Journal of the Kalash Science
Volume-9, Number-1, 2021 : 19-24

Website: www.kalashj.com
E-mail: saajjjan@rediffmail.com
ISSN: 2321-7634

Age pyramid of Common carp, *Cyprinus carpio* (Linnaeus, 1758) from the Tons river, India

Priyanka Mayank[1], Amitabh Chandra Dwivedi[2] and Neeti Mishra[1],
[1]Kalash Research and Welfare Society, Prayagraj-211002, Uttar Pradesh, India
[2]Department of Zoology, Nehru Gram Bharati (Deemed to be University), Prayagraj, Uttar Pradesh, India
Corresponding E-mail: saajjjan@rediffmail.com

Accepted: 23 May 2021

Abstract

Freshwater fishes are important and valued property for income, human food, sport and ornamental purposes. The key scales were studied for estimation of age and formation of age pyramid of *Cyprinus carpio* during February 2019 to January 2020 from the fish landing centre at Sirsa, Prayagraj, Uttar Pradesh, India. 548 fish specimens in the length ranges between 97 to 687 mm and age classes of 0+ to 9+ were selected for the present study. Age pyramid showed a tendency for urn shape as mature age groups occurred in higher proportion. The age group 1+ dominated by virtue of numbers (24.09%). Hence, the proportion of 0+ age group was much less than 1+ age group. The age groups 0+ constituted mostly immature individuals (about 50% to 70%) in the stock whereas 1+ age group shared immature nearly about 2-5%. The 2+ age group was second most dominating age group in the samples. The distribution was uneven between 0+ to 1+ age group, as difference was 17.34%. The share of fishes abruptly declined between 4+ to 5+ age group. The health of the stock of *C. carpio* is very stable in the Tons river at Prayagraj that dominate to indigenous fishes especially *Catla catla, Labeo rohita, Cirrhinus mrigala* (Indian major carp).

Keywords: *Cyprinus carpio*, Age pyramid, stock health, Tons river, Ganga basin, Riverine ecosystem

Introduction

Fisheries of the Ganga river basin are very vital for the livelihood of fishers/fishermen near the river bank and fish sellers, India. *Cyprinus carpio* is commonly known as Common carp, belongs to a family Cyprinidae of order Cypriniformes is a freshwater species in India. *C. carpio* prefer larger and slow moving water bodies with soft sediments. It is commercially exploited in the riverine ecosystem especially Ganga river system (Pathak *et al.* 2011, Dwivedi *et al*. 2016a, 2017a, Tripathi *et al.* 2017a, Dwivedi & Mishra 2021). It is frequently cultivated with different other carp fishes especially Indian Major Carp (*Catla catla, Labeo rohita, Cirrhinus mrigala*) in India, Pakistan and Bangladesh (Joadder *et al.* 2009, Jha *et al.* 2015, Khan *et al.* 2016). Currently, *C. carpio* is widely distributed throughout the world, due to its introduction in many countries to develop aquaculture industry (Froese & Pauly 2016, Tripathi *et al.* 2017b, Mishra & Dwivedi 2020).

It is normally considered to be one of the most ecologically detrimental fish species in both lotic and lentic ecosystem (Dean 2001, Dwivedi 2006, Zambrano *et al.* 2006, Nautiyal & Dwivedi 2019, Tessema *et al.* 2020). *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 (Mayank & Dwivedi 2015a, Tiwari *et al.* 2016, Dwivedi *et al.* 2017a, Mishra & Dwivedi 2020). 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 (Dwivedi & Nautiyal 2020, Mayank *et al.* 2015, 2018, Nautiyal & Dwivedi 2020).

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.

