

Natural Farming: Anchoring a Sustainable Way of Farming

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Introduction

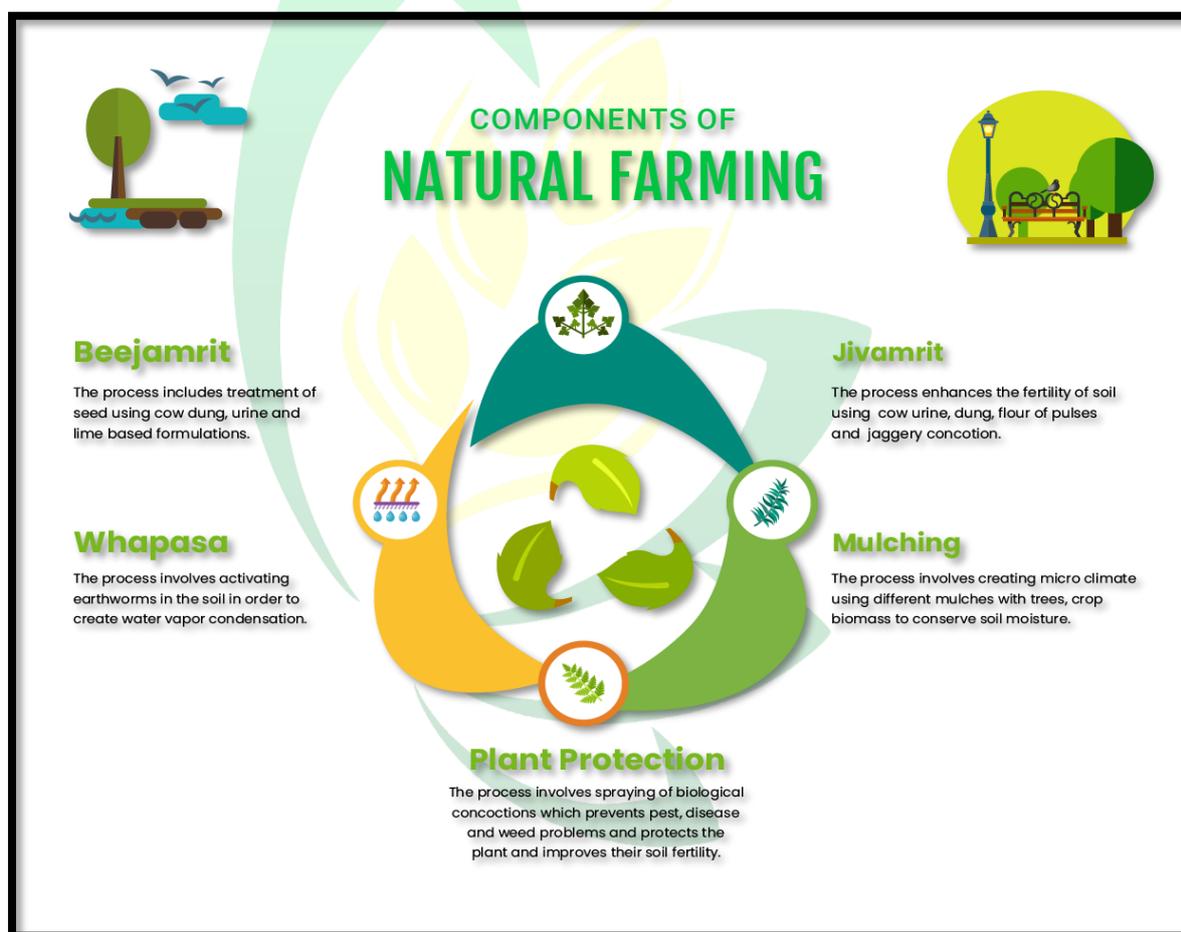
Natural Farming can be defined as “chemical- free farming and livestock based”. Soundly grounded in agro-ecology, it is a diversified farming system that integrates crops, trees and livestock, allowing the optimum use of functional biodiversity. It mainly based on conservation agriculture with four pillars Jeevamrutha, Beejamrutha, Acchadana, Whapasa respectively. It is considered as agroecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity. Natural Farming holds the promise of enhancing farmers’ income while delivering many other benefits, such as restoration of soil fertility and environmental health, and mitigating and/or reducing greenhouse gas emissions. Natural Farming builds on natural or ecological processes that exist in or around farms.

