

Relative and Absolute Fecundity of *Schizothorax Niger* and *Schizothorax Esocinus* at Dachigam National Park Kashmir

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Abstract: *Schizothorax niger* and *Schizothorax esocinus* were cultured on artificial diet at Dachigam National Park. The diet was composed of fish meal, Soya, mustard cake, wheat bran and rice bran. The feed was provided twice daily. Fishes having almost equal size and weight were selected. The results observed indicated that the absolute fecundity of *S.niger* was more as compare to *S esocinus*. Where as the relative fecundity of *S.niger* was less than *S.esocinus*. The P. Value for absolute and relative fecundity is 0.6467 and 0.8901 considered not significant.

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Key Words: *Schizothorax niger*, *Schizothorax esocinus*, relative fecundity, absolute fecundity.

1. Introduction

Schizothorax is commonly known as “Snow Trout” because it inhabits the snow fed streams and rivers of Kashmir valley where temperature ranges from 10-18°C. It is a delicate fish *Schizothorax esocinus* an important food fish, is reported to be distributed in eastern Himalaya through Garhwal, Kumaon to Jammu and Kashmir Himalayas in West. In Himalayan hill streams, this genus predominates in catches in Alakananda, Bhagirathi, in Jhelum river of Kashmir and in rivers of Yamuna and Ganga. In some perennial torrential streams of Jammu and Kashmir State, including Jhelum River, *Schizothorax* is the only fish in commercial catches. Despite its occurrence, no information is available on its natural and artificial food habits.

Fecundity is yet another factor of great significance to fish biology. Apart from its biological significance and being a major reproductive capacity of the females, the analysis of the fecundity data and its relationship with other morphological characters like size, age and weight have often been used to provide a reliable index of density dependent factors affecting the size of population. The fecundity of fish is much higher than the terrestrial vertebrates. The most fecund fishes have floating as well as pelagic eggs from which spawns emerge to attach themselves on the leaves and stems of water plants. The fecundity in marine fishes is usually higher than that of fresh water fishes.

Growth is a bioenergetics process, and is defined as a change in its length and weight over a period of time. It indicates the health of the individual and of the population and has been extensively studied for various species of fishes. The growth and age of a fish are closely related to each other

and depends on several factors like temperature, photoperiod, quality and quantity of food available, dissolved oxygen, ammonia, salinity, age and the state of maturity of the fish, interspecific and intraspecific competition among the individuals and crowding and disease etc. The rate of growth varies in different species, and in the same species living in different environmental conditions. *Schizothorax* like to live in oligotrophic environment but due to habitat degradation, over population, pollution, the breeding and feeding grounds of the species were being destroyed by various means. Hence due to above mentioned reasons studies on relative and absolute fecundity under controlled conditions were taken into consideration at Dachigam National Park Kashmir.

2. Material and methods

Study site

The study was carried out at Dachigam National Park Kashmir. The park is rich in streams, springs and ponds. The water is cool and crystal clear coming from the snow covered mountains. The *Schizothorax niger* and *S. esocinus* were brought from the fisheries department Kashmir and cultured for a period of twelve months at Dachigam National Park Kashmir.

Diet

All ingredients were hand blended and extruded through a commercial food grinder (0.48 cm diameter) without added heat. Diets were dried in a forced air oven (90+15) mechanically crumbled and hand sieved to sizes that could be taken by fish easily without waste. Diets were stored at 20°C. Portions were transferred to a refrigerator weakly as needed for feeding.

Feed was rationed at levels high enough to allow fish on all diets to feed to satiation. The feed was

applied at the rate of 4% body weight of the fingerlings throughout the experimental period of one

year. The diet was fed twice daily (morning and evening) in two equal portions.

Chemical composition of three feed ingredients.

Fish meal	Soya meal	Mustard cake	Wheat bran	Rice bran	
Group 1	50%	23%	11%	9%	7%
Group 2	40%	33%	7%	9%	11%
Group 3	30%	43%	9%	7%	11%
Control	*	*	*	*	*

Fecundity:

The fecundity of *Schizothorax* species was determined by gravimetric method;

$$F = \frac{W * (N1 + N2 + N3)}{(W1 + W2 + W3)}$$

Where, F =fecundity, W = total weight of ovaries (g), N1, N2 and N3 and W1, W2 are the ova counts and the weight of each sub sample respectively.

3. Results

Schizothorax niger and *Schizothorax esocinus* were cultured under artificial conditions. The results observed indicated that the absolute fecundity of fishes at control is less than fishes fed on artificial

feed. The standard deviation of *S. niger* observed at control is 87.32. *S. niger* having 167.21, 127.96, and 164.35 at feed first, feed second and at feed third respectively. Where as for *S. esocinus* the standard deviation of absolute fecundity at control was 80.57. On artificial diet it was 1278.25, 128.96 and 214.99.

The results observed on relative fecundity indicated that the relative fecundity at control is less than fishes fed on artificial feed. The standard deviation of *S. niger* observed at control is 3.41. *S. niger* having 6.07, 8.10, and 8.52 at feed first, feed second and at feed third respectively. Where as for *S. esocinus* the Standard deviation of absolute fecundity at control was 4.64. On artificial diet it was 4.64, 4.54, 9.39 and 7.63 at feed first, feed second and at feed third respectively.

