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Zero Budget Natural Farming (ZBNF)

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Zero Budget Natural Farming (ZBNF) is a sustainable and eco-friendly farming system that eliminates the use of synthetic fertilizers and pesticides by relying on natural inputs and biological processes. It promotes soil health through microbial activity, organic matter recycling, and practices like Jivamrit, Beejamrit, mulching, and Whapasa. ZBNF reduces production costs, enhances biodiversity, and improves climate resilience. Although challenges such as yield variability and training needs exist, it offers a promising approach for sustainable agriculture in the future.

Introduction

Zero Budget Natural Farming (ZBNF) is an eco-friendly, sustainable agricultural approach that emphasizes natural processes, local resources, and minimal external inputs. It is designed to reduce the dependency of farmers on chemical fertilizers, pesticides, and purchased inputs, thereby lowering the cost of cultivation to nearly zero. ZBNF promotes farming practices that restore soil health, enhance biodiversity, and maintain ecological balance. It is based on the principle that healthy soil, rich microbial activity, and natural farming inputs can sustain crop productivity without heavy financial investment. The concept became widely known in India through the efforts of agricultural practitioners and farmer movements advocating chemical-free agriculture. Today, it is considered an important model of sustainable agriculture in the context of climate change, soil degradation, and rising input costs.

Definition of Zero Budget Natural Farming

Zero Budget Natural Farming (ZBNF) can be defined as:

“A farming system that eliminates the use of synthetic fertilizers and pesticides and relies on natural inputs prepared from locally available resources, ensuring that the cost of cultivation is almost zero.” The term “Zero Budget” refers to the idea that farmers do not need to borrow money or spend on external agricultural inputs. Instead, they depend on on-farm resources such as cow dung, cow urine, plant residues, and microbial formulations.



Source: <https://www.dhyeyaias.com/>

Background and Origin

ZBNF was popularized in India by farmer-scientist practices and grassroots agricultural movements. It gained strong momentum in states like Karnataka and later spread to other parts of India. The approach is strongly influenced by traditional Indian farming knowledge combined with modern ecological understanding of soil biology and plant-microbe interactions.

Core Principles of ZBNF

ZBNF is based on four major pillars:

Jivamrit (Microbial Culture Booster)

Jivamrit is a fermented microbial solution made from:

- ❖ Cow dung
- ❖ Cow urine
- ❖ Jaggery
- ❖ Pulse flour
- ❖ Soil from the farm

Beejamrit (Seed Treatment)

Beejamrit is a natural seed treatment solution used in Zero Budget Natural Farming (ZBNF) before sowing seeds. It plays a vital role in protecting seeds from soil-borne pathogens, fungal infections, and harmful microorganisms. By coating seeds with Beejamrit, farmers ensure better germination, stronger seedling establishment, and improved early plant vigor. It also enhances beneficial microbial activity around the seed surface, which supports healthy root development. Beejamrit is prepared using locally available inputs such as cow dung, cow urine, lime, and a small amount of farm soil. These components are mixed and fermented to create a bioactive solution that improves seed health naturally without any chemical treatment.



Source: <https://www.dhyeyaias.com/>

Acchadana (Mulching)

Acchadana, or mulching, is an important practice in Zero Budget Natural Farming (ZBNF) where the soil surface is covered with organic materials such as crop residues, dry leaves, straw, and other plant biomass. This protective layer acts as a natural shield for the soil and helps in conserving moisture by reducing evaporation losses. It also suppresses weed growth by blocking sunlight, thereby reducing competition for nutrients, water, and space. In addition, mulching regulates soil temperature, keeping it cooler in summer and warmer in winter, which supports better root growth. Over time, the decomposing organic mulch enriches the soil by adding organic matter and improving soil structure, fertility, and microbial activity, ultimately enhancing overall crop productivity.

Whapasa (Soil Aeration and Moisture Balance)

Whapasa is a key concept in Zero Budget Natural Farming (ZBNF) that refers to the optimal condition of soil where both air and water are present in balanced proportions within the soil pores. This balance is essential for maintaining healthy root zone conditions. It ensures proper root respiration, allowing roots to absorb oxygen efficiently for metabolic activities. Whapasa also promotes efficient water use by reducing excess waterlogging and improving water availability in the root zone. In addition, it enhances microbial activity in the soil, as

beneficial microorganisms thrive under well-aerated and moderately moist conditions, ultimately supporting better nutrient cycling and plant growth.

