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Farmers' awareness, buying behaviour and problems for insecticides for sesame crop

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Abstract

In an agrarian economy like ours, agriculture productivity is of vital importance for farmers' economic wellbeing and national prosperity. When it comes to crop yield, the losses due to attack of various pests and insects need to be minimized. In this regard, rational use of various insecticides play an important role as it protects crops from insects; by either killing them or preventing their attack. They assist in keeping the number of pests under the appropriate threshold level and thereby contribute to increasing yield of the crop. For ensuring rational use of insecticides, it is necessary that the farmers should be aware about various aspects related to use of insecticides. In this regard, the present Empirical Research Study assesses the farmers' awareness and buying behaviour for insecticides in terms of factors influencing purchase of insecticides for sesame crop. It also analyzes their problems in purchase of insecticides for sesame crop. The study was conducted in the Jamnagar District of the vibrant Gujarat State; wherein sesame is one of the major crops and many cumin varieties are grown in summer season. Based on a rigorous survey of 120 farmers selected through multi stage sampling method, this study found that the farmers are aware regarding pesticides dosage, bio pesticides and pesticides solution preparation; but are found to be unaware about types of sprayers, different brands and ironically about the time of spray. Farmers mostly relied on past experience, dealer recommendation and brand image of the company while buying insecticides. The major problems faced by farmers include high price, no discount, poor quality of products, fear of adulteration and product availability.

Keywords: Awareness, bio pesticides, buying behaviour, economic wellbeing, insecticides, sesame

Introduction

Agricultural productivity is measured as the ratio of agricultural outputs to inputs. Agricultural productivity is becoming increasingly important as the world population continues to grow. As agricultural productivity grows, food prices decrease, allowing people to spend less on food, and combatting hunger. India, one of the world's most populous countries, has taken steps in the past decades to increase its land productivity. This wheat/rice combination is now widely used throughout the Punjab, Haryana, and parts of Uttar Pradesh. The wheat yield of three tons and rice yield of two tons combine for five tons of grain per hectare, helping to feed India's 1.1 billion people.

Agrochemical refers to the broad range of pesticides including insecticides, herbicides, and fungicides. It may also include synthetic fertilizers, hormones and other chemical growth agents, and concentrated stores of raw animal manure (Anonymous, 2014) [1]. More than 1000 agro chemicals are being manufactured and used for agriculture as well as public health purposes and about 90 percent is comprised of insecticides and herbicides with about equal share each. Fungicides represent about 10 percent of the total. Only 0.1% of these chemical usage aims at the pest and rest 99.9 percent remain and scatter in surroundings. Andhra Pradesh is the state which uses the highest amount of pesticides (23%) followed by Punjab and Maharashtra (Bhardwaj and Sharma, 2013) [2].

Pesticides are indispensable in agricultural production. They have been used by farmers to control weeds and insects, and their remarkable increases in agricultural products have been reported. The increase in the world's population in the 20th century could not have been possible without a parallel increase in food production. About one-third of agricultural products are produced depending on the application of pesticides. As per an estimate, without the use of pesticides, there would be a 78% loss of fruit production, a 54% loss of vegetable production, and a 32% loss of cereal production. Therefore, pesticides play a critical role in reducing diseases and increasing crop yields worldwide. But, every coin has two sides. So, pesticides should be used rationally.

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The term rational pesticide use is defined as a focused further subset of IPM, which attempts to mitigate the adverse effects of pesticide use by improvements in the selectivity of the products themselves and the precision of their application in both space and time. For ensuring rational use of pesticides, the farmers should be aware and conscious about various aspects of its rational use.

In the context of purchase of pesticides, it is also important to understand farmers' buying behaviour. Here, buying behaviour refers to the act of consumers obtaining and using goods and services and the decision process that determines these acts. When we think of farmers' buying behaviour, we usually talk about the factor that farmers consider while making purchase decision. Understanding farmers' buying behaviour for purchase of any agri inputs in general and for insecticides for sesame crop in particular was one of the major aim of this study. It also focuses on farmers' awareness and problems related to usage and purchase of insecticides in the study region. The findings will certainly help the companies in the production and marketing business of insecticides for strategizing their efforts for becoming market leader on one hand and contributing to farmers' welfare and nation's prosperity on the other by minimizing the losses due to attack of pests and insects.

