Original Research Article

AWARENESS AND BRAND PREFERENCE OF CHICKPEA GROWERS TOWARDS SELECTED PESTICIDES IN JUNAGADH DISTRICT OF GUJARAT

ABSTRACT

The study was carried out with five objectives: to know the cropping pattern of farmers, to measure market potential of selected pesticides, to know the awareness of farmers towards selected pesticides, to know the factors that influence brand preference of chickpea growers towards selected pesticides, and to identify the problems faced by farmers and dealers related to pesticides. Total 150 chickpea farmers and 25 dealers were studied. The primary data were collected from the Moti Monpari, Sarsai, Khambhaliya, Liliya, and Vichhavad. Major portion of farmers get information about pesticide from the retailer shop. The primary factors considered by the farmers in brand preference towards fungicides and insecticides were: perception about product, influence by others, price sensitivity, and easy to use. The major problem of the farmer related to pesticides was lack of technical knowledge, followed by unawareness about adverse effect on health and non-availability of pesticide on time. The major problem of dealers related to pesticides was low margin, followed by high competition and high cost of transportation.

Keywords: Chickpea, Fungicide, Insecticide, Brand Preference, Awareness

1. INTRODUCTION

Chickpeas, also known as garbanzo beans, are a kind of legume prominent in world cuisine. Chickpeas can be roasted, boiled, mashed, or ground into flour in a number of ways. Chickpea has been classified in two groups as follows: (1) Cicer arietinum (Desi gram) (2) Cicer kabulium (White gram). Desi gram usually small and white gram are bold and attractive (kvk.icar.gov.in, 2020). Chickpea are high in plant-based protein, as well as fibre and carbohydrates. Chickpeas include about 15 gramme of protein per cup (164 gramme), making them an encouraging alternative for vegans and vegetarians. Chickpea protein is also high in essential amino acids, which are necessary building blocks for the body's tissues and organs. Chickpeas are a nutritious and versatile food that can be employed in a variety of dishes. They are high in fibre, carbohydrates, and protein, and when consumed as part of a balanced diet, they may give a variety of health benefits (Jukanti*et al.,* 2012). The area, production, and productivity of chickpea in India in 2020-21 was 9996 ha, 11911 tons, and 1192 kg/ha (Ministry of Agriculture & Farmers' Welfare, 2022). Madhya Pradesh was the highest chickpea producing state in India with 36.16 lakh tons, followed by Rajasthan (19.72 tons), and Maharashtra (19.17 tons) in 2021 (Directorate of Pulses Development, 2022). Potato is the largest raised vegetable, contributing to 27% of total vegetable production throughout the country. Potato cultivation across the country is expected to be about 20.73 lakh acres and 519.47 million tonnes in 2019-20 (Kumar *et al.,* 2022).

The Indian pesticide market was worth USD 5.5 billion in 2020 and is predicted to be worth USD 7.5 billion by 2025, rising at a CAGR of 6.4% over the projected period (2021-2026). Factors including such expanding population, increased food consumption, government measures to boost agriculture, and breakthroughs in agrochemical technology are driving the industry's growth (research and markets, 2021). Maharashtra was the highest pesticideconsuming state with 13175 MT, followed by Uttar Pradesh with 11688 MT, and Telangana with 4920 MT (Directorate of Plant Protection, Quarantine & Storage, 2022).

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When properly used, pesticides may safeguard crops and food from pests while also increasing agricultural productivity. The industry has huge untapped potential because of the reduced rate of agrochemical use. According to FICCI data, India's per capita pesticide consumption in 2017-2018 was 0.27 kg/hectare. Limited usage can be attributed to causes such as split land holdings, lower irrigation levels, dependency on the rainy season, and farmers' lack of knowledge about the benefits of pesticide use, among others (FICCI, 2019).

The present study was undertaken with five objectives: to know the cropping pattern of farmers, to measure market potential of selected pesticides, to know the awareness of farmers towards selected pesticides, to know the factors that influence brand preference of chickpea growers towards selected pesticides, and to identify the problems faced by farmers and dealers related to pesticides.

