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Aquaculture development through participation of rural women

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Abstract

Contrast to the depletion of marine fisheries, freshwater aquaculture is being progressed at a remarkable growth rate. Freshwater prawn culture, a profitable and remunerative business for the local fish farmers which can be adopted very easily at low cost and with little culture technologies. With growing demand for freshwater prawn, an emergent need is felt for its growth and culture in local ponds in rural villages. Aquaculture has an important role in the development of many national economies and plays a key role in rural development . Three WSHGs namely Maa Mangala, Dulla Dei and Gayatri of Prataprudrapur, Bolamara and Nagapur village respectively were selected from Balipatna Block, Khurda District, Odisha. They were doing composite fish farming along with mrigal in six G.P. ponds. All the six ponds were stocked with seed of *M. rosenbergii* with average weight 0.15gm at 1,000 nos/ pond along with carps *Labeo rohita* and *Catla catla* of size 5-7 g and 6 - 8g respectively, were stocked by the women farmers at 3,000 nos/ha. The selected WSHGs were provided hands on training on different management protocol which include pond preparation, liming, fertilization and stocking of seed. The results indicated that freshwater prawn culture along with rohu and catla gives encouraging production in both prawn and carps which convinced the women of the self-help groups. It may be an ideal example for other rural farmers to motivate them for adoption of this management practice with adequate training, infrastructure, marketing and financial credit.

Introduction

Aquaculture, also known as aqua farming, is the farming of aquatic organisms such as fish, crustaceans, molluscs and aquatic plants. Aquaculture involves cultivating freshwater and saltwater populations under controlled conditions. Aquaculture has an important role in the development of many national economies and plays a key role in rural development. Farmers in the Asia-Pacific Region contribute over 80 percent of the world's aquaculture production, with China producing 50 percent of global production (Edwards and Demaine, 1997).Contrast to the depletion of marine fisheries, freshwater aquaculture is being progressed at a remarkable growth rate. Freshwater prawn culture, a profitable and remunerative business for the local fish farmers, can be adopted very easily in order to generate employment and family income maintaining sustainability. Rural Odisha is endowed with diversified freshwater resources with immense potentialities for finfish and shellfish farming (Radheyshyam *et al* 2013). With growing demand for freshwater prawn, an emergent need is felt for its growth and culture in local ponds in rural villages. Human resource is one of the crucial inputs to implement the agricultural and allied activities, which are adequately available in rural area. Several self-help groups (women self helf groups as well as men self help groups) have been organized in the country to utilize their capability and strength by involving them in different group activities like agriculture, horticulture, animal husbandry, small business, art and craft, etc. In this regard, aquaculture is also playing a significant role in improving the socio-economic status of many such groups. Since, Odisha is having a plenty of water resource potentials for pisciculture, the state government is emphasizing on tapping these water resources for optimum utilization in pisciculture. The community based aquaculture is a subset of the rural aquaculture in which governance and management are community centric with the central role played by the community institutions. The typical nature of aquaculture in rural areas in scattered distributed manner is termed as rural aquaculture and it includes farming under traditional and extensive system to meet the needs of

small scale farming households, fitting the resources available (De and Saha, 1999; Edwards *et al*., 2002; Littlem, 2003, Radheyshyam *et al* 2009) Such system is characterised by locally based small scale farming, using extensive technology without government involvement. The Gram Panchayat ponds in the village are being leased out to the women self-help groups (WSHGs) on priority basis for a short term period (3 to 5 years) and the women are encouraged for pisciculture with provision of adequate technical input and capacity building. Many of the WSHGs are successfully implementing aqua-farming and their success stories may be of different kinds. Present success story deals with freshwater prawn culture by women self-help groups in Balipatna block of Khurda district, Odisha – a successful venture.

Background Information

The WSHGs in Balipatna block, Khurda district are usually doing composite fish culture (rohu, catla and mrigal) as a group activity. An innovative step was undertaken for alternative culture practice in which, freshwater prawn (*M. rosenbergii*) was introduced in place of mrigal. The culture practice was adopted from the DST sponsored project "Growth and production efficiency of three larger *Macrobrachium* species - *Macrobrachium rosenbergii*, *Macrobrachium malcolmsonii* & *Macrobrachium gangeticum* under mono and poly culture practices".