Review of Literature

Solanki *et al.* (2013) ^[5] carried out a study to identify the factors that affect consumers' purchasing behaviour towards agricultural inputs like fertilizer, seeds, agrochemicals, oils and lubricants etc. and found that price was the most important consideration at the time of purchasing agricultural inputs, followed by packaging and branding. Fair billing and home delivery were considered relatively less important.

Prajapati *et al.* (2016) ^[9] studied the factors affecting farmers' purchase decisions of insecticides and found that the majority of farmers purchase insecticides at the time of insect attack and most farmers preferred bottle-type packaging while purchasing insecticides. Most influencing factors while purchasing insecticides were found to be quality, easy availability, price, shopkeeper suggestion, brand name and friend suggestion. Most considered promotional activities by farmers were personal contact and demonstration followed by group meetings, exhibitions and seminars.

Pundir (2016) ^[3] studied market potential and buying behaviour of micronutrient fertilizers in Vadodara and Bharuch districts of Gujarat. Data collected through personal interview method from 120 farmers and 50 retailers revealed that 83 percent of farmers of Vadodara district and 92 percent of Bharuch district were using micronutrient fertilizers. The non-users gave the reasons like they did not need; they were aware but did not use and they knew the importance but did not want to use in any way. Farmers mostly relied on their past experience for purchase of micronutrient fertilizers. Retailers mostly faced the problems of lack of awareness of farmers, orthodox mindset of farmers, delay in payment of credit and less understanding about micronutrient fertilizers.

Singh (2017) ^[4] conducted study on market potential, farmers' buying behaviour, and satisfaction level towards water soluble fertilizers in Anand and Narmada districts of Gujarat. 200 farmers were selected through convenience sampling method from 20 villages of four talukas of Anand and Narmada districts of Gujarat. Primary data were collected by survey method on pretested semi-structured schedules, and the findings suggested that about 90 percent farmers in Narmada

district used Water Soluble Fertilizers (WSFs). The annual market potential of water-soluble fertilizers in Anand and Narmada districts was estimated to be of Rs 14 crores and Rs. 50 crores respectively. In Anand, GSFC was leading company and in Narmada, Nagarjuna was leading in the sales of WSFs. Around 31 percent farmers in Anand and 59 percent farmers in Narmada District used drip irrigation method on their farms. On the other hand, 52 percent farmers in Anand and 18 percent farmers in Narmada did foliar application of WSFs. About 55 percent farmers preferred to purchase WSFs from local retail shop. Past experience of the farmers was the most influencing factor while purchasing WSFs. Satisfaction level towards using WSFs was high among farmers due to WSFs giving high yield, and small quantities of these fertilizers are sufficient, making it economic for the farmers.

Taherali, Pundir and Nayak (2021) ^[6] conducted a study for vimax crop science in the Banaskantha district of Gujarat and found that extensive promotional campaigns and flexible credit terms were the major driving factors for sale enhancement. Dealers were found be less satisfied with the credit terms of the company, price and timely availability. It was suggested that systematic efforts should be made by the company to make the last farmer in remote areas fully aware about the products and its applications. Further, running crop advisory campaigns, and providing more flexible credit terms with timely availability of the products can help propel the growth of the company.

Patel and Thakkar (2023) ^[7,8] highlighted the changing profile of Indian farmers as they have started using smart phones and internet services. They noted that the progressive farmers of new generation are very techno friendly and when they will prefer smart-work rather than hard-work. They will use digital technologies and digital services very effectively for farming purpose. Consequently, such new age farmers will prefer to use e-retailing of agri inputs, compared to personally going to the dealers for purchasing any of the required agri inputs.

In a landmark study, Patel and Thakkar (2023) ^[7,8] studied the awareness, expectations and usage of agricultural apps by farmers in Banaskantha district of Gujarat. They also highlighted the changing profile of farmers in Gujarat state with the use of various Agricultural Apps and the wide ranging expectations from the developers of these Apps. So, the farmers of Gujarat are becoming tech savvy and collect information from various sources including the internet and various agricultural Apps and may get less influenced by traditional factors affecting their buying behaviour for various agricultural inputs including insecticides.

Materials and Methods

The study was carried out with the following Research Objectives:

- To study the socio-economic profile of farmers in the study area.
- To study the awareness of farmers regarding insecticides for sesame crop.
- To study the farmers' buying behaviour for insecticides for sesame crop.
- To identify the problems faced by farmers in purchase of insecticides for sesame crop.