Major Components of ZBNF System

The Zero Budget Natural Farming (ZBNF) system is based on an integrated approach that promotes sustainability, ecological balance, and low-cost farming practices. It consists of several key components that work together to maintain soil health, crop productivity, and farm resilience.

Soil Health Management

In ZBNF, soil is treated as a living ecosystem rather than an inert growing medium. The main focus is on increasing soil organic carbon, enhancing microbial diversity, avoiding the use of chemical fertilizers, and promoting natural nutrient cycling. These practices improve soil structure, water-holding capacity, and long-term fertility.

Crop Diversity

ZBNF strongly encourages intercropping, mixed cropping, and crop rotation systems. Crop diversity reduces pest and disease pressure, minimizes risk of crop failure, and improves overall system stability. It also enhances efficient use of nutrients, sunlight, and water resources.

Natural Pest Management

Instead of synthetic pesticides, ZBNF relies on eco-friendly pest control methods such as neem-based sprays, herbal extracts, cow urine formulations, and biological repellents. These methods help manage insect pests while preserving beneficial organisms and maintaining ecological balance.

Local Resource Utilization

A core principle of ZBNF is the use of locally available farm resources. Inputs are prepared using farm waste, livestock by-products, and indigenous materials. This reduces dependency on external inputs and markets, making farming more economical and self-reliant.

Nutrient Management in ZBNF

In Zero Budget Natural Farming (ZBNF), nutrient management is completely based on natural and biological processes rather than synthetic chemical fertilizers such as NPK. The system focuses on maintaining soil fertility through ecological cycling of nutrients and enhancement of soil biological activity. Nutrients in ZBNF are supplied mainly through the microbial decomposition of organic matter, where beneficial microorganisms break down crop residues and organic waste into plant-available forms. Nitrogen is naturally fixed in the soil by symbiotic and free-living nitrogen-fixing bacteria, reducing the need for external nitrogen fertilizers. In addition, recycling of crop residues ensures that nutrients are returned back to the soil after harvest, maintaining a continuous nutrient cycle. Organic manures and composting further enrich the soil with essential macro and micronutrients, improving soil structure, fertility, and long-term productivity in a sustainable manner.

Preparation of Key ZBNF Inputs

Zero Budget Natural Farming (ZBNF) relies on a few important low-cost bio-formulations that are prepared from locally available materials. These inputs play a crucial role in improving soil fertility, seed health, and pest management in a natural and sustainable way.

Jivamrit Preparation

Jivamrit is a fermented microbial culture that enhances soil microbial activity and nutrient availability. It is prepared by mixing 10 kg cow dung with 10 liters of cow urine. To this mixture, 2 kg jaggery and 2 kg pulse flour are added to provide energy and nutrients for microbial growth. A handful of farm soil is also included as a microbial inoculum. The solution is thoroughly mixed and allowed to ferment for about 48 hours. It is applied to the soil twice a month to improve soil fertility and biological activity.

Beejamrit Preparation

Beejamrit is used for seed treatment before sowing to protect seeds from soil-borne diseases and enhance germination. It is prepared using cow dung, cow urine, lime, and farm soil. Seeds are coated with this solution and then air-dried before sowing, ensuring better seedling establishment and early plant vigor.

Natural Pest Spray (Agniastra / Neemastra)

Natural pest control formulations like Agniastra and Neemastra are prepared using neem leaves, garlic, green chili, and cow urine. These ingredients are processed into a liquid spray and used as a foliar application on crops. This helps in controlling insect pests effectively while maintaining ecological balance and avoiding chemical pesticides.

Advantages of ZBNF

Zero Budget Natural Farming (ZBNF) offers multiple economic, environmental, soil health, and climate-related benefits, making it a sustainable alternative to conventional chemical-based agriculture.

Economic Benefits

ZBNF significantly reduces the cost of cultivation by minimizing the use of external inputs. It eliminates the need for chemical fertilizers and pesticides, thereby lowering input expenses. As a result, farmers become less dependent on loans and credit, improving their financial stability and self-reliance.

Environmental Benefits

ZBNF promotes environmental conservation by enhancing soil biodiversity and reducing chemical pollution in soil, water, and air. It improves soil water retention capacity and supports the development of balanced and sustainable ecosystems, preserving natural resources for future generations.

Soil Health Improvement

One of the major advantages of ZBNF is the continuous improvement of soil health. It increases soil organic matter, enhances microbial activity, and improves soil structure. These changes lead to better nutrient cycling and long-term soil fertility.

Climate Resilience

ZBNF systems are more resilient to climate variability. They improve drought resistance by enhancing soil moisture retention and root development. Efficient water use and strong biological activity help maintain relatively stable yields even under stressful environmental conditions such as heat and water scarcity.

