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Effect of Bathua (*Chenopodium album*) on different water quality parameters for common a carp (*Cyprinus carpio*) (Linnaeus, 1758) fingerling

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Abstract
The 60 days experiments was conducted to assessment of water quality parameters when Common carp (*Cyprinus carpio*) fingerlings fed with Bathua (*Chenopodium album*). Common Carp fingerlings were stocked at the rate of 10 fishes per tank. In this experiment 5 experimental diets were prepared by using dried leaves of Bathua (*Chenopodium album*). T_0 diets were considered as control. Bathua (*Chenopodium album*) leaves powder was added at the rate of 5%, 10%, 15% and 20% per kg of feed in T_1, T_2, T_3 and T_4 respectively. The range of water quality reported during the test was observed water temperature from (24.1 °C to 26.7 °C), electrical conductivity from (1300-1550 µS/cm), pH from (7.97 to 8.61), dissolved oxygen from (5.2 to 7.8 mg/l), total alkalinity from (107 -151 mg/l), and total hardness from (427 mg/l to 517 mg/l). In the present study, the water quality parameters remained suitable during experimental period and were suitable for fish growth and survival. The result shows that 20% of Bathua (*Chenopodium album*) leaves powder added in experimental diet showed highest relative percent survival and growth in Common carp (*Cyprinus carpio*). We can conclude that by added Bathua (*Chenopodium album*) leaves powder in the diet had shown positive impact on water quality.

Keywords: *Chenopodium album, Cyprinus carpio,* water quality parameters

Introduction
The common carp a native of temperate regions of Asia, especially China, has four sub-species: *Cyprinus carpio* of the European-Transcaucasian area; C.c. aralensis of the mid-Asian region; C.c. haematopterus of the Amur-Chinese or Far Eastern region and C.c. viridiviolaceus of north Vietnam. The natural distribution of common carp maybe restricted to a narrow belt in central Asia and has been introduced into scores of countries. There are varieties and subvarieties or strains of common carp. The well-known variety of the Kwantung and Kwangsi regions of China

Is the 'big belly carp: and that of the Yangtze region, the "long bodied carp." The well-known Indonesian orange-colored carp (*Cyprinus carpiovar*. flavipinnis C.V.) has been split into a number of subvarieties, such as the lem on-colored Sinyonya and the gold brown Katiera domas. There is also the green variety in Indonesia, the "Punten carp" with stable genetic traits. The "Majalayan" strain of West Java is also a green-ish variety. The mirror carp (*Cyprinus carpio* var. *specularis*) of the Galician variety or of the Franconian variety were transplanted into Indo-nesia in the first half of the 20th century and are distinct from the Aischgrunder (Germany) or Royale (France) varieties. The Russian mirror carp (*Cyprinus carpio* var. *specularis*) is now split

into two varieties, the scale carp (C.c. var. communis) and the leather carp (C.c. var. nudus). The other varieties of common carp are the Japa-nese races which go by the name of Asagi and Yamato; Ropsha and Kursk of USSR; Dinnyes of Hungary and Nasice of Yugoslavia.

Millions of people depend on fisheries and aquaculture around the world for adequate food, nutrition, and employment. It is estimated that 179 million tonnes of fish were produced worldwide, with a first sale price of USD 401 billion, of which 82 million tonnes, or around USD 250 billion, were generated through aquaculture farming. Overall, 156 million tonnes were used by humans, with 20.5 kg per person per year being the supply. The 22 million tonnes that were left over were designated for uses other than food, mostly for the production of fishmeal and fish oil. Aquaculture accounts for 46% of all fish produced and 52% of fish consumed by humans worldwide (FAO, 2020) [9].

