

Natural farming: Embracing ecological approach for holistic development in an agro-climatic region of Bihar

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Natural farming, widely recognised as an agroecological and regenerative approach, is gaining global attention for its potential to produce safe, nutritious, and high-quality food while maintaining ecological balance. The approach seeks to enhance soil biological activity and long-term fertility through the use of locally available, low-cost, and farm-derived resources. Key practices include the regular application of cow dung- and cow urine-based formulations, efficient recycling of crop residues, incorporation of leguminous crops as intercrops and soil cover, pre-monsoon dry sowing, judicious use of irrigation, and management of soil moisture and aeration through appropriate water application. By conserving and enhancing the diversity of beneficial organisms within and around agricultural fields, it promotes greater ecological complexity and resilience. Thus, natural farming builds upon the inherent biological and ecological processes of farm ecosystems, seeking to sustain crop productivity while improving soil health, biodiversity, resource-use efficiency, and environmental sustainability.

Keywords: Crop diversification, Ecological balance, Nutritional security, Production sustainability

INDIA has substantial scope to gradually transition part of its conventional agricultural land to organic and natural farming (ONF) without compromising domestic food security. With annual agricultural output growth of 3.5% and demand growth of 2.8%, around 2% of cultivated land could potentially be converted to ONF annually, even considering an estimated 30% yield penalty. Although lower yields may reduce exportable surpluses, a phased and regionally suitable transition could avoid major domestic supply-demand imbalances. Under these assumptions, nearly 20% of India's agricultural area could potentially be brought under ONF by 2030, supported by measures that maintain productivity, food security, and farmers' economic returns. In addition to several financial incentives for environmentally

friendly products, India has undertaken numerous initiatives to support natural farming, including capacity building, input support, and technology demonstrations to farmers and other stakeholders.

Benefits of natural farming

- Rejuvenate soil fertility, structure, and microbial life by avoiding synthetic chemicals, promoting organic matter, and improving water retention to enhance soil health.
- Eliminate the need for costly external purchased inputs (fertilisers, pesticides) by using local, on-farm resources like *jeevamrit*, *bijamrit*.
- Boost farmers' economic resilience through lower expenses and potentially higher yields from healthier soil.
- Maintain diverse crop systems, integrate livestock (especially

local breeds), and encourage natural habitats for beneficial insects and microbes.

- Efficiently use land, water (through mulching/moisture retention), and natural resources.
- Build resistance to climate change impacts and ensure food security through sustainable, balanced systems.
- Produce nutrient-rich, chemical-free food, reducing health issues from pesticide residues.
- Involve farmers in research, capacity building, and documentation of practices to create a self-reliant system.

A progressive farmer in Bihar's Bhojpur district is leading a quiet revolution by practising natural farming, a method that revives soil health, reduces input costs, and ensures safe food for us. Krishi Vigyan Kendra (KVK)

Bhojpur has played an important role in his journey by providing motivation and training in bio-input production, mulching, and (soil moisture/aeration balance concept in natural farming), supplying high-quality seeds and technical guidance for crop diversifications, facilitating visits to successful farms, and supporting market linkages and the promotion of natural farming products. He envisioned his farm as a demonstration unit for the district. This success story is the result of Mr. Ravish Ranjan's dedication and KVK's technical support working in tandem.

Story of Ravish Ranjan

Mr. Ravish Ranjan, son of Late Shri Indu Shekhar Chaudhary, from Kosihan village, Block Koilwar, District Bhojpur, Bihar is one of the shining examples of a farmer who has adopted natural farming. At the age of 50, he has not only secured his own livelihood but

has also become a role model and resource farmer, inspiring hundreds of others to adopt natural farming. Ravish Ranjan grew up in a farming family where agriculture was the mainstay of life. Like other farmers of his village, he was also relying on conventional farming using chemical fertilisers and pesticides. Yields were good in the beginning years, but year by year he noticed the soil becoming hard, increasing incidence of insect-pest attack and the cost of cultivation rising at an alarming rate. By 2018, he gradually realised that farming had become more of a burden than a source of livelihood. Income margins were shrinking and health concerns regarding chemical-laden food also weighed heavily on his mind. It was during this time that he was introduced to the concept of chemical free farming through the guidance of the KVK, Bhojpur, Bihar. Inspired by training and exposure visits, he decided to experiment

with natural farming practices on a small portion of his land. What he started as an experiment has now turned into a life-changing journey.

