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RESEARCH PAPER

Determinants of Organic Fertilizer Purchase Decisions: Evidence from Bellari District of Karnataka

S.S. Pramod Nayak[1], Harish Kumar, H.R.[2] and G. Basavaraj[3]

[1]Department of Agri-Business Management, University of Agricultural Sciences, Dharwad, Karnataka, India
[2]Agricultural Economics, University of Agricultural Sciences, GKVK, Bangalore, India
[3]Department of Agricultural Economics, University of Agricultural Sciences, Dharwad, Karnataka, India

*Corresponding author: nayakpss767@gmail.com (**ORCID ID:** 0009-0003-2292-2532)

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ABSTRACT

Producers are shifting towards sustainable agriculture has led to growing interest in organic fertilizers, yet the factors influencing their adoption among farmers remain underexplored. This study, conducted in 2024 in the Bellari district of Karnataka, aimed to identify the determinants affecting the purchase decisions and usage of organic fertilizers. A total of 180 farmers were randomly selected from various villages, and data were collected through personal interviews. The study examined usage patterns, perceptions, influencing factors, and challenges using descriptive statistics, Pearson correlation, and regression models to assess social, economic, and technical dimensions. Results indicated that 92.30 per cent of respondents used organic fertilizers, with 64.44 per cent combining them with chemical inputs. Farmers recognized the benefits of organic fertilizers, particularly in improving soil health (58.33 % strongly agreed) and enhancing crop quality (86.11 % agreed or strongly agreed). Despite these positive perceptions, several constraints were identified, including high costs (82.78 %), perceived yield reduction (77.78 %), and uncertainty about effectiveness (72.23 %). Correlation analysis revealed a negative association between perception and usage, while knowledge showed a positive relationship with usage. However, regression analysis indicated that frequency of use significantly influenced adoption, whereas knowledge did not have a statistically significant effect due to practical barriers such as inconsistent supply, limited market acceptance, lack of credit support, and inadequate technical training. The study concludes that although farmers hold favorable views on organic fertilizers, significant economic and technical obstacles limit their widespread adoption. Therefore, enhancing farmer awareness, ensuring timely and affordable access to organic inputs, offering financial incentives, and providing adequate training are essential to promote sustainable agricultural practices in the region.

HIGHLIGHTS

- Majority (91.67%) of farmers use organic fertilizers, often in combination with chemical inputs.
- High cost, perceived yield reduction, and lack of knowledge are key barriers to adoption.
- Usage frequency significantly influences organic fertilizer adoption; knowledge alone does not.

Keywords: Perception, Challenges, Organic Farming, Sustainable, purchasing

Organic farming is a farming system that uses environmentally friendly methods of weed, pest, and disease control (Srutek and Urban, 2008). The organic movement may suddenly be in the mainstream spotlight, but this has not been the case for long. Organic farmers at the grassroots level have invented, tested, and shared production methods since the 1950s. Crop production methods in organic farming are gaining traction around the world. A variety of alternatives to chemical-

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intensive agriculture has been developed to achieve sustainable food-livelihood-environmental security. Organic farming is practiced in 187 countries worldwide, covering 72.30 million acres of land. Area under organic farming has expanded from 0.58 thousand ha in 2003-04 to 26.60 thousand ha in 2020-21. Currently India shares only 4.70 per cent of the global area (Ravisankar *et al.* 2021). Even though. India has 43.80 per cent of the world's organic farmers; its market share is very low.

In 1983, the Indian Council of Agricultural Research (ICAR) established the National Centre for Organic Farming (NCOF) to promote research and development in organic farming. In 2000, the Government of India launched the National Programme for Organic Production (NPOP) to provide certification and support to organic farmers. Today, India is one of the leading producers of organic products in the world. In 2021-22, India had over 3.1 million hectares of certified organic land, producing over 2.75 million tonnes of organic products. Organic farming is practised in all 28 States of India, and a wide range of organic products are now available in Indian markets, including fruits, vegetables, cereals, pulses, oilseeds, spices, and processed foods.