Freshwater fish species belonging to the Cyprinidae family include *Cyprinus carpio*. In China, it has been a part of culture since 475 BC. It is indigenous to central Eurasia. It has been regarded as the freshwater fish with the greatest global distribution. It ranks as the third most widely introduced fish species worldwide. Because of its aptitude for rapid development in eutrophic environments and capacity to withstand unfavourable environmental conditions, it is used in both ponds and captive fisheries. In many nations, angles strongly value it as well. C. carpio may have a significant impact on algal blooms as a benthic feeder later in life and a zooplankton feeder in its juvenile stage. Additionally, the way it feeds stirs up silt, which changes the habitats of local animals. Additionally, it is capable of eating other species' eggs directly. It is identified as one of the top 100 invasive alien species by the Global Invasive Species Database. (Species from the Global Invasive Species database, 2021) [10].

The genus Chenopodium is named for its characteristic goosefoot-shaped leaves, which are seen on the erect annual herbs Chenopodium album and c. mural. The chenopodium album has ridged branching stems that can reach heights of two metres and have a robust taproot. Red stripes are frequently visible on them. Similar to Chenopodium murale in growth form, but bushier and more compact, reaching a height of 70 cm and having a reddish stem. Both species' leaves range in hue from light to dark green, are farinose in seedlings, and have an abaxial surface when adult plants are present. Tiny branches with perfect green blooms on them. C. album seeds often have a disc form, measure 1.5 mm in diameter, and have a smooth, glossy appearance. The seeds of C. murale are similar in size and form, but they have a pitted test and are a dull black tint. The mature seed of both species is protected by a pricarp, a delicate, paper-like shell. Word 2021 and Eslamis.v.

Green leafy vegetables have generated interest worldwide as they exhibit multiple benefits for health of human beings. Vegetables can form the cheapest and most readily available sources of important vitamins, minerals, fibres and essential amino acids particularly In most of the developing countries where the daily diet is dominated by starchy staple foods, vegetables can form the cheapest and most readily available sources of important vitamins, minerals, fibres and essential amino acids. Across the globe there are several local and wild vegetables which are under-exploited because of inadequate scientific information on knowledge of their nutritional potentials. A resurgence of interest has developed in wild vegetables for their possible medicinal values in diets. C. album is under exploited vegetable which has high functional potential apart from basic nutritional benefits. The plant is used in diet not only to provide minerals, fibre, vitamins and essential fatty acids but also enhance sensory and functional value of the food. The plant has been traditionally used as a bloodpurifier, diuretic, sedative, hepatoprotective, antiscorbutic laxative and as an anthelmentic against round and hookworms. Pharmacological studies have revealed that the plant possesses anthelmentic, sperm immobilizing and contraceptive properties. It is also claimed to be antipruritic and antinociceptive in action. Therefore C. album holds a great potential for in depth biological evaluation. No significant work has ever been carried out for processing parameters for this potentially useful plant. Significance and future scope of C. album for public and dietary awareness of its nutritional status has been discussed in this review.

The protein content of *C. album* leaves is high 4.2% and contains considerable levels of important amino acids including lysine and isoleucine as well as calcium and vitamins A and C. The leaves of *C. album* contain high concentrations of vitamins C and carotenoids, according to Guerrero and Isis (1997) [15] and Pande and Pathak (2010) [16], respectively. Additionally, they are high in iron and fiber. (Food Science Technology).

