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Understanding Constraints in Zero Budget Natural Farming: A Comparative Study of Two Districts in Northern Karnataka, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The Green Revolution successfully achieved food security but also brought about new challenges, such as decreasing factor productivity and inefficient nutrient utilization. As concerns about food safety, environmental sustainability, and climate change continue to grow, Zero Budget Natural Farming (ZBNF) has emerged as an alternative and gained support from governments. This study aimed to identify the constraints of ZBNF in Northern Karnataka. Using an ex post facto research design, data were collected from 100 respondents in Belagavi and Haveri districts, categorized into planners and adopters. The Garrett Ranking Technique and Mann-Whitney U test were applied to analyze the constraints. Planners faced challenges, such as low initial yields (62.58) and a lack of confidence in using ZBNF inputs (59.54). However, adopters cited inadequate government support (53.96) as their top constraint. Both groups reported the labor-intensive nature of practicing ZBNF and issues with market access, highlighting systemic barriers to ZBNF adoption. Statistically significant differences were found between planners and adopters in terms of the non-availability of traditional seed varieties (p=0.012), low yields in the initial stages (p=0.030), lack of information on preparing asthras (p=0.024), and inadequate government support (p=0.015). Other constraints, such as purchasing indigenous cows (p=0.05) and intensive labor requirements (p=0.223), were identified but not statistically significant. These findings contribute to the sustainable agriculture discourse and offer insights for policymakers and practitioners aiming to promote ZBNF as a viable alternative to conventional farming.

Keywords: ZBNF; constraints; planners; adopters; sustainability.

1. INTRODUCTION

The Green Revolution revolutionized India's food production landscape, resolving critical food security concerns. However, it also introduced new challenges, often referred to as "second-generation" challenges. These challenges comprise declining factor productivity, imbalanced nutrient use, particularly of nitrogen, and low water and nutrient use efficiency. Over-reliance on nitrogenous fertilizers, comprising about 70 percent of all fertilizers employed in India and 80 percent of that being urea, has resulted in a use efficiency of only 30-50 percent [1]. This inefficiency extends to other nutrients as well, with phosphorus efficiency at 15-20%, potassium at 60-70 percent, sulfur at 8-10 percent, and micronutrients at a mere 1-5 percent [2]. Moreover, India's agricultural sector confronts challenges such as depleting natural resources, scarcity of safe water for irrigation, escalating input costs, and increased incidence of diseases and pests. There is also heightened concern over the nutritional quality and safety of food, exacerbated by the impacts of climate change. There is an urgent need for technologies and innovations that can diminish input costs, enhance productivity, improve product quality, and connect farmers to value chains and markets. Addressing these issues is pivotal for improving the livelihoods of farmers and ensuring sustainable agricultural development.

Zero Budget Natural Farming (ZBNF), often referred to as Natural Farming, signifies a significant shift towards agricultural practices that are free of chemicals. This method is based on an agroecology-driven, diversified farming system that integrates crops, trees, and livestock, encouraging functional biodiversity [3,4]. ZBNF was pioneered by Sh. Subhash Palekar in the mid-1990s, and he was awarded the Padma Shri in 2016 for his contributions to promoting this sustainable farming practice [5-8]. ZBNF has been widely adopted in various Indian states, such as Andhra Pradesh, Karnataka, Maharashtra, and Himachal Pradesh, mainly due to its cost-effective approach that replaces chemical inputs with natural alternatives like Jeevamritha, Beejamritha, and Neemastra, as well as practices like intercropping and mulching [9].

The principles of ZBNF draw inspiration from the biological sciences, emphasizing the symbiotic and "probiotic" connections between soil microbes and plant life [10,11]. Soils are a significant carbon reservoir globally, containing more carbon than the combined total found in plants and the atmosphere. The degradation of carbon-rich organic matter in soils results in the release of carbon dioxide, a potent greenhouse gas that contributes to climate warming. However, soil regeneration practices offer a way to sequester carbon underground, thus mitigating climate change. Cover crops play a critical role in

this process as they grow, absorbing carbon from the atmosphere and depositing it into the soil. Unlike cash crops, cover crops are not harvested but are left to decompose, enriching the soil and contributing to carbon sequestration [12,13].