Result and discussion

Age pyramid of *C. carpio* was determined from the Tons river at Prayagraj, Uttar Pradesh, India. The age groups of *C. carpio* was varied from 0+ to 9+ in the Tons river at Prayagraj. Age pyramid showed a tendency for urn shape as mature age groups occurred in higher proportion (Fig. 1). The 0+ age group comprised 6.75% in the total samples. The age groups 0+ constituted mostly immature individuals. The age group 1+ dominated by virtue of numbers (24.09%) (Fig. 1). Hence, the proportion of 0+ age group was much less than 1+ age group. The 2+ age group was second most dominating age. The middle age groups shared for 21.35%, 18.61%, 13.87% and 7.85% in 3+, 4+, 5+ and 6+, respectively. The distribution was uneven between 0+ to 1+ age group, as difference was 17.34%. The share abruptly declined between 4+ to 5+ age group. 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 (Mayank & Dwivedi 2015a, Odum 1971). Pathak *et al.* (2011) was recorded urn shaped age pyramid in *Cyprinus carpio* var. *communis* from the Ganga river at Allahabad, Uttar Pradesh. Mayank *et al.* (2018) was observed the urn shaped age pyramid in *Oreochromis niloticus* from the Yamuna river at Allahabad, India. The landing scenario of fish is fluctuated year to year and season to season in the riverine system due to size of mesh, length of net, fishing pressure, natural mortality and invasion of exotic fish species (Mayank & Dwivedi 2015b, Dwivedi *et al.* 2016a, 2017b, 2017c, Tripathi *et al.* 2013, 2017b, Mishra *et al.* 2021, Gopesh *et al.* 2020).

References

Dean, T 2001. Invasive freshwater fish in New Zealand; DOC's present and future management. In: Managing invasive freshwater fish in Zealand. Proc. workshop Dept. of conservation, 10–12 May, 2001, Hamilton. 2003; Pp1-8.

Dwivedi, A.C. & N. Mishra 2021. Age structure of non-native fish species, *Cyprinus carpio* (Linnaeus, 1758) from the tributary of the Ganga river, India. *Journal of Aquaculture & Marine Biology,* **10(2):** 76-79. DOI: 10.15406/jamb.2021.10.00309.

Dwivedi, A.C. & P. Nautiyal 2010. Population dynamics of important fishes in the Vindhyan region, India. LAP LAMBERT Academic Publishing GmbH & Co. KG, Dudweiler Landstr. 99, 66123 Saarbrucken, Germany, Pp. 220.

Dwivedi, A.C. 2006. Age structure of some commercially exploited fish stocks of the Ganga river system (Banda-Mirzapur section). Ph. D. thesis submitted to Department of Zoology, University of Allahabad, Prayagraj, (Uttar Pradesh), Pp. 138.

Dwivedi, A.C., M. Mayank & A. Tiwari 2016a. The River as transformed by human activities: the rise of the invader potential of *Cyprinus carpio* and *Oreochromis niloticus* from the Yamuna River, India. *Journal of Earth Science & Climatic Change,* **7(7):** 361. doi: 10.4172/2157-7617.1000361.

Dwivedi, A.C., P. Mayank & A. Tiwari 2017c. Size selectivity of active fishing gear: changes in size, age and growth of *Cirrhinus mrigala* from the Ganga River, India. *Fisheries and Aquaculture Journal,* **8(2):** DOI: 10.4172/2150-3508.1000205.

Dwivedi, A.C., P. Mayank & R.K. Pathak 2016b. Size composition and exploitation structure of Indian major carp, *Cirrhinus mrigala* (Hamilton, 1822) from the Ganga river, India. *J. Fish. Life Sci.,* **1(1):** 30-32.

Dwivedi, A.C., P., Mayank, S. Tripathi & A. Tiwari 2017a. Biodiversity: the non-natives species versus the natives species and ecosystem functioning. *Journal of Biodiversity, Bioprospecting and Development,* **4(1):** DOI: 10.4172/2376-0214.1000164.

Dwivedi, A.C., S. Khan & P. Mayank 2017b. Stressors altering the size and age of *Cirrhinus mrigala* (Hamilton, 1822) from the Ghaghara River, India. *Oceanography Fish Open Access Journal,* **4(4):** 555642. DOI: 10.19080/OFOAJ.2017.04.555642.

Froese, R. & D. Pauly (Eds.) 2016. Fish Base. World Wide Web electronic publication. www.fishbase.org, version (06/2016).

