

KRISHI VIGYAN KENDRA, BOKARO

(Birsa Agricultural University, Ranchi)

Cultivating Vegetables through Natural Farming

Smt. Soni Devi, 29, is an innovative farmer from Aamtand Tola in Arjua village, Petarwar panchayat of Bokaro district. Her village is located 15 km from Petarwar Block and 48 km from the district headquarters. Arjua village is known for its successful agriculture, especially vegetable production. Most farmers here use large amounts of fertilizers and pesticides to control pests and diseases, as farming is the main occupation.



Although Soni Devi studied only up to 9th grade, her passion for agriculture led her to work alongside her family in farming. She initially joined PRADAN to support her family's income. However, in 2017, she began experimenting with organic farming to grow chemical-free vegetables on her own land. She owns 20 decimals of land but leased an additional acre nearby. Since 2017, she has also produced vermicompost on plastic sheets in significant quantities for her own use. She noticed that using vermicompost reduced her need for chemical fertilizers, improved crop quality, and lowered pest infestation. Additionally, she realized that buying chemicals was expensive and harmful to both the soil and the environment.

Through training and awareness programs at KVK Bokaro, Soni Devi learned about Natural Farming and became motivated to pursue it. Since she was already using organic materials, she adopted natural farming in 2023. She learned to prepare natural farming inputs at KVK Bokaro and now makes them at home. Soni Devi is now skilled in preparing Agniastra, Neemastra, Brahmastra, Jeevamrit, and Beejamrit, which she uses on her own fields instead of chemical fertilizers and pesticides. She also sells these products to other farmers and at local fairs for Rs. 50 per litre, helping to popularize natural farming. She uses these inputs to grow cucumber, sponge gourd, tomato, and lobia in open fields.



Identifying Entrepreneurial Competencies

Horticulture scientists at KVK Bokaro held a brainstorming session with natural farming trainees and analyzed Soni Devi's technical and managerial skills. Her eagerness and strong learning abilities made her well-suited for natural vegetable farming.

Systematic Capacity Building and Awareness by KVK Bokaro

Soni Devi attended a training program on natural farming at Krishi Vigyan Kendra, Bokaro, where she received thorough training before starting systematic natural farming under KVK Bokaro's guidance and support in 2023. The list of programs conducted by KVK Bokaro for natural farming is provided below.

S.N	Date	Programme	Duration in days	No. of participants
1.	12.01.2023	Training on Natural farming	1	33
2	04.03.2023	Training on Natural farming	1	38
3	21-23.07.2023	Training on Natural farming	3	60
4	18.01.24-20.01.24	Training on Natural farming	3	60
5	29.01.24-31.01.24	Training on Natural farming	3	60
6	05.02.24-07.02.24	Training on Natural farming	3	80
7	12-14.02.2024	Training on Natural farming	3	80
8	22-24.02.2024	Training on Natural farming	3	80
9	13-18.03.2024	Training on Natural farming	3	60
10	26-28.03.2024	Training on Natural farming	3	60
11	04.05.2023	Awareness programme on Natural farming	1	75
12	4.07.2023	Awareness programme on natural farming	1	75
13	14.07.2023	Awareness programme on natural farming	1	75
14	02.08.2023	Awareness programme on natural farming	1	75
15	11.08.2023	Awareness programme on natural farming	1	75
16	24.08.2023	Awareness programme on natural farming	1	225
17	28.08.2023	Awareness programme on natural farming	1	75
18	11.09.2023	Awareness programme on natural farming	1	75
19	13.09.2023	Awareness programme on natural farming	1	75
20	15.09.2023	Awareness programme on natural farming	1	150
21	15.01.2024	Awareness programme on natural farming	1	300
22	19.01.2024	Awareness programme on natural farming	1	150

Additional Natural Farming Demonstrations by KVK Bokaro

In addition to the previously mentioned programs, KVK Bokaro organized 12 natural farming demonstrations at both farmers' fields and the KVK farm. The details of these demonstrations are presented below:

S.No.	Crop(s)	Location of Demonstration	Area (acres)
1	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Soni Devi, Aarajua, Petarwar BRC	1.0
2	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Jyoti Baske, Aarajua, Petarwar	1.0
3	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Sukh Deo Manjhi, Mayapur, Petarwar	1.0
4	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Sheela Devi, Angwali, Petarwar	1.0
5	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Hira Lal Hansda, Chatugadda, Mayapur	1.0
6	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Bandhan Manjhi, Chatugadda, Mayapur	1.0
7	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Bharti Devi, Gaga, Aarajua, Petarwar	1.0
8	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Pramila Devi, Gaga, Aarajua, Petarwar	1.0
9	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Lokesh Tuddu, Chatugadda, Mayapur	1.0
10	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Shanti Devi, Gaga, Aarajua, Petarwar	1.0
11	Paddy, Mandua, Maize, Tomato, Brinjal, Bhindi, Ole	Shankar Soren, Tand, Balidih	1.0
12	Paddy, Tomato, Brinjal, Bhindi, Cucurbits	Rameshwar Tuddu, Tand, Balidih	1.0

Smt. Soni Devi actively participated in these training and demonstration activities, conducting a demonstration on one acre of her own land.

