

Toxic Effects of Fish-seed (*Anamirta cocculus*) on Carp (*Cyprinus carpio*)

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Abstract: In this study, toxic effects of fish-seed (*Anamirta cocculus*) on carp (*Cyprinus carpio*) was investigated. Powdered fish-seed was applied at concentrations of 1, 2, 3, 4, 5, 7.5, 10, 15, 20, 30, 40, 50, 75 and 100 ppm. Temperature, pH, hardness and dissolved oxygen of water in aquariums used in the study were also measured. Although, no any behavioral changes were observed at the concentration of 1, 2, 3 and 4 ppm, fish became narcotized at higher concentrations of fish-seed. Between 5-50 ppm concentration, gradual decrease was observed in activity of fish. After 50 ppm concentration, fish become narcotized and inactive.

Key words: Toxic effects, fish-seed, *Cyprinus carpio*

Introduction

To determine population density of fish and measure stock value, one of the best sampling method is using toxic substances which have effect on fish. By means of these substances, it is possible to measure and estimate total fish stock in running water, lake or reservoir (Davies and Shelton, 1992).

Herbal toxicants are used when determining fish stocks. Such toxicants are called ichthyotoxic plants. These are administered by pounding and spreading to water surface or adding to fish rations. After administration of fish-seed, fish are anaesthetized, rise toward water surface and caught easily (Brandt, 1984).

Fish toxicants are generally used in small and slow running waters, inlet and gulf (Brandt, 1984). Ichthyotoxic plants have sponium and lacktan. which are very strong toxicants for protoplasma. Research on the fish toxicants have focused almost exclusively on the chemical toxicants (Kagan *et al.*, 1991; Sanger and Koehn, 1997; Bagarinao and Lantin, 1998), but except rotenon (Lawangawudhi, 1982; Davies and Shelton, 1992), ichthyotoxic plants have not been commonly studied.

These toxic substances are obtained from body, root, leaf (e.g., ox tongue and daphn), fruit and seed of plants. Fish-seed (*Anamirta cocculus*) have been used in fresh and salt water in Europe and Asia (Baytop, 1997; Brant, 1984). Fish toxicants have been studied by different researchers (Seyani and Chiotha, 1991; Davies and Shelton, 1992). Although use of fish toxicants when estimating fish stocks is mentioned in previous studies (Mengi, 1977; Brandt, 1984; Davies and Shelton, 1992; Çelikkale *et al.*, 1993), the effective concentration and time of toxicants have not been studied deeply.

This study was carried out to determine effective concentration of fish-seed (*Anamirta cocculus*) on Cyprinidae which has high tolerance to negative environmental conditions and very common fish group among invertebrates (Winfield and Nelson, 1991) which lives in mid and Sought Europe, Black Sea, Caspian Sea, Hazar Sea and rivers reaching to Pacific Ocean. (Slestenenko, 1955-56).

Materials and Methods

In this study, twenty *Cyprinus carpio* were used. The study was carried out between March and July 2001 at Fish Disease Laboratory, Firat University, Turkey. Total weight and total length of fish examined were between 22-200 g and 12.0-25.3 cm respectively. Fish-seed was dried in sterilizer at 103°C for 15 minutes and then powdered.

From these powdered samples, concentration of

1,2,3,4,5,7.5,10,15,20,30,40,50,75 and 100 ppm were prepared in glass aquarium (10 lt.). Each aquarium was stocked with one small (<50g) and one bigger (50-200g) *Cyprinus carpio* were placed. Each fish was let to stay 30 minutes. Temperature, pH, hardness and dissolved oxygen of water were measured (Anonymous, 1987) before and after fish-seed added. The fish were observed by two people during 30 minutes of exposure time.

Results and Discussion

Temperature, pH, hardness and dissolved oxygen value of water at the beginning of study are given in Table 1.

Table 1: Initial water quality in aquarium

Parameters	Value
Temperature	22 °C
pH	7.59
Hardness	310 CaCO ₃
Dissolved oxygen	6.94 mg/lt

Behavioral changes of the fish exposed to fish-seed at different concentrations during 30 minutes observation period are given in Table 2. No any behavioral differences were observed in fish during 30 minutes observation period at the concentration of 1, 2, 3 and 4 ppm. The observation on fish exposed to higher concentration are given in Table 2.

