RESEARCH PAPER:

Application of induced breeding practices for conservation of fishes in the Thar desert

ANITA JHAJHRIA

Asian Journal of Environmental Science, (June, 2011) Vol. 6 No. 1 : 42-45

Correspondence to :
ANITA JHAJHRIA
Dept. of Rural Development, MPOWER Project Funded by IFAD JODHPUR (RAJASTHAN) INDIA
anita290106@gmail.com

SUMMARY

Twelve induced spawning exercises were conducted on *Cyprinus carpio*, *Labeo* rohita and *Cirrhinus mrigala* in the modified CIFE-D81 Hatchery unit in Jodhpur using synthetic fish hormones ovaprim and ovatide. The eggs (1.00-3.45 lakhs) were produced by varying the injection time from 7.15 to 4.30 pm. Inducement through ovatide yielded spawn production (1.9204-2.4394 Lakhs) compared to ovaprim (0.4895-1.4509 Lakhs).Studies indicated that ovatide is a more convenient less expensive , indigenous ovulating agent which required low dosage (0.3 ml/kg. brooder) compared to ovaprim(0.5 ml/kg brooder). Thus, by using artificial propagation techniques, the declining and reduction in biodiversity of fish species can be controlled by using a more holistic approach to fisheries management in this semi-arid part of Rajasthan.

Jhajhria, Anita (2011). Application of induced breeding practices for conservation of fishes in the Thar desert. *Asian J. Environ. Sci.*, **6**(1): 42-45.

Key words :
Ovaprim, Ovatide, Induced spawning

Received:
February, 2011
Accepted :
March, 2011

The sustainable utilization of genetic resources, including fish is a vital part in improving the standard of living in a populous country like India. About 11% (2,200) of the total world fin fish species (more than 20,000) have been recorded from the Indian sub-continent.

The single most drawback of large scale commercial culture of several fish species is the deficiency of quality seed of uniform size and free of pests, parasites at the time of stocking in culture ponds. For this reason, the hormonal treatment has been attempted for stimulating gametes maturations and has been successfully used to spawn many commercially important fish species that exhibit arrested reproductive development.

Several commercially available synthetic ovulating agents in ready mode form containing GnRHAand dopamine antagonists like ovaprim, ovatide, ovoepel, Dagin and Aquaspawn are becoming very popular now days and found to be efficient and successful spawning agent in different fish species (Peter *et al.*1988; Das 2004; Brzuska, 2006).

MATERIALS AND METHODS

The induced breeding was carried out at modified CIFE- D81 Hatchery unit of Zoology Department, J.N. University, Jodhpur. The healthy brooders of *Cyprinus carpio, Labeo rohita* and *Cirrhinus mrigala* were collected from the local ponds of Jodhpur. The male brooders have fine denticulations on the dorsal side of pectoral fin rays while female brooders have smooth - to-touch pectoral fin with a soft and bulging abdomen. At least 12 matured females and 24 males were selected for the treatment.

Ovatide (0.3 ml/ kg brooder) and ovaprim (0.5 ml. kg brooder) were injected intramusculary, in the caudal peduncle above of the lateral line of the brood fish. The brood stocks were selected in the ratio of 2: 1 (male : female). The ovatide (Manufactured by Hemmo Pharma , Mumbai) is a synthetic analogue of peptide hormone SGnRH and is a dopamine antagonist dissolved in a mixture of aqueous and organic solvents whereas, the ovaprim (Syndel Laboratory, Canada) contains 20 µg of SGnRH and 10mg of domperidone. The time of injection varied and the brooders (Male – 2.200 kg to 4.100 kg and female 2.00 to 3.900kg) were weighed before and after giving the injections. The fertilization and hatching % was calculated as:

Table 1: Results of induced spawning of carps

Fish species	Date of breeding	Ovaprim of Ovatide	Time of injection	Water Temp (°C)	Brooder weight in kg. Male Before breeding	Male After breeding	Male Weight loss	Female Before breeding	Female After breeding	Female Weight loss	Time and date of egg laying	Spawning time (hrs.)	No. of egg laid (lakhs)	Fertilization (%)	Hatching time (hrs.)	Hatching (%)	No. of spawn produced (lakhs)
Cyprinus	17.2.2000	Ovaprim	4.00	24.3	4.000	3.800	0.200	3.300	2.900	0.400	5.10 P.M.	25.10	2.04	80	62	70	1.1424
carpio			P.M.								18.02.2000						
Cyprinus	20.3.2000	Ovatide	10.00	25.3	4.100	3.799	0.301	3.900	3.249	0.651	3.20 P.M.	29.20	3.45	82	49	77	2.1783
carpio			A.M.	17.9							21.03.00						
Labeo	6.7.2000.	Ovaprim	7.15	29.2	2.100	1.996	0.104	1.900	1.700	0.200	7.00 P.M.	12.15	1.10	50	39	89	0.4895
robita			A.M.	24.3							06.07.2000						
Cirrhinus	10.7.2000	Ovaprim	10.00	30	2.200	1.948	0.252	1.700	1.300	0.400	9.15 P.M.	11.15	1.92	75	45	85	1.2240
mrigala			A.M.	27.8							10.07.00						
Labeo	16.7.2000	Ovatide	10.30	32.7	2.400	2.151	0.249	2.000	1.700	0.300	11.50 P.M.	13.20	1.00	12			
robito			A.M.								16.07.00						
Labeo	28.7.2000	Ovatide	10.15	26.4	2.900	2.600	0.300	2.500	2.000	0.500	8.00 P.M.	10.15	2.72	85	30	84	1.9421
rohita			A.M.								28.07.2000						
Cirrhinus	19.8.2000	Ovaprim	11.10	33.0	2.500	2.296	0.204	2.000	1.700	0.300	11.40 P.M.	12.30	1.89	5			
mrigala			A.M.								19.08.2000						
Cirrhinus	25.8.2000	Ovatide	7.30	25.3	2.800	2.600	0.200	2.600	2.000	0.600	4.00 P.M.	9.30	3.08	90	32	88	2.4394
mrigala			A.M.								25.08.2000						
Cyprinus	30.11.2000	Ovaprim	2.30	24.6	3.000	2.600	0.400	2.500	2.000	0.500	8.00 P.M.	30.30	2.62	78	57	71	1.4509
carpio			P.M.	20.2							01.12.2000						
Cyprinus	11.12.2000	Ovatide	4.30	21.6	3.800	3.400	0.400	3.600	3.100	0.500	10.30 P.M.	42.00	2.95	90	80	65	1.7257
carpio			P.M.	18.2							13.12.2000						
Cyprinus	10.1.2001	Ovaprim	2.35	16.3	3.500	3.300	0.200	3.400	3.140	0.260	12.35 P.M.	70.00	1.15	10			
carpio			P.M.								13.01.01						
Cyprinus	16.2.2001	Ovatide	9.00	24.3	3.600	3.444	0.156	3.000	2.674	0.326	6.35 P.M.	21.35	2.27	94	60	90	1.9204
carpio			A.M.	17.5							17.02.01						

$$\text{Fertilizer rate \%} = \frac{\text{No. of fertilized eggs}}{\text{total no. of eggs counted}} \text{x100}$$

$$\text{Hatching rate \%} = \frac{\text{No. of eggs hatched}}{\text{total no. of eggs in a batch}} \text{x100}$$

The water quality parameters recorded during the study were as follows:

Optimum temp. = 21.6 to 27.8^{0}C; pH, 7.2± 0.7; Dissolved oxygen (ml/l) – 5.21 to 6.00; free CO_2 (ppm) = 1.0 to 2.1.

RESULTS AND DISCUSSION

6 exercises on *Cyprinus carpio* ; 3 exercises on *Cirrhinus mrigala* and 3 exercises on *Labeo rohita* in the months of November to February and July and August 2000-2001 using ovaprim and ovatide injections were conducted in the hatchery. Compared to ovaprim, ovatide yielded better results. These results depict similarity with the results of CIFE, 1999 but differ from the observations made by Khan *et al.* (2006).

Using ovatide in *Labeo rohita* yielded eggs 2.72 Lakhs, fertilization 85 % and hatching 84%, whereas ovaprim in the same fish species produced 1.10 lakhs , 50% fertilization rate and 89% hatching percentage. The lower number of spawns were produced 0.4895 (ovaprim) compared to ovatide treatment (1.9421).

In the case of *Cirrhinus mrigala* number of eggs (1.92 Lakhs), fertilization % (75), hatching % (85) and number of spawn (1.224 Lakhs) were obtained by injecting ovaprim and by using ovatide number of eggs (3.08 Lakhs) fertilization % (90), hatching % (88) and no. of spawn (2.4394 Lakhs) were obtained.

By injecting *Cyprinus carpio* using ovaprim number of eggs laid (2.62 Lakhs), fertilization % (78) and hatching % (71) and number of spawn were obtained(1.451 Lakhs) whereas ovatide injection gave number of eggs (3.45 Lakhs) fertilization % (82) and hatching % (77) and number of spawn were produced (2.1783 lakhs) Thus, the findings also correlates to Bhatt and Qureshi's (2000) observation that ovatide is a less expensive indigenous inducing agent of carps and is 70 per cent more economical as compared to ovaprim.

Ovatide has also been used on threatened fish species *Mystus vitattus* and ovaprim on *Mystus gulio* and indigenous magur by Mukherjee *et al.* (2002). Ovatide has also been successfully injected in the threatened *Channa punctatis* by Marimuthu *et al.* (2009). The synthetic hormones like ovaprim and ovatide are known to act at the pituitary level leading to the secretion of fishes own endogenous gonadotropin. Endogenous gonadotropin appears to significantly enhance the secretion of the right type of steroids in abundant quantity enabling maturity of ova for spawning.