Materials and Methods

Three WSHGs namely Maa Mangala, Dulla Dei and Gayatri of Prataprudrapur, Bolamara and Nagapur village respectively were selected from Balipatna Block, Khurda District, Odisha. The WSHGs comprise of 15, 18 and 13 no of members with age group of 24-48 years. More than 80% of the members have agriculture as their main occupation and about 20% of the members depend on service for their household income. These three WSHGs diverted to pisciculture as their group activity from agriculture in 2009. They were doing composite fish farming along with mrigal in these six G.P. ponds. In Sept, 2010; DST project was implemented in these six ponds for adoption of prawn culture along with carps (rohu & catla). The size of the ponds were 0.18 & 0.16 ha (Cluster I adopted by Maa Mangala WSHG), 0.17 & 0.21 ha (Cluster – II, Dulla Dei WSHG) and 0.25 & 0.19 ha (Cluster – III, Gayatri WSHG). All the six ponds were stocked with seed of *M. rosenbergii* with average weight 0.15gm at 1,000 nos/ pond along with carps (rohu and catla). The carp fingerlings comprising of *Catla catla* and *Labeo rohita* of size 5-7 g and 6 - 8g respectively, were stocked by the women farmers at 3,000 nos/ha. Financial credit was provided to the WSHGs by the State Bank of India. The selected WSHGs were provided hands on training by CIFA on different management protocol which include pond preparation, liming, fertilization and stocking of seed, etc. The water quality parameters of ponds were monitored every month at CIFA. The growth rate was checked at periodic intervals (fortnightly). At the end of six months, final harvesting of prawns and carps were made after draining out the water from the pond in the month of February, 2011.

Results and Discussion

During culture, water temperature of the ponds varied from 28.2 to 30.1ºC, water pH was slightly alkaline in reaction, while other important parameters like dissolved oxygen (DO), total alkalinity, total hardness and dissolved ammonia (NH_3) were within the acceptable limits with very little variations (Table 1). Including major river systems in the Punjab and Bangladesh, has concentrated in recent times on achieving self-sufficiency in food grains through agricultural intensification and floodwater management. However, this has been at the expense of aquatic animal production, which has declined due to drying out of fish habitat and blocking of migration routes (Haylor and Bhutta, 1997; Barr and Haylor, 2001). Earlier studies on the ponds indicated that the village community ponds are characterised by anaerobic benthic sediments (Olah and Sinha, 1984; Olah et al., 1987; Kumar, 1992).Agricultural growth at the expense of fish production in rural development in societies where culture and food security are based on fish and rice. The average growth of *M. rosenbergii* was maximum at 65.85g in cluster - I followed by cluster - II (61.05g) and cluster – III (60.65g) from the initial stocking size of 0.15 g. On the other hand the survival in three clusters was 46%, 42.5% and 43% respectively. Expenditure on different heads in prawn culture with carp in six selected ponds is given at Table 2. From this activity WSHGs harvested 75kg, 78 kg and 84 kg of prawn, rohu 151kg, 90kg and 120 kg and catla 122 kg, 140 and 152kg in cluster I, II& III respectively. Prawn was sold in a range of 180 - 200 rupees and carp 65-70 rupees at local markets (Table 3). Sale price of prawn & carps varied from cluster to cluster. In cluster I, unit sale price of prawn was Rs. 200, higher than other two Clusters and quantity of rohu and catla produced were also more than these two Clusters I & II that has resulted in more Gross Income in Cluster I. Women form about 48% of the total population in India Radheyshyam (1997). About 78% of them are economically active and are engaged in agriculture and allied fields. Moreover, total expenditure was lower than these two Clusters, I & II, which has brought out highest net return on expenditure and ultimately lowest Cost Benefit ratio and highest Profitability Index. The vital role of small-scale yet widespread systems in family nutrition, food security and income generation, is now beginning to gain recognition (UNICEF, 1994; Gregory and Guttman, 1997; Ahmed et al., 1998; Haylor et al., 1999). Taking rural development in the lower Mekong basin as an example, 80 percent of the 60 million people living in rural areas are rice farmers with 1-2 ha plots and a per capita income of US$186-400; rice and aquatic resources from paddies and nearby wetlands are the basis of their food security.