Material and Methods

Experiment Design

The present study was conducted at the Aquaculture Research and seed unit, Directorate of Research, MPUAT, and Udaipur for 60 days. 15 plastic tanks with a volume of 225 litres were used. Total numbers of 150 fingerlings of Common carp (*Cyprinus carpio*) were provided by Aquaculture Research and seed unit, Directorate of Research, MPUAT, and Udaipur. The current experiment was conducted in 225-liter plastic tanks. Prior to the start of the experiment, the fish were acclimated under experimental conditions for at least a week. Each treatment is provided with four replication using a complete randomized design, the healthy fingerlings of uniform size was randomly distributed in four experimental groups and one control group. 200 liters of fresh, filtered, ground water used to fill the tanks. Every day, the water was aerated for at least 8 hours. 10 Common carp (*Cyprinus carpio*) fingerlings were stocked in each tank. Before adding fish, all the tanks were carefully cleaned and disinfected. Ground water was used during the whole experimental period and filled the tanks up to 200 liters. In the form of pellets, fingerlings were fed once per day at a rate of 4% of their body weight. Every weekend, syphoning was used to remove uneaten food and waste, and water levels were maintained by replenishing. With the use of hand net, the fish in each tank were removed and placed in the tank. Measurements were taken at initial day and intervals of 15 days for the examination of the growth parameter. Water quality was also measured in initial day and every 15 days interval during experimental period. The water of the experimental units was partially replaced using bore well water to provide the fish comfortable habitat in the experimental tanks. Every 15 days, water quality parameters including temperature, pH, DO, electrical conductivity, total alkalinity, and total hardness were evaluated. For evaluating water quality parameters stated above, standard methods of American Public Health Association's Standard Procedures (2005) were followed.

Result and Discussion

In the present study, the administration of Bathua (*Chenopodium album*) leaves powder supplemented diet for Common carp (*Cyprinus carpio*) fingerlings has been assessed. The addition of Bathua (*Chenopodium album*) leaves powder in fish diet has been found beneficial for Common carp (*Cyprinus carpio*) as it manifest that the growth parameters of experimental fish Common carp (*Cyprinus carpio*) in all treatments were initiate better result than the control group. In the present study, the administration of Bathua (*Chenopodium album*) leaves powder supplemented diet for Common carp (*Cyprinus carpio*) fingerlings has been assessed. Environmental factors such as water quality parameters have a significant impact on fish growth and survival. Experiment done by DeLong *et al*. (2009) [17] shows that a special set of water chemistry required and optimal water quality is essential to a healthy, balanced, and

functioning aquaculture system. Sikotariya and Yusufzai (2019) [18] described that the temperature was found within the optimum range throughout the experimental period. Water temperature ranged from 21.75-26.25 °C. In the current study, the water temperature was within the optimum range of 24.1–26.7 °C. pH range between 7.97–8.61 is the ideal range for Common carp (*Cyprinus carpio*) as reported by Bolorunduro and Abba (1996) [4]. In the present experimental study, the pH of water ranged between 7.23-8.32 with average mean value 7.78-7.86. Riche and Garling (2003) [19] suggested that the dissolved oxygen for optimum growth of Common Carp is above 5 mg/L. Boyd (1979) [20] also suggested that DO is the one of the most important factor for maintaining life and survival of fish. During the experimental period, DO was observed in the range of 5.7 to 7.8 mg/l which was always reported above minimum essential level. Electrical conductivity is an important parameter of water quality that regulates growth and survival of fish. Water EC is based on the ions that are found in water. Stone and Thomforde (2004) [13] recommended the desirable range 100–2000 µS/cm and acceptable range 30–5000 µS/cm for pond fish culture. During the current study, the range of EC was 1300 to 1550µS/cm and was found to be ideal for fish growth. The overall alkalinity level of water in the current study was 107-151 mg/l. This is the optimal alkalinity level for growth and digestive metabolism, i.e. 50- 150 mg/l as observed by Stone and Thomforde as CaCO3 (2004) [13]. Water hardness shows the carbonate and bicarbonate of Ca and Mg ions in the water. In the current investigation, the total hardness range was 427 to 517 mg/l. Choudhary and Sharma (2018) [6] indicated that the hardness value of 488.56 to 530.22 mg/l was suitable for the growth of fish. Water quality in ideal range correlate with the higher fish production as suggested by Mali *et al.*

Table 1: Range and mean values of water quality parameters in different treatments during the experimental period

