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Adoption of scientific fish farming of Pengba (Osteobrama belangeri) by the fish farmers in the valleys of Manipur

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ABSTRACT

The present study examined the extent of adoption of scientific fish farming of Pengba (Osteobrama belangeri) by the fish farmers in the valleys of Manipur. Three districts viz., Bishnupur, Imphal West and Thoubal were purposively selected for the study. A sample size of 80 respondents was selected after consultation with Department of Fisheries, Government of Manipur and with the village key informants. Pre tested and structured interview schedule was administered for data collection. The study found that only 40.06 per cent of the respondents had fully adopted the scientific fish farming of Pengba. The variables such as experience in fisheries activities, knowledge level, family size, annual income and scientific orientation had significant and positive relationship with the extent of adoption of scientific fish farming of Pengba. This study also revealed that knowledge level, scientific orientation, annual income and family size were the best predictors to the total explained variation of 52.50 per cent to the extent of adoption of scientific fish farming of Pengba.

1. Introduction

Osteobrama belangeri (Val.) is the state fish of Manipur which is locally known as Pengba. Due to its taste and its association with the cultural heritage of the state, it has a great demand. The fish was once abundantly found in the Loktak lake of the state which is the largest fresh water lake in the North Eastern India. However, over the last 4 decades, its wild population has been drastically declining and can be hardly found in plains of Manipur. Loss of habitat after the the lake or in any other water bodies of central construction of Ithai barrage on the Imphal River for supply of water to the Loktak Hydro-Electric Project was one of the major causes for its decline from the natural habitat. Construction of the barrage possibly prevented the breeding migration of the fish from the southern parts of Manipur River, which finally drains into the Chindwin in Myanmar (Singh and Devi, 2012).

The stock of this species in India was regarded as "Endangered" (Menon, 2004). The decline in its population may be due to several other activities like degradation of habitats by human activities, pollution, construction of dams and introduction of non-native fish species etc. Induced breeding of Pengba was successfully achieved by Indian Council of Agricultural Research and other different fisheries organizations in the state. It is a herbivorous fish and is extensively cultured replacing grass carp in composite fish farming practices. Commercial-scale seed production of Pengba was achieved in captivity through induced breeding by using pituitary gland extract, Ovaprim, Ovatide and Wova-FH in the state (Behera *et al.,* 2015). As the breeding

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protocol for seed production is simple as well as cost-effective, it can be easily practiced by small and marginal farmers. Consequently, the technique is useful in conservation of the species and in encouraging commercial farming practice of the species throughout the country.

A scheme entitled "Mass Scale Production of State Fish Pengba" was executed in the state during 2015 –16 under Rashtriya Krishi Vikas Yojana (RKVY) by the Department of Fisheries, Government of Manipur, with the purpose of increasing the rate of Pengba fish production in the state. Under this scheme, a total amount of ₹27 lakhs was granted to 100 numbers of selected beneficiaries who were practising only Pengba fish farming (Annual Administrative Report, Government of Manipur 2016-17). Strong linkage mechanism among these stakeholders is required to properly disseminate information on scientific farming practices of Pengba and also to mitigate the constraints faced by these fish farmers. A major problem with Pengba is that it is more prone to ulcers and columnaris disease as compared to other carp species at higher stocking densities thereby causing growth reduction and mass mortalities (Behera *et al.,* 2015). Some of the serious problems faced by the fish farmers of Manipur are the unavailability of suitable, domestically available, cheap and well-balanced fish feed. Therefore, this study was deliberately conducted to assess the extent of adoption of scientific fish farming of Pengba by the fish farmers and to study relationship between socio economic and socio personal characteristics of the fish farmers and their extent of adoption of scientific fish farming of Pengba purposively selected based on the availability of higher concentration of Pengba farmers from the list of beneficiaries under the scheme entitled,

2. Methodology

The present study was conducted during 2017 in three districts of Manipur viz., Bishnupur, Imphal West and Thoubal. Ten villages were "Mass Scale Production of State Fish Pengba" with the consultation of Department of Fisheries, Government of Manipur and also through discussion with village key informants. The selected villages were: Hiyangthang and Uchiwa of Imphal West district; Lourembam, Pukhrambam, Toubul, Keinou, Moirang and Keirenphabi of Bishnupur district; Waithou and Wabagai of Thoubal district. A total of 80 respondents were selected from the villages wherein 33 respondents were from the list of beneficiaries and the remaining 47 respondents were selected with the help of the village key informants in such a way that all the other available Pengba farmers were identified. Socio economic and socio personal characteristics of the fish farmers viz., age, educational status, experience in fisheries activities, knowledge level, family size, information source exposure, annual income, mass media exposure, contact with extension agencies, scientific orientation, innovativeness and social participation status were selected as independent variables whereas extent of adoption of scientific fish farming of Pengba as dependent variable for the study. Statistical analysis such as frequency, percentage, mean, Spearman's rank correlation and stepwise multiple regression were performed.

