International Research Journal of Human Resources and Social Sciences
Vol. 4, Issue 1, January 2017 **Impact Factor- 5.414**
ISSN(O): (2349-4085) ISSN(P): (2394-4218)
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Website: www.aarf.asia Email : editor@aarf.asia , editoraarf@gmail.com

KNOWLEDGE STATUS OF FISH GROWERS TOWARDS SCIENTIFIC FISH FARMING IN WESTERN RAJASTHAN

P. Singh[1], Anoop Kumar[2] and J.P.Lakhera[3]
[1.]T.A., Agricultural Research Station, SKRAU, Bikaner 334006.
[2.] Senior Scientist cum Head, Krishi Vgyan Kendra- Sangariya, Hanumangarh.
[3.] Professor and Head of the Dept., College of Agriculture, Bikaner,SKRAU, Bikaner.

ABSTRACT

The study was conducted in agro-climatic zone 1b & 1c of western Rajasthan. Both the zone comprises six district, out of which two districts were purposively selected i.e.Hanumangarh & Bikaner districts. The study revealed that majority of the fish farmers (55.84%) had the medium level of knowledge regarding scientific fish culture practices. The highest extent of knowledge was observed in explaining name of three major Indian carp and exotic carp(86.67 %) and manure application in the fish pond (85.83%) and lowest knowledge was observed in recommended stocking rate in composite fish culture (21.67%). Majority of fish farmers were middle aged and in younger group category. Overall education level is medium that is, primary and middle schooling. Majority of fish growers possessed medium level of experience in fish farming, however, majority of farmers belonged to medium level of innovative proneness, risk orientation, economic motivation, progressiveness and value orientation. Most of the farmers belonged to low level of credit orientation and achievement motivation category. Most of the fish farmers exhibited medium level of mass media participation and linkage with extension agency while their cosmopoliteness was low. The path analysis indicated that innovative proneness was the most important variable in effecting the knowledge of fish farmers positively. It is necessary to increase innovative proneness, extension agency contact and mass media participation by the means of organizing awareness campaign, training field days, demonstrations, exhibitions, Kisan gosthi, kisan mela etc. enabling farmers to acquire latest knowledge on scientific fish culture practices.

Keywords: Fish farmers; scientific fish culture practices; Knowledge; Composite fish culture; Innovative proneness.

Introduction:- Fish has long been an important source of food for people all over the world. The importance of fish as a source of high quality, balanced and easily digestible proteins is well understood. The fish production of the country has increased eight times from 075 million tons in 1950 to over6.4 million tons at present. Aquaculture in India is seen as an attractive option for enhancing fish production at a stage when there has been stagnation of growth from open water fisheries. Fresh water aquaculture continues to contribute a giant share of over 95 per cent of the total aquaculture production in terms of quantity. This has increased the national average productivity from the ponds and tanks to the present level of 2200kg/ha, an over two folds growth in the last two decades (*Sagrangi and Jena, 2005*). A gamut of technologies over the years have largely contributed to such a vast growth in the sector.

In India, Rajasthan had been playing a significant role with regards to fish culture since time immemorial due to its vast inland aquatic resources. The present fish production is about 11.7 lakh tons but there is a scope to increase the production level. Low fish production in the state can be attributed to several reasons. However, knowledge of the fish farmers on scientific culture is the single largest known factor responsible for low fish production.

Knowledge about scientific fish culture plays a very important role in the adoption of scientific technologies. Knowledge is a component of the behavior of an individual. To improve the adoption of scientific fish culture under village conditions it is necessary to assess the knowledge of the fish farmers. This would form a base for the future extension efforts. Keeping these facts in view, the present investigation was carried out with the following objectives:

1. To measure the extent of knowledge on scientific fish culture practices of fish growers.
2. To study the socio-psycho and economic attributes of fish growers.
3. To find out the direct and indirect effects of selected independent variables on knowledge level of fish growers.

