**Original Research Article**

**PURCHASING BEHAVIOUR AND PROBLEMS FACED BY FARMERS IN THE ADOPTION OF BIOSTIMULANTS IN SELECTED TALUKAS OF KUTCH DISTRICT, GUJARAT**

**Abstract:** Agricultural advancements have played a vital role in enhancing crop productivity, with biostimulants emerging as a promising alternative to traditional chemical inputs. Despite their potential benefits, the adoption of biostimulants among farmers in selected talukas of Kutch district, Gujarat, remains limited due to various challenges. This study, titled “Purchasing Behaviour and Problems Faced by Farmers in the Adoption of Biostimulants in Selected Talukas of Kutch District, Gujarat,” was conducted from January 28, 2025, to March 28, 2025, to assess farmers' socio-economic profiles, purchasing behaviour and problems faced by farmers in adoption of biostimulants. Using a descriptive research design and purposive sampling, data was collected from 200 farmers across Nakhatrana, Bhuj, Bhachau and Mandvi talukas. Findings indicate that most farmers face barriers such as high costs, lack of knowledge, inconsistent product availability and scepticism regarding efficacy. Dealers’ recommendations and past experience played a significant role in purchase decisions, while limited awareness about biostimulants hindered adoption. The study highlights the need for strategic awareness programs and improved distribution channels to enhance biostimulants adoption and empower farmers with sustainable agricultural solutions.

**Keywords:** Biostimulants, Sustainable agricultural solutions, scepticism regarding efficacy.

**1. Introduction**

The agriculture sector, which contributes 18% of the country's GDP is the foundation of the Indian economy. More significantly, agriculture and related industries provide a living for 60% of India's workforce. The production of food grains must be self-sufficient and self-reliant, as noted in earlier five-year plans. The production of food grains increased from around 52 million tons in 1951–1952 to about 230 million tons in 2007–2008. There will be a higher need for food to meet the demands of the expanding population both domestically and globally. The primary objective of agricultural production was to decrease poverty and starvation which was almost accomplished once the green revolution was put into place. In 1980, we attained food self-sufficiency. Food sustainability and nutritional drift have been severely impacted by environmental imbalances and resource depletion caused by modern agricultural practices. As the global population continues to rise, so does the demand for food, intensifying concerns about hunger and the sustainability of food production. The reckless use of chemical pesticides and fertilizers has led to ecological hazards, while the sustainable management of soil fertility remains a pressing issue. Undesirable changes in the biological and chemical composition of soil further threaten long-term food security. Additionally, shifting environmental conditions have introduced unforeseen costs to farming techniques, making food production significantly more expensive and detrimental to the ecosystem compared to previous decades.

Biostimulants have emerged as a promising alternative in addressing the challenges posed by modern agricultural practices**.** Plant biostimulants contain substances and microorganisms whose function, when applied to plants or the rhizosphere, to stimulate natural processes, to enhance nutrient uptake, nutrient efficiency, tolerance to abiotic stress and crop quality. These organic substances, distinct from pesticides and conventional plant nutrients, enhance plant growth when applied in small quantities. Unlike traditional fertilizers, the effects of biostimulants cannot be solely attributed to nutrient supplementation. Examples such as microbial inoculants, fulvic acid, humic acid, seaweed extracts, trace minerals, protein hydrolysates and amino acids have demonstrated their potential in supporting plant development. Over the past two decades, biostimulants have gained considerable popularity, with their market projected to nearly quadruple within the next five years compared to current levels. In 2012, more than six million hectares across Europe were treated with biostimulants. Various crops benefit from their application, and new products incorporating biostimulants continue to be introduced into the market. Despite ongoing debates regarding their effectiveness, sales organizations actively promote these products as profitable solutions capable of boosting yields.

The global biostimulants market is projected to grow at a compound annual growth rate (CAGR) of 10.32% from 2025 to 2030, reaching USD 7.29 billion by 2030, up from USD 4.46 billion in 2025. This growth is driven by rising consumer demand for clean-label and organic food products, efforts to reduce agricultural carbon footprints, and regulatory actions by governments to establish clear standards (IMARC 2024). India’s biostimulants market is expected to expand at a CAGR of 10.27%, increasing from USD 210.4 million in 2025 to USD 343 million by 2030.Seaweed extract biostimulants dominate the Indian market, holding a 37.4% share in 2022, valued at USD 57.3 million. The market is highly fragmented, with the top five companies like Bierstadt India Limited, Coromandel International Ltd, Southern Petrochemical Industries Corporation, T. Stanes and Company Limited and Valagro Ltd. accounting for 10.77% of the total market share. Indian agriculture employs various biostimulants, including humic acid, fulvic acid, amino acids, protein hydrolysates, chitosan, and biopolymers. Additionally, new products incorporating plant and animal derivatives continue to emerge, contributing to market expansion.

