Fishery Technology 50 (2013) : 191 - 195

Adoption of Improved Practices in Freshwater Fish Farming

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Abstract

The study was undertaken to know the extent of adoption of improved practices in freshwater fish farming in the state of Kerala and to find out the relationship between the socio-psychological and economic characteristics of freshwater fish farmers with the level of adoption. One hundred fish farmers from all the 14 districts of Kerala were selected using proportionate random sampling technique. Data were collected with the help of a structured interview schedule. The results showed that majority (70%) of the respondents had medium level of adoption. Maximum adoption was observed in the practices of stocking the pond with selected species, followed by acclimatization of the seeds. Least amount of adoption was noticed in the case of maintenance of dissolved oxygen followed by application of inorganic fertilizer. The variables *viz.*, information source utilization, social participation, marketing orientation and extension participation showed positive and significant association with level of adoption of the respondents, while risk orientation was negatively and significantly correlated. Twelve variables taken together for the multiple regression analysis explained 71% of variation in the adoption level. Out of the total 71% variations explained by the independent variables together, 70% was explained by the variables *viz.*, occupation, information source utilization, risk orientation, marketing orientation and extension participation.

Keywords: Technology, adoption, freshwater fish farming, information source utilization, marketing orientation

Received 16 March 2012; Revised 29 November 2012; Accepted 03 December 2012

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Introduction

Among the maritime states in India, Kerala occupies the foremost position in marine fish production accounting for about 21% of the total landings (Anon, 2009). But the decreasing trend in the marine fish production during the past three years resulted in an alarming situation and fisheries sector is constrained to seek alternative sources of supply so as to meet the requirement both for domestic and export market. The extensive inland fishery resources of the state offers greater scope for the development of freshwater aquaculture. 'The success of fish culture depends to a great extent on the adoption of proven new technologies evolved for the purpose of obtaining higher yields and returns' (Seenappa & Surendra, 1988). Different agencies both at state and central level are engaged in promoting fish culture in an eco-friendly and sustainable manner and in motivating the farmers to adopt the technology by offering subsidies and other economic incentives to them. In this context, the present study was undertaken to know the extent of adoption of improved practices by the fish farmers in freshwater fish farming and to find out the relationship between socio-psychological and economic characteristics of freshwater fish farmers with the extent of adoption.

Materials and Methods

The study was conducted among the freshwater fish farmers of Kerala. A group of 100 freshwater fish farmers from all the 14 districts of Kerala was selected using proportionate random sampling technique which constituted the sample for the present study. Based on judges' opinion, 16 practices in freshwater fish farming *viz.*, strengthening of dykes, draining and drying the field, removal of aquatic weeds, eradication of predatory and weed fishes, liming the pond, application of organic fertilizer, application of inorganic fertilizer, stocking

the pond with selected species, acclimatization, supplementary feeding based on biomass, maintenance of dissolved oxygen level, monitoring and control of PH, control of algal blooms, need based control of diseases and parasites, periodic assessment of growth and biomass, and harvesting the crop at most economic size were selected for studying the level of adoption of freshwater fish farmers. Adoption of each practice was measured on a three point continuum as fully adopted/ partially adopted / not adopted with the scores of two, one and zero respectively. The total score secured by an individual was the obtained adoption score. The adoption quotient was worked out for each respondent as given below.

$$\text{Adoption Quotient (A.Q)} = \frac{\text{Adoption score obtained by the respondent}}{\text{Maximum possible adoption score}} \times 100$$

$$\text{Overall adoption level} = \frac{\sum_{i=1}^{N} \text{A.Q}}{N}$$

A.Q = Adoption quotient for the i^{th} respondent

N = Total number of respondents

Results and Discussion

The average age of the farmers was 45 and 69% of them belonged to middle aged group. All the farmers were literate and have received education at or above primary level. Forty five percent of the respondents was engaged in farming and business. They belonged to medium experienced group (88%) and 42% of the fish farmers had annual income between Rs. 50 000 to Rs.1 00 000. Majority (72%) of them had medium land holdings. The respondents had medium level of information source utilization and 79% of them had no debt at all. They had medium level of risk orientation and social participation. Regarding marketing orientation and extension participation, most of them belonged to medium level category. The distribution of freshwater fish farmers according to their extent of adoption showed three categories *viz.*, low (39 and below), medium (40-70) and high (above 70).

