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Perceived constraints in buying biofertilizers: A study of farmers in Siddipet district, Telangana

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Abstract

Biofertilizers have emerged as an eco-friendly and sustainable alternative to chemical fertilizers, offering benefits such as improved nutrient availability and soil health. However, their adoption among Indian farmers remains limited due to various constraints. This study was conducted in Siddipet district of Telangana to identify the major challenges faced by farmers in purchasing biofertilizers. A total of 200 farmers were surveyed using a structured interview schedule, and the data were analyzed using Garrett's ranking technique. The results revealed that lack of technical knowledge was the most significant constraint, followed by higher price and timely unavailability of the product. Other issues included concerns about product quality, fear of adulteration, and lack of credit access. Dealer support and packaging size were considered less critical. The findings underline the need for focused awareness programs, timely supply, and trust-building measures to promote the adoption of biofertilizers among farmers.

Keywords: Biofertilizers, constraints, farmers, sustainable agriculture, Telangana

Introduction

Biofertilizers are natural formulations containing live or latent cells of beneficial microorganisms that promote plant growth by enhancing the availability and uptake of nutrients, particularly nitrogen, phosphorus, and other essential elements. These microorganisms colonize the rhizosphere or the interior of the plant and contribute to nutrient cycling and organic matter decomposition. Unlike chemical fertilizers, which may lead to soil degradation and environmental pollution, biofertilizers offer a sustainable, eco-friendly, and cost-effective alternative for enhancing soil fertility and crop productivity (Vessey, 2003) [18]. In India, the excessive use of chemical fertilizers over the past few decades has raised concerns regarding soil health, declining productivity, and environmental hazards. As a response to these challenges, biofertilizers have gained attention for their ability to support sustainable and organic farming practices. Government policies, agricultural universities, and extension agencies have increasingly promoted biofertilizers as part of integrated nutrient management systems (Saxena & Pandey, 2002; APEDA, 2023) [16, 1]. Despite their proven benefits, the adoption of biofertilizers by Indian farmers remains relatively low, particularly in semi-urban and rural areas. Various studies have identified key barriers such as lack of awareness, limited availability in rural markets, delayed or inconsistent results, and inadequate extension services as major constraints (Kumar & Choudhary, 2018) [12]. These adoption challenges are often region-specific and influenced by socio-economic factors, educational levels, and prevailing farming practices. This study aims to explore the constraints perceived by farmers in the Siddipet district of Telangana in purchasing biofertilizers. By identifying these barriers through direct farmer feedback and analyzing them using the Garrett ranking technique, the study seeks to contribute to more effective policy planning and extension strategies that can accelerate the use of biofertilizers for sustainable agriculture in the region.

Literature review

A thorough analysis of the literature available shows that farmers face several purchase constraints for biofertilizers. Bodake *et al*. (2009) [6] and Joshi *et al*. (2019) [10] point out that poor awareness and a lack of technical knowledge are still major hindrances to the adoption of biofertilizers by farmers. Moreover, Katole *et al*. (2017) [11] and Pathak and Christopher (2019) [13] point towards quality and shelf life concerns of products, along with non-uniform results when tested under field conditions, that usually deter farmers from using biofertilizers. Inaccessibility is also common, particularly in less developed areas where supply chains are usually weak or unreliable (Chandawat *et al*., 2019; Bheemireddy *et al*., 2025) [7, 5]. Affordability is also a problem since while biofertilizers are typically cost-saving

in the long run, small and marginal farmers are often reluctant to spend on inputs they view as volatile (Purohit and Dodiya, 2014; Rakesh and Naik, 2022) [14, 15]. Trust in the market is also discredited by the availability of low-quality and spurious products owing mainly to weak regulatory mechanisms (Baconguis *et al*., 2012; Dharmawardana *et al*., 2023) [2, 8]. Studies at the regional level conducted in Kerala, Gujarat, and Andhra Pradesh have also found problems of irregular supply, the absence of demonstration activities, and limited extension services to be major hindrances to higher rates of adoption (Thomas *et al*., 2019; Bharath *et al*., 2024) [17, 4]. In general, review studies by Begho *et al*. (2022) [3] and IntechOpen (2020) [9] highlight the need for synchronized action, such as awareness campaigns, training of farmers, and guaranteed product supply, all buttressed by effective policy environments and institutional support. In total, the literature indicates that it will take more than enhancing access and affordability to raise the rate of adoption among farmers of biofertilizers, but also developing trust through good supply chains, on-farm demonstrations, and efficient agricultural extension services.

Materials and Methods

Study area

The present study was conducted in Siddipet district of Telangana, a region well-known for its robust agricultural activity. A large segment of the local population is engaged in farming and allied sectors. The district features diverse agro-climatic conditions, varied cultivation practices, and distinct cropping patterns, making it a suitable site for exploring multiple dimensions of the agri-input sector. Siddipet was purposively selected for this research owing to its agricultural prominence, which provided a representative setting for the study.

