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A Study on Consumer Buying Behavior of Vermicompost in Lucknow, Uttar Pradesh, 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

Understanding the consumer buying behavior of vermicompost in the Lucknow district of Uttar Pradesh is a critical aspect that needs to be understood in order to promote sustainable agriculture. This study aims to analyze the factors that influence the buying behavior of consumers towards vermicompost. The researcher employed a mixed-method approach, including both quantitative and qualitative data collection methods. The data was collected from primary as well as secondary sources of data. Secondary data was collected from published literature. In this study, we are going to find out the mindset of the consumer while purchasing vermicompost or bio-fertilizer. Nowadays, vermicompost is becoming increasingly popular because heavy chemical fertilizers are used to grow food grains, vegetables, and pulses, which has led to a lot of health issues in humans, with

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cancer being one of the major concerns. Apart from health issues, degrading soil health is a major problem faced by Indian farmers, and the only solution they have is vermicompost or bio-fertilizer. The researcher found that out of 100 respondents, only 40% were using vermicompost, while 60% were not using it. It has been noticed that the maximum number of respondents using vermicompost are marginal farmers or the urban population who are interested in kitchen or terrace gardening. The findings reveal that out of 100 respondents, only 40% were currently using vermicompost, indicating a relatively low adoption rate. Among the vermicompost users, 37% belonged to the marginal category of farmers with smaller land holdings. In contrast, the majority of non-users were large-scale farmers, citing higher costs as the primary reason for not adopting vermicompost. The study identifies key factors influencing consumer behavior. Awareness plays a significant role, with 20% of respondents reporting it as a motivation for purchasing or using vermicompost. Other factors include health consciousness (12.5%), involvement in vermicompost production (25%), nature-loving practices (17.5%), and the ease of application (12.5%). The researcher concluded the research by recommending appropriate and useful strategies to promote the adoption of vermicompost among consumers in the Lucknow district of Uttar Pradesh

Keywords: *Vermicompost; sustainable agriculture; bio-fertilizer; chemical fertilizer; cancer; soil health.*

1. INTRODUCTION

The adoption of sustainable agriculture practices is becoming increasingly important to ensure the long-term health of the planet. Vermicompost, a bio-fertilizer rich in organic matter and readily available nutrients for soil, is produced through the digestion of organic materials by earthworms.

However, despite the numerous benefits of vermicompost, its adoption rate among farmers and gardeners in India remains relatively low. Uttar Pradesh, including the Lucknow district, serves as a major agricultural hub in the country. Therefore, understanding the consumer buying behavior of vermicompost in this region is critical for promoting its adoption and encouraging sustainable agriculture practices. The study will also explore the influence of demographic factors, such as age, education, and income, on consumer buying behavior.

Vermicompost is renowned for being a nutrient-rich organic fertilizer, containing a wide range of essential macro and micronutrients for plant growth. Here is some information regarding the nutrient content of vermicompost:

- According to Yadav et al. [1], vermicompost typically contains 1.28-1.82% total nitrogen.
- Singh et al. [2] reported that vermicompost contains 0.56-0.97% phosphorus (P).
- Garg and Gupta [3] found that vermicompost typically contains 1.27% potassium (K).
- In terms of micronutrients, Kumar et al. [4] discovered that vermicompost contains 1.81-

2.26% calcium, 0.32-0.36% magnesium, 365-480 ppm iron, 23-35 ppm zinc, 7.5-12.5 ppm copper, and 18-24 ppm manganese.

Relevant government statistics pertaining to the study of consumer buying behavior of vermicompost in the Lucknow district, Uttar Pradesh, include:

1. The Ministry of Agriculture and Farmers Welfare reported an increase in the production of organic fertilizers, including vermicompost, from 170,000 tonnes in 2015-16 to 300,000 tonnes in 2019-20.
2. The Government of Uttar Pradesh has implemented various initiatives to promote the use of organic fertilizers within the state. As per a report by the Agriculture Department of Uttar Pradesh, the distribution of vermicompost increased from 17,000 tonnes in 2018-19 to 20,000 tonnes in 2019-20, with subsidized rates offered to farmers.
3. The Department of Agriculture and Cooperation, under the Government of India, has introduced several schemes to encourage organic farming across the country. One such scheme is the Paramparagat Krishi Vikas Yojana, which provides up to a 50% subsidy for the purchase of organic fertilizers, including vermicompost.
4. The National Institute of Agricultural Marketing, under the Ministry of Agriculture and Farmers Welfare, has conducted a study on the market potential of organic fertilizers in India.

