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Natural Farming: A Study of Farmers' Perceptions and Practices

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Abstract:
The growing concerns regarding chemical fertilisers and their health risks have shifted the policy focus and made Natural Farming a viable alternative. Natural Farming has proven useful in increasing crop yield, decreasing the utilisation of water and electricity, livestock integration, and enhancing soil fertility and biodiversity. However, there is scepticism around adopting this farming method due to a lack of scientific research, less exposure and willingness to shift from conventional chemical-based practices to natural farming. To understand farmers' perceptions and impact, a field survey was conducted in the Gaya District of Bihar State; there has been an attempt to study and understand the perceptions of farmers practicing the System of Root Intensification method of Natural Farming. This study aims to fill the research gap in farmers' adoption of natural farming practices. The study shows that most farmers who adopt natural farming practices are satisfied. More women than men have adopted this practice. Most of the farmers are small and marginal farmers who have benefitted from this farming method. The study also highlighted the major challenges and ways forward for adopting and promoting natural farming among farmers.

Keywords: Natural farming; SRI; PKVY; BPKP; APCNF

1. Introduction

India has achieved food self-sufficiency and security through Green Revolution era-led policies. However, these resource-intensive systems are unsustainable, considering the depletion of natural resources, loss of biodiversity, and climate change. The rising cost of cultivation is also an important issue that needs to be addressed to improve the livelihood of the farmers' community in India, which comprises 85% of small and marginal farmers owing less than 2 ha of land. The prime challenge for conventional agriculture is to ensure food and nutritional security to an increasing population in a way that ensures sustainable utilisation of available natural resources while at the same time reducing the environmental impact and preserving natural resources for future generations. According to the Union Agriculture and Farmers Welfare Ministry, approximately 60,000 tonnes of chemical pesticides were used annually between 2017-18 and 2021-22. Using such a high amount of chemicals in agriculture increases various types of water, air, and soil pollution, harming biodiversity and human health. Chemical inputs used in agriculture adversely affect the health of both farmers as well as consumers and have a negative impact on natural resources.

Natural Farming is being suggested and practised as an alternative to chemical-based farming methods in the country. Nearly 2.7% of the area (10 lakh ha) has been brought under natural farming in India, Andhra

Pradesh leading the implementation of natural farming through the Andhra Pradesh Community Managed Natural Farming (APCNF) program (Sharma et al., 2023). Natural farming is a chemical-free farming method that uses natural inputs like *Bijamrit*, *Jivamrit*, and *Ghanjivamrit* in the crop instead of chemical fertilisers. Multiple crops and intercropping are also utilised in this method of farming. India has a rich heritage of traditional farming practices that are environment-friendly and less resource-intensive, and the principles of natural farming can be traced back to ancient Indian knowledge repositories such as *Vrikshayurveda, Krishi Parasara, Kautilyas Arthsasthra,* etc.

Natural farming is one of the several approaches towards sustainable food production, and it is practised in various regions by inventing their own way of local practices using on-farm/ locally available inputs, and it is free from chemical fertilisers and pesticides. It is considered an agroecology-based diversified farming system integrating crops, trees, and livestock with functional biodiversity. This practice has many indigenous forms in India, and the farmers practice this farming system in their own ways. This movement is primarily a rural movement supported by the marginal, small, medium, and large farmers and further scaled up by the government. The government of India is promoting Natural Farming through the scheme known as "Bharatiya Prakritik Krishi Paddhati' (BPKP), introduced during the year 2020-21, which is a sub-scheme of Paramparagat Krishi Vikas Yojana (PKVY) to promote including natural farming.

System of Root Intensification (SRI) is one of the innovative approaches towards natural farming advocated and implemented by the Government of Bihar and PRAN (Preservation and Proliferation of Rural Resources and Nature), an NGO in Bihar. The SRI is a resource and climate-smart agroecological approach that enhances the productivity of crops such as paddy, wheat, mustard, and many others by modifying the management of plants, soil, water, and nutrients, thus making it resource-efficient. SRI method of natural farming is based on four major principles that are interrelated to each other, i.e., (i) healthy seed material and plant establishment; (2) reduced plant density/seed material per unit area; (iii) improved soil conditions through enrichment with organic matter; and (iv) reduced irrigation water demand.

Objectives

To understand farmers' perceptions and the impact of natural farming through the SRI method on crop yield, cost of cultivation, natural resource conservation, and perceived benefits on farmers' livelihoods in comparison with intensive or conventional farming in Gaya district of Bihar.

