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RESEARCH ARTICLE

STUDY OF GONADO-SOMATIC INDEX AND ABSOLUTE FECUNDITY OF *BANGANA DERO* (HAMILTON, 1822) UNDER COLDWATER CONDITIONS.

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Abstract

An attempt was made to assess the Gonadosomatic Index (GSI) and Fecundity of an indigenous carp, *Bangana dero* widely distributed all along the foot hill regions of Himalayan ranges of India, Pakistan, Bangladesh, Nepal, Myanmar and China. This species has good food value with fair market demand. GSI of female fish was ranging from 1.192 to 15.785 with a highest value in the month of July (15.546±1.104) and lowest level observed in January (1.132±0.136). Single peak of GSI in the month of July indicates the spawning season of *Bangana dero*. The absolute fecundity was ranging from 72265 to 184322 ova with an Average fecundity was recorded as 1,11,200-1,44,416.Present findings highlight the reproductive potential of *Bangana dero*, which will be very helpful for the development of breeding and seed production of this species.

Introduction:-

Gonad as indicators of gonadal state. Many works had been done on the fecundity and gonadosometic index such as *Anabas testudineus* (Marimuthu, 2009), *Labeo rohita* (Alam and Pathak, 2010), *Labeo calbasu (*Mishra and saksena 2012), *Labeo dyocheilus* (Singh *et al*., 2008; Gupta *et al*., 2013). For the production of healthy fish seeds normal gonadal development very much essential. GSI not only gives the idea about the maturity level of fish but also helpful for estimating the breeding season of a fish.

Bangana dero (Hamilton, 1822) is a minor carp, commonly known as 'Kalabans' in India, 'Gardi' and 'Kathalegi' in Nepal, 'Kursa' in Bangladesh , is one of the popular food fish and is widely distributed all along foot hill regions of Himalayan ranges of India, Pakistan, Bangladesh, Nepal, Myanmar and China (Talwar and Jhingran, 1991). It is very important to know about GSI and fecundity of this carp, to get more and more information about its reproduction potential and usefulness as a candidate species for hill aquaculture.

Scanning of literature shows that there are no systematic work has been done on the fecundity and gonadosomatic index of *B. dero*. Therefore, the present study was undertaken to determine the fecundity and gonadosomatic index of *B. dero.*

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Materials And Methods:-

To record the average value of GSI and absolute fecundity , three female fishes of *B. dero* weighing from 150-350 g and length ranging from 19.60 to 30.50 cm were collected from fish market Ramnagar, Uttarakhand (29° 29.038' N latitude, 79.08777' E longitude and altitude 410 m MSL) every month from January 2017 to December 2017. Total length of each fish was measured with help of a meter scale to the nearest 0.1cm. The body weight of each fish was measured by means of a single pan balance. Two lobes of the ovary from each sample fish were removed carefully by dissecting out the abdomen and placed in modified gilson's fluid. It helped to preserve the ovary as well as made it much easier to separate the eggs from the ovarian wall. Gravimetric method was used to determine the fecundity of fish (Murua and Saborido-Rey, 2003). For estimating the absolute fecundity ovaries were taken after dissection and weighed on a single pan electronic balance. One gram each from six cross sectional samples was taken from anterior, middle and posterior regions of the paired ovary and the pieces were kept separately. Then the numbers of the ova were counted from these parts of the ovary. The total number of ova in the entire ovary was computed and the mean was calculated. GSI and absolute fecundity were estimated using following formulae.

$$GSI = \frac{Weight \text{ of gonad (g)}}{\text{Total body weight (g)}} \times 100$$

Absolute Fecundity = Number of ova in 1.0g of ovary × Total weight of ovary in g

Results and Discussion:-

The GSI values of *B. dero* were ranging from 1.192 to 15.785. Average GSI value increased gradually from April to July and decreased in the August in females of pond and stream. GSI ranged from 3.324 ± 0.143 to 14.115±1.214 in captive reared females and 4.136±0.254 to 15.546±1.104 in wild females attained a peak in July (15.546±1.104) and then started to decrease in August (13.083±0.667) onwards and reached its lowest level in January (1.132±0.136). Our findings matched with the GSI pattern reported by (Pandey *et al.,* 2011) in *L. dyocheilus*. Similar trend in GSI was also recorded by (Gupta *et al.,*2013) in *L. dyocheilus* kept under captive condition who observed normal ovarian development of fish. Greater value of GSI reflects the ovarian maturity in the fish (Mishra and Saksena, 2012). GSI can not only be used to predict the breeding season but also indicate the maturity status and periodicity of spawning of a fish (Khanna, 2003). Highest value of GSI in the month of July clearly indicates the fish spawned once in a year with one spawning peak highest in the month of July. Results presented in the table shows sudden decrease in gonad weight from September to January as indicated by the decline of GSI after spawning.

