 Additionally, mulching techniques like straw and plastic mulch improve yields, conserve water (by 3–11%), and reduce nitrogen loss, especially in water-scarce regions like Punjab. Mulching is also promoted as a sustainable alternative to stubble burning.
4. **Whapasa (Soil Moisture Management):** Palekar advocates for minimal irrigation, arguing that plant roots primarily need water vapor, not liquid water. Watering only during midday and in alternate furrows maintains the ideal mix of air and water molecules in the soil, improving root health and reducing water use.

Other Core Practices of ZBNF (fig.2)

- **Intercropping:** Supports income generation by growing multiple crops together, balancing the budget and increasing overall yield.
- **Bund and Contour Cropping:** Helps in rainwater harvesting and prevents soil erosion.
- **Indigenous Earthworms:** Essential for restoring soil fertility and structure.
- **Cow Dung Utilization:** The dung of native Indian cows, rich in beneficial microbes, forms the base of all bio-inputs in ZBNF.



Fig. 2: Other important principles of ZBNF

Pest Management in Natural Farming

ZBNF incorporates traditional, plant-based pest management methods, replacing chemical pesticides with natural formulations:

1. **Agniastra:** Made from cow urine, tobacco, garlic, neem, and green chili, this solution deters leaf rollers and borers.
2. **Brahmastra:** Boiled extracts of neem, custard apple, papaya, and other leaves, effective against pod and fruit borers.
3. **Neemastra:** Fermented mixture of neem leaves, cow dung, and urine used to control sucking pests and mealybugs.

These bio-solutions help minimize pest-induced crop losses while keeping soil and food chemical-free.

Why Farmers Are Shifting to Natural Farming (fig.3):

Ecological Benefits:

- Increases biodiversity and pollinator activity.
- Enhances soil structure and reduces erosion.
- Avoids chemical runoff, preserving water bodies.

Socio-Economic Benefits:

- Reduces dependency on costly inputs and agrochemical companies.
- Generates more local employment through labour-intensive methods.
- Produces safe, nutritious food, ensuring food security.

Environmental Benefits:

- Lowers greenhouse gas emissions.
- Builds climate resilience through better water retention.
- Promotes agroforestry and sustainable land use.

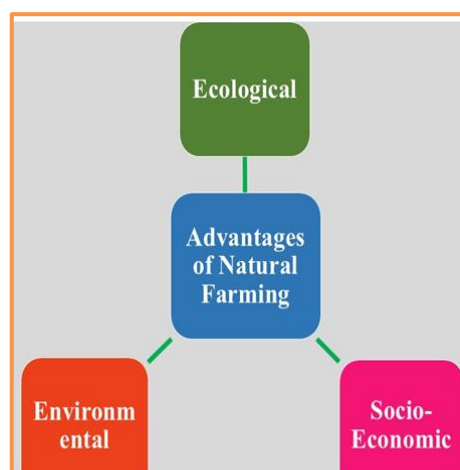


Fig. 3: Advantages of zero budgets natural farming

Challenges to Scaling Natural Farming

1. Critics argue that an all-natural approach may overlook advances made through scientific research in agriculture.
2. India's ₹18,000 crore agrochemical industry might be destabilized by a shift to natural alternatives.
3. ZBNF might be inadequate during severe pest outbreaks, where chemical intervention may be necessary.
4. Government investment remains low—only 0.8% of the Agri-budget is allocated to sustainable agriculture programs.

Conclusion

India's current agricultural framework is increasingly unsustainable—burdened by high input costs, ecological degradation, and social distress. ZBNF, by advocating for a low-input, nature-based approach, emerges as a transformative alternative. It empowers farmers, revives the soil, and realigns agriculture with ecological principles. While early results are promising, there is a lack of large-scale, long-term data on yields, soil impact, and farmer income under ZBNF. Future research should be region-specific and span multiple years to truly evaluate its effectiveness. Policy interventions, supportive infrastructure, and scientific validation will be crucial in scaling ZBNF without compromising food security or farmer welfare.

Future Prospects

The potential of ZBNF to revolutionize Indian agriculture is significant. Farmers have already embraced it across diverse regions, drawn to its alignment with traditional wisdom and resource availability. However, continuous monitoring of its long-term sustainability, economic viability, and ecological impact is essential. ZBNF may not be a universal remedy,

but it offers a scalable, farmer-friendly model that could play a central role in creating a more resilient and inclusive agricultural future for India.

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