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PERCEIVED IMPACT OF NATURAL FARMING PRACTICES AMONG FARMERS

Neha Padaliya[1], H. R. Meena[2] and Alok Dube[3]

1 Ph.D. Student, Dairy Extension Division, National Dairy Research Institute, Karnal- 132001
2 Principal Scientist & Head, IVRI, Izatnagar, Bareilly - 243122
3 Subject Matter Specialist, Agricultural Extension, KVK Kiphire, Nagaland - 798611
Email : padaliyaneha2411@gmail.com

ABSTRACT

Agricultural sustainability is increasingly threatened by climate change, soil degradation, and resource depletion, driving the need for wider adoption of natural farming practices. The study comparatively analyzed farmer perceptions of natural farming impacts across hill and plain regions using an ex-post facto design. Primary data were collected from farmers through household surveys, focus group discussions, and key informant interviews, covering environmental, economic, social, and agronomic dimensions. Mann–Whitney U test revealed significant inter-regional differences across all dimensions. Plain region farmers reported higher perceived economic, social, and agronomic impacts, while hill region farmers perceived greater environmental benefits. Reduced production costs, improved soil quality, and utilization of local natural fertilizers emerged as the most prominent impacts in their respective dimensions. The findings emphasize the need for region-specific policies and extension interventions to effectively promote and scale natural farming practices.

Keywords : *agricultural practices, environment-friendly, farmer perception, sustainable agriculture, natural farming, organic farming*

INTRODUCTION

Agriculture plays a pivotal role in providing food security, employment and economic stability in developing countries, particularly in India, where a large proportion of the population depends on agriculture for their livelihoods (Pingali P., 2012; Birthal *et al.*, 2014; Gamit and Vinaya, 2023). In recent years, sustainable agriculture has emerged as a guiding paradigm, emphasizing ecological balance, economic viability, and social equity (Pretty *et al*., 2018). Among the diverse strategies like sustainable agriculture, environment-friendly agricultural practices (EFAPs) including natural farming, organic farming, integrated pest management (IPM), conservation tillage, and agroforestry are widely recognized as practical approaches to reduce environmental footprints while enhancing long-term agricultural productivity (Patel *et al.,* 2025). Natural farming, which minimizes dependence on external chemical inputs, and organic farming, which relies on biological nutrient cycles, are particularly aligned with sustainability principles (Sharma *et al.,* 2012; Singh & Singh, 2017; Gamit and Vinaya, 2022). The growing adoption of natural farming in India has been largely driven by increase in awareness of the adverse consequences of conventional agricultural practices. Studies highlight education as the strongest positive factor, while income, occupation, livestock ownership, social participation, and media exposure also showed significant positive influence on adoption of natural farming practices (Chandawat *et al*., 2017; Patel *et al.,* 2017). The intensive application of chemical fertilizers and pesticides has contributed to a range of environmental problems, including soil degradation, water contamination, biodiversity loss, and a decline in long-term agricultural sustainability (Gupta *et al*., 2021). In response, an increasing number of farmers are voluntarily adopting EFAPs to foster ecological balance and strengthen livelihood security (Desai *et al*., 2024). Government of India initiatives, in collaboration with agricultural institutions and non-governmental organizations, have actively promoted natural and organic farming through capacity-building programs, field demonstrations, and awareness campaigns. Among the various approaches, Zero Budget Natural Farming (ZBNF) has received considerable attention owing to its emphasis on reducing external input costs and encouraging the use of locally available resources, thereby improving the economic sustainability of farming operations (Gamit *et al*., 2022; Kassie *et al*., 2015).