The use of pesticides has undoubtedly contributed to improved agricultural production and increased agricultural income. However, the haphazard utilization of artificial chemical pesticides has adversely affected human health and the environment, while also promoting the development of pesticide resistance among pest species. In Karnataka, for instance, farmer suicides have been attributed to untreated mental illness, with depression arising from repeated exposure to agrochemicals and pesticides potentially increasing the risk of mood disorders and ultimately leading to suicide (Purnanand, 2011). A recent estimate by the World Health Organization (WHO) for 2023-24 indicated that there are 25 million cases of acute occupational pesticide poisoning in developing countries, resulting in approximately 20,000 deaths worldwide each year (Ezhil Vendan, 2016).

In light of these challenges, agricultural growth alone is insufficient to meet the rising food demands of an expanding population without technological solutions to increase yields (Khonje *et al.* 2015). Additionally, farmers continue to face declining per capita food availability due to decreasing soil fertility, which is a major biophysical cause (Mugwe *et al.* 2009). To address these issues, practices such as using composts, manures, cover crops, green waste, and other organic materials can serve as valuable sources of nutrients for crops while enhancing soil quality and health. These organic amendments not only add essential elements but also improve the soil's capacity to absorb nutrients and water, thereby promoting healthier crops. Healthy soil can mitigate problems related to food safety, volatilization, and leaching losses (Company & Gradziel, 2017).

Moreover, Research indicates that organic fertilizers are among the most effective alternatives to chemical fertilizers. Their preference is growing due to several factors, including the rising cost of chemical fertilizers, the timely availability and ease of use of organic options, and increasing concerns about soil contamination caused by chemical inputs (Etim & Benson, 2016). Moreover, excessive use of chemical fertilizers can lead to unintended environmental consequences, such as increased susceptibility of plants to pests and diseases due to elevated nitrogen levels in the soil (Chen, 2006). Therefore, the transition to organic fertilizers not only addresses soil health and food safety concerns but also promotes the overall well-being of both farmers and the environment.

Organic fertilizers offer several advantages over conventional chemical fertilizers. Their use presents a promising approach to mitigating the negative environmental impacts associated with the excessive application of chemical fertilizers (Bhatt *et al.* 2019). By serving as an effective alternative, organic fertilizers help enhance the availability of essential minerals, reduce dependency on chemical inputs, and prevent environmental pollution resulting from the overuse of synthetic fertilizers. In general, adopting organic fertilizers as a substitute can improve agricultural productivity (Janmohammadi *et al.* 2014). Additionally, they support the growth of diverse and beneficial soil microbial communities and are environmentally sustainable (Bulluck *et al.* 2002; Islam *et al.* 2017; Mehdizadeh *et al.* 2013; Muhammad *et al.* 2017; Wilkinson, 2005).

A widely adopted practice that mitigates environmental threats and enhances soil functionality is the application of carbon-rich amendments, such as organic fertilizers. Understanding how

fertilization influences soil quality begins with examining its effects on soil biota (Wasil *et al.* 2023). Manure is one of the most effective forms of organic fertilizer. Regardless of its source or composition, manure contains substantial levels of essential plant nutrients, including nitrogen (in the forms of NH_4^+-N, NO_3^--N, and urea), as well as phosphorus (P), sulfur (S), calcium (Ca), magnesium (Mg), boron (B), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), and zinc (Zn). It is particularly rich in the primary nutrients nitrogen, phosphorus, and sulfur in organic forms. For instance, manure may contain between 8–68 per cent of its total phosphorus as organic phosphorus, with this proportion varying based on factors such as the animal species, age, diet, and husbandry practices. However, the nutrient composition, chemical binding forms, and the subsequent availability of these nutrients to plants after manure application depend significantly on these same factors (Bruhn & Ngigi, 2021).

Despite the high potential demand for organic fertilizers, the actual demand from the farming community remains low. This is largely due to a lack of awareness among farmers regarding the benefits of organic fertilizers, particularly in comparison to inorganic fertilizers. To address this issue, this study was conducted to examine the purchase decisions, usage patterns, perceptions, benefits, and challenges associated with organic fertilizers in the Bellari district of Karnataka.

