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Effect of Different Organic Manures on Growth and Production of Different Carps Rearing from Fry to Fingerlings

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ABSTRACT: Aquaculture is rapidly developing sector in India and has great demand. Presently, the productivity of fisheries was poor. In order to reduce cost of rearing, the use of indigenous wastes as food is sustainable approach. An experiment was conducted in cement ponds to determine the effect of different organic manures on Specific growth rate and net production of carps (*Catla catla, Labeo rohita* and *Cyprinus carpio*) during fry to fingerling stage. Ponds were applied with three types of organic manures *viz.*, cow dung (T_1: CD), poultry manure (T_2: PM) and cow dung + poultry manure (T_3: CD + PM) applied @ 10,000 kg/ha, 5000 kg/ha and 5,000 + 5,000/ha respectively. Periodically growth and survival of fishes were recorded. The result revealed that, in Catla, the growth in weight appeared best in PM treatment, followed by CD, and CD+PM treatment in that order but the differences between treatments were slight. In rohu, the growth in weight may be considered best in PM treatment, followed by CD + PM and CD treatments in that order. In common carp, best growth in weight in CD + PM treatment, followed by PM and CD treatments. Among the three species, catla gave the highest net fish production followed by common carp and rohu, in that order. Among the three treatments, PM and CD + PM were comparable in net fish seed production and better than cow dung (CD). Poultry manure was proved as best for higher yield of rohu, catla and common carp fishes.

Keywords: Organic Manures, Poultry manure, Cow dung, Rohu, Catla and Common carp.

INTRODUCTION

Inland fisheries waterbodies including rivers, tanks streams, flood plain lakes, wetlands, estuaries, estuarine wet lands brackish water, backwater and mangroves are major resources. These are being used for irrigation purpose and utilized for fish culture to some extent by creating awareness among the fish growers. Scarcity of major carp seeds is as one of the major constraints for aquaculture development in Karnataka and in India as well. Though, carps hatcheries producing plentiful of spawns, their survival per cent from spawn to fingerling is lesser than 30%. This calls for better nursery management practices with suitable manuring dosages. The low-cost fish production needs use of organic fertilizers and better utilization of naturally available food through composite fish culture. There are many other organic manures available in the country which can substitute or complement the existing manures. Proper management, Predominantly, the raw cow dung and poultry manure is used in many of the fish nurseries owing to its low cost and availability. Care and understanding about the biotic and abiotic conditions of particular waterbody are important, when undesirable conditions may lead to mass mortality of fingerlings. Application of organic manure in nursery and rearing ponds can play vital role to ensure the production of planktonic feed for fingerlings. Among the organic manure, poultry manure and cow dung + poultry manures are the best for most of the fish species because it contain more nitrogen and phosphorus which play a vital role for primary production and promoting fish growth with high profit (Priyadarshini *et al.*, 2011). The nutrients contents in manures were higher in poultry manure and lower in cow dung and compost. Weight gain of common carp stocked in poultry manures system was reported the significantly higher growth (Gameredinn *et al*., 2018). Akhtar *et al.*, (2017) also reported that, use of organic manure is the best option to reduce cost of fish rearing along with higher net production of fishes. Earlier workers have worked on the influence of the manures on carps seed rearing; but most of them on a mono species rearing. Therefore, the present study was undertaken to understand the effect of different organic manures on the growth and survival of carp species when they are reared together.

MATERIALS AND METHODS

The experiment was under taken in cement ponds of the Zonal Agricultural and Horticultural Research Station, Brahmavara, Udupi District, Karnataka. The size of ponds was equal having 8.57 m^2 each. The average depths of the ponds were 2.5ft. Three types of fertilizer, like cow- dung, poultry manure and cow dung + poultry manure (10,000 kg, 5000 kg and 5,000 + 5,000

kg/ha were tried in treatments T_1, T_2 and T_3 respectively. Treatments with three replicates were applied.

The ponds were prepared by cleaning them properly and added one inch thickness of red soil. Lime ($CaCO_3$) was applied at a dose of 0.170 g/m^2 and then after 3 days, the ponds were fertilized properly by organic fertilizers using proper dose in the respective three treatment groups. After 7 days of fertilization, the ponds were stocked with carp fry (Catla : Rohu : Common Carp) at a density of 30 No./m^2 in the ratio of 4:3:3 to the ponds of all the treatments and replications. From the second day of stocking, fry were fed twice daily with a mixture of finely powdered dried groundnut oil cake and rice bran at the ratio of 1:1. Supplemental feed was applied on the following days maintaining 3 times of the initial stock of the fry and was continued up to 5 days. On the consequent 5 days, the amounts of feed were increased 5, 7 and 9 times respectively. Sampling was done every 10 days interval by dragging a in the pond to check the growth. Weight and length of 30 fry/pond were recorded randomly during each sampling.

