

Biological Forum – An International Journal

16(8): 290-295(2024)

ISSN No. (Print): 0975-1130 ISSN No. (Online): 2249-3239

# Awareness, Buying Behaviour and Constraints of Farmers for Fungicides in Botad District

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ABSTRACT: Agriculture plays a significant role in the Indian economy. Agrochemical is a generic term for the various chemical products used in agriculture. In most cases, agrochemicals refer to the broad range of pesticides, including insecticides, herbicides, fungicides and nematicides. They play an important role in agricultural development because they can reduce the losses of agricultural products and improve the affordable yield and quality of food. The critical role that agrochemicals play in enhancing agricultural productivity, it becomes essential to understand how farmers perceive and utilize these products. The study aims to take a closer look on awareness, buying behaviour and constraints of farmers toward fungicides in Botad district of Gujarat. In this regard a total 200 farmer were surveyed from two talukas of Botad district for the duration of three months. For the collection of primary data interview schedule was used and secondary data were collected from the internet, articles, journals, company's website and various other sources. From the study, it was found that farmers were well aware about various fungicide brands. The most influencing factors for purchase of fungicides are 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. By emphasizing dealer relationships, using past positive experiences, and competitive pricing, the company can survive well in market and give tough competition to competitors. Company should also focus on having dealer oriented sales promotion schemes.

Keywords: Agrochemicals, Awareness, Buying behaviour, Constraints, Farmers, Fungicides.

#### INTRODUCTION

According to FAO, the world population is projected to reach 9 billion by 2050. The increasing population creates a huge demand for food products to feed the population, which is turning into a major challenge with the decreasing farmland. Agriculture holds a significant place in the Indian economy, with over 70% of rural households relying on it for their livelihoods. As a critical sector of the Indian economy, agriculture contributes around 17% to the total GDP and provides employment for approximately 58% of the population. The agricultural sector, particularly in developing regions, relies heavily on agrochemicals to mitigate the impact of plant diseases and pests that threaten crop yields and quality. Agrochemical is a generic term for the various chemical products, such as fertilizer, hormone, fungicide, insecticide, or soil treatment that improves the production of crops (Biswas et al., 2014). Agrochemicals are essential components of modern agriculture, encompassing a diverse range of chemical substances used to optimize crop production, protect plants from diseases and pest, and enhance soil productivity. Agrochemicals play a vital role in modern agriculture by increasing yields, ensuring food security, and supporting sustainable farming practices (Anand *et al.*, 2021). According to FICCI, India's agrochemical industry is expected to grow by 8-10% by 2025, reflecting its significant potential despite the low level of agrochemical consumption. India is the world's 4th largest producer of agrochemicals after United States, Japan and China and has emerged as the 13th largest exporter of pesticides globally. The pesticides industry has grown rapidly during the last two decades. The companies like Syngenta, Bayer, Indofil, BASF, TATA Rallis, DOW, UPL, Monsanto, Sumitomo chemicals have undergone structural changes from producing low value products to one producing high value specialty products. Competition is getting bigger day by day.

