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A study on factors influencing farmers towards the purchase of bio-fungicides in Erode district of Tamil Nadu

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Abstract

Since green revolution, Indian Agricultural production has attained tremendous changes to satisfy the needs of the rapidly increasing population. One such change is the extreme usage of chemical pesticides for plant protection. Recently, there is a rising concern about the negative effects of these chemical pesticides on human and soil health. To combat these ill effects, alternative solutions such as environment friendly bio pesticides are being employed. Hence, there is a need to gain a deeper understanding about the farmers' preference towards bio fungicides. This study provides insight into the various factors that play a major role in motivating farmers towards purchase of bio-fungicides. An exploratory factor analysis was carried out and the result showed that dealers influence, technical guidance, product Quality, advertisement and credit availability were some of the major factors that influenced the farmers towards purchase of bio-fungicides.

Keywords: Factors influencing, bio-fungicides, factor analysis, dealer influence

1. Introduction

India is a developing country with agriculture as the major occupation of the people. With the continuous increase in the population, there is a need to produce more to attain food security. To achieve food security in India, Agricultural production has undergone substantial changes since green revolution and one among the major changes is the tremendous increase in the use of chemical inputs (fertilizers, pesticides, fungicides, micronutrients, etc). Although there is a positive change that has greatly supported the economic growth of the nation, chemical-based agriculture is being criticized from an environmental perspective^[1, 2]. Throughout the history, several significant changes taken place by either considering the consumer demand or reasons owing to ethical significance. This is particularly true in case of plant protection. Increasing concern over the exposure of consumers to chemical inputs has led to the development of innovative, less hazardous, and sustainable plant protection techniques. One among these is the use of bio-inputs for disease control in plants^[3].

A bio-fungicide is a formulation containing living organisms that hampers the growth of pathogenic fungi and bacteria on plants. Plant pathogens are inhibited from attaching to plants by beneficial microorganisms, usually extracted from the soil. These beneficial microorganisms are termed as bio fungicides. There are different kinds of bio-fungicides used in the market. Statistical data revealed that, there are more than 100 different types of biological pesticide products in the globe, but bio-insecticides account for more than 90% of them. Bio fungicides will be the next significant commercial bio-pesticide. Currently being developed are microbial fungicides of bacteria, fungi, and antibiotics, which primarily include agricultural antibiotics, bacterial fungicides, fungal fungicides, and viral fungicides [FAO, 2021].

2. Review of Literature

Banumathy and Thennarasu (2008)^[4] conducted a study on the factors determining Bio-input adoption for sugarcane in cuddalore and revealed that the farmers experience in handling Bio-inputs played a predominant role in bio-input adoption followed by age of the respondent, farm size and income.

According to Dhakal *et al.*, (2018)^[5] around 40 per cent of the farmers used bio-fertilizers. Farmers' lack of knowledge regarding the use of bio-fertilizers, as well as their usage of synthetic fertilizers, were identified to be the significant factors that influenced bio-fertilizer usage.

Lin, L., & Ming, S. Y. (2020) ^[5] observed that the farmers' gender, educational background, the size of the family, the total income, the quality of farmland, the depth of knowledge of organic fertilizer, the ease with which organic fertilizer can be applied, the plausibility of the price of organic fertilizer, and the comprehension of national policy related to organic fertilizer were all the important factors affecting farmer's Purchase Behavior of Organic Fertilizers. M.K. Njeru (2016) ^[6] investigated the elements that influence adoption of organic farming among farmers in Kenya. Women accepted organic agricultural methods at a higher rate than men, according to the survey. The farmers' age, education level, labor access, and farm size did not statistically affect the adoption of organic farming in the Nembure division, contrary to previous literature.

3. Objective of the study

- To find out the factors influencing the farmers towards the purchase of Bio-fungicides in erode district.

4. Methodology

This study was conducted using a descriptive research design with an aim of finding out the factors influencing the farmers towards purchase of bio-fungicide in erode district. Convenience sampling technique was used. The study was conducted with farmers in erode district who had already purchased and used bio-fungicides. A total number of 120 farmers were selected for the study. The primary data was collected through survey. The Farmers' response to the factors influencing their purchase of Bio-fungicide had been recorded using a 5-point Likert scale. (1=Strongly Disagree,

2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree).

To fulfill the objective, exploratory factor analysis (EFA) was used considering the following variables:

Table 1: List of Variables

Field officer's influence
Dealers influence
Effectiveness/ Quality
Peer group influence
Easy availability
Brand loyalty
Advertisement
Credit Availability
Affordable price
Discounts/ Rebates/ Subsidy
Technical guidance

Factor analysis was used to determine the factors influencing farmers towards purchase of bio-fungicides. The factors which had Eigen value greater than one were taken into consideration.

5. Results and Discussion

5.1 Socio-economic characteristics of sample respondents.

For a better understanding about the sample respondents, their socio economic details were studied. A detailed breakdown of the socio-economic characteristics of the 120 respondents is provided in Table 2. The Socio-economic characters include age, gender, education, occupation, annual income, size of the land holding.