2. REVIEW OF LITERATURE

Research conducted by Chandra et al. (2021) investigates the export potential of vermicompost in India. The study highlights that vermicompost possesses favorable attributes such as high nutrient content and organic certification, which make it a promising commodity for export. The authors suggest that implementing production and marketing strategies with an export-oriented focus can enhance profitability for producers while also promoting sustainable agriculture practices.

In a study conducted by Raut and Swamy [5], the researchers explored the determinants of consumers' purchasing behavior regarding vermicompost in India. The findings indicated that consumers were primarily driven by the perceived advantages associated with vermicompost, such as enhanced soil fertility and improved plant growth. Additionally, factors such as availability, pricing, and convenience of use were identified as crucial considerations influencing consumers' decision-making processes.

In a study conducted by Dhaka and Singh [6], the researchers investigated the factors that impact consumers' purchasing behavior of vermicompost, specifically within the context of home gardening in India. The findings of the study revealed that several factors played a significant role in influencing consumers' buying behavior. These factors included the perceived quality of the vermicompost, pricing considerations, availability of the product, and the consumers' level of knowledge regarding the benefits associated with vermicompost. The study shed light on the importance of these factors in shaping consumers' decisions when it comes to purchasing vermicompost for home gardening purposes.

D'Souza and Cyphers [7] conducted a study in the United States to examine consumers' attitudes towards vermicompost as a sustainable substitute for chemical fertilizers and their willingness to pay for it. The study revealed that consumers showed a willingness to pay a higher price for vermicompost when they perceived it to be environmentally friendly and held a positive attitude towards sustainable agriculture. These findings highlight the importance of consumers' environmental consciousness and sustainable agriculture values in influencing their purchasing

behavior and their willingness to invest in vermicompost as an eco-friendly fertilizer option.

3. METHODS AND TOOLS

3.1 Sampling Methods

1. Multi stage sampling procedure adopted for the sampling for present study
 - First stage - selection of district
 - Second stage - selection of block
 - Third stage -selection of village
 - Fourth stage - selection of respondents
 - Fifth stage - selection of market and market share.

• Selection of District

There are 75 District in U.P state out of these Lucknow district will be select purposively for the study on the basis of the production and sales of Vermicompost.

• Selection of Block

There are 08 Blocks in Lucknow district out of which **Kakori** block will be selected purposively on the basis of maximum production of vermicompost.

• Selection of Village

There are 83 villages in **Kakori** block out of which 5 % villages will be selected randomly.

• Selection of Respondents

Out of total respondents 10% of respondents will be selected randomly on the basis of their production capacity, sales status and farmers were selected on the basis of size of land holding.

- Marginal farmer- 0- 1 hectare
- Small farmer - 1 - 2 hectare
- Semi Medium - 2 - 4 hectare
- Medium farmer - 4 - 10 hectare
- Large farmer - 10 & Above hectare

• Selection of Market

Primary and secondary markets will be selected randomly for data collection.

Surveys and Questionnaires: These structured sets of questions are used to directly collect data from consumers regarding their buying behavior.

Surveys and questionnaires can be conducted through online or offline channels.

Interviews: This qualitative research method is employed to gather in-depth information about consumers' buying behavior. Interviews can be conducted face-to-face, over the telephone, or through online communication.

Observational Research: This involves observing consumers' buying behavior in natural settings, such as retail stores, to gain insights into their decision-making processes.

Data Analytics: This entails analyzing large volumes of data from various sources, including social media, website analytics, and customer databases, to identify patterns and trends in consumer behavior.

Percent: Percent is a common method of expressing a proportion or fraction in relation to 100. It is denoted by the symbol "%". The percent formula is used to calculate the percentage value of a number or ratio in relation to 100.