MATERIALS AND METHODS

The present study was carried out using *ex post facto* research design during2011-12 in the purposively selected Hanumangarh and Bikaner district of Rajasthan. A combination of purposive and systematic random sampling procedures was employed. These district were purposively selected as it has vast and diverse inland fishery and ponds resource ideally suited for taking up scientific fish culture. Among the eight development blocks, four blocks namely Pilibanga, Sangariya, Hanumangarh and Lunkaransar were selected for the study with the consideration of the preponderance of fish farmers among the population. From the eac selected panchayat samities, three villages were selected randomly. In total, twelve villages served as the representing unit for the study. A list of fish farmers was prepared in the selected villages hence, a total of 600 fish farmers in the selected villages formed the universe. Ten fish farmers from each village were selected by simple random sampling technique. A total 120 fish farmers constituted the sample for the study.

Knowledge was measured by using a teacher made knowledge test. In the knowledge test, there were 43 question. One score was assigned for each correct response. Thus maximum obtainable score of knowledge was 43, whereas minimum could be zero and extent of knowledge was calculated by the following formula.

Extent of knowledge- No. of correct response x 100

Total number of items

Based on a thorough review of relevant literature and discussion with the experts in the subject, a total of 23 independent variables having some bearing on the dependent variables were identified for inclusion in the study. These independent variables represented socio- personal, socio-economic, communicational, psychological and situational variables of the respondents and were empirically measured by procedures evolved for the purpose, and also by using scales and scoring procedures developed earlier. The data were collected with the help of structured and pre tested interview scheduled developed for this purpose from the respondents through personal interview. The data were tabulated and analyzed with the help of statistical tools like frequency, percentage, mean and standard deviation for categorization of

respondents in to low, medium and high categories. Path analysis was used to see direct and indirect effect on the knowledge of farmers on fish farming.

RESULTS AND DISCUSSION

The results presented in table -1 shows that Majority of fish farmers were middle aged and in younger group category. Overall education level is medium that is, primary and middle schooling level. Majority of fish farmers possessed low to medium level of experience in fish farming. Majority of fish farmers belonged to low social participation, medium land holding and high income group they may have other source of income, however Agriculture was an important primary occupation followed by fish culture. Majority of respondents perceived fish culture as secondary occupation. Whereas majority of the farmers belonged to general caste (55.84%). Majority of farmers belonged to medium level of innovative proneness, risk orientation, economic motivation, progressiveness and value orientation. Most of the farmers belonged to low level of credit orientation and achievement motivation respectively. Majority of fish farmers exhibited medium level of mass media participation, linkage extension agency while of their cosmopoliteness was low. Majority of ponds were medium sized medium in water holding and canal source of water. Most of the ponds were infested with weeds and the extent of weed infestation was moderate to high. In the present study knowledge was operationalised as the extent to which information is possessed by the respondents about the specific items of recommended scientific fish culture practices in the study area

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a) **Knowledge status of farmers regarding recommended scientific fish culture:**

The findings presented in table 2 reveals that out of 120 fish farmers, majority i.e. 67(55.84%) had medium level of knowledge whereas 30(25.0%) had low level of knowledge, followed by 23(19.16%) possessed high level of knowledge.

The above findings are in line with Mahendra Kumar(1996), Awasthi et al(2000) and Goswami & Samajdar (2011) who also reported that majority of fish farmers were having medium level of knowledge related to fish

culture practices. It is known fact that education is the basic requirement which widens the knowledge of an individual to expose him to various media and information sources. It can be interpreted from these figures that there is a scope to endow these respondents from medium knowledge category to high score category. Keeping in view the need to improve the fishermen's socio economic status, both the policy makers and extension functionaries should make effective use of various teaching methods like demonstration, field day, on- farm testing, exhibition, film show, educational tour, campaigns, farm clinic, seminar, workshop and information communication technology like radio, TV, different audio visual aids and internet etc. for raising the level of knowledge on different aspects of scientific fish culture together with marketing and cultural practices.

