

Original Research Article

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## Paddy-Cum-Fish Cultivation and the Challenges Face by the Farmers of Manipur, India

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### ABSTRACT

The study was carried out with an objective to study various socio-economic, socio-personal, socio-psychological and communication variables associated with paddy-cum-fish cultivation and the constraints perceived by the farmers in the low lying paddy fields of Kakching block in Thoubal district of Manipur. Purposive along with simple random sampling techniques were adopted for the study. Net Income and Income being the dependent variables of the study to explore the factors associated with the paddy-cum-fish farmers and seventeen causal variables were considered as the independent variables to establish the relation between the dependent one. In the present study, data were generated through a sample survey of farmers by personal interview method using pretested well-structured interview schedule and were processed into frequency, percentage, mean, standard deviation, coefficient of variation, correlation analysis, regression analysis, constraints etc. to draw conclusion the of the study. Random sampling was adopted for the selection of the respondents. Correlation analysis of the two dependent variables Net income and Income of the study revealed that out of the 17 variables, 12 and 13 independent variables were found to be significant respectively. The result of regression analysis on Net Income and Income revealed that out of 17 variables, 5 and 3 independent variables were found to be significant respectively. Constraints analysis revealed that non-availability of insurance when the crop failed, lack of knowledge of paddy-cum-fish practices and the irregular visit of extension worker/scientist were top in their respective 3 main relative constraints.

#### Keywords

Constraints, Correlation, Income, Net Income, Paddy-cum-Fish cultivation, Regression

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### Introduction

The Paddy-cum-fish cultivation can be practiced where paddy fields remain waterlogged for about 3 to 8 month throughout the year (Pullin *et al.*, 1989).

Farmers' income can be increased by providing more emphasis on low-cost technology and appropriate management practices of more effective extension to the poor people and securing their right of access of land control of resources, rather than

technical research (Edwards, 2002). Okoye (2004) reported that fundamental role in sustaining the livelihood of the rural poor in Asia is playing by the living aquatic resources. Rice-fish farming is an ancient practice in Asia (Rabbani *et al.*, 2004; Tasnoova *et al.*, 2008). Especially in the rain-fed agriculture system practicing subsistence farmers, integration of fish into the rice farming provides invaluable protein to them. More than one half of the animal protein available in many Asian countries is from fish. A unique agro-landscape in many countries across the world, particularly in Asian countries are created by the rice-fish system of cultivation. Such as China, Thailand, Philippines, India, Bangladesh and Indonesia (Lu and Li, 2006). (IDRC, 1998) reported that not only protein is available from the rice-fish culture but it also increases the actual rice yield (up to 10% in some cases) which provided extra income for the farmers. Putting into practice is relatively inexpensive and low-risk. (Saikia and Das, 2008) reported that rice-fish culture under either capture systems or culture systems in low-cost, sustainable practice. By using available local resources, traditional rice-fish culture can be turned into a low input self-supporting system if the appropriate location-specific refinement of packages of practices is achieved. (Ahmed and Luong-Van, 2009) reported integrated production of rice-fish culture can optimize resource use via the complementary utilization of land and irrigation water. In the rural areas of less developed countries in the tropics. It has the benefit of supplying rice as a source of carbohydrates and fish as a source of high-quality protein (Frei and Becker, 2005). Reduction of lower costs of the farmer's economic load and increases in their additional income from the sale of fish are obtained at the farm level as rice-fish integration reduces the use of fertilizers, pesticides and herbicides in the fields (Noorhosseini, 2010; Noorhosseini and

Radjabi, 2010; Ahmed and Garnett, 2011). Integrated rice-fish farming also provides higher rice yields and fetches a higher gross margin than a sole rice cropping system (Das *et al.*, 2002). Various new modern farming techniques of the rice-fish system are still lacking in the most practical area of rural sectors of the world and need to be spread as soon as possible. Integrated rice-fish farming is ecologically sound has been suggested by many reports as fish improves soil fertility by increasing the availability of nitrogen and phosphorus (Rahman *et al.*, 2005; Ahmed *et al.*, 2011; Ahmed and Garnett, 2011). Practicing of fish in the paddy field is an ancient traditional farming practice found in numerous rice growing area of the world and as well as in the northeastern states of India. But due to the higher uses of organic fertilizer in the recent period in the paddy field survival and practice of fish in the paddy field become almost shattered. In a populous country like India, where the per capita availability of land and water resources is going down day by day, the need of the hour is a vertical growth in food grain production without endangering ecological assets. Therefore, integrated farming system along with fish can provide both food security and generate rural income to farmers and livelihood security to the rural workforce on an economically sustainable basis.

