

Economic assessment of natural farming over conventional methods in Himachal Pradesh, India

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India's agricultural sector has achieved record-breaking food grain production while grappling with significant challenges such as soil degradation and an over-reliance on chemical inputs that threaten its long-term sustainability. The present study examines the effectiveness of natural farming over conventional farming practices in the Kangra district of Himachal Pradesh. Key metrics such as cultivation costs, crop yields, and net returns were focused on using the data collected from a primary survey. The findings indicate that natural farming achieves a cropping intensity of 190.62%, while conventional farming reaches 136.12%, suggesting more efficient land utilisation. Additionally, natural farming typically incurs lower cultivation costs, primarily due to the use of locally sourced inputs. For the *kharif* season, the vegetable–pulse combination in natural farming produced the highest net farm income of ₹ 27,092, compared to ₹ 18,978 from conventional paddy farming. However, challenges like limited market access and labour intensity remain persistent. This study highlights the need for supportive policies to enhance the adoption of natural farming practices, promoting both profitability and environmental sustainability.

Keywords: Conventional farming, cost of cultivation, economic analysis, Himachal Pradesh, natural farming.

AGRICULTURE plays a pivotal role in India's economy, employing 45.5% of the workforce and contributing 18.3% to the gross value added, with a growth rate of 3.3% (ref. 1). In 2022, India produced a record 3288.52 lakh metric tonnes of food grains². Despite these achievements, the country ranked 71st out of 113 countries in the Global Food Security Index 2022 (ref. 3), underscoring a persistent gap in nutritional security. This calls for agricultural practices that not only enhance food production but also improve its quality. India also ranks 12th globally and 3rd in Asia in pesticide usage, following China and Turkey⁴. While the Green Revolution made India a food-surplus nation, it brought challenges such as escalating input

costs, health risks, soil degradation, water scarcity, and stagnating yields⁵. These issues, exacerbated by market volatility and climate change, have made agriculture less profitable and have spurred a shift towards more sustainable farming practices. In Himachal Pradesh, agriculture remains vital, with 71% of the population engaged in farming, contributing 30% to the state's GDP⁶. The region's soils, rich in organic matter, phosphorus and potassium but low in nitrogen, are particularly suited for natural farming (NF). The availability of nutrients in these soils supports yields during the transition phase, and the use of organic inputs further enhances soil fertility. As such, the region presents ideal conditions for adopting sustainable agricultural methods⁷. Zero budget natural farming (ZBNF), pioneered by Subhash Palekar, offers a promising alternative to conventional farming (CF)⁸. ZBNF emphasises local inputs like cow dung and urine, and practices such as crop rotation, intercropping, and mulching. The core principles are Jeevamrita (microbial solution), Beejamrita (seed treatment), Acchadana (mulching), and Whapasa (moisture regulation)⁹, which promote soil fertility and reduce dependency on chemical inputs.

In Andhra Pradesh, ZBNF has delivered remarkable outcomes, reducing cultivation costs by 3% to 41% while boosting yields by 6% (ref. 10). Studies indicate that ZBNF does not lead to short-term yield declines when compared to CF, although outcomes may vary by regions¹¹. In Himachal Pradesh's Solan district, ZBNF has enhanced both crop productivity and soil health, although challenges such as labour shortages and inadequate transportation infrastructure continue to hinder progress¹². To promote broader adoption, the Himachal Pradesh government has rebranded ZBNF as Subhash Palekar Natural Farming (SPNF) under the 'Prakritik Kheti Kushhal Kisan Yojna' (PK3Y)^{13,14}. This initiative aims to lower farming costs, improve soil fertility, and boost farmer incomes, offering a sustainable path for agricultural development. However, the adoption of ZBNF continues to face several barriers, such as limited farmer awareness, insufficient training, and apprehensions regarding short-term economic returns⁴. Additional obstacles include the availability of critical inputs like cow dung, the labour-intensive nature

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