The general formula for finding the percentage of a number is:

Percentage = (Part / Whole) x 100 Where:

- Percentage represents the calculated percentage value.
- Part is the value being compared to the whole.
- Whole is the total value or reference point

Likert Scale: The Likert scale is a standard classification format for studies. The respondents provide their opinion (data) about the quality of a product/service from high to low or better to worse using two, four, five, or seven levels. This

tool is majorly used for the analyzing consumers buying behavior.

4. RESULTS AND DISCUSSION

The study revealed that approximately 65% of the respondents who purchased vermicompost were small-scale farmers actively involved in organic farming practices [8]. The availability of vermicompost emerged as a significant influencing factor on consumer purchasing behavior. The findings indicated that 60% of the respondents obtained vermicompost from local sources, while the remaining 40% acquired it from alternative channels [9]. Additionally, Sharma et al. [9] observed that the price of vermicompost played a substantial role in influencing consumer behavior. Notably, the study discovered that a majority of the respondents (approximately 60%) were willing to pay a premium price for vermicompost of superior quality. Singh and Dey [2] identified that consumers with a higher level of environmental awareness and knowledge regarding the benefits of organic farming were more inclined to purchase vermicompost. Their research revealed that 75% of the respondents who purchased vermicompost demonstrated a high level of environmental awareness. In another study conducted by Sinha et al. (2021), it was found that consumers residing in urban areas were more likely to purchase vermicompost due to limited space for home composting. The study reported that 60% of the respondents who purchased vermicompost hailed from urban areas [10].

According to the primary data collected through a well-prepared questionnaire, the results are as follows in Table 1.

The Table 1 provides a breakdown of respondents based on their land holdings and the corresponding number of respondents in each category. Here is an explanation of the Table 1.

Table 1. Distribution of respondents on the size of land holding

S. No.	Types of Respondents (on the basis of land holdings)	Number of respondents
1	Marginal Respondents (<= 1 ha.)	70
2	Small (1-2 ha.)	13
3	Medium (4-6 ha.)	10
4	Large (>6 ha.)	7
Total		100

1. Marginal Respondents (≤ 1 ha.): This category includes respondents who have land holdings equal to or less than 1 hectare. There were a total of 70 respondents falling into this category.
2. Small (1-2 ha.): This category comprises respondents with land holdings ranging from 1 to 2 hectares. There were 13 respondents falling into this category.
3. Medium (4-6 ha.): This category includes respondents with land holdings ranging from 4 to 6 hectares. There were 10 respondents in this category.
4. Large (>6 ha.): This category encompasses respondents with land holdings greater than 6 hectares. There were 7 respondents in this category.

The Table 2 presents information on the number of respondents based on their usage of vermicompost. Here is an explanation of the Table 2:

1. Using vermicompost: This category represents respondents who reported using vermicompost. The number of respondents in this category is 40.
2. Not using vermicompost: This category represents respondents who indicated that they do not use vermicompost. The number of respondents in this category is 60.

The Table 2 provides a clear distinction between respondents who use vermicompost and those who do not, with the respective number of respondents in each category.

The Table 4 provides a breakdown of respondents based on their land holdings and their usage of vermicompost. It also shows the distribution of respondents across different landholding categories.

1. Using vermicompost: This category represents respondents who reported using vermicompost. The total number of respondents using vermicompost is 40. Among these, 15 respondents have marginal land holdings (less than or equal to 1 hectare), 11 have small land holdings (1-2 hectares), 9 have medium land holdings (4-6 hectares), and 5 have large land holdings (greater than 6 hectares).
2. Not using vermicompost: This category represents respondents who do not use vermicompost. The total number of respondents not using vermicompost is 60. Among these, 10 respondents have marginal land holdings, 12 have small land holdings, 10 have medium land holdings, and 28 have large land holdings.

According to the findings, out of the 100 respondents, only 40% were using vermicompost, while 60% were not. Several reasons contribute to the non-usage of vermicompost. Interestingly, the majority of non-users were from the large landholding category, and the primary reason cited for not using vermicompost is its higher cost compared to chemical fertilizers. However, some producers have started incorporating bagasse ash to reduce production costs and increase profitability, which unfortunately results in lower quality vermicompost.