Despite the multiple environmental and economic benefits attributed to natural and organic farming systems, their widespread adoption continues to be constrained by several challenges. Farmers frequently encounter problems such as high labor costs associated with the preparation of bio-formulations, inadequate market linkages, short shelf-

life of natural formulations, and the absence of standardized protocols for the preparation of organic inputs (Padaliya *et al*., 2025). Under these circumstances, farmers' perceptions emerge as a critical determinant of the adoption process. Perception, in this context, refers to the manner in which farmers interpret and evaluate the potential benefits, associated risks, and overall practicality of implementing EFAPs within their specific farming conditions. These subjective assessments significantly shape decision-making behavior and the willingness to adopt sustainable practices. The understanding of perception of farmer becomes vital for designing participatory extension strategies and adaptive policy interventions that can foster equitable sustainability transitions (Pretty *et al*., 2018). The present study, therefore, aims to examine and compare perceived impact of natural farming among the farmers across hill and plain regions. By analyzing the perceived outcomes of these practices, the research contributes to a deeper understanding of how location-specific realities shape the trajectory of sustainable agricultural development.

OBJECTIVE

The primary objective of this study was to evaluate and compare farmers' perceptions of the socio-economic and environmental impacts of natural farming practices across hill and plain regions of northern India.

METHODOLOGY

Research design

An ex-post facto research design was adopted for the present study. Ex-post facto research involves a systematic empirical inquiry in which researchers examine the relationships between existing independent variables and a dependent variable, without manipulating the independent variable or randomly assigning participants to treatment conditions (Kerlinger & Lee, 2000). This design was considered appropriate given that the adoption of natural farming practices had already occurred among the selected respondents, and the study aimed to assess the perceived outcomes thereof.

Study area and sampling

The study was conducted in two northern Indian states Haryana and Uttarakhand. From each state, two districts were purposively selected based on the higher number of farmers registered under the Participatory Guarantee System–India (PGS-India) Jind and Karnal districts from Haryana, and Almora and Nainital districts from Uttarakhand. From each selected district, one block was chosen, and from each block, two villages were randomly selected. Within each village, 15 farmers who had adopted natural or organic farming practices were purposively selected, resulting in a total sample of 120 respondents.

Data collection

Primary data were collected through a combination of structured household surveys, focus group discussions (FGDs), and key informant interviews (KIIs). A pre-tested, structured interview schedule was used to gather information on farmers' perceived impacts of natural farming practices across environmental, economic, social, and agronomic dimensions. Each impact statement was rated by respondents on a five-point Likert scale, and weighted mean scores were computed for comparative analysis.

Data analysis

Descriptive statistics, including weighted mean scores, were used to summarize the perceived impacts within each region. To test for statistically significant differences in perceived impacts between farmers of the hill and plain regions, the Mann–Whitney U test, a non-parametric alternative to the independent samples t-test was employed. This test was considered appropriate given the ordinal nature of the Likert-scale data and the non-normal distribution of the responses. All statistical analyses were performed using SPSS (Version 25.0). A significance level of $p < 0.01$ was adopted for all tests.

RESULTS

The perceived impacts of environment-friendly agricultural practices were analyzed across four dimensions environmental, economic, social, and agronomic and compared between farmers of the plain region (Haryana) and the hill region (Uttarakhand). The findings are presented in the following subsections.

Table 1. Perceived impact of natural farming across plain and hill region (n=120)

Sr. No.	Impact Dimension	Mean Rank		Mann–Whitney U	Z-value	p-value
		Plain	Hill			
1	**Environmental**	48.99	72.01	2490.50	−3.702	0.000**
2	**Economic**	75.38	45.62	907.00	−4.796	0.000**
3	**Social**	86.67	34.33	230.00	−8.414	0.000**
4	**Agronomic Practices**	72.86	48.14	1058.50	−4.398	0.000**

Note: ** $p < 0.01$ (statistically significant)