Table 2: Profile of Respondents

Characteristics	Category	Frequency (n=120)	Percentage
Age (years)	Adult hood (25-40)	27	22.5
	Middle Age (41-60)	58	48.33
	Senior Citizen (above 60)	35	29.17
	Total	120	100
Gender	Male	113	94.17
	Female	7	5.83
	Total	120	100
Education	Illiterate	5	4.17
	Primary	24	20
	Secondary	45	37.50
	Higher Secondary	12	10.00
	Graduate & above	34	28.33
	Total	120	100
Annual income (Rs.)	Below 5 lakhs	81	67.50
	5-10 lakhs	36	30.00
	10-15 lakhs	2	1.67
	Above 15 lakhs	1	0.83
	Total	120	100
Occupation	Agriculture only	75	62.50
	Agriculture & other Occupation	45	37.50
	Total	120	100
Size of the land holding	Below 1 ha	30	25.00
	1-2 ha	42	35.00
	2-4 ha	38	31.67
	4-10 ha	9	7.50
	Above 10 ha	1	0.83
	Total	120	100

From the Table 2, majority of the respondents were male (94.17 per cent). Majority of the sample respondents come under the age category of 41-60 years (48.33 per cent) followed by above 60 years (29.17 per cent) and 25-40 years

(22.5 per cent). In case of education, majority of the respondents had completed their secondary education (37.50 per cent) followed by graduation and above (28.33 per cent). With regard to occupation, majority of the respondents

occupation was agriculture alone (62.50 per cent) followed by agriculture and other occupation (37.50 per cent). In case of annual income majority of the respondents earned Less than Rs.5 lakhs (67.50 per cent) and Rs.5 to 10 lakhs (30 per cent). With respect to the size of the land holding, majority of the respondents were small farmers (35 per cent), followed by semi-medium farmers (31.67 per cent) and marginal farmers (25 per cent).

From the study, it could be inferred that middle aged male respondents with moderate educational background were the major customers for bio-fungicide products available in the market. Hence the companies could focus on them as their target customers and device strategies to improve their sales.

5.2 Factors influencing farmers towards the purchase of bio-fungicides - Factor analysis

In order to determine whether the data can be used for factor analysis, two tests were performed, namely

Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity. These tests were applied to see whether there was a significant relationship among the variables and to test their Statistical significance.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.706
Bartlett's Test of Sphericity	Approx. Chi-Square	404.742
	Df	55
	Sig.	.000

From Table 3, it could be found that the value of KMO statistics was 0.706 (> 0.5), which indicated that the sample was adequate and good for conducting the factor analysis. In Bartlett's test, the approximate chi-square statistic was found to be 404.742 with 55 degrees of freedom which was significant at 0.01 levels.

Table 4: Total Variance Explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of variance	Cumulative%	Total	% of variance	Cumulative%
1	3.402	30.930	30.930	3.402	30.930	30.930
2	2.146	19.509	50.439	2.146	19.509	50.439
3	1.013	9.213	59.652	1.013	9.213	59.652
4	0.963	8.757	68.409			
5	0.788	7.168	75.577			
6	0.688	6.259	81.836			
7	0.590	5.363	87.198			
8	0.542	4.927	92.126			
9	0.333	3.026	95.151			
10	0.284	2.577	97.729			
11	0.250	2.271	100.00			

The principal component analysis (PCA) method, provided the relationship between factors and variables within the analysis. Technically, it could be called as factor loadings. These factor loadings indicated the relationship between variables clearly, but do not group all of them with the factors clearly. From Table 4, it was clear that three components had an Eigenvalue of more than one. These three components explain about 59.652 per cent of the variance. But to get a meaningful conclusion of grouping the variables under certain factors, the rotation of components was done using varimax rotation with Kaiser Normalization.

Table 5: Rotated Component Matrix

	Component		
	1	2	3
Field officer influence	0.895		
Dealers Influence	0.728		
Effectiveness / quality	0.709		
Peer group Influence	0.706		
Easy Availability	0.705		
Brand Loyalty	0.653		
Advertisement		0.852	
Credit Availability		0.758	
Affordable price		0.651	
Discounts / Rebates / Subsidy		0.600	
Technical guidance			0.895

Table 5 represented the Rotated component matrix which grouped the 11 variables taken for the analysis into three Factors that have factor loadings greater than or equal to 0.5. From this, component 1 and 3 showed high relevancy with

respect to direct influence of farmers towards bio-fungicide purchase. Hence the two components are combined together and named as directly influencing factor in Table 6.

Table 6: Factors Influencing farmers towards purchase of Bio-fungicides.

Factors	Statements	Loadings
Directly influencing factors	Technical guidance	0.895
	Field officer influence	0.895
	Dealers Influence	0.728
	Effectiveness / quality	0.709
	Peer group Influence	0.706
	Easy Availability	0.705
	Brand Loyalty	0.653
Indirectly influencing factors	Advertisement	.0852
	Credit Availability	.0758
	Affordable price	0.651
	Discounts / Rebates / Subsidy	0.600

It could be concluded from the Table 6 that, the factor 1 was labeled as directly influencing factor, which includes technical guidance (0.895), field officers influence (0.756), Dealers influence (0.728), Effectiveness /quality (0.709), Peer group influence (0.706) followed by Easy availability (0.705) and brand loyalty (0.653). The factor 2 was labeled as indirectly influencing factor, which includes Advertisement (0.852), Credit availability (0.758), Affordable price (0.651) and Discounts /Rebates/Subsidy (0.600). It could be further concluded from the concluded that direct influencing factors, indirectly influencing factors were the important factors

influencing the farmers towards the purchase of bio-fungicides.

6. Conclusion

It could be concluded that there were three new extracted components found to have Eigen value more than one. The total variance explained by the study were 59.652 per cent. The study also concluded that directly influencing factors and indirectly influencing factors were the key factors influencing farmers to purchase bio-fungicides. Field officer's influence, dealers influence were the major factors that directly influence the farmers to purchase bio-fungicides. The study revealed that the product quality and its effectiveness play an important role in buying bio-fungicides. Advertisements and credit availability were the major factors indirectly influencing farmers to buy bio-fungicides. Technical guidance to the farmers regarding the method of application, composition of bio-fungicide, time of application also motivates the farmers to purchase bio-fungicides.

7. Limitations

This study was limited to Erode district alone, which may not represent all other districts in Tamil Nadu as well as India.

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