The absolute fecundity was ranging from 72,265 to 1,84,322 ova with an Average fecundity were recorded as 1,11,200-1,44,416. However, variation was observed in absolute fecundity from May to August presented in the Table 2. Value of absolute fecundity in present experiment was found almost similar to previous studies conducted for *B. dero*, (Biswas *et al.,* 1984); *L. dyocheilus,* (Sarkar *et al.,* 2001; Gupta *et al.,* 2013); *Cirrhinus reba* (Lashary *et al.,* 2007). Results clearly indicate that female fish with greater weight had higher fecundity. Similar kind of observation was also recorded (Khan *et al.,* 1992; Gupta *et al.,* 2013).

Fecundity of this fish is very high as compared to other cold water fishes, which reflects the importance of this fish to be incorporated into coldwater aquaculture sector as a new candidate species. Present findings highlight the reproductive potential of *B. dero*, which will be very helpful for the development of breeding and seed production of this species.

Table 1:-Monthly variation in GSI value of female *B. dero*.

Month	**Average weight of fish(g)** (Mean± SD)	**Ovary wt. (g)** (Mean± SD)	**GSI (%)** (Mean± SD)
Jan	243.13±42.25	2.752±0.87	1.132±0.136
Feb	198.00±58.88	2.839±2.31	1.434±0.167
March	270.00±36.48	7.419±4.96	2.748±0.672
April	350.30±23.42	11.367±5.90	3.245±0.699
May	346.66±60.27	17.828±3.55	5.143±0.158
June	451.67±65.88	46.797±17.43	10.361±1.445
July	480.67±82.60	74.724±20.20	15.546±1.104
Aug	410.00±75.82	53.640±10.35	13.083±0.667

Sept	373.33±80.08	33.457±6.58	8.962±1.038
Oct	322.00±102.88	11.344±9.45	3.523±0.672
Nov	310.00±75.49	6.770±5.32	2.184±0.234
Dec	391.67±29.29	7.449±2.28	1.902±0.200

Table-2:-Variation in Absolute Fecundity of *B. dero*

Month	**Average weight(g)** **(** Mean± SD**)**	**Ovary weight(g)** **(** Mean± SD**)**	**Absolute Fecundity** **(** Mean± SD**)**
May	346.66±60.27	17.828±3.55	82419.76±14588
June	451.67±65.88	46.797±17.43	134097.55±65332
July	480.67±82.60	74.724±20.20	178458.78±45363
August	410.00±75.82	53.640±10.35	90347.32±18776

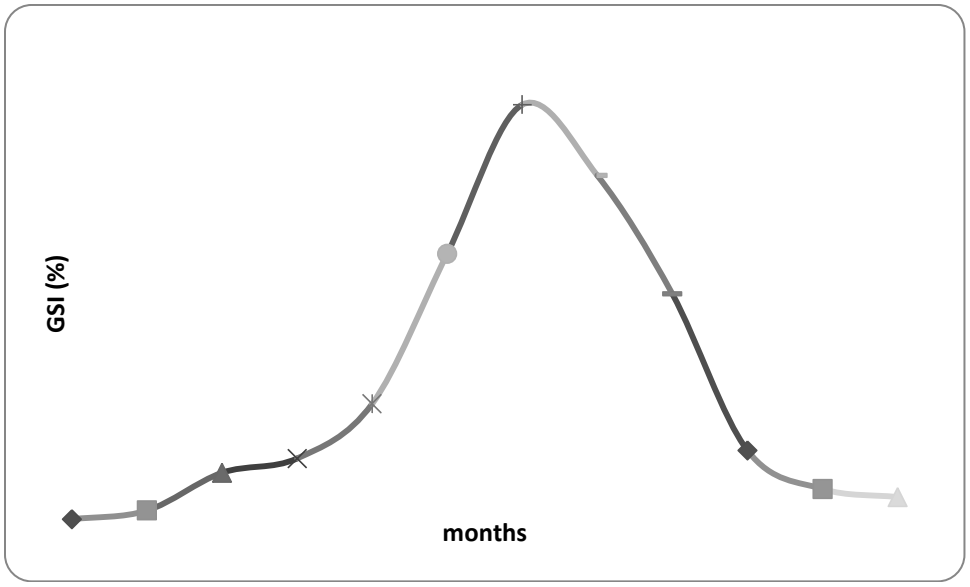

Fig.1:-Monthly variation in GSI value of female *B. dero*

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