Descriptive cross-sectional research design was used for the study. Jamnagar district was purposively selected as the area of study, considering the large scale sowing of sesame crop. Primary data were collected through a structured interview

schedule consisting of mixture of open ended, closed ended and multiple response questions. The respondents were personally approached by the researchers for personal interview. Secondary data were obtained from relevant research papers, books, websites, etc. Multistage sampling method was used for selecting 120 farmers as respondents.

Sampling plan

Stage 1: 2 talukas of were selected randomly from 6 talukas of Jamnagar district.

Stage 2: 6 villages were selected randomly from each of the selected 2 talukas.

Stage 3: 10 farmers were selected randomly from each of the selected 12 villages; for making a sample size of 120 farmers. Collected data have been analyzed by using simple descriptive statistics.

Results and Discussion

Socio-economic profile of the respondents

Out of 120 respondents, highest 48.33 percent were in the age group between 41-50 years. In terms of farming experience, the respondent farmers were highly experienced as 43.33 percent farmers were having 10-20 years' experience, 40 percent farmers were with 5-10 years' experience and 10.83 percent farmers were found to have 20 years' experience. 41.66 percent farmers were small farmers having 1-2 ha land, 29.17 percent were marginal farmers with land holding up to 1 ha, 17.5 percent were medium farmers with >2-4 ha land and remaining 11.66 percent farmers were large farmers having more than 4 ha land. Maximum number 43.33 percent farmers were having education up to 12th standard – HSC. 45.83 percent farmers' annual income was between 1 to 2 lakhs, 38.33 farmers were having more than 2 lakhs and remaining 15.83 farmers' annual income was below 1 lakh. 85 percent farmers were doing irrigated farming and remaining 15 percent farmers were doing non irrigated farming. 65 percent farmers adopted furrow irrigation method, 22.5 percent adopted drip irrigation method and remaining 12.5 percent adopted sprinkler irrigation method.

Farmers' Awareness on Usage of Insecticides

Farmers' awareness play important role in their buying behaviour and problems being faced I using insecticides. It is also crucial to ensure judicious use of the insecticides. So, awareness was measured on 9 different aspects, identified from earlier research studies. The findings are shown in Table 1.

Table 1: Farmers' Awareness on Usage of Insecticides

Awareness Attributes	Mean	Rank
Pesticides Dosage	3.65	1
Bio Pesticides	3.53	2
Pesticides Solution Preparation	3.31	3
Pest Enemies	3.17	4
Different Types of Pesticides	2.74	5
Spraying Techniques	2.61	6
Types of Sprayers	2.48	7
Different Brands of Pesticides	2.42	8
Time of Spray	2.24	9

Table 1 shows the awareness of farmers on usage of insecticides. Here, pesticides dosage was the top ranked

attribute for farmers' awareness towards insecticides followed by Bio Pesticides, pesticides solution preparation and pest enemies. Ironically, the farmers were least aware about the time of spray followed by different brands and types of sprayers.

Impact of selected Socio-Economic Variables on Farmers' Awareness

Based on earlier research studies, an attempt was made to analyze the impact of selected socio-economic characteristics of farmers like age, education, land holding, farming experience and annual income on their awareness on usage of insecticides. For this, based on awareness on different aspects, the farmers were classified into 3 categories like having Low Awareness, Medium Awareness and High Awareness. Chi-square test was performed at 0.05 significance level with the following hypothesis.

Hypothesis

H0: There is no significant association between the selected socio-economic variable (age, education, land holding, farming experience and annual income) of the respondents and their awareness on usage of insecticides.

Ha: There is some significant association between the selected socio-economic variable (age, education, land holding, farming experience and annual income) of the respondents and their awareness on usage of insecticides.

Table 2: Impact of selected Socio-Economic Variables on Farmers' Awareness

Hypothesis Variables	P Value
Age v/s Level of awareness towards insecticides	0.4976
Education v/s Level of awareness towards insecticides	0.0394
Land Holding v/s Level of awareness towards insecticides	0.0069
Farming Experience v/s Level of awareness towards insecticides	0.0079
Annual Income v/s Level of awareness towards insecticides	0.1596

Table 2 indicates that there is no significant association between age group of farmers and farmers' annual v/s their level of awareness towards insecticides, as the P value is more than 0.05. Hence, we accept the null hypothesis.