Methodology

The primary survey was carried out in nine (9) villages namely Navada, Naknupa, Saudpur, Dohari, Gaya, Chitela, Saidpur, Behradig, and Ghaghari of different blocks i.e., Tankupa, Bodhgaya, Mohanpur, Sherghati, Gurua, and Manpur comes under the jurisdiction of Gaya district of Bihar state in the year 2022-23 (Fig. 1). The information was collected from 63 farmers practicing natural farming with the help of a pretested, well-structured interview schedule, while secondary data were obtained through literature review.

Fig. 1: Map of the selected district, and Blocks

The questionnaire included closed-ended questions in multiple-choice format so that respondents had to select only the appropriate answers that best described their opinion or attitude on a particular issue. The questionnaire contained four main sections (i). information on the socio-economic characteristics of the farmers, including age, gender, education level, source of income, etc., (ii). farmers' perception of the cost of practicing the SRI natural farming method, (iii). yield comparison between natural farming and conventional farming, and (iv). farmers' views on changes in soil health, biodiversity and natural enemies in natural farming. In addition, a remark column was also included in the questionnaire to identify the issues and challenges farmers face in adopting natural farming and marketing their produce at remunerative prices. Farmers were chosen randomly for the interview, and their participation was optional. A detailed discussion was held with the CEO, PRAN NGO and their staff, who promoted natural farming through the SRI method in the district. The primary information was collected, compiled, classified, and concluded using a simple percentage method of statistics.

3. Result & Discussion:

3.1 Socioeconomic status of the survey respondents:

Out of 63 farmers surveyed practicing natural farming with SRI, 47 were female, and 16 were male farmers. The average age of the farmers was 38 years, and the average family had seven members. Most of the farmers are small and marginal categories and reported their primary source of income is agriculture and livestock is a major secondary source of income reported by 96.83 per cent of respondents (Table 1).

Table 1: Socio-Economic status of the respondents

Variable	Frequency	Percentage
Age (years)		
0-24	1	1.59
25-30	14	22.22
31-40	26	41.27
41 and above years	22	34.92
Average age	**37.98**	
Total	**63**	**100.00**

Gender		
Male	16	25.40
Female	47	74.60
Education		
Illiterate	56	88.89
Schooling	5	7.94
Collage	2	3.17
Source of income		
Agriculture (primary)	63	100.00
Secondary		
Livestock	61	96.83
Business	2	3.17

It was observed that women's involvement in agriculture is higher, particularly when the landholding is small. In the study area, most female farmers belong to the marginal category. As reported by the respondents, men are involved in non-farm activities away from the village, and women continue farming on their small piece of land. It was found that all the farmers were satisfied with the SRI method of natural farming and reported that their livelihood improved after switching to natural farming when compared to another method of farming. One of the respondents stated, "*We used to spend all our bare minimum earnings from other sources in purchasing costly inputs like fertilizers, pesticides, seeds, etc. After switching to the SRI method of natural farming, we don't have those expenses, and the yield is also better now. Besides, we are happy that, we are eating safe and healthy food in the family*".

3.2 Cost of practicing the SRI method of natural farming:

Compared to the conventional farming method, where costly inputs (seeds, fertilizers, and pesticides) are being used, the SRI method of natural farming requires less or minimal cost for cultivation. Farmers use locally available inputs, such as *Bijamrit (seed treatment), Jivamrit*, *Ghanjivamrit, Acchadana (mulching), and Whapasa (moisture)*. Besides, the majority of farmers reported using cattle dung and decomposed farm waste as an input to enhance soil fertility. All the respondents reported that the cost of seeds was reduced significantly as the quantity of seeds used in the SRI natural farming method was comparatively lower. For example, around 40 kgs of paddy seeds per acre is used in a conventional farming system, while in the SRI natural farming method, only around 2 kgs are used. The critical and very important practice with the SRI natural farming method is healthy seed selection using the local screening method. Also, very young seedlings are used to preserve the plant's inherent growth potential for rooting and tillering. Transplanting single seedlings per hill is done quickly, carefully, and skillfully to avoid any

root trauma, which is the key to plants' success. The above practice reduced their expenditure on seeds significantly. Besides, labour use is also significantly less as plant density at the time of seedling is very less. Further, respondents reported that the land preparation cost was also reduced compared to an intensive farming system, as the farm waste is used as natural mulch. also, stubbles are not removed and burnt, but the farmer transplants seedlings in the presence of stubbles, which preserves the soil moisture in case of paddy cultivation. The SRI method uses all the natural waste generated on-farm as inputs for the next season. All the farmers reported that their cultivation cost was significantly reduced after adopting the SRI natural farming method (Table 2).

