CHAPTER 5 - AGE AND GROWTH OF THE FISH

5.1. INTRODUCTION

The study on age and growth determination of fish is very formal and fundamental components and has a great significance for not only in fisheries biology but it is equally important for providing information about stock management, age of maturity, life span, yield and production also. The proper knowledge on the age and growth of the fish is a prerequisite for studying population dynamics and maintaining sustainable yields in aquaculture (Campana and Thorrold, 2001). The age wise growth rate of the fish is species specific, some fish shows higher weight increment than others at same length of time, whereas some attain more length than others. Even in the same species, the growth rate differs between both sexes and also with the different seasons of the year which is related to environmental conditions especially on water temperature (Akamine, 1993). The main objective to study on age and growth of the fish is to assess the maximum level of production of a species in relation to a particular culture period.

A good number of scientific information is available on age and growth rate studies of fishes. Determination of age and growth of the fish has still continued to be one of the most important actions by fisheries professional (Jackson, 2007). In the year 1895 Peterson first described the method of determination the age of that fish from the frequency curve. The effect of diet, the temperature variation and population density on growth of fry and fingerling stages of Blue gourami was observed by Degani, 1991. The

curve linear relationship of weight and length growth performance of Golden Mahseer in captive condition was observed by Sharma, 2005. Various studies on the age and growth of fish were done by different workers, out of those valuable works some are, Le Cren, 1947; Burnet-Herkes, 1975; Barger, 1990; Seshappa, 1999; McGravey and Fowler, 2002; Allam *et al*., 2004; Harris *et al*., 2007; Bustos *et al*., 2009; Aziz *et al*., 2013 and Potts *et al*., 2016.

Frequency distributions are commonly used in small fishes to estimate growth parameters. The length frequency curve is also used to assess the fish stock status (Froese and Binohlan, 2000). Length frequency distribution is more important parameter than length variance.

5.2. MATERIALS AND METHODS

5.2.1. Age wise growth determination:

Among the various methods of fish age and growth determination the three basic methods are, (1) direct observation of the growth of fish with known age, (2) study of fish size-frequency distribution and (3) study of seasonal annuli formation in calcified body parts such as scales and bones of fish (Khan and Khan, 2014). For this study, the direct observation method is used to determine the age and growth of the fish. In this method the fish with known age are maintained under captive condition and observed the changing growth with the age.

5.2.2. Length frequency distribution:

Total 400 specimens were observed for calculating the length frequency distribution. The total length measurements are converted into frequencies with constant class intervals of 15 mm and tabulated. The graphical representation also shows.

5.2.3. Data collection and analysis:

For the study the fishes were obtained from the experimental aquarium and tanks of ICAR-CIFE, Kolkata and Ramkumar Fishery Farm at Domjur under Howrah district. After random sampling of the specimens, their total length and weight were taken and the data were noted down. The observation period extended from 2015-2017. After taking all the data, were analysed with the help of MS Excel, 2010 software.

5.3. RESULTS

5.3.1. Age wise growth determination:

The direct method of age and growth determination study of *C. nobilis* during 5 days to 320 days, is represented in **Table 10**. The length and weight growth estimated by direct method were plotted separately against the corresponding ages (**Figure 18 and 19**) to obtain the growth curves.

Table 10. Age and growth relationship of *C. nobilis*

Age group (Days)	No. of fish	Average length (mm)	Average weight (g)
5	15	5	0.02
15	26	9	0.06
30	23	13	0.26
50	27	18	0.44
70	24	29	0.85
100	21	40	1.68
130	25	50	2.58
170	24	63	4.56
220	26	83	7.83
270	24	90	8.41
320	22	96	9.05