#### LITERATURE REVIEW

The literature review provides a summary of findings from different research studies that are relevant to this topic. The main aim of conducting a literature review is to establish familiarity with and understanding the current research in a particular field before undertaking new research. The review of the work done by past researchers in the field is presented below. Prajapati et al. (2016) reported that main important constraints perceived by the vegetable growers in purchasing of agrochemicals where high price of agrochemicals (85.33%), lack of technical knowledge (84.00%), poor quality of agrochemicals (73.67%), lack of training (71.33%) and lack of finance (43.33%). The least important constraints faced by farmers were residual effect on crop (6.67%) and lack of timely available (5.33%). Babu et al. (2017) revealed that unawareness about effect of pesticides on human health (66.66%), illiteracy (61.66%) and lack of technical guidance (56.66%) were the major problems faced by the growers. Badekhan & Devi (2018) conducted study on the socio-economic status of cotton farmers and their attitude towards pesticide use. The study reveals that majority of small and medium farmers possessed education up to high school level, whereas large farmers had higher level of education and agriculture was the only occupation among 84 farmers (70%). Most of the farmers do not know how to read literature on pesticide containers. Momin & Shaikh (2019) discovered that majority 80 percent farmer purchase products from company dealers. Most important factor which is considered by farmers while purchasing of pesticides products, quality of pesticides products. products and brand image of Recommendation by progressive farmers is lastly considered by farmers while purchasing of pesticides products. Bhashkar & Nahatkar (2019) studied on consumer behaviour of fungicide for paddy crop in Dhamtari district of Chhatisgarh, India. The factors considered for the buying of fungicides in the study area were quality of the product, brand reputation, performance and long durability effect of fungicide. Waris et al. (2020) reported that majority of farmers were (77.27 %) illiterates and thirteen per cent had primary level of education. Majority were small farmers and have low level of farming experience. Majority (71.82 %) of the respondents had medium family size and 57.27% of the respondents did not have any social participation. Sharma et al. (2020) analysed the buying behavior of the farmers regarding agrochemicals used on cotton crop in Punjab. Study revealed that most affecting factor to buying agrochemical was brand of the agrochemicals. Farmers mostly rely on private dealers for gaining the information regarding agrochemicals. Most of the cotton farmers were purchasing the fertilizers from cooperative societies whereas for purchasing pesticides most of them prefers to go to private dealers. Sai et al. (2021) reported that large number of cucurbit farmers (86.7%) were not aware about the registered pesticides. The study indicated that there is a lack of awareness about ban of 'monocrotophos' and measurement of pesticide formulations. Majority 90% of the growers were aware of the hazards caused due to pesticide use and above 60% of the farmers applied pesticides before harvesting. It was found that 70.33% of farmers used the pesticide dosage as per the manufacturer's instructions.

## METHODOLOGY

The purpose of the methodology is to describe the process involved in the research design, data collection, sampling procedure, field survey and analysis procedure.

**Research Design.** Descriptive cross sectional research design was used for the study as it enables us to identify the various attributes affecting farmers' awareness, buying behaviour and constraints during the study period. The study was conducted at a specific point in time; hence it is classified as cross-sectional.

## Data Collection

(i) **Primary data:** The study is predominantly based on primary data. Primary data were collected from the respondents with the help of structured interview schedule.

(ii) Secondary data: Secondary data were also utilized for the study. Secondary data were sourced from various mediums including articles, journals, company's website, other published and unpublished sources, as well as electronic databases and internet resources.

**Sampling Procedure.** Multi-stage Random Sampling method was adopted as per the objectives of the study. In the  $1^{st}$  stage, two talukas of Botad district were selected randomly. In the  $2^{nd}$  stage, 10 villages from each taluka were selected randomly. In the  $3^{rd}$  stage, 10 farmers from each village were selected randomly.

**Sample Size.** In this study, 200 farmers were selected from the Botad district of Gujarat.

## **RESULTS AND DISCUSSION**

Socio-Economic Profile of Farmers in Botad District. Based on the frequency analysis of the responses of 200 farmers, as shown in Table 1, socio economic characteristics of farmers were classified according to their gender, age, education level, farming experience, occupation, land holding size, type of irrigation, method of irrigation and annual family income. Out of 200 farmers, 100 per cent farmers were male in the study region. Most of the farmers 41.50 percent fell within the 41-50 years age group. Additionally, about 30.50 per cent of farmers fell within the 31-40 years age group. Most of the farmers, comprising 48.50 percent, had completed education up to SSC level, followed by 35.50 percent completed SSC. Most of farmers, comprising 49.00 percent, have above 20 years of farming experience. Most of the 43.50 percent farmers engaged in both farming + animal husbandry, followed by 31.00 percent solely engaged in farming. Most of 28 percent farmers were small farmers having 1.01 to 2 ha land. Majority of farmers, comprising 79.50 percent, had irrigated farming. Out of them most of 52.20 percent farmers used furrow irrigation method. The majority of farmers, comprising 27.00 per cent, reported an annual family income ranging from 1,00,000 to 3 lakhs, followed by 25.50 percent with income between 3,00,001 to 5 lakhs. Additionally, 20.50 percent had income up to 1 lakh, while 17.50 percent reported income ranging from 5,00,001 to 7 lakhs. Only 9.50 percent of farmers had annual family income above 7 lakhs.

