TILAPIA (*OREOCHROMIS NILOTICUS*) PRODUCTION CONSTRAINTS IN BANGLADESH: A SOCIO-ECONOMIC PERSPECTIVE

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ABSTRACT

The purpose of this study was to identify underlying socioeconomic constraints to the adoption of tilapia culture and to formulate appropriate policy guidelines to promote this species in existing aquaculture systems. The overall goal was to promote and sustain tilapia production in Bangladesh and other South Asian countries. The specific objectives included identifying sets of constraints impeding tilapia production, formulating appropriate policy guidelines, and suggesting research priorities to promote tilapia in Bangladesh.

Farm households from five major tilapia growing areas (Mymensingh, Dhaka, Chittagong, Jessore, and Patuakhali) were evaluated by observational tours and in-depth discussion with relevant actors. A total of 30 households were selected from each study location. The interpretation of qualitative data was conducted by content analysis.

Tilapia producers' responses on tilapia adoption trends (TAT) were analyzed through correlation (Spearman's rho), which identified 17 major constraining factors. These were grouped into five major categories, including physical resources, technology, support services, market and financial, and environmental constraints. About 80 percent of variation in the negative trend for tilapia adoption was explained by limited availability of technical information, high seed price, poor seed quality, and difficult technology. All important variables from the regression fell within the upper 7 of the 17 ranked variables.

Limited availability of technical information was one of the major significant constraining factors of TAT. To address this problem, a public-private partnership is needed in extension activities. Strategically important private sectors, such as hatcheries, should become involved not only in improved seed supply but also in technology generation and dissemination.

INTRODUCTION

Over last few decades, Nile tilapia has become a dominant component of the fisheries sector in many Asian countries. In Bangladesh, the current stock of Nile tilapia was introduced by UNICEF in 1974, and later, in 1987 by the Bangladesh Fisheries Research Institute (BFRI), from Thailand (Gupta et al., 1992). Despite several attempts made by BFRI, Department of Fisheries (DOF) and Bangladesh Agricultural University (BAU) during last two decades, dissemination and adoption of this species has not expanded in the country. Routine field monitoring indicates that low performance in adoption of tilapia could be linked to a number of technical and socioeco-

nomic constraints. The purpose of this study was to identify the underlying socioeconomic constraints to adoption of tilapia as well as to formulate appropriate policy guidelines, in order to promote this species in existing aquaculture systems of the country.

The overall goal of the study was to promote and sustain tilapia production in Bangladesh and other South Asian countries. The specific objectives were to:

1) Identify specific sets of constraints impeding tilapia production; and

2) Formulate appropriate policy guidelines and suggest research priorities to promote tilapia in Bangladesh.

METHODS AND MATERIALS

In order to evaluate significant socioeconomic variables that constrain farmers from adopting tilapia culture, farm households were used as the primary source of data. Farm households from five major tilapia growing areas of the country were evaluated by observational tours and several levels of discussion with relevant actors. The locations included Mymensingh, Dhaka, Chittagong, Jessore, and Patuakhali. Data collection techniques included literature review, observational tours, key informant interviews, group discussions, and a questionnaire survey. A total of 30 households from each study location were surveyed.

The interpretation of qualitative data was carried out by content analysis. According to Holsti et al. (1968), content analysis is a technique for making inferences by systematically and objectively identifying specified characteristics of messages. Quantitative data were also analyzed using Statistical Package for Social Science (SPSS), Version 11.0, computer software. In addition to descriptive statistics, specific statistical tests such as correlation and multiple regression analysis were performed. For all statistics, alpha was set at 0.05.

RESULTS

Tilapia producers' response on tilapia adoption trends (TAT) was analyzed through correlation (Spearman's rho), which identified 17 major constraining factors. These were grouped into five major categories, including physical resources, technology, support services, market and financial, and environmental constraints (Table 1). Significantly correlated constraining factors that hampered TAT included difficult technology, poor quality seed, limited availability of technical information, lack of technical support, limited availability of seed and feed, low price of tilapia, high price of seed and feed, low economic return, and tilapia affecting other fish species and the environment.

