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PREDICTION OF EXTENT OF ADOPTION OF BLUE-GREEN ALGAL BIOFERTILIZER TECHNOLOGY BY RICE GROWERS

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Rice is one of the most important food grains for about two-thirds of world population. In India, it occupies first place among all the food crops. But the productivity of rice was one of the lowest, the reasons being the inability of resource-poor Indian rice farmer to exploit fully the genetic potential of high yielding varieties. A fertilizer, being crucial but costly input, has been beyond the reach of an average Indian farmer. In this context, a bio-fertilizer called blue-green algae technology has been recommended for rice growers wherein natural biological fixation of nitrogen by blue-green algae would bring about a saving of 25 to 30 kg N per hectare per crop season bringing in the much needed succor to the poor farmers.

The major emphasis of agricultural development as it is today is on the transfer of technology to the farmers and getting it accepted and adopted by the farmers. Adoption of innovation involves the farmer's capacity to acquire and understand information about the technology and his ability to translate his knowledge into action. Technology cannot be divorced from its social context, and is unlikely to have an independent determinative role to play in the success of social change (Johny *et al*, 1981). Since adoption of innovation depends partly upon the nature of innovation itself, partly on the prevailing situational factors, and partly on the socio-psychological and economic characteristics of farmers among whom the innovation is introduced. With this broad view in mind, a study was planned to study the adoption behaviour of farmers with respect to blue-green algae technology, with the following specific objectives :

1. To study the socio-psychological factors affecting the adoption of blue-green algae technology by farmers.
2. To predict the extent of adoption of farmers with respect to blue-green algae technology.

METHODOLOGY :

The study was conducted in Walajabad block of Chengelput district of Tamil Nadu, where the technology has been introduced and popularized. Thirty five adopter farmers, who were adopting the blue-green algae technology were purposively selected from a cluster of closely situated 14 villages in the block. Structured interview schedules were used to collect data. The dependent variable Extent of adoption of blue-green algae technology was operationally defines as the proportion of the total acreage of paddy crop under algal bio-fertilizer/blue-green algae to the total acreage of paddy crop expressed in percentage. Eight socio-personal variables, four socio-psychological variables, four communication variables, and seven attributes of innovation variables were the independent variables. Appropriate scales were used to collect data. The data so collected was analyzed and discussed for their prediction of adoption behaviour. Correlation analysis was done to determine the association between the socio-economic, psychological characteristics of respondent with the level of adoption of blue-green algae technology. Regression analysis was done to assess the contribution of independent variables in the prediction of extent of adoption of blue-green algae technology.

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RESULTS AND DISCUSSION :

1. Extent of adoption of blue-green algae technology among farmers : The adopter farmers were those who had grown algal biofertilizers in their own field or brought algal cultures from seed depot and were applying them in their paddy fields. Based on the extent of adoption, farmers can be classified into three categories: low adopters, medium adopters and high level adopters. High level adopters are those who had algalized their land holdings in full. Medium and low level adopters applied blue-green algae inoculum in only a part of their land holdings. The distribution of the farmers on the extent of adoption is presented in Table 1.

Table 1. Distribution of adopter farmers on the scores of extent of adoption

Category	Large farm holders (n=8)	Medium farmers (n=19)	Small farmers (n=8)
Low adoption (0-33)		2 (10.52)	-
Medium adoption (34-66)	4 (50.00)	7 (36.84)	2 (25.00)
High adoption (67-100)	4 (50.00)	10 (52.63)	6 (75.00)

It can be seen from the data that a large percentage of farmers in all the three groups had algalized their paddy fields completely, while a considerable percentage of farmers had achieved medium level of adoption. This means that the farmers were found have understood the beneficial effects of using blue-green algal biofertilizers in their paddy fields.

2. Factors affecting extent of adoption of blue-green algae technology among farmers : The possible association of selected relevant independent variables with the extent of adoption of algal biofertilizer technology were put to empirical testing, using a correlation analysis and the results are presented in Table 2.

