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Buying behaviour and usage pattern of farmers towards insecticide in Karnal district of Haryana

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Abstract

This study investigates how farmers buy and use insecticides in the Karnal district of Haryana. It is based on primary data collected from 200 farmers by means of a structured interview schedule. The frequency and percentage descriptive statistical methods were used to analyze the data. The findings reveal that agro-service centres are the main source of purchased insecticides and have a dominant influence on farmers' decisions to use them. When farmers obtain information about insecticides, they rely mostly on dealers and fellow farmers; extension services play little role in this regard. Most farmers would prefer to apply insecticides by spraying during the evening and at sunrise; however, very few farmers use any protective equipment when using insecticides. This study points out the need to strengthen extension services and create awareness about the safe and effective use of insecticides for improving sustainable agricultural practices.

Keywords: Buying behaviour, Farmers, Insecticides, Usage pattern

Introduction

Agriculture is an important part of the economy in India by providing livelihood for a large percentage of Indians and assisting with food security and development. Agriculture is still the major income generator for rural households in developing nations including India (FAO, 2022) ^[3]. Even though agriculture's contribution to GDP has gone down over the last couple of decades, it still accounts for about half of the total workforce (World Bank, 2023) ^[13]. One major issue with agriculture is crop damage due to pests, diseases and weeds which has a significant impact on both productivity and farm income (FAO, 2021). In this regard, agrochemicals especially insecticides, play a major role in increasing crop productivity by helping to eliminate damaging insects and decrease crop loss (Popp *et al.*, 2013) ^[12]. However, the effectiveness of insecticides relies on farmer buying and usage behaviours. The purchasing decisions made by farmers in many cases will depend on a number of factors, including socio-economic conditions, price, accessibility, brand image and advice from dealers and other farmers (Kotler & Keller, 2016; Birtal *et al.*, 2013) ^[7, 1]. The patterns of usage in regard to the methods of application, amount used, timing and safety precautions when using insecticides are vital in successfully achieving the desired outcome while minimising environmental and health impacts, as incorrect usage can lead to pollution, developing pest resistance and health risks (Damalas and Koutroubas, 2016) ^[2]. Although many studies have studied the use of pesticides, so far few have investigated the behaviours associated with purchasing and using pesticides at a regional level, where the farming practices of farmers differ because of their local situation. The Karnal district of Haryana, India, is an area where agriculture is very intensive and therefore is very closely suited to this type of research. Therefore, this study will provide an analysis of the socio-economic characteristics of farmers and investigate their purchasing behaviours and usage patterns with respect to insecticides in the Karnal district of Haryana.

Review of Literature

Jamanal and Syed (2017) ^[6] concluded that farmers who grew soy beans were often middle aged and had completed high school as their highest formal education. Most of the surveyed soy bean creators owned moderate sized parcels of land. Many farmers in the study also

reported interacting with extension services, exposure to mass media, a rate of innovating, and being oriented to the use of scientific practices at a medium level of effort.

Nitish O. *et al.* (2017) ^[10] conducted a study that concluded that 46.25% of farmers earned between Rs. 1,00,000 and Rs. 1,50,000, whereas 28.75% earned less than Rs. 1,00,000, and the remaining 25% earned more than Rs. 1,50,000. Most of these farmers were middle aged; however, a significant number of those surveyed were unable to think critically and find new technologies due to a lack of education.

Mohammed S. *et al.* (2018) ^[9] conducted a study of insecticides and herbicides used to control pests. The findings indicated that most farmers in the study selected pesticides based on cost, availability, effectiveness, and ability to provide effective pest and disease control. Farmers primarily selected pesticides as a quickly and effectively to protect their crops and increase their yield. When selecting a pesticide, farmers indicated that effectiveness and performance were the two most important factors in their choice of a pesticide.

Padaliya *et al.* (2021) ^[11] provided insights into the purchasing behavior of farmers concerning herbicides for soybean production in Chhotaudepur regarding what influences their purchase of herbicides. The following elements are influential in shaping the attitudes of farmers purchasing herbicides: (i) positive association with weed and crop control services, (ii) personal experience with herbicide purchases and advice from professionals, (iii) buying practices and finances, and (iv) crop/weed status and stage.

Ganganpreet *et al.* (2018) ^[5] discovered that farmers have low knowledge of managing pests and understanding how pesticides impact vegetable production. Their results indicated that malathion, mancozeb, and propiconazole were the primary insecticides, fungicides, and acaricides used on cauliflower and brinjal. Farmers believe that malathion, chlorpyrifos, cypermethrin, carbendazim, and mancozeb are highly effective pesticides. In most cases, farmers have used the advice of their regional pesticide dealer rather than local agricultural extension agents or researchers to determine their crop protection strategy.

Kumar and Singh's (2021) ^[8] study evaluated the application of Saaf fungicide on mangoes and the potential market in Railway Koduru area of Andhra Pradesh in recent years. Four mandals were chosen for the study, with five villages selected from each mandal, for a total of 20 villages. Five farmers from each village were randomly sampled to yield a total of 100 farmers surveyed. In addition, each mandal had 3 dealers selected, for a total of 12 dealers surveyed. Mandals, villages, farmers, and dealers were all selected using random sampling methods.