The Mann–Whitney U test was employed to assess differences in perceived impacts of EFAPs between farmers of Haryana and Uttarakhand. As presented in Table 1, the results revealed statistically significant variation across all four impact dimensions ($p < 0.01$), indicating that farmers' perceptions of the impacts of natural farming are not uniform between the two agro-ecological regions. A consistent pattern was observed, wherein farmers from the plain region (Haryana) reported relatively higher perceived impacts in the economic, social, and agronomic dimensions, whereas farmers from the hill region (Uttarakhand) reported higher perceived impacts in the environmental dimension. The most salient inter-regional disparity was observed in the social dimension ($Z = -8.414$), followed by the economic ($Z = -4.796$) and agronomic ($Z = -4.398$) dimensions. The comparatively lower perceived economic and social impacts among hill region farmers may be attributed to differences in agro-ecological conditions, the scale of farming operations, market accessibility, and the extent of exposure to natural and organic farming programs. These findings are consistent with the broader literature emphasizing that the perceived benefits of sustainable agricultural practices are heavily context-dependent (Meijer *et al*., 2015; Kassie *et al*., 2015).

(1) Environmental impact

Table 2: Farmers' perceived environmental impact of natural farming (n=120)

Sr. No.	Statement	Plain Region	Hill Region
1	Improvement in soil health	3.91	4.56
2	Reduced environmental pollution due to use of eco-friendly inputs	2.80	4.00
3	Low incidence of pests and diseases	2.46	3.11
4	Better water-use efficiency	3.30	4.28
5	Positive impact on human health	2.90	2.33

As shown in Table 2, improvement in soil health was perceived as the most significant environmental benefit of natural farming practices , with high weighted mean scores recorded in both the plain region (3.91) and the hill region (4.56). This finding aligns with literature reporting that the adoption of natural and organic inputs leads to improved soil organic matter content, microbial activity, and soil structure over time (Arora *et al.,* 2023; Saha *et al.,* 2025). Better water-use efficiency was ranked second overall (pooled mean = 3.79), with a notably higher score in the hill region (4.28), possibly reflecting the critical importance of water conservation in the fragile agro-ecosystems of the Himalayan foothills. Reduction in environmental pollution was also prominently perceived, particularly among hill region farmers (4.00), were more acutely aware of ecological degradation in their geographically sensitive environments. The relatively lower scores for positive impact on human health across both regions suggest that the health co-benefits of natural farming are not yet widely perceived by farmers, possibly due to limited awareness or the long time horizons.

(2) Economic impact

Table 3: Farmers' perceived economic impact of natural farming (n=120)

Sr. No.	Statement	Plain Region	Hill Region
1	Increase in farm income	3.40	3.00
2	Favorable market prices for produce	3.25	2.21
3	Reduced cost of production	4.25	4.48
4	Reduced dependency on credit	2.53	2.35

Table 3 reveals that reduced cost of production was perceived as the most prominent economic benefit of natural farming by farmers in both regions, recording the highest weighted mean scores in the plain region (4.25) and the hill region (4.48), with a pooled mean of 4.24. The finding supports the economic rationale underlying the promotion of natural and Zero Budget Natural Farming (ZBNF) approaches, wherein the substitution of costly chemical inputs with locally prepared biological formulations substantially reduces per-hectare production costs (Nagamani & Sriya, 2025; Hasan *et al.,* 2025). Increased farm income was ranked second in both regions, while favorable market prices were perceived more strongly by plain region farmers (3.25) than their hill region counterparts (2.21), reflecting the comparatively better market infrastructure and access to premium organic markets in Haryana. Reduced dependency on credit received the lowest ratings in both regions (pooled mean = 2.44), suggesting that financial benefits related to credit reduction are not yet widely perceived, possibly due to the transitional costs incurred during the initial years of conversion to organic practices.