2. MATERIAL AND METHODS

- **Sampling unit:** Farmer and dealer
- **Sample size:** 150 Farmer & 25 Dealer
- **Sampling method:** Non-probability sampling
- **Sampling technique:** Purposive sampling
- **Research instrument:** Semi-structured schedule
- **Area of Study**: Moti Monpari, Sarsai, Khambhaliya, Liliya, and Vichhavad
- **Analytical Tools:**

  The tabular and percentage analysis were used to analyse the cropping pattern and awareness of selected pesticides. The cropping pattern were analysed in the sequence of kharif, rabi and summer.

  Factor analysis

  Factor analysis was used to find out the underlying factors that influence the brand preference of the chickpea farmers towards fungicides and insecticides. Factor analysis was developed by the British psychologist Charles Spearman in 1904. In factor analysis each variable is expressed as linear combination of underlying factors. Communality was analysed to know the amount of variance a variable share with other variables. Factor analysis is also known as data reduction technique, because by the analysis of interdependencies of variables can be used to reduce the number of variables.

  Factor analysis model:

  $$\boldsymbol{Xi} = \boldsymbol{Ai1F1} + \boldsymbol{Ai2F2} + \boldsymbol{Ai3F3}+ \ldots\ldots\ldots + \boldsymbol{Aim} + \boldsymbol{Fm} + \boldsymbol{ViUi}$$

  Where:

  Xi= ith Standardized variable

  Aij =Standardized multiple regression coefficient of variable i on common factor j

  F = Common factor

  Vi = Standardized regression coefficient of variable i on unique factor i

  Ui = Unique factor for variable i

  m = Number of common factors

  The unique factors are uncorrelated with other variables and with the common factors.

  The unique factor model is expressed as below:

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$$Fi = Wi1X1 + Wi2X2 + Wi3X3 + \ldots \ldots + WikXk$$

Where:

Fi = Estimate of ith factor

Wi = Weight or factor score coefficient

K = Number of variables

(Malhotra, 2015)

Henry Garrett's ranking technique

The Henry Garett's ranking method was used to analyse the rank given by chickpea farmers and dealers to the problems.

The method was given by Henry Edward Garrett in 1969.

In the first part of the method, the rank given by the respondents as per the highest problem faced by them. After that the rank is transformed into the score value by the use of following formula:

Per cent position = 100(Rij – 0.5)/Nj

Where:

Rij = Rank given for the ith variable by jth respondents

Nj = Number of variables ranked by jth respondents

(Zalavadiya et al., 2022)

The study was performed to analyse the farmers knowledge about selected pesticides and factors considered by them while preferring particular brand of the pesticides.

3. RESULTS AND DISCUSSION

Socio-economic profile of farmers

The age is the important socio-economic parameter to study. The table no. 1 revealed that the 4 farmers were under the age of 25, 46 farmers were in the age range of 25 to 40 years, 86 farmers were in the age range of 40 to 55 years, and rest of the 14 farmers were equal to or greater than 55 years age. From the study, it was revealed that the 4 per cent farmers were illiterate, 10 per cent farmers had completed education up to primary, 51 per cent farmers had completed SSC, 32 per cent farmers were cleared HSC education, and 3 per cent farmers had graduated. In the study, it was revealed that the 9 per cent of the farmers have below 1 ha land, 39 per cent of the farmers have land between 1 to 4 ha, 46 per cent of the farmers have land between 4 to 8 ha, and rest of the 6 per cent farmers have above 8 ha land. Seventeen per cent of the farmers have annual income below 1 lakh, 35 per cent of farmers have annual income in the range of 1 to 5 lakh, 43 per cent of farmers have annual income in the range of 5 to 10 lakh, and rest of the 5 per cent farmers have annual income above 10 lakh. Seventy per cent of the respondents have agriculture as source of income, 23 per cent of respondents have agriculture and livestock as source of income, and 7 per cent of respondents have agriculture and business as source of income. From the study, it is clear that the 55 percent of the farmers had well for the irrigation, 38 percent of the farmers had tube well, and 7 percent farmers were depending on check dam for irrigation.

