



Research Article

FACTORS AFFECTING THE ADOPTION OF WATER SOLUBLE FERTILIZERS BY BANANA GROWERS IN TRICHY DISTRICT, TAMIL NADU

SATHISH KUMAR M.*, MAHETA H.Y., KALPESH KUMAR, BHARODIA C.R. AND MALOTH SRINIVAS

Department of Agri-Business Management, Post Graduate Institute of Agri-Business Management, Junagadh Agricultural University, Junagadh, 362001, Gujarat, India

*Corresponding Author: Email - vmsathishkumar1996@gmail.com

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Abstract: The water soluble fertilizer is solid form of mixed fertilizer composition. It includes urea, phosphoric acid and one potassium salt. It increased the fertilizer use efficiency up to 90 per cent. The present study conducted in Lalgudi, Thottiyam and Manapparai blocks of Trichy district in Tamil Nadu state. The multi stage purposive sampling technique has been adopted to select the sample farmers for the study. The data collected from 120 banana growers by personal interview method and analysis has done by Binary Logistic Regression to find out the factors which influence the farmers to adopt water soluble fertilizers in their banana field. The study revealed that three factors namely promotional activities, irrigation facility and efficacy level of product influencing the adoption of water soluble fertilizers.

Keywords: Water soluble fertilizer, Binary Logistic Regression

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Introduction

The water soluble fertilizer market had stood at \$ 185 million in 2016 and it will be grown \$ 365 million by 2027 in India. The use of complex water soluble fertilizers and micro nutrients has been increasing in horticulture and ornamental crops. The efficiency of water soluble fertilizers has increased by foliar application method and the demand is increasing because of its customized crop specific solutions [1]. The awareness about micro irrigation practices and efficiency level of water soluble fertilizers among the farmers is expected to increase the demand of water soluble fertilizer in future. The benefit of water soluble fertilizers are increase the plant yield, reduce fertilizer usage in fields, provides nutrients in a controlled manner and protect soil against excess fertilizer dose [2-4].

Methodology

Selection of Samples

The selection of district, blocks, villages and farmers has done by multi stage purposive sampling technique. Total 120 banana growers selected from three blocks of Trichy district. The adopters and non adopters of water soluble fertilizers selected from each village as per the availability of banana growers while 8 villages selected from Lalgudi block, 10 villages selected from Thottiyam block and 10 villages selected from Manapparai block. The adopters who are having micro irrigation system and using water soluble fertilizers in their banana field and non adopters who are having micro irrigation system and does not use water soluble fertilizers. The collected data analyzed by using binary logistic regression method.

Binary Logistic Regression

The farmers considered the advantages and disadvantages while adopting water soluble fertilizers in their banana field. The decision defined as the latent variable Y, which is willingness of each farmer to adopted water soluble fertilizers and can be related to set of explanatory variables $X_1 - X_n$. The binary logistic regression applied when maximum likelihood estimates by transforming the dependent variable into logit of the odds of the dependent variable occurring.

The pattern of adoption described by dummy variable, y, such that $y_i = 1$ if farmer i has adopted or $y_i = 0$ if farmer i has not adopted. The binary logistic regression method used to analyze problems which independent variables determine outcome has measured variable in which there are two possible income (True = 1 or False = 0). In this method, the dependent variable is the probability that an event will occur [5-8].

The logistic model is written as:

$$P_i = \frac{1}{1 + e^{-z_i}} \quad (1)$$

Where,

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + n$$

The logistic equation can be rearranged by converting the probability into log odds of logit.

$$\text{Logit}(P) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + n + U_i \quad (2)$$

Where,

P is the probability of presence of the characteristics of interest

P = 1, when he adopts

P = 0, when he did not adopt

This model could be explicitly specified thus

$$\text{Logit}(P) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + n + U_i \quad (3)$$

Where,

(P) = Farmers / respondents decision

β_0 = intercept term

$\beta_1 - \beta_n$ = logistic regression coefficient

$X_1 - X_n$ = independent variables

The independent variables are as follows:

X_1 = Age (year)

X_2 = Education level (Number of years spent in schools)

X_3 = Family size (Number)

X_4 = Farm size (hectare)

X_5 = Farming experience (years)

