



Study on Growth Performance and Production of Singhi and Carps (Rohu) under semi-intensive culture system in rainfed areas of Srikakulam District of Andhra Pradesh

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Abstract

Heteropneustes fossilis (Bloch) is an indigenous stinging catfish of South-East-Asia, which is locally known as Singhi. It is not only recognised for its excellent taste and market value but is also highly sought after for its nutritional and medicinal benefits. Production potential of Singhi, *Heteropneustes fossilis* and IMCs (Rohu carp in polyculture) were assessed at a stocking density per acre of 15000 in Tank 1 and Tank 2 and 10000 in tank respectively. Culture period of Singhi was 228, 231 and 265 in T1, T2 and T3. All fingerlings were of the same age at stocking, with an average weight of 2.75 g for singhi and 50 gm for IMC respectively. Local farm made fish feeds supplied in 260, 230, 210 in T1, T2 and T3 respectively. Fortnightly feeding was maintained of about 20 kg in T1 and T2 tank whereas around 27 kg were feed at fortnightly interval in T3 tank. Fish production in treatment T1, T2, T3 480 kg, 450 kg and 388 kg per acre were observed in polyculture method respectively. The feed conversion ratio (FCR) was significantly lower in T2 of 1.02 whereas T1 and T3 remains same of treatments.

1. Introduction

The species has high content of iron (226 mg 100 g-1) and fairly high content of calcium compared to many other freshwater fishes (Saha and Guha, 1939). Due to its high nutritive value the fish is recommended in the diet of the sick and the convalescents (Singh, Kohli and Goswami, 1989). Being a lean fish, it is very suitable for people for whom animal fats are undesirable (Rahman *et al.*, 1982). Singhi and IMC are commonly found in open waters (streams, lakes, floodplains and beels), paddy fields and swamps of India and its preferred habitats are heavily vegetated, stagnant waters. They are very hardy fish and can survive for a few hours out of the water due to the presence of accessory respiratory organs. Indiscriminate destructive practices have caused havoc to aquatic biodiversity (Hussain and Mazid, 2001) in Bangladesh. International Union of Conservation of Nature (IUCN, 2000) enlisted *H. fossilis* species are threatened now due to poorly planned water management policy for irrigation, over exploitation, illegal fishing and various ecological changes in its natural habitat (Chakraborty, 2010). Considering the importance of these species from the nutritional, economic and biodiversity point of view, appropriate culture technologies for *H. fossilis* and *carps* are needed to meet the dietary demand and ultimately more of these tasty fishes will be available for the rural people of India. For large scale production of these fishes, comprehensive information on culture technologies is required. Therefore, the present study was conducted to find the growth, yield and economic performance of Singhi along with poly IMC culture various rainfed areas.

2. Study Area

The study was carried out in Srikakulam, a coastal district in the eastern Indian state of Andhra Pradesh. The district is geographically located at 18.6177° N, 84.0167° E, in the extreme northern part of the state. The district is flanked by Vizianagaram district in the south, Odisha state on the north - west and Bay of Bengal in the East. The biogeography of the district can be divided



into intensely agriculture plains and forest cladded rocky and the district has an area of 5,837 sq.km and has one of the longest coastlines of about 193 km. hilly terrains.

The study was a part of the pilot carried out at three tribal villages of Nowguda, Chintamanguda and Chinnaramma of the district. The size of the pilot/study ponds was 0.5 acre. Duration of the culture in T1 and T2 were 7 months (September to April) and T 3 culture duration was 8 months (September 2019 to April 2020). Growth performance was of the fish is evaluated for the purpose of the study.

[3] Pond Preparation and Fertilisation

Liming was applied before stocking of fingerlings/yearlings. A basal dose of 50 kg in T1 and 25 kg in T2 and T3 were applied before fingerlings stocking. Liming application maintained at 100 kg per acre. Every month about 100 kg manure were applied in the pond to enhance the Natural plankton availability.

[4] Stocking Density

Generally, a higher stocking density were maintained at the rate of 20000 Nos. fingerlings (of Catfishes) per acre (Sahoo, et al., 2016). However lower stocking densities were tested in T1, T2, and T3 Tank as stated below (table 1). Average weight of Desi Singhi were 2.75 gram and IMC - Rohu weight 50 grams. Transportation of Desi Singhi were done from West Bengal with oxygen packing and Local Yearlings were transported in buckets from nearby ponds of the same local areas. Uniform size was maintained during stocking of IMC and Desi Singhi.

Table 1 Showing Stocking densities of the fish in the Study Waterbodies

	T1	T2	T3
Size of the Pond	0.5 acre	0.5 acre	0.5 acre
Singhi (in Nos.)	7500	7500	10000
Yearlings (in Nos.)	500	500	1000

[5] Supplementary feeding

Small balls were made by mixing feed with slight water and provided on the bag placing under the water in some specific places of the pond. Oil cake should soak in water 24 hours before feed preparation (table 2). Commercial feed from market were avoided as the price of this feed is higher than homemade feed. Growth performances were tested with low-cost feed application.

Table 2. Showing fish feeding fortnightly interval and ratio

Tank	Weight of feed Kg / fortnightly (stocking density 15000 / acre)	Total feeding % rice product (bran/broken rice): oil cake
T1	20	88:12
T2	24	99:11
T3	27	88:12

[6] Growth performance with culture of carps

Fishes were sampled by seine net and cast net. Weigh balance and scale is used to measure the weight (gram) and length measurement. (cm) Growth in terms of length, weight, SGR, FCR, ADG, Production and survival % were computed. Desi Singhi growth in terms of Net length obtained in the study shows 9 to 14 cm and Net weight gain ranges from 92 to 167 gram. Similarly on an average Rohu obtained a length of 27 to 30 cm and weight gain range from 1.1 kg to 1.2 kg.