Disease and Pest of Chickpea

The study revealed that the major disease arrived in the chickpea crop was Wilt, followed by Ascochyta blight, Powdery mildew, Stunt virus, and Stem rot. 138 respondents reported Wilt, 125 respondents reported Ascochyta blight, 114 respondents reported Powdery mildew, 87 respondents

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reported Stunt virus, and 46 respondents reported Stem rot in their crop. The seed treatment helps to cure these diseases in chickpea crop. According to study, majorly three pests arrived in chickpea crop. From the 150 respondents, 142 respondents reported Gram pod borer, 87 respondents reported Cutworm, and 137 respondents reported Sucking pest. From the study, it is clear that the Gram pod borer was the major pest of the chickpea crop and accounted major yield loss.

Cropping Pattern of Farmers

The cropping pattern is influence by the many factors like soil type, weather condition, irrigation facility, etc. Major crops of the study area were chickpea, groundnut, sesame, soybean, pigeon pea, and fodder crop. In the rabi season, all the respondents cultivate the chickpea. In kharif season, 60 percent farmers cultivate groundnut, 32 percent farmers cultivate cotton, and 8 percent farmers grow soybean. In summer season, 17 percent farmers cultivate sesame, 34 percent farmers cultivate fodder crops, and 49 percent farmers doesn't grow any crop.

Table 1 Cropping pattern of the farmers

Cropping Pattern	Frequency (n)	Percentage (%)
Groundnut - Chickpea – Fallow land	51	34
Groundnut - Chickpea – Fodder crop	39	26
Cotton - Chickpea – Sesame	26	17
Cotton – Chickpea – Fallow land	22	15
Soybean – Chickpea – Fodder crop	12	8
Total	150	100

Awareness about selected Pesticides

From the study, it is clear that the 91 percent of the farmers were doing seed treatment, and rest of the 9 percent farmers were not doing seed treatment. Most of the farmers were doing seed treatment, because they are already aware about the benefits of the seed treatment. For the Avancer glow, source of awareness for farmers as follows: 40 percent farmers got information from retailer shop, 26 percent farmers got information from farmer meeting, 16 percent farmers got information from Unimart store, 10 percent farmers got information from demonstration, and 8 percent farmers got information from leaflet/poster. For the Spolit, source of awareness as follows: 40 percent farmers got information from retailer shop, 25 percent farmers got information from farmer meeting, 19 percent farmers got information from Unimart store, 11 percent farmers got information from demonstration, and only 5 percent farmers got information from leaflet/poster.

Factors Influencing Brand Preference towards Fungicides

The first step of the factor analysis was to determine whether data is suitable for factor analysis or not by the performing Kaiser-Meyer-Olkin (KMO) test. The KMO value higher than 0.5 indicates that the data is adequate to perform factor analysis. Bartlett's test of sphericity was used to examine the hypothesis that the variables are uncorrelated in population. Each variable correlate with itself but uncorrelated with other variables (Shrestha, 2021). The KMO value was 0.757, which indicated that the data was adequate

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and suitable for the factor analysis. The significance value of Bartlett's test was 0.00, which indicated that the hypothesis was rejected. That means the variables were correlated.

Table 2 KMO and Bartlett's Test for brand preference towards fungicides

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.757
Bartlett's Test of Sphericity	Approx. Chi-Square	1879.241
	df	136
	Sig.	.000

Table 3 Total variance explained brand preference towards fungicides

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.088	29.932	29.932	3.709	21.817	21.817
2	3.262	19.187	49.119	3.194	18.790	40.606
3	2.869	16.874	65.993	3.021	17.773	58.380
4	1.702	10.011	76.004	2.996	17.624	76.004
5	.727	4.278	80.282			
6	.552	3.248	83.530			
7	.464	2.727	86.257			
8	.413	2.431	88.688			
9	.367	2.160	90.848			
10	.309	1.815	92.663			
11	.293	1.724	94.387			
12	.270	1.591	95.978			
13	.214	1.259	97.237			
14	.165	.968	98.205			
15	.138	.813	99.108			
16	.093	.548	99.566			
17	.074	.434	100			
Extraction Method: Principal Component Analysis						

The above table explains total variance explained by the all factors. The four factors extracted from all variables using principal component analysis and explains about 76.00 % variance in brand preference towards fungicides. The four factors were extracted, which had eigen value greater than or equal to one.