Internationally, Natural Farming is considered a form of regenerative agriculture-a prominent strategy to save the planet. It has the potential to manage land practices and sequester carbon from the atmosphere in soils and plants, where it is actually useful instead of being detrimental.

Natural Farming has many indigenous forms in India, the most popular one is practised in Andhra Pradesh. The practice has also spread, in other forms, to other states, especially those in southern India. It is promoted as ‘*Bharatiya Prakritik Krishi Paddhati*’ (BPKP) under the centrally sponsored scheme Paramparagat Krishi Vikas Yojana (PKVY). BPKP aims at promoting traditional indigenous practices, which are largely based on on-farm biomass recycling with an emphasis on mulching and use of cow dung and urine formulations. It excludes all synthetic chemical inputs. Currently several states are undertaking Natural farming through central programmes like RKVY, PKVY, BPKP and others state specific programmes.

The BPKP programme has been adopted in State of Andhra Pradesh, Karnataka, Himachal Pradesh, Gujarat, Uttar Pradesh and Kerala. Several studies have reported the effectiveness of natural farming- BPKP in terms of increase in production, sustainability, saving of water use, improvement in soil health and farmland ecosystem. It is considered as a cost- effective farming practices with scope for raising employment and rural development.

NITI Aayog along with Ministry of Agriculture and Farmers welfare had convened several high-level discussions with global experts on Natural farming practices. It is roughly estimated that around 2.5 million farmers in India are already practicing regenerative agriculture. In the next five years, it is expected to reach 20 lakh hectares- in any form of organic farming, including natural farming, of which 12 lakh hectares are under BPKP.



Natural Farming: Anchoring a Sustainable Way of Farming

Natural Farming offers a solution to various problems, such as food insecurity, farmers' distress, and health problems arising due to pesticide and fertilizer residue in food and water, global warming, climate change and natural calamities. It also has the potential to



generate employment, thereby stemming the migration of rural youth. Natural Farming, as the name suggests, is the art, practice and, increasingly, the science of working with nature to achieve much more with less.

The world's population is predicted to expand to approximately 10 billion by 2050. It is expected that in a situation of modest economic growth, this will boost agricultural demand up to 50.00 per cent, in comparison to 2013 (FAO 2017, *The future of Food and Agriculture—Trends and challenges*). Expanding food production and economic growth have often come at a heavy cost to the natural environment. There has been significant decrease in forest cover and biodiversity over the years. Groundwater sources are also getting depleted rapidly. High-input, resource-intensive farming systems have caused massive deforestation, water scarcity, soil depletion and high levels of greenhouse gas emissions.

A transformational process towards 'holistic' approaches such as agro-ecology, agro-forestry, climate-smart agriculture, and conservation agriculture is a necessity. Practices such as agro-ecology, including Natural Farming, result in better yields without compromising the needs of the future generations. They are advocated by FAO and other international organizations.

The generic principles that govern Natural farming are mentioned below:

1. A healthy soil microbiome is critical for optimal soil health and plant health, and thereby animal health and human health.
2. Soil may be covered with crops for maximum period of the year.
3. The soil across a farm or larger field/collection of fields should have diverse crops, a minimum of 8 crops over the year. The greater the diversity, the better.
4. Minimal disturbance of soils is critical, hence no till farming or shallow tillage is recommended.
5. Animals should be incorporated into farming. Integrated farming systems are critical for promoting Natural farming.
6. Healthy soil microbiome is the key to retaining and enhancing soil organic matter. Bio stimulants are necessary to catalyse this process. There are different ways of making bio stimulants. In India, the most popular bio-stimulants are based on fermentation of animal dung and urine, and uncontaminated soil.

7. Increasing the amount and diversity of organic residues returned to the soil is very important. These include crop residues, cow-dung, compost, etc.
8. Pest management should be done through better agronomic practices (as enshrined in Integrated Pest management) and through botanical pesticides (only when necessary).
9. Use of synthetic fertilizers and other biocides is harmful to this process of regeneration and is not allowed.

Four pillars of Natural farming

1. Beejamrit

It is an ancient, sustainable agriculture technique. It is used for seeds, seedlings or any planting material. It is effective in protecting young roots from fungus. It is a fermented microbial solution, with loads of plant-beneficial microbes, and is used for seed treatment. It is expected that the beneficial microbes would colonize the roots and leaves of the germinating seeds and help in the healthy growth of the plants.