The specific growth rate was calculated using following formula.

$$\text{SGR (\%weight gain /Day)} = \frac{\text{Log}_e \text{ Final Weight (g)} - \text{Log}_e \text{ Initial Weight (g)}}{\text{Rearing Period (days)}} \times 100$$

RESULTS AND DISCUSSION

Fish growth: Catla is known to show a definite preference for zooplankton which can therefore be considered as its favorite food and chief source of nutrition. Catla dwells predominantly in the surface layers of the water column. In present investigation, comparing the growth pattern in weight between treatments it is seen that the species grew better in PM treatment after the 30th day. The difference in growth between the treatment became noticeable from the 30th day and were maintained till termination of the experiment from the average initial weight of 0.79 mg, catla grew at a daily rate of 0.48 mg, 0.95 mg, 0.90 mg, and 1.37 mg, 0.33 mg in CD, PM, and CD + PM treatment reaching a final weight of 29.7 mg, 62.96 mg, and 23.83 mg in the three treatments respectively at the time of harvesting after 60 days of culture (Table 1). The growth in weight appeared best in PM treatment, followed by CD, and CD + PM treatment in that order but the differences between treatments were slight. The specific growth rate of catla is given in Table 2. Similarly, Safi *et al.*, (2016) studied the effect of different levels of poultry droppings on growth performance of Indian major carps in the foothills of Arunachal Pradesh, India. They reported that, the weight and specific growth rate of catla fish was higher in poultry manure treated ponds compared to other organic fertilisers. Kour *et al.*, (2016) evaluated the effect of organic manure and inorganic fertilizer on the growth and proximate composition of carp. They reported that, the weight and specific growth rate of fish was significantly higher in chicken manure treated ponds.

Rohu is known to feed predominantly on filamentous green algae and to some extent on zooplankton and decaying organic matter suspended in the column of water. Rohu predominantly dwells in the middle layers of the column of water. In present investigation, comparing the pattern of growth in weight the treatments, it was found that the treatment PM seemed to show the best growth especially after the 40th day.

Table 1: Growth in Weight (g) of catla catla in the different treatments.

Treatments	Cisterns	Initial	10	20	30	40	50	60
Cow dung	R1	0.79	4.74	9.23	13.7	18.9	21.1	26.3
	R2	0.79	5.36	8.46	13.1	18.4	24.6	32.2
	R3	0.79	6.45	12	16.7	21.5	26.3	30.6
	Average	**0.79**	**5.52**	**9.90**	**14.50**	**19.60**	**24.00**	**29.70**
	S.D	**0.00**	**0.87**	**1.86**	**1.93**	**1.66**	**2.65**	**3.05**
Poultry manure	R1	0.95	2.56	13.2	23.8	39	43.9	55.5
	R2	0.95	5.75	14.5	26.5	41.4	54.9	70.8
	R3	0.95	4.33	14.6	26.1	40	51.5	62.6
	Average	**0.95**	**4.21**	**14.10**	**25.47**	**40.13**	**50.10**	**62.97**
	S.D	**0.00**	**1.60**	**0.78**	**1.46**	**1.21**	**5.63**	**7.66**
Cow dung + Poultry manure	R1	1.37	11.3	13.7	16.2	16.3	17.9	21.4
	R2	1.37	9.9	10.2	11.9	12.5	17.1	23.4
	R3	1.37	14.5	20.5	22.8	22.8	25.1	26.7
	Average	**1.37**	**11.90**	**14.80**	**16.97**	**17.20**	**20.03**	**23.83**
	S.D	**0.00**	**2.36**	**5.24**	**5.49**	**5.21**	**4.41**	**2.68**

Table 2: Specific Growth Rate (%/day) of *Catla catla* in different treatments.