(3) Social impact

Table 4 : Farmers' perceived social impact of natural farming (n=120)

Sr. No.	Statement	Plain Region	Hill Region
1	Better scope for promoting community-managed farming	3.45	3.93
2	Improved standard of living	2.88	2.18
3	Enhanced social status	2.77	2.99

As presented in Table 4, the promotion of community-managed farming emerged as the most prominently perceived social benefit of natural farming across both regions (plain = 3.45; hill = 3.93; pooled = 3.46). The higher score in the hill region may reflect the stronger tradition of collective farming and community resource management prevalent in mountain communities. Enhanced social status was perceived more favorably by hill region farmers (2.99) compared to plain region farmers (2.77), possibly owing to the recognition accorded to organic farmers within their local communities. Improved standard of living received the lowest scores in both regions, indicating that the social welfare benefits of natural farming in terms of tangible improvements in household well-being are yet to be strongly realized by adopting farmers. Overall, the findings suggest that natural farming contribute more meaningfully to community cohesion and social empowerment than to immediate improvements in individual living standards.

(4) Impact on Agronomic Practices

Table 5. Farmers' perceived impact of natural farming on agronomic practices (n=120)

Sr. No.	Statement	Plain Region	Hill Region
1	Application of locally available natural fertilizers	4.18	4.55
2	Increased cropping intensity	3.00	2.26
3	Increased crop diversification	3.95	3.76
4	Early, rapid, and healthy plant establishment	3.25	2.77
5	Encouragement of own-seed use	4.00	4.54
6	Shift towards integrated farming systems	4.35	4.23

Table 5 indicates that the application of locally available natural fertilizers was perceived as the most significant agronomic benefit across both regions (plain = 4.18; hill = 4.55; pooled = 4.36). This revealed the central role of locally sourced, sustainable inputs such as farm-yard manure, vermicompost, and biodynamic preparations in the practice of natural and organic farming. Encouragement of own-seed use was ranked second, reflecting a positive shift towards seed sovereignty and reduced dependence on external seed suppliers. A shift towards integrated farming systems was also highly perceived indicating that natural farming foster more holistic and diversified farm management approaches. Increased crop diversification was perceived relatively favorably in both regions, which aligns with research demonstrating that organic systems tend to promote greater varietal and species diversity (Saha *et al.,* 2025; Joshi T., 2025 Zala et al., 2025; Khodifad et al., 2024). Conversely, increased cropping intensity received the lowest ratings, suggesting that farmers do not associate natural farming with an increase in the number of crop cycles, possibly due to longer crop duration.

DISCUSSION

The findings of study reveal clear regional differences in farmers' perceived impacts of natural farming, indicating the need for location-specific and context-based policy measures to improve the adoption and effectiveness of these practices. Natural Farming is influenced by both internal and external motivating factors, particularly perceived economic advantages, level of innovativeness, and degree of social participation (Gamit & Vinaya Kumar, 2024). Across both hill and plain regions, farmers generally expressed support for sustainable agricultural practices when they perceived tangible benefits in terms of income, productivity, and risk reduction a finding consistent with the broader literature on technology adoption in agriculture (Meijer *et al.,* 2015; Muriithi *et al.,* 2018). The key psychological factors influencing farmers' decisions, including norms, knowledge use, and perceived responsibility. Overall, it reflects weaker pro-environmental attitudes and limited adoption of sustainable residue management practices among such farmers (Dube *et al*., 2024). In the hill region, indigenous conservation practices such as contour bunding, vegetative barriers, and rainwater harvesting have been reported to improve soil fertility and reduce erosion in ecologically fragile ecosystems (Arora *et al.,* 2023; Muriithi *et al*., 2018). Integrated crop–livestock–horticulture systems have further demonstrated potential for enhancing livelihood security among farming communities in hills (Kuniyal *et al*., 2024). Minimal soil disturbance, crop diversification, and the promotion of soil health have collectively contributed to resource sustainability and the mitigation of land degradation in hilly terrain (Saha *et al.,* 2025; Joshi Tanaka, 2025). In the plain region, sustainable practices such as crop rotation, application of organic inputs, and efficient irrigation have been associated with improved yields, reduced input costs, and enhanced farmer income (Nagamani & Sriya, 2025; Hasan *et al.,* 2025). Despite the perceived benefits, the adoption of natural farming under environment-friendly agricultural practices remains limited due to several critical constraints. The major barriers identified include high labor costs associated with the preparation of bio-formulations, consumer reluctance to pay premium prices for organic produce, the short shelf-life of natural formulations, the absence of standardized packages of practice for organic production systems, and inadequate market linkages (Padaliya *et al.,* 2025).

