

Adoption of Organic Horticulture in Haryana: An Analysis of Opportunities and Constraints

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Abstract. In India, the shift towards sustainable agriculture has gained notable momentum, especially in states like Haryana, where intensive farming has caused significant environmental damage. This research investigates the adoption of horticulture practices in Haryana in organic form, intending to analyse the pattern and extent of adoption of organic horticulture among farmers and to trace out the main prospects and constraints influencing adoption. The study is based on primary data collected from 180 farmers using a well-structured questionnaire across selected districts in the state of Haryana. A multi-stage sampling technique was used to select the farmers for the study. To determine the institutional and socio-economic factors affecting adoption, a binary logistic regression model is employed. The findings of the study revealed that farm size, market linkage, access to extension services and education significantly influence adoption. Opportunities such as premium pricing, environmental sustainability and rising demand encourage adoption, while constraints include certification barriers, weak marketing infrastructure and lack of technical knowledge, which hinder its expansion. The study suggests various policy interventions focusing upon institutional support, capacity building and market development to promote organic horticulture in Haryana.

Keywords: Organic horticulture, Adoption, Haryana, Logistic regression, Opportunities and constraints.

1. Introduction

Organic Farming has emerged as an important priority area globally in view of the growing demand for safe and healthy food and concerns about environmental pollution associated with the indiscriminate use of agro-chemicals. Organic farming is a way of farming sustainably and has proven to be a means to achieve the Sustainable Development Goals (SDGs), especially SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production) [1]. In Haryana, a state with intensive agricultural practices, the shift towards organic farming is gradually gaining momentum due to concerns over environmental degradation, rising input costs, and consumer demand for chemical-free food. Historically, Indian agriculture was organic by default before the advent of chemical-based Green Revolution techniques. However, soil fertility degradation, pesticide residues in food, and groundwater depletion have made organic farming a necessity in states like Haryana [2]. Haryana has a very fertile land and is called the 'Green land of India' [3]. Organic farming refers to a system of cultivation that avoids the use of synthetic fertilisers, pesticides, and genetically modified organisms, relying instead on natural processes, biodiversity, and ecological balance to maintain soil fertility and crop productivity.

The rise in demand for various organic horticulture crops, such as vegetables, spices, plantation crops, and fruits, can be attributed to increasing consumer awareness of food safety, health, and environmental sustainability [4,5]. Organic produce can fetch significantly higher prices in urban markets due to rising concerns about chemical contamination, pesticide residue, and long-term health risks, resulting in a substantial shift in consumption patterns [6]. The expansion in demand for organic horticulture produce in

both domestic and international market makes it high value realisation and a promising avenue for farmers in Haryana. Horticulture crops are more responsive to quality attributes like nutrition and taste, which organic farming is deemed to augment [7].

From an economic perspective, the demand for organic horticulture crops reflects a transition towards quality-oriented consumption. Unlike staple crops, horticultural products are more sensitive to quality attributes such as taste, nutrition, and safety, which organic farming is perceived to enhance [8, 9]. The increase in government initiatives promoting organic agriculture, the benefits of organic certification and development of supply chains have driven the growth of the sector. Organic horticulture is seen as environmentally friendly production system as well as an important strategy for income diversification and rural development [10].

Soils under organic production contain greater amounts of organic carbon, better aeration and more biodiversity than soils managed with conventional methods. This leads to long-lasting agricultural productivity and sustainability. Organic farming further reduces the threat of soil erosion and prevents contamination of both soil and groundwater. Organic farming restores balance to ecosystems, allowing soil to remain a living and dynamic system for long-lasting crop production [11]. In horticulture production, crop quality is greatly influenced by the condition of the soil. Good soil fertility leads to increased yield stability and increased quality of fruits and vegetables in terms of their nutritive content and shelf life. Organic farming, therefore, is highly beneficial for the horticulture farmer and the growing demand for organic horticulture crops is matched only by the need to develop sustainable farming systems that preserve soil health [12]. Although several studies are available on organic farming in India,

most of them focus on general organic farming trends, policy perspective and sustainability issue with limited focus on organic horticulture specifically. There is a lack of integrated analysis that covers the prospects, constraints, and determinants of adoption simultaneously in the state of Haryana. Very little is available in terms of farmers' perceptions of organic horticulture and the role of institutions and specific extension facilities, such as extension input, information and training and the role of FPOs etc.

Therefore, the present study tries to examine these aspects through a comprehensive, data-driven approach with the following objectives:

1. To assess the pattern and extent of adoption of organic horticulture practices among farmers in Haryana.

2. To analyse the major prospects and constraints affecting the organic horticulture practices in Haryana. To meet the above-mentioned objectives, the following hypothesis was formulated:

H₀₁: There is no significant difference in the adoption of organic horticulture practices among farmers across socio-economic and institutional characteristics.

H₀₂: Opportunities and constraints have no significant influence on the adoption of organic horticulture practices in Haryana.

