Research Article

Status of Adoption of Improved Fish Production Technology in Rupandehi, Nepal

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Abstract

Aquaculture plays an important role to increase farm income and hence alleviate widespread poverty in the country. Fish is considered as the principal source of animal protein. The research was conducted to assess the status of adoption of improved fish production technologies in the Rupandehi, Nepal. The research was designed to ascertain the socio-demographic characteristics of the farmers, determine available technologies on fish production, determine awareness and adoption of the available technologies and identify the major problems faced by farmers in using improved fish production technologies. Purposive sampling procedure was used to select 100 respondents for the study. Data were analyzed using frequency count, percentages, standard deviation and indexing. The result shows that average age of the respondents was 39.8 years. Eighty percent respondents had post-secondary school certificate. Major sources of information of fish farming were trainings and information and communication technologies. Average pond size of respondents was 0.8 ha. Most of the respondents were aware of the technologies and adopted them. Indexing showed that High cost of fish feed was ranked as the major problem followed by high cost of fingerlings and inadequate capital in using improved fish production technology.

Keywords: adoption; fish production; fish farmers; improved technology and socio-demographics

Introduction

Aquaculture is the breeding and rearing of fish, shellfish, or plants in ponds, or any enclosure for direct harvest of the product, which is an area of activity growing rapidly (FAO, 2004). Aquaculture is an important food production sector in the world. Nepalese aquaculture is in growing stage and the amount of fish production is too low compared to the world aquaculture production; however, the progress achieved in recent years is highly encouraging (Mishra, 2015). Fish is acclaimed to be the principal source of animal protein for over one billion people globally as it is the cheapest source of animal protein, providing many important nutritional and health benefits (FAO, 2004).

In Nepal, fish demand as estimated by FAO, 2012 was about 62,500 tons at 2.3 kg per capita consumption. Fish production in Nepal is gradually increasing with a growth rate of 8-9% per year reaching 64,900 MT in year 2013/14, contributing 33.17% from capture fisheries and 66.83% from culture practices (DoFD, 2014) but this productivity lags far behind from neighboring countries. Aquaculture contributes to about 1.32 % of total GDP and about 4.22% of AGDP (DoFD, 2016).

The Agriculture Perspective Plan (APP) has categorized fisheries and aquaculture in Nepal as a small but important and promising sub-sector of agriculture. But performance of the fishery sub sector in Nepal is very poor as most clearly evidenced by low standard of living of the small scale fish farmers (FAO, 2004). To revamp this sub sector, government of Nepal has introduced and implemented numerous policies and programs aimed at empowering the small scale fish farmers to get out of the 'poverty trap'. This include dissemination of improved fish production technology such as adequate pond construction, water management, adequate stocking rate, use of nutritious and floating feed, and improved fish feed to the farmers (Ideba *et al.*, 2013). Despite the fact that fish farming account for the highest percentage of the Nepal's annual fish production output, fish workers are often among the poorest people and they generally operate small scale fishing units using traditional fishing practices. However, new technology and environmental requirements favor large scale capital intensive operation at the expense of traditional and small scale commercial fishing (Delgado *et al.*, 2003). Thus, it is of paramount importance to study the status of adoption of improved production technology of fish.

The research was designed to identify socio-demographic characteristics of the fish farmers, examine various technologies available to fish farmers, ascertain awareness of these technologies, assess sources of information on new technologies to fish farmers, examine production level of fish farmers and identify the constraints to adoption of the new technologies. The importance of this is to generate and provide information on the level of awareness and adoption of fish production technologies which can help technology developers and policy makers to take decisions concerning fish production in the area of study.

The main objective of the study is to know the status of adoption of improved fish production technology in the study area. The specific objectives of the study are to describe the socio-demographic characteristics of fish farmers in the study area, identify the types of improved fish production technology used by fish farmers and identify the problems faced by farmers to use improved fish production technology.

Materials and Methods

Study Area

Rupandehi is one of the Terai district in province no. 5 in Nepal. It is adjoining to Kapilvastu in the west, India in the south, Nawalparasi to east and Palpa in the northern part. Administratively, the district has 7 rural-municipalities and 6 Municipalities. Geographically, the district is spread ranging the altitude from 100m to 1229m. The temperature ranges from 37°C as maximum and 2°C as minimum having the annual average rainfall 1367mm. Mostly monsoon concentrate from June to middle of the September of the

year and little in winter rainfall. The district has 241587 hectare land of which 100,149 hectare is cultivable and remaining is covered by forest, watersheds and grazing land (DADO-RUP, 2017). The district has tropical and subtropical type of climate which is mostly hot and humid. Crop, fish and livestock based farming is the major means of rural livelihood in Rupandehi. Keeping cattle, buffalo, goat, pig, poultry and ducks are the major livestock integrated with crop production including fish farming as major in some communities of western part of the district (DADO-RUP, 2017). Rupandehi has one zone for fish and four blocks for two commodities: 1 for rice and 3 for fish and 60 pockets of various commodities.

