

## Utilization of Harvested Rain Water in Short Duration Fish Culture

D. Sarma, S. Borthakur, K. K. Borua,  
M. P. Dutta, B. Phukan

Received 20 April 2016 ; Accepted 18 May 2016 ; Published online 15 June 2016

**Abstract** An experiment was conducted in farmer's rain fed ponds with yearlings of IMC. The experiment was shorter in duration (90 days) aiming to produce small sized fish popularly known as Hotel sized fish. The catla showed overall faster growth followed by rohu and mrigal at 20,000 no./ha stocking density. The overall fish production in 90 days was 1229 kg which was calculated to be 3,368 kg/ha. The value is higher than the state and national average fish production per ha per year. The BCR value was 1.02 which shows that the short duration fish culture with rain fed water is a profitable venture.

**Keywords** Rain fed ponds, Short duration, Hotel sized fish, Yearlings.

### Introduction

Assam has an excellent sub-tropical climate for development of fresh water fish culture in a variety of aquatic bodies but aquaculture activities in Assam are in subsistent level and monsoon dependent. Due to smaller sized fish pond of the state, majority of fish pond cannot hold water to its optimum level

needed for fish culture activities and the shortage of water becomes more severe during the non monsoon months. Further low temperature prevailing during non-rainy months affect negatively on the fish pond productivity and slows down the growth of fish which eventually lead to shorter fish growing period of about 5–6 months as against the national level fish culture technology [1]. In Assam although the fish culture can be started from the month of March due to rise of environmental temperature, the same cannot be initiated due to lack of adequate quantity of water in the fish ponds. The fish farmers need to wait till the month of May / June, the months when monsoon begins in this part of the country. This results in waste of almost three valuable months, causing overall low fish production per unit area. Further the excessive rain during monsoon months also causes severe problems to the fish farmers Rain water harvest and its subsequent use can be become an alternative option to fill up the ponds in February and starts the fish culture thereafter.

With this concept an experiment was conducted in the farmers field of Roumari village of Nagaon district, Assam in 2012 to observe whether collected rain water could be utilized to grow fish in short duration.

### Materials and Methods

The experiment was conducted in the fish pond of a farmer of Roumari village, Nagaon, Assam in 2012. The rain and flood water was initially collected in

---

D. Sarma, S. Borthakur, K. K. Borua, M. P. Dutta\*,  
B. Phukan  
College of Fisheries, Assam Agricultural University, Raha,  
Assam, India  
e-mail: duttax@gmail.com  
\*Correspondence

**Table 1.** Details of pond treatments, species and stocking densities.

Ex-periment	Stoc-king Densi-ties (fish/m <sup>2</sup> )	Species reared	Num-ber of fish	Av initial body weight (g)
P-I	2	<i>C. catla</i> ,	960	72.40±0.08
		<i>L. rohita</i>	1200	48.5 ±0.06
		<i>C. mrigala</i>	240	38.00±0.06
P-II	2	<i>C. catla</i>	960	69.20±0.04
		<i>L. rohita</i>	1200	45.00±0.08
		<i>C. mrigala</i>	240	39.50±0.06
P-III	2	<i>C. catla</i>	960	72.40±0.08
		<i>L. rohita</i>	1200	48.5 ±0.06
		<i>C. mrigala</i>	240	38.00±0.06

almost one hectare fish pond of the farmer. The fish pond was initially renovated and bundhs and dykes were strengthened. The water of the collected pond was primarily used for boro rice cultivation.

The present experiment was conducted in three equal sized ponds (P-I, P-II and P-III) having water spread area of 0.12 ha. Lime was used @ 800 kg/ha and fertilizers mixture consisted of raw cow dung, mustard oil cake and single superphosphate @ 0.20 kg/m<sup>3</sup>, 0.025 kg/m<sup>3</sup> and 0.03 kg/m<sup>3</sup> respectively were used to increase the plankton population. Before application the fertilizer components were mixed properly in a container and soaked in water for three days. After filling the fish ponds to a water depth of 1.5 m

with water drawn from the storage tank the fertilizer mixture was broadcasted over the ponds. The lime and fertilizer application were repeated in every ten days interval during the experiment period of 90 days. The ponds were stocked with yearlings of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* @ 20,000 no./ha and at the ratio of 4 : 5 : 1 (Table 1).

During the experimental period the stocked fish were fed with a mixture of rice bran and mustard oil cake (6 : 4) fortified with 2% vitamin-mineral mixture. The fish were fed @ 2% body weight and the daily measured quantities of feeds were fed twice daily. Feeds were given in specially made perforated bamboo trays fixed below 1.5 ft of surface water. Along with the gain in body weight of fish the quantity of feed was adjusted at 10 days intervals.

