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Analysis of factors influencing preferences for sources and brands of pesticides in Bemetara district of Chhattisgarh

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Abstract

A study was conducted in the Bemetara district of Chhattisgarh, taking into consideration the context of India being the largest democracy with a population exceeding 1.42 billion. The country heavily relies on agriculture, with approximately 60% of the rural population dependent on it. In the year 2022-23, agriculture contributed 18.3% to India's GDP. Protecting crops from pests and diseases is of utmost importance due to the significant role of quality agricultural production. The total vegetable production in the country is estimated to be around 204.61 million tons. In order to tackle these challenges, a wide range of pesticide products are available in the market, promoted by pesticide companies through diverse promotional strategies. The study revealed that the product's effectiveness was the primary motivator for the maximum number of respondents to purchase pesticides, with product quality ranking second. Additionally, the study found that 100 percent of respondent farmers followed chemical application methods, along with other management techniques like physical control, soil testing, and IPM. Furthermore, the study highlighted that most farmers obtained information about pesticides from retailers. Subsequently, they would meet with company representatives and co-farmers before making their purchase decision. Regarding the factors influencing a company's promotional strategy for pesticides, the study identified dealers as the primary factor, followed by retailers, and then field demonstrations. Furthermore, the research ranked pesticide companies based on their promotional strategies, with UPL obtaining the first rank, BSF ranking second, and the IT industry ranking third.

Keywords: Bemetara, retailers, company ranking, field demonstration, respondent

1. Introduction

India is primarily an agrarian country, with agriculture providing direct employment to over fifty percent of its population. Agriculture contributes approximately 17.8% (2019-20) to the country's total GDP. The diverse climate in India ensures the availability of a wide range of vegetables, which not only enhances vegetable production but also serves as a significant source of income and employment opportunities, contributing to the country's economy (Chandra Kumar, 2020) [2]. The term "pesticides" encompasses a diverse range of substances, including insecticides, herbicides, fungicides, rodenticides, nematicides, and more. These substances play a crucial role in increasing grain yields, ensuring safe and high-quality food production, and maintaining competitive pricing. Pesticides consist of active chemicals that deliver various beneficial effects, while the inactive compounds support or preserve the actions of the active ingredients. However, it is important to note that the use of pesticides has also resulted in a significant number of unintentional poisonings (Swarna Karthik, 2017) [1]. India's status as a global agricultural powerhouse is highlighted by its position as the world's largest producer of pulses, spices, and milk. The country also boasts the largest cattle herd and cultivates the largest area of rice, wheat, and cotton. It holds the second rank globally in rice, wheat, sugarcane, cotton, tea, vegetables, fruits, and cultured fish production. Out of the total cultivated area of around 195 million hectares in India, approximately 63% is rainfed, while the remaining 37% is irrigated (Kumar, 2019) [3]. In ancient times, pest control was documented through the use of plant-based extracts and cow's urine. Turmeric powder mixed with cow's urine was sprayed to control caterpillars and sucking pests. Neem leaf extract and chili extract were also employed to combat certain beetles and aphids. Ash, neem oil, and pongamia oil were commonly used as well. The Bengal famine of 1943, characterized by acute food shortage, was mainly attributed to rice blight disease. To address such issues, the Famine Commission of 1945 recommended the establishment of a comprehensive organization for effective pest and disease control.

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As a result, the Directorate of Plant Protection, Quarantine, and Storage (Directorate of PPQ&S) was established in Faridabad in May 1946. The Destructive Insects and Pests Act of 1914 was enacted to control locusts. The Government of India, through the Directorate of PPQ&S, supports and encourages innovative programs and activities such as integrated pest management, surveillance and monitoring, use of bio-control agents, quality control of pesticides, and human resource development. The Central Government, in cooperation with State Governments, implements the Insecticides Act of 1968 to regulate the import, export, manufacture, safe transport, storage, distribution, sale, and use of pesticides through the Central Insecticides Board and Registration Committee. DDT was first used in India in 1947 to control malaria, while the usage of pesticides in agriculture began in 1949 with the use of BHC for locust control (Sampath Kumar, 2021) [4]. The main purpose of this research was to analyze the factors affecting farmers' pesticide preference and brand preference in Bemetara district. The study aimed to examine the sources of information about pesticides, explore various cultural activities of the farmers, and investigate the advertising techniques and effectiveness of different pesticide companies. Furthermore, a comparative study of companies operating in the area was conducted to determine their rankings, and information was gathered from retailers, dealers, and other pesticide organizations to identify the most commonly used pesticides by the farmers.

2. Objectives

1. To analyze the factors influencing preferences for sources and brands of pesticides.
2. To examine the promotional strategies employed by the pesticide companies.