Masanobu Fukuoka's pioneering work in Japan provided the foundation for natural farming methods, which emphasize harmony with natural cycles and processes [14]. In India, where over 85% of the 146.5 million farmers are smallholders and 68.5% operate on an average of 0.38 hectares [15], zero budget natural farming (ZBNF) offers a practical solution to the challenges faced by small-scale farmers. These challenges include low-input, low-yield technologies and limited access to modern innovations, which contribute to poverty and food insecurity [16].

The ZBNF movement began in Karnataka in 2002 when the Karnataka Rajya Ryathu Sangha (KRRS), a farmers' organization, invited Shri Subhash Palekar to introduce these practices to its members. This initiative is part of a broader global trend toward agroecology, as promoted by La Via Campesina (LVC), a global social movement that includes KRRS as a member and advocates for food sovereignty and diverse agroecology practices worldwide [17].

Although ZBNF has its benefits, it faces criticism from some in the scientific community who argue that it lacks a robust scientific foundation and promotes outdated belief systems, particularly regarding the use of indigenous cows [18-20]. Nonetheless, ZBNF aligns with global efforts to combat climate change by enhancing soil carbon sequestration and reducing greenhouse gas emissions [13]. The adoption of practices like minimum tillage, cover cropping, and soil regeneration under ZBNF supports sustainable agricultural growth.

In a diverse country like India, one farming practice cannot suit to all kinds of soil types, agro-climatic conditions, and all crops. The socioeconomic backgrounds of farmers are different and so their constraints in practicing farming. Therefore, it is necessary to identify and analyse the issues specific to farmer group. Therefore, the present study was conducted in order to explore the specific constraints associated zero budget natural farming.

2. METHODS AND MATERIALS

2.1 Study Area and Data Collection

The research was carried out in the northern region of Karnataka- Belagavi and Haveri districts were randomly selected. This region was chosen for several reasons: the 'Zero Budget Natural Farming' (ZBNF) movement was first introduced by farmers' organizations in this part of the state, a significant number of farmers in Karnataka were already practicing ZBNF, and the State Agricultural Universities (SAUs), in collaboration with the state government's agricultural department, were providing training on ZBNF under a government scheme. The study used an Ex Post Facto research design, and the respondents were divided into two groups based on specific criteria: Adopters and Planners. Adopters had at least three years of experience in ZBNF and cultivated a minimum of 2.5 acres using ZBNF methods, while Planners were participants in the ZBNF training program since 2019 and practiced ZBNF on at least 0.25 acres. All respondents were required to reside in the same village. In each district, three taluks were selected randomly, specifically, the Belagavi district included Belagavi, Hukeri, and Kittur taluks, while the Haveri district included Savanur and Hirekerur taluks for the study. Twenty-five farmers from each category in each district were randomly chosen, leading to a total of 100 respondents for the study. Data were collected using a structured interview schedule. Respondents were asked to rank the issues presented to them based on the constraints they faced.

2.2 Analytical Tools Used

The Garrett Ranking Technique was used to assign numerical ratings to the constraints faced by the respondents. This technique offers an advantage over a simple frequency distribution because it allows for the assignment of different ranks to constraints even if the same number of respondents identified them. The resulting ranks were converted into scores using a specific formula, which were then translated into percent positions.

The formula for working out percent position is as below

$$\text{Percent position} = 100 * (Rij – 0.5)/Nj$$

Where, Rij = rank given for ith constraint by jth individual; Nj = number of constraints ranked by jth individual.

The Garrett and Woodworth (1969) reference table was employed to convert the percent positions for each rank into scores. To determine the most influential constraint, the individual scores for each factor were summed and both the total and mean scores were calculated [21]. The mean scores for all constraints were then sorted in descending order, allowing for the identification of the most significant constraint based on its rank. The constraint with the highest mean score was regarded as the most important in the analysis. A Mann-Whitney U test was conducted to determine if there was a statistically significant difference in the degree of constraints faced by adopters and planners who practiced zero budget natural farming.

3. RESULTS

The data in Table 1 revealed that among planners, the primary constraint was low initial yields (62.58), followed by a lack of confidence in using ZBNF inputs (59.54). The third most significant challenge was purchasing local or indigenous cows (53.16), which is crucial for ZBNF practices. The non-availability of traditional seed varieties (52.84) ranked fourth, followed by the absence of specialized markets for ZBNF produce (49.22). Other notable constraints included the complicated procedure of ZBNF input preparation (48.62), inadequate government support (46.24), intensive labor requirements in practicing ZBNF (44.50), timely unavailability of materials for ZBNF input preparation (44.44), and a lack of information on preparation and use of asthras (43.86).