Parameters	T_0	T_1	T_2	T_3	T_4
Water Temperature (°C)	24.5-26.5 (25.50)	24.4-26.4 (25.45)	24.1-26.4 (25.25)	24.4-26.4 (25.40)	24.4-26.7 (25.55)
Electric conductivity (µS/cm)	1300-1483.3 (1391)	1300-1145.66 (1222)	1300-1503.3 (1401)	1300-1550 (1425)	1300-1526.6 (1413)
Ph	7.97-8.43 (8.22)	7.99-8.47 (8.23)	8.07-8.43 (8.25)	8.03-8.61 (8.32)	8-8.43 (8.21)
Dissolved oxygen (mg/l)	5.7-7.6 (6.65)	5-7.5 (6.25)	6.1-7.7 (6.9)	6.4-7.6 (7.0)	5.2-7.8 (6.5)
Total Alkalinity (mg/l)	107-136 (121.5)	108-139 (123.5)	108-132 (120)	118-141 (129.5)	112-151 (131.5)
Total Hardness (mg/l)	427-517 (472)	428-484 (456)	440-480 (460)	430-490 (460)	427-491 (459)

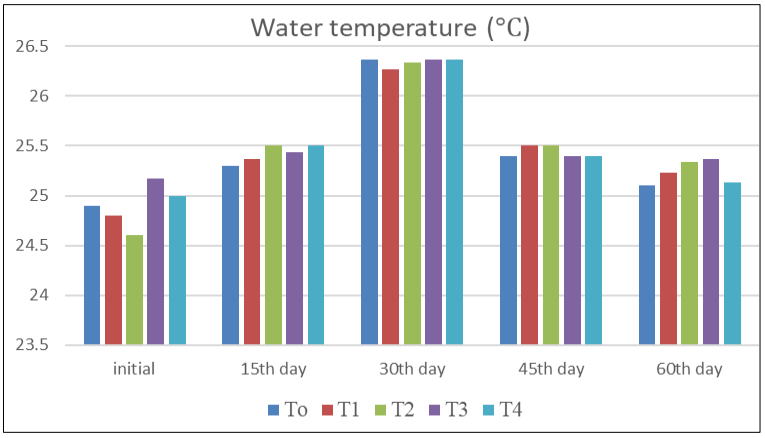

Fig 1: Water temperature during the experimental period in different treatments

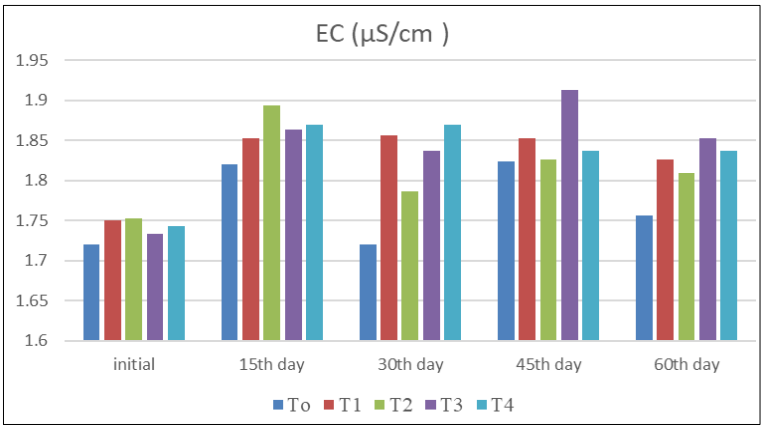

Fig 2: Electrical conductivity of water during the experimental period in different treatments