Treatments		0-10 days	30-40 days	50-60 days
Cow dung	**Average**	**2.40**	**0.75**	**0.36**
	S.D	0.33	0.02	0.07
Poultry manure	**Average**	**3.26**	**1.23**	**0.52**
	S.D	0.53	0.17	0.17
Cow dung + Poultry manure	**Average**	**3.77**	**1.11**	**0.55**
	S.D	0.59	0.09	0.08

In PM treatment, growth rate was good up to the 20th day. In CD+PM treatment, the fish grew better than in CD treatment after the 20th day. Rohu grew at a lower and constant rate in the CD treatment. From an average initial weight of 0.95mg rohu increased in weight daily at an average rate of 0.34mg in CD treatment, 0.57mg in PM treatment, 0.44mg in CD + PM treatment to reach final weights of 21.5, 35.26 and 27.7mg in these three treatments respectively (Table 3). The growth in weight may be considered best in PM treatment, followed by CD + PM and CD treatments in that order. This is also seen from the specific growth rate (%/day) of rohu (Table 4). Similarly, Banerjee *et al*., (1969) found poultry manure plus cow dung superior over cow dung and Govinda *et al*., (1978) reported that a combination of poultry manure and cow dung was better than poultry manure.

Table 3: Growth in weight (g) of rohu in different treatments.

Treatments	Cisterns	Initial	10	20	30	40	50	60
Cow dung	R1	0.95	2.53	6.38	11.7	14.7	18	21.6
	R2	0.96	2.75	7.56	13.1	16.7	20.1	23.5
	R3	0.95	2.54	5.95	10.6	12.9	16.1	19.4
	Average	**0.95**	**2.61**	**6.63**	**11.80**	**14.77**	**18.07**	**21.50**
	S.D	**0.01**	**0.12**	**0.83**	**1.25**	**1.90**	**2.00**	**2.05**
Poultry manure	R1	0.95	3.42	11.1	21.1	27	32.9	39.4
	R2	0.95	4.54	9.68	17.8	22	26.7	30.5
	R3	0.95	4.62	10.4	20	23.6	29.9	35.9
	Average	**0.95**	**4.19**	**10.39**	**19.63**	**24.20**	**29.83**	**35.27**
	S.D	**0.00**	**0.67**	**0.71**	**1.68**	**2.55**	**3.10**	**4.48**
Cow dung + Poultry manure	R1	0.95	3.97	7.54	13.1	16.1	19.8	23.9
	R2	0.95	3.51	12.4	20.7	26.8	32	38.3
	R3	0.95	2.81	6.96	11.1	14.1	17.2	20.9
	Average	**0.95**	**3.43**	**8.97**	**14.97**	**19.00**	**23.00**	**27.70**
	S.D	**0.00**	**0.58**	**2.99**	**5.06**	**6.83**	**7.90**	**9.30**

Table 4: Specific Growth Rate of Rohu (*Labeo rohita*) in different treatments.

Treatments		0-10 days	30-40 days	50-60 days
Cow dung	**Average**	**2.34**	**0.36**	**0.29**
	S.D	0.08	0.03	0.02
Poultry manure	**Average**	**3.59**	**0.47**	**0.40**
	S.D	0.41	0.06	0.07
Cow dung + Poultry manure	**Average**	**3.09**	**0.57**	**0.43**
	S.D	0.43	0.06	0.05

Though the preferred food of common carp is zoo benthos, when this becomes relatively unavailable, common carp also feeds on zooplanktons (Schroeder, 1983), common carp is known to be a bottom dwelling fish. In present investigation, the growth in weight of common carp was faster in both CD+ PM and PM treatments after the 30th day, as compared to the other treatment. From an average initial weight of 0.36mg, the fish grew daily at an average rate of 0.38 mg, 0.52 mg, and 0.59 mg in CD, PM and CD + PM treatments reaching final weights of 23.36 mg, 32.1 mg, 113 mg and 36.23 mg in the three treatments respectively, at the time of harvesting after 60 days of culture (Table 5). Common carp showed the best growth in weight in CD + PM treatment, followed by PM and CD treatments in that order. This is also evident from the specific growth rate (%/day) of common carp (Table 6). The growth of common carp in the PM treatment of the present study compared that of James David (1987) under similar manure. But the growth of common carp achieved using PM treatment was far better (80%) than the CD + PM treatment.

Cow dung is found to be an effective source of organic fertilization, which positively influences the growth performance of major carps in respect of fish production (Kanwal *et al*., 2003).

The raw cattle dung treated pond gives 44.20 gram average weight of fish which is higher than other compost treated pond without inorganic fertilizers and supplementary feed as recorded by Shukla *et al*., (2019). Jasmine *et al*., (2011) conducted an experiment to study the effect of fertilizer (organic as cow dung and in-organic as triple super phosphate) in supplemented ponds on the growth of carps. The results showed that fish production was significantly higher in pond received cow dung than in the treatment pond received triple super phosphate ($P<0.05$). Fish production in cow dung treatment was 1.45 times greater than the other treatment.