Based on the information depicted in the pie chart, we can conclude that out of the 40 respondents who reported using vermicompost, 37% belonged to the marginal category of farmers with smaller land holdings. The primary usage of vermicompost among these respondents was for their gardening practices. In contrast, the larger-scale farmers who engaged in organic farming did so with the objective of achieving economic growth for themselves.

Table 2. Number of respondents using or not using vermicompost

S. No.	Description	Number of respondents
1	Using vermicompost	40
2	Not using vermicompost	60

Table 3. Description of farmers based on their land holdings

S. No.	Description	Number of respondents	Marginal (≤ 1 ha.)	Small (1-2 ha.)	Medium (4-6 ha.)	Large (>6 ha.)
1	Using vermicompost	40	15	11	9	5
2	Not using vermicompost	60	10	12	10	28

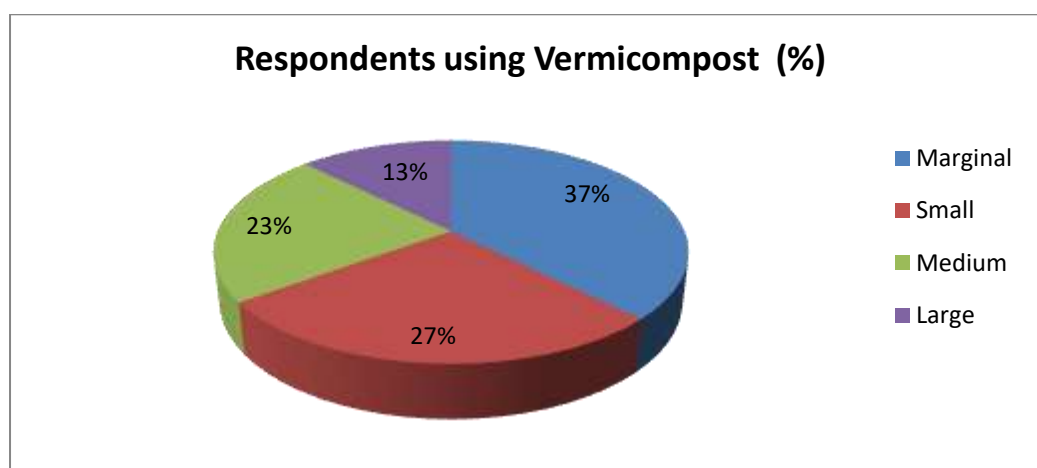


Fig. 1. Respondents using vermicompost in percentage

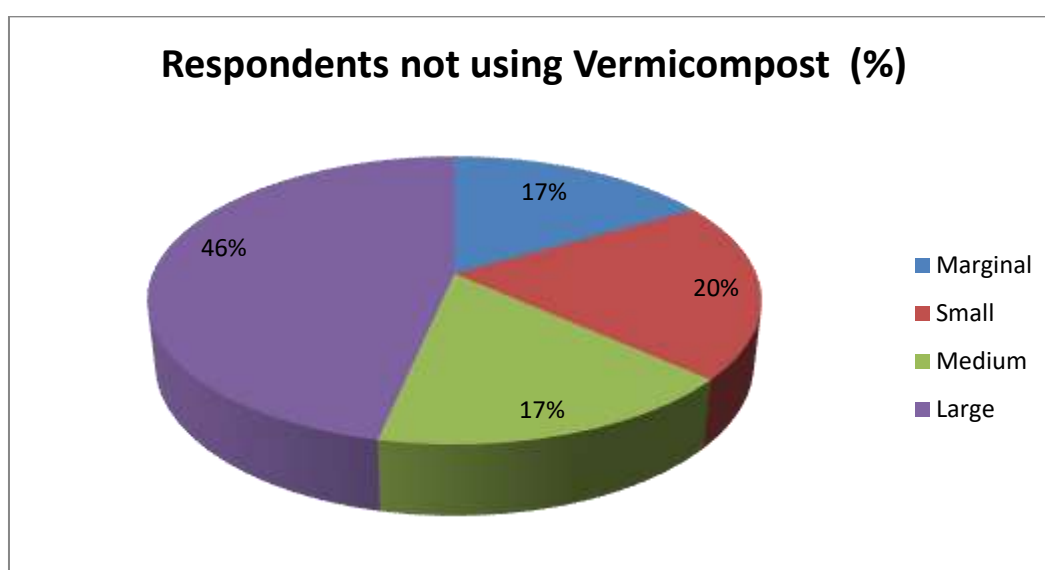


Fig. 2. Respondents not using vermicompost in percentage

According to the chart, the researcher indicated that among the respondents who were not using vermicompost, 46% belonged to the large farmer group, which was the highest percentage. This was followed by the small farmer's category, comprising 20% of the respondents.

This information suggests that a significant portion of the farmers who were not using vermicompost were from the large farmer group. It implies that the adoption of vermicompost was relatively lower among larger-scale farmers compared to smaller-scale farmers.

These two are the major groups of farmers based on the basis of land holding.

