



The Role of Zero Budget Natural Farming in Enhancing Rural Household Income and Sustainability

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Abstract

The impacts of the natural cropping system on rural families in Agra, India are investigated in this research. Many believe that natural farming, and more specifically Zero Budget Natural Farming (ZBNF), may have a positive effect on rural communities' economies, ecosystems, and social fabric. According to the study's findings, natural farming boosts profit margins and offers more steady revenue via crop diversity by lowering input costs by doing away with artificial pesticides and fertilizers. Natural farming practices have a positive impact on the environment because they encourage the use of bio-fertilizers and compost, which promote soil health, water retention, and biodiversity. Socially, it helps people eat healthier food by lowering their chemical exposure, and it empowers communities via programs that teach people new skills and share what they've learned. Natural farming has the potential to increase economic stability, environmental health, and social well-being for rural people, but it faces constraints including early production unpredictability and market access limitations. Evidence from Agra supports this claim. According to the research, natural farming may help farmers and the environment in the long run if given the proper resources in Agra.

Keywords: Natural farming, Cropping System, Rural Households, Zero Budget, Natural Farming

Introduction

Agriculture plays a crucial role in sustaining approximately 58% of India's population. In the fiscal year 2020, a substantial amount of 19.48 lac crore, equivalent to \$276.37 billion in United States dollars, was contributed by the agriculture, forestry, and fishery sectors. Furthermore, during the same fiscal year, agriculture and its related industries accounted for 17.8 percent of India's gross value added at constant prices. There is a possibility that Indian consumer spending could see a rise of 6.6% in 2021. Over the past decade, India's global agricultural exports share has grown from 1.71 percent in 2010 to 2.1 percent, as projected by the Ministry of Commerce for the year 2021.

Following the onset of the Green Revolution in the 1960s, there was a significant expansion in the agricultural sector of the country. This event was a defining moment in

India's agricultural history. The Green Revolution led to the adoption of fertilizers and plant protection chemicals, the substitution of hardy plant varieties with hybrids and high-response ones, the construction of massive irrigation systems to water more arable land, and the consolidation of agricultural holdings, all aimed at increasing agricultural production. Despite being the world leader in food production, India has a relatively low ranking on the hunger index. The Green Revolution had a detrimental effect on the agriculture industry in India, causing damage to the biological operation of the soil, crop diversity, cultivation costs, groundwater deterioration, loss of flora and fauna, increased human diseases, malnutrition, and decreased soil fertility. These negative effects were a result of decreased soil fertility and increased use of pesticides and fertilizers. Consequently, small-scale farmers find themselves in a debt trap due to investing in expensive goods, leaving them without enough money to cover their expenses. In response to the negative effects of pesticides on the environment and the ecosystem, the government has tightened laws, and there has been a growing campaign to stop the use of pesticides. Despite legally permitted maximum residual levels for food, there is a growing movement to avoid products that include pesticides due to concerns about their impact on health.

To put a stop to the problems that had surfaced during the Green Revolution, a scientist named Subhash Palekar presented in the year 2006 in the state of Maharashtra in India a method of farming that was climate-resilient and did not involve the use of any chemicals. It wasn't until farmers started utilizing his methods that they gained widespread recognition. Following this, a multitude of studies and reports indicated that natural farming, as opposed to chemical farming, has a positive effect on sustainable development, either directly or indirectly. This was the conclusion reached by the researchers. Natural farming seeks to achieve the goal of returning to agricultural practices that were in use before to the "Green Revolution" while simultaneously reducing production costs by a significant amount.

OBJECTIVES

1. To study natural farming.
2. To study cropping system's effect.

Methodology

Research Design

In this study, a mixed-methods research technique is used in order to get a comprehensive understanding of the influence that the natural agricultural cropping system has on rural households in Agra, India. Combining qualitative and quantitative methods is the approach that this strategy takes in order to collect a wide range of useful information.

Data Collection Methods

Sample Selection: A selection method known as stratified random selection was used to choose fifteen hundred rural Agra households that were involved in natural agriculture methods. It was necessary to stratify the sample in accordance with farm size, crop type, and amount of time spent engaging in natural farming practices in order to ensure that all segments were well represented.

Questionnaire: A systematic questionnaire was used to examine a number of factors, including yields, income levels, soil health indicators, and water usage. Input prices were also another variable that was measured. A combination of open-ended and closed-ended questions was included in the survey in order to collect quantitative data as well as the views of the participants.

Qualitative Methods:

Semi-Structured Interviews: 30 stakeholders, including farmers, agricultural extension agents, and representatives from non-governmental organizations, participated in the study. We wanted to get a deeper understanding of the viewpoints, challenges, and experiences that are associated with organic farming, and these interviews were designed to do that.