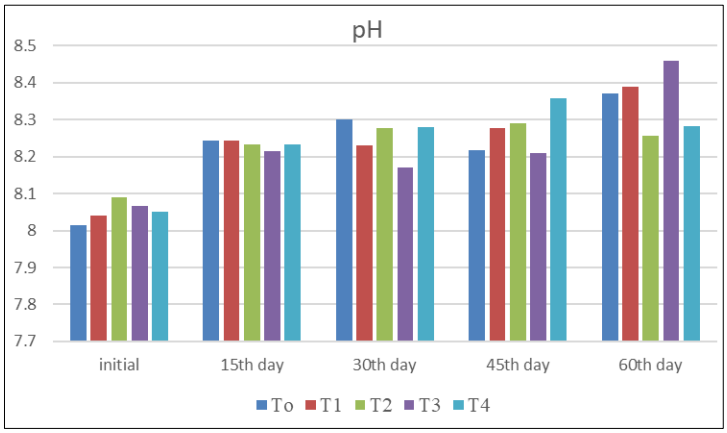

Fig 3: pH of water during the experimental period in different treatments

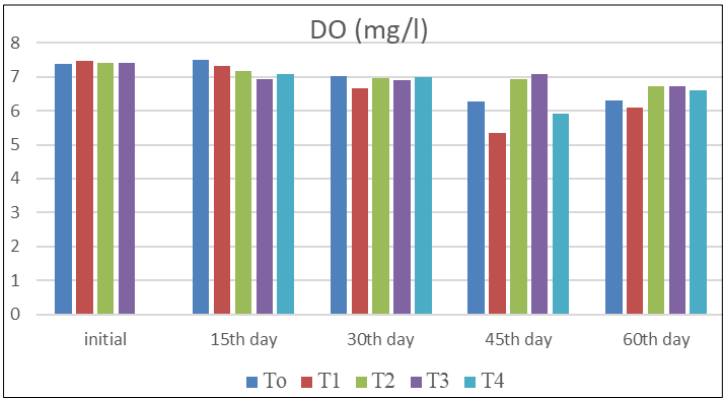

Fig 4: Dissolve oxygen in water during the experimental period in different treatments

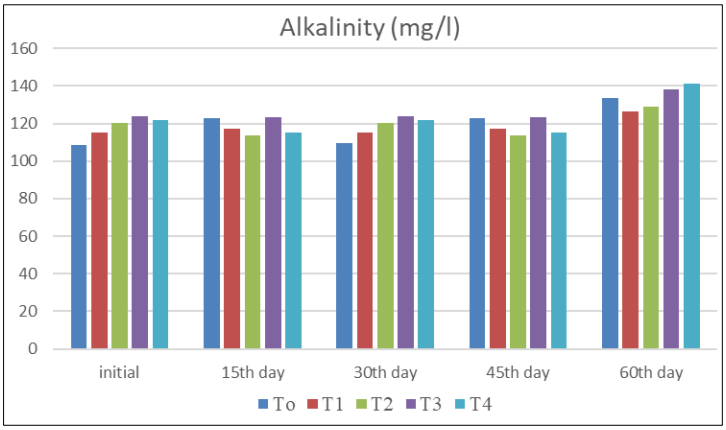

Fig 5: Alkalinity of water during the experimental period in different treatments

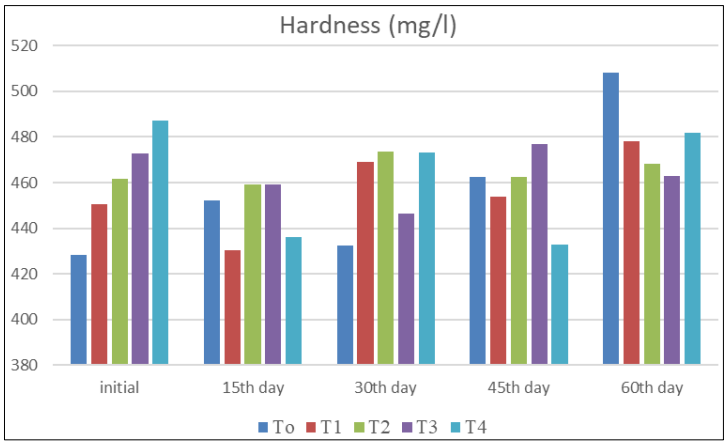

Fig 6: Hardness of water during the experimental period in different treatments

Conclusion

Water quality parameters including temperature, electrical conductivity, pH, DO, total alkalinity, and total hardness were remained suitable during experimental period and were suitable for fish growth and survival in water used in experimental period. By this study we can conclude that by added Bathua (*Chenopodium album*) powder in the diet with suitable water quality parameters had shown positive impact on fish growth and survival.

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