On the other hand, adopters with their extensive ZBNF experience identified inadequate government support as the most pressing issue (53.96), ranking it first. Lack of confidence in using ZBNF inputs (53.64) ranked second. Low yields during the initial implementation phase (52.92) ranked third. The complexity of ZBNF input preparation (52.06) ranked fourth. Other constraints included lack of information on preparation and use of asthras (51.68), the lack of specialized markets for ZBNF produce (51.22), and the timely unavailability of materials for ZBNF input preparation (50.44). Intensive labor requirements (49.52), purchasing indigenous cows (45.04), and the non-availability of traditional seed varieties (44.52) were also notable constraints, with the latter being the least significant.

Data in Table 2 highlighted comparative analysis of the constraints faced by planners and adopters of zero budget natural farming. The most significant difference was observed in the non-availability of traditional seed varieties (0.012) and the lack of information on preparing and using asthras (0.024). Additionally, low yields in the initial stages of ZBNF adoption (0.030) and inadequate government support (0.015) were identified as statistically significant. While the issue of purchasing indigenous cows (0.05) was

Table 1. Constraints as perceived by the respondents in ZBNF

Sl No.	Constraints	Planners (n=50)		Adopters (n=50)	
		Mean Score	Rank	Mean Score	Rank
1	Non availability of traditional varieties seed	52.84	IV	44.52	X
2	Intensive labour requirement in practicing ZBNF	44.50	VIII	49.52	VIII
3	Purchasing local/indigenous cows	53.16	III	45.04	IX
4	Low yields in initial level	62.58	I	52.92	III
5	Lack of information on preparation and use of asthras	43.86	X	51.68	V
6	Lack of confidence to use ZBNF inputs	59.54	II	53.64	II
7	Timely unavailability of materials for preparation of ZBNF inputs	44.44	IX	50.44	VII
8	Inadequate support from Government	46.24	VII	53.96	I
9	Complicated procedure of ZBNF input preparation	48.62	VI	52.06	IV
10	Lack of specialized markets for ZBNF produce	49.22	V	51.22	VI

Table 2. Comparison of constraints as perceived by the respondents in ZBNF (n=100)

Sl. No	Constraint	U	z	p
1.	Non availability of traditional varieties seed	886	-2.53	0.012*
2.	Intensive labour requirement in practicing ZBNF	1072.5	-1.23	0.223
3.	Purchasing local/indigenous cows	965	-1.98	0.05
4.	Low yields in initial level	935	-2.2	0.030*
5.	Lack of information on preparation and use of asthras	921	-2.29	0.024*
6.	Lack of confidence to use ZBNF inputs	1049	-1.4	0.168
7.	Timely unavailability of materials for preparation of ZBNF inputs	976.5	-1.9	0.06
8.	Inadequate support from Government	897	-2.45	0.015*
9.	Complicated procedure of ZBNF input preparation	1095	-1.08	0.288
10.	Lack of specialized markets for ZBNF produce	1115.5	-0.93	0.357

**= 5.00% level of significance*

less significant, it was still notable. Other constraints, such as intensive labour requirements (0.223), lack of confidence in using ZBNF inputs (0.168), and timely unavailability of materials for preparing ZBNF inputs (0.06), were not statistically significant. The complexity of ZBNF input preparation (0.288) and the lack of specialized markets for ZBNF produce (0.357) were also identified, but they were not considered significant constraints between planners and adopters.

4. DISCUSSION

Planners face numerous challenges when attempting to integrate zero-based natural farming techniques into their practices. The most significant constraints were the low yield in initial years and lack of confidence in using ZBNF inputs which reflected a substantial barrier, indicating that planners were uncertain about the effectiveness and application of ZBNF techniques. This could potentially deter planners due to the uncertainty and risk associated with transitioning to ZBNF. Moreover, planners and adopters had different perspectives on the accessibility of conventional seed varieties. While planners viewed the accessibility of conventional seed varieties as a significant constraint, adopters do not necessarily agree, indicating that planners might face more difficulties obtaining these seeds. This disparity might be attributed to the absence of well-established networks or resources that adopters had built up. Furthermore, both groups had similar apprehensions with regard to the labor-intensive nature of ZBNF input preparation as a constraint suggesting a manual process involved in preparation of inputs for ZBNF.

