J. Aqua., **21** (2013): 37-42

WATER QUALITY MANAGEMENT IN IMPROVING FRESHWATER AQUACULTURE: INTERVENTIONS OF KVK-KHORDHA

B. K. Pati, P. R. Sahoo, P. N. Ananth*, A. K. Dash and P. Jayasankar[1]

KVK-Khordha, Central Institute of Freshwater Aquaculture, Bhubaneswar-751002, India
[1]Central Institute of Freshwater Aquaculture, Bhubaneswar-751002, India
**Corresponding author: pnananth37@yahoo.com*

Adoption of Scientific Management Practices (SMPs) is imperative for increasing production and productivity in fish farming. From pond preparation to harvesting fish, the Research and Development Institutions have disseminated technologies and techniques for the benefit of farmers and it is understood that adoption varies from farmer to farmer based on their capacity, willingness and the robustness of the practice. Among the different SMPs in fish farming, water quality management is one of the key practices that determine the success of fish farming. This study was conducted with the objective of assessing the advisory role of Krishi Vigyan Kendra (KVK)-Khordha in promoting water quality management practices through its soil and water testing laboratory. Twenty beneficiaries of the KVK from three districts of Odisha were selected for the study. The results indicated that majority of the farmers have never tested water samples before and tested for the first time at KVK. Further, the sources of information for testing water were found to be limited. The study also concluded that the major reason for testing water was towards understanding the manuring and fertilization schedule. Most of the farmers tested their water before stocking and also fully adopted the recommendations provided by KVK. The study suggests more intensive efforts by development agencies to organize different campaigns and use of the other extension methods to sensitize the adoption of water quality management practices with a larger impact.

INTRODUCTION

The Scientific Management Practices (SMPs) of fish farming aims at optimum utilization of pond productivity at different ecological niches by culturing together fast growing compatible species with complementary feeding habits in ponds under favorable conditions with enough food including supplementary feeding. In India, fish yields at experimental and onfarm trials have been reported as 8 t/ha/year and 5.5 t/ha/year, respectively making a gap of 2.5 t/ha/year. The actual farm average was 1.93 t/ha/year with a range of 0.3 to 9 t/ha/year making a gap of 3.57 t/ha/year from onfarm trial data (Katiha *et al.*, 2005). It is thus evident that there is enormous scope to increase the production through adoption of SMPs. Among the SMPs of fish farming, the farmers are well aware about maintaining quality of water for enhanced fish production. It is a fact

that fish solely depends upon water to breathe, feed to grow and reproduce; hence understanding the physical and chemical qualities of water is critical to successful aquaculture.

With such significance, water determines the success or failure of an aquaculture operation. Availability of appropriate services for soil and water testing facilities is one of the major constraints faced by farmers though they know the importance of testing pond soil and water. The study conducted by Balasubramaniam and Perumal (1990) inferred that testing of soil and water parameters before site selection was adopted by less than 50% of farmers. A study by Kumaran *et al.* (2003) recorded that 65% of respondents were not adopting soil and water parameter testing before construction of farm and during composite fish culture in Tamilnadu, whereas 57.5% of shrimp farmers adopted recommendations with regard to site selection.

The area under study, Khordha, Cuttack and Puri districts of Odisha state is bestowed with freshwater resources providing large scope for aquaculture development. Adoption of SMPs in fish farming has been promoted in the district by different agencies. However, there lies a gap in the adoption of water quality management practices among the farmers practicing aquaculture. Krishi Vigyan Kendra (KVK)-Khordha under Central institute of Freshwater Aquaculture (CIFA), Bhubaneswar is one of the key institutions that play a crucial role in the development of agriculture and allied sectors through demonstration of latest technologies and capacity building initiatives. The KVK is fully funded by Indian Council of Agricultural Research (ICAR) and mandated to work in Khordha district. Since inception, the KVK has promoted "Pond Water Quality Management" in improving scientific fish farming. During 2005, the KVK established a soil and water testing laboratory to cater the needs of farmers in Khordha district. The lab functions with the aim of providing appropriate recommendations through soil and water analysis for agriculture and aquaculture activities. The requests of majority farmers are towards testing water samples and providing recommendations for improving fish production by maintaining water quality parameters.

The KVK though mandated to work in Khordha district has extended its fisheries related activities to the neighboring districts *viz.*, Puri, Cuttack, Jajpur, Nayagarh, Jagatsinghpur and Kendrapara. On an average every year 252 samples are tested benefitting 161 farmers. The objective of this paper is to assess the extent of adoption and effectiveness of advisory services provided to the stakeholders by KVK-Khordha.