The extent of adoption of scientific fish farming practices of Pengba was measured using the scale developed by Mohan *et al.*, 2003 with required modification in practices. The aforementioned scale consisted of 18 statements and that was administered on a 4 point continuum ranging from non adopters, partial adopters, low adopters, full adopters, for which the assigned scores were 1, 2, 3 and 4 respectively. Thus, the maximum possible score for a respondent to attain could be 72 and the minimum could be 18. After building good rapport with the respondents, the primary data were collected from the selected respondents by using constructed and pre-tested structured interview schedule. To determine the domain of scientific practice as perceived by the Pengba farmers, adoption index on the basis of adoption score was computed for all the 18 practices using the following formula:

$$\text{Adoption Index} = \frac{\text{Total score obtained in a particular practice}}{\text{Maximum obtainable score in that practice}} \times 100$$

Overall adoption index was calculated by the following formula:

$$\text{Overall Adoption index} = \frac{\text{Adoption score obtained combining all the practices}}{\text{Maximum obtainable score combining all the practices}} \times 100$$

3. Results and discussions

3.1. Assessment of the extent of adoption of scientific fish farming of Pengba by the fish farmers

A high proportion (98.75%) of the respondents fully adopted the practice of using excavated pond for Pengba farming followed by control of aquatic weed fish (67.50%); control of aquatic insects and aquatic weeds (67.50%); use of lime during pond preparation (72.50%); use of seeds from known and reliable source (71.25%); acclimatization of fish seeds before stocking (86.25%); practice of mixed farming with other compatible fish species (76.25%); stocking appropriate number of fish seeds (61.25%) and pond drying after completion of a crop (96.25%). Practices such as periodical application of cow dung or any other organic manure (47.50%); application of inorganic fertilizers (63.75%) and regular sampling for monitoring growth and health of fish (53.75%) had low level of adoption by the fish farmers Practices which were not adopted by the respondents are as follows: construction of pond with inlet and outlet facilities (32.50%); initial soil and water testing (97.50%); treatment of intake water (98.75%); supplementary feeding using commercially available formulated feed (90.00%); regular monitoring of water quality parameters (50.00%) and use of commercial health promoting supplements/probiotics (97.50%).

The study also revealed that 40.06 per cent of the respondents adopted all the scientific fish farming practices of Pengba enlisted for the study followed by 14.33 per cent and 12.17 per cent of the respondents who had partial and low level of adoption respectively. However, 28.16 per cent of the respondents did not adopt any of the scientific fish farming practices of Pengba (Table 1).

It was also found that out of the 18 scientific fish farming practices, 12 practices were found to have above 50 per cent of level of adoption by the fish farmers. Among these 12 practices, the practices which were majorly adopted by the fish farmers are: use of excavated pond; pond drying after completion of a crop; acclimatization of fish seeds before stocking; practice of mixed farming with other compatible fish species; use of seeds from known and reliable source; stocking appropriate number of fish seeds with the level of adoption 99.69 per cent, 99.06 per cent, 95.31 per cent, 94.06 per cent, 92.5 per cent and 90.31 per cent respectively. Practices like control of aquatic weed fish; control of aquatic insects and aquatic weeds; use of lime during pond preparation; construction of pond with inlet and outlet facilities; periodical application of cow dungor any other organic manure; regular sampling for monitoring growth and health of fish also had above 50 per cent level of adoption with 88.12 per cent, 88.12 per cent, 84.69 per cent, 60 per cent, 58.75 per cent and 58.44 per cent respectively. However, the level of adoptin was significantly poor in case of practices such as regular monitoring of water quality parameters (47.19%); application of inorganic fertilizers (46.87%); supplementary feeding using commercially available formulated feed (32.50%); use of commercial health promoting supplements/probiotics (26.87%); initial soil and water testing (25.94%) and treatment of intake water (25.62%). Consequently, the overall adoption index of the practices by all the respondents was found to be only 67.45 per cent.

3.2. Relationship between socio economic and socio personal characteristics of the fish farmers and their extent of adoption of scientific fish farming of Pengba

It could be observed from Table 2 that experience in fisheries activities, knowledge level, family size, annual income and scientific orientation had shown significant and positive relationship with the extent of adoption of scientific fish farming of Pengba by the fish farmers. The remaining variables had shown non-significant relationship with the extent of adoption of scientific fish farming of Pengba by the fish farmers.

It could be concluded that the extent of adoption of scientific fish farming of Pengba by the fish farmers was very much influenced by experience in fisheries activities, knowledge level, family size, annual income and scientific orientation. The findings in connection with knowledge level and scientific orientation are in accordance with the findings of Talukdar and Sontaki, 2005 and the findings with respect to annual income and family size are supported by the study of Goswami *et al.,* 2010 and Wetengere, 2009. Therefore, the socio economic and socio personal characteristics of fish farmers play a significant role in the adoption of scientific fish farming of Pengba and this finding is in accordance with the study of Okunlola *et al.,* 2011.

