Analyzing The Impact of Socio-Economic, Knowledge Level and Buying Behavior of Groundnut Growers Towards Micronutrient Fertilizer in Sabarkantha District

ABSTRACT

The study aims to analyze the impact of socio-economic, knowledge level and buying behavior of groundnut growers towards micronutrient in Sabarkantha District. This study employed a multistage sampling technique in the Sabarkantha district of north Gujarat, known for its high groundnut productivity. The focus was on three talukas-Himmatnagar, Idar and Talod-chosen for their extensive groundnut cultivation areas. From each taluka, five villages were randomly selected and eight growers from each village, totaling 120 growers, were selected. The study aimed to explore the socio-economic profiles of groundnut growers, assess their knowledge of micronutrient fertilizers, analyze their buying behavior. The majority of growers (55.83%) were between 36 and 50 years old, with more than 15 years of farming experience. Most belonged to nuclear families and had completed higher secondary education. Borewells and open wells were the main irrigation sources, with 57.50% also involved in animal husbandry. Annual incomes ranged between ₹1,44,901 and ₹6,72,800. Additionally, 73.33% between ₹3,38,501 and ₹8,26,500 from both farming and other sources. Groundnut growers demonstrated high awareness of the importance, access and benefits of micronutrients, though only 19.17% had soil health cards. Agro-input dealers (54.16%) were the primary information source and mixed micronutrients (49.16%) were most preferred. The study found a strong relationship between socio-economic variables and buying behavior, with 96.20% of the variation explained. Positive influences on purchasing included the price of micronutrients, growers' income, farming experience and larger landholdings, while older growers and those with higher knowledge were less likely to purchase micronutrients. Most growers (75.00%) purchased from agro-service centers or dealers. This comprehensive analysis provides valuable insights into the socio-economic profiles, knowledge and buying behavior of groundnut growers in the Sabarkantha district.

Keywords:(Groundnut, Micronutrient, fertilizer, Socio-economic, Buying behavior, Knowledge)

1. INTRODUCTION

Fertilizers, essential for soil fertility and crop yields, include organic (e.g., manure) and inorganic types (e.g., potassium chloride). Russia leads global fertilizer exports, followed by Canada and China. India's fertilizer market is projected to grow at 4.7% CAGR to reach $1160.18 billion by 2028. (Anonymous, 2022[a]). Micronutrient fertilizers, crucial for plant health, come in inorganic salts (e.g., sulphates) and chelates (e.g., EDTA). Groundnut, or peanut (Arachis hypogaea L.), a significant oilseed, is widely used for cooking and is rich in vitamin E, fatty acids and carbohydrates. it's widely cultivated in tropical and subtropical regions worldwide, including Sabarkantha district in Gujarat, India. During the 2020-21 Kharif season, Sabarkantha district saw extensive groundnut cultivation, with Himmatnagar leading in cultivated area. The district achieved high productivity with an average yield of 3,057.24 kg/ha in 2021-2022, showcasing efficient agricultural practices and favorable growing conditions in Gujarat. (Anonymous, 2022[c])

2. METHODOLOGY

The multistage sampling technique was adopted as per the objective of the study. In the first stage, Sabarkantha district was selected purposively because the productivity of groundnut in north Gujarat is high. In the second stage, three talukas from Sabarkantha district were selected purposively i.e., Himmatnagar, Idar, Talod, because these talukas having highest area under. In the third stage, from each taluka five villages were selected randomly and from each village eight farmers were selected randomly. In this way total 120 farmers were selected from Sabarkantha district.

To study the socio-economic characteristic and knowledge of micronutrient fertilizers among groundnut growers in Sabarkantha district, a simple tabular analysis method was used, surveys and interviews were conducted. The data regarding the annual income and annual income +other source of the groundnut growers was analyzed by the mean and standard deviation method and divided into three categories according to Mean - S.D., Mean ± S.D., and Mean + S.D.