Ravish Ranjan has adopted a holistic approach that combines crops, horticulture, intercropping, mulching, water management and animal integration. He has developed a 3-acre land as a 'Natural Farming Renovation Centre' on his farm, which serves as an instructional unit to other farmers. He emphasises farm-made bio-inputs, ensuring zero dependence on external chemical fertilisers or pesticides. By adopting micro-irrigation systems and mulching techniques, he conserves water while improving soil health. His farm is not only for production of crops but also a learning platform for visitors, progressive farmers and farm women, *Krishi Sakhis*, extension functionaries and agricultural students from several places. His approach is distinctive

Jeevamrit

- Ingredients: 10 kg cow dung + 10 L cow urine + 2 kg jaggery + 2 kg pulse flour/besan + handful of soil for 200 L water
- Fermented for a week while stirring three times a day in a shaded barrel
- Used as liquid fertiliser by further diluting in water as foliar application or fertigation

Ghanjeevamrit

- Solid form of *jeevamrit*
- Ingredients are same except water is not added and cow urine is gradually added as per need to form solid discs

Beejamrit

- Used as seed treatment to protect from soil and seed borne diseases
- Ingredients: 5 kg cow dung + 5 L cow urine + 50 g lime + a handful of soil + 20 L water
- Fermented for 12-24 h in shade

Bio-inputs under natural farming

Neemastra

- Prepared by fermenting crushed neem leaves (5 kg), indigenous cow dung (2 kg), and cow urine (5 L) with water (100-200 L) for 24-48 h
- Used as foliar spray against sucking pests after filtering

Brahmastra

- Crushed leaves of neem, karanj, custard apple, castor, papaya, pomegranate, and other locally available plants mixed with 20 L cow urine and cow dung, followed by boiling the mixture on low heat with regular stirring until it becomes concentrated
- Later fermented for 24-48 h before filtering and then stored
- Effective against borers and caterpillars

Preparation method of bio-pesticides

Table 1. Comparative yield and economics of natural farming vis a-vis traditional practices in different crops at farmers' field

Crop and variety	Economics									
	Yield (q/ha)		Cost of cultivation (₹/ha)		Gross return (₹/ha)		Net return (₹/ha)		B:C ratio	
	Natural farming	Traditional farming	Natural farming	Traditional farming	Natural farming	Traditional farming	Natural farming	Traditional farming	Natural farming	Traditional farming
Rice (Chandan-1121)	45.34	44.86	31,686	37,253	1,13,350	1,07,170	81,664	69,917	3.58	2.88
Wheat (Sriram-303)	40.75	40.04	29,760	35,481	1,10,025	103,503	80,265	68,022	3.70	2.92
Bajra (NBH-27)	29.41	27.90	22,831	26,142	85,289	77,422	62,458	51,280	3.74	2.96
Proso-millet	13.67	11.58	18,354	21,788	61,515	49,794	43,161	28,006	3.35	2.29

for its vision of making farming not only a profitable model of business for himself but also replicable for others.

Ravish cultivates a diverse set of field crops including paddy, wheat, potato, pulses, oilseeds and minor millets. These crops are selected keeping in mind soil fertility, water availability and nutritional needs of the family and local consumers. Further, by rotating cereals and pulses, he maintains nitrogen balance in the soil naturally. He also grows a range of horticultural crops like mango, guava and lemon. These provide year-round income and nutritional security. The mango and guava orchards are particularly successful, benefiting from mulching and bio-inputs. One of his successful models is lentil intercropped with mustard. This combination not only optimises land use but also enhances soil fertility and pest resistance. Intercropping reduces risks and provides farmers with diversified income streams. Along with crops, horticulture, and intercropping, Ravish Ranjan also practices green manuring to improve his soil fertility. He grows *dhaincha* (*Sesbania* spp.) and sunn hemp (*Crotalaria juncea*) in his fields during fallow periods and ploughs them back into the soil before flowering. This practice enriches the soil with organic matter, adds natural nitrogen through the process of biological nitrogen fixation and improves soil structure. It is one of the key reasons behind the sustained productivity and long-term health of his farm. Ravish uses mulching in his mango orchards. By covering the soil with crop residues and organic matter, he conserves soil

moisture, prevents weed growth, and enhances microbial activity.