Table 1. Distribution of fish growers according to their of socio- personal, socio economic, exposure to mass media, psychological and situational attributes

S.no	Variable	Fish farmers		SD	Mean
		No.	%		
A.	***Socio- personal variable***				
1.	Age				
	Young (>30 year)	34	28.33	37.22	9.40
	Middle (31 to 45 year)	67	55.84		
	Old (46 year and<)	19	15.83		
2.	Caste				
	General	67	55.84		19.77
	OBC	42	5.98		
	ST/ SC	11	35.00		
			9.16		
3.	Education				
	Illiterate	5	04.16		4.08
	Can read and write	10	1.27		
	Primary school	30	08.33		
	Middle school	38	25.00		
	Secondary school	17	31.67		
	Higher secondary	11	14.17		
	Graduation	9	9.17		
			7.50		

4.	Experiences towards fish farming				
	Low (>2 years)	65	54.16		
	Medium (3 to 6 years)	43	35.84		3.81
	High (7 years and <)	12	1.26		
			10.0		
B.	***Socio- economic variables***				
5.	Occupation				
	Main occupation	59	49.17	49.25	
	Subsidiary occupation	12	10.0 0		48.12
	Fish farming	49	11.13		
			40.83		
6.	Annual income	29	24.20		
	Low income group Rs.0.21 lakh to Rs.0.50 lakh				
	Medium income Rs.0.51 lakh to Rs.1.00	30	25.00		38.45
	High income group Above Rs. 1.00 lakh	36	9.68		
		54	30.0		
			45.0		
7.	Size of land holding				
	low (up to 5 acres)	43	35.83		
	Medium (5 to 8 acres)	57	55.83		3.91
	High (More than 10 acres)	20	2.89		
			16.67		
8.	Social participation				
	Low social participation(score below 1.56)	55	45.84		
	Medium social participation (score between 1.57 to	47	39.16		2.95
	3.222)	18	1.85		
	High social participation (score above 3.22)		15.00		
9.	farm assets				
	No of fishing equipment low (score below - 1.049)	29	24.16		
	Having of fishing equipments medium (score btwn	67	56.84	4.45	2.92
	1.050 to 8.01)	24	20.00		
	High-(score above 8.01)				
C.	***Communication variables***				
10.	Mass media exposure				
	Low (score below 6.89)	45	37.50		
	Medium (score from 6.89 to 16.18)	51	42.50	9.96	4.14
	High (score above 16.18)	24	20.00		
11.	Linkage with Extension agencies				
	Low (score below 15.10)	32	26.67		
	Medium(score from 15.10 to 30.17)	67	55.89		21.71
	High (score above 30.17)	21	7.29		
			17.50		

12.	Cosmo politeness				
	Low(score below 9.17)	59	49.17		
	Medium(score between 9.18 to 15.77)	25	20.83		16.28
	High (score above 15.77)	36	5.79		
			30.00		
D.	***Psychological variable***				
13.	Innovative proneness				
	Low(score below 8.7)	36	30.0		
	Medium(score from 8.8 to 12.7)	50	41.67		9.8
	High(score above 12.7)	34	3.32		
			28.33		
14.	Credit orientation				
	Low(score below 0.443 to 1.10)	49	40.84		
	Medium(score from 1.11 to 1.73)	42	35.0	1.13	0.43
	High(score above 12.7)	29	24.16		
15.	Value orientation				
	Low(score below 0.95)	34	28.33		
	Medium(score from0.96 to 2.31)	56	46.67		1.17
	High(score above 2.31)	30	0.69		
			25.0		
16.	Risk orientation				
	Low(score below 30.38)	35	29.16		
	Medium(score from30.39 to 56.10)	61	50.84		38.07
	High(score above 56.10)	24	8.00		
			21.0		
17.	Economic motivation				
	Low(score below 12.04)	36	30.0		
	Medium(score from12.05 to 20.10)	49	40.84		18.54
	High(score above 20.10)	35	5.50		
			29.16		
18	Progressiveness				
	Low (score below 28.71)	33	27.50		
	Medium(score from28.72 to 54.33)	66	55.00		32.42
	High (score above 54.33)	21	12.48		
			17.50		
19.	Achievement motivation				
	Low (score below 2.50)	55	45.84		
	Medium(score from2.51 to 3.65)	39	32.50		3.36
	High (score above 3.65)	26	1.27		
			21.66		