Gopesh, A., S., Tripathi, K. D. Joshi & A.C. Dwivedi 2020. Size composition, exploitation structure and sex ratio of *Clupisoma garua* (Hamilton) from middle stretch of the Ganga River at Allahabad, India. *Natl. Acad. Sci. Lett*., https://doi.org/10.1007/s40009-020-01011-0.

Jha, D.N., K.D. Joshi, A.C. Dwivedi, P. Mayank, M. Kumar & A. Tiwari 2015. Assessment of fish production potential of Chitrakoot district, Uttar Pradesh. *Journal of the Kalash Science,* **3(3, Special Volume):** 7-10.

Joadder, A.R., M.D. Hossain & Nur-E-Shirin 2009. Fecundity and sex ratio of Common carp, *Cyprinus carpio* Var. *communis* (L.). *J. Bio-sci.,* **17:** 159-160.

Khan, M.N., K. Shahzad, A. Chatta, M. Sohail, M. Piria & T. Treer 2016. A review of introduction of common carp *Cyprinus carpio* in Pakistan: origin, purpose, impact and management. *Croatian Journal of Fisheries,* 71-80. DOI: 10.1515/cjf-2016-0016.

Mayank, P. & A.C. Dwivedi 2015a. Dwivedi AC. Biology of *Cirrhinus mrigala* and *Oreochromis niloticus*. LAP LAMBERT Academic Publishing GmbH & Co. KG, Dudweiler Landstr. 99, 66123 Saarbrucken, Germany, Pp. 188.

Mayank, P. & A.C. Dwivedi 2015b. Population structure of alien fish species, *Oreochromis niloticus* (Linnaeus 1758) from lower stretch of the Yamuna river, India. *J. Kalash Sci*., **3(1):** 35-40.

Mayank, P., A.C. Dwivedi & R.K. Pathak 2018. Age, growth and age pyramid of exotic fish species *Oreochromis niloticus* (Linnaeus 1758) from the lower stretch of the Yamuna river, India. *Natl. Acad. Sci. Lett.,* **41(6):** 345-348. doi.org/10.1007/s-40009-018-0673-7.

Mayank, P., R.K. Tyagi & A.C. Dwivedi 2015. Studies on age, growth and age composition of commercially important fish species, *Cirrhinus mrigala* (Hamilton, 1822) from the tributary of the Ganga river, India. *European J. Exp. Biol.,* **5(2):** 16-21.

Mishra, N. & A.C. Dwivedi 2020. Environmental derivers supports to distribution, composition and biology of *Cyprinus carpio* (Linnaeus, 1758) in respect of time scale: A review. *Journal of the Kalash Science,* **8(2):** 91-102.

Mishra, N., A.C. Dwivedi & P. Mayank 2021. Invasion potential, impact and population structure of non-native fish species, *Cyprinus carpio* (Linnaeus, 1758) from the tributary of the Ganga River, Central India. *Aquacult. Fish. Stud.,* **3(3):** 1-4. DOI: 10.31038/AFS.202132.

Nautiyal, P. & A.C. Dwivedi 2019. Fishery in the tributaries of Yamuna river (Ken river, Paisuni river) and Ganga river (Tons river). *J. Mountain Res.,* **14(2):** 19-36.

Nautiyal, P. & A.C. Dwivedi 2020. Growth rate determination of the endangered Mahseer, *Tor tor* (Hamilton 1822) from the Bundelkhand region, central India. *J. Fish. Res.,* **4(2):** 7-11.

Odum, E.P. 1971. Fundamentals of ecology, 3rd edn. Saunders College Publishing, Phialadelphia.

Pathak, R.K., A. Gopesh & A.C. Dwivedi 2011. Age composition, growth rate and age pyramid of an exotic fish species, *Cyprinus carpio* var. *communis* from the Ganga river at Allahabad, India. *Natl. Acad. Sci. Lett.,* **34(5/6):** 223-228.

