

Performance of vegetable crops under Natural farming

Natural farming is a chemical-free farming approach. It is a diversified agricultural system based on agroecology that mixes crops, trees, and animals with functional biodiversity. Natural farming can also be helpful to revive the rural economy, which highly depends upon cash crops like vegetables crops. This article reveals that returns were high and cost was less in natural farming vegetable crop cultivation as compared to conventional farming.

WHEN the entire planet is under the threat of climate change, India likewise falls into a high-risk group for this disaster. India is the world's rising economy today, but it also has limited natural resources. However, India's expanding population is a source of concern. More and more of India's population is reliant on natural resources for a living; their relationship is entirely based on climate-sensitive activities such as agriculture, horticulture, forestry, and fishing, all of which are directly related to water, land, biodiversity, and farming on the mainland. With developing economies, industrialization, urbanisation, commercial agriculture, and expanding capabilities of energy producers, primarily through non-renewable energy. India is on the way to become a developed country, raising the probability of greenhouse emissions in the future years. According to research by the Ministry of Earth Sciences of the Government of India, the average temperature in the nation has risen since the middle of the 20th century, although monsoon rainfall has dropped. Maximum temperatures have risen, as have rainfall and drought, strong cyclones have increased, and the monsoon cycle has changed. Today, India ranks third

in the world in terms of greenhouse gas emissions, trailing behind only China and the United States. If current trends continue, carbon emissions in India might reach 3.7 billion tonnes by 2030.

India ranks fifth in terms of agricultural carbon emissions, with livestock excreta accounting for 54.6% of emissions, agrochemical fertilisers accounting for 19.1%, paddy cultivation accounting for 17.5%, poor manure management accounting for 6.7%, and crop burning accounting for 2.1%. According to a 2014 report published in the Environment Journal, it takes 1000 years to develop the top 3 cm of the soil; presently, one-third of the world's land has turned barren owing to agricultural chemicals. If agricultural chemicals are employed in this manner, 100% of the land will be uncultivable within 50 to 60 years. According to a research report, residues of numerous agricultural pesticides have been identified in 2.5% of food grains, which is extremely hazardous to human health and poses a significant issue for India. According to a Down to Earth report from 2017, just 1.2% of rural youth aspire to pursue agriculture as a career, and only 0.5% of students enrolled in agricultural graduating institutions. Every day, 2000 farmers leave farming, according to the 2011 census. Agriculture now accounts for one-third of rural family income, whereas it accounted for almost three-fourths of rural household income in 1970. Today's farmer is looking for a sustainable farming approach that can lower his agricultural costs while increasing output and profitability. The alternative approach branded as 'organic farming' not only lowered the average farmer's productivity, but also raised agricultural costs in comparison to chemical farming, therefore every farmer in the country is seeking for such a farming method that may enhance the farmer's revenue. It should not only enhance agriculture, but it should also be the most environmentally friendly farming system. Natural farming can alleviate agricultural and environmental concerns, according to scientific evidence. Natural farming is based on the agro-ecological principles given here.





- **Diversity:** Diversification is essential for agro-ecological transitions to assure food that conserves, preserves, and enriches natural resources.
- **Co-creation and information sharing:** Agricultural technologies that are co-created through participatory procedures adapt better to local concerns.
- **Cooperation:** The formation of synergies improves essential functions in food systems, enhancing production and delivering various ecological services.
- **Efficiency:** Agro-ecological approaches generate more while using fewer external resources.
- **Recycling:** More recycling implies more agricultural produce at a lower cost, as well as lower economic and environmental expenses.
- **Resilience:** Improving the resilience of individuals, communities, and ecosystems is critical to the long-term viability of food and agricultural systems.
- **Human and social values:** Preserving and enhancing rural livelihoods, fairness, and social well-being are critical for the long-term viability of food and agricultural systems.
- **Culture and food traditions:** Ecological agronomy helps with food security and nutrition while also maintaining ecosystem health by promoting healthy, diversified, and culturally appropriate diets.
- **Responsible governance:** Responsible governance is accountable for sustainable food and agriculture by determining effective governance structures at many

Table 1. Comparison between natural and conventional farming

(Per ha)

Crop Combination	Natural Farming				
	Crop equivalent yield (Qtl)	Cost of Cultivation (₹)	Gross Return (₹)	Net Return (₹)	BC Ratio
Tomato-capsicum-frenchbean	196.52 (3.83)	104098 (-23.90)	334084 (3.83)	229986 (24.34)	3.2
Tomato-frenchbean	203.73 (7.64)	95684 (-30.05)	346341 (7.64)	250657 (35.51)	3.6
Capsicum-frenchbean	246.49 (13.67)	114625 (-38.19)	517629 (13.67)	403004 (49.30)	4.5
Pea-cauliflower	162.71 (2.00)	98528 (-14.14)	211523 (2.00)	112995 (22.00)	2.1
Pea-cabbage	234.52 (12.08)	109585 (-12.18)	281424 (12.08)	171839 (36.05)	2.6
Crops	Conventional Farming				
	Yield	Cost of Cultivation (₹)	Gross Return (₹)	Net Return (₹)	BC ratio
Tomato	189.27	136788	321759	184971	2.4
Capsicum	216.85	185461	455385	269924	2.5
Cauliflower	159.52	114760	207376	92616	1.8
Cabbage	209.24	124784	251088	126304	2.0

Figures in paratheses are % change as compared to conventional farming.

stages ranging from local to national to global.