## **Materials and Methods**

This study was conducted in four practiced villages *viz.* Wabagai, Hiyanglam, Laphupat, Khoidum from the Thoubal District in Kakching block of Manipur. Simple random sampling techniques were adopted in selecting 120 farmers. The district, block, and villages were purposively selected for the study. It may be termed as multistage random sampling procedure. Net Income and Income of the farmers practicing paddy-cum-fish cultivation were taken up as the dependent variables. In

the context of the present study Net Income was defined as the income from an investment after deducting all expenditures from the gross income generated by the investment. Similarly, income was defined as the gross annual earnings from the mean agricultural products as well as by-products. The 17 selected independent variables were group on the basis of socio-economic (age, caste, house type, family type, material possession, family member, education, occupation), agro-economic (operation landholding, farm power, cost of input), socio-psychological (scientific orientation, and risk orientation) and extension-communication (social participation, mass media exposure, personal cosmopolite, personal localite) characteristic. The data were collected by personal interview with the help of pre-tested interview schedule. Problems faced by farmers in adopting paddy-cum-fish cultivation were divided into 3 main relative constraints and the farmers were asked to rank them. Statistical tools such as frequency, percentage, mean, standard deviation, coefficient of variation, correlation and regression analysis were used to draw the logical conclusion of the study.

## **Results and Discussion**

Table 1 presented the distribution of the 17 independent variables in terms of their mean, standard deviation, coefficient of variation and the ranks of their consistency for the paddy-cum-fish farmers. The independent variables exhibited highly consistent behaviour. The variables as ranked according of their consistency were scientific orientation (0.09%), caste (0.14%), age (0.15%), risk orientation (0.16%), family member (0.19%), personal localite (0.21%), personal cosmopolite (0.23%), mass media exposure (0.25%), material possession (0.27%), house type (0.28%), family type (0.35%), occupation (0.41%), operational land holding (0.43%), social participation (0.45%), Cost on inputs

(0.45%), education (0.47%), farm power (0.59%) respectively. Table 2 highlights the correlation between 17 independent variables and the dependent variables. Correlation analysis between Net Income and other causal variables reported positively significant correlation in six socio-economic variables (caste, family type, material possession, family member, education, occupation), three agro-economic variables (operation landholding, farm power, cost of input), one socio-psychological variable (risk orientation) and one extension-communication variable (mass media exposure). Similarly 12 causal variables, 7 from socio-economic variable (caste, house type, family type, material possession, family member, education, occupation), 3 from agro-economic variable (operation landholding, farm power, cost of input), 1 from socio-psychological variable (risk orientation) and 2 from extension-communication variable (social participation, mass media exposure) showed positively significant correlation with Income. Family members had a negatively significant correlation with Net Income and Income respectively. It indicates that with the increase in the family member, there is higher expenditure and little surplus from the production as compared with the lower family member.

From table 3 it is clear that education, operation landholding, farm power, social participation, cost of input had a substantial effect on net income of farmers practicing paddy-cum-fish cultivation. From the table, a unit change in farm power had contributed to a proportion 0.273 unit change to the level of net income of the paddy-cum-fish cultivation farmers. Similarly, a unit change in education, operation landholding, social participation and cost of input will contribute a change in the level of net income of the paddy-cum-fish cultivation farmers by 0.158, 0.238, 0.273, 0.179 and 0.237 units respectively.

**Table.1** Descriptive distribution of the variables with reference to respondent profile (N=120)

Sl. No.	Variables	Range		Mean	Standard Deviation
		Min.	Max		
1	Age (X <sub>1</sub> )	34	64	47.43	7.06
2	Caste (X <sub>2</sub> )	3	4	3.58	0.50
3	Family Type (X <sub>3</sub> )	1	2	1.4	0.49
4	Family Member (X <sub>4</sub> )	1	2	1.85	0.36
5	Education (X <sub>5</sub> )	1	8	4.21	1.98
6	Occupation (X <sub>6</sub> )	1	7	4.18	1.70
7	Operation Landholding (X <sub>7</sub> )	1	3	1.78	0.77
8	House Type (X <sub>8</sub> )	1	3	2.00	0.55
9	Farm Power (X <sub>9</sub> )	0	3	1.38	0.81
10	Material Possession (X <sub>10</sub> )	3	9	6.37	1.71
11	Social Participation (X <sub>11</sub> )	0	3	1.73	0.78
12	Mass Media Exposure (X <sub>12</sub> )	4	11	6.83	1.69
13	Personal Cosmopolite (X <sub>13</sub> )	4	9	6.60	1.50
14	Personal Localite (X <sub>14</sub> )	3	10	7.72	1.63
15	Cost of Input (X <sub>15</sub> )	14500	118200	56707.78	25563.22
16	Scientific Orientation (X <sub>16</sub> )	15	22	18.15	1.72
17	Risk Orientation (X <sub>17</sub> )	7	20	18.15	2.85
18	Net Income (Y <sub>1</sub> )	28800	185100	80857.23	37592.45
19	Income (Y <sub>2</sub> )	34000	280000	124829.6	61945.77

