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Buying behaviour, usage pattern and constraints of sesame growers for insecticides in Gujarat

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Abstract

This empirical investigation, utilizing the published theoretical literature and descriptive cross-sectional research design, examines the buying behaviour, usage pattern and constraints for insecticides among the sesame growers. The study was conducted in the purposively selected Rajkot district of Saurashtra region of Gujarat state. The research involved a structured survey of 200 sesame growing farmers selected across four talukas - Jasdan, Vinchhiya, Gondal, and Kotada Sangani - using a multistage random sampling approach and surveyed using a structured interview schedule. The objectives were to analyse farmers' socio-economic profiles, insecticide purchasing behaviour, application practices, and the constraints faced during procurement. The findings revealed that the majority of farmers were male, aged between 31-40 years, with education levels ranging from below SSC to HSC. Most respondents were small and semi-medium farmers, holding less than 4 hectares of land, with farming experience of over 20 years and an annual income between ₹1,00,000 to ₹5,00,000. Insecticides were mostly purchased from local dealers, with decisions influenced by past experience, dealer recommendations, and progressive farmers' opinions. Farmers preferred packaging sizes of 250 ml and 500 ml and applied insecticides primarily in the early morning hours. Key challenges included high prices, limited access to preferred brands during peak seasons, and insufficient technical guidance. The study recommends improving dealer engagement, offering insecticides on credit, organizing farmer field demonstrations, and simplifying promotional materials in regional languages to support better-informed and safer insecticide use in sesame farming.

Keywords: Agrochemicals, buying behaviour, constraints, insecticide use, Rajkot district, sesame growers

Introduction

India's agricultural sector supports over 54% of the population and contributes 18.3% to the nation's Gross Value Added (GVA), yet faces major crop losses due to pests and diseases, accounting for 15-25% annually (MoAFW, 2024; ICAR, 2024). Agrochemicals, particularly insecticides, play a critical role in minimizing these losses and improving productivity. Despite being the fourth-largest agrochemical producer globally, India's pesticide usage remains low at 0.6 kg/ha compared to countries like China (13.1 kg/ha) and the USA (7.0 kg/ha), indicating potential for growth (FICCI, 2024) [25].

Gujarat, a leader in the chemical and agrochemical industry, significantly contributes to India's pesticide output and consumption/usage. Sesame (*Sesamum indicum*), a major oilseed crop in Rajkot district of Saurashtra region of Gujarat state, is increasingly affected by pest infestations, prompting the need for effective insecticide use. However, factors such as socio-economic conditions, market access, and awareness influence farmers' purchasing and usage behaviour.

This study investigates the buying behaviour, insecticide usage patterns and constraints for procurement among sesame growing farmers. The insights aim to assist agrochemical companies, extension agencies, and policymakers in developing region-specific strategies for safe and effective insecticide adoption.

Review of literature

The review of literature provides a comprehensive understanding of prior research relevant to sesame farmers' socio-economic conditions, insecticide buying behaviour, usage patterns, and perceived constraints. This foundation helps define existing knowledge gaps and guides future investigation.

Mathukiya (2014) [7] conducted a socio-economic study among cotton farmers in Junagadh district, Gujarat. The findings revealed that the majority of farmers (71%) were aged 36-50, with 39.5% classified as marginal farmers. Most were married (94%) and had only primary education (58.5%). Nuclear families were common (69%), typically with 2-5 members (58%). Income levels were predominantly below ₹60,000 per year.

Posia (2016) [12] studied brand loyalty and purchase

decisions regarding cumin seeds in Junagadh, focusing on socio-economic characteristics. Most participants had 5-15 years of farming experience and were aged 30-45. Annual incomes largely ranged from ₹50,000 to ₹2,00,000.

Badekhan and Devi (2018) [1] analysed socio-economic status and pesticide attitudes among cotton farmers. Most respondents were small and medium farmers educated up to high school. Notably, 73.33% did not use protective gear during pesticide application, highlighting a need for awareness on safety practices.

Vasoya *et al.* (2023) [18] explored insecticide purchase behaviour among cumin farmers in Dhrol taluka, Gujarat. Findings showed that most were middle-aged, primarily educated, and had farming experience of 21-30 years. Land holdings were typically between 1-2.5 hectares, with annual incomes ranging between ₹1-5 lakh.

Thombare *et al.* (2024) [17] assessed maize growers in Maharashtra, reporting that 95% depended entirely on agriculture. Educationally, 46.66% had completed higher secondary education, and 48.33% operated medium-sized farms (2-4 ha). Livestock ownership was also common.

Momin and Shaikh (2019) [8] examined pesticide purchase decisions in Vadodara, Gujarat. Among the findings, 80% sourced pesticides from company dealers and 70% bought on credit. Factors influencing purchase included price, brand image, yield performance, and dealer relationship.