Research design

A Descriptive Cross-sectional research design was adopted for this study. This design is suitable as it helps in systematically describing the present conditions without making any changes to the environment. It allows the researcher to collect detailed information about major problems farmers face while buying biofertilizers. The descriptive nature of the design helps to capture the real-time experiences and opinions of farmers, offering insights into current practices and challenges. It is called cross-sectional because the data was collected at one specific point in time from a sample that represents the larger farming community.

Sampling design

Area of Research

The study was conducted in 4 talukas, namely Raipole, Dubbaka, Chinnakodur, and Narayanraopet in the Siddipet district.

Sampling Method

In the first stage, Siddipet district was selected purposively. Then, in the second stage, out of 26 talukas of Siddipet district, four talukas were selected randomly. Next, in the third stage, five villages were selected randomly from each taluka. In the fourth stage, ten farmers using biofertilizers were selected randomly from each selected village. Thus, the sample size comprised 200 farmers.

Sample Size

In this study total 200 farmers were selected from the Siddipet District of Telangana.

Table 1: Sampling Plan

District (Stage I)	Name of Taluka (Stage II)	No. of Villages (Stage III)	No. of farmers from each village (Stage IV)	Total no. of farmers
Siddipet	Raipole	5	10	50
	Dubbaka	5	10	50
	Chinnakodur	5	10	50
	Narayanraopet	5	10	50
Total		20		200

Data collection

Primary data: Primary data were collected from farmers using biofertilizers.

Secondary data: Secondary data were collected from relevant research papers, Online resources like websites, industry reports, etc…

Data collection instrument

A structured interview schedule was used as a research instrument to collect required data and information to fulfil the objectives of the research.

Method of data collection

The data collection was carried out using personal interviews with the farmers.

Analytical tool

Garret ranking method

Henry Garrett Ranking Method

The Garrett ranking technique was used to explore constraints as perceived by farmers for buying biofertilizers. In Garrett ranking technique, per cent position was calculated using following formula.

Percent position = 100 (Rij - 0.5)/ Nj

Where,
Rij = Rank given for the ith variable by jth respondents
Nj = Number of variables ranked by jth respondents

In the Garrett's ranking technique, the per cent positions were converted into scores. Thus, for each factor the scores of the various respondents were added and then mean values were estimated. The attribute with the highest value was considered as the most important one and the other follow in order.

Results and Discussion

To study the socio-economic profile of farmers

Table 2: To study the socio-economic profile of farmers (n=200)

Variables	Parameters	Frequency	Percentage (%)
Gender	Male	200	100
	Female	00	00
Age (in years)	18 - 30	22	11
	31 - 40	54	27
	41 - 50	66	33
	Above 50	58	29
Land Holding Size (ha)	Marginal (up to 1ha)	62	31
	Small (1.02-2 ha)	84	42
	Semi medium (2.01-4ha)	30	15
	Medium (4.01-10ha)	14	07
	Large (more than 10ha)	10	05
Farming experience (years)	Below 5	18	09
	5 - 10	48	24
	11 - 20	66	33
	Above 20	68	34
Education level	Illiterate	28	14
	Below SSC	98	49
	SSC	38	19
	HSC	20	10
	Graduate	16	8
	Post Graduate	00	00
Annual family income (Rs.)	Below 1,00,000	42	21
	1,00,000 - 2,00,000	96	48
	2,00,001 - 4,00,000	34	17
	4,00,001 - 6,00,000	18	9
	Above 6,00,000	10	5
Type of farming	Irrigated	200	100
	Rainfed	00	00
Sources of irrigation	Canal	98	49
	Open well	26	13
	Pond	46	23
	River	00	00
	Bore well	30	15

Above Table 2 indicates all the farmers who took part in the survey were men. Most of them were between 41 and 50 years old (33%), with another 29% older than 50. About 27% were in the 31-40 age group, and the remaining 11% were between 18 and 30 years old. When it came to the size of their farms, 42% were small farmers, 31% had marginal landholdings, 15% were semi-medium, 7% were medium, and only 5% had large farms. Looking at their experience, 34% had been farming for over 20 years, while 33% had between 11 and 20 years of experience. Around 24% had 5-10 years, and just 9% had less than 5 years' experience. In terms of education, nearly half the farmers (49%) had not studied beyond the Secondary School Certificate (SSC), 19% had completed SSC, 10% finished Higher Secondary Certificate (HSC), 8% were graduates, and 14% could not read or write. None had a postgraduate degree. Most families (48%) had an annual income between ₹1,00,000 and ₹2,00,000. About 21% earned below ₹1,00,000, 17% earned between ₹2,00,001 and ₹4,00,000, 9% earned from ₹4,00,001 to ₹6,00,000, and only 5% earned more than ₹6,00,000 per year. All the farmers used irrigated farming methods, with canals being the primary source of water for 49% of them. Ponds were used by 23%, bore wells by 15%, and open wells by 13%. No farmers reported using any other source of irrigation.