Table 2. Correlation analysis between extent of adoption of algal biofertilizer technology and the independent variable of the study

Independent variables	Coefficient of correlation
1. Age	0.0664
2. Education	0.0826
3. Family type	0.0322
4. Family size	0.1296
5. Farm size	-0.2297
6. Fertilizer 'N' use	-0.2921
7. Intensity of cropping	0.4417**
8. Irrigation potentiality	0.4772**
9. Attitude towards algal biofertilizer technology	0.5872**
10. Knowledge of algal biofertilizer technology	0.5915**
11. Risk orientation	0.5163**
12. Innovation proneness	0.5599**
13. Mass media exposure	0.5404**
14. Change agent contact	0.7024**
15. Exposure to demonstration	0.5700**
16. Exposure to training	0.5444**
17. Simplicity – complexity	0.3556*
18. Compatibility	0.4706**
19. Observability	0.4726**
20. Triability	0.4454**
21. Cost of innovation	0.3551*
22. Profitability	0.2676
23. Labour and time requirement	0.1322

The results clearly indicate that about fifteen variables were significantly and positively associated with the extent of adoption. All the socio-psychological variables–attitude and knowledge of algal biofertilizer technology, risk orientation and innovative proneness have been found to be positively associated with the extent of adoption. Thereby meaning that farmers, who are generally innovation-prone and possess a degr0ee of risk orientation and those who had developed a positive disposition and adequate knowledge of the algal technology, were adopting the technology. These findings are supported by the studies of Shukla (1980) and Gowda (1980). Similarly the association of all the communication variables with extent of adoption indicate that the proper communication efforts, if taken up would yield tangible and positive results in promoting algal technology among rice growers. These findings were supported by Sharma and Nair (1974), Gowda (1980) and Shukla (1980). Among the technology

attribute variables, observability, triability, compatibility, cost of innovation an simplicity-complexity were found to be associated (supported by Sharma and Nair, 1974) with extent of adoption of algal biofertilizer technology. This clearly bring out the key features of the technology itself into forefront–that the blue-green algae technology is simple, cheap, compatible to wet rice fields, easy to try, and with easy to observe results. Indeed the farmers have understood the true attributes of this simple technology, which has been reflected in their extent of adoption. In addition, farmers' irrigation potentiality (Shukla, 1980) and intensity of cropping (Gowda, 1980) significantly influenced their adoption behaviour of farmers.

3. Prediction of extent of adoption of blue-green algae technology among farmers : The correlation analysis would merely give an idea about the possible association of selected relevant independent variables with the extent of adoption. But in order to assess the contribution of each independent variable to the prediction of the extent of adoption of blue-green algae technology, the data were subjected to regression analysis. The extent of adoption was regressed with the following sets of independent variables:

1. All selected independent variables
2. Some related socio-personal variables
3. Some selected communication variables
4. Some selected socio-psychological variables
5. Some selected variables regarding perception of attributes of innovation
6. Some selected variables for final prediction

In the first set, all the selected variables were fitted in the multiple regression equation, the results of which were presented in Table 3. It may be seen from the data in Table that all the selected variables explained to the extent of 78.86 percent of variation in the extent of adoption of the algal biofertilizer technology by farmers. 'F' ratio was found to be significant. The statistical analysis thus indicated that all the selected independent variables taken together explained a highly significant amount of variation in the adoption behaviour of farmers. Out of all the selected variables fitted in the multiple regression analysis, only one variable–the change agent contact contributed significantly to the prediction of behaviour of farmers.

Table 3. Multiple regression analysis of extent of adoption of algal biofertilizer technology with all selected independent variables

Independent variables	Partial 'b'	't' value
1. Age	-0.2016	-0.4395
2. Education	-4.7184	-1.0899
3. Family type	-11.5676	-0.9214
4. Family size	11.9513	0.9355
5. Intensity of cropping	4.8607	0.2240
6. Irrigation potentiality	5.9011	0.5284
7. Attitude towards BGA technology	-1.8824	-1.1730
8. Knowledge of BGA technology	-0.1231	-0.1606
9. Risk orientation	1.2192	0.4313
10. Innovation proneness	1.1435	0.1993
11. Mass media exposure	-4.4867	1.2494
12. Change agent contact	6.2901	2.4205*
13. Exposure to demonstration	11.5110	0.8870
14. Exposure to training	13.7551	0.9915
15. Simplicity – complexity	1.4883	1.1267
16. Compatibility	-0.5201	-0.4381
17. Observability	1.8604	1.1249
18. Triability	-0.6436	-0.5372
19. Profitability	1.5113	0.9891
20. Labour and time requirement	-0.6384	-0.5112

* Significant at 0.05 level of probability R2 = 0.7886F = 2.6117*

In the second set, some related socio-personal variables were fitted in the multiple regression equation, the results of which are given in Table 4. Here, only a small amount (38.84 per cent) of variation in the extent of adoption

of algal biofertilizer technology by rice growers was explained. The computed 'F' ratio was significant at 0.05 level of probability. Two variable–irrigation potentiality and fertilizer 'N' use were found to be contributing significantly to the prediction of adoption behaviour of farmers. The negative partial 'b' value of fertilizer 'N' use indicates that the reduction of 'N' fertilizer use by farmers in related to increasing adoption of blue-green algae technology by farmers.

