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Adoption of farmers towards bio-fertilizers and constraints faced by farmers while purchasing of Biofertilizers in Amravati District

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Abstract
This study investigates the purchasing behaviour of farmers towards bio-fertilizers in Amravati district, Maharashtra, focusing on socio-economic characteristics, adoption levels and contraints faced by farmers. A random sample of 60 farmers from Warud and Morshi talukas was surveyed through structured interviews. Analysis using descriptive statistics and Garrett's ranking technique for constraints. Study revealed that most farmers were older, had medium-sized families, and low income respectively. While over half were aware of bio-fertilizers, adoption varied. The Agriculture Department was the main information source, followed by dealers and social media. Constraints such as limited availability, lack of technical knowledge, and financial issues hindered adoption, though overall satisfaction with bio-fertilizers was moderate to high. The study offers actionable insights for policymakers, extension agencies, and agri-input firms to strengthen awareness, improve access, and support sustainable agricultural practices.

Keywords: Biofertilizers, farmer's behaviour, sustainable agriculture, adoption level, purchasing behaviour, constraints

Introduction
Biofertilizers can play a vital role in addressing this issue by boosting crop productivity and helping alleviate food shortages. Despite vast tracts of land under cultivation, the yield per hectare in India often falls short of optimal levels due to factors such as limited adoption of modern farming techniques, degraded soil conditions, and the use of unproductive lands. Enhancing agricultural output per unit area is achievable through the implementation of improved technologies such as biofertilizers, vermicompost, organic farming, biological pest control, and genetically modified crops.

The study will begin by examining the socio-economic characteristics of farmers, acknowledging that aspects such as income, education level, and landholding size significantly. It will then analyse the level of adoption of biofertilizers among farmers to gauge their familiarity and understanding of these products. The study will investigate the challenges farmers encounter when purchasing biofertilizers, focusing on issues like limited access, lack of awareness, and market-related obstacles.

Farmers' choices between biofertilizers and conventional fertilizers are influenced by a complex mix of socio-economic, cultural, and environmental factors. Key elements shaping these decisions include the farmer's educational background, level of awareness about biofertilizers, access to reliable information, financial condition, landholding size, and their assessment of the potential benefits and risks associated with using biofertilizers.

This study seeks to investigate the purchasing behaviour of farmers in the Amravati region, offering valuable insights into both the motivators and challenges of adopting biofertilizers. These insights can guide the development of targeted strategies to support the broader goal of advancing sustainable agriculture.

Objectives of study
- To study the socio-economic characteristic of selected farmers.
- To assess the adoption level of bio fertilizer by selected farmers.
- To identify the constraints faced by the farmers in purchasing of biofertilizers.

Methodology

- **Area of study:** Amravati district of Maharashtra was selected to study the purchasing behaviour of farmers towards biofertilizers.
- **Selected Talukas:** The primary data was collected using a survey method. Out of the fourteen talukas in Amravati district, two talukas, Warud and Morshi were selected.
- **Selection of Villages:** From the selected district all the villages were listed out *viz*., Pusla, Wathoda, Warud (rural), Morshi (rural) selected randomly to make total four villages.
- **Selection of Farmers:** Farmers of selected village were randomly selected for the survey thus making the total sample size to 60.
- **Primary Data:** The primary data regarding socio-economic characteristics of selected farmers, biofertilizer using awareness towards biofertilizer, source of information regarding biofertilizers, and problems in purchasing process of biofertilizer were collected using interview schedule.

Analytical tools

Identify the constraints faced by the farmers in purchasing of biofertilizers

Garrett's Ranking Technique

Garrett's ranking technique will employee to prioritize or rank the level of problems while purchasing biofertilizer from private dealers and agriculture department by the farmers.

Percent position = 100 x (Rij-0.5)/ Nj Where,
Rij = rank given for ith factor by jth individual
Nj = number of factors ranked by jth individual

The factors having highest mean value was considered to be the most important factor and was ranked accordingly.

Results and Discussion

The socio-economic characteristics of selected farmers

A comprehensive understanding of farmers is provided by the socioeconomic profile, which includes information on their age, educational attainment, family size, yearly income, land ownership, intended uses.

