

Natural farming:

A socio-ecological approach for sustainable livelihood

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Himachal Pradesh is the only state in India where the government has achieved significant progress in creating academic programs and procedures to implement natural farming at the community level. Natural farming technique is a cutting-edge approach to agriculture that places a focus on sustainability and traditional methods. The technique uses little tillage, growing sequential legume and pulse crops, and utilizing local farm bio-resources. Additionally, it promotes the preservation of soil, water, and biodiversity resources. Concern over the negative environmental effects of conventional agricultural methods, such as the use of synthetic fertilizers and pesticides, soil erosion, and biodiversity loss, has grown in recent years. Natural farming promotes ecologically sustainable farming methods that are advantageous to farmers and the environment as a whole as a solution to these issues. This case study focuses on Shimla fruit growers who have demonstrated a high net return on adopting natural farming crop combinations over conventional farming including, apple + French bean + vegetables (₹5,81,867) in rainy (kharif) season and apple + pea (₹2,2042.2), apple + pulses + vegetables (₹21,926.4) and apple + pea + vegetables (₹20,140.3) in winter (rabi) season over conventional farming.

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Agriculture is the primary source of livelihood covering half of India's population. Farmers use a variety of agricultural practices, such as subsistence, shifting, plantation, intensive, dry, and wet cultivation, and terracing, depending on the kind of soil, climate area, geographic location, and irrigation facilities available. Amazingly, a wide variety of foods and other agricultural products are grown using a wide variety of farming techniques. Recently, agroecological farming has become popular because it draws on traditional knowledge that is deeply rooted and intertwined with the land, its bio-resources, and climatic conditions, as well as is reflective of socio-cultural needs. The idea of nutri-sensitive agricultural innovation, which is designed using natural farm inputs, can be a financially viable strategy

to cultivate nutrient-rich crops for consumption by the community to promote good health and well-being. This farming method has been shown to be the most effective paradigm and provides a way to boost farmer's income, ensure better health, protect the environment, use less water, reduce production costs, eliminate the usage of synthetic chemical inputs, and restore soil health.

The Hon'ble Prime Minister, Sh. Narendra Modi Ji envisioned that natural farming shall be most beneficial to 80% of the agrarian community having small land holdings of 2 ha or less. However, in our nation, groundwater is used to irrigate nearly 60% of the arable land, making it a valuable resource in times of environmental crisis. Natural farming would thereby encourage groundwater recharging

for the next generations. Through the Prakritik Kheti Khushal Kisan Yojana (PK3Y) Scheme of the Central Government, more than 1.5 lakh farmers now work on more than 20,000 ha of land spread across the State's various agroclimatic zones and practice natural farming. Dr Yashwant Singh Parmar University of Horticulture and Forestry at Nauni-Solan, Himachal Pradesh, has been working persistently to develop and explore natural farming methods. The University is acting as a Resource Centre for imparting training to scientists of different KVKs across the country and practitioners for a demonstration of natural farm practices.

Natural farm approach

Natural farming, often known as traditional farming, uses no chemicals. The agricultural system

uses a diverse, agroecology-based strategy and incorporates agri-horticultural crops, forest trees, livestock, and functional biodiversity. It is also known by other names like Zero Budget Natural Farming (ZBNF), Subhash Palekar Natural Farming (SPNF), Chemical Free Agriculture, low input, etc. This alternative farming method focuses more on soil productivity in an organic approach intended to promote long-term soil, plant, and human health. It is a new dimension for sustainability and increased farmer income and is regarded as the basis of crop diversity in terms of fruits, vegetables, spices, medicinal plants, and aromatic plants in mixed farming. ZBNF is zero cost or zero input natural farming, whatever, the quantity is harvested is treated as net profit to the farmer. To preserve ecological balance and encourage soil health, this zero-cost farming employs organic inputs. Native-breed cattle are a crucial component of rural agricultural households and are needed for this strategy. According to this method, one cow is sufficient to begin farming on 30 acres of land. SPNF has lots of potential for low-income farmers. This method supports the complete abolition of synthetic chemical inputs, including fertilizers and insecticides. It promotes the use of mulching methods, symbiotic intercropping, and natural combinations created from cow dung, cow urine, jaggery, pulse flour, etc.

Jeevamrit, Beejamrit, mulching (acchadan), and Waaphasa are the four main components of natural farming to rehabilitate the soil. The natural plant protection products namely, Agniaster, Brahmaster, and Neemaster, among others, are made from cow dung, cow urine, and green chillies. Jeevamrit's formulation improves the soil's natural microbial biota and earthworm activity. It is made up of soil, water, jaggery, pulse flour, cow dung, and urine. Cow dung and urine are combined in the second formulation, i.e. Beejamrit, which is used to treat seeds, seedlings, and other planting material. The third formulation

is known as achchadana, which is a mulching method that uses three different types of mulch including straw mulch, soil mulch, and live mulch. It serves as a barrier to water evaporation and aids in the development of soil humus. The fourth and last one is Whapasa, which is a way of maintaining the soil's air and water molecules. It aids in lowering the additional watering consumption. Natural farming methods can help farmers to become less reliant on external inputs and enhance their social and economic well-being. It encourages the use of locally accessible resources and increases crop diversification, it can also boost food security.