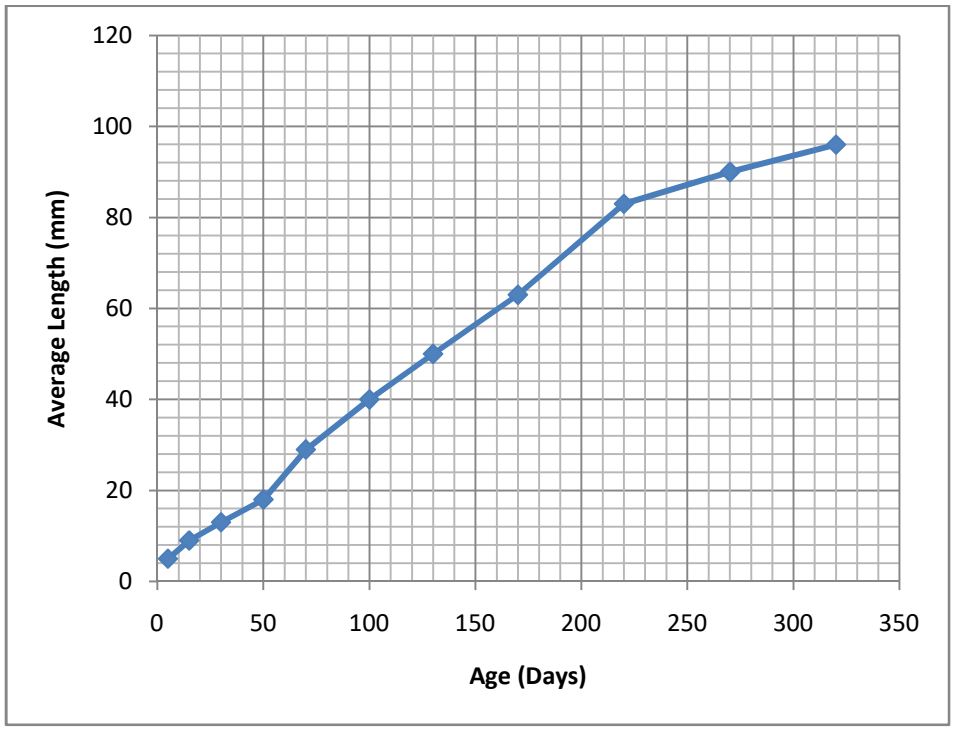

Figure 18. Length wise Growth curve of *C. nobilis*

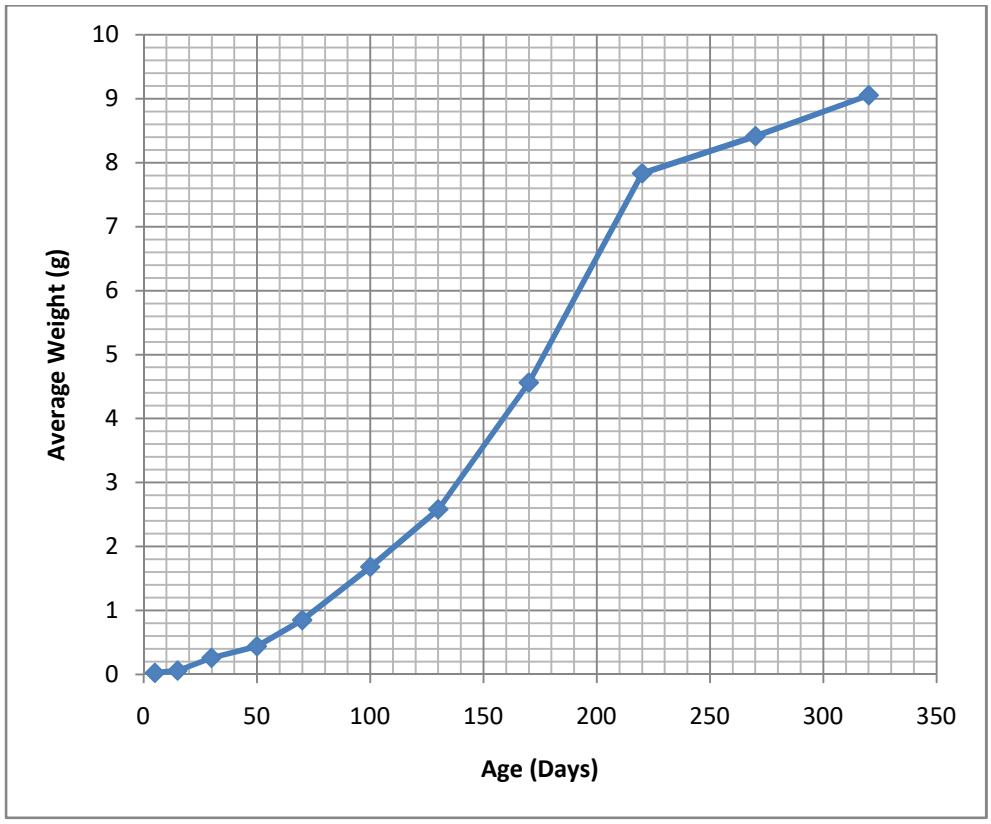

Figure 19. Weight wise Growth curve of *C. nobilis*

5.3.2. Length frequency distribution:

From the present study it is observed that the total length of the fish ranges from 23 to 100 mm. The maximum number of fish observed within 45-60 mm (44.75%) and minimum number of fish observed within 23 to 30 mm (4.5%) size range (**Table 11, figure 20**).

Table 11: Total length frequency distribution of *C. nobilis*

Bin	Frequency	Distribution %
30	18	4.5%
45	58	14.05%
60	179	44.75%
75	93	23.25%
90	32	8.00%
105	20	5.00%

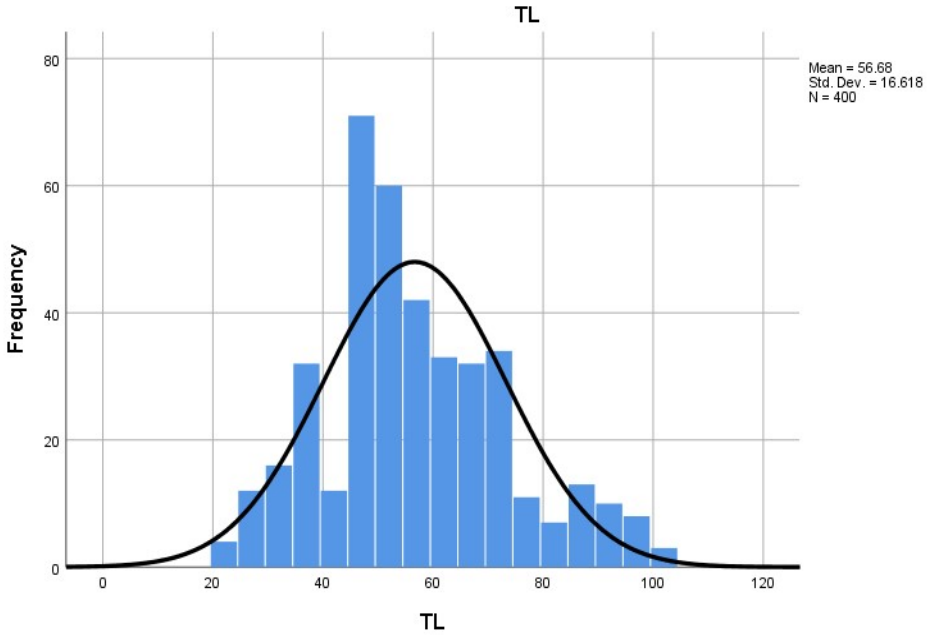

Figure 20. Length frequency distribution curve of *C. nobilis*

5.4. DISCUSSION

The age and growth determination of the fish is very significant for assessing health of fish population (Francis, 1990). Several methods have been used to estimate the growth of fish, including mark-recapture experiments, length-frequency analyses and

growth of hard body parts like scales, otoliths, and vertebrae (King, 2007). Age and growth study of the fish in captive system by direct observation method is the easiest and most convenient for aquaculture. The present study was aimed at obtaining a distinct growth curve of the species by which the optimum length and weight could be determined for finding out the right time for breeding and aquarium keeping of the fish stock. As there was no such information available on the age and growth rate of *C. nobilis* so from the above data it can be said that within 9-10 months of age the fish become matured. From length frequency distribution study it also concluded that the ideal age for keeping in aquarium is from 3-4 months and the length varies from 45-60mm.