These factors were taken as explanatory variables for a stepwise regression analysis. Among the four models obtained from stepwise regression, the fourth model produced the highest adjusted R^2, number of significant variables and appropriate sign of coefficients. About 80 percent of variation in tilapia adoption was explained by non-availability of technical information, high seed price, poor seed quality and difficult technology (Table 2). All of these variables were significant, indicating their negative contribution towards TAT. The remaining variables were excluded during stepwise regression based on non-significant contribution to improving the model. Physical resources and environmental factors did not pose constraints, whereas some variables related to technology, support services, and market and financial factors significantly constrained TAT.

A comparison of the variables that entered into the regression models with those ranked by respondents showed that all important variables from the regression fell within the upper half of the list of ranked variables (Table 3). All significant constraining variables chosen from selected regression models were also found within the upper 7 out of 17 variables.

A broad policy model is suggested (Figure 1) for relevant stakeholders to promote adoption of tilapia culture. The model consists of three basic conceptual components—awareness, access, and affordability (three 'A's), which are assumed to be interlinked in systemic patterns in order to facilitate adoption of innovation.

DISCUSSION

The research identified four key constraints to tilapia culture in Bangladesh; limited availability of technical information, high seed price, poor seed quality, and difficult technology. These constraints limit success of tilapia culture at present, and could serve as a basis for improved outreach or other activities to reverse apprehension about tilapia culture. None of the constraints were ecological or biological, although the difficult technology and the lack of technical information are based on known culture techniques for the species.

Besides public research and extension agencies, private hatcheries are important sources for technical support. However, the main objective of private hatcheries is to supply seed, not to generate and disseminate technology. Planned development of private hatcheries as technology generation and information resource centers would be useful in enhancing TAT. Arrangements should be made to strengthen private hatcheries through technical backstopping on innovations, to establish a functional linkage with research centers, and to make provisions for regular training. This should help develop private hatcheries not only as strong commercial centers for an assured quality and supply of seed but also as a technol-

ogy generation and information resource centers for the enhancement of TAT.

Limited availability of technical information was one of the significant constraining factors to TAT. To address this problem a paradigm shift in conventional extension is needed. This shift involves a public-private partnership in extension activities. Strategically important private sectors, such as private hatcheries, should become involved not only in seed supply but also in technology dissemination. This requires continuous technical training and budgetary provision to disseminate technology through hatcheries. Such provision will develop close ties between tilapia producers and hatcheries, and in this way avail technology to the larger public.

Poor quality seed was also identified as a significant constraining factor. Quality seed requires specialized knowledge, skill, equipment, and environment. Hence, clearly defined regulations should be formulated that facilitate and encourage establishment, production and distribution of high quality seed through private hatcheries.

Finally, difficult technology was identified as one of the significantly constraining factors in the model. This implies that technical information in extension materials needs simplification. It requires regular testing, updating, and production of extension materials with the users in mind. In addition, use of demonstration farms should be enhanced to facilitate farmer understanding of technology and culture skills.

The conceptual model for adoption includes three components—awareness, access, and affordability (three 'A's). Awareness implies allowing stakeholders to become optimally informed about the innovation so that they can participate in all stages of technology generation and dissemination. Appropriate extension tools, such as campaigns through mass media, group discussions, and field demonstrations, could be effective for this purpose. This process increases willingness of relevant farmers to try the innovation. However, trying an innovation largely depends on the scope of access of farmers to required components (popularly called technology packages). Failure in ensuring access may lead into critical dispute, because the offered package may fall beyond the means of stakeholders (particularly farmers), or may be too risky for investment, which is directly related to their level of affordability. A radical paradigm shift (in existing policy) would be needed to ascertain and meet the access and affordability of stakeholders in order to get an innovation adopted. Decentralization of research, extension, and support services, as well as strengthening of relevant public-private partnership, could make significant impact in this regard.

LITERATURE CITED

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Table 1. Correlation between constraining factors and TAT (n = 150).