Focus Groups:

Focus Group Discussions: Natural farming was the subject of two independent focus groups, each consisting of 10 farmers, and the topics that were discussed were the social elements, the consequences on the community, and the means of information transmission.

Field Observations:

On-Site Visits: On a regular basis, the farming practices, crop conditions, and soil health of farms that engaged in natural farming were subjected to monitoring. While we were on these excursions, we took pictures and gathered samples of the dirt.

Secondary Data:

Literature Review: A review of the relevant literature, which included government documents, academic studies, and case studies on natural farming in India, was conducted by me in order to provide context for the findings and to provide the study with support.

Results and Discussion

Socio-economic characteristics of sampled households

Size and Structure of the Sampled Households in the Study Area

The size of the family and the composition of the family are two factors that influence the harvest output. The breakdown of the homes that were included in the sample for the study can be found in Table 3, which can be found here. On average, there were 5.28 persons in a family, with men accounting for 51.64 percent, women for 39.66 percent, and children for 8.70 percent. 5.35 was the average number of members in a family among farmers, with 5.35 being the fewest number among small farmers, 5.30 being the average among medium farmers, and 5.21 being the average among marginal farmers. According to the findings, the nuclear family group accounted for 66.67 percent of all families in the area under investigation. It was highest among small farms (47.06 percent), followed by marginal farms (30.30 percent), and then medium farms (20 percent).

Table 2 | Demographic profile of sampled households in the study area (No.).

Particulars	Farm category			
	Marginal	Small	Medium	Overall
Family structure				
Joint family	10.00 (30.30)	8.00 (47.06)	2.00 (20.00)	20.00 (33.33)
Nuclear (amily)	23.00 (69.70)	9.00 (52.94)	8.00 (80.00)	40.00 (66.67)
Total	33.00 (100.00)	17.00 (100.00)	10.00 (100.00)	80.00 (100.00)
Family size				
Male	2.66 (51.16)	2.70 (50.55)	2.90 (54.72)	2.72 (51.64)
Female	2.06 (39.54)	2.23 (41.76)	1.90 (35.85)	2.09 (39.66)
Children	0.48 (9.30)	0.41 (7.69)	0.50 (9.43)	0.45 (8.70)

Average family size	5.21 (100.00)	5.35 (100.00)	5.30 (100.00)	5.28 (100.00)
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Literacy Status of the Sampled Households

It is a measure of a person's educational background and the amount to which they are able to contribute to the improvement of the social and economic conditions in their community if they are able to read and write. It is necessary for people to be read in order for them to move away from poverty and underemployment. This paves the way for educational opportunities and employment opportunities. A high literacy rate is a good indicator of a human resource base that has been improved quite a bit. When people are literate, they have a greater chance of being aware of new ideas, technologies, and technologies in general, as well as engaging with them. The literacy rates of the households that were sampled are listed in Table 3, which can be seen here. Table 3 demonstrates that the overall literacy rate for men was 89.70%, while the literacy rate for women was 77.52%.

Comparative Analysis of Natural Farming System and Conventional Farming System Yield.

Table 3 | Farm category-wise literacy status of sampled households (%).

Particulars	Marginal		Small	Farm categories		Medium	Overall	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiterate	11.11	21.62	8.70	20.93	9.68	21.05	10.18	21.32
Primary	5.56	10.8	2.17	20.93	32.26	0	9.58	12.50
Middle	21.11	17.57	21.74	11.63	12.90	21.05	19.76	16.18
High school	15.56	25.68	26.09	18.60	12.90	15.79	17.96	22.06
&Sec	18.89	12.16	21.74	13.95	9.68	31.58	17.96	15.44
Graduation	25.55	5.41	19.57	9.30	22.58	10.53	23.35	7.35
Non-school going (below 5 yrs)	2.22	6.75	0	4.65	0	0	1.19	5.14
Total	100	100	100	100	100	100	100	100

Literacy rate	88.64	76.81	91.30	78.05	90.3 2	78.95	89.70	77.52
Literacy index	2.00	1.90	2.30	1.73	1.58	2.26	2.00	1.90

The small farm group had the highest literacy rate, with males in the group having a rate of 91.30% and females having a rate of 78.05%. According to the data shown in Table 3, 21.55 percent of males and 7.35 percent of females had completed high school or higher on average. It is clear that the level of education is poor because the literacy index for males varied from 1.58 to 2.30 among different farm groups, while the index for females varied from 1.73 to 2.26. This indicates that the literacy rate is low. Increasing numbers of farmers have begun to place a higher priority on natural agricultural practices that do not pose a threat to human health. This is due to the fact that people are becoming more aware of the importance of improved medical treatment.