Table 4 Rotated component matrix brand preference towards fungicides

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Description	Component			
	1	2	3	4
Protection period	.898			
Risk of poisoning in use	.855			
Brand image	.843			
Past Experience	.841			
Result	.670			
Recommendation by co-farmer		.919		
Recommendation by dealer		.877		
Recommendation by field assistant of company		.844		
Advertisement by company		.761		
Price			.870	
Quality			.856	
Quantity			.783	
Discount			.727	
Convenient accessibility				.913
Easy process of preparation				.835
Timely availability				.822
Credit facility				.777
Extraction Method: Principal Component Analysis				
Rotation Method: Varimax with Kaiser Normalization				

The rotated matrix table revealed that the first factor was loaded on five variables, including Protection period (.898), Risk of poisoning in use (.855), Brand image (.843), Past experience (.841), and Result (.670). This factor was named as “Perception about product”. This factor explains the 21.81% variation in factors influencing brand preference towards fungicides.

The second factor was loaded on four variables, including Recommendation by co-farmer (.919), Recommendation by dealer (.877), Recommendation by field assistant of company (.844), Advertisement by company (.761). This factor was named as “Influence by others”. This factor explains the 18.79% variation in factors influencing brand preference towards fungicides.

The third factor was loaded on four variables, including Price (.870), Quality (.856), Quantity (.783), and Discount (.727). This factor named as “Price sensitivity”. This factor explains the 17.77% variation in factors influencing brand preference towards fungicides.

The fourth factor was loaded on four variables, including Convenient accessibility (0.913), Easy process of preparation (.835), Timely availability (.822), and Credit facility (.777). This factor named as “Ease to use”. This factor explains the 17.62% variation in factors influencing brand preference towards fungicides.

Factors Influencing Brand Preference towards Insecticides

The 17 variables were analysed to find out the factors that influencing brand preference of farmers towards insecticides. The sample adequacy and suitability of the data were examined by KMO and Bartlett’s Test of Sphericity. The KMO value stands at 0.743, which was greater than threshold value

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(.50), so the sample size was adequate. The hypothesis was rejected by the performing Bartlett's Test of Sphericity, because the significant value was 0.00, which means the variables were correlated.

Table 5 KMO and Bartlett's Test for brand preference towards insecticides

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.743
Bartlett's Test of Sphericity	Approx. Chi-Square	3014.283
	df	136
	Sig.	.000

Table 6 Total variance explained brand preference towards insecticides

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.717	33.628	33.628	4.323	25.430	25.430
2	3.909	22.992	56.620	3.474	20.438	45.868
3	3.051	17.948	74.568	3.350	19.708	65.576
4	1.754	10.318	84.886	3.283	19.310	84.886
5	.608	3.574	88.460			
6	.373	2.197	90.657			
7	.358	2.104	92.761			
8	.268	1.575	94.336			
9	.231	1.356	95.692			
10	.168	.988	96.679			
11	.140	.822	97.502			
12	.132	.775	98.277			
13	.094	.553	98.830			
14	.072	.424	99.254			
15	.061	.359	99.613			
16	.048	.283	99.896			
17	.018	.104	100			
Extraction Method: Principal Component Analysis						

The above table shows the total variance explained by the all extracted factors. The all four factors were extracted based on eigen value and use of principal component analysis. The total variance explained by four factors was 84.88%.

Table 7 Rotated component matrix brand preference towards insecticides

Description	Component			
	1	2	3	4
Brand image	.932			
Protection period	.919			

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Past Experience	.879			
Risk of poisoning in use	.867			
Result	.824			
Recommendation by co-farmer		.933		
Advertisement by company		.891		
Recommendation by dealer		.882		
Recommendation by field assistant of company		.865		
Price				.883
Quality				.872
Quantity				.815
Discount				.761
Easy process of preparation			.959	
Convenient accessibility			.943	
Timely availability			.832	
Credit facility			.792	
Extraction Method: Principal Component Analysis				
Rotation Method: Varimax with Kaiser Normalization				

After the varimax rotation method, the four factors were extracted. Among them first factor was loaded on Brand image (.932), Protection period (.919), Past experience (.879), Risk of poisoning in use (.867), and Result (.824). The factor one was named as “Perception about product”. This factor was explained the 25.43 % variation.