MATERIALS AND METHODS

The present study has used simple random sampling techniques to achieve the analysis of the purchasing behaviour of organic fertilizers in the Ballari District of Karnataka. The primary data was collected in the month of September, 2024 from 180 respondents using personal interview method to assess their knowledge, awareness, attitudes and factors influencing the purchasing of organic fertilizer in Ballari Region of Karnataka. The secondary data was reviewed from Food and Agriculture Organization (FAO), Centre for Science and Environment (CSE), agricultural statistics at a glance, Ballari districts at a glance, reports, articles and various official websites. Descriptive Statistics used to summarize frequency, percentages, means, and standard deviations of the farmers' responses.

A Likert Scale Analysis was employed in this study to systematically measure farmers' perceptions, challenges and attitudes toward organic fertilizers. A five-point scale was used, where responses ranged from Strongly Agree (1) to Strongly Disagree (5), allowing for a quantitative assessment of subjective opinions.

Likert scale description	Likert-scale
Strongly Disagree (SD)	1
Disagree (D)	2
Neutral (N)	3
Agree (A)	4
Strongly Agree (SA)	5

This method is particularly useful in capturing varying degrees of agreement or disagreement, providing insights into behavioral tendencies and motivational drivers behind fertilizer usage. The Likert scale is widely recognized in social science research for its simplicity, reliability, and effectiveness in attitude measurement (Likert, 1932).

Pearson Correlation Coefficient: Used to measure the strength and direction of relationships among perception, knowledge, and usage of organic fertilizers. The Pearson Correlation is a statistical technique used to assess the relationship or similarity between two data objects. It does so by comparing their attributes and calculating a score that ranges from -1 to +1. Higher scores denote stronger similarity, while scores close to zero suggest little to no correlation. This method is parametric, relying on the mean value of the objects, which makes it more applicable to data that is normally distributed (Pearson, K., 1948).

$$r = \frac{\sum(X_i - \bar{X})\,(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2}(Y_i - \bar{Y})^2}$$

Where,

r is Pearson correlation coefficient

X_i and Y_i; Individual Scores for variable X and Y (perception, Knowledge and Usage); Means of $\overline{X}$ and $\overline{Y}$

Multiple linear regression analysis was employed to evaluate the impact of farmers' perception and knowledge on the usage of organic fertilizers. The model assumes a linear relationship, with usage as the dependent variable and perception

and knowledge as independent predictors. Such regression models are commonly used to analyze behavioural patterns in agricultural practices (Montgomery *et al.* 2012).

$$\beta_0 + \beta_1 + X_1 + \beta_2 X_2 + \varepsilon$$

Where;

Y: Dependent variable (Usage of organic fertilizers)

X_1: Independent variable 1 (Perception)

X_2: Knowledge

β_0: Intercept

β_1, β_2: Regression coefficients

ε: Error term

RESULTS AND DISCUSSION

Usage of organic fertilizers by sample respondents

The sample respondent's usages of organic fertilizers revealed that majority (91.67 %) of the respondents are using organic fertilizers. While 8.33 per cent of the respondents were not using the organic fertilizers (Table 1).

Table 1: Usage of organic fertilizers by sample respondents (n = 180)

Sl. No.	Particulars	Frequency	Per cent
1	Yes	180	92.30
2	No	15	7.69
	Total	**195**	**100**

The results indicated that the increase in usage of organic fertilizers may be due to the increase in consumer awareness about organic fertilizers and consumers being more health conscious. The study by Siva and Chandrachud (2022) reported that increased awareness of the health benefits of using organic fertilizers has led farmers to prefer them over inorganic fertilizer alternatives.