Dabhi & Thakkar

Table 1: Socio-econom	nic profile	of farmers
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Variables	Parameters	Frequency	Percentage
Condon	Male	200	100.00
Gender	Female	0	0.00
	21-30 years	27	13.50
	31-40 years	61	30.50
Age (years)	41-50 years	83	41.50
	Above 50 years	29	14.50
	Below SSC	97	48.50
	SSC	71	35.50
Education Level	HSC	24	12.00
	Graduate	8	4.00
	Post Graduate	0	0.00
	Below 5 years	12	6.00
Farming experience	5-10 years	34	17.00
	>10- 20 years	56	28.00
	Above 20 years	98	49.00
	Only Farming	62	31.00
	Farming + Animal	97	42 50
Occupation	husbandry	07	45.50
	Farming + Service	19	9.50
	Farming + Business	32	16.00
	Marginal (up to 1 ha)	49	24.50
	Small (1.01-2 ha)	56	28.00
Land Holding Size (ha)	Semi Medium (2.01-4 ha)	41	20.50
	Medium (4.01-10 ha)	31	15.50
	Large (more than 10 ha)	23	11.50
Type of Irrigation	Irrigated	159	79.50
Type of frigation	Rainfed	41	20.50
	Surface	83	52.20
Method of Irrigation	Drip	62	38.99
	Sprinkler	14	8.81
	Below 1,00,000 ₹	41	20.50
	1,00,000 to 3,00,000 ₹	54	27.00
Annual Family Income	3,00,001 to 5,00,000 ₹	51	25.50
	5,00,001 to 7,00,000 ₹	35	17.50
	Above 7,00,000 ₹	19	9.50

Awareness of Farmers for Fungicides. Out of the 200 farmers 100 percent of farmers were aware about fungicides product. Majority 87 percent of farmers were aware by agro service center, followed by 49 percent of farmers were aware by advertisement, 47 percent of farmers were aware by farmer's meeting, 45 percent of farmers were aware by progressive farmer, 42 percent of farmers were aware by company representative and only 29 percent of farmers were aware by field demonstration. Majority 92 percent of farmers were aware about Bayer, 86% of farmers were aware about Syngenta, 84 percent of farmers were aware about Dhanuka, 79 percent of farmers were aware about BASF, 77 percent of farmers were aware about UPL, 60 percent of farmers were aware about Dharmaj, 56 percent of farmers were aware about Rallis, 54 percent of farmers were aware about United Insecticides, 52 percent of farmers were aware about other brands and 51 percent of farmers were aware about Gharda.

Most of 14 percent farmers preferred Bayer company's fungicide followed by 13 percent farmers preferred UPL company's fungicide, followed by 11 percent farmers preferred Dhanuka and Gharda company's

fungicide, followed by 10 percent farmers preferred other local company's fungicide, followed by 9 percent farmers preferred Syngenta and BASF company's fungicide, followed by 8 percent farmers preferred United Insecticides and Dharmaj company's fungicide and only 7 percent farmers preferred Rallis company's fungicide. If we compare awareness and preference of brands, it can be seen that Bayer, Syngenta and Dhanuka were the top three brands which the farmers were aware of with 92%, 86%, and 84% awareness respectively. UPL, though ranking fifth in terms of awareness with 77%, still shows significant recognition in terms of preferred brand by farmers. In terms of brand preference, the top three choices among farmers are Bayer at No. 1, UPL at No. 2 and Dhanuka & Gharda both at No. 3. This suggests that even though UPL is not among the top three in awareness, it is highly preferred, indicating that factors such as product effectiveness, reliability, or cost-effectiveness are likely to influence farmers' preferences more than mere brand recognition. Most of 39 percent of farmers were influenced by dealer / agro service centers followed by 21 percent by company personnel, 17 percent by progressive farmers, 12 percent by own decision and only 11 percent by advertisement.