E.	***Situational variable***			
20.	Size of water body/ Ponds			
	Low (score Up to 0.318 ha)	23	19.16	
	Med (score 0.319ha to 0.862 ha)	72	60.00	0.42. ha
	High score Above 0.862 ha)	25	0.31	
			20.84	
21.	Duration of water availability			
	Low (score below 1.21)	28	23.33	
	Medium(score from1.22 to 2.19)	52	43.34	1.63
	High (score above 2.19)	40	0.97	
			33.33	
22.	Source of water			
	Rain water Low (score below 1.0)	44	36.67	
	Canal Medium(score from1.1to 2.10)	60	50.0	1.09
	Other Sources High (score above 2.10)	16	0.71	
			13.33	
23	Extent of weed infestation			
	Low extent (score blow 1.29)	36	30.0	
	Moderate extent (score from 1.30to 2.10)	43	35.84	1.21
	High Low extent(score above 2.10)	41	0.92	
			34.16	

Table 2. Distribution of fish growers based on their level of knowledge towards scientific fish culture practices

(N=120)

Category	**No.**	**%**	**Mean**	**S.D.**
Low (score below 25.86)	30	25.00	38.07	10.92
Medium (score 25.86 to38.81)	67	55.84		
High (score Above 38.81)	23	19.16		

A) **Knowledge status of farmers regarding recommended scientific fish culture pre-stocking practices:**

Perusal of table-3 indicates a high majority of fish farmers having excellent knowledge level about use of manures in the fish culture ponds (85.83%) necessity of lime use in fish ponds (84.17%) Name of some common organic manures used in fish culture (82.50%) and suitable soil for fish culture (81.66%) respectively. However, it is clear from the tables that majority of fish farmers lacking correct information on items pertaining to minimum depth of water, nutrients required for production of fish food, advantages of using inorganic fertilizers, names of pesticides, application of mohua oil cake, method of eradication of predatory and weed fishes, the optimum size of harvesting, harvesting period and the necessity of checking growth. The table further reveals that only a few farmers had knowledge about correct feeding rate of supplementary feed (24.16%) and recommended stocking density of different fish species (21.67%).

Thus, it can be concluded that though fish farmers are aware of routine and general practices, they lack adequate knowledge on scientific fish farming. The reason may be low education, lack of adequate scientific curriculum in training programme and poor communication characteristics. More or less similar finding were reported by *Praveena (1993)* and *Goswami & Samajdar (2011)* with respect to rate of application of manures, fertilizers and diseases.. *However two third majority of the respondents possessed good knowledge regarding desirability predatory and weed fishes (77.50%) necessity to erad*icate excess aquatic weed (76.67%),names of predatory and weed fishes.

Name of predatory and weed *fishers (75.84%) and names of some aquatic weed (75.00%) respectively while more more than half of the respondents were found under the practices i.e. rate of application of cow dung initiate and subsequent dose's (62.50%),use of inorganic fertilizers in addition to organic manures in fish culture (61.67%) and correction acidic condition of pond water(58.34%) the knowledge level on varied issued were remedies for advantages of manuringin fish pond (57.50%) ,recommended doses of lime (54.17%)and aware about the nutrients required for production of natural food organism in fishpond(51.67%) respectively.*

B) Knowledge status of fish growers regarding stocking practice:

Perusal of table shows that a under this four practices were taken to measured

knowledge status of fish growers, table also reveals that 86.67percentrespondents were having excellent knowledge about name of most popular Indian major carp while 63.33 percent respondents were having acknowledge about the fastest growing major carp and exotic crop and 46.66 percent were fall farmers who had more extension agency contact would like to acquire more knowledge on scientific fish culture practices.

C) Status of fish growers regarding stocking common carp omnivorous practices.