Banerjee *et al*., (1979) reported that poultry manure was the best fallowed by poultry manure plus cow dung and cow dung. Safi *et al*., (2016) concluded that, moderate application of poultry dropping at the rate of 1 chick/ 11.1 sq. m is ideal in maintaining suitable water quality and plankton productivity which ultimately enhanced fish growth and overall higher production of fish per unit area. Gameredinn *et al.*, (2018) evaluated the different organic manure on growth and production of common carp fingerlings. They reported that, the highest SGR was noticed in poultry manure treated ponds and the lowest SGR was observed in cow dung fertilized system and compost system.

They also suggested that application rate of 0.52 kg/m^3 at every 7 days seems to be the most suitable for common carp manured with poultry litter, through maintenance of better water quality to enhance the greater abundance of plankton biomass in the system.

Table 5: Growth in weight (g) of common carp in different treatments.

Treatments	Cisterns	Initial	10	20	30	40	50	60
Cow dung	R1	0.28	3.1	4.2	7.7	14.2	19	22.3
	R2	0.28	2.8	4.6	9	14.2	18.6	21.2
	R3	0.28	1.1	4.6	10.3	17	22.6	26.6
	Average	**0.28**	**2.33**	**4.47**	**9.00**	**15.13**	**20.07**	**23.37**
	S.D	**0.00**	**1.08**	**0.23**	**1.30**	**1.62**	**2.20**	**2.85**
Poultry manure	R1	0.41	1.6	6	7.2	19	27.8	33.1
	R2	0.41	1.9	6	10.6	17.4	24	25.6
	R3	0.41	1.6	6.5	12.9	22.5	32.5	37.6
	Average	**0.41**	**1.70**	**6.17**	**10.23**	**19.63**	**28.10**	**32.10**
	S.D	**0.00**	**0.17**	**0.29**	**2.87**	**2.61**	**4.26**	**6.06**
Cow dung + Poultry manure	R1	0.41	7.6	6.5	15.4	22.7	27.8	32
	R2	0.41	6.3	7.7	15.9	24.3	30.4	36.5
	R3	0.41	1.9	7.1	17.4	27.2	33.7	40.2
	Average	**0.41**	**5.27**	**7.10**	**16.23**	**24.73**	**30.63**	**36.23**
	S.D	**0.00**	**2.99**	**0.60**	**1.04**	**2.28**	**2.96**	**4.11**

Table 6: Specific Growth Rate (%/day) of Common Carp in different treatments.

Treatments		0-10 days	30-40 days	50-60 days
Cow dung	**Average**	**5.02**	**0.78**	**0.24**
	S.D	0.48	0.04	0.03
Poultry manure	**Average**	**7.66**	**1.02**	**0.40**
	S.D	0.95	0.08	0.06
Cow dung + Poultry manure	Average	7.01	1.27	0.31
	S.D	**0.46**	**0.07**	**0.14**

Net fish production: The data on net fish production for the experimental period (g/cistern), and the statistical analysis of the data are tabulated in Table 7. The average net production of catla per cistern 8.57 m^2 was 202.43 g in CD treatment, 310.4 g in PM treatment, and 280.23 mg in CD + PM treatments. From this data it is seen that the highest production was obtained in PM treatment. While the least production was in CD treatment. The average net production of rohu per cistern (8.57 m^2) was 77.9 g in CD treatment, 102.3 g in PM treatment, 124.8 mg in CD + PM treatment. Therefore, the net production of rohu was the best in CD+PM treatment and lowest in CD treatment. The average net production of common carp per cistern (8.57 m^2) was 119.03 g in CD treatment, 192.3 g in PM treatment, 155.13 g and in CD + PM treatment. Hence the net production of common carp was the highest in PM treatment and the least in CD treatment (Table 7). The mean net production of fish was comparable in PM and CD + PM treatment, both of which were higher than CD treatments ($p<0.05$) the two treatments were comparable.

Table 7: Net fish production (yield) (g/Cistern) of different Species in different treatments.