CONCLUSION

This study examined and compared the perceived impacts of environment-friendly agricultural practices among farmers in the hill and the plain region of northern India. The findings revealed statistically significant inter-regional differences ($p < 0.01$) across all four impact dimensions environmental, economic, social, and agronomic. Farmers in the plain region perceived greater economic, social, and agronomic benefits from natural farming, whereas farmers in the hill region reported stronger perceptions of environmental benefits, particularly in relation to soil health improvement, water-use efficiency, and pollution reduction. Across both regions, reduced cost of production, application of locally available natural fertilizers, and the encouragement of own-seed use were the most prominently perceived benefits of natural farming.

POLICY IMPLICATIONS

First, the extension and policy interventions should prioritize region-specific strategies to enhance the effectiveness of natural farming practices. A one-size-fits-all approach is unlikely to address the various challenges and opportunities characterizing hill and plain farming systems. Second, strengthening farmer awareness and capacity-building efforts particularly in regions with lower perception levels, such as the hill region with respect to economic and social impacts is essential for improving adoption outcomes. Third, engaging progressive farmers and leveraging local knowledge networks can facilitate the wider dissemination and scaling of natural farming, as peer-to-peer learning has been shown to be an effective catalyst for sustainable agricultural change. Finally, investment in market infrastructure, certification systems, and value chain development is critical to ensuring that farmers who adopt natural farming practices can access premium markets and derive commensurate economic returns.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

Arora, S., Bhatt, R., Sharma, V., & Hadda, M. S. (2023). Indigenous practices of soil and water conservation for sustainable hill agriculture and improving livelihood security. *Environmental Management*, 72, 321–332. Springer Nature.

Birthal, P. S., Joshi, P. K., & Gulati, A. (2014). Agricultural diversification in India: Trends, determinants, and policy implications. *International Food Policy Research Institute.*

Chandawat, M. S., Bochalya, B. C., & Bhoraniya, M. F. (2017). Adoption of organic farming practices by the farmers of Surendranagar district of Saurashtra region of Gujarat. *Gujarat Journal of Extension Education, 28(2), 382-388.*

Desai, J. D., Patel, S. R., & Patel, H. K. (2024). Relationship between profile of farmers and their perception about organic farming. *Gujarat Journal of Extension Education*, 37(1), 101–104. https://doi.org/10.56572/gjoee.2024.37.1.0016

Dube, A., Barua, S., Burman, R. R., Kumar, R., Muralikrishnan, L., Datta, A.,& Padaliya, N. (2024). Factors behind crop residue burning in northern India: Psychological determinants of farming community. *Journal of Community Mobilization and Sustainable Development*, 19(4), 1103-1107.

Gamit, R. A., & Vinaya Kumar, H. M. (2024). Perception of farmers about natural farming. *Gujarat Journal of Extension Education*, *38*(2), 195-200.

Gamit, Rohan A. and Vinaya Kumar, H. M. (2022) Farmers attitude towards zero budget natural farming. *Gujarat Journal of Extension Education*, 34(2): 41-46.

Gupta, N., Pradhan, S., Jain, A., & Patel, N. (2021). Sustainable agriculture in India 2021: What we know and how to scale up. *Council on Energy, Environment and Water.* https://www.ceew.in/sites/default/files/CEEW-FOLU-Sustainable-Agriculture-in-India-2021-20Apr21.pdf

Hasan, M. M., Rahman, M. A., & Momin, M. R. (2025). Effectiveness of sustainable agricultural practices as perceived by vegetable farmers: A study in selected areas of Mymensingh district. Discover Agriculture, 3, 136. Springer Nature.

Joshi Tanaka, S. (2025). Organic farming practices: Challenges, opportunities, and future prospects. *Journal of Plant Pathology*, 6(2), 13–16.