A natural farming system is one in which a single piece of land is used to cultivate a number of different crops. It is difficult to make a comparison between the economic produce of CF and that of NF because a multiple or mixed crop system involves the cultivation of a large number of different types of crops. In light of this, the concept of crop equivalent yield (CEY) was applied to a mixed cropping system in order to make a comparison of the production. All crop combinations had yields that are significantly higher when grown under NF as opposed to CF along the rows. When we take a look at Table 11, we can see that the NF system produced a yield that was between 49.20 and 208.45 q/ha higher than the CF system did for each and every crop combination available. It was during the Kharif season that the vegetable crop achieved its maximum yield, which was 208.45 q/ha. Over the course of the Rabi season, it rose and fell between 48.33 and 58.12 q/ha. The results demonstrated that the yield in all crop combinations under NF was higher than the output under CF, just as it did during the Kharif season's harvest. The 58.12 q/ha yield that was achieved by the combination of vegetable crops was the highest. It is was established that the CEY of the NF system was greater than that of the CF system. All of the crop combinations that are used in the NF system have a greater average yield when compared to the CF system. In comparison to the CF system, the NF system resulted in a yield gain of between 3.18% and 5.10% during the Kharif season.

This was the case for all crop combinations. The Rabi season yield gain ranged from 2.83% to 7.98%. During the Kharif season, the yields of the vegetable and cereal-pulse crops were at their peak, whereas the Rabi harvest was the time when NF was utilized. Tripathi and Tauseef (2018) reported that groundnut farmers who participated in zero budget natural farming (ZBNF) had an average yield that was 23% greater than those who did not participate in ZBNF. This discovery provided further evidence that further supported the findings that were previously presented. Through the utilization of ZBNF, paddy farmers had an average increase in yields of 6%. The ability of farmers to adapt to a changing environment is a byproduct of sustainable agricultural methods, and these increases are a direct result of the enhanced ability of farmers to adapt to changing environments. According to the findings of another study, the consumption of a combination of grains and pulses led to

a 17.22% increase in CEY. According to Chandel *et al.* (2021), this bigger increase can be attributed to the mutually beneficial impact that pulses have on cereal crop yield as well as the relatively low price of pulses.

Problems Faced by the Natural Farmers

Every every development process comes with its own individual set of constraints. Farmers who practiced natural farming in the Agra district also faced a variety of difficulties that were specific to their method of farming. The most major challenges include, but are not limited to, unfair market pricing, poor irrigation infrastructure, high pay rates, a lack of possibilities for training, and overall market inadequacy. For the purpose of analyzing constraints, we utilized Garrett's ranking technique. One thing that should be highlighted is that the purpose of these constraints was to influence the responses of all of the farmers who were included in the sample.

Garrett's Ranking Technique

For the purpose of this inquiry, we applied Garrett's ranking approach to establish the most and least essential issues based on the ranks that each difficulty achieved. Inadequate extension facilities; Unfair market prices for product; I. Labor-intensive; II. Higher wage rates; III. Lack of specialized markets; IV. Skilled labor shortages; V. Knowledge of practice packages; VI. Consumer awareness of NF produce; VII. Inadequate extension facilities; VIII. Unfair market prices for produce for a variety of reasons. Other usual problems include a dearth of public transportation options, inadequate irrigation infrastructure, and so on.

Conclusion

One of the most important aspects of organic farming is the practice of intercropping with legumes. Legumes are able to fix nitrogen from the air, which in turn increases the fertility of the soil and agricultural production. According to the findings, farmers experienced a reduction in the cost of production per hectare, as well as an increase in the production yield of their crops, which was profitable. When the farmers found out that natural farming practices are not only cost-effective but also good to the environment, they were pleased. The crop equivalent yield (CEY) under natural farming ranged from 3.08 to 5.10% during the Kharif season. However, during the Rabi season, it ranged from 2.83 to 7.98% across all crop combinations, which was the highest compared to conventional farming. Therefore, natural farming was the most effective method of crop production. In comparison to the CF system, the percentage reduction in cultivation costs that occurred under the NF system ranged from 12.56 to 30.73 during the Kharif season and from 6.86 to 12.34 during the Rabi season according to the NF system. NF systems produced the highest gross returns across all crop combinations, in contrast to CF systems, which produced the lowest earnings. The combination of vegetable crops resulted in the greatest increase in gross returns over the course of the two successive seasons.

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