Pattern of fertilizer application by sample farmers

The pattern of fertilizer application by sample farmers is presented in Table 2. The results revealed that majority of the sample farmers (64.44%) preferred using a combination of organic and chemical fertilizers, followed by those who preferred using primarily organic fertilizer with some amount of chemical fertilizers (21.67 %) and those using purely chemical fertilizers (13.89 %). The results indicated that pragmatic stance where farmers adapt their fertilization strategies to optimize yield and address the diverse needs of different crops. It also suggested that farmers adopting this method may be aiming for improved crop yield.

Table 2: Pattern of fertilizer application by sample farmers (n = 180)

Sl. No.	Particulars	Frequency	Per cent
1	Practice purely organic farming and do not use chemical fertilizers at all	25	13.89
2	Primarily use organic fertilizers, but also use some chemical fertilizers.	39	21.67
3	Usage of combination of organic and chemical fertilizers based on the requirement	116	64.44
	Total	180	100.00

Frequency of organic fertilizer application per crop in a crop season

The frequency of organic fertilizer application per crop in a crop season is presented in Table 3. The results indicated that 49.44 per cent of the respondents applied organic fertilizers 1-2 times. While, 41.67 per cent of the respondents applied 3-4 times, 8.89 per cent of the respondents applied more than 4 times. The results suggested that since majority of the sample farmers applied 1 to 2 times, there exist a moderate application frequency sufficient for meeting the nutrient requirements of the crops. This may indicate an understanding of the balance between providing adequate nutrients and avoiding excesses.

Table 3: Frequency of organic fertilizer application per crop in a crop season (n = 180)

Sl. No.	Particulars	Frequency	Per cent
1	1-2 times	89	49.44
2	3-4 times	75	41.67
3	More than 4 times	16	8.89
	Total	**180**	**100**

Perception of using organic fertilizers

The analysis of farmers' perception toward organic fertilizers revealed that 82.22 per cent held a positive

view of their use, while 9.44 per cent had a negative perception and 8.33 per cent remained neutral. This high prevalence of positive perception may be attributed to the perceived benefits of organic fertilization practices among farmers. It also reflects a growing inclination toward sustainable agricultural methods. Farmers often associate organic fertilizers with advantages such as enhanced soil health, reduced environmental degradation, and the production of healthier crops.

Table 4: Perception of using organic fertilizers (n = 180)

Sl. No.	Particulars	Frequency	Per cent
1	Positive	148	82.22
2	Negative	17	9.44
3	Neutral	15	8.33
	Total	**180**	**100**

Benefits of using organic fertilizers in overall farming practices

The perceptions of respondents regarding the benefits of sustainable agricultural practices are summarized in Table 5. Enhanced soil health and fertility was rated the highest, with a mean score of 4.11 and ranked first, as 58.33 per cent of respondents strongly agreed and only 2.22 per cent strongly disagreed with this benefit. Sustainable crop productivity followed, with a mean score of 3.79 and ranked second, supported by 41.11 per cent of respondents strongly agreeing and 45.00 per cent agreeing. Promotion of soil microbial and biological activity was ranked third (mean score: 3.56), with 55.56 per cent agreeing and 25.56 per cent strongly agreeing. Environmental protection and climate benefits received a mean score of 3.41 and ranked fourth, with 54.80 per cent agreeing, 17.51 per cent strongly agreeing, and 5.08 per cent strongly disagreeing. Long-term economic sustainability was ranked fifth (mean score: 3.36), with 40.68 per cent agreeing, 12.43 per cent strongly agreeing, and 12.99 per cent strongly disagreeing. Better produce quality and marketability had a mean score of 3.30, ranked sixth, with 49.15 per cent agreeing, 13.56 per cent strongly agreeing, and 8.47 per cent strongly disagreeing. Improved nutrient use efficiency was perceived as the least important benefit, with a mean score of 3.26 and ranked seventh, as 38.98 per cent agreed, 10.73 per cent strongly agreed, and 14.69 per cent strongly disagreed.