The study revealed that majority (70%) of the respondents had medium level of adoption followed by high (16%) and low levels of adoption (14%) of improved practices in freshwater fish farming. The results are in confirmation with the findings of Kumaran (2001), Basawarajaiah et al. (2002) and Ranish et al. (2001). The mean adoption quotient of the freshwater farmers was 55.16 with a standard deviation of 15.63.

Table 1. Mean adoption scores of individual practices in freshwater fish farming

Improved practices	Mean adoption scores	Rank
Strengthening of dykes	1.44	V
Draining and drying the field	1.13	IX
Removal of aquatic weeds	1.42	VI
Eradication of predatory and weed fishes	0.95	XI
Liming the pond	1.27	VII
Application of organic fertilizer	1.27	VII
Application of inorganic fertilizer	0.35	XV
Stocking the pond with selected species	1.84	I
Acclimatization	1.64	II
Supplementary feeding based on biomass	1.48	IV
Maintenance of dissolved oxygen level	0.28	XVI
Monitoring and control of PH	0.81	XIII
Control of algal blooms	0.55	XIV
Need based control of diseases and parasites	0.88	XII
Periodic assessment of growth & biomass	1.01	X
Harvesting the crop at most economic size	1.61	III

Table 1. shows that maximum adoption was in stocking the pond with selected species followed by acclimatization. Least adoption was observed in the case of maintenance of dissolved oxygen followed by application of inorganic fertilizer. Among the given practices, the adoption score was above the mean value in the case of nine practices *viz.*, stocking the pond with selected species, acclimatization, harvesting the crop at most economic size, supplementary feeding based on bio-mass, strengthening of dykes, removal of aquatic weeds, liming the pond, application of organic fertilizer and draining and drying the field.

The correlation and regression coefficients showing the relationship between the extent of adoption of the respondents and twelve independent variables selected for the study are given in Table 2.

The variables *viz.,* age, education, occupation, experience, annual income, farm size and indebtedness of freshwater fish farmers indicated non-significant association with level of adoption of improved practices. Information source utilization, social participation, marketing orientation and extension participation showed positive and significant association with level of adoption of the respondents, while risk orientation was negatively and significantly correlated. Increased use of various types of information sources helped the respondents to gather more information from different sources, understand and evaluate the benefits, leading to better adoption of the technology. This is in conformity with the findings of Ashaletha (2000) and Naruka & Bangarva (2004). Similarly, social participation provides an opportunity for the respondents to interact with one another, exchange knowledge, ideas and experiences among themselves. This type of information output leads to dissemination of information about the technology to others and thereby increases the rate of adoption of different practices. This finding is in consonance with the findings of Jha & Jha (2003) and Naruka & Bangarva (2004). The negative and significant association of the variable, risk orientation with the level of adoption is at variance with the findings of Rao & Mathur (2002) and Jha & Jha (2003). Generally, people with more marketing orientation would be rational in nature, and enthusiastic to adopt more practices so as to secure more monetary returns. This is supported by the findings of Singh & Singh (1970). Participation in extension activities helps people to become exposed to the advantages of the innovative technology making them more confident in adopting the different practices recommended by experts and researchers. This is in conformity with the findings of Rao & Mathur (2002). The results of the multiple linear regression analysis showed that

Table 2. Correlation and Regression coefficients for the level of adoption of the freshwater fish farmers and independent variables (n=100)