Treatments	Cisterns	Catla (g/ cistern)	Rohu (g/ cistern)	Common carp (g/ cistern)
Cow dung	R1	182.3	69.6	115.8
	R2	210.8	102.6	114.1
	R3	214.2	61.5	127.2
	Average	**202.43**	**77.90**	**119.03**
	S.D	**17.52**	**21.77**	**7.12**
Poultry manure	R1	312.2	77.9	163.1
	R2	346.9	160.7	198.9
	R3	272.1	69	214.9
	Average	**310.40**	**102.53**	**192.30**
	S.D	**37.43**	**50.57**	**26.52**
Cow dung + Poultry manure	R1	219.7	125.2	174.9
	R2	268.1	138.7	134.2
	R3	352.9	110.5	156.3
	Average	**280.23**	**124.80**	**155.13**
	S.D	**67.42**	**14.10**	**20.38**

The data on the percentage contribution of the different species to the total net fish production (g/cistern) in the three treatments are presented in Table 8. The average contribution of catla was 11.33% in CD treatment, 16.88% in PM treatment, and 16.19 % in CD + PM treatment. The average contribution of rohu was 4.36% in CD treatment, 5.39% in PM treatment, and 7.35%

CD + PM treatment. Common carp contributed to an extent of 6.72% in CD treatment, 10.52% in PM treatment and 9.11% in CD+PM treatment. Thus, in all the treatments, the average % contribution from catla was the highest, followed by that of common carp and rohu (Table 8). Safi *et al*., (2016) studied the influence of different levels of poultry droppings on net production of Indian major carps. Net fish production (Catla & rohu) was higher in the poultry dropping treated ponds compare to control ponds, and the result clearly indicates that the poultry manure enriched the soil nutrients and pond water thereby enhanced plankton productions by making the pond environment more congenial for fishery purposes. The present investigation affirmed that the fish production in foothills areas can be increased through Poultry cum fish culture by judicious utilization of poultry droppings. Similarly, Billah *et al.*, (2019) reported that, use of organic manure increases the net production of Indian carps with low cost of rearing.

Table 8: Percentage contribution of individual species to the total net production.

Treatments	Cisterns	Catla	Rohu	Common carp
Cow dung	R1	11.05	4.28	7.07
	R2	11.07	5.42	5.94
	R3	11.88	3.39	7.16
	Average	**11.33**	**4.36**	**6.72**
	S.D	**0.47**	**1.02**	**0.68**
Poultry manure	R1	18.31	4.57	9.57
	R2	16.32	7.55	9.35
	R3	16.02	4.06	12.65
	Average	**16.88**	**5.39**	**10.52**
	S.D	**1.24**	**1.89**	**1.85**
Cow dung + Poultry manure	R1	13.93	7.94	11.08
	R2	15.98	8.27	8
	R3	18.66	5.84	8.26
	Average	**16.19**	**7.35**	**9.11**
	S.D	**2.37**	**1.32**	**1.71**

Manure may enter the feeding regime as food which is directly consumed by the fish as a source of nutrients for photosynthetic production of phytoplankton and as a substrate supplying organic and mineral matter to the heterotrophic microorganisms, which in turn may be consumed either directly by the fish or by zooplankton (Schroeder, 1980). Even though the growth of individual species showed different results as a function of split manuring, the total net production was found to be directly related to the frequency of manuring. The best total production in PM treatment can be attributed to the best growth and survival of catla, common carp and survival and growth of rohu was poor. The application of manure in the liquid form and by the broadcasting method might have had a beneficial effect on the production of fish food organisms through an action similar to the carbon manuring technique. The food values of zooplankton are found to be better than conventional feed pellets and it is found that use of manure to produce fish food organisms is more economical than using conventional feed pellets. The phyto and zooplankton are reported to contain 45% and 55% protein content (dry weight) respectively. Use of poultry and cattle manure was showed consistence in both chlorophyll *a* and phosphorus. It indicated that animal manure varied in influencing the production of chlorophyll *a*, planktons and phosphorus. Poultry manure was assumed to have the highest nutrient content as compared to cattle manure. Therefore, a combination of the two resulted in an increase in phytoplankton production, a performance attributed to high presence of phosphorus and chlorophyll *a* production as observed (Chanda and Musuka 2012). Kumar *et al*., (2019) evaluated the, effect of different organic manure on the growth of Amur carp (*Cyprinus carpio*) fingerlings with supplementary feed in the tarai region of Uttarakhand. They reported that, the growth, specific growth rate and net production of amur carp were significantly higher in poultry manure treated ponds compared to cow dung and vermicompost.