Marimuthu *et al.* (2009) have observed that by injecting ovatide (0.4ml kg per body weight) complete spawning occurred in *Channa punctatus* and fertilization rate (90.6%) and hatching (91.33%) rates were observed. In *Clarias batrachus,* Sahoo *et al.* (2007) have also observed that the injection of 1-5ml ovaprim / kg body weight ensures better fertilization rates. Ray (2005) have used ovatide in catfish, *Mystus gulio* at the rate of 2ml/ kg body weight of female and 1 ml/ kg body weight of male fish and ovatide gave better results and more number of eggs in comparison to pituitary extracts.

This technology can help to conserve threatened fish species through captive breeding programmes and also to generate new employment opportunities for rural people. Thus, the biodiversity of threatened fresh water fishes can be conserved and managed in Rajasthan (Fisheries Survey, 2009-10) by adopting the artificial propagation techniques and the water security in 1.80 Lac hectares of small ponds in Rajasthan can be enhanced.

Acknowledgement:

The author is grateful to Prof. Devender Mohan, Head Dept. of Zoology J.N.V. University, Jodhpur under whose guidance the study was done and the replication will be done in the MPOWER Project. The author would also like to express gratitude to the Project Director for providing the platform to incorporate rural aquaculture as livelihood opportunity for rural women of Western Rajasthan.

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RESEARCH PAPER:

Riparian vegetation analysis along Tungabhadra River

B.K. HARISH KUMARA AND S. SRIKANTASWAMY

Asian Journal of Environmental Science, (June, 2011) Vol. 6 No. 1 : 46-52

See end of the article for authors' affiliations

Correspondence to :

B.K. HARISH KUMARA

Department of Studies in Environmental Science, University of Mysore, Manasagangotri, MYSORE (KARNATAKA) INDIA

SUMMARY

The present study examined the variation in riparian vegetation communities along the Tungabhadra River, Karnataka, India. Direct sampling of 0.3 ha, by quadrat method for the study of plant communities and quantification of vegetation, documented 26 species and 87 individuals. Quantitative analyses on species diversity in addition to phytosociological attributes were conducted. The plant communities were determined in percentage of frequency, abundance value, relative density and importance value. The phytosociological studies revealed that in most part of area, the vegetation was characteristically dominated by *Pongamia pinnata* species followed by *Acacia nelotica*, which were also recorded as the most abundant and frequent species of the study area. The study also emphatically revealed that increase in the anthropogenic pressures within the river basin and surrounding landscapes have persistently stressed the riparian ecosystem structure adversely, besides altering its composition. The results indicated that the mean density and basal area of trees per plot were higher in the upstream of river than downstream. In addition, species composition indicated a relatively low or poor similarity between upstream and downstream. The Shannon–Weiner diversity of upstream was found to be 3.6, which was higher than downstream. The results of the present study clearly brought out the need for preparing and implementing site-specific conservation plans for riparian ecosystem.

Kumara Harish, B.K. and Srikantaswamy, S. (2011). Riparian vegetation analysis along Tungabhadra River, India. *Asian J. Environ. Sci.*, **6**(1): 46-52.

Key words : Riparian vegetation, Shannon–Weiner Index, Simpson index, Tungabhadra river.

The word "Riparian" itself means along the river margin. Plant communities seen along the river margins are commonly referred to as the riparian vegetation. From the beginning to the end of a river, the riparian zone is highly influenced by the quantum and flow of water in the river channel. Usually altitude, total rainfall, duration of rainy season, wind, and temperature along with soil characteristics, influenced by climatic factors determine the nature of plant communities (Nair, 1994). The riparian wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstance do support a prevalence of vegetation typically adapted for life in saturated soil conditions (James *et al.,* 1992). Variations in the environmental conditions provide a diversity of inhabitants, for both aquatic and terrestrial animal community (Cairns and Pratt, 1995).

The unit characteristics of riparian system result from the spatial allocation and configuration. The plant communities in these systems are likely to be affected by both longitudinal (*i.e.*, upstream-downstream) (Vannote *et al.,* 1980) and transversal (*i.e.,* stream- floodplain or floodplainbasin) (Newbold *et al.,* 1982) linkages for species recruitment and species diversity (Tabacchi, 1995). Riparian zones have been reported as some of the most species rich and most productive systems and they are also some of the most sensitive to human influence and potentially threatened ecosystems (Malanson, 1993). The riparian canopy regulates stream temperature through shadowing and provides organic matter via litter fall, while their root systems stabilize the bank and filter lateral sediment and nutrient inputs, thereby controlling stream sediment and nutrient dynamics.

The surfaces of submerged leaves are sites of primary and secondary production by micro algae and bacteria, which can be rival that of phytoplankton and bactereophils in water column. The community serve as food for grazing invertebrates and protozoa,

Received: *March, 2011*
Accepted : *April, 2011*