2. Research Methodology

To analyse the adoption of organic horticulture practices among farmers of Haryana, the present study was based on primary data collected through a well-structured and pre tested questionnaire from the farmers during the year 2025-26. The respondents were selected on the basis of a multistage sampling technique. Based on the prevalence of organic farming practices and horticulture activities, three districts from the state of Haryana, namely Sonapat, Karnal and Hisar, were selected purposively in the first stage, while in the second stage, from each district, two blocks were selected randomly. In the next stage, using random sampling, five villages from each block previously selected were chosen. Thus, considering the constraints of time, cost, and field investigation, and by using the Cochran sample size determination formula, a total of 180 farmers, comprising both non-adopters and adopters of organic horticulture practices, were selected for the study. Prior to the final survey, a pilot survey was conducted to ensure clarity, relevance, and reliability of the questionnaire. The reliability of the scale items was tested using Cronbach's Alpha coefficient to assess internal consistency. The data collected includes farm-level variables, socio-economic characteristics, institutional awareness and access related to organic farming. To assess the pattern and extent of adoption, descriptive statistics such as percentages, frequency distributions, and means were used. To identify the various determinants affecting the adoption of organic horticulture practices, a binary logistic regression model was used. The goodness of fit of the model was assessed using the Nagelkerke R², Hosmer–Lemeshow test, and classification accuracy measures. Additionally, the weighted mean square method was used to rank and

analyse the prospects and constraints of organic horticulture practices among farmers. To provide a comprehensive interpretation of the adoption behaviour of the farmers, both qualitative and quantitative frameworks were integrated.

Binary logistic regression model for the adoption decision is modelled as follows:

$$\text{Logit}(P_i) = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{j=1}^{10} \beta_j X_j + \varepsilon_i$$

Where:

- P_i = Probability of adoption (1 = adopter, 0 = non-adopter)
- X_j = Explanatory variables (age, education, farm size, irrigation, market access, credit, extension services, training, awareness, FPO membership)
- P_i = Probability of adoption of organic horticulture practices (1 = adopter, 0 = non-adopter)
- X_1 = Age
- X_2 = Education
- X_3 = Farm size
- X_4 = Access to irrigation
- X_5 = Access to market
- X_6 = Institutional credit access
- X_7 = Extension services
- X_8 = Training exposure
- X_9 = Awareness level
- X_{10} = Membership in FPOs
- ε_i = Error term

3. Result and Discussion

The descriptive analysis indicates that adoption of organic horticulture practices is relatively low but increasing among progressive farmers. As per the results of the binary logistic regression model, as shown in Table 1, Education, with a beta coefficient value of 0.123, shows a positive and significant impact on adoption. Farm size with value 0.296 revealed a positive influence upon adoption due to the greater risk-bearing capacity of the farmers. Extension services and training with coefficient value 0.432 and 0.398, respectively, significantly enhance the adoption of organic horticulture practices. Market access with value 0.345 plays a crucial role in encouraging organic farming. Overall, Education, farm size, market access, extension services, training, and awareness are positive and statistically significant, indicating higher likelihood of adoption. Age shows a negative but weak effect, indicating younger farmers are more inclined towards adoption as older farmers are more risk averse and they are comparatively hesitant towards new technologies

and management practices. The odds ratios, which are greater than 1, indicate an increased probability of adoption with improvements in these variables. The model explains 55% of the variation (Nagelkerke R²) and correctly classifies 78.3% of the cases, indicating a good model fit. The rate of adoption is higher among those farmers who have better access to institutional

support, large landholdings and higher education. These findings are consistent with earlier studies highlighting the importance of knowledge and institutional support in adoption decisions [1, 13].

Table 1: Binary Logistic Regression Results for Adoption of Organic Horticulture Practices

Variables	Coefficient (β)	Standard Error	Sig. (p-value)	Odds Ratio
Constant	-2.425	0.831	0.007	—
Age (X ₁)	-0.031	0.011	0.090	0.978
Education (X ₂)	0.123	0.053	0.005*	1.159
Farm Size (X ₃)	0.296	0.119	0.014*	1.342
Irrigation Access (X ₄)	0.179	0.092	0.040*	1.218
Market Access (X ₅)	0.345	0.128	0.007*	1.439
Credit Access (X ₆)	0.173	0.086	0.042*	1.189
Extension Services (X ₇)	0.432	0.134	0.004**	1.532
Training Exposure (X ₈)	0.398	0.138	0.005*	1.484
Awareness Level (X ₉)	0.453	0.146	0.004**	1.588
FPO Membership (X ₁₀)	0.297	0.135	0.019*	1.346

Significance level (** p < 0.01, * p < 0.05)