The second factor was loaded on Recommendation by co-farmer (.933), Advertisement by company (.891), Recommendation by dealer (.882), and Recommendation by field assistant of company (.865). This factor was named as “Influence by others”. This factor was explained 20.43 % variation.

The third factor was loaded on Easy process of preparation (.959), Convenient accessibility (.943), Timely availability (.832), and Credit facility (.792). This factor was named as “Ease to use”. This factor was explained 19.70 % variation.

The fourth factor was loaded on Price (.883), Quality (.872), Quantity (.815), and Discount (.761). This factor was named as “Price Sensitivity”. This factor was explained 19.31 % variation.

The below table explains the underlying variables in common factor for brand preference of chickpea growers towards fungicides and insecticides.

Table 8 Underlying factors for brand preference towards fungicides and insecticides

Variables	**Factors**
Protection period	Perception about Product
Risk of poisoning in use	
Brand image	
Past Experience	

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Result	
Recommendation by co-farmer	Influence by others
Recommendation by dealer	
Recommendation by field assistant of company	
Advertisement by company	
Price	Price sensitivity
Quality	
Quantity	
Discount	
Convenient accessibility	Ease to use
Easy process of preparation	
Timely availability	
Credit facility	

Problems Faced by Farmers Related to Pesticides

The below table shows the problems faced by chickpea farmers related to pesticides. The highest problem faced by farmers was Lack of technical expertise about pesticides with the mean score of 58.07, followed by Unawareness about adverse effect on health (57.46), Non availability of pesticide on time (53.51), Unaffordable price (51.69), Lack of purchasing power (49.13), Poor quality (48.50), Fulfilment of safety measures (45.79), Residual effect on crop (42.18), and Lack of application equipment (43.67). Previous study by Prajapati et al. (2016) also studied problems faced by farmers and they also found that the lack of technical expertise was the highest problem faced by the farmers (Prajapati *et al.*, 2016).

Table 9 Problem faced by farmers related to pesticides

Problems	Mean Score	Rank
Lack of technical expertise	58.07	1
Unawareness about adverse effect on health	57.46	2
Non availability of pesticide on time	53.51	3
Unaffordable price	51.69	4
Lack of purchasing power	49.13	5
Poor quality	48.50	6

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Fulfilment of safety measures	45.79	7
Residual effect on crop	42.18	8
Lack of application equipment	43.67	9

Problems Faced by Dealers Related to Pesticides

The highest problem faced by dealers was Low margin with mean score of 67.60, followed by High competition (60.77), High cost of transportation (56.07), Non availability (51.23), Lack of storage (45.43), Poor quality (37.27), and Lack of knowledge (28.93). The study conducted by Zalavadiya et al. (2018) on problems faced by delaers, also concluded that the highest problem faced by dealers was low margin of the pesticides, which cause less interest of dealers in selling of specific pesticides, which have low margin (Zalavadiya*et al.*, 2018).

Table 10 Problem faced by dealers related to pesticides

Problems	Mean Score	Rank
Low margin	67.60	1
High competition	60.77	2
High cost of transportation	56.07	3
Non availability of pesticide	51.23	4
Lack of storage	45.43	5
Poor quality	37.27	6
Lack of knowledge	28.93	7

4. CONCLUSION

Any company wishing to enter this market can encourage the adoption of technology by leveraging the demographic and educational attributes of farmers. Any firm can boost awareness and consumption of its products by concentrating on the cropping patterns and implementing effective marketing strategies. By providing farmers with appropriate training to expand their knowledge of pesticides, pesticide manufacturing companies could help farmers with their issues. When demand is high, pesticide companies must also keep adequate stock on standby. To mitigate the problems they have, companies may give the dealers higher margins of profit and more effective transportation services.

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