Selection of the Study Area

The study was conducted in previous 8 VDCs of Rupandehi district namely Amuwa, Dayanagar, Dhamauli, Harnaiya, Kamhariya, Mainahiya, Manmateriya and Suryapura. On the present context of federalism, these 8 VDCs come under 4 Rural Municipalities namely Siyari, Suddhodhan, Mayadevi and Gaidahawa. It was well known region for aquaculture production and is considered as fish zone by Prime Minister Agriculture Modernization Project (PMAMP), Nepal. Aquaculture is the major agriculture activity of majority of the farmers in the district who are involved in aquaculture practices since last 30 years and more.

Sampling Procedure and Sample Size

The study was focused only on farmers who had adopted carp poly culture practices. At first, commercial fish farmers of the survey area having at least 0.2 ha pond water and having more than 3 years of fish farming experiences were identified and listed. For this, PMAMP zone survey report was analyzed and listed. The research site was visited and preliminary idea on improved fish production technology was developed. In this way, the sampling frame was identified.

Among the 720 farmers meeting above two criteria, 120 households (farmers/farms) were selected based on simple random sampling. For this, 40 households from Siyari, 30 from Shudhdodhan, 25 from Gaidahawa RM and 25 from Mayadevi RM were selected based on fish farmers' distribution in four RMs. In order to avoid the biasness in the selection of the sample, a simple random sampling technique was adopted as this provides an equal chance for a selection of the elements from the sampling frame (Scheaffer, 1979).

Instrument for Data Collection

The data collected for this study were obtained from primary and secondary sources. Primary data was collected from the field survey through the administration of pre tested semi-structured questionnaire which was used to solicit information from the respondents on issues related to objectives of the study.

Secondary data were collected from the various sources. PMAMP zone profile, district annual report, district profile, annual progress report and statistic book of DADO, Rupandehi, fish profile book of DADO, Rupandehi, various report from Ministry of Agriculture Development (MoAD), Central Bureau of Statistics (CBS), cooperatives, bulletins, books, publications from different governmental and non-governmental organizations, journals, proceedings of various NGOs and INGOs were the sources of secondary information for the study.

Data Analysis

Of the 120 questionnaires administered, 105 were retrieved and 5 were rejected for incompleteness. A total of 100 questionnaires were therefore available for analysis. Data obtained from the field were subjected to descriptive and inferential statistics. The descriptive statistics tools used were frequency counts, percentage, mean score and standard deviation. Indexing was used to rank the problems faced by respondents in using improved fish production technology.

Results and Discussions

Socio-Demographic Characteristics of Respondents

Results presented in Table 1 illustrate the socio-economic characteristics of fish farmers in Rupandehi, Nepal. The results showed that the mean age of respondents was 39.8 years. The implication is that the fish farmers in the study area are fairly young, and are expected to be active in fisheries activities, and constitute potential labor force for the fisheries enterprise in the study area. The mean age of farmers in Nepal is usually between 43-47 years (MoAD, 2015).

As revealed by Table 1, the majority (82%) of the farmers were male while only 18% were female. This implies that fish farming business is male dominated in the study area. This may be due to the high degree of human energy and physical exertion associated with farming activities, as it is evident from significantly low frequency of involvement of women in fish farming.

Table 1: Socio-economic characteristics of respondent fish farmers in study area, 2018

Variables	Frequency	Percent	Mean
1. Age (years)			
Less than 30	15	15	
30-40	40	40	
41-50	25	25	39.8
51-60	12	12	
More than 60	8	8	
2. Gender			
Male	82	82	
Female	18	18	
3. Education level			
Illiterate	8	8	
Primary level	12	12	
Secondary level	36	36	
Higher secondary level	37	37	
University level	7	7	
4. Fish farming experiences in yrs.			
Less than 5	9	9	
6 to 10	27	27	
11 to 15	42	42	
16 to 20	14	14	13.49
More than 20	8	8	
5. No. of fish farming trainings attended			
Not attended	57	57	
1 to 2 times	34	34	
3 to 4 times	6	6	0.89
More than 4 times	3	3	
6. Sources of information on fish farming			
Trainings	43	43	
ICT devices	27	27	
Government offices	22	22	
Fellow fish farmers	8	8	
7. Farm size in ha			
Greater than 1	32	32	
0.6 to 1	40	40	0.8
Less than 0.6	28	28	

Total number of fish farmers under survey is 100 for all variables.

Information furnished in Table 1 also revealed that the majority (80.0%) had attended secondary level or more education. This implies that fish farmers in the study area are educated and could be trusted to adopt any innovation that could enhance fish farming practices. Okunlola (2010) stated that educational level is one of the factors that influence adoption of new technology by farmers. The majority (42%) of respondents, had between 11–15 years in fish farming experience. The mean fish farming experience of respondents was 13.49 years. Of the 100 respondents, mean number of participants in training/seminars for fish farming was 0.89. The major source of information on fish farming was from trainings followed by information and communication technologies. The average landholding of the respondents was 1.37 hectares which was higher than the national average (0.68 hectare) (MoAD, 2015). Similarly, the average pond water under carp poly culture practice was found to be 0.80 hectare in the study area.