Majority of the growers (75 .0%) possessed knowledge about type of fish growers in weed infested ponds. Whereas, more than half of the respondents were having knowledge about size of fish seed for stocking(58.33%) and the recommended species combination for composite fish raring (55.84%) respectively.

D) Knowledge regarding post stocking practices of fish farming.

The table further reveals that majority of the respondents (80.84%) having knowledge about the indicators of oxygen depletion in fish pond, while knowing the time of manuring after stocking knows the name of commonly used supplementary food and necessity of supplementary feeding with 77.50 ,75.84 and 74.16 percent of respondents respectively.

Further, the range of knowledge of fish farmers on different item was between 50 to 65 percent. The knowledge status on varied use us wee remedies for recommended manuring schedule to be practices after stocking (65.0%),necessary to stop manuring and feeling when water ponds turns greenish (61.67%) best method of feeding (54.16%)a necessary to check the growth after stocking (58.83%) control disease out breaks (50.00%) respectively.

Table 3. knowledge status of fish growers about recommended scientific fish culture practices.

S.no.	Practices	Responses (yes)	
		No.	%
A.	***Pre- stocking practices***		
1.	Good soil type for fish culture	98	81.66
2.	Minimum depth of water required for fish culture	28	23.34
3.	Nutrients required for production of natural fish food organisms in fish pond	62	51.66
4.	Use of lime in fish culture	101	84.17
5.	Correction in acidic condition of fish culture pond/ tank water	70	58.43

6.	Recommended dosage of lime used in general	65	54.17
7.	Use of manure in the fish culture ponds	103	85.83
8.	Advantages of manuring in fish pond	69	57.50
9.	Name of some common organic manures used in fish culture	99	82.50
10.	Rate of application of cow dung (including initial dose and subsequent monthly doses)	75	62.50
11.	Days interval in between manure application stocking of fish seed	35	29.17
12.	Use of inorganic fertilizers in adoption to organic manures in fish culture	74	61.67
13.	Advantages of using inorganic fertilizer	32	26.67
14.	Necessity to eradicate excess aquatic weeds	92	76.67
15.	Name some aquatic weeds	90	75.00
16.	Desirability of predatory and weed fishes	93	77.50
17.	Mention any two predatory and two weed fishes	91	75.84
18.	Manual method of eradication/ control of predatory and weed fishes	63	52.50
19.	Name any piscide used in fish culture	35	29.2
20.	Recommended dosage of mohua oil cake or bleaching powder/ G.Nut. oil cake	33	26.7
B.	***Stocking practices***		
21.	Name three Indian major carp and exotic carp	104	86.67
22.	Name three exotic carps	56	46.66
23.	The fastest growing major carp and exotic carp	76	63.33
24.	Catla and silver carp are surface feeders	42	35.00
	Rohu is a column feeder Mrigal feeds on bottom vegetation		
C.	***Common carp is omnivorous***		
25.	Type of fish grows in weed infested ponds	90	75.0
26.	Recommended rate stocking for irrigation tanks when CFC is practices	26	21.67
27.	The recommended species combination for composite fish raring	67	55.84
28.	The idea size of fish seed for stocking	70	58.33
D.	***Post stocking practices***		
29.	Necessity of supplementary feeding	89	74.16
30.	Name the commonly used supplementary feeds	91	75.84
31.	Best method of feeding	65	54.16
32.	Rate of supplementary feeding	29	24.16
33.	Time of manuring after stocking	93	77.50
34.	The recommended manuring schedule to be practices after stocking	78	65.00
35.	Indicators of oxygen depletion in fish pond	97	80.84
36.	Necessary to stop manuring and feeling when pond water turns greenish	74	61.67
37.	Name any fish disease that occurs in fish raring ponds	60	50.00
38.	Control disease outbreaks	54	45.00
39.	Necessary to check the growth after stocking	78	50.83
40.	In general, after how many months of stocking should the fish crop be harvested	42	35.00
41.	The optimum size of harvesting	40	33.33
42.	Knowledge about prohibited species or banned by Govt. of India	37	30.83
43.	Knowledge about common hatch of process	43	35.84