2. Jivamrit

It acts as a bio stimulant by promoting the activity of microorganisms in the soil and also the activity of phyllo spheric microorganisms when sprayed on foliage. It acts like a primer for microbial activity, and also increases the population of native earthworms.

3. Mulching

Defined as covering of soil surface using both live crops and straw (dead plant biomass) to conserve moisture, lower soil temperature around plant roots, prevent soil erosion, reduce runoff and reduce weed growth.

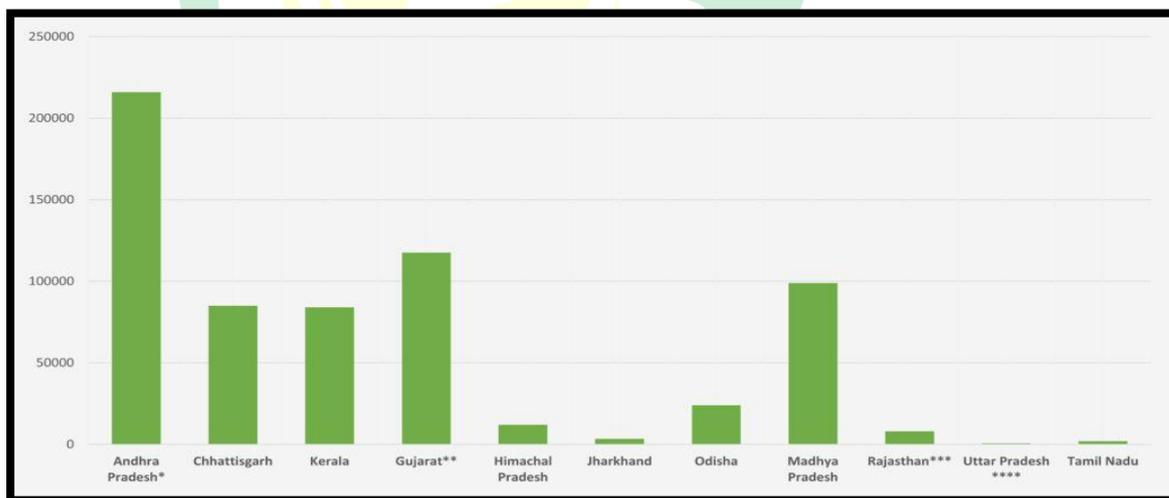
4. Whapasa

Means the mixture of 50.00 per cent air and 50.00 per cent water vapour in the cavity between two soil particles. It is the soil's microclimate in which soil organisms and roots depend for most of their moisture and some of their nutrients. It increases water availability, enhances water-use efficiency and builds resilience against drought.



Natural Farming in Practice

States Practicing Natural Farming Area covered (lakh ha)



Source: <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1705191>

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Improve Yield

Natural Farming aims to increase yields by maximizing production factors like labour, soil, equipment and by avoiding the use of non-natural inputs like fertilizers, herbicides and pesticides. Independent Assessment in Crop Cutting Experiments by Centre for Economics and Social Studies (CESS) / I.D.S has been done for 6 seasons till now – 2018-19 (2 seasons) and 2019 – 20 (2 seasons), Kharif 2020 and Rabi 2020-21 (2 seasons). It was observed that the Yield differences are not significant between NF and Non-NF farms.

Parameter	Trends in FGD responses from 142 ZBNF farmers (% of farmers)		
	Increase	Same	Decrease
Impact on yield of ZBNF farms	57	35	8
Impact on farming expenses in ZBNF	0	0	100
Price received for ZBNF produce	13	87	0
Impact on manual labour for ZBNF	78	7	15
Impact on net income of ZBNF	90	10	0

Source: Amit Khurana and Vineet Kumar, 2020, The State of Organic and Natural Farming in India- Challenges and Possibilities, Centre for Science and Environment, New Delhi