MATERIALS AND METHODS

Since the focus of the study was to find out the adoption and effectiveness of advisory services rendered to the fish farmers on pond water quality management by

KVK, it was considered essential to contact those fish farmers who were undertaking testing of water samples at KVK. The present study was conducted involving 20 fish farmers as respondents who were selected from 10 blocks of three districts *viz.*, Khordha, Puri and Cuttack of Odisha State. The 20 farmers were selected using simple random sampling technique. All the selected districts under study have abundant natural resources for providing livelihood for both rural and urban population. Agriculture plays a vital role in the economic development of these districts with animal husbandry as alternate income sources for the farming community in the district. Fisheries also serve as a major livelihood option of the rural communities due to the presence of freshwater resources. Data were obtained using a pre tested structured interview schedule and simple percentage analysis was used for interpretation. The present study was conducted in the year 2012-13.

RESULTS AND DISCUSSION

Profile of testing water

The results of the study indicated that majority of the beneficiaries (80%) never tested pond water before and used the services of KVK for the first time. The reasons for farmers not using the services of agencies like KVKs, line departments, Central Research Institutes and State Agricultural Universities of ICAR are due to lack of awareness about such services being provided by these agencies. This implied that institutions have to create awareness on usefulness of water testing. Intensive mass campaigns and other extension methods have to be initiated for creating awareness towards farmers to test pond water and adopt scientific management practices. Gopakumar *et al.* (1999) opined that aquaculture input availability to farmers must receive high priority and establishment of aquashops with facilities for soil and water testing, disease diagnosis and also availability of material inputs like fertilizers, feeds, medicines and literature at district level as well as block level will greatly accelerate the freshwater aquaculture activities. Bihari and Mishra (2001) indicated that information revolution would be helpful to enhance the adoption of latest technologies to increase both quantity and quality production.

Information sources play a major role for dissemination of SMPs in fish farming; unless the individual is exposed to the latest developments, progress cannot be much experienced. It was observed from the present study that the major sources of information regarding pond soil and water analysis were CIFA and KVK (Table 1). This indicated that there is a need for creating awareness through mass

Table 1. Sources of information

Source of Information	Percent
KVK	30
CIFA	55
Fisheries Extension Officers	10
Progressive farmers	5

campaign by other extension agencies on the theme "Pond soil and water testing". The state fisheries department that has a well-structured extension network, needs to address this problem. In these lines, the KVK also has to take steps in creating awareness on the availability of such advisory services through different extension methods. The results indicate that sources of information for the farmers about the services on pond soil and water testing needs to be intensified by the development actors in the district.

Perceived reasons for testing water

Major reasons cited by the beneficiaries for testing water were i) for determining the schedule of liming and manuring and, ii) for profitable fish culture/seed rearing in new ponds (Table 2). The results point out that the farmers have knowledge on the advantages of testing water and the reasons behind adopting such management practices. However, for promotion of this practice, there is a need to make them realize that adoption of water quality management practices also reduces the cost of inputs. Further, cost analysis on the reduction of such inputs *viz.*, feed, fertilizers and manuring needs to be well documented by the agencies and disseminated for further effective adoption.

Table 2. Reasons for testing water

Reasons for testing water	Percent
To know the liming and manuring schedule	50
To know about feed management	10
To have recommendation towards mortality of fish	05
For profitable fish culture/seed rearing in new ponds	35

Discontinuance in the adoption of innovations is a common feature amongst farmers and, the reasons are varied and mostly due to the issue of affordability. The same is factual in water testing practices by farmers. De and Saha (2005) reported that recommended level of inputs was not being applied with regard to adoption of different practices of scientific pond culture due to various socio-economic constraints. They also opined that extension link between farming community and the development agencies are rather weak. The present study observed that the frequency of testing water was once in a season by majority of the beneficiaries (Fig. 1). Agencies also have to take efforts to increase the frequency of farmers testing their water samples through sensitization.