Table 2: Cost of practicing under SRI method of Natural Farming

Particulars	**Deceleration reported by the respondents**		
	>50%	<50%	No change
Cost of cultivation	29 (46.03)	34 (53.97)	0.00
Cost on Fertilizers	63 (100.00)	0.00	0.00
Cost on Pest & Disease Management	61 (98.83)	0.00	2 (3.17)
Cost on Land preparation	63 (100.00)	0.00	0.00
Cost on Seeds	63 (100.00)	0.00	0.00

3.3 Yield & income comparison between natural farming and intensive farming:

All the respondents reported a significant increase in the yield in natural farming practices. In addition, more than 90% of the respondents reported more than 50% acceleration in the yield and income, with special reference to rice & wheat.

Particulars	**Acceleration in Yield reported by the respondents**		
	>50%	<50%	No change
Yield & income of crops under SRI-NF	57 (90.48)	06 (9.52)	0.00

3.4 Soil health, biodiversity and natural enemies in natural farming:

The respondents highlighted a significant improvement in soil health due to not using chemical fertilizers or pesticides and using livestock-based manures. Earthworms, honeybees, bird nests, and beneficiary insects are a common sight in natural farming fields. Around 69% of the respondents strongly agreed that there is improvement in the soil health at their farm where natural farming is practiced. In addition, 31% of the respondents agreed there is an improvement in soil health. One of the farmers mentioned that "*after switching to the SRI method of natural farming, the earthworm population is increased in the soil, and also honey bees, butterflies and other insect population increased*".

About 82% of respondents reported that there is improvement in the beneficial microorganisms in the soil, besides 69% of the respondents agreed that there is improvement in the beneficial insects (predators, parasites, pollinators) in the SRI method of natural farming. However, 17% of the farmers reported they don't observe improvement in the natural enemies and beneficial insects in the natural farming field. Further, 58% of the respondents reported decreased pest and disease incidence on the crops in natural farming, and 42% reported pest and disease incidence was the same as in conventional/intensive farming.

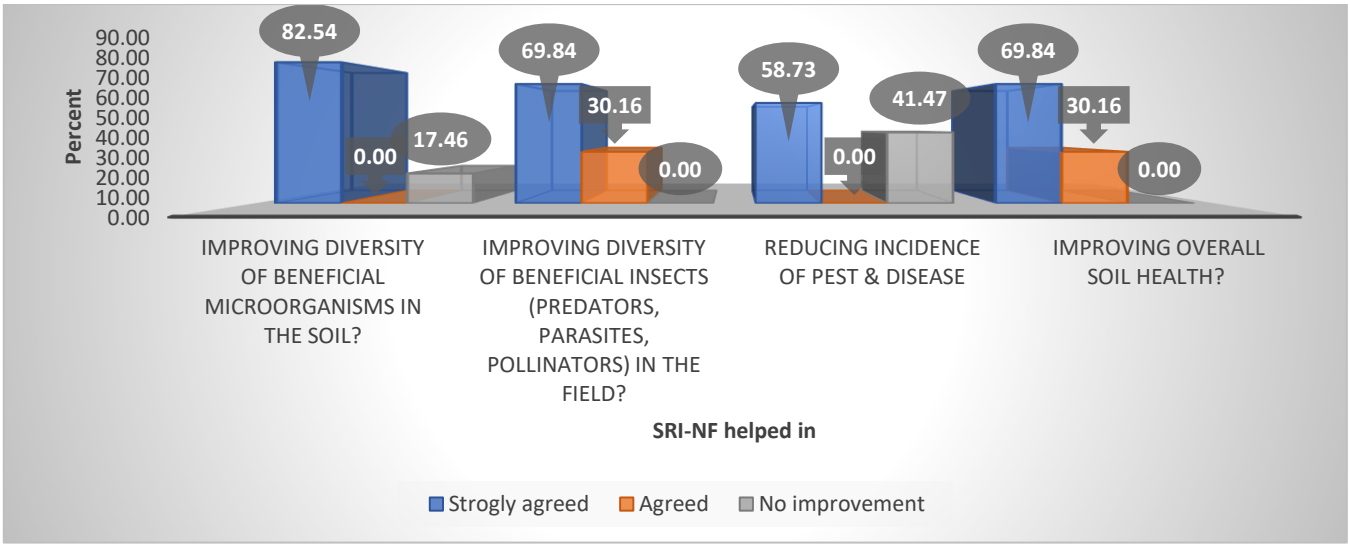

Fig.: Soil health, biodiversity and natural enemies in natural farming

4. Perceived Challenges in Continuing Natural Farming

Natural farming is a niche in the scale of production, and farmers are keen on adopting natural farming practices due to increased cost of production (fertilizers, agrochemicals, seeds, etc.), soil health deterioration, decline in groundwater resources, etc. However, there is a lack of information/knowledge about natural farming practices.

