



Short Communication

On the Breeding Season of *Schizothorax plagiostomus*

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ABSTRACT

The breeding season of *S. chizothorax plagiostomus* was studied River Panjkora from February 2014 to January 2015. Kumrat valley in Khyber Pakhtunkhwa. The GSI values recorded monthly ranged from 2 to 13.5, the highest value was recorded in March while the lowest was recorded in April and October. We inferred that *S. plagiostomus* spawn twice a year, once in March-April and then in October-November.

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Authors' Contributions

AJ conceived and designed the study and wrote the article. RU and IU helped in fish collection. H and AR helped in preparation of manuscript.

Key words

GSI, Gonadosomatic index.

From the subfamily Schizothoracinae 12 species are reported from Pakistan (Javed *et al.*, 2012). The schizothoracine fishes provide a good material to study patterns of evolutionary modifications in terms of their biogeographic distribution. These species are expert in fast running high-elevation streams and rivers and show remarkable fitness for their environment. The Genus *Schizothorax* (Heckel, 1838) is one of the most diversified and abundant group with 68 species around Central Asia, Himalayas, Pakistan, India and Tibetan Plateau (He and Chen, 2006; Jan *et al.*, 2016). Snow trout, *Schizothorax plagiostomus* (Heckel, 1838) is the most important food fish of different rivers, lakes and tributaries throughout Himalayas extending to parts of China, Afghanistan, Nepal, Bhutan, North East India, Kashmir and northern areas of Pakistan including River Panjkora Dir Upper (Day, 1958). Raizada (1985), Chen and Cao (2000) and Kullander *et al.* (1999) reported that *S. plagiostomus* can weigh upto 2.5 kg and attain 60 cm length. It gets sexually mature at 18–24 cm length and spawns in natural and artificial environments in two seasons *i.e.* September to October and March to April. It spawns naturally in clear water on a gravelly or fine pebbled bed at 10–30 cm depth. The suitable water current for this fish is from 2.8 to 4 meter per second and optimum pH recorded is 7.5. The ideal dissolved oxygen concentrations is 10–15 mg/l and the suitable gravel size is 50–60 mm. Bhatangar (1964), Qadri *et al.* (1982) and Jan *et al.* (2014) have reported that

S. plagiostomus spawns twice a year. Jhingran and Sehgal (1978) however, have reported that it spawns only once a year in different months of the year at different elevations of riverine streams. The current study was, therefore, undertaken to determine the exact time frame of breeding season of *S. plagiostomus*.

Materials and methods

S. plagiostomus samples were collected fortnightly from River Panjkora from Kumrat Valley Thal to Chukyatan (Dir upper district spans from 34° N latitude and 72° 20E longitude (Khan, 2012) from February 2014 to January 2015. Mature gravid females were dissected to obtain the ovaries for gonadosomatic index (GSI) estimation. Stake nets, bag nets, cast nets, drag nets and some other types of traps were used to capture fishes according to the topography, depth and velocity of water at different locations.

Spawning season was determined by examining monthly variations in GSI (Wang and Chen, 1995) and microscopic analysis of maturity stages of ova periodically.

Results and Discussion

The lengths and weights of different collected specimens and their average absolute fecundity is given in Table I.

The monthly recorded values of GSI for *S. plagiostomus* are shown in Figure 1. Mature ripened ovaries (Fig. 2) were found from December to March and then from June to September. Spawning and spent ovaries were found in the months of April and May and to some extent in October and November.

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Table I.- Lengths and weights of *Schizothorax plagiostomus* and their average absolute fecundity.

Weight class g	Length range	Total No.	Average absolute fecundity
150-200	24.3-30.2	10	7169.88
200-300	30.2-32.9	11	7955.33
300-500	32.9-37.9	10	14185.83
500-700	38.2-40.8	15	21184.63
700-900	40.8-42.6	04	28671.11

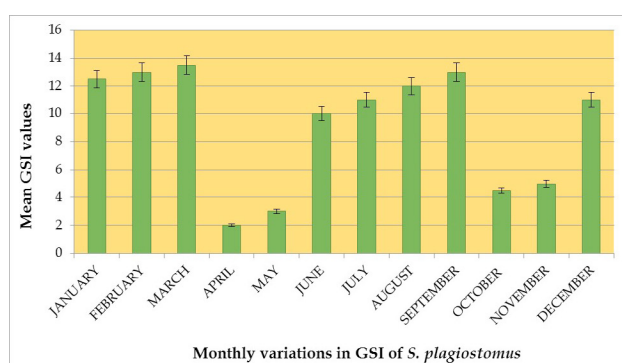


Fig. 1. Monthly variations in GSI of *S. plagiostomus*.

A sudden pronounced drop in GSI was recorded in April showing its sharp breeding season. More or less similar situation was observed in the months of October and November; however the GSI drop was not so sharp. Some of the fishes were found with developing ovaries during the months of October and November, while the rest were in the spawning and spent stages. Hatchlings and fries were observed during December-February,

further supporting the breeding season at November and December. Another fact observed was that fishes that were to spawn in April-May batch, had their eggs and ovaries matured right from December and January. The GSI values ranged from 2 to 13.5. Highest value was observed in the month of March, while lowest value was recorded in the month of April.

The fish remain sexually dormant because of intense cold and extremely low temperature of water. Finally some exteroceptive factors and favorable environmental conditions click the fish to spawn in spring season (Malhotra, 1967; Jyoti et al., 1973; Sunder, 1992; Jan et al., 2014).

In the River Panjkora, fishes were found to migrate slightly upper parts of the River during their spawning period. We collected fishes from all along the study site right from Thal Valley to Chukyatan Dir Upper. Mature gravid fishes that were ready to spawn were observed to move slightly in ascending direction to the upper parts of the River.

According to Lambert and Ware (1984), batch spawning reproductive strategy may be associated with increase in probability of survival of offspring. Bhatangar (1964), Qadri et al. (1982) and Jan et al. (2014) are of the view that *S. plagiostomus* spawns twice a year. In contrast, Jhingran and Sehgal (1978) reported that it spawns only once in different months of the year at different elevations of a given river. Our study area covers a length of about 80 km of River Panjkora and elevation difference of only 500 meters. Our study suggests that this much elevation cannot account for a spawning difference of 5 months as we have found. Therefore, we also suggest that *S. plagiostomus* might be spawning twice a year. Water temperature may be the principal environmental factor to synchronize the endogenous physiological rhythms (Papoulias et al., 2006).



Fig. 2. Bi-lobed ripened ovaries of the gravid female fish.

In the present study, gonadal development of *S. plagiostomus* initiated in May and continued upto September, which suggests that gonadal development may be induced by increasing water temperature. The ovaries keep on growing and maturing from November to March of the following year. It does not spawn until the water temperature increases in April although the ovaries matured even during the cold season but the fish did not begin to spawn until late spring. Qadri *et al.* (1982) have found similar finding about the timing of maturation and spawning for *S. richardsonii*.

Statement of conflict of interest

Authors have declared no conflict of interest.

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