Since 2019-20, Smt. Soni Devi has attended the majority of training programmes on vegetable cultivation at KVK Bokaro. During these sessions, she engaged closely with resource persons to gain in-depth technical knowledge and practical skills essential for successful vegetable farming. She is recognized as a keen learner and effectively implements new echnologies and practices in her field.

To further enhance her expertise, Smt. Soni Devi received several follow-up, on-campus training programmes focusing on high-value vegetable cultivation on natural farming. She was provided with comprehensive support for the preparation and application of natural farming inputs such as Beejamrit, Jeevamrit, Neemastra, Brahmastra, and Agniastra, following a structured schedule. Additionally,



she was supplied with critical inputs including seeds, seedlings, mulching materials, and other necessary support to help establish a successful natural farming enterprise with KVK's assistance.

Her collaboration with KVK Bokaro has been instrumental in developing a successful natural farming model, particularly for bell pepper production under protected cultivation.

Farmer's Natural Farming Schedule

In August, the transplanting of Cucumber, Bodi, and Jhinga (sponge gourd) was recommended so that harvesting could continue until January of the following year. Before transplanting, Jeevamrit was applied to the soil. Raised beds were then prepared, and seedlings were transplanted at a spacing of 30 cm between plants and 45 cm between rows.

A detailed schedule of natural liquid sprays was also followed. Initially, seeds were treated with Beejamrit. After transplanting, Jeevamrit was applied once a week. In alternate weeks, a mixture of Jeevamrit was used. This schedule was repeated regularly throughout the growing season.

To control insect pests, Agniastra and Neemastra were applied as needed. The use of natural farming practices increased soil fertility and significantly reduced the incidence of insect pests and diseases in both polyhouse and open field conditions.



Overcoming Challenges

In the initial years, the farmer faced many difficulties in cultivating vegetables through natural farming, as both the concept and practices were entirely new and challenging for her. Scientists from KVK conducted regular visits and provided timely guidance and support to help her overcome these challenges and move towards successful entrepreneurship. With the assistance of KVK scientists, the farmer was able to standardize effective agro-techniques for vegetable production using natural farming methods. However, issues such as irrigation problems and excessive rainfall created obstacles during the early stages of adopting natural farming.



Visit of KVK Scientist Horticulture in farmers field

Support from KVK and Overcoming Market Challenges

The horticulture scientists at KVK assisted by developing a concise set of agro-techniques tailored to the local agro-climatic conditions for vegetable cultivation through natural farming. One of the most significant challenges faced by the farmer was obtaining premium prices for high-quality produce grown using natural farming methods. In the general market, prices for vegetables were the same regardless of whether they were produced using chemical or natural farming practices. To address this, KVK facilitated connections between the farmer and various agencies involved in the marketing of natural farming produce.

According to the farmer, only a small amount was spent on purchasing besan (gram flour) and jaggery from the market to prepare Jeevamrit, which significantly reduced the overall cost of cultivation. In addition to polyhouse cultivation, natural farming methods were also applied in open fields for crops such as tomato, cucumber, and bodi. Demonstrating

scientific initiative, the farmer developed an automatic system for preparing and applying bio-formulations, thereby reducing the labor required for these processes.

Impact on Soil and Overall Influence

The farmer is pleased because natural farming has not only reduced the expenditure on chemical inputs but also enriched the soil with beneficial microorganisms. Most importantly, she feels a great sense of satisfaction knowing that she is providing safe and healthy food for her family and consumers.

Impact of Natural Farming on Soil Parameters

The following table presents the changes in key soil parameters before and after the adoption of natural farming practices:

S.No.	Parameter	Before Natural Farming	After Natural Farming
1	pH	6.53	6.75
2	Organic Carbon (OC)	0.57	0.62
3	Electrical Conductivity (EC)	0.556	0.567
4	Nitrogen (N) (kg/ha)	334.76	341.76
5	Phosphorus (P) (kg/ha)	22.13	22.33
6	Potassium (K) (kg/ha)	344.96	348.21

The data in the table clearly demonstrate that the adoption of natural farming practices has led to measurable improvements in soil health and fertility. After implementing natural farming techniques, the soil pH increased from 6.53 to 6.75, moving closer to the neutral range, which is optimal for most crops and supports better nutrient availability. The organic carbon content also rose from 0.57 to 0.62, indicating an enrichment of soil organic matter through the use of natural amendments such as Jeevamrit and compost. Electrical conductivity (EC) showed only a slight increase, from 0.556 to 0.567, which suggests that there is no harmful accumulation of salts and the soil remains suitable for crop growth. Notably, the levels of essential nutrients improved: available nitrogen rose from 334.76 kg/ha to 341.76 kg/ha, and phosphorus increased slightly from 22.13 kg/ha to 22.33 kg/ha. Potassium content also saw a small increase, from 344.96 kg/ha to 348.21 kg/ha. These positive changes highlight the benefits of natural farming in enhancing soil fertility, promoting healthier crop growth, and sustaining

productivity over time, even after harvest. This evidence supports the view that natural farming is an effective and sustainable approach to maintaining and improving soil health.