Planners ranked the procurement of local or indigenous cows as a more significant constraint than adopters, suggesting that new farmers might faced challenges in obtaining necessary livestock for ZBNF. Conversely, adopters are more concerned about inadequate government support, which they rank as their top constraint, while planners place it at a lower level of concern. This difference suggested that adopters, who might rely more on government assistance for expanding their operations, feel a greater lack of support. There is need for stronger institutional backing to support the sustainability of ZBNF practices. Additionally, there were differences in how planners and adopters perceive the complexity of ZBNF input preparation procedures and the accessibility of information on asthras. Adopters ranked the complexity of preparation methods as a higher constraint than planners, which could be due to their greater experience and understanding of the detailed requirements involved. This highlights the need for more accessible and practical training resources. Planners and adopters of ZBNF acknowledged the lack of specialized markets as an obstacle to its commercial viability, emphasizing the requirement for improved market infrastructure. Compared to planners, adopters were more concerned with the timely unavailability of materials, which underscored the practical challenges of gathering all the necessary inputs for implementing and maintaining ZBNF systems.

The Mann Whitney U test revealed a complex picture of the challenges faced by planners and adopters of zero budget natural farming when attempting to practice these methods. Non-availability of traditional seed varieties, low yields in the initial stages, lack of information on preparing and using asthras and inadequate support from the Government were all found to be significantly different between the two groups.

These results suggest that these constraints were more pronounced for one group than the other. The most significant difference identified was the non-availability of traditional seed varieties. This issue was particularly pronounced among planners, likely due to their more recent adoption of ZBNF, which may limit their access to or familiarity with sourcing traditional seeds. For adopters, this issue may be less acute, as they may have stored the previous grown seeds or contacted fellow farmers practicing zero budget natural farming. Another significant difference was observed in the lack of information on preparing and using asthras. Asthras are critical bio-inputs in ZBNF which control pest and disease, and the lack of information on their preparation can be a substantial barrier. Low yields in the initial stages of ZBNF adoption were also a significant concern. This finding underscored the transitional challenges faced by both groups, although it may be more acute for planners who are just beginning their journey with ZBNF. The initial reduction in yield could be discouraging and might require strategic support to ensure that farmers persist through this phase.

Inadequate government support, was another constraint differed significantly between adopters and planners. For adopters, continuous government support was crucial to sustain and scale their practices. However, planners registered in the zero-budget natural farming programme might receive the necessary support for practicing ZBNF in the initial stage. The lack of adequate policy support and incentives could stifle the growth and expansion of ZBNF, limiting its potential impact on sustainable agriculture. Although purchasing indigenous cows was not statistically significant between the groups, it was more challenging for planners.

Other constraints, such as intensive labor requirements, lack of confidence in using ZBNF inputs, and the timely unavailability of materials for preparing ZBNF inputs, were less significant statistically but still relevant. These issues reflect ongoing operational and logistical challenges that could affect the day-to-day practice of ZBNF. The complexity of ZBNF input preparation and the lack of specialized markets for ZBNF produce were also noted, though they did not show significant statistical differences between the two groups, indicating that both groups face similar challenges for practicing ZBNF. Overall, the findings emphasized the need for targeted interventions that address specific barriers faced by new and experienced ZBNF practitioners. Enhanced training, better access to resources, and stronger institutional support are crucial for overcoming these challenges and ensuring the long-term viability and success of ZBNF practices.