Relationship between pH and fish-seed and dissolved oxygen and fish-seed are also shown in Fig. 1 and Fig. 2 respectively. At 5 ppm concentrations of fish-seed, there was gradual

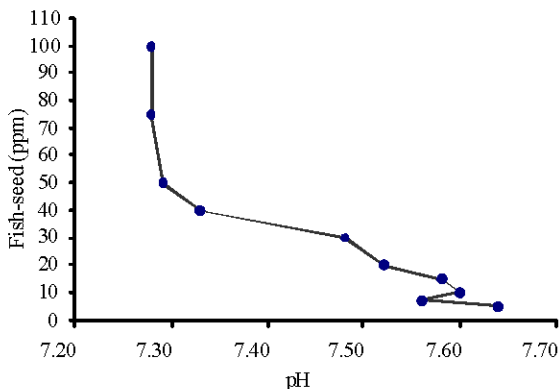


Fig. 1: Relationship between fish-seed concentration and pH

Table 2: Temperature, pH, dissolved oxygen value and behavioral response of *Cyprinus carpio* in different fish-seed concentration

Concentration of fish-seed (mg/L)	Temperature (°C)	pH	Dissolved oxygen (mg/L)	Behavioral responses of fish
5	22	7.64	6.60	Initially, decrease in swimming up to 5-15 minutes. After 25 minutes fish become restless.
7.5	22	7.56	6.24	Initially, fish inactive up to 5-15 minutes. After 25 minutes fish become restless.
10	22	7.60	6.50	After 5 minutes decrease in swimming
15	22	7.58	6.32	After 10 minutes hyperactivity
20	22	7.52	6.30	Gradual decrease in activity between 10-20 minutes and increase after 25 minutes
30	22	7.48	6.35	Fish inactive between 10-20 minutes, then restless.
40	22	7.33	6.40	Fish inactive between 10-20 minutes, then restless.
50	22	7.29	6.40	Decrease in swimming between 10-25 minutes and bigger fish is narcotized and became inactive.
75	22	7.28	6.25	Decrease in swimming between 10-30 minutes and large fish is narcotized and became inactive.
100	22	7.28	6.19	Decrease in swimming between 10-30 minutes and large fish narcotized and large fish become inactive.

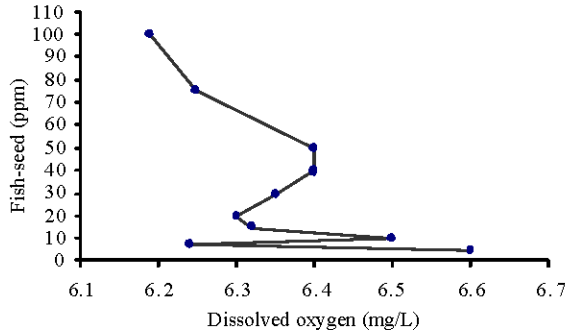


Fig. 2: Relationship between fish-seed concentration and dissolved oxygen

decrease in swimming activity of fish up to 5-15 minutes and after 25 minutes fish become restless. Similar observations were recorded at 7.5 ppm concentration. Decrease in swimming activity was also observed at 10 ppm concentration after 5 minutes and fish become hyperactive at 15 ppm concentration after 10 minutes. Gradual decrease in activity between 10-20 minutes at 20 ppm concentration and increase in activity after 25 minutes were observed. Fish become inactive at 30 ppm concentration of fish-seed between 10-20 minutes, then restless. Between 50-100 ppm concentration, decrease was seen in activity of fish and bigger fish become narcotized.

In this study the effects of different concentrations of *Anamirta cocculus* which has picrotoxin and ichthyotoxic characters on *Cyprinus carpio*. Observation time was limited for 30 minutes and this period was found to be enough for *Cyprinus carpio*. Water temperature occurred 22°C in all trails. pH showed a regular decrease with increasing fish-seed concentration. Similarly, dissolved oxygen also decreased with increasing fish-seed concentration. This is in accordance with the fact that dissolved oxygen is blocked by ichthyotoxic plant and fish became more effected (Davies and Shelton, 1992). It can be stated that narcoze effects of toxicant on *Cyprinus carpio* increase with increasing concentration. These results showed that even in low concentrations, fish-seed (*Anamirta cocculus*) has narcotic effect on the fish (Brandt, 1984). Moreover, increasing narcotic effects of fish-seed on larger fish in high concentration showed similarity to findings in a

study carried out by Davies and Shelton (1992).

It can be concluded that ichthyotoxic fish-seed should be administered to *Cyprinus carpio* at the concentration of 50-100 ppm for 10-20 minutes and narcotic effect can be increased in shorter period with higher concentration.

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