Research Article

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Study on Stock Health of Non-Native Fish Species, *Cyprinus Carpio* (Linnaeus, 1758) through Age Pyramid from the Tributary of the Ganga River, India

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Abstract

Age pyramid of *Cyprinus carpio* was studied during February 2019 to January 2020 from fish landing centre at Sirsa, Prayagraj, Uttar Pradesh, India. The key scales were studied for estimation of age and formation of age pyramid in the present study. A total of 548 fish specimens in length ranges between 97 to 687 mm and age classes of 0+ to 9+ were reported. Age pyramid showed a tendency for urn shape as mature age groups occurred in higher proportion in case of male, female and pooled samples.

The age groups 0+ constituted immature individuals (about 50% to 70%) in the stock while 1+ age group shared immature near about 2-5%. The age group 1+ dominated by virtue of numbers in male (23.53%), in female (24.64%) and in pooled (24.09%) samples. Hence, the proportion of 0+ age group was much less than 1+ age group. The 2+ age group was second most dominating age group in case of male, female and pooled samples.

The distribution was uneven between 0+ to 1+ age group, as difference was 15.18% in male, 18.48% in female and 17.34% in pooled sample. The share of fishes abruptly declined between 4+ to 5+ age group in case of male, female and pooled samples. The health of the stock of *C. carpio* is very stable in the Tons river at Prayagraj that dominate to indigenous fishes especially Indian major carp (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*).

Keywords: Age pyramid; *Cyprinus carpio*; Ganga basin; Riverine ecosystem; Stock health; Tons river

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Introduction

The Tons river is a right bank tributary of the Ganga river which forms confluence at Sirsa near Meja at Prayagraj district, Uttar Pradesh, India (Map 1).

Cyprinus carpio (Linnaeus, 1758) is commonly known as Common carp, belongs to a family Cyprinidae of order Cypriniformes is a freshwater species in India. It is commercially exploited in riverine ecosystem especially Ganga basin [1-4]. Currently, *C. carpio* is widely distributed throughout the world, due to its introduction in many countries to develop aquaculture industry [5-7]. (Froese & Pauly 2016, Tripathi et al 2017, Mishra and Dwivedi 2020).

It is adapted for cultivation with different type of fishes especially Indian Major Carp (*Catla catla, Labeo rohita, Cirrhinus mrigala*) in India, Pakistan and Bangladesh [8-10].

C. carpio is normally considered to be one of the most ecologically detrimental fish species in both lotic and lentic ecosystem [11-16]. *C. carpio* is also commonly called an ecological pest because it can change ecological characteristics (Example feeding ground, food supply, richness of species and breeding ground) of aquatic ecosystems [17-20].

Map 1: Tons river map with Allahabad district now Prayagraj district. The sampling site Sirsa is confluence of Tons river from the Ganga river at Prayagraj, Uttar Pradesh.

The present study would help the fishery managers and planners in the managing of *C. carpio* fishery in respect of Indian major carp

(*Catla catla, Labeo rohita, Cirrhinus mrigala*) of the Tons river, Uttar Pradesh, India.

Material and Methods

The fish samples of *Cyprinus carpio* were collected from fish landing centre at Sirsa, Prayagraj, Uttar Pradesh, India during February 2019 to January 2020 (Map 1). Samples of the key scales from 548 fish specimens in the length ranges between 97 to 687 mm were examined for determination of age class and age pyramid. The total length of each fish was measured and recorded in mm, from the tip of snout and the end of longest caudal fin rays. The key scales were removed from the region just below the dorsal fin (3 to 4 rows) and above the lateral line [1,21-23].

The scales were cleaned in 5% KOH solution to remove adhering-tissues and finally washed in distilled water. The scales were then pressed while drying in order to avoid their curling. The season with "Minimum width in the terminal part of the anterior field of the scale" was designated as the period of ring formation. Since this condition occurred only once a year, the ring was designated as annuli. The total length and growth rate were recorded as differences between-at-age. The number of fishes in each age class was converted into percentage to obtain age pyramid.

Results and Discussion

Age pyramid were determined for male, female and pooled samples separately from the Tons river at Prayagraj, Uttar Pradesh, India. The age groups varied from 0+ to 9+ in the Tons river at Prayagraj in samples of male, female and pooled. The 0+ age group comprised 7.35%, 6.16% and 6.75% in case of male, female and pooled samples, respectively (Table 1).

Age classes	Number of male	Percentage	Number of female	Percentage	Pooled samples	Percentage
0+	20	7.35	17	6.16	37	6.75
1+	64	23.53	68	24.64	132	24.09
2+	57	20.95	60	21.74	117	21.35
3+	50	18.38	52	18.84	102	18.61
4+	37	13.60	39	14.13	76	13.87
5+	20	7.35	23	8.33	43	7.85
6+	12	4.41	9	3.26	21	3.83
7+	7	2.57	5	1.81	12	2.19
8+	3	1.11	2	0.72	5	0.91
9+	2	0.73	1	0.36	3	0.55
Total	**272**		**276**		**548**	

Table 1: Age pyramid structure of Cyprinus carpio from the Tons river at Prayagraj, India.

The age group 1+ dominated by virtue of numbers in male (23.53%), in female (24.64%) and in pooled samples (24.09%) (Figures 1-3).