Pravin *et al.* (2020) [13] evaluated herbicide buying behaviour and satisfaction in Gujarat. Using multiple regression and Likert scale, they found that brand image, experience, and crop area significantly influenced satisfaction. While most farmers were satisfied with quality, satisfaction with pricing and advertisement was mixed.

Ladumor *et al.* (2023) [6] investigated fertiliser buying behaviour in Kheda district. All 100 participants used fertiliser in rice crops, with 41% cultivating 2.01-4 acres. Monthly income ranged from ₹20,001-30,000, and 13% were graduates, reflecting moderate education and income levels.

Sahu and Singh (2017) [15] focused on post-application hygiene practices among sesame and groundnut farmers. Results indicated that 42% washed hands with plain water, 36% used soap, while 22% did not wash at all. Unsafe practices were linked to water scarcity and lack of awareness.

Patel and Joshi (2018) [11] found that 57% of oilseed farmers in Rajkot and Jamnagar sprayed insecticides in the early morning, while 32% preferred evening due to temperature considerations. Timing choices were largely based on tradition and crop growth stages.

Kumar and Meena (2019) [5] highlighted that over 50% of sesame and cotton farmers in Surendranagar did not use any protective gear. Only 10% used gloves and 22% masks. Reasons cited included discomfort, lack of access, and unawareness.

Rathod *et al.* (2020) [14] found that 49% of farmers in Amreli and Bhavnagar districts mixed insecticides with bare hands. Lack of training and access to proper tools were cited as key issues. The study recommended distribution of low-cost mixing tools and safety education.

Patel *et al.* (2017) [10] documented that 95.5% of farmers in Banaskantha, Gujarat, faced high input costs. Other major issues included poor quality and non-availability during peak times. Suggestions included establishing local fertilizer depots and pricing reforms.

Chauhan and Patel (2018) [3] reported that 83% of farmers in Mehsana faced credit shortages. A lack of technical guidance (65%) and inappropriate packaging sizes (58%) were also significant constraints. Recommendations included agro-service center expansion and seasonal interest-free credit.

Thakor *et al.* (2019) [16] identified that 92.4% of farmers in Junagadh perceived high insecticide prices as a major constraint. In addition, 68.5% complained of non-availability during pest outbreaks, and 57.2% about adulterated products. Suggestions included training, rural depots, and insecticides on credit.

Dabhi and Thakkar (2024) [4] found that most of the farmers got aware about fungicides from agro service centre and the most influencing factors for purchase of fungicides were found to be dealer recommendation followed by past experience and price. Constraints faced by most of the farmers were high cost of fungicides followed by lack of technical knowledge.

Zapda and Thakkar (2024) [19] in their landmark study on awareness and purchasing behaviour of farmers towards insecticides for sesamum crop in Saurashtra region of Gujarat reported that farmers' brand preferences for specific insecticides were influenced by competitive pricing, past experiences, and the opinions of progressive farmers. Price sensitivity was significant, leading farmers to switch brands when prices were high, products were unavailable, or credit facilities were lacking. It was also found that farmers' choices were also strongly influenced by farmer meetings and field demonstrations.

Bhalodiya and Thakkar (2024) [2] reported that farmers' brand preferences were mainly influenced by dealers' recommendation. Higher prices and fear of adulteration were found to be the main constraints perceived by farmers in the purchase of cotton pesticides.

Paghadar and Thakkar (2023) [9] found that farmers mostly relied on past experience, dealer recommendation and brand image of the company while buying insecticides. The major problems faced by farmers included high price, no discount, poor quality of products, fear of adulteration and product availability.

In nutshell, there have been plethora of research studies highlighting the factors considered important while making purchase decision for insecticides for different crops, associated buying behaviour of farmers, their usage pattern and the constraints. But, there is a dearth of empirical research on assessment of buying behaviour, usage pattern and constraints of sesame growers for insecticides, particularly in Saurashtra region of Gujarat state; and this study is a sincere attempt to fill that void. In and all, this study stands out as a landmark study for developing thorough understanding about the buying behaviour, usage pattern and constraints of sesame growers for insecticides.

Methodology

The present research was conducted in Rajkot District of Gujarat, which was selected due to its significant sesame cultivation area. Descriptive cross-sectional research design

was employed to analyze various factors influencing sesame farmers' buying behaviour, usage pattern, and perceived constraints regarding insecticides.

Both primary and secondary data collection methods were used. Primary data was collected through a structured interview schedule administered to 200 sesame farmers, while secondary data was obtained from company records, reports, research articles, and relevant websites.