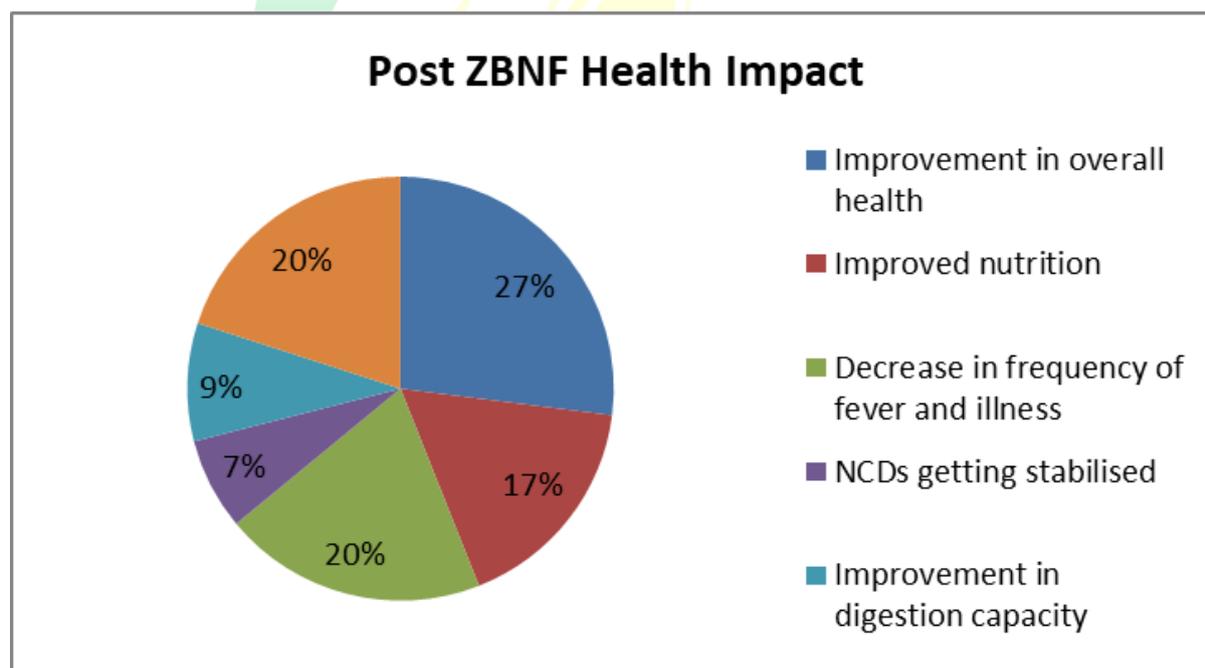
Ensure Better Health

Fertilizers and pesticides have been shown to have adverse impacts on farmers as well as consumers. Farmers are exposed to contaminants while applying chemical inputs. By replacing such external inputs with locally made natural concoctions, inoculums, and decoctions, NF can reduce the incidence of non-communicable diseases, such as acute and chronic neurotoxicity, respiratory diseases and even cancer, which are associated with the use and application of inorganic chemicals in agriculture. Pesticides contain endocrine-disrupting chemicals (EDCs), which enter humans through diet and can have negative health impacts such as breast cancer, reproductive disorders, and poorer intellectual development in children.

Discontinuing chemical pesticides and fertilizers in fields will prevent run-off into water sources, further reducing communities' exposure to such chemicals.

Natural Farming products have a much higher nutritional content. Protein, amino acid, crude fat and other essential nutrient were about 300% higher than ordinary products. Chemical residue such as nitrate is almost undetectable in Natural Farming produce. A research study on 'Assessment of Post NF effects on the Health and Nutrition Profile of Households' through interviewing 570 households spread across 8 pilot districts and 19 clusters of Andhra Pradesh revealed that almost 80% of the NF families have experienced improvement in gastric problems, Hypertension and Diabetes post NF consumption. All the NF households revealed improvement in stamina and improvement of health in their infants post NF consumption.

Perception of HHs on Health post NF consumption



*Source: Assessment of Post NF effects on the Health & Nutrition profile of households
(December 2019)*

Eliminate the Application of Chemical Inputs

The indiscriminate use of chemical fertilizers and pesticides is a threat to soil and environment. This has adversely impacted the crop response ratio and created an imbalance of nutrients in the soil. The crop response ratio has reduced from 58.00 percent in the last six decades. The ideal ratio of the three major plant nutrients, Nitrogen, Phosphorous, and

Potassium of 4:2:1 is disrupted.