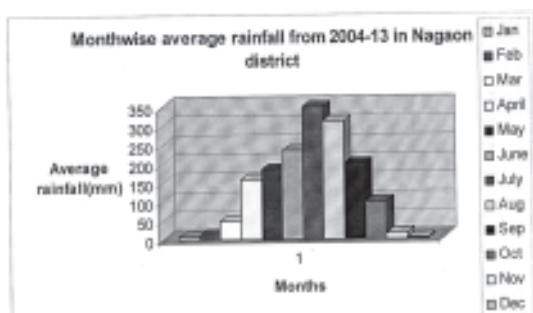
The physico-chemical parameters of water like temperature, pH, Dissolved oxygen, free carbon dioxide and alkalinity were recorded on the day of stocking and on every ten day intervals. The collected data were analyzed following the standard methods [2].

The average weights of fish were recorded on the day of stocking and their growth was assessed on every ten day intervals (Table 2). The data were pooled and analyzed statistically by the standard methods [3]. Economics of fish culture program was calculated based on expenditure incurred and revenue realized.

**Table 2.** Physico-chemical parameters and plankton volume during the experimental period.

Day of sampling	Temp (°C)	pH	Parameters		Total Alkalinity (mg/l)	Plankton volume (ml/l)
			Dissolved Oxygen (mg/l)	Free CO <sub>2</sub> (mg/l)		
0	28.30	7.60	5.40	3.40	36.00	60.00
10	29.10	7.40	5.20	3.00	34.00	58.00
20	29.10	7.80	5.20	3.20	32.00	58.00
30	30.30	8.00	5.00	3.00	30.00	56.00
40	30.30	7.80	4.80	2.80	32.00	52.00
50	29.00	7.80	5.00	2.80	31.00	54.00
60	30.00	7.60	4.60	3.00	32.00	55.00
70	31.30	7.60	4.50	3.60	34.00	53.00
80	28.80	7.80	4.80	3.80	32.00	51.00
Average	29.57	7.71	4.94	2.84	32.50	55.22





**Fig. 1.** Monthly average rain fall of Nagaon for 2004—2013.

lings during the later part of May/early part of June, provided fish yearlings are available. The stocked fish are harvested partially or fully in September / October, the month from which fish ponds start drying due to low/no rainfall. At the same time due to fall of temperature from the month of October to February also slows down the growth of fish as well as the productivity of fish ponds. The analysis of temperature and rainfall data (Tables 3 and 4, Fig. 1) shows that the fish culture in Assam can be started from March itself with the carried over fish seed.

#### Water quality and management

The values recorded for physico-chemical parameters and plankton volumes are given in Table 2. The minimum and maximum ranges of water temperature, pH, dissolved oxygen, free carbon dioxide and total alkalinity were 28.3°C - 31.3°C (av 29.57°C), 7.40–8.00 (av 7.71), 4.50 - 5.20 (av 4.94), 2.80 - 3.80 (av 2.84) and 31.00 - 36.00 (av 32.50), respectively. The observed values of water parameters fall within the optimum ranges recommended for carp grow out ponds [6, 7].

The minimum plankton volumes (51.00 ml/m<sup>3</sup>) recorded was above the recommended level (30—50 ml / m<sup>3</sup>) which was correlated with other research findings [8] for carp grow out culture.

The needed water for maintaining a minimum

depth of 1.5 m was drawn from the rain water harvested storage tank. The ponds were initially filled in the mid February and thereafter on the day when water level came down the minimum level. Maintenance of water level became easy in April and May due to the pre-monsoon precipitation during the year.

#### Conclusion

Utilization of harvested rain water in a place like Assam where flood is a chronic problem can be a very profitable venture. Fishes like IMC can easily be cultured using this innovative technology. The research findings also suggest that the production of the fish can be increased if short duration fish culture is practiced using rain water in flood prone areas which will also lead to employment generation and strengthen the livelihood of the flood affected fish farmers.

#### References

1. Borthakur S, Sarma D (2013) An approach to diversity carp culture practices in North Eastern region through cat fish farming. Proc Nat Sem on Indigenous Fin Fish Species for Aquacultural Diversification : Current status and prospects in North-Eastern Region. College of Fish, AAU, Raha, pp 112—120.
2. APHA (2005) Standard methods for examination of water and waste water. Am Public Hlth Assoc, Am Water Works Assoc and Water Poll Contr Fed, New York, pp 970—975.
3. Snedecor GV, Cochran GW (1980) Statistical methods. 7<sup>th</sup> edn. The Iowa State Univ Press.
4. Sastry G, Hussenappa V, Bansal RC, Tejwani KG (1991) Hydrological aspects of farm ponds in Doon Valley, CSWCRTI, Dehradun, Bull No. 6.
5. Muruganandam M, Sastry S (1999) Water harvesting and aquaculture in Himalayan perspective for rural development. Workshop of Water in Western Himalayas. Soc Waste land Development, New Delhi.
6. Muruganadan M (2000) Composite fish culture in run-off fed ponds in outer Himalayas. Aquacult 1 : 161—166.
7. Kumar D (1992) Fish culture in undrainable ponds. FAO Fishery Techn Paper 325, FAO, pp 185.
8. Bhattacharjya BK (2012) Fishery reservoir of North Eastern India—Problems and prospects for Development. Reading material for capacity building for rural functionaries and progressive fish farms for development of pisciculture in Meghalaya NIRD, NERC, Guwahati, pp 1—11.