Table 2: Prospects in the Adoption of Organic Horticulture Farming

Sr. No.	Prospects	Yes	No	Total Score	Weighted Mean Score	Rank
1	Surge in demand for organic products	149	31	329	1.83	I
2	Nearness to urban centres like Delhi NCR	143	37	323	1.79	II
3	Export prospects	109	71	289	1.60	VII
4	Opportunities for crop diversification	119	61	299	1.66	VI
5	Improvement in Soil Health	132	48	312	1.73	IV
6	Government support schemes	123	57	303	1.68	V
7	Employment generation	104	76	284	1.57	VIII
8	Premium pricing	137	43	317	1.76	III
9	Scope for value addition	97	83	277	1.53	IX
10	Role of FPOs	91	89	271	1.50	X

Table 3: Constraints in the Adoption of Organic Horticulture Farming

Sr. No.	Constraints	Yes	No	Total Score	Weighted Mean Score	Rank
1	Low yield in the transition period	141	39	321	1.78	III
2	Lack of technical knowledge	156	24	336	1.86	I
3	High cost of certification	149	31	329	1.82	II
4	Lesser availability of organic inputs	135	45	315	1.75	IV
5	Weak marketing infrastructure	129	51	309	1.72	V
6	Uncertainty of price	126	54	306	1.70	VI
7	Limited access to credit	121	59	301	1.67	VII
8	Lack of extension services	117	63	297	1.65	VIII
9	Labour-intensive practices	107	73	287	1.59	IX
10	Lack of trust among consumers	101	79	281	1.56	X

The prospects of organic horticulture in Haryana, as shown in Table 2, based on Weighted Mean Scores (WMS) reveals a stronger influence of market-related factors in comparison to institutional and value-chain related factors. The prospects like 'Rise in demand of organic products' scored the highest (WMS = 1.83) and indicate a very good scope with rising consumer demand for safe organic products with zero residues of chemicals. Market access (WMS = 1.79) is also another prospect related to the proximity of cultivation land to

major urban markets of Delhi NCR, which helps in getting a better price for organic produce. Premium pricing (WMS = 1.76) is another prospect that makes economic sense, as it offers premium prices to organic produce as compared to conventional produce. Soil health (improved) was seen as important (4th overall, WMS = 1.73). Government support schemes (WMS = 1.68) and opportunities for crop diversification (WMS = 1.66) were seen as moderately effective.

To the contrary, prospects for exports (WMS = 1.60) and employment generation (WMS = 1.57) were perceived to have less influence. The lowest rated perspectives included scope for value addition (WMS = 1.53) and role of Farmer Producer Organizations (FPOs) (WMS = 1.50), implying largely inadequate processing and branding, and consequently, collective marketing mechanisms in place in the region under study.

An analysis of the constraints to the adoption of organic horticulture in Haryana, as shown in Table 3, identified mainly technical and economic barriers. The main constraint was found to be 'lack of technical knowledge' with WMS 1.86. Organic certification is very expensive for farmers as it has WMS 1.82 for 'high cost of certification' with the second ranking. Weak yields during the transitional period (WMS = 1.78, Rank III) further keep farmers away from organic cultivation due to loss of income for some time. Lack of supply of organic inputs and materials (WMS = 1.75, Rank IV) and other things like equipment and instruments (WMS = 1.72, Rank V) are another major constraint that prevents farmers from shifting towards organic agriculture. Market-related constraints like a lack of adequate marketing infrastructure (WMS = 1.70, Rank VI) and price uncertainty for their produce are some of the indicative inefficiencies in the current marketing systems. Farmers encounter institutional obstacles like limited access to credit (WMS 1.67; Rank VII) and inadequate extension services (WMS 1.65; Rank VIII). Slightly less severe are then still relevant constraints related to organic farming, like very time-consuming practices (WMS 1.59; Rank IX) and lack of trust by consumers (WMS 1.56; Rank X). These findings are consistent with earlier studies which reported that high certification costs, poor marketing infrastructure, yield reduction during the conversion period, limited institutional credit, lack of technical knowledge, weak extension support and inadequate supply of organic inputs are major constraints affecting the adoption of organic farming practices [1, 12-14].

4. Conclusion

Organic horticulture in Haryana has much to offer economically, but lacks institutional support. The study highlights market-oriented opportunities, such as increasing demand, an organic price premium, and a ready market, but identifies a lack of technical knowledge, high costs of certification and production risks in terms of yield decline during transition as major constraints. The empirical results also show that several other factors, such as education, market and credit, extension and training, and awareness, influence the adoption of organic horticulture. To promote organic horticulture in Haryana, future policies need to focus on strengthening extension systems, integrating and supporting farmer training programmes, reducing the cost of certification, facilitating access to organic inputs and helping farmers gain access to markets and value-chains. Building on these conditions, a combination of strong market incentives and supportive institutional mechanisms will help to create opportunities for organic horticulture to grow sustainably and inclusively. Future studies should focus upon region specific studies for examining the long term social, environmental and

economic impact of organic horticulture adoption in Haryana.

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