- **Circular and solidarity economies:** Circular and solidarity economies that connect producers and consumers present new ways to living within our circles, setting boundaries, and promoting sustainable growth while maintaining inclusive and social foundations.

According to a Himachal Pradesh latest study, in natural farming the per cent total cost of cultivation has fallen in apple by 56.5%; wheat 28.1%; cereals and pulses 14.3%; cereals, pulses and vegetables 26.46%; fruits, pulses and vegetables 45.5%; and vegetables and pulses by 20.4%. Also, in natural farming the per cent net return in wheat increased by 63.6%, followed by apple 27.4%; pulses and vegetables increased by 21.5%; cereals, pulses, and vegetables increased by 18.8%; fruits, cereals and pulses increased by 16.1%; and vegetables and pulses increased by 11.8%. According to the research, farmers are cultivating nine crops at the same time, which also meets the purpose of agricultural diversity. Himachal's vast range of agro-climatic conditions, topographical changes, and altitude differences, along with fertile, deep, and well-drained soils, encourage the growing of vegetable crops. The state's agro-climatic characteristics are favourable for the development of cash crops such as tomato, potatoes, pea, capsicum, off-season vegetables, ginger, garlic, etc. From 2011 to 2018 approximately 32% area under vegetable cultivation has increased.

Comparison between natural and conventional farming

Natural farming producers also cultivate vegetable crops in a variety of combinations to preserve the nitrogen balance of the field, and producing vegetables in intercropping minimizes the risk of market price fluctuations. Survey research under Dr. YSP University of Horticulture and Forestry, Nauni, Himachal Pradesh revealed that natural farming producers were growing vegetable combination with one leguminous crop tomato-capsicum-frenchbean, tomato-frenchbean, capsicum-frenchbean, pea-radish, pea-carrot, pea-potato-garlic, turmeric-frenchbean, garlic-frenchbean, pea-cauliflower and pea-cabbage, etc. The cost of cultivation and returns of major crop combinations were also analysed and it has been found that cost of cultivation reduced in all combination.

The per cent increase in the yield per hectare between natural farming and conventional farming were measured. In conventional farming system, growers were practicing mono cropping, so yield of per hectare was taken and for natural farming crop equivalent yield per hectare was taken because of intercropping farming pattern of natural farming. Study revealed that % increase in the yield of natural farming combinations were 3% in Tomato-capsicum-frenchbean, 7% in Tomato-frenchbean,



13% in Capsicum-frenchbean, 2% in Pea-cauliflower and 12% in Pea-cabbage. Cost of cultivation per hectare in natural farming were decreased by 23% in Tomato-capsicum-frenchbean, 30% in Tomato-frenchbean, 38% in Capsicum-frenchbean, 14% in Pea-cauliflower and 12% in Pea-cabbage. Also, increase in income was 24% in Tomato-capsicum-frenchbean, 35% in Tomato-frenchbean, 49% in Capsicum-frenchbean, 22% in Pea-cauliflower and 36% in Pea-cabbage. Vegetable production through natural farming technique showed positive response economically, so it be concluded that farmers should adopt the natural farming technique to produce vegetables.

Way forward

In response to the increasing reliance on technology-driven agriculture, there is a growing trend toward natural farming. This is notably evident in the use of eco-friendly plant protection technologies and the pursuit of a balance between technological usage and environmental effect. India can achieve food and nutrition sufficiency and the UN's target Sustainable goal of Zero Hunger (SDG 2) by adopting natural farming systems. As a result, it is proposed that a liberal policy be formed to give direction in order to expand the adoption of natural farming technology in rural areas, in order to accomplish the aim of doubling agricultural income and the UN SDG of No Poverty (SDG 1). By supporting creative market linking mechanisms for natural farming producers, as well as new standards on Sustainable Food Systems such as fair price accounting, transparency between farmers and customers, the development of formal models such as FPOs, and the use of information technology. Natural farming practices may be pushed globally as a viable agro-ecology paradigm. Natural farming cropping systems might be presented to develop a fully contemporary and internationally integrated agricultural paradigm for chemical-free food production worldwide.

For further interaction, please write to:

Rohit Kumar Vashishat (Research Scholar), Agricultural Economics, UHF Nauni, Himachal Pradesh 173 230. *Corresponding author email: prohitvashishat@gmail.com