A report by CEEW states that Non-Zero Budget Natural Farming (ZBNF) farmers use three times more urea and DAP per acre than ZBNF farmers. It also highlights that farmer practicing rice cultivation using ZBNF can avoid 83–99 percent of various fertilizers consumption. The expected urea use for ZBNF rice farmers is 0.59 kilograms per acre (kg/acre) and for non-ZBNF farmers is 74.46 kg/acre, resulting in 73.87 kg/acre of avoided urea consumption. (CEEW – “Can Zero Budget Natural Farming Save Input Costs and Fertiliser Subsidies- Evidence from Andhra Pradesh”)

The fertilizers that can be avoided through ZBNF are mentioned below

Fertilizer	Rice	Groundnut	Maize
Urea	99.2	69.5	84.9
DAP	98.5	90.9	78.4
SSP	82.9	58.3	79.8
MOP	99.8	47.7	24.6
Complexes	90.4	44.4	67.4

Source: Can Zero Budget Natural Farming Save Input Costs and Fertiliser Subsidies- Evidence from Andhra Pradesh, January 2020

Environment Conservation

Over the past 50 years, greenhouse gas (GHG) emissions resulting from ‘Agriculture, Forestry and Other Land Use’ (AFOLU) have nearly doubled, and projections suggest a further increase by 2050 (Tubiello *et al.*, 2014). The largest share of global methane and nitrous oxide emissions is contributed by Agriculture as per the studies of FAO. Excessive use of fertilizers in conventional farming has significantly contributed to global greenhouse gas (GHG) emissions and climate change. The number of greenhouse gases (GHGs) emitted per nutrient ton of fertilizer produced is 1.1 metric tons of CO₂/nutrient ton in 2016. The climate change will have an impact on global food security and may affect the nutritional properties of some crops. Under conditions of elevated levels of carbon dioxide, the concentrations of minerals in some crops (e.g., wheat, rice and soybeans) can be up to 8 percent lower than normal. Protein concentrations may also be lower, while carbohydrates are higher (FAO, 2015). A meta-analysis of 1090 studies on yields (primarily wheat, maize, rice and soybeans) under different climate change conditions indicates that climate change may significantly reduce yields in the long run.



Natural Farming aims to reduce risks associated with uncertainties of climate change by promoting the adoption of an agroecology framework. It encourages farmers to use low-cost home-grown inputs, eliminate the use of chemical fertilizers, and industrial pesticides. It has shown evidence of increased resilience of farmlands along with protecting crops against extreme weather conditions by improving the fertility and strength of the soil. Natural Farming fields / crops / orchards show especially strong resistance to climatic fluctuation. During the Pethai and Titli cyclones of 2018, the crops cultivated through Natural Farming in Andhra Pradesh, showed greater resilience to heavy winds than conventional crops.

A study by CEEW on “Zero Budget Natural Farming for the Sustainable Development Goals Andhra Pradesh, India”, observed that during a bout of cyclonic winds in Vishakhapatnam in 2017, paddy crops withstood the winds and water-logging much better than adjacent non-NF (Zero-Budget Natural Farming) paddy fields. This aspect would help minimize the revenue losses to the farmer due to adverse climatic conditions.

Similarly, the CSE study on “State of Organic and Natural Farming in India- challenges and opportunities” also states that most farmers felt that NF had improved the overall resilience of crops to adverse climatic conditions.

Rejuvenate Soil Health

Natural Farming is not simply farming without chemical fertilizers and pesticides, but rather it is organic farming with the added dimension of exploiting beneficial microorganisms to enhance soil quality and soil health. It employs the use of natural bio-inoculums instead of chemical fertilizers and pesticides. This revives the soil microbiota and in turn, improves soil health. Rejuvenating the soil micro-organisms through the use of bio-inoculums and natural pesticides helps to enhance the nutrient content of the plant leading to better bioavailability for humans. This agro-ecological intervention has a nutrition-sensitive approach and exhibits linkages between soil health, plant health, and animal health. It increases the population of earthworms and beneficial insects, improving the germination rate, allowing deeper penetration in the roots, and make soil better disease resistant. The concoction prepared using the technique of Jivamrit using cow dung, cow urine, jaggery, pulse flour, water, and soil has proved to multiply the number of soil microbes.

Resilience

Climate change poses critical risks for farmers, and endangers the soil, water, and



other resources on which food production depends. Rising temperatures have already intensified droughts, heat waves, and cyclones, making it harder to grow crops. In this context the crops grown under natural farming methods show great resilience to droughts and cyclones. The changes in soil structure with the help of organic carbon, no/low tillage and plant diversity are supporting plant growth even under extreme situations like severe droughts and withstanding severe flood and wind damage during cyclones. NF impacts many farmers positively by imparting resilience to the crops against weather extremities.

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