Mean ($\bar{X}$): Mean is the average of the numbers or a calculated 'central' value of a set of numbers. This technique was used for classification of the respondents into different categories. This was obtained by total score divided by the numbers of the respondents.

$$\bar{X} = \frac{\sum X_i}{n}$$

Where,

$\bar{X}$ = Arithmetic mean

$\sum X_i$ = Observed value

n = Number of observations

Standard deviation (S.D.): Standard deviation is a measure that is used to quantify the amount of variation or dispersion of a set of data values. Standard deviation was calculated by taking the difference of each item (Xi) in the sample from their arithmetic mean ($\bar{X}$), squaring this difference $(Xi - \bar{X})2$, summing all the squares differences $\sum (Xi - \bar{X})2$, dividing by the number of items minus one (n - 1) and then extracting the square root. Standard deviation was calculated by using following formula:

$$S.D. = \sqrt{\frac{\sum(X_i - \bar{X})^2}{n - 1}}$$

Where,

$\bar{X}$ = Arithmetic mean

X_i = Observed values of variable

n = Number of observations

S.D. = Standard deviation

Multiple regression method

To study the factors influencing the buying behavior of growers for purchasing of micronutrient fertilizer for groundnut crop, multiple regression method was used. The model is given as:

$$y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + \ldots + b_nx_n + u$$

Where,

y = Expenditure on micronutrient (Rs/ha)

b_0 = Intercept

x_1 = Price of the product (Rs)

x_2 = Farmer income (Rs)

x_3 = Farming experience

x_4 = Age

x_5 = Land holding (ha)

x_6 = Education of farmer (Illiterate-1, Primary level-2, Secondary level-3, Higher secondary-4, Graduation / post-graduation-5)

x_7 = Frequency of application

x_8 = Knowledge score

u = Error term

x_5 = Land holding (ha)

3. RESULTS AND DISCUSSION

3.1 socio-economic characteristic of groundnut grower

Age

The results indicate that 55.83 per cent of groundnut growers belong to the middle age group (36 to 50 years) followed by the old age group (above 50 years) at 30.00 per cent and only 14.17 per cent of groundnut growers belong to the young age group (18 to 35 years).

Farming experience

The results showed that the agricultural experience of the sample respondents, who were groundnut growers divided into four groups according to their growing experience. The majority (60.83%) of groundnut growers had at least 15 years of experience followed by 17.50 per cent with 6 to 10 years of experience and 16.67 per cent with 11 to 15 years of experience.(Hadiya and Deshmukh, 2014)

Family type

The results were displayed in Table 1, It was observed that the majority of groundnut growers (60.83%) belonged to the nuclear family, while a comparatively lesser percentage (39.17%) belonged to the joint family.

Educational

It was observed that 30.00 per cent of groundnut growers have studied up to higher secondary level. Among these groundnut growers, 26.67 per cent have attained graduation or post-graduation level followed by 20.00 per cent who have studied up to the secondary level. Additionally, 17.50 per cent of groundnut growers have studied up to the primary level and 05.83 per cent of groundnut growers were reported as illiterate. (Pandya and Pandya, 2008)

Size of land holding

The groundnut growers were categorized into five groups based on their land holdings. The highest percentage (44.17%) of groundnut growers belonged to the medium size land holding category followed by the semi-medium land holding category (28.34%). Additionally, 13.33 per cent of the growers fell into the small land holding category, 08.33 per cent in the marginal land holding category and only 05.83 per cent belonged to the large land holding category.

Sources of irrigation

The results showed that the main source of irrigation water for groundnut growers was a combination of borewells and open wells, accounting for 44.16 per cent. Borewell was also a significant irrigation source utilized by 14.17 per cent of groundnut growers. Additionally, open wells were another important irrigation source utilized by 41.67 per cent of groundnut growers.

Occupation

The results revealed that the majority (57.50%) of the growers were engaged in farming alongside animal husbandry, with another significant portion (12.50%) involved in farming alongside business. Furthermore, 10.84 per cent were engaged in farming along with animal husbandry and business, while 10.00 per cent were involved in farming alongside services. A smaller percentage of growers were engaged solely in farming (5.83%) or in combinations such as farming with animal husbandry and service (3.33%) or farming with animal husbandry, business, and service (1.67%).