Constraining Factor	Correlation Coefficient
I. Physical resource:	
1. Poor market	0.096
2. Lack of water body	0.097
II. Technology:	
1. Difficult technology	0.650**
2. Poor quality seed	0.759**
3. Poor quality feed	0.121
4. High disease prevalence	0.041
III. Support services:	
1. Non availability of technical information	0.859**
2. Lack of credit	0.051
3. Non availability of seed	0.780**
4. Non availability of feed	0.253**
5. Lack of technical support	0.750**
IV. Market and financial:	
1. Low price	0.190*
2. Low economic return	0.371**
3. High price of seed	0.836**
4. High price of feed	0.560**
V. Environmental:	
1.Affects other fish species	0.337**
2. Affects environment	0.193*

** Significant at 0.01 level
* Significant at 0.05 level

Table 2. Stepwise multiple regression output on constraining factors for TAT (n = 150).

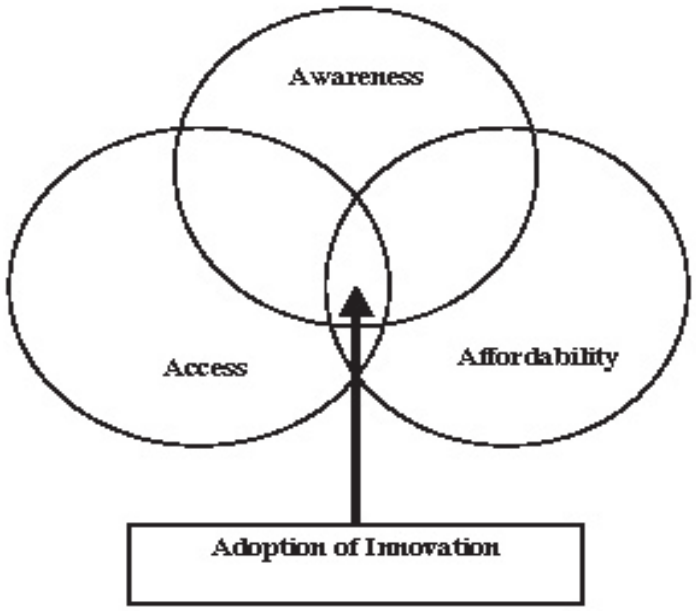
Model	Explanatory Variable	Coefficient	R^2	Adjusted R^2	F-value
1	Constant	1.070**	0.738	0.737	417.948**
	Non-availability of technical information	1.044**			
2	Constant	1.210**	0.788	0.785	273.162**
	Non-availability of technical information	0.647**			
	High seed price	584**			
3	Constant	1.263**	0.800	0.796	194.858**
	Non-availability of technical information	0.601**			
	High seed price	0.419**			
	Poor seed quality	0.272**			
4	Constant	1.269**	0.808	0.803	152.950**
	Non-availability of technical information	0.506**			
	High seed price	0.406**			
	Poor seed quality	0.277**			
	Difficult technology	0.179*			

** Significant at 0.01 confidence level
* Significant at 0.05 confidence level

Table 3. Tilapia adoption constraints ranking by respondents, calculated on a 0-1 ratio scale (n = 150). Figures in parentheses are weighted means.

Constraint	Rank Based on Weighted Mean
Lack of technical support	1 (0.72)
Poor quality seed	2 (0.71)
Non-availability of seed	3 (0.70)
High seed price	4 (0.67)
Non-availability of technical information	5 (0.64)
High feed price	6 (0.53)
Difficult technology	7 (0.47)
Affects other fish species	8 (0.34)
Lack of credit	9 (0.28)
Poor quality feed	10 (0.24)
Lack of water body	11 (0.15)
Low economic return	12 (0.14)
Non-availability of feed	13 (0.04)
Affects environment	14 (0.02)
Low tilapia price	15 (0.01)
Poor market of tilapia	16 (0.01)
High Disease prevalence	17 (0.01)

Figure 1. Policy Model.



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