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Sustainable Agriculture in India - Natural Farming Spreads Roots in Andhra Pradesh

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Abstract

Indian agriculture sector is the most vulnerable due to climate change challenges like uncertain rainfall and water stress and coupled with week economic status of the farmers. The Indian agriculture sector facing three different challenges, such that high cost of production, low production and productivity and degradation of natural resources with affected agroecological system. Now it evident that serious concerns raised about the future problems related to country with the present approach. Natural farming can produce nutritious food without harming the environment or the health of the soil. The Andhra Pradesh state was specifically chosen for the study since it has more than 750000 farmers that practice natural farming there. The secondary data have been used which is drown from the RySS and Indiastat and also related reposts, and the study referred various previous studies and research articles from the existing literature. The study investigates the spatial distribution analysis by using ArcGIS. And the study analyzed the yield and net returns of the natural and non-natural farming in the study area. Natural farmers will gain more from lower cultivation costs, higher crop yields, higher earnings, better, healthier, more nutrient-rich food, environmental preservation, and reduced soil erosion. In addition, ecological farming requires less capital, which lowers debt loads.

Keywords: Natural Farming, Sustainable Agriculture, Agroecological Practice, Agronomic Practice, Organic Farming, Green Revolution.

Introduction

Sustainable Agriculture (SA) has been identified as a global theme focusing on environmental and socio-economic challenges. International organizations such as the Food and Agriculture Organization of the United Nations (FAO) and the World Economic Forum, among others, are putting a lot of work into sustainable agriculture. Williams, Alter, and Shrivastava, (2018) argue that it is critical to initiate 'SA' in order to meet significant challenges posed by future generations for food and agriculture, as well as to establish a human-friendly agriculture system. He also stressed that climate change has had a negative impact on the planetary system, as well as its effects on agriculture production, productivity, and livelihood in developing countries. Priyadarshini and Abhilesh, (2020) have described, Indian economy as a developing nation, even India is agriculture dependent economy, the agriculture sector yet to develop. Indian agriculture sector is the most vulnerable due to climate change challenges like uncertain rainfall and water stress and coupled with week economic status of the farmers. The Indian agriculture sector facing three different challenges, such that high cost of production, low production and productivity and degradation of natural resources with affected agroecological system.

During 1960s the country adopted the Green Revolution (GR) model to increase food production. This model is input and chemical intensive model and it was focused on development of new variety seeds and rigorously used synthetic fertilizers and increased irrigation facilities for increase in food production. GR played an important role to boosting self-reliance and it took roots of food security in India. Since 1960s the GR, Indian agriculture has been heavily reliant on external privatized inputs such as chemical fertilizers and pesticides, but failed the sustainability and adversely effected natural resources such as decline in soil health, water scarcity and biodiversity loss and human and animal health concerns. Careless use of privatized agriculture inputs led to unforeseen consequence, such as loss of soil fertility, and over consumption of water etc. However, increasing cost of cultivation due to increase privatized agriculture inputs, decreasing prices of farm products and gradually decrease size of land holdings have largely negative effected in the Indian agriculture sector. Now it evident that serious concerns raised about the future problems related to country with the present approach.

Natural Farming in India

The Ministry of Agriculture and Farmers' Welfare recommended the agronomic practice like Zero Budget Natural Farming (ZBNF) as a chemical free natural method of farming wherein low cost of cultivation to achieve SA in India. In July 2018, National Institute for Transforming India (NITI Aayog) emphasized the scope for promoting Natural Farming (NF) in countrywide and the evidence from the Andhra Pradesh. Many states in the country have been initiated ZBNF as agroecological practice. Along with Andhra Pradesh, the states like Himachal Pradesh, Gujarat, Haryana, Karnataka and Kerala have been adopting and implementing the ZBNF method of farming practice to doubling the farmer's income.