Limitations and Challenges of ZBNF

Despite its multiple ecological and economic advantages, Zero Budget Natural Farming (ZBNF) also faces several practical limitations and implementation challenges that can affect its large-scale adoption.

Yield Variability

One of the major concerns in ZBNF is yield variability, especially during the initial transition period from conventional farming. Some crops may show a temporary reduction in yield as the soil ecosystem adjusts from chemical inputs to biological nutrient cycling. This transition phase can affect short-term productivity and farmer confidence.

Knowledge Intensive

ZBNF is highly knowledge-driven and requires proper understanding of natural farming principles and practices. Farmers need adequate training, regular guidance, and skill development to prepare bio-formulations correctly and manage crops effectively under this system.

Availability of Livestock

A key limitation of ZBNF is its dependence on cow-based inputs such as cow dung and cow urine. This makes it challenging for farmers who do not own livestock or for landless farmers, thereby limiting its universal applicability.

Scientific Validation

Although ZBNF has shown positive results in many regions, there is still a need for more long-term scientific research and experimental data. Variations in soil type, climate, and management practices can lead to different performance outcomes, highlighting the need for region-specific validation studies.

Comparison with Conventional Farming

Aspect	Conventional Farming	ZBNF
Inputs	Chemical fertilizers & pesticides	Natural inputs
Cost	High	Very low
Soil health	Degrading in long term	Improving
Productivity	High short-term	Stable long-term
Environmental impact	Negative	Positive

Role of ZBNF in Sustainable Agriculture

Zero Budget Natural Farming (ZBNF) plays a significant role in promoting sustainable agriculture by integrating ecological balance with productive farming systems. It helps in reducing environmental degradation by minimizing the use of chemical fertilizers and pesticides, which often harm soil, water, and biodiversity. Through natural processes, ZBNF enhances soil fertility by improving organic matter content and stimulating microbial activity, leading to long-term soil health improvement. ZBNF also supports biodiversity conservation by maintaining a healthy population of beneficial insects, soil organisms, and diverse crop systems through intercropping and mixed cropping practices. Additionally, it promotes farmer self-reliance by reducing dependency on external inputs and encouraging the use of locally available resources, thereby lowering production costs.

Scientific Perspective of ZBNF

From an agronomic and scientific viewpoint, Zero Budget Natural Farming (ZBNF) functions through several biological and ecological processes that improve soil fertility and crop productivity in a sustainable manner. The system enhances microbial populations in the soil, which play a key role in decomposing organic matter and releasing essential nutrients in plant-available forms. It also improves nutrient mineralization, where complex organic compounds are broken down into simpler nutrients that plants can easily absorb. Biological nitrogen fixation is another important process, in which beneficial microorganisms convert atmospheric nitrogen into usable forms, reducing dependence on synthetic nitrogen fertilizers. ZBNF further stimulates rhizosphere activity, promoting better interaction between plant roots and soil microorganisms, which enhances nutrient uptake and plant growth. In addition, it helps maintain a natural pest-predator balance by supporting beneficial insects and reducing pest outbreaks through ecological regulation. Collectively, these processes contribute to long-term agroecosystem stability, improved soil health, and sustainable agricultural productivity.

Future Prospects

Zero Budget Natural Farming (ZBNF) holds strong potential in the future of sustainable agriculture due to increasing global challenges such as rising fertilizer costs, soil degradation, climate change impacts, and the growing demand for safe and organic food products. As conventional farming becomes more input-intensive and less sustainable, ZBNF offers an eco-friendly alternative that reduces dependency on external chemical inputs while maintaining soil health and productivity. In the future, the effectiveness of ZBNF can be further enhanced by integrating it with modern agricultural technologies. Precision agriculture tools can help in monitoring crop and soil conditions more accurately, while soil testing technologies can guide better nutrient management decisions under natural farming systems. Additionally, digital advisory systems and mobile-based platforms can support farmers with timely information, improved practices, and expert guidance.

Conclusion

Zero Budget Natural Farming is a transformative agricultural approach that promotes sustainability, economic savings, and ecological balance. By relying on natural inputs and biological processes, it reduces the dependency on external chemical inputs and improves long-term soil health. Although challenges exist in terms of yield stability and adoption, ZBNF offers a promising pathway toward resilient and sustainable agricultural systems. With proper scientific validation, training, and policy support, it can play a significant role in shaping the future of agriculture, especially in developing countries like India.

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