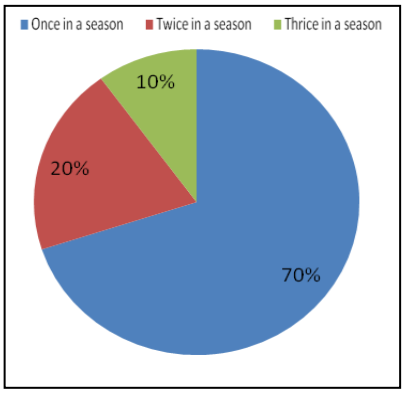

Fig. 1. Frequency of testing water

The study recorded that majority of the beneficiaries tested their water particularly before stocking (Table 3). As per the recommendations, farmers are required to test water during pond preparation, before stocking, during and after stocking. However, majority of the farmers get satisfied by testing water in a limited frequency. This implies that there is a need to advice farmers in keeping a close watch on water quality on all the phases of culture and to test water on observing any abnormality in fish health.

Table 3. Period of testing water

Stages	Percent
Pre-stocking	70
Stocking	5
Post stocking	25

Extent of adoption of recommendations

The recommendations provided by KVK upon testing water samples were either fully adopted or partially adopted by the beneficiaries (Table 4). The reasons for such partial adoption pattern by the farmers might be due to non-availability of adequate inputs to be used as per the recommendations, to lack of conviction on such recommendations or to financial constraints. Pradhan and Sarangi (1997) also opined that the recommended practices are adopted by the farmers in piecemeal or, adopted below or above the recommended levels. Gawde *et al.* (2006) indicated the reasons for partial adoption as unavailability of soil and water testing laboratory in nearby areas or, farmers were not in a position to purchase the soil and water testing kits due to high cost.

Table 4. Extent of adoption of recommendations

Extent of adopting the recommendations	Percent
Fully adopted	55
Partially adopted	45
Non-adopted	0

Perception towards the benefits of water testing

The perception of beneficiaries on the benefits of water testing were towards adopting proper manuring schedule, control of fish mortality and effective management of pond water quality (Table 5). The other responses recorded were satisfactory fish growth, enhancement in fish production and enhancement in fry/ fingerling survivability leading to higher profitability in fish culture (75%). These responses indicate that the farmers were benefitted with the recommendations provided by KVK. The perceived benefits claimed by them have been reflected at the end by the desired yield.

Table 5. Benefits of water testing

Benefits	Percent
Undertaking manuring schedule	85
Controlled fish mortality	70
Managing pond water quality effectively	65
Fish culture became profitable	75

CONCLUSION

The results of the present study highlighted the need of water management practices to be adopted for better fish production. Adoption of scientific management practices in farmer's point of view depends on the nature of practice and mostly on its affordability and accessibility. The present study revealed the importance of institutional support for water testing in improving aquaculture production. It is evident that KVK has to increase the awareness on pond water quality management through mass campaign and other extension methods for ensuring larger adoption of such practices. Developing prescription formats for easy understanding of recommendations and a system with the feedback of the recommendations should form parts of the adoption strategies. Finally, there is also a need for conducting regular impact studies of these services for improvement in the process.

REFERENCES

Balasubramanium, S. and G. Perumal, 1990. Adoption behaviour and impact of technology transfer among fish farmers. *Fish. Technol.*, **27**: 75-78.

Bihari, B and A. S. Mishra, 2001. Information Revolution in Indian Agriculture. *J. Agric. Ext. Manage.*, **II**: 62-69.

De, H. K and G. S. Saha, 2005. Semi-intensive carp culture - an adoption study. *Agric. Ext. Rev.*, **17**: 27-30.

Gawde, M. M., M. S. Chandge and M. M. Shirdhankar, 2006. Adoption of improved aquaculture practices by shrimp farmers in South Konkan Region, Maharastra, India. *J. Agric. Soc. Res.*, **6**: 1-8.

Gopakumar, K., S. Ayyappan, J. K. Jena, S. K. Sahoo, S. K. Sarkar, B. B. Satapathy and P. K. Nayak, 1999. National freshwater aquaculture development plan. Central Institute of Freshwater Aquaculture, Bhubaneswar, 75 pp.

Katiha, P. K., J. K. Jena, N. G. K. Pillai, C. Chakraborty and M. M. Dey, 2005. Inland aquaculture in India: past trend, present status and future prospects. *Aquacult. Econ. Manage.*, **9**: 237-264.

Kumaran, M., K. Ponnusamy and N. Kalaimani, 2003. Diffusion and adoption of shrimp farming technologies. *Aquacult. Asia*, **VIII**: 20-23.

Pradhan, C. S. and B. N. Sarangi, 1997. Adoption behavior of fish growers and factors associated with it. *J. Ext. Edu.*, **2**: 99-103.