Table 1: Mean water quality parameters in three clusters of village ponds

Parameters	Cluster I		Cluster II		Cluster III	
	Range	Mean	Range	Mean	Range	Mean
Temp.	28.2-30.1	29.09	28.3-29.9	29.1	28.3-30.1	28.9
pH	7.2-7.6	7.3	6.9-7.8	7.3	7.1-7.8	7.39
DO	5.3-6.6	4.9	5.8-6.4	5.12	5.8-6.4	6.2
Total alkalinity	135-160	146.9	130-140	135.8	122-143	133.8
Total hardness	120-135	126.8	120-140	129.3	120-140	128
Ammonia	0.01-0.06	0.022	0.03-0.07	0.039	0.03-0.08	0.046

Table 2: Economics of prawn (*M.rosenbergii*) with carp (Rohu + Catla) culture

Sl. No.	Expenditure head	Rate	Cluster I	Cluster II	Cluster III	Total
i.	Lease value (₹/ha/yr)	5000	1700	1900	2200	5800
ii.	**Pond Preparation**					
	Diesel(₹/litre)	47	188	116	235	539
	Bleaching powder (₹/kg)	10	306	342	396	1044
	Lime (₹/kg)	12	1020	1368	1320	3708
iii.	**Manure & Fertilizer**					
	*Cow dung (₹/tonne)	5000	340	380	440	1160
	Urea (₹/kg)	9	184	205	238	627
iv.	**Seed Prawn**					
	(*M.rosenbergii*) (₹/PL)	0.5	1040	1040	1040	3120
	Carp (Rohu + Catla) (₹/ fingerling)	1	1020	1140	1320	3480
v.	**Feed**					
	GNOC (₹/kg)	25	6375	9500	11000	26875
	Rice bran (₹/kg)	7	1700	2660	3080	7440
vi.	Miscellaneous (labour charge for netting only) **	120	1440	1440	1560	4440
vii.	Subtotal (₹)		15313	20091	22829	58233
viii.	Interest on finance (12% per annum for 6 months) (₹)		900	1200	1320	3420
ix.	Total (₹)		16213	21291	24149	61653

Cow dung was used from their own village ** Liming, stocking, feeding, manuring and watch & ward by the members themselves

Table 3: Gross return and net income from sale of prawn and carp

Sl. No	Item	Cluster I			Cluster II			Cluster III		
		Prawn	Rohu	Catla	Prawn	Rohu	Catla	Prawn	Rohu	Catla
i.	Quantity produced (kg)	75	151	122	78	90	140	84	120	152
ii.	Unit sale price (₹/kg)	200	65	65	180	70	70	195	65	65
iii.	Sale price (₹)	15000	9815	7930	14040	6300	9800	16380	7800	9880
iv.	Gross income (₹)	32745			30140			34060		
v.	Total expenditure (₹)	16213			21291			24149		
vi.	Net income(₹) (iv-v)	16532			8849			9911		
vii.	Net return on expenditure (%)	101.97			41.56			41.04		
viii.	Profitability index	1.02			0.42			0.41		
ix.	Cost benefit ratio (C:B)	0.98			2.41			2.44		

Conclusion

The results indicated that freshwater prawn culture along with rohu and catla gives encouraging production in both prawn and carps which convinced the women of the self-help groups. Although the ponds used were seasonal with water level varying from 0.8-1.2 meter during culture period, the achievement in production has drawn the attention of local farmers for adoption of freshwater prawn culture along with rohu and catla. It may be an ideal example for other rural farmers to motivate them for adoption of this management practice with adequate training, infrastructure, marketing and financial credit.

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