Farmers' Buying Behaviour towards Fungicides. Out of 200 farmers majority 72 percent of the farmers purchase the fungicides from the local dealers, followed by 19 percent from other sources while only 9 percent from online platforms. Most of 48 percent farmers said that price of fungicides was moderate/reasonable, followed by 43 percent of farmers said that price of fungicides was high and rest of 9 percent of farmers said that price of fungicides was low. Most of 43 percent of farmers done their payment by cash and credit both modes, followed by 28 percent of farmers done their payment by credit mode only, 16 percent of farmers done their payment by cash mode only and rest of 15 percent by digital payment. Majority 77 percent of farmers were using fungicides from above 8 years, followed by 14 percent of farmers were using fungicides from 5 - 8 years, 9 percent of farmers were using fungicides from 3 - 5 years, while none of farmers were using fungicides from less than 3 years. Most of 41 percent farmers two times purchased fungicides in a year, followed by 30 percent of farmers who purchased fungicides three times in a year, 15 percent of farmers purchased fungicides four times in a year, 9 percent of farmers purchased fungicides only once in a year and only 5 percent of farmers purchased

fungicides more than four times. Most of 38 farmers take decision based on visual observation of crops, followed by 32 percent of farmers take decision based on attack of fungi, 24 percent of farmers take decision based on visit by company representative/technical specialist, 6 percent of farmers take decision based on fellow farmer. Most of 28 percent farmers preferred 500 ml packaging size, followed by 26 percent of farmers preferred packaging size of 1000 ml, 24 percent of farmers preferred packaging size of 250 ml and 22 percent of farmers preferred packaging size of 100 ml. As mentioned in Table 2 regarding factors affecting the purchasing behaviour of farmers towards fungicides, it is clear that most affecting factor was dealer recommendation (mean-3.69), followed by past experience (mean-3.57), price (mean-3.52), progressive farmers opinion (mean-3.48), brand image (mean-3.36), advertisement (mean-3.31), and least affecting factor was availability (mean-3.11).

From above Table 3, it could be inferred that the value of chi square statistics is 12.22 which is greater than the chi square table value at 0.05 level with degree of freedom is 4. Hence it could be interpreted that chi square statistics is significant. So, relation between type of irrigation and frequency of purchase of fungicides in a year is established.

Table 2: Factors affecting the Purchasing Behaviour of farmers towards Fungicides (n = 200).

Sr. No.	Factors	SA	Α	N	D	SD	Cumulative score	Mean	Rank
1.	Price	61(305)	55(220)	33(99)	30(60)	21(21)	705	3.52	III
2.	Brand image	55(275)	50(200)	36(108)	31(62)	28(28)	673	3.36	V
3.	Dealer recommendation	69(345)	57(228)	34(102)	22(44)	18(18)	737	3.69	Ι
4.	Advertisement	54(270)	48(192)	35(105)	32(64)	31(31)	662	3.31	VI
5.	Past experience	63(315)	58(232)	32(96)	24(48)	23(23)	714	3.57	II
6.	Progressive farmers opinion	58(290)	52(208)	38(114)	32(64)	20(20)	696	3.48	IV
7.	Availability	41(205)	43(172)	46(138)	37(74)	33(33)	622	3.11	VII

Figures in the parentnesis represent cumulative score obtained by CS = Score Value of Response × No. of Farn SA - Strongly Agree (5), A - Agree (4), N - Neutral (3), D - Disagree (2), SD - Strongly Disagree (1)

Table 3: A	Association	between type	of irrigation	and frequency of	purchase of	of fungicides i	n a year.
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	Type of 1						
Frequency of purchase of fungicides in	Irrigated	Rainfed	Grand Total				
year							
One time	15	4	19				
Two times	56	26	82				
Three times	54	6	60				
Four times	26	3	29				
More than four times	8	2	10				
Grand Total	159	41	200				
Chi-square test							
Chi square statistics value	Df	Chi square table value (0.05)					
12.22	4	9.49					

Table 4: Association between land	holding and	preferred	packaging size	e of fungicides b	oy farmers.
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Land Holding	100ml	250ml	500ml	1000ml	Grand Total		
Marginal (up to 1 ha)	22	19	8	0	49		
Small (1-2 ha)	19	20	13	4	56		
Semi Medium (2.01-4ha)	2	6	14	19	41		
Medium (4.01-10 ha)	1	1	12	17	31		
Large (more than 10 ha)	0	2	9	12	23		
Grand Total	44	48	56	52	200		
	Chi-square test						
Chi square statistics value		Df	Chi	square table value	e ( <b>0.05</b> )		
96.350		12		21.026			

From above Table 4, it could be inferred that the value of chi square statistics is 96.350 which is greater than the chi square table value at 0.05 level with degree of freedom is 12. Hence it could be interpreted that chi square statistics is significant. So, relation between land holding and preferred packaging size is established.