4 Path analysis: The path analysis presented in Table 4 indicated that innovative proneness was the most potent variable in effecting the knowledge of farmers positively. The directed effect (0.3643) of the variable was highest. Indirectly it was exerting its influence through mass media participation, extension agency contact and risk orientation. Incidentally this variable was being used by as many as ten variables in exercising their indirect influence, which indicate its significant role on knowledge. Next in order of importance was extension agency contact, which had 0.4263** correlation coefficient, 02277 direct effect and 0.2463. indirect effect on the knowledge of farmers. Its total indirect effect was channelized through mass media participation, innovative proneness and economic motivation. This variable in being utilized by nine variables to exert their indirect influence. It is quite to logic to assume that those

Mass media participation was positively correlated and contributing significantly to the variation in knowledge. Its direct effect (0.1246) and total indirect effect (0.2476) influence was found to be additive.

This showed that farmers who had more exposure to mass media such as radio, television, magazine newspaper Training and published literature etc. are likely to acquire more knowledge on scientific fish culture practices. Similar finding were also reported by Goswami(2011) with respect to knowledge of stocking practices among the fish farmer.

Table 4. path analysis of selected independent variables with knowledge of fish farmers towards scientific fish farming

Variables	Correlation coefficient	Direct effects	Rank	Total Indirect effect	Rank	Variables through which substantial indirect effect are channeled through		
						I	II	III
Socio- personal								
X5 Education	0.3156	0.1169	5	0.1959	12	0.1284(X15)	0.0899(X13)	0.0618(X12)
X6 Fish farming experiences	0.3285	0.1049	6	0.2248	11	0.1453(X13)	0.0468(X15)	0.0346(X14)
Socio- economic								
X8 Annual income	0.2405	0.0416	10	0.2379	10	0.1075(X15)	0.058(X12)	0.037(X13)
X9 land holding	0.2021	0.0425	9	0.2501	6	0.0704(X15)	0.042(X17)	0.037(X19)
X10 Social participation	0.2831	0.0437	8	0.2406	8	0.0775(X13)	0.095(X15)	0.065(X14)
Communication								
X12 Mass media participation	0.3771	0.1246	4	0.2476	7	0.0385(X13)	0.0217(X15)	0.002(X18)
X13 Extension agency contact	0.4262	0.2277	2	0.2463	9	0.1166(X12)	0.0597(X15)	0.00485(X19)
X14 Cosmo- politeness	0.4312	0.0529	7	0.4823	2	0.2390(X15)	0.1238(X13)	0.0582(X12)
Psychological								
X15 Innovative proneness	0.5166	0.3643	1	0.2849	5	0.1491(X12)	0.0534(X13)	0.0494(X18)
X17 Value orientation	0.4929	0.1799	3	0.3658	4	0.1943(X13)	0.1137(X12)	0.0597(X15)
X18 Risk orientation	0.5121	0.0235	12	0.4229	3	0.1270(X15)	0.0.0817(X12)	0.0549(X5)
X19 Economic motivation	0.4093	0.007	13	0.5004	1	0.2242(X18)	0.1370(X18)	0.0529(X10)
Situational								0.0264(X14)
X23 Extent of weed infestation	0.1903	0.038	11	0.1886	13	0.0676(X10)	0.0578(X10)	

CONCLUSION

On the whole it may be concluded that majority of the respondents of the study area were having medium level of knowledge on scientific fish culture. It is worth to increase innovative proneness, extension agency contact and mass media participation. Hence, it is suggested that technology dissemination system must focus on these variables by organizing awareness campaigns, fields days, demonstration, exhibitions, krishan gosti, kisan mela,radio conferencing and to contact call center etc. enabling farmers to acquire latest

knowledge on scientific fish culture practices. In order to improve the process of reorienting the fishery extension system and to provide technical and input support to the farmers to enhance knowledge, the authorities should arrange to formulate and monitor visit schedule of extension officials along with introduction of a system of evaluation at apex level.

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N. K. Sharma49@ rediffmail.com