3. Material and Method

The study focused on examining farmers' preferences for pesticide brands in the Bemetara district, which was deliberately chosen for this purpose. The district is renowned for its extensive use of pesticides in the cultivation of fruits and vegetables. The selection of Bemetara district was based on its reputation as a prominent vegetable-producing region. Within the district, two blocks, namely Berala and Saja, were identified as having larger areas of crop cultivation dedicated to vegetables and fruits. Out of these two blocks, a total of 38 villages were randomly chosen, and within each village, vegetable-growing farmers were selected through random sampling. Consequently, a sample of 65 respondent farmers was obtained. Furthermore, 25 pesticide dealers, retailers, and company representatives from both blocks were randomly selected to investigate the promotional strategies employed by pesticide companies. To achieve the study's objectives, data were collected from primary and secondary sources.

4. Analytical tools and techniques

The fundamental characteristics of the study's data were described using descriptive statistics. To evaluate the data pertaining to the socioeconomic characteristics of the sample respondents, such as age, education, occupation, and family size, percentage analysis and averages were performed. The study also examined farmer purchasing patterns, decisions regarding where to acquire pesticides, frequency of purchases, and cost of pesticides. Tabulation is the systematic and logical representation of numeric data in rows and columns to

facilitate comparison and statistical analysis. It facilitates comparison by bringing related information close to each other and helps in statistical analysis and interpretation. The basic objectives of tabulation are to simplify complex data, bring out essential features of data, facilitate comparison, facilitate statistical analysis, and save space. In mathematics, a percentage is a number or ratio that can be expressed as a fraction of 100. If we have to calculate percent of a number, divide the number by the whole and multiply by 100. Hence, the percentage means, a part per hundred. The word percent means per 100. It is represented by the symbol "%". The percentage can be found by dividing the value by the total value and then multiplying the result by 100. The formula used to calculate the percentage is: Formula = (value/total value) × 100%.

4.1 Garrett's ranking technique

The sample respondents were asked to rank the constraints faced by them in purchasing pesticides. These ranks were converted into percent position by using formula,

$$\text{Percent position} = 100 \times (R_{ij} - 0.5) / N_j$$

Were,

R_{ij} = Rank given to the i^{th} factor by the j^{th} individual

N_j = Number of factors ranked by the j^{th} individual

5. Result and Discussion

5.1 Factors influencing farmer's preference for pesticides brands

Farmers' pesticide preferences are influenced by multiple factors, including effectiveness, product quality, advertisements, demonstrations, good service, and the availability of new products. These factors collectively play a crucial role in farmers' decisions to purchase specific pesticides.

5.1.1 Factors influencing pesticide purchase decision

The factors influencing the pesticide buying decisions of farmers in Bemetara district are presented in Table 1. Among the attributes that help in building a good brand image, immediate efficacy was ranked first with an average score of 70.34, followed by product quality with an average score of 68.05, communication strategies were assigned a third rank with an average score of 63.18, discounts were ranked fourth with an average score of 54.49, competitive pricing was ranked fifth with a score of 49.26, good value-added services were ranked sixth with an average score of 40.26, new products and packages were ranked seventh with an average score of 35.42, and finally others were ranked eighth.

Table 1: Factors influencing pesticide purchase decision

Sl. No	Attributes	Garrett's value		Rank
		Total score	Avg. score	
1.	Efficacy	4572	70.34	I
2.	Product quality	4423	68.05	II
3.	Communication strategies (advertise/demonstration)	4107	63.18	III
4.	Discount	3542	54.49	IV
5.	Competitive pricing	3202	49.26	V
6.	Good value-added service	2617	40.26	VI
7.	New product /package	2302	35.42	VII
8.	Others	1300	20	VIII

5.1.2 Alternative management techniques adopted by farmers

Table 2. Lists the additional specific management practices that the farmers in the Bemetara district sample use. Other than the use of insecticides, various management techniques would help in the efficient control of insect pests. Physical control methods like picking and destroying were scored best among the conventional strategies, with an average score of 59.65, followed by soil testing and management with an average score of 52.63, and IPM with an average score of 37.72.

Table 2: Alternative management techniques adopted by farmers

Sl. No.	Particulars	Garrett's value		
		Total score	Avg. score	Rank
1.	Physical control, picking and destroying	3877	59.65	I
2.	Soil testing & management	3421	52.63	II
3.	IPM	2452	37.72	III

5.1.3 Sources of information for pesticide purchase

Farmers purchase pesticides based on their unique needs. Table 3. Shows the findings on the information sources for buying pesticides. Among the attributes that help respondents choose the right pest control measure, retailers' advice was ranked first with an average score of 69.74, followed by dealer's advice with an average score of 66.2, company representative's promotion was ranked third with an average score of 64.58, advertisement was ranked fourth with an average score of 55.08. The advice of retailers or dealers at the point of purchase, it could be inferred, influences consumers' decisions to buy pesticides.