Table 4. Multiple regression analysis of extent of adoption of algal biofertilizer technology with all selected socio-personal variables

Independent variables	Partial 'b'	't' value
1. Age	-0.3603	1.0131
2. Education	-2.4428	0.6677
3. Family type	3.9841	0.3548
4. Family size	3.9328	0.3412
5. Farm size	-0.2007	0.3271
6. Fertilizer 'N' use	-0.5058	-2.2345*
7. Irrigation potentiality	20.1207	2.9532**

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability R2 = 0.3884 F = 2.4494*

In the third set, some selected communication variables were fitted in the multiple regression analysis equation, the results of which are presented in Table 5. It is clearly seen from the data in Table 6 that a considerably high amount (58.10 percent) of variation in the extent of adoption of farmers was explained by the four communication variables. The computed 'F' ratio was significant at 0.01 level of probability. Out of the four communication variables, only one variable, viz., change agent contact, contributed significantly to the prediction of adoption behaviour of farmers.

In the fourth set, some selected socio-psychological variables were fitted in the multiple regression analysis equation, the results of which indicated that a considerable amount (44.58 percent) of variation in the extent of adoption of farmers was explained by the four socio-psychological variables. The computed 'F' ratio was significant at 0.01 level of probability. Out of the four socio-psychological variables, none of the variables contributed significantly to the prediction of adoption behaviour of farmers.

Table 5. Multiple regression analysis of extent of adoption of algal biofertilizer technology with all selected communication variables

Independent variables	Partial 'b'	't' value
1. Mass media exposure	-0.6105	0.3265
2. Change agent contact	3.2488	2.4235*
3. Exposure to demonstration	12.0459	1.3375
4. Exposure to training	11.1324	1.2822

* Significant at 0.05 level of probability, ** Significant at 0.01 level of probability, R2 = 0.5810, F = 10.4018*

In the fifth set, some selected variables concerning the perception of attributes of innovation were fitted in the multiple regression analysis equation, the results of which indicated that a considerable amount (43.17 percent) of variation in the extent of adoption of farmers was explained by the four socio-psychological variables. The computed 'F' ratio was significant at 0.01 level of probability. Out of the seven variables, none of them contributed significantly to the prediction of adoption behaviour of farmers.

4. Final prediction analysis : To determine the relative importance of the variable in the final prediction of the extent of adoption of algal biofertilizer technology, the independent variables were compared on the basis of the respective 'standard partial regression coefficients' or 'beta weights'. The respective beta weights for each of the variables in the regression equation are given in Table 6.

Table 6. Multiple regression analysis of extent of adoption of algal biofertilizer technology with all selected variables for final prediction

Independent variables	Partial 'b'	Beta weights	't' value
1. Change agent contact	3.1795	0.5564 (1)	4.0367**
2. Exposure to demonstration	16.8679	0.2840 (2)	2.0606*

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability R2 = 0.5527 F = 19.7621*

The two selected variables explained to the extent of 55.27 percent of variation in the extent of adoption of algal biofertilizer technology by farmers. The computed F ratio was significant at 2,32 degrees of freedom. It was significant at 0.01 level of probability. Of the two variables studied, change agent contact was found to be the most important in prediction of adoption behaviour of farmers with respect to adoption of blue-green algae technology is concerned. Exposure to demonstration was also found to be very important variable which contributes significantly to the prediction of adoption behaviour of farmers. These findings are supported by Shukla (1980).

CONCLUSION :

It can be concluded from the study that change agent contact and exposure to demonstration were the most important communication variables helpful in the prediction of adoption behaviour of rice growing farmers with respect to algal biofertilizer technology. The extension system need to be geared for using these two extension approaches–farm and home visits and demonstrations extensively as they would greatly impact the farmers' adoption behaviour. Farmers would believe and understand when they see the demonstrations of new technology and translate this into action and adoption when they interact frequently with the village level agricultural extension personnel.

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