CONCLUSION

The low-cost fish production needs use of organic fertilizers and better utilization of naturally available food through composite fish culture. In Catla, Rohu and Common carp, poultry manure treated ponds were shown significantly higher weight, specific growth rate and net production. The known interaction of organic manure and fish production is through abundance of phytoplankton as well as zooplanktons in rearing ponds. The detailed mechanism of interaction of organic manure and fish growth should be studied in future.

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REFERENCES

Akhtar, N., Verma, J. D., & Pandey, M. K. (2017). Effect of Organic Manuring on Growth of Indian Major Carps. Bull. *Env. Pharmacol. Life Sci.*, *6*(2): 161-164.

Banerjee, R. K., Singit, G. S., & Dutta, B. R. (1979). Poultry droppings its manural potentiality in aquaculture. *J. Inland Fish. Soc. India*, *11*(1): 98-108.

Banerjee, R. K., Singit, G. S., & Ray, P. (1969). Some observations on the use of poultry manure as fertilizer in rearing major carp fry. *J. Inland Fish. Sociery India*, *2*(2): 29-34.

Billah, M., Uddin, K., Samad, Y. A., & Hassan, Z. B. (2019). Fertilization effects on the growth of common carp (*Cyprinus carpio*) and Nile tilapia (*Oreochromis niloticus*) and rice yields in an integrated rice-fish farming system. *AACL Bioflux*, *12*(1): 121-132.

Chanda, K. M., & Musuka, C. G. (2012). Determination of chlorophyll a and total phosphorus abundance in organic manured fish ponds. *Aquaculture, Aquarium, Conservation & Legislation*, *5*(4): 223-230.

Gameredinn, Y., Saharan, N., Prakash, C., & Tiwari, V. (2018). Growth Performance and Survival of Common Carp (*Cyprinus carpio*,Linnaeus 1785) Fingerlings Under Different Fertilizers. *International Journal of Livestock Research*, *8*(1): 235-243.

Govind, B. V., Rajagopal, K. V., & Singit, G. S. (1978). Study on the comparative efficiency of organic manures as fish food producers. *J. Inland fish. Soc. India*, *10*: 101-106.

Jasmine, S., Ahamed, F., Rahman, S. H., Jewel, M. A. S., & Hossain, M. Y. (2011). Effects of organic and inorganic fertilizers on the growth performance of carps in earthen ponds through polyculture system. *Our Nature*, *9*: 16-20.

Shukla, K. S., Tripathi, C. M., & Singh, A. K. (2019). Effect of different compost as pond manure on the water quality and growth of *Labeo rohita* (Ham.). *International Journal of Current Microbiology and Applied Sciences*, *8*(2): 2332-2336.

Kanwal, S., Iftikhar, A., Afzal, M., Sughra, F., & Abbas, K. (2003). Effect of different levels of cow dung on growth performance of major carps. *International Journal of Agriculture & Biology*, *5*(3): 23-28.

Kour, S., Masud, S., & Khan, A. (2016). Effect of organic manure and inorganic fertilizer on the growth and proximate composition of common carp, *Cyprinus carpio. Journal of Environmental Biology*, *37*: 149-153.

Kumar, A., Kumari, M., & Dhami, T. (2019). Effect of different organic manure on the growth of Amur carp (*Cyprinus carpio* haematopterus) fingerlings with supplementary feed in the tarai region of Uttarakhand. *Journal of Entomology and Zoology Studies*, *7*(2): 889-894.

Priyadarshini, M., Manissery, J. K., Gangadhar, B., & Keshavanath, P. (2011). Influence of feed, manure and their combination on the growth of *Cyprinus carpio* (L.) fry and fingerlings. *Turkish J. Fish Aquaculture Science*, *11*: 597-606.

Safi, V., Achom, D., Budhin, G., Ram Kumar, Rajashree, S., & Debangshu Narayan, D. (2016). Effect of different levels of poultry droppings on growth performance of Indian major carps in the foothills of Arunachal Pradesh, India. *International Journal of Fisheries and Aquatic Studies*, *4*(2): 56-63.

Schroeder, G. L. (1980). Fish farming in manure-loaded ponds. Integrated Agriculture-Aquaculture Farming Systems. (Eds. Pullin, S.V. & Shehadeh, Z. H.) ICLARM Conference Proceedings 4, International Center for Living Aquatic Resources Management, Manila and the Southeast Asian Center for Graduate Study and Research in Agriculture, Los Baiios, Laguna, The Philippines, p. 73-86.

Schroeder, G. L. (1983). Sources of fish and prawn growth in polyculture ponds as indicated by delta C analysis. *Aquaculture*, *35*: 29-42.

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