Annual income

The results revealed that 71.66 per cent of the groundnut growers have an annual income in the range of ₹1,44,901 to ₹6,72,800. Meanwhile, 16.67 per cent of the growers have an annual income of more than or equal to ₹6,72,801, and 11.67 per cent have an annual income of less than or equal to ₹1,44,900. (Patel, 2017)

Annual income from farming and other source

The results revealed that 73.33 per cent of the groundnut growers have an annual income in the range of ₹3,38,501 to ₹8,26,500. Meanwhile, 17.50 per cent of the growers have an annual income of more than or equal to ₹8,26,501, and 9.17 per cent have an annual income of less than or equal to ₹3,38,500.

Table 1: Categorization of groundnut growers according to their socio-economic characteristic

(n=120)

Variables	Category	Frequency (n)	Percentage (%)
Age	Young age (18 to 35 years)	17	14.17

	Middle age (36 to 50 years)	67	55.83
	Old age (above 50 years)	36	30.00
Farming experience	Up to 5 Years	06	05.00
	6 to 10 Years	21	17.50
	11 to 15 Years	20	16.67
	More than 15 Years	73	60.83
Type of family	Joint	47	39.17
	Nuclear	73	60.83
Education	Illiterate	7	05.83
	Primary (1 to 8 std.)	21	17.50
	Secondary (9 or 10 std.)	24	20.00
	Higher secondary (11 or 12 std.)	36	30.00
	Graduation /post-graduation	32	26.67
Size of land handling	Marginal (Up to 1.0 ha)	10	08.33
	Small (1.01 to 2.0 ha)	16	13.33
	Semi medium (2.01 to 4.0 ha)	34	28.34
	Medium (4.01 to 10.0 ha)	53	44.17
	Large (more than 10.0 ha)	07	05.83
Source of irrigation	Borewell	17	14.17
	Open well	50	41.67
	Borewell + Open well	53	44.16
Occupation	Farming	07	05.83
	Farming+ Animal husbandry	69	57.50
	Farming+ Animal husbandry + Business	13	10.84
	Farming+ Animal husbandry + Service	04	03.33
	Farming+ Business	15	12.50
	Farming+ Service	12	10.00
Annual income	Low (≤ ₹1,44,9000	14	11.67
	Medium (₹ 1,44,901- 6,72,800)	86	71.66
	High (≥ ₹6,72,801)	20	16.67
	Mean- 408800	S.D.- 2640000	
Annual income + Other source	Low (≤ ₹3,38,500)	11	09.17
	Medium (₹3,38,501- 8,26,500)	88	73.33
	High (≥ ₹8,26,5010)	21	17.50
	Mean- 582500	S.D.- 244000	

3.2 Knowledge level of micronutrient fertilizers among the groundnut growers

3.2.1 Knowledge level of micronutrient fertilizers among the groundnut growers

The results indicated that 100.00 per cent of the groundnut growers were aware of the importance of micronutrients for groundnut cultivation and applied micronutrients to their crops. Additionally, 100.00 per cent of the growers were satisfied with the availability of micronutrient fertilizers in their area. A significant majority (93.33%) knew about the specific micronutrients recommended for groundnut cultivation, and 87.50 per cent were familiar with the symptoms of micronutrient deficiencies. Based on their experience, 84.17 per cent noticed improvements in groundnut yield or quality after using micronutrient fertilizers. Furthermore, 67.50 per cent were familiar with the recommended dosage of micronutrients for groundnut cultivation, while 41.67 per cent consulted agricultural experts or extension services for advice on micronutrient management. However, only 34.17 per cent thought micronutrient deficiencies were more common in their soil types or regions. In terms of formal education, 20.00 per cent had received training regarding micronutrient management in agriculture. (Magarvadiya, 2014)