* 1. **Objectives**

1. To study the Socio-economic profile of farmers
2. To study factors affecting farmers purchasing behaviour towards biostimulants
3. To study the problems faced by farmers in adoption of biostimulants

2. **Materials and Methods**

The study employed a structured interview schedule to gather data aligned with its objectives. It was conducted in selected talukas of Kutch district, using primary data from farmers and secondary data from literature, publications, and websites. A descriptive research approach was adopted to explore key aspects of farmers. Using non-probability purposive sampling, 200 farmers were surveyed over 60 days. Data were analyzed through tabular methods and statistical tools such as Weighted Average Mean and Garret Score.

The study utilized a structured interview schedule to collect data in accordance with its objectives. It was conducted in selected talukas of Kutch district, it relied on primary data from farmers and secondary sources such as literature, publications, and websites. A descriptive research approach was employed to examine key aspects of farming practices. Using non-probability purposive sampling, 200 farmers were surveyed in the survey over a 60-day period. The collected data were systematically analyzed through tabular methods and statistical techniques, including Weighted Average Mean and Garret Score.

**3. Result and Discussion**

**3.1 To study the Socio-economic profile of farmers**

Table 1. Socio-economic profile of farmers

|  |  |  |  |
| --- | --- | --- | --- |
| Sr. No. | Particulars | Respondents | Percentage |
| 1 | **Age** | | |
| 21-35 | 24 | 12 |
| 36-50 | 97 | 48 |
| 51-65 | 59 | 30 |
| Above 65 | 20 | 10 |
| Total | 200 | 100 |
| 2 | **Education** | | |
| Illiterate | 36 | 18 |
| Up to primary | 72 | 36 |
| SSC | 48 | 24 |
| HSC | 29 | 14 |
| Graduate | 15 | 8 |
| Total | 200 | 100 |
| 3 | **Marital status** | | |
| Married | 186 | 93 |
| Unmarried | 14 | 7 |
| Total | 200 | 100 |
| 4 | **Landholding (acre)** | | |
| Below 5 | 72 | 36 |
| 5-10 | 64 | 32 |
| 10-20 | 36 | 18 |
| Above 20 | 28 | 14 |
| Total | 200 | 100 |
| 5 | **Occupation** | | |
| Agriculture | 121 | 60 |
| Agriculture + Animal husbandary | 48 | 24 |
| Agriculture + Business | 31 | 16 |
| Total | 200 | 100 |
| 6 | **Annual income (lakh)** | | |
| <1 | 28 | 14 |
| 1-5 | 96 | 48 |
| 5-10 | 46 | 23 |
| >10 | 30 | 15 |
| Total | 200 | 100 |
| 7 | **Family size** | | |
| 2 | 22 | 11 |
| 3-5 | 107 | 53 |
| Above 5 | 71 | 36 |
| Total | 200 | 100 |
| 8 | **Experience of farming** | | |
| Up to 5 years | 21 | 10 |
| 5 to 10 years | 26 | 13 |
| 10 to 15 years | 52 | 26 |
| More than 15 years | 101 | 51 |
| Total | 200 | 100 |
| 9 | **Major growing crop** | | |
| Pomegranate | 68 | 34 |
| Castor | 24 | 12 |
| Cotton | 33 | 17 |
| Vegetable crop | 16 | 8 |
| Wheat | 18 | 9 |
| Mango | 15 | 7 |
| Mustard | 12 | 6 |
| Date palm | 5 | 2 |
| Other | 9 | 5 |
| Total | 200 | 100 |

Results show that nearly half of the group is aged 36-50 (48%), with a substantial portion being 51-65 years old (30%). The younger 21-35 age bracket represents 12%, while those above 65 years account for 10%. It is found from the analysis that the majority farmers (48%) earn between 1 to 5 lakh rupees, while 23% earn 5-10 lakh rupees and 15% earn more than 10 lakh rupees. Only 14% earn less than 1 lakh rupee per year, reflecting diverse income levels within the farming community.

The group's education levels vary widely. Majority 36% have primary-level education (72 people), while 24% have SSC qualifications (48 people). Additionally, 18% are illiterate (36 people), 14% have HSC education (29 people) and only 8% are graduates (15 people), reflecting the diverse educational backgrounds of these 200 individuals. Agriculture is the main occupation for 60% (121 individuals) of the group. Another 24% (48 individuals) combine agriculture with animal husbandry, while 16% (31 individuals) mix agriculture with business activities, showcasing varied farming practices and entrepreneurial spirit.