These results indicate that enhanced soil health and fertility, along with sustainable crop productivity, are the most highly valued benefits, whereas improved nutrient use efficiency was considered less significant by the respondents. Similar findings were reported by Patidar and Patidar (2015) in their study on farmers' perceptions of organic farming. Supporting this, studies by Kumar (2024) and

Table 5: Benefits of using organic fertilizers in the overall farming practices (n = 180)

Sl. No.	Particulars	SA	A	N	D	SD	Mean score	Rank
1	Enhanced soil health and fertility	105 (58.33)	8 (4.44)	53 (29.44)	10 (5.56)	4 (2.22)	4.11	I
2	Sustainable crop productivity	74 (41.11)	13 (7.22)	81 (45.00)	5 (2.78)	7 (3.89)	3.79	II
3	Promotes soil Microbial and biological activity	46 (25.56)	23 (12.78)	100 (55.56)	7 (3.89)	4 (2.22)	3.56	III
4	Environmental Protection and climate benefits	31 (17.51)	36 (20.34)	97 (54.80)	7 (2.26)	9 (5.08)	3.41	IV
5	Long-term economic sustainability	22 (12.43)	72 (40.68)	57 (32.20)	6 (1.69)	23 (12.99)	3.36	V
6	Better produce quality and marketability	24 (13.56)	45 (25.42)	87 (49.15)	9 (3.39)	15 (8.47)	3.30	VI
7	Improved nutrient use efficiency	19 (10.73)	69 (38.98)	57 (32.20)	9 (3.39)	26 (14.69)	3.26	VII

Note: *The figures shown in parenthesis indicates per cent (%).*

Khadim *et al.* (2024) found that organic fertilizers improve soil structure and fertility by increasing the organic matter content, which in turn enhances water retention and aeration. Moreover, organic fertilizers promote a diverse microbial community that is essential for nutrient cycling and overall soil vitality (Varma *et al.* 2024). In contrast to synthetic fertilizers, organic fertilizers release nutrients gradually, thereby reducing the risk of nutrient leaching and ensuring a consistent nutrient supply for crops (Kumar, 2024; Khadim *et al.* 2024). This slow and sustained nutrient release supports healthier crop growth and minimizes the need for frequent applications (Kumar, 2024).

Factors influencing the purchase of organic fertilizers

The respondents' perceptions on factors influencing the purchasing of organic fertilizers are presented in Table 6. The factor increases soil organic matter and overall soil health received the highest mean score of 4.36 and was ranked first, with 58.33 per cent of respondents strongly agreeing and only 2.22 per cent strongly disagreeing. Sustainable and eco-friendly agriculture was ranked second (mean score 4.29), as 55.56 per cent strongly agreed and 25.56 per cent agreed. Better crop quality followed closely in third place (mean score 4.18), with 41.11 per cent strongly agreeing and 45.00 per cent agreeing. The factor reduces dependency on chemical fertilizers was ranked fourth (mean score: 4.03), supported by 48.33 per cent of respondents strongly agreeing and 25.00 per cent agreeing. Lower incidence of pests and diseases was ranked fifth (mean score: 3.88), with 38.33 per cent strongly agreeing and 31.67 per cent agreeing, while increases crop yield was ranked sixth (mean score: 3.77), with 17.22 per cent strongly agreeing and 53.89 per cent agreeing. The lowest ranked factor was lower risk of crop failure (mean score: 3.27), with only 12.22 per cent strongly agreeing and 31.67 per cent agreeing, while 40.00 per cent remained neutral and 12.78 per cent strongly disagreed. These results indicate that enhancing soil organic matter and promoting eco-friendly agricultural practices are considered the most important factors for sustainable agriculture, whereas reducing the risk of crop failure is perceived as less significant by the respondents.

The similar studies reported that Shah and Wu (2019) found that 59.32 per cent of respondents strongly agree that organic fertilizers enhance soil organic matter, which is crucial for sustainable agriculture, while Chowdhury *et al*. (2021) reported that 56.50 per cent of respondents strongly agree that organic fertilizers promote sustainable agricultural practices, reflecting the growing consumer preference for environmentally friendly products.