Variables		Correlation coefficient	Regression coefficient	S.E. of 'b'	t value
X_1	Age	-0.062^{NS}	0.168	0.143	1.177
X_2	Education	0.077^{NS}	1.396	1.193	1.169
X_3	Occupation	-0.142^{NS}	-2.460	1.200	-2.049**
X_4	Experience	-0.176^{NS}	-0.337	0.284	-1.183
X_5	Annual income	0.124 ^{NS}	0.480	0.768	0.625
X_6	Farm size	0.005^{NS}	0.039	0.629	0.06
X_7	Information source utilization	0.341**	0.336	0.170	1.967
X_8	Indebtedness	-0.102^{NS}	1.265	1.380	0.916
X_9	Social participation	0.402**	0.345	0.689	0.501
X_{10}	Risk orientation	-0.239*	-0.565	0.197	-2.863**
X_{11}	Marketing orientation	0.259**	1.794	0.652	2.750**
X_{12}	Extension participation	0.737**	6.819	0.678	10.049**

R^2=0.7148; F=18.17079*; * Significant at 5% level; ** Significant at 1% level; NS: Non significant

Table 3. Step-wise regression analysis showing the final step with all the significant variables included in the study of the level of adoption of freshwater fish farmers

Variables		Partial regression coefficients	S.E. of 'b'	t value
X_3	Occupation	-2.104	0.994	-2.117**
X_7	Information source utilization	0.422	0.078	5.398**
X_{10}	Risk orientation	-0.646	0.182	-3.547**
X_{11}	Marketing orientation	1.506	0.606	2.486**
X_{12}	Extension participation	6.935	0.637	10.882**

R^2 =0.700; F=43.923*; * Significant at 5% level of probability; ** Significant at 1% level of probability

71% of the variation in the adoption of the freshwater fish farmers was due to 12 independent variables taken together (R^2 =0.7148). This variation was found to be significant as explained by F value. These results led to the conclusion that all the 12 variables of the respondent together play a major role in increasing the rate of adoption of the improved practices.

The regression equation is $Y_1 = 2.702 + 0.168\ X_1 + 1.396\ X_2 - 2.460\ X_3 - 0.337\ X_4 + 0.480\ X_5 + 0.039\ X_6 + 0.336\ X_7 + 1.265\ X_8 + 0.345\ X_9 - 0.565\ X_{10} + 1.794\ X_{11} + 6.819\ X_{12}$

The best fitting regression equation was obtained through the step-wise regression analysis, the results of which are given in Table 3.

Of the total variation of 71% explained by all the variables together, 70% was contributed by five variables namely, occupation (X_3), information source utilization (X_7), risk orientation (X_{10}), marketing orientation (X_{11}) and extension participation (X_{12}). The variation contributed by these five variables were significant as indicated by F value. The final regression equation is as follows.

$Y_1 = 18.4 - 2.104\ X_3 + 0.422\ X_7 - 0.646\ X_{10} + 1.506\ X_{11} + 6.935\ X_{12}$

The results showed that a unit increase in the occupation of freshwater farmers resulted in a decrease of 2.104 unit in the adoption of improved practices, other factors being kept constant. A unit increase in the information source utilization resulted in an increase of 0.422 unit of their adoption. Similarly, with a unit increase in risk orientation, their adoption would decrease by 0.646 unit and an increase of 1.506 and 6.935 unit in adoption would be brought by a unit increase in marketing orientation and extension participation respectively.

It is necessary to intensify the extension activities so as to motivate the farmers to adopt the practices *viz.*, maintenance of dissolved oxygen and application of inorganic fertilizer which would help in increasing the yield leading to better economic returns to the farmers. Research stations, extension agencies and NGOs can play a vital role in increasing the rate of adoption of different practices in an eco-friendly and sustainable manner so as to increase the production and productivity. While transferring or disseminating the technology, due consideration should be given to the variables such as information source utilization, social participation, marketing orientation and extension participation since all these had shown positive and significant association with level of adoption of the respondents.

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