Constraints perceived by farmers for buying Bio-fertilizers

Table 3: Constraints perceived by farmers for buying Bio-fertilizers

Sr. No.	Constraints
1	Higher price
2	Unavailability of suitable packaging size
3	Timely unavailability of product
4	Lack of credit availability
5	Poor quality
6	Fear of adulteration
7	Lack of technical knowledge
8	Dealer/ Retailer support

Garrett's ranking method was employed to explore the constraints as perceived by farmers for buying biofertilizers. As per this method, farmers have been asked to assign the rank for all constraints and the outcome of such ranking has been converted into score value with the help of the following formula:

Percent position = 100 (Rij - 0.5)/Nj

Where,
Rij = Rank given for the ith variable by jth respondents

Nj = Number of variables ranked by jth respondents
The percent is converted into scores by referring to the table given by Garrett's and Woodworth (1969).

Table 4: Percent Position and Garret Value

Rank	100 (Rij - 0.5)/Nj	Percent position value	Garette value
1	100(1-0.5)/8	6.25	80
2	100(2-0.5)/8	18.75	68
3	100(3-0.5)/8	31.25	60
4	100(4-0.5)/8	43.75	53
5	100(5-0.5)/8	56.25	47
6	100(6-0.5)/8	68.75	40
7	100(7-0.5)/8	81.25	32
8	100(8-0.5)/8	93.75	20

Then for each factors, farmers were asked to assign rank and the scores of the individual farmers were added together and divided by the total number of respondents for whom score were added. These mean scores for all the factors were arranged in descending order and the most influencing factors were identified the rank assigned.

Table 5: Ranks given by farmers to each factor and garret score calculation (n=200)

Constraints	1st* 80	2nd* 68	3rd* 60	4th * 53	5th * 47	6th * 40	7th * 32	8th * 20
Higher price	31 (2480)	34 (2312)	29 (1740)	27 (1431)	23 (1081)	20 (800)	21 (672)	15 (300)
Timely unavailability of product	28 (2240)	26 (1768)	27 (1620)	29 (1537)	30 (1410)	24 (960)	21 (672)	15 (300)
Unavailability of suitable packaging size	17 (1360)	20 (1360)	20 (1200)	15 (795)	18 (846)	26 (1040)	30 (960)	54 (1080)
Lack of credit availability	19 (1520)	20 (1360)	24 (1440)	28 (1484)	29 (1363)	31 (1240)	27 (864)	22 (440)
Lack of technical knowledge	42 (3360)	35 (2380)	28 (1680)	21 (1113)	18 (846)	16 (640)	22 (704)	18 (360)
Fear of adulteration	21 (1680)	23 (1564)	25 (1500)	25 (1325)	31 (1457)	26 (1040)	27 (864)	22 (440)
Poor quality	24 (1920)	25 (1700)	26 (1560)	30 (1590)	27 (1269)	26 (1040)	23 (736)	19 (380)
Dealer/ Retailer support	18 (1440)	17 (1156)	21 (1260)	24 (1272)	20 (940)	30 (1200)	33 (1056)	37 (740)

Table 6: Rank wise major constraints perceived by farmers for buying biofertilizers

Constraints	Garett Score	Mean score	Rank
Lack of technical knowledge	11083	55.42	I
Higher price	10816	54.08	II
Timely unavailability of product	10507	52.54	III
Poor quality	10195	50.98	IV
Fear of adulteration	9870	49.35	V
Lack of credit availability	9711	48.56	VI
Dealer / Retailer support	9064	45.32	VII
Unavailability of suitable packaging size	8641	43.21	VIII

All 200 farmers were asked to rank the constraints they faced on a scale from 1 to 8, where 1 indicated the most significant constraint and 8 the least significant. Responses were analyzed using Garret's ranking method.
Table 6 shows the Garrett ranking of constraints faced by farmers in purchasing biofertilizers. The major constraint identified was lack of technical knowledge with the highest mean score of 55.42, followed by higher price (54.08) and timely unavailability of the product (52.54). Other significant issues included poor quality (50.98), fear of adulteration (49.35), and lack of credit availability (48.56). The comparatively less severe constraints were dealer/retailer support (45.32) and unavailability of suitable packaging size (43.21), which received lower mean scores and were ranked last.

Conclusion

The surveyed farmers predominantly perceived a lack of technical knowledge as the most significant constraint in purchasing biofertilizers, followed by higher price and the timely unavailability of the product. Specifically, 55.42 mean Garrett score was recorded for lack of technical knowledge, indicating a critical gap in awareness and training. Price sensitivity and inconsistent product supply further discouraged adoption. Fear of adulteration and concerns about poor quality also ranked high among the barriers. On the other hand, issues like dealer/retailer support and unavailability of suitable packaging sizes were

perceived as less severe. These findings suggest that strengthening farmer education, ensuring timely product availability, and improving trust through quality assurance are essential to promote biofertilizer usage in the region.

Suggestions

1) Since lack of technical knowledge has emerged as the top constraint, it is important to intensify field demonstrations, practical training programs, and farmer meetings to enhance awareness and promote better understanding among farmers.
2) Higher price and timely unavailability emerged as significant concerns. To address these issues, it is essential to ensure timely distribution of products, particularly before critical cropping seasons. Additionally, introducing flexible pricing strategies, seasonal discount offers, and credit facilities through local dealers can help improve accessibility and affordability for farmers.

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