Table-1 Results of binary logistic regression analysis

	B	S.E.	Wald	Df	Sig.	Exp(B)
Age	-1.973	1.054	3.501	1	0.061 NS	0.139
Education level	-0.102	1.003	0.010	1	0.919 NS	0.903
Family Size	-0.735	1.101	0.447	1	0.504 NS	0.479
Farm size	0.938	1.137	0.680	1	0.410 NS	2.554
Farming Experience	-0.262	1.074	0.060	1	0.807 NS	0.769
Annual income	-0.290	1.064	0.074	1	0.785 NS	0.748
Membership of association	-0.920	0.993	0.858	1	0.354 NS	0.399
Promotional activities	3.869	1.236	9.799	1	0.002 **	47.895
Price of WSF	-0.803	1.113	0.521	1	0.471 NS	0.448
Irrigation facility	2.346	1.067	4.834	1	0.028 **	10.445
Extension contact	1.121	1.102	1.035	1	0.309 NS	3.068
Efficacy level	4.805	1.343	12.796	1	0.000 **	122.119
Constant	-3.944	1.468	7.222	1	0.007	0.019

NS- not significant, ** significant at $p < 0.05$ and $p < 0.01$, respectively.

Number of observation- 120.00, Likelihood test- 38.094, Cox & Snell R Square- 0.657, Nagelkerke R Square- 0.875., Overall case correctly- 93.3

X_6 = Annual income (High/ Medium/ Low)

X_7 = Membership of Association (yes = 1, otherwise = 0)

X_8 = Promotional activities (yes = 1, otherwise = 0)

X_9 = Price of water soluble fertilizer (High/ Medium/ Low)

X_{10} = Irrigation facility (Well/ Bore well/ Canal/ River)

X_{11} = Extension contact (yes = 1, otherwise = 0)

X_{12} = Efficacy level (Good/ Average/ Poor)

U_i = Error term

Result and discussion

The results of the logit regression analysis [Table-1] show the overall percentage of case correctness for the model stands at 93.3 percent. The model accepted by indication of Goodness of fit measures. The amount of variation explained by the model is significantly different from zero because likelihood ratio was significant ($p < 0.05$). The Cox and Snell R Square value, a commonly used measure for goodness of fit for binary choice model was 0.657, which means 65.7 percent of the total variation in the dependent variable could be explained by the X variables that were included in the logit model. A Nagelkerke R Square statistical test gave a p- value of 0.875, which indicated that the model fits reasonably well [9-10].

The results of the logit regression analysis indicated that among the twelve independent variables included in the model, three factors namely promotional activities, irrigation facility and efficacy level of product were statistically significant in influencing a farmer's decision to adopt the water soluble fertilizers in their banana field. Promotional activities such as free sampling, field demonstration, fairs and exhibition, attractive schemes and discounts regularly conducted in this area which increased the adoption of water soluble fertilizer by farmers. The Cauvery River is the main irrigation source of this area influenced farmers to cultivate banana crop and efficacy level of water soluble fertilizers is also high in banana crops than fertilizers which influenced banana growers to adopt water soluble fertilizers in their banana field. Farmers age, education level, family size, farming experience, annual income, membership of association, price of water soluble fertilizer and extension contact had no significant influence on farmers decision to adopt water soluble fertilizers.

Conclusion

The perception of farmers about water soluble fertilizers plays an important role to adopting and non adopting of water soluble fertilizers in their banana field. Water soluble fertilizer produced when rock phosphate treats with acids. It took responsible for huge increase in food production. Three factors namely promotional activities, irrigation facility and efficacy level of product influenced the adoption of water soluble fertilizers by banana growers. The adoption of water soluble fertilizers in banana field increased the yield and annual income of farmers. Finally, it is suggested that adoption of water soluble fertilizer is essential for banana growers.

Application of research: Study the factors affecting the adoption of water soluble fertilizers by farmers in their banana field

Research Category: Agri-Business Management

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***Research Guide or Chairperson of research: Dr H. Y. Maheta**

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Study area / Sample Collection: Lalgudi, Thottiyam and Manapparai blocks of Trichy district in Tamil Nadu

Cultivar / Variety name: Monthan

Conflict of interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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