But, as the P value is less than 0.05 in case of education of farmers v/s their level of awareness towards insecticides, land holding v/s their level of awareness towards insecticides, and farming experience v/s their level of awareness towards insecticides; we fail to reject the null hypothesis. Hence, there is significant association between these selected variables of education, land holding and farming experience v/s their level of awareness towards insecticides. Here, education and farming experience of farmers can be easily understood as having impact on their awareness, because as the education level increases, farmers logically become more aware. Similarly, those farmers who have more experience of farming may have learned and understood various aspects of using insecticides from their years of experience, and their awareness may be higher. But, the association of land holding and awareness is surprising, as rarely any earlier research studies found such an association. This finding needs to be analyzed further with larger sample size.

Farmers' Buying Behaviour for Insecticides

Out of 120 farmers of Jamnagar district, 63.33 percent farmers used to purchase insecticides from private dealers, 9.17 percent from FPOs, 14.17 percent farmers from co-operative society, 7.5 percent farmers preferred to purchase from agriculture department and remaining 5.83 percent farmers were purchasing insecticides from direct selling agent.

Table 3: Brand Preference of Farmers

Company	Mean	Rank
UPL	2.37	1
Crystal	2.28	2
FMC	2.25	3
Syngenta	2.23	4
Rallis	2.2	5
Bayer	2.13	6
NACL	2.03	7

Table 3 shows the brand preferences of farmers for purchase of insecticides. This shows that the farmers mostly preferred the insecticides products of UPL company, followed by Crystal, FMC, Syngenta, Rallis and Bayer. The least preferred brand for purchase of insecticides in the study area was NACL.

For understanding the influencing factors for purchase of insecticides, farmers were asked to rank the following 11 factors, as identified from earlier research studies. These rankings of influencing factors are shown in Table 4.

Table 4: Factors Influencing Purchase of Insecticides

Factors	Mean	Rank
Past Experience	3.78	1
Dealer Recommendation	3.77	2
Brand Image of Company	3.74	3
Quality	3.68	4
Progressive Farmers Influence	3.67	5
Credit Availability	3.53	6
Availability	3.51	7
Price	3.48	8
After Field Demonstration	3.43	9
Weather Condition	3.27	10
Packaging Size	3.08	11

Table 4 shows farmers' buying behaviour towards insecticides from sesame crop in terms of 11 influencing factors. Here, past experience was the top ranked factor followed by dealer recommendation, brand image of the company and quality of the insecticides. The packaging size was the least important factor for farmers' decision to buy a particular brand insecticide; which is surprising as usually it is believed that Indian farmers always look for cheaper agri inputs.

Problems of Farmers in purchase of Insecticides

Table 5: Problems of Farmers in purchase of Insecticides

Problems	Mean	Rank
High Price	3.62	1
No Discount	3.6	2
Poor Quality of Products	3.33	3
Fear of Adulteration	3.23	4
Product Availability	3.16	5
Lack of Credit Availability	2.86	6

Top five major problems faced by the surveyed farmers in purchase of insecticides were high price of the insecticides followed no discount, poor quality of products, fear of adulteration and product availability. The lack of credit availability was the last ranked problem faced by the farmers. So, whether a company gives credit facility or not will not influence the farmers' decision to buy that brand insecticides.

Conclusion

Agriculture plays a major role in Indian economy. Hence, to maintain higher agriculture productivity through more crop yield, the losses due to attack of various pests and insects need to be tackled. With the judicious use of various insecticides, we can increase crop yield by minimizing the risk of pests and insects. In this regard, to measure the farmers' awareness and buying behaviour for insecticides in terms of factors influencing purchase of insecticides and their problems for purchase of insecticides; the present study was conducted. The study was conducted in the Jamnagar District for one of the major crops sesame. The study indicates that the top 3 factors influencing farmers' decision to purchase insecticides for sesame crop include past experience, dealer recommendation and brand image of the company. So, the companies should focus on quality of the products to have excellent past experience with the products, keep dealer friendly policies like margin, schemes, return policy, etc. and also put systematic efforts for improving brand image. Further, it was found that the farmers are aware regarding pesticides dosage, bio pesticides and pesticides solution preparation; but are unaware about types of sprayers, different brands and the time of spray. So, the companies may aim to get competitive edge by spreading awareness on these aspects by having farmer meetings and field visits highlighting these aspects. The companies interested to become market leader should also try to resolve farmers' major problems of high price, no discount, poor quality of products, fear of adulteration and product availability. Mutually benefitting long term strategies should be worked out to combat these problems.

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