Table 3: Sources of information on pesticide purchase.

Sl. No.	Attributes	Total score	Avg. score	Rank
1.	Retailers	4533	69.74	I
2.	Dealers	4303	66.2	II
3.	Company representatives	4198	64.58	III
4.	Advertisement	3580	55.08	IV
5.	Co-farmers	3457	53.18	V
6.	Krishi Vigyan Kendra (KVK)	2983	45.89	VI
7.	Agri/Horticulture office	2683	41.28	VII
8.	Agricultural University	2278	35.05	VIII
9.	Others	1235	19	IX

5.2 Promotional strategies employed by the pesticide companies

The product promotion tactics used by manufacturers and distributors, together with an effective supply chain, play a crucial role in the promotion of goods and services in a competitive market environment. The industry is home to a large number of pesticide businesses that compete with one another. In order to meet the new obstacles in the commercial environment, pesticide manufacturers have modified their marketing approaches. The Indian pesticide industry's marketing tactics have seen a tremendous shift during the past ten years. The businesses are extensively promoting their goods in order to gain market share.

5.2.1 Influence of promotional strategies on pesticide purchase decisions

Table 4. Shows the impact of promotional tactics on sample respondents' purchases of pesticides in the Bemetara district. Among the sources that promote pesticides of various

companies at buyers point in rural areas, dealers influence was ranked first with the average score of 71.35, followed by retailer was ranked second with the average score of 66.03, Field demonstration was ranked third with the average score of 62.03, regular meetings was ranked fourth with the average score of 59.55, discount was ranked fifth with the average score of 54.92, advertisement was sixth with the average score of 49.12, brochures was ranked seventh with the average score of 44.02, banners was ranked eighth with an average score of 38.71, wall paintings was ranked ninth with the average score of 29.49 and social media was ranked tenth with the average score of 22.55 respectively.

Table 4: Influence of promotional strategies on pesticide purchase decisions

S. No.	Sources	Total score	Avg. score	Rank
1.	Dealer influence	4638	71.35	I
2.	Retailer influence	4292	66.03	II
3.	Field demonstrations	4046	62.25	III
4.	Regular meetings	3871	59.55	IV
5.	Discounts	3570	54.92	V
6.	Advertisement	3193	49.12	VI
7.	Brochures	2861	44.02	VII
8.	Banners	2516	38.71	VIII
9.	Wall paintings	1917	29.49	IX
10.	Social media	1466	22.55	X

5.2.2 Ranking of pesticide companies based on promotional strategies

The respondents were asked to rank the promotional tactics used by pesticide businesses in order of preference. According to the preferences for promotional tactics used by the pesticide firms in the Bemetara district, the companies were rated among those advertising their pest control products, and the specifics are shown in Table 5. According to respondents' preferences for the marketing tactics used by pesticide firms, UPL was ranked first with an average preference score of 67.55, followed by BASF (62.72), in that order. In that order, the following companies scored the highest: PI (60.71), Bayer (57.26), Syngenta (53.68), Sumitomo (52.38), Rallis India (47.02), Dupont (39.45), Dhanuka (32.88), and Nagarjuna (24.35).

Table 5: Ranking of pesticide companies based on promotional strategies

S. No.	Company Name	Average score	Rank
1.	UPL	67.55	I
2.	BASF	62.72	II
3.	PI	60.71	III
4.	Bayer	57.26	IV
5.	Syngenta	53.68	V
6.	Sumitomo	52.38	VI
7.	Rallis India	47.02	VII
8.	DuPont	39.45	VIII
9.	Dhanuka	32.88	IX
10.	Nagarjuna	24.35	X

6. Conclusion

The pesticide's immediate efficacy was its initial quality, which contributed to strong customer loyalty. The most common source of pesticide procurement was through local agricultural input supply retailers. Alternative management was implemented by the farmers. Were IPM, soil testing, and physical control (picking and destroying). Effectiveness was rank 1st in the factor influencing pesticide purchase decision.

In research found the 100% farmer was adopted alternative management technique. According to the research the retailer was the main source of the information for pesticide purchase. In the pesticide businesses' advertising methods, the impact of dealers and retailers came in first. According to respondents' preferences for the marketing tactics used by pesticide firms, UPL was ranked first with an average preference score of 67.55, followed by BASF (62.72), in that order. In that order, the following companies scored the highest: PI (60.71), Bayer (57.26), Syngenta (53.68), Sumitomo (52.38), Rallis India (47.02), DuPont (39.45), Dhanuka (32.88), and Nagarjuna (24.35). According to the research the dealer used to influence the promotional strategies more. According to research UPL Pesticide Company was in the first rank in promotion strategy.

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