**Table.2** Coefficient of correlation of net income and income with 17 causal variables

Variables	Net Income (Y1) (r - value)	Income (Y2) (r - value)
Age (X <sub>1</sub> )	0.103	.008
Caste (X <sub>2</sub> )	.348**	.289**
Family Type (X <sub>3</sub> )	.402**	.427**
Family member (X <sub>4</sub> )	-.228*	-.259**
Education (X <sub>5</sub> )	.605**	.506**
Occupation (X <sub>6</sub> )	.721**	.596**
Operational Landholding (X <sub>7</sub> )	.874**	.774**
House Type (X <sub>8</sub> )	.167	.268**
Farm Power (X <sub>9</sub> )	.877**	.826**
Material Possession (X <sub>10</sub> )	.515**	.509**
Social Participation (X <sub>11</sub> )	.822**	.749**
Mass Media Exposure (X <sub>12</sub> )	.322**	.374**
Personal Cosmopolite (X <sub>13</sub> )	-.080	-.057
Personal Localite (X <sub>14</sub> )	-.050	.022
Cost of Input (X <sub>15</sub> )	.873**	.973**
Scientific orientation (X <sub>16</sub> )	-.119	-.048
Risk Orientation (X <sub>17</sub> )	.195*	.180*

**Table.3** Regression Co-efficient of net income of farmers with other causal variables

Variables	B-Value	Standard Error	t- value	β Value
Age (X <sub>1</sub> )	362.750	185.857	1.952	.068
Caste (X <sub>2</sub> )	-379.569	2496.178	-.152	-.005
Family Type (X <sub>3</sub> )	-2092.916	3012.015	-.695	-.027
Family member (X <sub>4</sub> )	1582.032	3518.390	.450	.015
Education (X <sub>5</sub> )	2986.353	678.248	4.403**	.158
Occupation (X <sub>6</sub> )	1174.477	874.385	1.343	.053
Operational Landholding (X <sub>7</sub> )	11627.930	2599.277	4.474**	.238
House Type (X <sub>8</sub> )	-1123.382	2476.842	-.454	-0.016
Farm Power (X <sub>9</sub> )	12637.217	2395.563	5.275**	0.273
Material Possession (X <sub>10</sub> )	278.163	713.071	.390	0.013
Social Participation (X <sub>11</sub> )	8675.535	2190.789	3.960**	0.179
Mass Media Exposure (X <sub>12</sub> )	320.764	715.900	.448	0.014
Personal Cosmopolite (X <sub>13</sub> )	-1154.246	811.551	-1.422	-0.046
Personal Localite (X <sub>14</sub> )	1356.806	702.661	1.931	0.059
Cost of Input (X <sub>15</sub> )	0.348	.094	3.709**	0.237
Scientific orientation (X <sub>16</sub> )	-4.752	731.307	-.006	0.000
Risk Orientation (X <sub>17</sub> )	-32.387	390.728	-.083	-0.002

R<sup>2</sup>=0.934, F=85.392\*\*; \*\* Regression is significant at 1% and \* regression is significant 5% level of significance.