According to the High-Level Panel of Experts on Food Security and Nutrition (HLPE) Report, ZBNF is the peasant movement which was started in Karnataka. The report estimated that about 100 000 farming communities are practicing ZBNF methods and millions of farming families are used this method at national level.

Question regarding economic viability of the Community Managed Natural Farming in (CMNF) are very important aspect from economic point of view; but there are remained unanswered questions to large extent in the agrarian society. The economics of natural farming in comparison to Conventional Farming in A.P. is the focus of a research by Kumar, C. P. (2021), which aims to close this gap. As awareness of environmental and health harms has grown in recent years, agriculture has begun to shift toward natural farming.

Objectives

The present study, would therefore, bring out the Agroecological practices towards SA in Andhra Pradesh in India and the status of natural farming in Andhra Pradesh, to work out the comparative analysis of yield per hector differences and net returns between the NF and Conventional Farming (CF) and to bring out the policy implications in the context of Natural Farming towards the sustainable agriculture in Andhra Pradesh.

The major objectives of this study are:

1. To examine the spatial distribution of Natural Farming practices in districts of Andhra Pradesh
2. To show the yield differences and net returns between the Natural Farming and Conventional farming

Methods and Materials

To accomplish the various objectives of the study, intended to cover Andhra Pradesh, where a greater number of farmers are adopted the NF practices by the supports of Rythu Sadhikara Samstha ((RySS), Government of Andhra Pradesh. The secondary data have been used which is drown from the RySS and India stat and also related reposts, and the study referred various previous studies and research articles from the existing literature. The available necessary data have been used for the presentation and interpretation to show status of natural farming in state. The study applied percentages and used the ArcGIS mapping software for spatial analysis and the analysis primarily aimed to understand the yield per hector and net returns between the CF and NF to draw inference as per the objectives of the study.

Literature Review

In his article, K. K. Tripathy, (2022) noted that consumers' preferences for organic and natural foods are expanding. Keeping this in mind, the Indian government encourages chemical-free, natural farming throughout the nation. The river Ganga will be chosen to promote organic farming methods. The Paramparagat Krishi Vikas Yojana (PKVY) Program, supported by the Government of India, is encouraged to promote traditional indigenous methods, including natural farming. 4.09 lakh hectares in India are currently used for natural farming. The article's conclusion is that it is urgently necessary to upgrade the facilities that are needed for natural farming to be adopted and widely recognized across the nation. ZBNF and other forms of organic farming have been actively promoted by the government in India. According to Ankita Sharma and Deekshit Bhattacharya, (2022) in contemporary agriculture, the use of high yield variety (HYV) seeds, herbicides, and fertilizers has long-term detrimental effects on the health of the soil, people, and the ecosystem. ZBNF and other indigenous organic farming methods provide a financially feasible and environmentally responsible alternative. When compared to conventional agriculture, the employment of such techniques will give superior climate adaptation as farming systems will naturally match with the local climatic circumstances. A study on natural farming was carried out in the Andhra Pradesh district of Visakhapatnam by Saradhi, K. V. et al., (2021). 120 samples were obtained for the study from ZBNF and non-ZBNF farmers. According to the study's findings, the majority of ZBNF farmers had greater levels of perception than non-ZBNF farmers (55% versus 51,66%). The study came to the conclusion that the respondents' main challenges in the study area were a lack of adequate marketing facilities and a high demand for labour. A study entitled "Comparative Economics of Zero Budget Natural Farming with Conventional Farming Systems in Northern Dry Zone (Zone-3) of Karnataka" was carried out by Babalad et al. (2021), 80 samples were chosen and according to the study's findings, ZBNF has lower production costs than conventional farming since its external inputs are less expensive. However, in a few crops, the average yield under the ZBNF was marginally lower than that under conventional farming. According to the study, the ZBNF system for millets cultivation performed better when it was rainfed. They contend that if farmers use the ZBNF approach throughout the state, they may increase yields while also protecting the ecosystem, environment, and economy.