Besides, one of the major challenges all the respondents reported was that there is a lack of a separate market for naturally grown products, and also, there is no price premium for the same. Further, respondents highlighted separate markets and recognition for naturally grown products, which may act as a pull factor towards bringing more and more area under natural farming.

Farmers also revealed that the SRI natural farming method suits small and marginal farmers. It was noticed during interactions that some farmers misinterpreted concerns regarding SRI, and SRI is a more rigorous and exact regime that needs precision-timed operations and constant supervision. Further, the unavailability of skilled labour is another foremost concern reported by the respondents.

5. Conclusion and Way Forward

Based on the filed survey involving 63 farmers who are practicing natural farming through the SRI method and a discussion held with the CEO of PRAN NGO, Gaya, Bihar, it can be concluded that the SRI method of natural farming is performing better in terms of increased yield, particularly in wheat and rice. Besides, there is a decrease in the cost of production by minimal use of fertilizers, pesticides and seeds. Further, farmer's perceived benefits, such as improved soil health, biodiversity and natural resource conservation in natural farming as against intensive farming, is recorded. It is observed that a majority of the farmers who are practising natural farming are small and marginal farmers with an average household size of 7 members per family. It has also been noticed that natural farming is best suited for small and marginal farmers who have livestock. Based on findings and challenges faced by the farmers, the following strategy is suggested for the adoption and promotion of natural farming.

5.1 Differentiated market for naturally produced products: Due to the lack of a separate market for naturally grown products, they are sold in the same market as that of chemically produced products. Consumers cannot distinguish between both of them clearly, and eventually, there is a lack of demand for

naturally produced products since they are priced slightly higher than their counterparts. Therefore, the brand and awareness of the product are the keys to promoting such produce.

5.2 Enhancing recognition and certification systems: A recognized certification system should be in place to properly recognize naturally grown products. It would help the consumers distinguish between naturally produced agricultural products and chemically produced agricultural products. A certification system would provide proper authenticity to naturally produced products, which are healthier for the consumers and the ecosystem.

5.3 Creating awareness regarding naturally produced products: The market base of Natural Farming is increasing every day, but there is still less knowledge among consumers regarding its enormous health benefits relating to the consumption of unadulterated food and water. Most farmers are also unaware of its enormous benefits, like increased yield, reduced cost incurred on agricultural inputs, improved soil and water health, and lesser water utilisation. So, there is an emerging need to increase awareness about it, both among farmers and consumers.

5.4 Sale of products in Haats: Improve post-harvest management, processing for value addition, and create marketing infrastructure. Naturally grown products can be marketed and sold in Haats after providing them proper recognition and certification. It may lead to an increase in their visibility and sales, ultimately reaping profits for the farmers, and the same may lead to more farmers shifting towards Natural Farming methods.

5.5 Export opportunities: Export of natural products- The export standards of different countries may be identified in collaboration with the Ministry of External Affairs and Embassies of other countries in India. Standards for natural products may be developed by APEDA to facilitate the export of natural products.

5.6 Identify the area and collaborate with Gaushalas and Poultry Farms: The state has more area under rainfed agriculture may be identified as a priority district/block for adopting and promoting Natural Farming. Areas in clusters may be identified through state governments and farming practices may be implemented using the ATMA network/ state departments based on the priority areas.

1. **Capacity building and inputs supply**

- Awareness and capacity building at all levels, including that of State officials, KVK officers, NGOs / FPOs / SHGs / Pashu Sakhi / Krishi Sakthi / agripreneur, etc., through workshops, seminars, trainings, exposure visits coordinated or organized is important.
- Ensuring availability of inputs through coordination between farmers and those who rear livestock for the seamless supply of inputs, formation of village-level SHGs, FPOs, and Gaushalas.

2. **Creation of Natural Agricultural Tourism Zones**

Along Special Agricultural Zones and Agricultural Economic Zones, a Natural Agricultural Tourism Zone may be developed in those areas where Natural farming is being practiced, or farmers are willing to do the same. The farming system can be promoted alongside our rivers. Agro and ecotourism may be promoted through organized weekly haats and markets.

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