5. CONCLUSION

The study uncovered the distinct and overlapping constraints experienced by planners and adopters of zero budget natural farming in Northern Karnataka. A comparative analysis revealed significant challenges, such as low initial yields and a lack of confidence in utilizing ZBNF inputs for planners, while adopters primarily struggle with insufficient government support. Both groups emphasize the labor-intensive nature of ZBNF and the scarcity of specialized markets, highlighting systemic barriers that hinder widespread adoption. The differences in constraints between planners and adopters, such as the non-availability of traditional seed varieties, initial low yields, and a lack of knowledge on preparing asthras, were statistically significant. This points to the need for tailored interventions. To address these challenges, enhanced access to traditional seeds, practical training resources, and government support are crucial. The findings contribute to the broader conversation on sustainable agriculture, offering actionable insights for policymakers and practitioners aiming to promote ZBNF. To effectively promote ZBNF, policies should focus on enhancing farmer education and awareness about sustainable practices, while providing financial and technical support to ease the transition from conventional farming. Additionally, integrating ZBNF into agricultural extension services can facilitate widespread adoption and ensure long-term sustainability.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERNCES

1. NAAS. Soil health: New policy initiatives for farmers welfare. Policy Brief No. 3, National Academy of Agricultural Sciences, New Delhi. 2018;15.

2. NAAS. Zero budget natural farming - A myth or reality? Policy Paper No. 90, National Academy of Agricultural Sciences, New Delhi. 2019;20.
3. Biswas S. Zero budget natural farming in India: aiming back to the basics. International Journal of Environment and Climate Change. 2020;10(9):38-52.
4. López-García D, Cuéllar-Padilla M, de Azevedo Olival A, Laranjeira NP, Méndez VE, Parada YSP, Tendero-Acín G. Building agroecology with people. Challenges of participatory methods to deepen on the agroecological transition in different contexts. Journal of Rural Studies. 2021;83:257-267.
5. Khadse A, Rosset PM, and Ferguson BG. Taking agro ecology to scale: The zero budget natural farming peasant movement in Karnataka, India. The Journal of Peasant Studies. 2017; 45:1–28.
6. Sharma SK, Ravisankar N, Jain NK, Sarangi SK. Natural farming: current status, research and case studies. Indian Council of Agricultural Research, New Delhi–2023;110:12.
7. Niyogi DG. Andhra farmers taste success with Zero Budget Natural Farming. Down to Earth, (Online); 2018. Available:https://www.downtoearth.org.in/author/deepanwitagita-niyogi-2399
8. Economic Survey. Economic survey 2018-19. Department of economic affairs, ministry of finance, Government of India; 2019.
9. Palekar S. The philosophy of spiritual farming. 2nd ed. Zero Budget Natural Farming Research, Development & Extension Movement, Amravati, Maharashtra, India; 2005.
10. Saharan BS, Tyagi S, Kumar R, Vijay Om H, Mandal BS, Duhan JS. Application of Jeevamrit improves soil properties in zero budget natural farming fields. Agriculture. 2023;13 (1):196.
11. Lorimer J. Probiotic Environmentalities: Rewilding with wolves and worms. Theory, Culture and Society. 2017;34(4):27–48.
12. Kumar R, Kumar S, Yashavanth BS, Meena PC, Indoria AK, Kundu S, Manjunath M. (Adoption of natural farming and its effect on crop yield and farmers' livelihood in India. ICAR-National Academy of Agricultural Research Management, Hyderabad, India. 2020;130.
13. Wallenstein M. To restore our soils, feed the microbes. The Conversation. 2017;27.
14. Fukuoka M. The natural way of farming. Tokyo: Japan Publications. 1985;17.
15. MoA, FW. Agriculture Census 2015-16 (Phase-I). All India report on number and area of operational holdings. Ministry of Agriculture & Farmers Welfare, Government of India; 2019.
16. Bisht IS, Rana JC, Pal Ahlawat S. The future of smallholder farming in India: Some sustainability considerations. Sustainability. 2020;12(9):3751.
17. LVC. La Via Campesina. From Maputo to Jakarta: 5 years of agroecology in La Via Campesina. International Commission on Sustainable Peasant Agriculture, Jakarta; 2013.
18. Khan MR, Raja W, Bhat TA, Mir MS, Naikoo NB, Amin Z, Patyal D. Zero budget natural farming: A way forward towards sustainable agriculture. Current Journal of Applied Science and Technology. 2022;41(13): 31-43.
19. Saldanha LF. A review of Andhra Pradesh's climate resilient zero budget natural farming programme. Bangalore: Environment Support Group; 2018.
20. EPW. Mirage of zero budget farming (editorials). Economic & Political Weekly, Vol. LIV (30), July 27; 2019.
21. Garrett HE, Woodworth RS. Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay. 1969; 329.

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