The comparative advantages of conventional farming and zero-based national farming were highlighted in the aforementioned review of research studies. The conclusions gathered from the previous study clearly show that natural farmers will gain more from lower cultivation costs, higher crop yields, higher earnings, better, healthier, more nutrient-rich food, environmental preservation, and reduced soil erosion. In addition, ecological farming requires less capital, which lowers debt loads. Due to this method's labour requirements, jobs are created. In a variety of agro - climatic conditions, this farming technique is viable.

Results & Discussion

The study compared the yield and return of major crops grown by NF and non-NF farms in the states. The selected crops are Maize, Groundnut, Cashew, Citrus, Palm Oil, Tomato, Cotton, Paddy. Farmers in Andhra Pradesh do not have a specific market where they can sell their NF produce; as a result, the produce is sold in the same market at about the same price. Maize yield is 51.43 quintal per hectare for ZBNF farmers whereas it is 39.41 for Non-ZBNF farmers, It could be that many farmers are using Ghanajeevamritha in their fields because they have indigenous cows.

The net returns from the maize crop were Rs. 45375 for ZBNF farmers and Rs. 21458 for non-ZBNF farmers. The yield of the groundnut crop 13.34 per hectare to the ZBNF farmers and it is 11.51 to Non-ZBNF and net returns for this crop is Rs. 35819 and Rs. 25409 for ZBNF and Non-ZBNF farmers respectively. It is noted that there is only a 0.35 per hectare yield difference between ZBNF (5.19) and Non-ZBNF (4.84) farmers for the cashew crop, and that their respective net returns are Rs. 40311 and Rs. 35616. Citrus growers in ZBNF and Non-ZBNF received yields of 41.24 and 36.85 quintals per hectare, respectively, and their corresponding net returns were Rs. 73881 and Rs. 67856. Farmers of

Palm oil of ZBNF and Non-ZBNF received yields of 203.39 and 159.36 ha, respectively. The net returns to ZBNF farmers were Rs. 147734 and Rs. 97846, respectively. The yield of tomatoes for ZBNF farmers was 375.24 quintals per hectare, while the yield for non-ZBNF farmers was 368.57 quintals per hectare. The respective net returns for ZBNF farmers were Rs. 323409 and for non-ZBNF farmers were Rs. 229926. The yield of the cotton crop is 11.19 quintal per hectare for ZBNF farmers whereas it is 10.56 quintal per hectare for Non-ZBNF farmers, with respective returns of Rs. 19662 and Rs. 8923. The yield for paddy produced by ZBNF farmers was 45.22 quintals per hectare, while the yield for non-ZBNF farmers was 47.7 quintals per hectare. Their respective net returns were Rs. 45262 and Rs. 41708.

Table 1 Crop-wise Yield and Net Returns by Practicing ZBNF under RKVY in Andhra Pradesh (2018-2019)

Crop	Method of Farming	Yield (Quintals/ Hectare)	Net Returns (Rs. / Hectare)
Maize	ZBNF	51.43	45375
	Non-ZBNF	39.41	21458
	Difference	12.02	23917
Groundnut	ZBNF	13.34	35819
	Non-ZBNF	11.51	25409
	Difference	1.83	10410
Cashew	ZBNF	5.19	40311
	Non-ZBNF	4.84	35616
	Difference	0.35	4695
Citrus	ZBNF	41.24	73881
	Non-ZBNF	36.85	67856
	Difference	4.39	6025
Palm oil	ZBNF	203.39	147734
	Non-ZBNF	159.36	97846
	Difference	44.03	49888
Tomato	ZBNF	375.24	323409
	Non-ZBNF	368.57	229926
	Difference	6.67	93483
Cotton	ZBNF	11.19	28585
	Non-ZBNF	10.56	19662
	Difference	0.63	8923
Paddy	ZBNF	45.22	45262
	Non-ZBNF	47.7	41708
	Difference	-2.48	3554

Source: Rajya Sabha Unstarred Question No. 678, dated on 22.11.2019.