**Constraints of Farmers Towards the Purchase of Fungicides.** In the present study, for identifying the farmers' constraints, based on the review of literature, seven constraints were formulated and a five point Likert type teacher made rating scale was used to

identify constraints faced by farmers. Rank was given based on the mean score.

As mentioned in Table 5 regarding constraints faces by farmers, it is clear that most consider factor was high price of fungicides (mean-3.68), followed by lack of technical knowledge (Mean-3.66), lack of credit facility (Mean-3.54), no discount (Mean-3.48), poor quality of fungicides (Mean-3.37), non-availability of fungicides (Mean-3.30) and least consider factor was not aware about recommended dose (Mean-3.19).

Sr. No.	Constraints	SA	А	Ν	D	SD	Cumulative score	Mean	Rank
1.	Lack awareness about recommended dose	49(245)	43(172)	39(117)	35(70)	34(34)	638	3.19	VII
2.	Non-availability of fungicides	54(270)	48(192)	35(105)	30(60)	33(33)	660	3.30	VI
3.	Lack of technical knowledge	69(345)	58(232)	30(90)	23(46)	20(20)	733	3.66	Π
4.	High price of fungicides	73(365)	54(216)	29(87)	25(50)	19(19)	737	3.68	Ι
5.	Lack of credit facility	63(315)	55(220)	32(96)	28(56)	22(22)	709	3.54	III
6.	No discount	59(295)	52(208)	37(111)	31(62)	21(21)	697	3.48	IV
7.	Poor quality of fungicides	56(280)	49(196)	36(108)	32(64)	27(27)	675	3.37	V
6. 7.	No discount Poor quality of fungicides	59(295) 56(280)	52(208) 49(196)	37(111) 36(108)	31(62) 32(64)	21(21) 27(27)	697 675	3.48 3.37	IV V

Table 5: Constraints faced by farmers towards the purchase of fungicides (n = 200).

Figures in the parenthesis represent cumulative score obtained by CS = Score Value of Response × No. of Farmers

SA - Strongly Agree (5), A – Agree (4), N – Neutral (3), D – Disagree (2), SD - Strongly Disagree (1)

#### CONCLUSIONS

The present study was carried out in Botad district of Gujarat state to focus on farmers' awareness, buying behaviour and constraints for purchasing fungicides. For fulfilment of the study, 200 farmers were selected through multi stage random sampling method. From the study, it was found that most of the farmers have low education which was below SSC/SSC and having above 20 years of farming experience. Most of farmers were small farmers and having annual income of 1 to 3 lakh. Most of the farmers got aware about fungicides from agro service center. Farmers were well aware about various fungicide brands. Mostly farmers purchased pesticides from dealers in both cash and credit modes. Most of farmers took a decision for spraying fungicides based on visual observation of crops. Most of farmers preferred 500 ml package size of fungicides. The most influencing factors for purchase of fungicides are 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.

#### RECOMMENDATIONS

1. Most of the farmers got awareness about fungicides from agro service centers. So, company should focus on providing product knowledge, better deals to retailers for increasing sales of the product.

2. Majority of farmers are price sensitive in nature considering it as the  $3^{rd}$  most influencing factor. So, company should adopt discount schemes in order to attract a great number of farmers.

3. Only 8% farmers preferred United Insecticides' products. So, company need to attract target farmers for purchasing of their products.

4. Most of the farmers have a constraint of lack of technical knowledge about products. Hence, company

should provide training to educate and raise awareness about appropriate products.

5. Dealer recommendation is the top most influencing factor affecting farmers' purchase decision. So, company should adopt dealer oriented sales promotion schemes to motivate them for recommending company's products to farmers.

Conflict of Interest. None

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**How to cite this article:** Divya G. Dabhi and Mehul G. Thakkar (2024). Awareness, Buying Behaviour and Constraints of Farmers for Fungicides in Botad District. *Biological Forum – An International Journal, 16*(8): 290-295.