Table 2: Knowledge level of micronutrient fertilizers among the groundnut grower

(n=120)

Sr. No.	Particular	Frequency (n)	Percentage (%)
1.	Do you have soil health card?	23	19.17
2.	Are you aware of the importance of micronutrients for groundnut cultivation?	120	100.00
3.	Do you think micronutrient deficiencies are more common in your soil types or regions?	41	34.17
4.	Do you apply micronutrients to your groundnut crops?	120	100.00
5.	Are you familiar with the symptoms of micronutrient deficiencies in groundnut crops?	105	87.50
6.	Based on your experience, have you noticed any improvements in groundnut yield or quality after using micronutrient fertilizers?	101	84.17
7.	Do you know any micronutrients applied or recommended for groundnut cultivation?	112	93.33
8.	Are you familiar with the recommended dosage of micronutrients for groundnut cultivation?	81	67.50
9.	Do you consult agricultural experts or extension services for advice on micronutrient management?	50	41.67
10.	Have you received any formal training or education regarding micronutrient management in agriculture?	24	20.00
11.	Are you satisfied with the availability of micronutrient fertilizers in your area?	120	100.00

3.2.2 Sources groundnut growers used for information on micronutrient application and deficiency management in groundnut crops

The majority of growers (54.16 %) relied on agro-input dealers for information. This was followed by 20.83 per cent of growers who received information from the local co-operative society and 19.16 per cent who got information from friends or relatives. Social media or online platforms were a source for 18.33 per cent of the growers. Farmers meetings were attended by 11.66 per cent of the growers for this information, while 2.50 per cent relied on Self-assess**.**

Table 3: Sources use for information on micronutrient application and deficiency management in groundnut crops (n=120)

Sr. No.	Sources	Frequency (n)	Percentage (%)
1.	Friends/ Relatives	23	19.16
2.	Agro input dealers	65	54.16
3.	Local co-operative society	25	20.83
4.	Social media/ Online platform	22	18.33
5.	Farmers meeting	14	11.66
6.	Self-assess	03	02.50

3.2.3 Micronutrient fertilizer preference in groundnut crop

A majority of the growers (49.17%) preferred using mixed micronutrients for their groundnut crops. This was closely followed by 47.50 per cent of the growers who preferred using both single and mixed micronutrients. Only a small fraction (3.34%) of the growers preferred using single micronutrients.

Table 4: Distribution of micronutrient fertilizer preference in groundnut crop

(n=120)

Sr. No.	Micronutrient	Frequency (n)	Percentage (%)
1.	Single micronutrient	04	03.34
2.	Mix micronutrient	59	49.16

3.	Both	57	47.50
	Total	120	100

3.3 Buying behavior of the groundnut growers with respect to micronutrient fertilizers

3.3.1 Factors influencing the buying behavior of groundnut growers with respect to micronutrient fertilizers

The results showed that the coefficient of multiple determination (R2) is 0.962, indicating that the explanatory variables included in the model explain over 96.2% of the variation in the purchasing behavior of groundnut growers for micronutrient fertilizers.

The coefficient for the price of the product was 6.26, which was positive and highly significant (p =0.000). This suggests that as the price of the micronutrient fertilizer increases, the buying behavior of groundnut growers was positively influenced. The coefficient for farmer income was 0.001, which was positive and significant (p=0.000). This implies that an increase in farmer income has a positive impact on the buying behavior, although the effect size was very small. The coefficient for farming experience was 32.44, which was positive and significant (p=0.014). This indicates that growers with more farming experience were more likely to purchase micronutrient fertilizers. The coefficient for age was -50.75, which was negative and significant (p=0.000). This suggests that older growers were less likely to purchase micronutrient fertilizers. (Bhoot, 2017)

The coefficient for land holding was 69.98, which was positive and significant (p=0.043). This indicates that farmers with larger fields were more likely to buy micronutrient fertilizers because they needed more of these inputs to cover their extensive land. The coefficient for the education of the farmer was -48.81, which was negative but not significant (p=0.406). This suggests that the education level of the farmer does not significantly influence the purchasing behavior for micronutrient fertilizers. The coefficient for the frequency of application was 149.84, which was positive but not significant (p=0.077). This implies that while frequent application might influence buying behavior, the effect was not statistically significant. The coefficient for the knowledge score was -83.07, which was negative and significant (p=0.004). This could be because more knowledgeable farmers are better informed about the appropriate doses and effective use of fertilizers, reducing the need to purchase excessive quantities.