Table 1. Extent of adoption of scientific fish farming of Pengba by the fish farmers (n=80)

Sl. No.	Improved Practices	Non Adopters		Low Adopters		Partial Adopters		Full Adopters		Maximum obtainable score	Obtained score	Adoption index (%)
		No.	%	No.	%	No.	%	No.	%			
1.	Use of excavated pond.	---	---	---	---	1	1.25	79	98.75	320	319	99.69
2.	Constructed pond with inlet and outlet facilities.	26	32.50	17	21.25	16	20	21	26.25	320	192	60
3.	Initial soil and water testing.	78	97.5	1	1.25	1	1.25	---	---	320	83	25.94
4.	Control of aquatic weed fish.	1	1.25	7	8.75	18	22.5	54	67.5	320	282	88.12
5.	Control of aquatic insects and weeds.	4	5	4	5	18	22.5	54	67.5	320	282	88.12
6.	Use of lime during pond preparation.	8	10	11	13.75	3	3.75	58	72.5	320	271	84.69
7.	Treatment of intake water.	79	98.75	---	---	1	1.25	---	---	320	82	25.62
8.	Periodical application of cow dung or any other organic manure.	11	13.75	38	47.5	23	28.75	8	10	320	188	58.75
9.	Application of inorganic fertilizers.	21	26.25	51	63.75	5	6.25	3	3.75	320	150	46.87
10.	Use of seeds from known and reliable source.	---	---	1	1.25	22	27.5	57	71.25	320	296	92.5
11.	Acclimatization of fish seeds before stocking.	2	2.50	---	---	9	11.25	69	86.25	320	305	95.31
12.	Practice of mixed farming with other compatible fish species.	---	---	---	---	19	23.75	61	76.25	320	301	94.06
13.	Stocking appropriate no. of fish seeds.	---	---	---	---	31	38.75	49	61.25	320	289	90.31
14.	Supplementary feeding using commercially available formulated feed.	72	90.00	---	---	---	---	8	10	320	104	32.5
15.	Regular monitoring of water quality parameters.	40	50.00	12	15	25	31.25	3	3.75	320	151	47.19
16.	Use of commercial health promoting supplements/probiotics.	78	97.50	---	---	---	---	2	2.5	320	86	26.87
17.	Regular sampling for monitoring growth and health of fish.	8	10	43	53.75	23	28.75	6	7.5	320	187	58.44
18.	Pond drying after completion of a crop.	---	---	---	---	3	3.75	77	96.25	320	317	99.06
Overall status			28.16		12.17		14.33		40.06	5760	3885	67.45

Table 2. Correlation coefficient between the extent of adoption of scientific fish farming of Pengba by the fish farmers and socio economic and socio personal characteristics of the fish farmers (n=80)

Variables	Correlation Coefficient
Age	0.185
Educational status	0.070
Experience in fisheries activities	0.445**
Knowledge level	0.545**
Family size	0.367**
Information source exposure	0.201
Annual income	0.369**
Training exposure on scientific aquaculture practices	-0.037
Mass media exposure	-0.030
Contact with extension agencies	-0.020
Scientific orientation	0.412**
Innovativeness	0.062
Social participation status	-0.186

(*- indicates significant at 5% level of significance)

In order to determine the accurate contribution of the variables, stepwise multiple regression analysis was performed and the findings are given in Table 3. The regression coefficient of four variables viz., knowledge level, scientific orientation, annual income and family size were found to have significant contribution to the extent of adoption of scientific fish farming of Pengba by the fish farmers at 5% level of significance. Despondently, the remaining variables had no significant contribution to the extent of adoption of scientific fish farming of Pengba. The R square value was found to be 0.525 and the corresponding F value was 20.709. This R square value indicated that the independent variables explained 52.50 per cent of total variation to the extent of adoption of scientific fish farming of Pengba by the fish farmers. Therefore, any variation in the extent of adoption of scientific fish farming of Pengba was predominantly due to the contribution of these four variables.

Table 3. Association between the extent of adoption of scientific fish farming of Pengba by the fish farmers and socio economic and socio personal characteristics of the fish farmers (n=80)

	Unstandardized Coefficients		Standardized Coefficients	t-value	Level of Significance
	B	Std. Error	Beta		
Constant	23.364	3.703		6.310	0.000
Knowledge level	0.068	0.021	0.293	3.301	0.001
Scientific orientation	0.615	0.158	0.333	3.897	0.000
Annual income	2.709	0.712	0.313	3.806	0.000
Family size	1.676	0.827	0.171	2.027	0.046
R Square = 0.525	Adjusted R Square = 0.499			F= 20.709	

This study concluded that very less number of the fish farmers had adopted scientific fish farming of Pengba. The Pengba farmers are carrying out the farming practice on their own experience as there is no recommended practice developed for Pengba faming till date. Extension agencies and line departments should make efforts to train the fish farmers, specifically on scientific Pengba farming practices by way of organising and conducting demonstration and training programmes. There is a need to provide information related to availability of fish seed source, fish feed and preventive measures for disease. This finding will form a knowledge base of information to different relevant stakeholders for improvement and development of Pengba farming thereby augmenting the production of the fish and increasing the rate of adoption of these practices by the fish farmers. Therefore, active and dedicated involvement of different stakeholders is essential not only to promote its farming practices but also to create awareness for its conservation.

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