Table 6: Factors influencing the purchase of organic fertilizers (n = 180)

Sl. No.	Factors	SA	A	N	D	SD	Mean Score	Rank
1	Increases soil organic matter and overall soil health	105 (58.33)	53 (29.44)	8 (4.44)	10 (5.56)	4 (2.22)	4.36	I
2	Sustainable and eco-friendly agriculture	100 (55.56)	46 (25.56)	23 (12.78)	8 (4.44)	3 (1.67)	4.29	II
3	Better crop quality	74 (41.11)	81 (45.00)	13 (7.22)	7 (3.89)	5 (2.78)	4.18	III
4	Reduces dependency on chemical fertilizers	87 (48.33)	45 (25.00)	24 (13.33)	15 (8.33)	9 (5.00)	4.03	IV
5	Lower incidence of pests and diseases	69 (38.33)	57 (31.67)	26 (14.44)	19 (10.56)	9 (2.22)	3.88	V
6	Increases crop yield	31 (17.22)	97 (53.89)	36 (20.00)	12 (6.67)	4 (2.22)	3.77	VI
7	Lower risk of crop failure	22 (12.22)	57 (31.67)	72 (40.00)	6 (3.33)	23 (12.78)	3.27	VII

Note: *The figures shown in parenthesis indicates per cent (%).*

The results indicated that a high level of agreement indicated a positive perception of the environmental benefits associated with organic farming practices. However, a notable proportion of respondents remains neutral or disagrees on some aspects, highlighting the need for awareness and communication to address specific concerns and build a more universally accepted understanding of the benefits associated with organic fertilizers. Similar results were found by Ashoka *et al.* (2018) on farmer's behaviour toward bio-pesticides in Hyderabad-Karnataka with focus on Ballari and Koppal districts.

Challenges associated with the usage of organic fertilizers

The challenges associated with the usage of organic fertilizers are presented in Table 7. Reduces crop yield was identified as the most significant constraint, with a mean score of 4.30 and ranked first, as 61.67 per cent of respondents strongly agreed and only 2.22 per cent strongly disagreed. High cost of organic fertilizers was ranked second (mean score: 4.09), with 36.67 per cent strongly agreeing and 46.11 per cent agreeing. Timely availability and supply issues was ranked third (mean score: 4.02), as 36.67 per cent strongly agreed and 43.33 per cent agreed. Limited nutrient content was ranked fourth (mean score: 4.02), with 40.56 per cent strongly agreeing and 35.00 per cent agreeing. Uncertainty about the effectiveness of organic fertilizers was ranked fifth (mean score: 3.96), with 41.67 per cent strongly agreeing and 30.56 per cent agreeing, while 11.11 per cent disagreed and 3.33 per cent strongly disagreed. Slower nutrient release rate compared to chemicals was perceived as the least significant constraint, ranked sixth (mean score: 3.87), with 36.11 per cent strongly agreeing and 39.44 per cent agreeing, while 9.44 per cent strongly disagreed. These results indicate that reduced crop yield and the high cost of organic fertilizers are considered the most critical constraints, whereas slower nutrient release is viewed as relatively less significant by the respondents.

These findings are consistent with several previous studies, which have identified low yield, high input costs, supply and availability issues, and limited nutrient content as key barriers to organic fertilizer adoption (Oyetunde-Usman *et al.* 2021; Taruna Dubey and Tawheed Nabi, 2024; Khan *et al*. 2024; Praveen K.V. and Alka Singh, 2021). Additionally, skepticism about the effectiveness of organic fertilizers and concerns over market acceptance have also been reported as significant challenges by farmers in various regions.