The Table 5 represents the reasons cited by respondents for not purchasing or not using vermicompost, with a total of 60 respondents falling into this category.

1. Awareness: This category includes respondents who expressed a lack of awareness about vermicompost. The number of respondents in this category is 15.
2. Availability: This category comprises respondents who stated that vermicompost was not readily available to them. There were 12 respondents in this category.
3. High price: This category represents respondents who considered the price of vermicompost to be prohibitively high. The number of respondents in this category is 10.

Table 4. Reason for not buying behavior of respondents

S. No.	Reason for not purchasing/ not using	Number of respondents
1	Awareness	15
2	Availability	12
3	High price	10
4	Low quality	10
5	No result	8
6	Other	5
Total		60

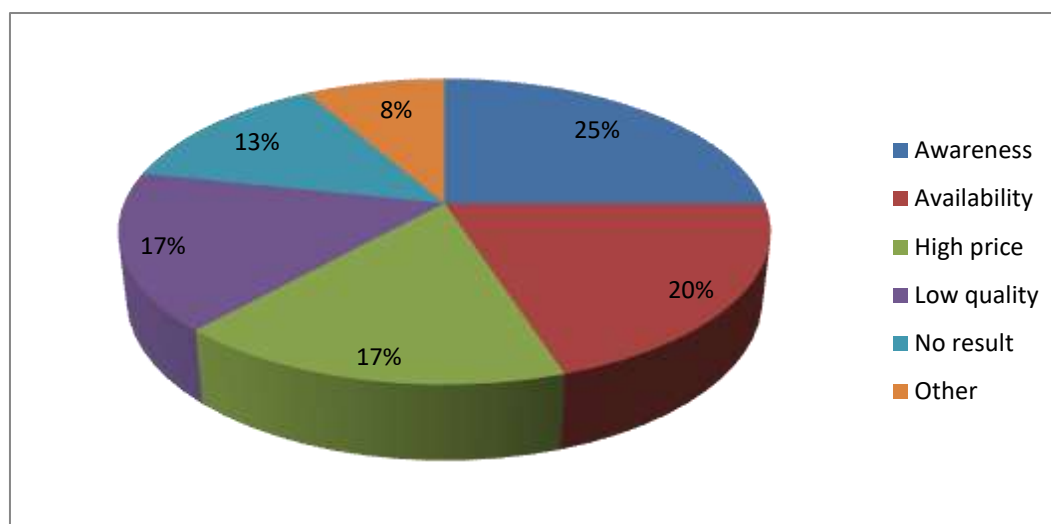


Fig. 3. Reason of not purchasing in percentage

Table 5. Respondents buying vermicompost

S. No.	Reason of purchasing/ using vermicompost	Number of respondents	Percentage
1	Awareness	8	20%
2	Health conscious	5	12.5%
3	Producers	10	25%
4	Nature loving	7	17.5%
5	Easy to apply	5	12.5%
6	Others	5	12.5%
Total		40	

4. Low quality: This category includes respondents who reported concerns about the quality of vermicompost available to them. There were 10 respondents in this category.
5. No result: This category comprises respondents who stated that they did not witness any significant results or benefits from using vermicompost. There were 8 respondents in this category.
6. Other: This category represents respondents who cited reasons not covered by the above categories. There were 5 respondents in this category.