The farm of Smt. Soni Devi has become a model of progressive farming in the region. Many farmers, students, and agricultural professionals frequently visit her fields to observe the natural farming techniques she uses for vegetable cultivation. She has played an instrumental role in spreading these technologies to fellow farmers, who have greatly benefited from her scientific approach.

Smt. Soni Devi has presented her work on several occasions at the district level and has served as a trainer for natural farming. As a master trainer in natural farming within the block, she is recognized as an important resource person, and her expertise is sought after by farmers throughout the district.



Yield Comparison of Vegetables in Demonstration and Non-Demonstration Plots under Natural Farming Conditions

The table below presents a comparison of cost of cultivation and yield for various crops grown in demonstration (natural farming) and non-demonstration (conventional) plots:

Crop Season	Crop Name	Variety Name	Cost of Cultivation (Demo Plot) (Rs./ha)	Yield (Demo Plot) (qtl/ha)	Cost of Cultivation (Non-Demo Plot) (Rs./ha)	Yield (Non-Demo Plot) (qtl/ha)
Rabi 2023-24	Tomato	Laxmi	32,600	216	73,500	235
Summer 2023-24	Cucurbits	Haruna, Pali, Century Plus	24,500	108	65,500	189
Rabi 2023-24	Onion	Kalash	42,300	82	53,400	124

From the above table, it is evident that the yield from non-demonstration plots is higher for all crops. However, the cost of cultivation in the demonstration (natural farming) plots is nearly half that of the non-demonstration plots. This significant reduction in input costs makes natural farming a cost-effective and sustainable alternative, even when yields are slightly lower. As natural farming practices continue to improve soil health and fertility, yields are expected to increase over time, further enhancing profitability.

Financial Performance

The financial performance of an entrepreneur is a key indicator of overall success over time. With the support of KVK through training, exposure visits, and continuous guidance, Smt. Soni Devi's annual income has gradually increased, ranging from Rs. 0.5 lakh to Rs. 1.5 lakh.

The table below compares the cost of cultivation, yield, and income from demonstration (natural farming) and non-demonstration (conventional) plots:

Crop Name	Variety Name	Total Cost of Cultivation (Demo Plot) (Rs./ha)	Yield (Demo Plot) (qtl/ha)	Rate (Rs/qtl)	Yield Value/ha (Rs.)	Total Cost of Cultivation (Non-Demo Plot) (Rs./ha)	Yield (Non-Demo Plot) (qtl/ha)	Rate (Rs/qtl)	Yield Value/ha (Rs.)
Potato	Kufri Lalima	72,400	118	1,000	118,000	88,500	178	800	142,400
Tomato	Laxmi	32,600	216	1,000	216,000	73,500	235	800	188,000
Cucurbits	Haruna, Pali, Century Plus	24,500	108	1,000	108,000	65,500	189		

Natural farming has proven financially viable, especially for tomato cultivation, and offers the additional benefits of lower input costs and chemical-free produce. With ongoing improvements in soil management, profit margins for other crops are expected to rise, further supporting the sustainability and profitability of natural farming.

Year-wise Income from the Sale of Natural Farming Components Product (Rs./annum)

Year	Quantity Produced (Ltr.)	Sale Price (Rs./Ltr.)	Net Income (Rs.)	Remarks
2022	50	25	1,250	Demand is increasing yearly
2023	250	30	7,500	
2024	600	40	24,000	
2025	850	50	42,500	

Source of income: Sale of Jeevamrit, Beejamrit, Agniastra, Brahmastra, and Neemastra

The table above clearly shows a steady increase in both the production and sale of natural farming components each year. The growing demand is not limited to rural areas; it is also rising in peri-urban regions where people are cultivating kitchen gardens. This trend reflects a wider public preference for chemical-free vegetables, indicating the expanding market potential for natural farming inputs.

Lessons for Adopting Natural Farming

The use of chemical inputs in vegetable cultivation can cause both acute and chronic health problems in humans, including skin irritation, respiratory issues, neurological damage, reproductive harm, and an increased risk of cancer. Environmentally, chemical use can result in soil and water contamination, harm beneficial organisms such as insects and birds, and contribute to the development of pesticide-resistant pests. Overuse of chemicals also depletes soil fertility, creating a dependency cycle that requires increasing chemical inputs to sustain yields. Consumers can reduce their exposure by choosing produce from local farmers' markets, growing their own vegetables, or opting for organically grown options.

Smt. Soni Devi has set an inspiring example for rural youth, demonstrating that agriculture can be a sustainable and attractive source of income and livelihood when approached with modern techniques, passion, and dedication. She has proven that natural farming is not just a low- or zero-budget enterprise, but also a promising pathway to prosperity. Her determination to achieve higher farm income through innovative methods serves as a model for others to move beyond conventional farming, create new livelihood opportunities, and generate employment within their communities.