India - Sustainable Agriculture

The Sustainable Development Goals (SDGs) were established by the United Nations and adopted by all member countries. The SDGs emphasize the importance of adopting higher yielding manufacturing systems while minimizing environmental impact. SA is a farming method that employs ecological principles to fulfil three basic objectives: environmental, social, and economic. SA is an agroecological farming system in which ecological techniques and principles are used to ensure a financially and environmentally balanced agriculture system.

The Indian government has consistently prioritized food grain self-sufficiency, rather than agriculture sustainability. Agriculture production and productivity increased from the 1970s through the 1980s, but later growth slowed in the 1990s. Since 2000, the growth of agricultural productivity and production has slowed. A decline in agriculture poses a severe threat to food security, livelihood, and the environment. At this point, India must adopt a SA development strategy.

According to Khadse et al. (2019), the SA movement in India has historically been headed by non-governmental organizations (NGOs) and other middle-class activists rather than peasant movements. However, ZBNF is a movement founded on neo-Gandhian ideas of self-reliance and autonomy that began as a rural movement and quickly spread to small and medium-sized landholders. ZBNF is now promoted as a state-sponsored movement, and it has institutionalized and extended throughout India's southern states. As a result, the entire country has been inspired and is expressing significant interest in adopting ZBNF for India's long-term agricultural development.

Conclusion

Natural farming can produce nutritious food without harming the environment or the health of

the soil. To meet the demands of the global market for natural farm production, it is necessary to identify acceptable crops and goods on a regional scale. This will give the area plenty of employment opportunities in addition to peace and prosperity in country. The Andhra Pradesh government chose to use farming methods that are in tune with nature since they are based on ecological science rather than input economics. In terms of the quantity of farmers participating, the NF programme has been acknowledged as the largest agroecology programme in the world. NF demonstrates that, with the correct methods, Natural Farming is not only very profitable but also scalable in a reasonable amount of time. ZBNF is an alternate method of agriculture that is appropriate for small and marginal farmers.

Figure 1

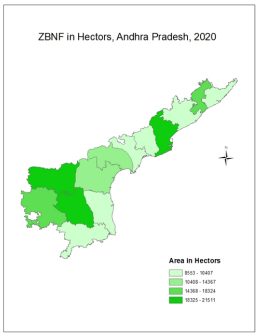


Figure 2

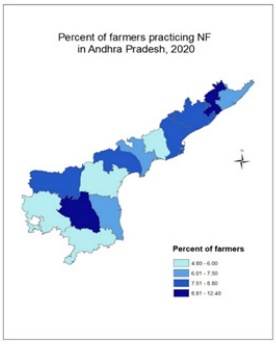


Figure 3

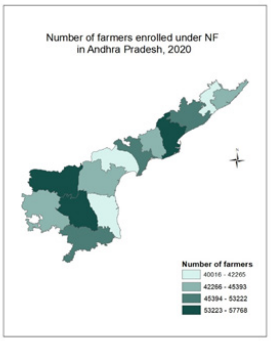


Figure 4

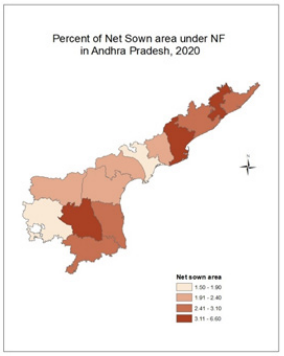
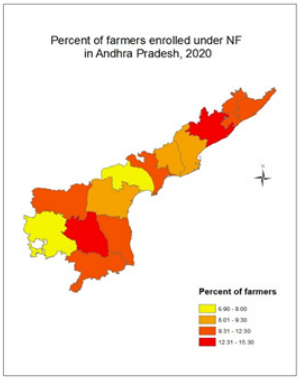


Figure 5



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