Table 5: Factors influencing the buying behavior of groundnut growers regarding micronutrient fertilizers (n=120)

Sr. No.	Factors	Coefficients	P-value
1.	Intercept	2592.08	0.000
2.	Price of the product	6.26**	0.000
3.	Farmer income	0.001**	0.000
4.	Farming experience	32.44**	0.014
5.	Age	-50.75*	0.000
6.	Land holding	69.98*	0.043
7.	Education of farmer	-48.81 ^{NS}	0.406
8.	Frequency of application	149.84^{NS}	0.077
9.	Knowledge score	-83.07**	0.004
	R^2	0.962	

(*Significance at 0.05 level, **Significance at 0.01 level, NS- Non significance)

3.3.2 Place of buying groundnut growers for micronutrient

The majority of the growers (75%) bought their micronutrients from agro-service centers or dealers. This was followed by 15.84 per cent of the growers who purchased from co-operative societies, or mandlis. A smaller percentage (9.16%) of the growers bought their micronutrients online.

Table 6: Distribution of growers according to their place of buying (n=120)

Sr. No.	Place of buying	Frequency (n)	Percentage (%)
1.	Agro service center/Dealer	90	75.00
2.	Co-operative& Mandli	19	15.84

3.	Online	11	09.16
	Total	120	100

4. CONCLUSION

The majority of groundnut growers (55.83%) were between the ages of 36 and 50 years. Most (60.83%) of the groundnut growers had more than 15 years of farming experience. Results revealed that 60.83 per cent of the growers belonged to nuclear families. In terms of educational level, most respondents had completed higher secondary education (30.00%), followed by graduation (26.67%). Most growers (44.17%) belonged to the medium-size landholding category. Additionally, 57.50 per cent of groundnut growers were involved in farming and animal husbandry. The distribution of groundnut growers by yearly income from farming revealed that 71.66 per cent of growers fell within the range of ₹1,44,901 to ₹6,72,800; while annual income from farming plus other sources showed that 73.33 per cent of groundnut growers were in the range of ₹3,38,501 to ₹8,26,500.

Groundnut growers demonstrated high awareness of micronutrient importance, access and benefits, but only 19.17 per cent had soil health cards. Agro-input dealers were the dominant source of information (54.16%) for groundnut growers regarding micronutrients, with mixed micronutrients being the most preferred type (49.16%) in Sabarkantha district. The price of micronutrient fertilizers and farmer income positively and significantly influenced the purchasing behavior of groundnut growers. Farming experience and larger landholdings significantly increased the likelihood of purchasing micronutrient fertilizers. Conversely, older farmers were significantly less likely to purchase micronutrient fertilizers. Higher knowledge scores also significantly reduced the purchasing of micronutrient fertilizers, possibly due to better-informed nutrient management practices. The majority of groundnut growers (75.00%) purchased their micronutrients from agro-service centers or dealers.