Kassie, M., Teklewold, H., Jaleta, M., Marenya, P., & Erenstein, O. (2015). Understanding the adoption of multiple sustainable agricultural practices in rural Ethiopia. *World Development*, 65, 33–48.

Kerlinger, F. N., & Lee, H. B. (2000). Foundations of behavioral research (4th ed.). Harcourt College Publishers.

Khodifad, P. B., Mallapalli, K. and Sharma, O. P. (2024) Perception of agricultural professionals of Navsari Agricultural University about natural farming. *Gujarat Journal of Extension Education*, 38(1):173-180. https://doi.org/10.56572/gjoee.2024.38.1.0029.

Kuniyal, J. C., Kesarwani, K., Rai, S., & Singh, M. (2024). Climate resilient practices in Indian Himalayan region: Success stories. *G.B. Pant National Institute of Himalayan Environment.*

Meijer, S. S., Catacutan, D., Ajayi, O. C., Sileshi, G. W., & Nieuwenhuis, M. (2015). The role of knowledge, attitudes, and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *International Journal of Agricultural Sustainability*, 13(1), 40–54.

Muriithi, B. W., Menale, K., & Diiro, G. (2018). Adoption of sustainable agricultural practices and impacts on productivity and food security. *Agricultural Economics*, 49(3), 1–12.

Nagamani, G., & Sriya, T. (2025). Sustainable agricultural practices: An empirical assessment of adoption, challenges, and impact in India. IOSR *Journal of Business and Management,* 27(7), 1–7.

Padaliya, N., Meena, H. R., Dube, A., Mahapatra, A., Berry, S., Anu, J., & Mishra, S. (2025). Constraints in adoption of environmentally friendly agricultural practices as perceived by the farmers: A Garrett ranking analysis. *Journal of Community Mobilization and Sustainable Development*, 20(2), 504–510.

Patel, R. M., Patel, J. K., & Dubey, L. R. (2025). Adoption of natural farming practices by the farmers. *Gujarat Journal of Extension Education, 39*(2), 130-134.

Patel, V. B., Prajapati, M. R., & Joshi, S. G. (2017). Adoption of organic farming practices by organic farmers in North Gujarat. *Gujarat Journal of Ext. Edu*, *28*(1), 182-184.

Peshin, R., Bandral, R. S., Zhang, W., & Dhawan, A. K. (2009). Farmers' perceptions of integrated pest management in India. Pest Management Science, 65(10), 1091–1099.

Pingali, P. (2012). Green Revolution: Impacts, limits, and the path ahead. Proceedings of the National Academy of Sciences, 109(31), 12302–12308.

Pretty, J., Benton, T. G., Bharucha, Z. P., Dicks, L. V., Flora, C. B., Godfray, H. C. J., & Wratten, S. (2018). Global assessment of agricultural system redesign for sustainable intensification. *Nature Sustainability,* 1(8), 441–446.

Saha, S., Yadav, D., Layek, J., Babu, S., Ansari, M. A., Das, B., Chowdhury, S., Singh, R., Rajkhowa, D. J., Ghosh, P. K., & Das, A. (2025). Potential of conservation agriculture in hill ecosystems: Impact on resource sustainability. ICAR Research Complex for North-Eastern Hills Region.

Sharma, R., Singh, R., & Singh, S. (2012). Comparative analysis of farming systems in hill and plain regions of Himachal Pradesh. *Indian Journal of Agricultural Sciences,* 82(4), 301–308.

Singh, R., & Singh, S. (2017). Agricultural sustainability in plain regions: Farmers' perspectives. *Journal of Sustainable Agriculture,* 41(2), 189–204.

Zala, P. H., Kalsariya, B. N. and Kapuriya, T. D. (2025) Attitude of farmers towards natural farming. *Gujarat Journal of Extension Education,* 40(1): 135–139. https://doi.org/10.56572/gjoee.2025.40.1.0022

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