Objectives of the study

This study was carried out with the following objectives:

1. To study the socio-economic profile of farmers.

2. To study the buying behavior and usage pattern of farmers towards insecticides.

Methodology

This study was undertaken in the Karnal district of Haryana, a primary agricultural area characterized by high-intensity farming methods. The research design was descriptive and was used to determine how farmers purchase and use insecticides. Multistage sampling was used to select subjects for this study. The first stage was purposive selection of the Karnal district; second, four talukas (Karnal, Assandh, Nilokheri and Indri) were randomly selected; third, five villages within each of the four talukas were randomly selected; and finally, ten sample farmers from each of those villages were selected using stratified random sampling, yielding a sample size of 200 farmers. Primary and secondary data were used in this study. A structured schedule for interviews was used in the collection of primary data, which included questions relating to socio-economic characteristics, purchasing habits and usage patterns with respect to insecticides. Secondary data were collected from published articles or reports and other relevant published materials. Simple statistical analysis, (frequency, percentage, table etc.) were completed on the collected data in order to infer meaningful characteristics about the socio-economic profile of the farmers and the patterns of insecticide purchases and usage for those farmers.

Results and Discussion

Socio-economic profile of the consumers

Table 1 shows an overview of the socio-economic profiles of farmers in the study. Most respondents are male (96%) and fall within the age range of 36-45 (45.5%) with a further 28% in ages 46-55. This shows that middle-aged farmers are heavily involved in agriculture. Most of these farmers are educated to the higher secondary (29%) and graduation (23%) level of education, indicating only moderate educational attainment. The income levels of the farmers show that 38% of all respondents have an income between ₹2,00,000 and ₹3,00,000 which indicates they are in the medium income grouping. Of those surveyed, 62% produced crops on their own property and live within medium-sized families (61%). The landholding structure of the farmers demonstrates the largest percentage (40.5%) of farmers have small landholdings and 31% have medium-sized landholdings. Of farmers practicing irrigation, the majority (84%) utilize irrigation as their method of farming and the majority of these farmers (85.5%) use the sprinkler form of irrigation. In addition, nearly half (46%) of the farmers have between 11 and 20 years of experience in farming, which indicates they have good experience with agricultural practices. Therefore, the findings of this study demonstrate that the farmers in this area are moderately educated, experienced, and primarily classified as small and medium farmers.

Table 1: Socio-economic profile of farmers

Particulars	Frequency	Percentage
Gender		
Female	8	4
Male	192	96
Age (Years)		
Below 25	12	6

25 - 35	28	14
36 - 45	91	45.5
46 - 55	56	28
Above 55	13	6.5
Education		
Illiterate	11	5.5
Below SSC	32	16
SSC	45	22.5
HSC	58	29
Graduation	46	23
Post-Graduation	8	4
Annual Income of farmers		
Below 50,000 or 50,000	21	10.5
50,000 - 1,00,000	28	14
1,00,000 - 2,00,000	52	26
2,00,000 - 3,00,000	76	38
Above 3,00,000	23	11.5
Type of farmers		
Land owner farmer	124	62
Crop sharing farmer	22	11
Tenant farmer (Rent)	54	27
Family size		
Small (up to 3 members)	52	26
Medium (4 to 7 members)	122	61
Big (8 and above members)	26	13
Total land holding of farmers		
Marginal (up to 1 ha)	23	11.5
Small (1.01-2 ha)	81	40.5
Medium (2.01 - 10 ha)	62	31
Large (More than 10 ha)	34	17
Type of farming		
Irrigated	168	84
Rainfed	32	16
Type of irrigation		
Drip irrigation	8	4
Sprinkle irrigation	171	85.5
Furrow irrigation	21	10.5
Farming experience		
1 to 10	40	20
11 to 20	92	46
Above 20	68	34

2. Buying behavior and usage pattern of farmers towards insecticides.

Table 2: Source of purchase

Sources of purchase	Frequency	Percentage
Company person	32	16
Co-operative society	6	3
Online purchase	8	4
Agro service centers	154	77

Table 2 shows that insecticides are purchased by farmers through a variety of sources; agro-service centers account for 77% of insecticide purchases from farmers. Only about 16% of farmers buy insecticides through company representatives, and a relatively low percentage buy via other channels such as online purchasing (3%) or via co-operatives (4%).

Table 3: Source of influence for insecticide application

Sources of influence	Frequency	Percentage
Company representative	27	13.5
Dealer / Agro service centers	78	39
Extension officer	3	1.5
Media advertisement	26	13
Neighbour and friends	66	33

As shown in Table 3, dealers/agro-service centers are the main source of influence for farmers in regard to applying insecticides, while (33%) neighbours or friends come in second. Company representatives (13.5%) as well as media advertisements (13%) exert moderate levels of influence on farmers, while extension agents (1.5%) only have a slight amount of influence on them.

Table 4: Using pattern of Insecticide

Particulars	Frequency	Percentage
Preferred time for spraying insecticide		
Afternoon	3	1.5
Early morning	94	47
Evening	103	51.5
Protection used by farmers while using insecticide		
Gloves	7	6.5
Mask	23	11.5
No protection	143	71.5
Shoes	27	13.5

According to Table 4, when examining usage of insecticides from farmer's perspective, it can be seen that majority of farmers spray their crops in the evening (51.5%), followed by early morning (47%) with very little preference for spraying during the afternoon (1.5%). Additionally, with

regards to safety measures; 71.5% of the farmers do not wear any type of protective gear, while less than 20% report that they wear shoes 13.5%, masks 11.5% and gloves 6.5%.

Conclusion

The conclusion of the research demonstrates that the purchasing behaviour and use of insecticides by farmers is influenced primarily by agro-service centers and are impacted more so by dealer sources (farmer reliance on) than by formal extension services. Farmers display a tendency to spray during optimal climatic periods, such as late in the day and early in the morning, however, safety precautions are rarely performed. The overall conclusion stresses the importance of enhancing extension services and educating farmers on safe handling methods of insecticides for effective use of insecticides and sustainable use of insecticides.

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