Hence, the proportion of 0+ age group was much less than 1+ age group. The 2+ age group was second most dominating age in case of male, female and pooled samples. In case of male, the middle age groups shared 18.38% (3+), 13.60% (4+), 7.35% (5+) and 4.41% (6+) while in case of female, contributed 18.84% (3+), 14.13% (4+), 8.33% (5+) and 3.26% (6+).

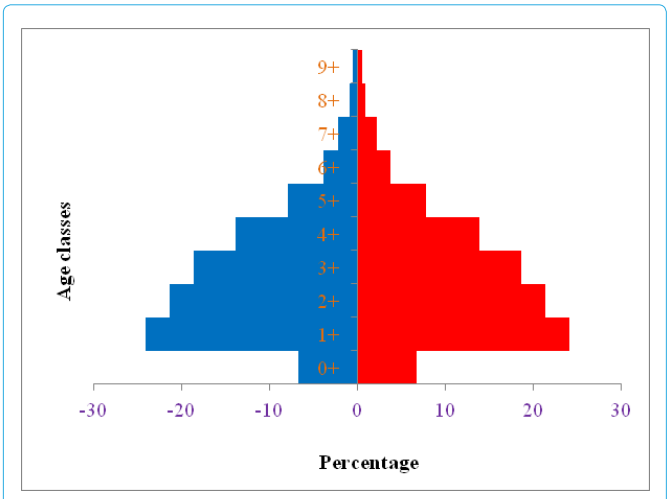

Figure 1: Age pyramid of Cyprinus carpio from the Tons river (Pooled) at Prayagraj, India.

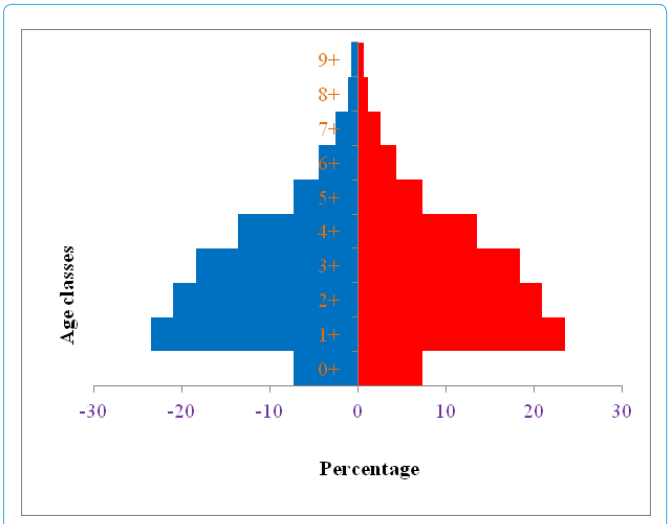

Figure 2: Age pyramid of Cyprinus carpio from the Tons river (Male) at Prayagraj, India.

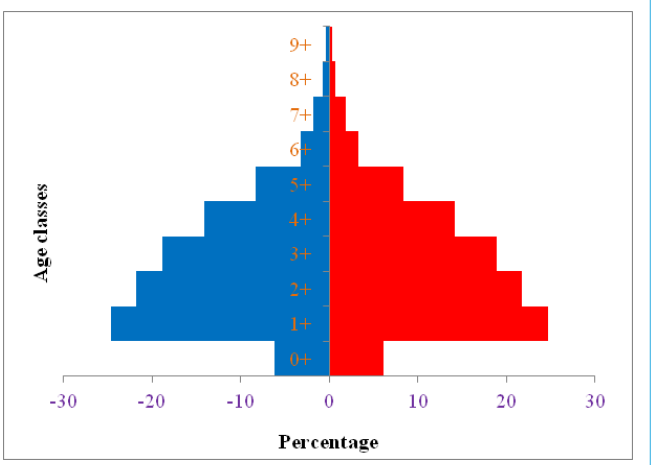

Figure 3: Age pyramid of Cyprinus carpio from the Tons river (Female) at Prayagraj, India.

In case of pooled sample, the middle age groups accounted for 21.35%, 18.61%, 13.87% and 7.85% in 3+, 4+, 5+ and 6+, respectively (Table 1). The distribution was uneven between 0+ to 1+ age group, as difference was 15.18% in male, 18.48% in female and 17.34% in pooled sample. The share abruptly declined between 4+ to 5+ age group in case of male, female and pooled samples.

Age pyramid showed a tendency for urn shape as mature age groups occurred in higher proportion in case of male, female and pooled sample (Figures 1-3). The age groups 0+ constituted immature individuals (about 50% to 70%) in the stock while 1+ age group shared immature near about 2 to 5%. The health of the stock of *C. carpio* is very stable that dominate to the indigenous fishes especially Indian major carp (*Catla catla, Labeo rohita, Cirrhinus mrigala*). Indian major carp and *C. carpio* are large size fish species and both are most active in the monsoon season due to spawning season. These above species are struggling each other for food and breeding ground in the Tons river due to water holding potential of the river. The urn shaped pyramid indicates a low percentage of young individuals in the total stock [22-24]. [1] was recorded urn shaped age pyramid in *Cyprinus carpio* var. *communis* from the Ganga river at Allahabad. The urn shaped age pyramid of *Oreochromis niloticus* was observed from the Yamuna river at Allahabad, India [25,26]. Were stated that the age group 1 was the most dominant age group with 67.48% for *O. niloticus* in the Nile river, Egypt.

The landing scenario (Harvesting stock) of fishes is altering year to year due to fishing pressure, mesh size, length of net and natural mortality [27-30].

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