**Table.4** Regression co-efficient of Income (Y2) of the farmers

Variables	B-Value	Standard Error	t Stat	Beta Value
Age (X <sub>1</sub> )	-148.49	239.15	-.621	-.017
Caste (X <sub>2</sub> )	2307.44	3211.95	.718	.018
Family Type (X <sub>3</sub> )	-2009.29	3875.70	-.518	-.016
Family member (X <sub>4</sub> )	4480.06	4527.27	.990	.026
Education (X <sub>5</sub> )	-46.28	872.73	-.053	-.001
Occupation (X <sub>6</sub> )	-1319.61	1125.11	-1.173	-.036
Operational Landholding (X <sub>7</sub> )	4508.91	3344.61	1.348	.056
House Type (X <sub>8</sub> )	1734.52	3187.07	.544	.015
Farm Power (X <sub>9</sub> )	6254.13	3082.48	2.029*	.082
Material Possession (X <sub>10</sub> )	-2326.66	917.54	-2.536*	-.064
Social Participation (X <sub>11</sub> )	5114.40	2818.99	1.814	.064
Mass Media Exposure (X <sub>12</sub> )	-960.23	921.18	-1.042	-.026
Personal Cosmopolite (X <sub>13</sub> )	-960.23	1044.26	-.395	-.010
Personal Localite (X <sub>14</sub> )	386.93	904.15	.428	.010
Cost of Input (X <sub>15</sub> )	2.18	0.121	18.021**	.898
Scientific orientation (X <sub>16</sub> )	-200.92	941.01	-.214	-.006
Risk Orientation (X <sub>17</sub> )	-619.41	502.77	-1.232	-.028

R<sup>2</sup>=0.960, F=143.880\*\*; \*\* Regression is significant at 1% and \* regression is significant 5% level of significance.



**Table.5** Constraints perceived by the famers

<b>Paddy-cum-fish cultivated farmers</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Rank</b>
<b>ECONOMIC CONSTRAINTS</b>			
High cost of inputs	80	66.69	II
Lack of timely availability of fund for arranging inputs	75	62.50	III
Non-availability of insurance when crop fails	110	91.67	I
Lack of Market Intelligence	60	50.00	IV
<b>TECHNICAL CONSTRAINTS</b>			
Lack of knowledge of Paddy-cum-fish practices	50	41.67	I
Lack of on-availability fish feed	45	37.50	II
Problem of diseases in the Paddy-cum-fish cultivation	30	25.00	III
Lack of fertilizer	25	20.83	IV
<b>COMMUNICATION CONSTRAINTS</b>			
Irregular visit of extension worker/scientist and VLWs	55	45.83	III
Inadequate demonstration of new technologies	67	55.83	I
Lack of mass-media contact	40	33.33	IV
Insufficient	63	52.50	II

The R<sup>2</sup> value is found 0.934, which is all casual variables put together, the amount of variation in the consequent variable has been the tune of 93.40 % and its F-value is 85.392 which is significant in both 5% and 1% level of significance at 119 degrees of freedom.

Table 4 shows the multiple regression analysis of Income. From table 4 it is clear that farm power, material possession, cost of input have the substantial effect on net income of paddy-cum-fish cultivation farmers. A unit change in the cost of input has contributed to the proportion of 0.898 units change to the income of the paddy-cum-fish cultivation farmers. Similarly, a unit change in farm power, material possession, cost of input will yield the change in the level of income of the farmers by 0.082, -0.064 and 0.898 respectively.

The R<sup>2</sup> value is found 0.960, which is all causal variables put together, the amount of variation in the consequent variable has been to the tune of 96 percent and it's F-value 143.88 which is significant in both 5% and 1% level of significance at 119 degrees of freedom.

From table 5 for constraints perceived, the result was studied from the frequency and percentage of each item was summaries and the constraints have been ranked according to the percentage. Economical constraints reveal that Non-availability of insurance when the crop fails has the highest frequency and lack of market intelligence as the lowest frequency of constraining from the respondents respectively as there is no support from the government and private sector for the cultivation policy. Technical constraints reveal that lack of knowledge of Paddy-cum-fish practices has the highest frequency and lack of fertilizer as the lowest frequency of constraining from the respondents respectively as the farmers are still using a primitive or traditional method of cultivation. Lastly, for communication constraints reveal that inadequate demonstration of new technologies has the highest frequency and lack of mass-media contact as the lowest frequency of constraining from the respondents respectively as the farmers face lack of government and private sector support for training and impartment of new knowledge to the farmers. With the increase in demand for fish consumption, there is a

need to increase production of fish in Manipur. This gives scope for the improvement of fish farming practices in Manipur so as to meet the growing demand of the population and to improve rural economy of the state. Integration of rice cultivation with fish farming enables optimum utilization of available local resources, by turning the practice into a low input self-supporting system if the appropriate location-specific refinement of packages of practices is achieved. Paddy-cum-fish cultivation is beneficial for the farmers of Manipur as integrated farming reduces the risk of separate cultivation of paddy and fish monoculture and generates more net income and income for the farmers with minimum input. Therefore both public and private organizations should put a thrust on identifying the innovative method of traditional fish farming practices and develop need-based and location specific and low-cost technology that will improve fish productivity and deliver sustainable development of the farming community in Manipur.

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