A multi-stage sampling technique was adopted for sample selection. Four talukas namely Jasdan, Vinchhiya, Gondal, and Kotada Sangani were randomly chosen from the district. From each taluka, five villages were selected randomly, and ten sesame farmers from each village were interviewed, leading to a total sample size of 200 respondents.

Analytical methods included tabular presentation, along with simple statistical tools such as percentages, frequency distribution, mean scores, and Likert scale ratings. Additionally, rank order analysis was used to prioritize influencing factors and constraints.

This methodology aimed to provide a clear, data-driven understanding of sesame farmers' purchasing behaviours and practices related to insecticide use, combining both qualitative and quantitative techniques for robust and reliable results.

Results and Discussion

Socio-Economic Profile of Sesame Farmers

The socio-economic profile analysis revealed that the highest proportion of sesame farmers (38.5%) were in the age group of 31-40 years, followed by 28% in the 41-50 years category, indicating that middle-aged individuals are most actively involved in sesame cultivation. Most of the respondents (44%) had more than 20 years of farming experience, suggesting a strong base of agricultural knowledge among the farming community. Regarding occupation, 49% of the farmers were involved in both farming and animal husbandry, highlighting the prevalence of mixed farming systems. Landholding data showed that 34% were small farmers (1.01-2.00 ha), followed by 31% semi-medium farmers (2.01-4.00 ha), and 20% medium farmers (4.01-10.00 ha). A significant majority (84%) practiced irrigated farming, relying primarily on surface irrigation methods (95.5%). Drip irrigation was practiced by only a few farmers, and sprinkler irrigation was not reported at all. In terms of annual income, 32% of the farmers earned between ₹3,00,001 to ₹5,00,000, followed by 29% in the ₹1,00,000 to ₹3,00,000 range. Sesame cultivation area was generally limited, with 38% cultivating less than 1 ha and 33% cultivating 1-2 ha.

Table 1: Socio-Economic Profile of Sesame Farmers

Variable	Parameter	Frequency	Percentage (%)
Age Group	21-30 years	38	19.00
	31-40 years	77	38.50
	41-50 years	56	28.00
	Above 50 years	29	14.50
Education Level	Below SSC	82	41.00
	SSC	72	36.00
	HSC	36	18.00
	Graduate	10	5.00
	Post Graduate	0	0.00
	Diploma	0	0.00
	Any Other	0	0.00
Farming Experience	Below 5 years	12	6.00
	5 - 10 years	38	19.00
	11 - 20 years	62	31.00
	Above 20 years	88	44.00
Occupation	Farming	56	28.00
	Farming + AH	98	49.00
	Farming + Service	13	6.50
	Farming + Business	33	16.50
Landholding Size (Ha)	Marginal (up to 1 ha)	22	11.00
	Small (1.01-2.00 ha)	68	34.00
	Semi-medium (2.01-4.00 ha)	62	31.00
	Medium (4.01-10.00 ha)	40	20.00
	Large (more than 10 ha)	8	4.00
Type of Farming	Irrigated	168	84.00
	Rainfed	32	16.00
Method of Irrigation	Surface	191	95.50
	Drip	9	4.50
	Sprinkler	0	0.00
Annual Income (₹)	Below ₹1,00,000	18	9.00
	₹1,00,000 - ₹3,00,000	58	29.00
	₹3,00,001 - ₹5,00,000	64	32.00
	₹5,00,001 - ₹7,00,000	44	22.00
	Above ₹7,00,000	16	8.00
Area Under Sesame Cultivation	Below 1 ha	76	38.00
	1-2 ha	66	33.00
	2.01-4 ha	32	16.00
	4.01-10 ha	26	13.00
	Above 10 ha	0	0.00

Buying Behaviour of Sesame Farmers for Insecticides

The study found that the most influential sources guiding insecticide purchases were dealers and agro-service centers (46.5%), followed by neighbors and friends (37%) and company representatives (31%). When determining insecticide application, 30% of farmers relied on their own assessment of pest infestation, while 20% depended on dealer advice, and 16% on recommendations from progressive farmers. Insecticide purchase frequency was high, with 34% of farmers purchasing four times a year and 27% buying more than four times. Most farmers (76%) purchased insecticides from local dealers or retailers, while 16% used cooperative societies and 8% relied on online platforms. Payment modes varied, with 47% paying through a mix of cash and credit, 32% using only cash, and 21% using only credit. The preferred pack sizes were 500 ml/gm (41%) and 250 ml/gm (36%), reflecting a preference for medium-sized packaging. Among the factors influencing purchase decisions, past experience with the product received the highest average score (mean = 3.81), followed by dealer recommendations (3.74), progressive farmer suggestions (3.62), price (3.49), and brand image (3.48).