REFERENCES

1. Amaliyar, K. and Singh, R. (2016). A study on market potential, farmers 'buying behavior and satisfaction level towards water soluble fertilizers in Anand and Narmada districts of Gujarat. *International Journal of Research in Business Management*. **4**(9): 27-36.
2. Anonymous (2022[a]) Report of International Fertilizer Association (IFA) 2022-2023 by United Nations
3. Anonymous (2022[b]) Agricultural Statistics at a Glance, Government of India
4. Anonymous, (2022[c]) Anuual Report. Department of Agriculture, Himmatnagar.
5. Bhoot, A. K. (2017) Awareness and purchase decision of farmers about fertilizers in Junagadh district. M.B.A. (Agri-Business). Thesis (Unpublished). Junagadh Agricultural University, Junagadh.
6. Chaturvedi, B. K., Shrivastava K. K. and Khare C. P., (2015). A Study on Knowledge and Adoption of Management Practices of Prevalent Insects and Diseases of Groundnut Crop in Raigarh District of Chhattisgarh. *Plant Archives*. **15**(2): 903-907
7. Chavda, H., Marviya, P. and Savaliya, V. (2016) A Study on Consumer Behavior Towards Purchase of Agriculture Inputs in Junagadh District. *Advances in Life Sciences*. **5**(5): 1647-1651
8. Gajera, R. H., Raval, K. N. and Shaikh, A. S. (2022) Association between characteristics of groundnut growers and their level of knowledge about plant protection measures. *Gujarat Journal of Extension Education*, **33**(1): 116-120.
9. Gayathri, G. N. and S. Sahana. (2022) Socio-Economic Profile of Fruits and Vegetable Growers: An After the Fact Research. *Asian Journal of Agricultural Extension, Economics and Sociology.* **40**(11): 175-184.
10. Hadiya, B. and Deshmukh, G. (2014). Study on personal, socio-economic, communication, situational characteristics and constraints of adopting recommended

practices of groundnut growers in Saurashtra zone of Gujarat. *International Journal of Home Science Extension and Communication Management*. **1**(2): 80-86.
11. Jalu, S. N., Bariya, M. K. and Chandravadia, K. U. (2022) Relationship Between Profile of Groundnut Cultivators and Their Knowledge Level on The Recommended Crop Production Technology in Saurashtra Region of Gujarat. *Indian Research Journal of Extension Education,* **22**(5): 214-219
12. Kaur, S., Kaur, P. and Kumar, P. (2020). Farmers' knowledge of soil health card and constraints in its use. *Indian Journal of Extension Education*. **56**(1): 28-32.
13. Magarvadiya, D. K. and Patel, V. T. (2014). Knowledge and attitude of farmers regarding biofertilizers. *Gujarat Journal of Extension Education*. **25**(2): 149-151.
14. Pandya, C. D. and Pandya, R. D. (2008). Development and standardization of a scale to measure the socio-economic status of the farmers. *Gujarat Journal of Extension Education*, **17**(1): 7-14.
15. Patel, J. (2017) Constraints faced by the farmers and dealers in purchasing and selling fertilizers in Banaskantha district of North Gujarat. *International Journal of Agriculture Sciences,* **9**(3): 3683-3685
16. Patel, G. G., Lakum, Y. C., Mishra, A. and Bhatt, J. H. (2019). Correlates of knowledge regarding utility of soil testing and soil health card. *Indian Journal of Extension Education*. **55**(4): 31-35.
17. Patel, R. J., Mistry, J. J. and Chaudhary, K. V. (2023). Association between characteristics of groundnut growers and their level of knowledge about plant protection measures. *The Pharma Innovation Journal 2023.* **12**(12): 2606-2610.
18. S.K., Jamanal., Syed, Sadaqath. (2017). Socio-economic characteristics of soybean growers. *Journal of Pharmacognosy and Phytochemistry,* **6**(5): 2766-2768.
19. Shanmugaraja, P, R. Nightingale, V. Prabudoss and S.Jawahar. 2020.Relationship between profile characteristics with knowledge level of groundnut growers in Cuddalore district. *Journal of Information and Computational Science*, **10** (2): 1389-1393.
20. Shukla, A. K., Behera, S. K. and Singh, G. (2021). Micronutrient fertilizers in Indian agriculture–product profile, availability, forecast and agronomic effectiveness. *Indian Journal of fertiliser*, **17**(4): 348-360.
21. Vithani, F. and Pundir, R. S., (2016). A study on market potential and buying behaviour of micronutrient fertilizers in Vadodara and Bharuch districts of Gujarat. *International Journal of Commerce and Business Management,* **9**(2): 220-226.