Table-1. Effect of diet on the absolute fecundity of *S. niger* and *S. esocinus* (Site - Dachigam National Park)

Month	<i>S. niger</i> control	<i>S. esocinus</i> Control	<i>S. niger</i> Feed ist	<i>S. esocinus</i> Feed ist	<i>S. niger</i> Feed 2nd	<i>S. esocinus</i> Feed ist	<i>S. niger</i> Feed 2nd	<i>S. esocinus</i> Feed ist
Mean	1242.5	1222.5	1397.5	1278.25	1277.75	1368.5	1306.5	1345.25
S.D.	87.32	80.57	167.21	1278.25	127.96	128.96	164.35	214.99
Standard error of mean	43.66	40.28	83.60	63.97	63.97	64.48	82.17	107.49

Table 2. Effect of diet on the relative fecundity of *S. niger* and *S. esocinus* (Site - Dachigam National Park)

Month	<i>S. niger</i> control	<i>S. esocinus</i> Control	<i>S. niger</i> Feed ist	<i>S. esocinus</i> Feed ist	<i>S. niger</i> Feed 2nd	<i>S. esocinus</i> Feed 2nd	<i>S. niger</i> Feed 3rd	<i>S. esocinus</i> Feed 3rd
Month	42.5	41.75	43.25	43	43.5	42.5	46	48.25
S.D.	3.41	4.64	6.07	4.54	8.10	9.39	8.52	7.63
Standard error of mean	1.70	2.32	3.03	2.27	4.05	4.69	4.26	3.81

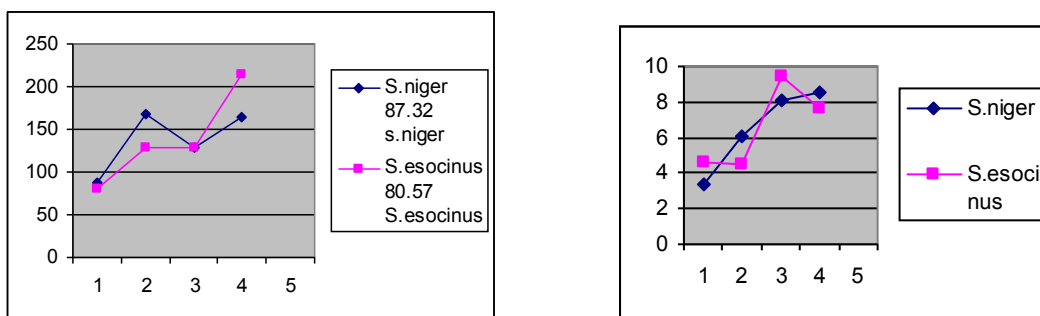


Fig. (a) Comparison of absolute fecundity of *S. Schizothorax niger* and *S. esocinus*. (B) Comparison of relative fecundity of *Schizothorax niger* and *S. esocinus*.

4. Discussion

During the present study fishes were fed on artificial diet made through gravimetric method. *Schizothorax niger* has shown better results of relative fecundity as compared to *S. esocinus*. Whereas *S. esocinus* has shown better results of absolute fecundity as compared to *S. niger*. Overall observations imply that diet, age, condition of fish, disease atmospheric conditions play an important role in fish health directly and on fecundity indirectly. Many workers have found similar findings. Nikolskii (1965) stated that fecundity is a specific feature that arises during the evolution of a new species adapted to a certain environment and is directed to the continuance of the species. Nikolskii (1965) stated that there may be marked changes in the fecundity within a population for a given size due to fluctuations in feeding conditions. The irregular fluctuations found in the relative fecundity of *S. niger* could not be attributed to any known environmental factor. The positive relation was found between the fecundity and length and weight of fish. Heidrich (1925) and Kestevan (1942) have shown that the total number of ova (absolute fecundity) holds some experimental relationship with the length of the fish in the same way as it does with the weight. Simpson (1951) found in place that the fecundity was related with the cube of the length and was thus directionally proportional to the fish weight. In *S. niger* the value of the exponent is higher (3.56) than the cube of the length as is also the case with the other species of the genus. But these values are not unique because values as low as 2.21 have been reported in *Rita rita* (Saxena, 1972) and as high as 5.48 in *labeo calbasu* (Pathak and Jhingran, 1978). Sunder and Subla (1984) have reported a steady increase in the absolute fecundity of *S. niger*. Age is reported to be a major factor in the determination of egg size (Nikolskii 1965). In the

present fish the egg diameter showed a marked increase with age. Increase in the total weight of the ovary caused a decline in the number of ova produced per unit weight of the ovary. Thus while there was an increase in fecundity with increase in the body weight, the number of ova per unit weight of the ovary shows decline. This is in line with the findings of Pivnev (1950) who reported a decline in the number of ova per unit ovary weight with increase in the diameter of egg. Bagarals (1978) gave the assumption that fecundity and the egg size are negatively correlated; this is also true for *Schizothorax niger*.

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