Table 1 showed the age distribution: A majority of the farmers (56.67%) were older than 50 years, while 35.00% were between 31-50 years, and only 8.33% were below 30 years. This indicates that farming in the region is predominantly managed by older individuals.

Table 1: The socio-economic characteristics of selected farmers

Sr. No	Profile	No of famers N=(60)	Percentage
1	**Age**		
	Young (up to 30)	5	8.33
	Middle (31-50)	21	35.00
	Older farmers (Above 50)	34	56.67
2	**Education**		
	Primary	0	0
	Secondary	24	40
	Higher secondary	18	30
	Degree and above	18	30
3	**Family size**		
	Small (Up to 3)	15	25.00
	Medium (4 to 6)	40	66.67
	Large (Above 6)	5	8.33
4	**Annual income**		
	Low (below 1 Lakh)	38	63.33
	Medium (1 to 2)	20	33.33
	High (above 2 Lakh)	2	3.33
5	**Total land holdings**		
	Marginal (up to 2.5 acres)	17	28.33
	Small (2.5 to 5 acres)	27	45.00
	Large (Above 5 acres)	16	26.67
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Education Level: None of the farmers had only primary education. Most had secondary education (40%), followed by higher secondary (30%) and degree and above (30%), reflecting a relatively educated farming population.

Family Size: Most farmers belonged to medium-sized families (4-6 members), accounting for 66.67%, while 25.00% had small families and only 8.33% had large families.

Annual Income: A significant proportion of farmers (63.33%) had low annual income (below ₹1 lakh), indicating financial constraints. About 33.33% were in the medium-income bracket, while only 3.33% had high income (above ₹2 lakh).

Landholding Size: Nearly 45.00% of farmers had small landholdings (2.5-5 acres), 28.33% had marginal holdings (up to 2.5 acres), and 26.67% had large holdings (above 5 acres), reflecting a predominance of small and marginal farmers in the study.

Adoption level of biofertilizers of selected farmers

Table 2 showed how 48 out of 60 selected farmers adopted biofertilizers in their farming practices. The adoption was divided into three levels: low, medium, and high.

Table 2: Adoption level of biofertilizers of selected farmers

Sr. No	Adoption Level	No of Farmers	Percent Share
1	Low	8	16.67
2	Medium	23	47.92
3	High	17	35.42
	Total	48	100.00

Out of the total, 8 farmers (16.67%) had a low level of adoption, meaning they used biofertilizers very little or rarely. The majority, 23 farmers (47.92%), were at a medium adoption level, showing they used biofertilizers occasionally and in moderate amounts. Meanwhile, 17 farmers (35.42%) had a high level of adoption, indicating they regularly and actively used biofertilizers in their agricultural work.

Overall, the table showed that most farmers used biofertilizers at medium or high levels. Only a small group had low adoption. This indicated growing awareness and acceptance of biofertilizers among the farming community.

Table 3: Source of information for using biofertilizers of selected farmers

Sr. No	Particulars	No of farmers	Percent Share
1	Agriculture Department	20	41.66
2	Social media	9	18.75
3	Biofertilizer Dealers	12	25.00
4	Advertisement	7	14.59
	Total	48	100.00

Source of information for using biofertilizers of selected farmers

The Table 3 presents data on the sources of information through which farmers became aware about biofertilizers. The responses of 60 farmers in which only 48 adopted the use of biofertilizer so out of 48 farmers were grouped based on four categories: Agriculture Department, Social Media, Biofertilizer Dealers and Advertisement

It was observed that the Agriculture Department was the most common source of information, with 20 farmers (41.66%) learning from it. Biofertilizer dealers informed 12 farmers (25%), and social media was the source for 9 farmers (18.75%). Advertisements played a smaller role, reaching only 7 farmers (14.59%).

Overall the table indicated that the Agriculture Department was the primary source of information for most farmers, while a significant number still lacked any exposure. This highlights the need to improve outreach through various channels, especially to reach those who remain uninformed.

Challenges faced by farmers while purchasing biofertilizer

Understanding these challenges, identify and prioritize these challenges, a study was conducted using Garrett's Ranking Technique, which allowed for ranking based on perceived severity.