Average daily weight gain of Singhi recorded were 0.64, 0.39, 0.63 gram in T1, T2 and T3 respectively. Similarly, on ADG of Rohu recorded 5.5 in each T1 and T2 and 4.3 in T3 respectively (table 3).

Studies on growth performance of Singhi suggest that normally singhi attains a weight between 0.1 Kg and 0.2 Kg at harvesting. Singhi Normal yields range from 800- 1200 kg per acre/yr. Study shows that 480 kg, 450 kg and 388 kg per acre yield have been recorded in 7- 8 months duration in T1, T2 and T3 respectively.

Table 3. List of Growth Parameters Used for Assessment of Growth Performance of Fish

Parameters	T1	T2	T3	Units
Days of culture	228	231	265	
No of fish stocked - desi singhi	7500	7500	10000	
No of yearlings stocked	500	500	1000	
<u>Initial length</u>				
• Desi Singhi	3	3	3	cm
• Rohu	10	10	10	cm
<u>Final length</u>				
• Desi Singhi	15	12	17	cm
• Rohu	37.5	38	40	cm
<u>Net length</u>				
• Desi Singhi	12	9	14	cm
• Rohu	27.5	28	30	cm
<u>Initial weight</u>				
• Desi Singhi	2.75	2.75	2.75	gm
• Rohu	50	50	50	gm
<u>Final weight</u>				
• Desi Singhi	150	95	170	gm
• Rohu	1200	1200	1250	gm
<u>Net weight</u>				
• Desi Singhi	147.25	92.25	167.25	gm
• Rohu	1150	1150	1200	gm
<u>Average daily weight gain (ADG)</u>				
• Desi Singhi	0.64	0.39	0.63	gm
• Rohu	5.47	5.47	4.28	
<u>Specific growth rate</u>				
• Desi Singhi	1.96	1.76	2.02	
• Rohu	2.27	2.27	2.28	
Total feed given in culture period	260	230	210	kg
FCR	1.083	1.02	1.08	
Per acre yield	480	450	388	

[7] Harvesting and Economic Analysis

Hand Picking and drainage method is used for complete harvest. In the study areas, summer season is ideal for harvesting Singhi fishes from ponds. Partial harvesting of the fishes was done by netting in the month of April and May 2020. Out of 5 ponds, only 3 ponds have been harvested and 2 ponds have been left out for natural breeding and conservation purpose. These Seasonal waterbodies in rainfed regions are highly suitable for culture. Due to their high demand in Northeastern state and market price, the culture of this Singhi fish provide profitable income to fish farmers with simple management techniques. However, Covid 19 Pandemic have affected the price rate and market. The expected rate of returns was half than which was planned for sale in urban areas. Farmers were forced to sale the Desi Singi fish at local market at the rate of Rs 150/kg. However, the urban market price of Singhi varies from 400-500 Rs /kg Carps sale rate ranges from Rs 120-150 Rs per kg in retail market. Simple benefit cost analysis was calculated for the T1, T2 and T3 Ponds (table 4).

Table 4: Economics of Polyculture of Major Carp and Singhi

Economics	T1	T2	T3
Singhi stock in nos	7500	7500	10000
Carps stocks in nos (Rohu)	500	500	1000
VARIABLE COST			
Total lime	1000	500	500
Total fingerlings cost	25375	25375	34250
Total feed cost	6500	5600	4500
Total investment In Rs	32875	31475	39250
Total desi singhi harvested in kg	70	75	60
Total carps harvested	170	150	134
Total kgs	240	225	194
Income from IMC	25500	18000	20100
Income from Desi Singhi	17500	18750	15000
Gross income from Desi Singhi + IMC	43000	36750	35100
Net income	10125	5275	-4150
<i>Average weight gain- singhi</i>	<i>150</i>	<i>95</i>	<i>170</i>
<i>Average weight gain- carps</i>	<i>1200</i>	<i>1200</i>	<i>1250</i>
<i>Counts of fish per kg- singhi</i>	<i>6.66</i>	<i>10.52</i>	<i>5.88</i>
<i>Counts of fish per kg- carps</i>	<i>0.83</i>	<i>0.83</i>	<i>0.8</i>
<i>Total count of desi singhi</i>	<i>467</i>	<i>789</i>	<i>353</i>
<i>Total counts of carps</i>	<i>142</i>	<i>125</i>	<i>107</i>
<i>BC ratio -present</i>	<i>1:0.30</i>	<i>1:0.16</i>	<i>1:0.10</i>
<i>Desi Singhi-(out of survival rate ; harvesting %</i>	<i>9%</i>	<i>15%</i>	<i>5%</i>
<i>Carps harvested</i>	<i>40%</i>	<i>36%</i>	<i>15%</i>
<i>Expected survival rate -70% singhi</i>	<i>5250</i>	<i>5250</i>	<i>7000</i>
<i>Expected returns- singi in Rs</i>	<i>87500</i>	<i>87500</i>	<i>175000</i>
<i>Expected survival rate -70% Carps in kgs</i>	<i>350</i>	<i>350</i>	<i>700</i>
<i>Expected returns - in carps in Rs</i>	<i>52500</i>	<i>52500</i>	<i>105000</i>
<i>Expected Net returns in Rs</i>	<i>107125</i>	<i>108525</i>	<i>240750</i>
<i>BC ratio -expected</i>	<i>1:3.25</i>	<i>1:3.44</i>	<i>1:6.13</i>

[8] REFERENCES

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