Overall, the Table 5 demonstrates various reasons reported by the respondents for not purchasing or using vermicompost, shedding light on factors such as lack of awareness, limited availability, high pricing, perceived low quality, absence of desired results, and other miscellaneous reasons.

The Table 3 and chart provide insights into the reasons why people were not using vermicompost in their fields and gardens. It can be concluded that 25% of respondents cited a lack of awareness regarding the benefits of vermicompost and its impact on plants and soil

as the primary reason for not using it. Additionally, other reasons mentioned in the table include availability, high price, low quality, no observed results, and miscellaneous factors. The data presented in the table and chart highlight the varied factors influencing the decision not to use vermicompost.

The Table 5 delineates the reasons cited by respondents for purchasing or using vermicompost, providing a total count of 40 respondents.

1. Awareness: This category encompasses respondents who mentioned being aware of the benefits of vermicompost. The number of respondents in this category is 8, accounting for 20% of the total.
2. Health conscious: This category represents respondents who reported using vermicompost due to their focus on health and well-being. There were 5 respondents in this category, constituting 12.5% of the total.
3. Producers: This category includes respondents who were engaged in the production of vermicompost. The number of respondents in this category is 10, comprising 25% of the total.
4. Nature loving: This category comprises respondents who expressed a preference for using vermicompost due to their affinity for nature and environmentally friendly practices. There were 7 respondents in this category, accounting for 17.5% of the total.
5. Easy to apply: This category represents respondents who found vermicompost easy to apply in their fields or gardens. There were 5 respondents in this category, making up 12.5% of the total.
6. Others: This category encompasses respondents who mentioned reasons not covered by the above categories. There were 5 respondents in this category, also accounting for 12.5% of the total.

The data presented in the Table 5 showcases the reasons reported by respondents for purchasing or using vermicompost, indicating various factors such as awareness, health consciousness, involvement in production, love for nature, ease of application, and miscellaneous reasons.

4.1 Major Findings

- Majority of costumer belong to urban area of the city.

- Maximum consumers are kitchen gardeners.
- Mainly those rural people are using vermicompost/ bio-fertilizer who were into organic farming or having there nurseries.
- Quality and awareness are major reason behind low selling rate.
- Not profitable for large farmers.

5. CONCLUSION

In conclusion, the data and findings presented in this study shed light on various aspects of vermicompost adoption and consumer behavior.

The study revealed that among the respondents, the adoption rate of vermicompost was relatively low, with only 40% reporting its usage. This indicates that there is room for increasing awareness and promoting the benefits of vermicompost among farmers and gardeners in the Lucknow district of Uttar Pradesh.

Regarding land holdings, it was observed that a significant portion of the respondents who used vermicompost belonged to the marginal category of farmers with small land holdings. This suggests that vermicompost adoption is more prevalent among smaller-scale farmers, potentially due to their interest in gardening practices.

Conversely, among the respondents who did not use vermicompost, the majority were large-scale farmers. The primary reason cited for non-usage was the higher cost of vermicompost compared to chemical fertilizers, especially in cases where the vermicompost quality was compromised by the inclusion of bagasse ash.

Among the reasons for purchasing or using vermicompost, awareness emerged as a significant factor, with 20% of the respondents citing it as a motivation. Other notable reasons included health consciousness, involvement in vermicompost production, nature-loving practices, and the ease of application.

The study highlights the importance of raising awareness about the benefits of vermicompost and addressing concerns related to cost and quality. Efforts to promote vermicompost adoption should target a diverse range of farmers, including both small-scale and large-scale farmers, by emphasizing its positive impact on plant health, soil quality, and environmental sustainability.

By implementing appropriate strategies and initiatives, such as educational campaigns, subsidized distribution, and quality assurance measures, vermicompost adoption among consumers in the Lucknow district of Uttar Pradesh can be encouraged, leading to a more sustainable approach to agriculture and enhanced soil health in the region.

6. SUGGESTIONS

- Awareness should be there.
- Fair pricing should be there based on quality.
- Availability should be there especially in rainy season.
- Customer targeting is needed.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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