Interrelationship between perception, knowledge, and usage of organic fertilizers

The results of the Pearson correlation analysis between perception, usage, and knowledge of organic fertilizers are presented in Table 8. There was a significant negative correlation between

Table 7: Challenges associated with the usage of organic fertilizers (n = 180)

Sl. No.	Factors	SA	A	N	D	SD	Mean Score	Rank
1	Reduces crop yield	111 (61.67)	29 (16.11)	27 (15.00)	9 (5.00)	4 (2.22)	4.30	I
2	High cost of organic fertilizers	66 (36.67)	83 (46.11)	18 (10.00)	8 (4.44)	5 (2.78)	4.09	II
3	Timely availability and supply issues	66 (36.67)	78 (43.33)	19 (10.56)	8 (4.44)	9 (5.00)	4.02	III
4	Limited nutrient content	73 (40.56)	63 (35.00)	28 (15.56)	6 (3.33)	10 (5.56)	4.02	IV
5	Uncertainty about the effectiveness of organic fertilizers	75 (41.67)	55 (30.56)	24 (13.33)	20 (11.11)	6 (3.33)	3.96	V
6	Slower nutrient release rate compared to chemicals	65 (36.11)	71 (39.44)	16 (8.89)	11 (6.11)	17 (9.44)	3.87	VI

Note: *The figures shown in parenthesis indicates per cent (%)*

perception and usage (r = -0.221, p = 0.005), indicating that as positive perception towards organic fertilizers increases, the frequency of usage tends to decrease, or vice versa. Similarly, a significant negative correlation was observed between perception and knowledge (r = -0.199, p = 0.011), suggesting that higher perception scores are associated with lower knowledge levels regarding organic fertilizers. In contrast, a significant positive correlation was found between usage and knowledge (r = 0.418, p < 0.01), indicating that respondents with greater knowledge about organic fertilizers tend to use them more frequently. All correlations were statistically significant at either the 0.05 or 0.01 level, highlighting important interrelationships among perception, knowledge, and actual usage of organic fertilizers among the respondents.

Table 8: Pearson correlation between frequency of perception, knowledge and usage of organic fertilizers

		Perception	Usages	Knowledge
Perception	Pearson Correlation	**1**	-.221**	-.199*
	Sig. (2-tailed)		.005	.011
	N	162	162	162
Usages	Pearson Correlation	-.221**	**1**	**.418****
	Sig. (2-tailed)	.005		.000
	N	162	162	162
Knowledge	Pearson Correlation	-.199*	**.418****	**1**
	Sig. (2-tailed)	.011	.000	
	N	162	162	162

Note: **. *Correlation is significant at the 0.01 level (2-tailed).*

*. *Correlation is significant at the 0.05 level (2-tailed).*

These findings are consistent with previous studies, which have also reported that knowledge plays a crucial role in the adoption and usage of organic fertilizers, while perception alone may not always translate into increased usage (Varma *et al.* 2024; Wasil *et al.* 2023; Musafiri *et al.* 2022; Sapbamrer and Thammachai, 2021; Chen *et al.* 2020; Farouque and Sarker, 2018). The studies of Varma *et al.* (2024) and Wasil *et al.* (2023) found that farmers with higher knowledge and awareness levels were more likely to adopt organic fertilizer practices, whereas positive perceptions without adequate knowledge did not necessarily lead to increased usage. These studies underscore the importance of targeted educational interventions to bridge the gap between perception and practical adoption of organic fertilizers.

Regression model predicting organic fertilizer usage based on knowledge and perceptions in farming practices

The regression analysis aimed at predicting organic fertilizer usage based on farmers' knowledge and perceptions on framing practices summarized in Table 9, as results indicated by an F-statistic of 9.245 ($p < 0.001$), demonstrating that the model is statistically significant and effectively explains the variance in organic fertilizer usage. The Regression Sum of Squares (RSS) was 36905.726 with two degrees of freedom, resulting in a Mean Square of 18452.863, while the RSS was 317374.774 with 159 degrees of freedom, yielding a Mean Square of 1996.068. The Total Sum of Squares amounted to 354280.500, underscoring the model's substantial explanatory power. These findings highlight the critical role of knowledge and perceptions in influencing organic fertilizer usage among farmers, suggesting that enhancing farmers' understanding of organic practices could lead to increased adoption of organic fertilizers. This aligns with existing literature emphasizing the importance of education and awareness in agricultural practices. Consequently, targeted educational programs and interventions are necessary to improve farmers' knowledge and perceptions, ultimately promoting sustainable agricultural practices. Future research could further explore additional factors, such as economic incentives and access to resources, to enhance the model's predictive capabilities and provide a more comprehensive understanding of organic fertilizer adoption in farming practices.