Tessema, A., A. Getahun, S. Mengistou, T. Fetahi & E. Dejen 2020. Reproductive biology of common carp (*Cyprinus carpio* Linnaeus, 1758) in Lake Hayq, Ethiopia. *Fisheries and Aquatic Sciences,* **23:**16.Doi.org/10.1186/s41240-020-00162-x.

Tiwari, A., A.C. Dwivedi & P. Mayank 2016. Time scale changes in the water quality of the Ganga River, India and estimation of suitability for exotic and hardy fishes. *Hydrology Current Res.,* **7(3):** 254. doi:10.4172/2157-7587.1000254.

Tripathi, S., A. Gopesh & A.C. Dwivedi 2017a. Fish and fisheries in the Ganga river: current assessment of the fish community, threats and restoration. *Journal of Experimental Zoology, India,* **20(2):** 907-912.

Tripathi, S., A. Gopesh & A.C. Dwivedi 2017b. Framework and sustainable audit for the assessing of the Ganga river ecosystem health at Allahabad, India. *Asian Journal of Environmental Science,* **12(1):** 37-42. DOI: 10.15740/HAS/AJES/12.1/37-42.

Tripathi, S., A. Gopesh, K.D. Joshi, A.C. Dwivedi & P. Mayank 2013. Studies on feeding behaviour of *Labeo bata* (Hamilton, 1822) from the lower stretch of the Yamuna river, Uttar Pradesh. *J. Kalash Sci.,* **Special Volume:** 49-52.

Zambrano, L., E. Martinez-Meyer, N. Menezes & A. Townsend Peterson 2006. Invasive potential of common carp (*Cyprinus carpio*) and Nile tilapia (*Oreochromis niloticus*) in American freshwater systems. *Canadian J. Fish. Aquatic Sci.,* **63:** 1903-1910.

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

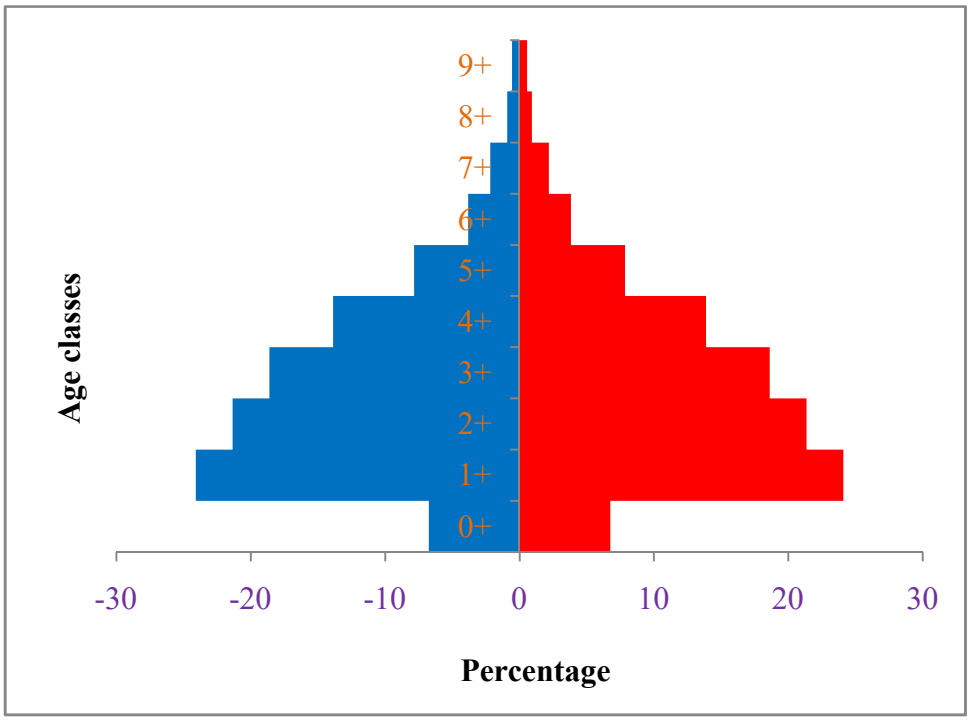

Fig. 1 Age pyramid of *Cyprinus carpio* from the Tons river at Prayagraj, India