He adopted *wapasa* and implemented micro-irrigation (sprinkler and drip irrigation systems) on his farm, primarily in the mango orchard and potato field. This ensures efficient water use, which is particularly important in a region with high irrigation costs. He owns two desi cows, which are essential to his natural farming methods to create *jeevamrit* and *beejamrit* (bio-fertiliser/seed-treatment formulations) and other bio-pesticides such as *neemastra* and *brahmastra*. This integration results in a closed-loop system that recycles waste into valuable inputs. This centre is frequently visited by neighbouring farmers, school children, agricultural students, and even policymakers. It serves as a practical training ground, allowing farmers to see results firsthand rather than just hearing about them in meetings.

Marketing strategy

Ravish understands that production is not the end of farming. Production must also engage customers. The marketing strategy focuses on establishing direct sales of chemical-free, naturally grown produce in neighbouring towns such as Ara, Danapur, and Patna. Bulk marketing is promoted through collaboration with farmer associations, non-governmental organisations (NGOs), self-help groups (SHGs), Kisan Clubs, and agricultural dealers. Fruits such as mango, guava, and lemon are marketed under distinct branding to differentiate them from conventionally produced commodities and may achieve a price premium of approximately 20–30% (practical view). The strategy also explores farm-to-home delivery models to improve market access, reduce intermediaries, and provide consumers with convenient access to farm commodities.



Distribution of natural farming inputs by KVK Bhojpur

Customers have grown to trust him as a result, and they prefer his produce for its flavour, freshness, and health benefits. Ravish's success has cascaded throughout his community. More than 150 farmers have visited his farm to observe natural farming practices firsthand. Many have started trial plots of natural farming under his mentorship.

Economic analysis

One of Ravish's most significant accomplishments is economic recovery. Farm-made alternatives to chemical pesticides and fertilisers resulted in a 40–50% reduction in input costs. Profit margins increased by 30–40%, owing primarily to higher prices and lower input costs. When compared to monocropping, the lentil–mustard model generated an additional ₹45,000/ha. Guava and mango orchards generate consistent annual profits with low

ongoing costs. In general, his farm is now more resilient, profitable, and safer than farms under traditional methods. He frequently shares bio-input preparation techniques and conducts field training sessions.

Chemical-free farming is becoming increasingly popular in Kosihan and the surrounding villages. Earthworm populations have increased, as has the amount of organic matter. Mulching and micro-irrigation helped to reduce water requirements. His family and customers can now access chemical-free food. In addition to cereals, the production of millet crops and pulses contributed to an improvement in nutritional status. More farmers now believe that natural farming is both profitable and sustainable.

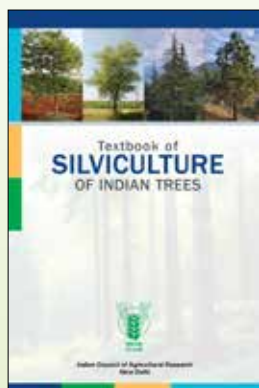
SUMMARY

Natural farming emphasises working in harmony with natural

processes rather than relying on synthetic chemicals and intensive external inputs. The advancement of natural farming requires strong government support through initiatives such as the National Mission on Natural Farming, along with farmer education, capacity building, and peer-to-peer learning. Strengthening research and development, market linkages including PDS integration and certification, and the integration of traditional knowledge with modern technologies such as agroforestry and water conservation are essential for wider adoption. These measures can help establish sustainable and economically viable farming systems while improving soil health and enhancing climate resilience.

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TECHNICAL ASPECTS

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