Table 2: Factors Affecting the Buying Behaviour of farmers towards insecticides

Factors	HI (5)	I (4)	N (3)	SI (2)	NI (1)	CS	Mean	Rank
Price	60	62	22	27	29	697	3.49	IV
Brand image	54	71	20	27	28	696	3.48	V
Dealer recommendation	74	59	24	26	17	747	3.74	II
Advertisement	41	38	32	34	55	576	2.88	VII
Past experience	76	62	23	28	9	762	3.81	I
Progressive farmers opinion	66	63	24	22	25	723	3.62	III
Availability	50	48	39	42	21	664	3.32	VI

Cumulative Score (CS) = Maximum Scale × No. of Farmers (Highly important: 5, Important: 4, Neutral: 3, Somewhat Important: 2, Not Important: 1)
Mean = Cumulative Score (CS) / Total No. of Farmers (200)

Farmers' Usage Pattern for Insecticides of Sesame Crop

With respect to insecticide application practices, a majority of farmers (60%) preferred spraying during the early morning, while 40% preferred evening hours. Regarding mixing methods, 82% used sticks, 15% employed other tools, and only 3% used bare hands. Concerning the use of protective equipment, 51.5% of the farmers did not use any safety gear. Among those who did, 33.5% used shoes, 21% used masks, and 9% used gloves. Post-application hygiene was also an issue; 51% of the farmers used plain water for handwashing, 42% used soap, and 7% did not wash their hands at all. These practices highlight a lack of awareness and adoption of safety measures in pesticide handling and application.

Constraints as Perceived by Sesame Farmers While Purchasing Insecticides

The primary constraints perceived by the farmers in purchasing insecticides included the high cost of products, which had the highest mean score (3.67), followed by poor product quality (3.47), and fear of adulteration (3.44). Other reported constraints included a lack of technical knowledge regarding appropriate insecticide use, high interest rates on credit purchases, limited availability of credit, untimely availability of insecticides during pest outbreaks, and inconvenient packaging sizes. These barriers significantly impacted farmers' purchasing decisions and the efficiency of pest management in sesame cultivation.

Table 3: Constraints as Perceived by Sesame Farmers While Purchasing insecticides

Constrain perceived by farmers	HA (5)	A (4)	N (3)	D (2)	HD (1)	CS	Mean	Rank
Timely unavailability of product	42 (210)	38 (152)	42 (126)	44 (88)	34 (34)	610	3.05	VII
Suitable Packing size	36 (180)	42 (168)	40 (120)	46 (92)	36 (36)	596	2.98	VIII
High price	68 (340)	52 (208)	42 (126)	24 (48)	12 (12)	734	3.67	I
Lack of credit availability	46 (230)	42 (168)	36 (108)	40 (80)	36 (36)	622	3.11	VI
Lack of technical knowledge	56 (280)	46 (184)	42 (126)	38 (76)	18 (18)	684	3.42	IV
High interest on credit borrowing	48 (240)	52 (208)	46 (138)	32 (64)	22 (22)	672	3.36	V
Fear of adulteration	60 (300)	44 (176)	40 (120)	36 (72)	20 (20)	688	3.44	III
Poor quality	62 (310)	46 (184)	38 (114)	32 (64)	22 (22)	694	3.47	II

HA= Highly Agree: 5; A= Agree: 4; N = Neutral: 3; D = Disagree: 2; HD= Highly Disagree: 1
Cumulative Score (CS) = Maximum Scale × No. of Farmers
Mean = Cumulative Score (CS) / Total No. of Farmers (100)

Suggestions

Many farmers rely on dealers and agro service centers for purchasing decisions regarding insecticides. Therefore, companies should invest in training and supporting these dealers to ensure accurate and farmer-friendly product recommendations.

A significant portion of farmers apply insecticides based on their own judgment or influence from peers and media. Companies should strengthen awareness campaigns and conduct field demonstrations to educate farmers on correct application timing and dosage.

Since a major portion of farmers use stick or other basic tools for mixing insecticides, training should be provided on proper mixing techniques and equipment to avoid health risks and improve efficacy.

High price and poor quality of insecticides were reported as major constraints. Companies should focus on maintaining product quality, offering trial packs, and running awareness programs to build trust and long-term brand loyalty.

Conclusion

The study revealed key insights into the insecticide buying behaviour, usage practices and constraints of sesame farmers for insecticides in Saurashtra region of Gujarat. Based on responses from 200 farmers selected through multistage sampling, the findings show that purchasing decisions were mainly influenced by dealers and past experiences. Most farmers preferred 250 ml and 500 ml pack sizes and purchased insecticides multiple times a year, primarily from local dealers. Major constraints included high prices, poor quality, and fear of adulteration. Additionally, many farmers lacked awareness of safe usage practices. The study recommends strengthening dealer training, improving product quality, offering preferred packaging, and conducting awareness programs to promote safe and informed insecticide use.

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