According to the study Pomegranate is the most grown crop in the group, with 34% (68 individuals) cultivating it. Other significant crops include cotton (17%), castor (12%), wheat (9%), vegetables (8%), mango (7%), mustard (6%) and date palm (2%), highlighting a diverse range of agricultural activities.

**3.2 To study factors affecting farmers purchasing behaviour towards biostimulants**

Table 2. factors affecting farmers purchasing behaviour towards biostimulants

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Factor** | **SD(1)** | **D(2)** | **N(3)** | **A(4)** | **SA(5)** | **WAM Score** | **Rank** |
| Price | 0 | 0 | 0 | 57 | 143 | 4.715 | 1 |
| Past experience | 0 | 0 | 40 | 48 | 112 | 4.366 | 2 |
| Quality | 0 | 18 | 45 | 60 | 77 | 3.980 | 3 |
| Effectiveness/Performance | 0 | 34 | 55 | 67 | 44 | 3.605 | 4 |
| Brand | 16 | 30 | 87 | 23 | 44 | 3.245 | 5 |
| Other farmers suggestion | 43 | 56 | 87 | 9 | 5 | 2.385 | 6 |
| Availability | 55 | 78 | 67 | 0 | 0 | 2.066 | 7 |

(1- Strongly disagree, 2 - Disagree, 3-Neutral, 4-Agree, 5-Strongly agree)

Study highlights the factors affecting farmers purchasing behaviour towards biostimulants. Responses were grouped into five categories: 1- Strongly disagree, 2 - Disagree, 3-Neutral, 4-Agree, 5-Strongly agree. Key factors considered include Price, Past experience, Quality, Effectiveness/Performance, Brand, Other farmers suggestion and Availability. The importance of each factor was determined using the Weighted Average Mean (WAM).

The analysis revealed that Price ranked as the top influencing factor (WAM 4.715), followed by Past experience (4.366), Quality (3.980), Effectiveness/Performance (3.605) and Brand (3.245). Other farmers' suggestions and availability are the least important factors, with WAM scores of 2.385 and 2.066, respectively, indicating less influence on farmers' buying decisions.

* 1. **To study the problems faced by farmers in adoption of biostimulants**

Table 3. Problems faced by farmers in adoption of biostimulants

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Problems** | **Not at all (1)** | **Moderately**  **(2)** | **Extremely (3)** | **WAM Score** | **Rank** |
| **High price** | **15** | **39** | **146** | **2.655** | **1** |
| Delayed effect | 16 | 61 | 123 | 2.535 | 2 |
| Uncertainty | 55 | 58 | 87 | 2.160 | 3 |
| Availability | 54 | 95 | 51 | 1.985 | 4 |
| Adverse effect | 132 | 54 | 14 | 1.410 | 5 |
| Lack of knowledge | 154 | 41 | 5 | 1.255 | 6 |
| Less products range | 165 | 35 | 0 | 1.175 | 7 |

The Farmers face several challenges when adopting biostimulants. The high price ranks as the biggest obstacle, making it difficult for many to afford them. The delayed effect is another concern, as farmers prefer quicker results for their crops. Uncertainty about their effectiveness causes hesitation in using them regularly. Limited availability adds to the struggle, making it hard for farmers to access these products when needed. Some farmers fear adverse effects, believing biostimulants might harm their crops instead of benefiting them. Lack of knowledge is another major barrier, as many farmers are unaware of how to use biostimulants effectively. The narrow range of products further limits options, reducing flexibility in choosing the right type. These factors collectively discourage farmers from adopting biostimulants widely. Addressing these concerns through better education, affordable pricing and wider availability could improve adoption. Overcoming these barriers would help farmers utilize biostimulants effectively for better crop productivity.

1. **Conclusion**

The study reveals diverse farmer demographics, income levels and education, which influence agricultural decisions and biostimulants adoption. Pomegranate is the leading crop and land holdings vary, with many managing small farms. Price and past experience are major factors in purchasing biostimulants, while brand relevance and availability have less impact. Adoption remains low due to high costs, delayed effects and uncertainty indicating significant hesitation. Addressing these concerns through education, demonstrations and financial incentives could boost acceptance. Effective outreach strategies, such as farmer meetings and social media campaigns, can enhance trust and understanding. Strengthening collaboration between agricultural experts and farmers can further promote awareness and confidence in biostimulants usage. Government support through subsidies and training programs could play a crucial role in increasing adoption rates. Overall, targeted efforts are essential to encourage farmers to embrace biostimulants for sustainable agriculture.

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