Table 4: Challenges faced by farmers while purchasing biofertilizer

Sr. No.	Challenges	Total score	Mean score	Rank
1	Lack of trusted suppliers	3600	75	I
2	Inadequate supply of biofertilizers in local market	2880	60	II
3	Poor Quality of products	2400	50	III
4	Unavailability during peak agricultural seasons	1920	40	IV
5	Limited types of biofertilizers available	1200	25	V

Lack of trusted suppliers received the highest mean score 75 and was ranked I. This showed that farmers placed the most importance on the difficulty of finding reliable and genuine suppliers of biofertilizers. Inadequate supply in the local market had a mean score of 60, earning it rank II. This indicated a widespread issue in the distribution and easy availability of biofertilizers in rural or farming areas. Poor quality of products was ranked III, with a mean score of 50. Farmers expressed concern over the effectiveness and consistency of biofertilizer products. Unavailability during peak agricultural seasons received a mean score of 40 and was ranked IV, highlighting the problem of timely access, especially during critical periods of crop growth. Limited variety of biofertilizers available had the lowest mean score 25 and was ranked V, indicating that while product range was a concern, it was not as urgent as the other challenges.

Overall, it indicated that the most critical issues were the lack of trusted suppliers and poor market availability.

Constraints faced by farmers while purchasing biofertilizers from private dealers

When purchasing biofertilizers from private dealers, farmers often faced several constraints that limited their willingness to use them. To identify and rank these issues, a study was conducted using Garrett's Ranking Technique, which analyzed farmer responses and assigned scores to each constraint based on its severity.

Table 5: Constraints faced by farmers while purchasing biofertilizers from private dealers

Sr. No.	Constraints	Total score	Mean score	Rank
1	Fear of adulteration	3696	77	I
2	High price	3024	63	II
3	Poor quality of products	2592	54	III
4	No discount	2208	46	IV
5	Delayed supply	1776	37	V
6	Preferred brands not available	1104	23	VI

Fear of adulteration was the most significant issue, with the highest mean score of 77, and was ranked I. This reflected farmers' concerns about receiving impure or fake products from private sellers. High price followed with a mean score of 63, ranked II, indicating that many farmers found biofertilizers too expensive when bought from private dealers. Poor quality of products was the third major concern, with a mean score of 54, ranked III, showing that some farmers were dissatisfied with the effectiveness of the products. No discount had a mean score of 46 and was ranked IV, suggesting that the absence of price reductions or incentives was a barrier for many buyers. Delayed supply, with a mean score of 37, was ranked V, pointing to problems in receiving biofertilizers on time, especially during critical farming periods. Preferred brands not available was the least significant issue, with a mean score of 23, and was ranked VI, showing that while brand preference mattered, it was not as urgent as other constraints.

Overall, it indicated that fear of adulteration and high prices were the most critical concerns for farmers buying from private dealers. Product quality, lack of discounts, and timely supply were also notable issues. Unavailability of preferred brands was the least severe constraint in comparison.

Conclusion

The study on farmer's adoption behaviour towards bio-fertilizers in Amravati district reveals key insights into the socio-economic profile, awareness, adoption levels, and constraints faced by farmers. Most respondents were older, had medium-sized families, and operated with limited income, reflecting a typical demographic of small and marginal farmers. Despite a moderate to high level of awareness and adoption of bio-fertilizers, the penetration remains constrained by several factors.

The Agriculture Department emerged as the primary source of information, indicating a dependency on formal channels for awareness. However, limited availability, lack of trusted suppliers, fear of adulteration, high prices, and inconsistent product quality were significant barriers to consistent and widespread use of bio-fertilizers. These challenges were especially pronounced when sourcing from private dealers.

The findings suggest that for sustainable adoption of bio-fertilizers, efforts must focus on improving accessibility, enhancing quality assurance, building farmer trust, and offering competitive pricing. Policymakers, extension agencies, and agri-input companies should collaborate to strengthen the supply chain, provide reliable information, and address farmers' concerns effectively. Strengthening these areas will help promote environmentally sustainable agricultural practices and increase the confidence of farmers in adopting bio-fertilizers as a viable alternative to chemical inputs.

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