Types of Improved Fish Production Technology Used by The Respondents

Table 2 presents information on the types of improved fish farming technology used by respondents, ranked in ascending order of the percentage of respondents using such technology. The results revealed that 100% respondent farmers used liming and fertilization of pond, was the top rank; followed by provision of inlet and outlet in pond (96%), soil testing before site selection (93%), Aerated

containers for transporting fingerlings to reduce stress and mortality (90%), improved techniques in pond construction and maintenance (87%).The lowest ranks were techniques of hatchery and fingerling production (35%) and pellet feeding (20%).

Awareness and Adoption of Improved Fish Production Technology

From Table 3 below, respondents generally have high awareness about various technologies on fishing production. This ranges from pond site selection (75%), pond construction (85%), stocking of fish (72%), feeding (88%), pond maintenance (81%), harvesting of fish (70.0%) and post-harvest fish preservation (65%).

Respondents generally have high adoption of the technologies such as pond site selection (70%), pond construction (64%) and stocking of ponds (65%), feeding (72%), pond maintenance (80.0%), harvesting of fish (64%) and post-harvest fish preservation (55%). But respondents have low adoption in the transportation of fingerlings (40%) and pond installation (28%). Higher adoption of improved technology by respondents can account for higher annual income from their fishing enterprise. This implies that if farmers are aware and adopt relevant technologies, it can lead to high income from their farming enterprise. Hence agricultural technologies should be disseminated to farmers using as many channels as possible.

Table 2: Types of improved production technology adopted by respondent farmers of study area, 2018

Improved Fish Technology used	Frequency	Percentage	Percentage rank
1. Fertilization and liming of fish pond	100	100.0	I
2. Provision of inlet and outlet in pond	97	97.00	II
3. Soil testing before site selection	93	93.00	III
4. Aerated containers for transporting fingerlings to reduce stress and mortality	90	90.00	IV
5. Improved techniques in pond construction maintenance	87	87.00	V
6. Improved breeds of fingerlings	85	85.00	VI
7. Prevention and control of fish diseases	81	81.00	VII
8. Optimum stocking rate	75	75.00	VIII
9. Frequent change of water	71	71.00	IX
10. Techniques of improving water quality in fish culture	67	67.00	X
11. Daily sanitation and record-keeping practices	60	60.00	XI
12. Fish preservation and storage techniques	57	57.00	XII
13. Integrated fish farming for increased fish production	52	52.00	XIII
14. Regular sampling/sorting of fish	50	50.00	XIV
15. Techniques of hatchery and fingerling production	35	35.00	XV
16. Pellet feed	20	20.00	XVI

Total number of fish farmers under survey is 100 for all variables.

Table 3: Awareness and adoption of improved fish production technology by respondent farmers of study area, 2018

Technologies	Awareness of technology		Adoption of technology	
	Aware (%)	Not aware (%)	Adopted (%)	Not-adopted (%)
Pond site selection	75	25	70	30
Pond construction	85	15	64	36
Pond installation	61	39	28	72
Stocking of ponds	72	28	65	35
Feeding	88	12	72	28
Pond maintenance	81	19	80	20
Harvesting of fish	70	30	64	36
Post-harvest preservation of fish	65	35	55	45

Total number of fish farmers under survey is 100 for all variables.

Problems Ranking of Fish Farmers in Using Improved Fish Production Technology

Various problems were identified at the farm level through focused group discussion which can affect in using improved fish production technology and these problems were ranked based on farmers' responses towards those problems. Index value was obtained and ranking was done based on higher index value.

High cost of fish feed, High cost of fingerlings, inadequate capital, genetic erosion of fingerlings, water quality problems, Disease outbreak, Lack of technical knowledge and Water scarcity were ranked 1st, 2nd, 3rd, 4th, 5th, 6th,7th and 8th important problems faced by farmers to use improved fish production technology respectively as shown in Table 4.

Table 4: Ranking of problems of respondent farmers in using improved fish production technology in study area, 2018

Problems	Weightage	Index Value	Rank
Inadequate capital	8.9	0.089	III
Disease outbreak	5.2	0.052	VI
High cost of fish feed	11.3	0.113	I
Genetic erosion of fingerlings	7.1	0.071	IV
High cost of fingerlings	10.1	0.101	II
Water quality problems	6.4	0.064	V
Lack of technical knowledge	4.8	0.048	VII
Water scarcity	4.1	0.041	VIII

Conclusion

Fish farming is a viable option that can increase farm income and hence alleviate widespread poverty in the country if practiced by adopting the necessary technologies. Requirement of less time for its management and less expand of land, fish farming can be practiced by virtually everybody including the youths, house wives, working class and retirees. There is high level of awareness and adoption of improved fish production technologies in study area. High cost of fish feed, high cost of fingerlings and inadequate capital were the major problems faced by farmers in using improved fish production technology.

Recommendations

As much as possible, it is necessary to improve extension services to the farmers to facilitate the dissemination of research results and to inform farmers about the novel innovations to improved fish production practices. Information gaps need to be identified, and information and techniques that are already available in other area and culture system need to be applied in carp polyculture system. Governments at all levels should devote more attention and capital to fish farming in every geographical zones of the country in order to increase food production and hence food security in the country.

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