Case study

In 2016–17, Himachal Pradesh adopted the natural farming method. Later, the State Government changed the name of ZBNF to Subhash Palekar Natural Farming System. In all 12 districts of the state, 53,951 farmers have accepted the SPNF model (partially), with an objective to train 50,000 farmers in the financial year 2019–20. The Himachal Pradesh government introduced the PK3Y Scheme of the Central Government to motivate farmers towards natural farming.

It seeks to reduce cultivation costs and increase farm income for farmers' overall and long-term welfare and prosperity. Agricultural Technology Management Agency, Shimla provided data of farmers natural farming, from which 30 farmers from each of the three blocks of Jubbal, Kotkhai, and Choupal in the Shimla district of Himachal Pradesh were selected by purposeful sampling. The possible apple-based crop combinations adopted by farmers are depicted in Table 1.

Socio-economic analysis was performed between conventional and natural farming systems under different intercrops. The study inferred a significant output with high net returns in area under natural and conventional farming systems. The highest net return in *kharif* was observed in the crop combination of apple + pulses + vegetables (₹17,251) for the non-bearing area, for the initial fruiting year crop it was (₹2,04,352), for the main fruiting trees area (₹5,83,918), for above 30 years year crop (₹5,76,293). In the *rabi*, apple+ pea was high with ₹46,735.2 in the non-bearing period, ₹51,276.8 in initial fruiting years, ₹22,042.2 in main fruiting years, and ₹32,664.8 for above 30 years

Table 1. Major apple-based crop combinations in rainy (*kharif*) and winter (*rabi*) season under natural farming of sampled households

<i>Kharif</i> season	<i>Rabi</i> season
<i>French bean + Other vegetables</i>	<i>Vegetables + Pulses</i>
French bean + Capsicum	French bean + Kidney French bean
French bean + Tomato	French bean + Cabbage + Blackgram
French bean + Cabbage	Maize + Kidney French bean
French bean + Garlic	Tomato + Kidney French bean
French bean + Cauliflower	French bean + Cauliflower + Blackgram
French bean + Broccoli	French bean + Blackgram
French bean + Potato	Pea
French bean + Brinjal	<i>Vegetables + Peas</i>
French bean + Maize	Pea + Kidney French bean
French bean + Coriander	Pea + Cauliflower + Kidney French bean
<i>Pea + Other vegetables</i>	Potato + Garlic + Kidney French bean
Apple + Pea + Cabbage	Pea + Garlic + Kidney French bean
Apple + Pea + Cauliflower	Cabbage + Kidney French bean
Apple + Pea + Garlic + Onion	Pea + Potato + Chickpea
Apple + Pea + Garlic + Capsicum	Pea + Onion + Chickpea
Apple + Pea + Potato + Garlic	Potato + Garlic + Kidney French bean

(Table 2). Low net returns have been observed in conventional farming as compared to natural farming.

Economic implications

The adoption of natural farming practices can have potential economic benefits for farmers. The practice can be a viable approach to reduce input costs through the maximum use of locally available resources to enhance farm net profits substantially. The sustainable practices utilized in natural farming enhance crop productivity and quality, leading to better market prices for organic and eco-friendly produce. Furthermore, natural farming encourages crop diversification, allowing farmers to spread their income sources and reduce their reliance on a single crop. This diversification strategy offers a buffer against crop failures, providing farmers with a more stable income.

Way forward

The way forward for promoting natural farming can be accomplished by supporting and promoting it through various schemes and initiatives. Financial incentives, training programs, and research grants can encourage more farmers to adopt natural farming practices. The government should collaborate with agricultural universities and



Apple-based vegetable intercropped combinations under natural farming

research institutions to improve innovative practices and crop combinations that suit local conditions. Steps should be taken to facilitate market linkages for farmers practicing natural farming which create a demand for organic and eco-friendly products in the markets. Highlighting and sharing success stories can also inspire and motivate others to adopt similar practices. By implementing these strategies, Himachal Pradesh and other regions can further promote natural farming as a viable and sustainable alternative to conventional farming.

SUMMARY

There is increasing evidence that natural farming is a more effective and sustainable method of farming than conventional farming. The net returns per 100 plants were high in all combinations in natural farming systems. During the first few years of the *kharif* season, apple + French bean + vegetables get net return of ₹21,572 and apple + pulses + vegetables get net return of ₹2,04,352.30. In the same way, for every 100 plants for each crop combination in the *rabi* season, the net returns were ₹51,276.84, ₹40659.07, and ₹33,016.19, respectively. The net returns of natural farming were consequently higher than those of conventional farming for all crop combinations. Through a variety of extension services, the government must put initiatives to promote the use of this approach and develop eco-friendly habitats. In addition, farmers must voluntarily accept ZBNF practices within their farming enterprises.

Table 2. Comparison of net returns under natural farming system and conventional farming systems (₹ per 100 plants)

Crop combination	Non-bearing (0–7)	Initial years (8–12)	Main years (13–30)	Above 30 years
<i>Kharif in Natural farming</i>				
Apple + French bean + Vegetables	17205	215572	581867	547475
Apple + Pulses + Vegetables	17251.8	204352	583918	576293
<i>Rabi in Natural farming</i>				
Apple + Pea	46735.2	51276.8	22042.2	32664.8
Apple + Pulses + Vegetables	35991.1	40659.1	21926.4	22510
Apple + Pea + Vegetables	48460.1	33016.2	20140.3	23852.9
<i>Conventional farming</i>				
Apple + Pea + French bean + Vegetables	-22161	288029	544817	504671

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