Coefficients of regression model highlighting the impact of perception and knowledge on organic fertilizer usage in farming practices

The regression model coefficients provide valuable insights into the influence of perception and knowledge on organic fertilizer usage in farming practices. The analysis reveals that the coefficient for the predictor variable Usages is 22.504, with a standard error of 6.662 and a Beta of 0.279. This coefficient is statistically significant (t = 3.378, p =

Table 9: Regression Model Predicting organic fertilizer usage based on knowledge and perceptions in farming practices

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36905.726	2	18452.863	9.245	.000[b]
	Residual	317374.774	159	1996.068		
	Total	354280.500	161			

Note: *Dependent Variable: Constant and Predictors: (Constant), Knowledge, Usages.*

Table 10: Regression model coefficient showing perception and knowledge impact organic fertilizer usage in farming practices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.247	15.422		2.026	.044
	Usages	22.504	6.662	.279	3.378	.001
	Knowledge	4.626	4.595	.083	1.007	.316

Note: *Dependent Variable: Constant.*

Table 11: model summary of R value of organic fertilizer usage framing practices

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	**.853[a]**	**.728**	**.724**	42.556

Note: *Predictors: (Constant), Knowledge, Usages.*

0.001), indicating a positive association between the frequency of usage and organic fertilizer adoption. In contrast, the coefficient for Knowledge is 4.626, with a standard error of 4.595 and a Beta of 0.083, which does not demonstrate statistical significance (t = 1.007, p = 0.316). These findings suggest that while the frequency of usage significantly influences organic fertilizer use, knowledge alone does not appear to have a significant impact. The emphasis here lies in the importance of usage frequency in shaping the utilization of organic fertilizers in agricultural practices, highlighting its role in decision-making among farmers. Additionally, the model summary (Table 11) indicates an R value of 0.853, reflecting that the model accounts for 72.8% of the variance in organic fertilizer usage, which underscores the efficiency of the model in capturing the dynamics of organic fertilizer adoption in farming practices.

CONCLUSION

The study highlights that a significant majority of farmers in Bellari district have adopted organic fertilizers, often using them in combination with chemical inputs. This widespread adoption reflects both rising consumer awareness and a pragmatic approach among farmers to balance crop yield with soil health. The data also reveal that most farmers apply organic fertilizers moderately, typically 1–2 times per crop season, indicating an understanding of nutrient management and the need to avoid over-application. Despite this positive trend, the study identifies several persistent barriers to broader and more consistent use of organic fertilizers. High costs, perceived yield reductions, and uncertainties about effectiveness remain major challenges, as reported by over half the respondents. Statistical analysis further shows that while knowledge about organic fertilizers is widespread, it does not automatically translate into higher usage; instead, actual frequency of use is the most significant predictor of adoption. This suggests that practical experience and tangible benefits are more influential than awareness alone in shaping farmers' decisions. Overall, the findings underscore the importance of targeted policy interventions and support systems to address these

barriers. Efforts such as improving supply chains, offering financial incentives, and providing technical training are essential to encourage wider adoption of organic fertilizers. By addressing both economic and technical challenges, stakeholders can help promote sustainable farming practices that benefit both farmers and the environment in Bellari district.

LIMITATIONS AND FUTURE STUDIES

The long-term economic impacts of organic fertilizer adoption on farm profitability and rural livelihoods. Research should also examine the effectiveness of different extension and training models in increasing both awareness and sustained usage of organic fertilizers among diverse farmer groups. Comparative studies assessing the environmental benefits and soil health improvements from varying organic and integrated fertilizer regimes would provide valuable insights. Additionally, investigating policy interventions, such as credit access and market incentives, could help address current adoption barriers and promote wider uptake of organic fertilizers

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