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Effect of Bait on Efficiency of Fyke-nets for Catching Crayfish *Astacus leptodactylus* Esch. 1823

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Abstract

Effect of four different bait types (bread, potato, apple and prussian carp *Carassius auratus gibelio* (Bloch 1782) on efficiency of fyke-nets for catching crayfish *Astacus leptodactylus* Esch. 1823 were tested. Trapping was conducted in Lake Eğirdir of Turkey. The results showed that catching efficiency of fyke-nets with bread, potato, prussian carp and apple were higher 20.3%, 11.2%, 7.4% and 7.1% than those without bait, respectively. But, the difference in catch between only with bread and empty fyke-nets was found statistically significant ($P<0.05$). In addition, crayfish caught with prussian carp and empty fyke-nets tended to be larger (in total length) than those caught with bread, potato and apple. But, there was no significantly difference between groups ($P>0.05$). The catching rate of males captured with potato was higher than with the other bait types and without bait. Differences between potato and the other groups were statistically significant ($P<0.05$).

Key Words: *Crayfish,* Astacus leptodactylus*, fyke-net, bait, efficiency*

Introduction

The crayfish *Astacus leptodactylus* Esch. 1823 is an especially important fishery resource in Turkey. The fishery for this species is the most valuable freshwater fishery, and nearly all of crayfish production are exported to the other European countries. Since the 1960s many different traps had been developed and used by commercial fishermen. These traps differ from each other in configuration, physical dimension, construction material and mesh size, number of entrances, presence or absence of retainer bands or collars, and presence or absence of bait protection containers (Gary, 1975; Romaire, 1988). In Turkey, fishermen used only cylindrical traps with funnel entrances at both ends till the beginning 1980s. It is necessary to use bait to catch crayfish with this trap type, if bait is not put in these traps, crayfish do not enter into them. Later one-entrance traps were also used in increasing numbers (Furst, 1988). This type of traps is generally called as fyke-nets. They are deployed in pairs with a single leader between them, so that leader intercepts the movements of crayfish. The crayfish go into the hoop net while they are trying to get around net by following the leader. Therefore, the baits should be used to attract the crayfish in order to catch them with the fyke-nets.

In Lake Eğirdir, most of total trap fishing effort were fyke-nets. During the study, while some fishermen had been using only fyke-nets, some of them had also used fyke-nets and traps together. Generally, both traps and fyke-nets had been baited by fishermen with different baits such as bread, potato, apple, prussian carp *Carassius auratus gibelio* (Bloch, 1782), sugar beet, water melon, tomato etc. But, the most frequently used baits were bread, potato, apple and prussian carp. Different bait types had been selected to show the size, sex and crayfish species (Somers and Stechey, 1986; Kutka *et al*., 1992). Effect of bait types on efficiency has been known by fishermen. According to Balık *et al*. (2002), 45.6 t bread, 38.6 t potato, 48.2 t apple and 145 t prussian carp were used as bait in 2001. Most of these baits had been decomposed in water, and the water quality had been negatively affected by them. The water quality of this lake is more important than fishery for the people who live in that region. Because, the water supply of Isparta city and Eğirdir town are provided from this lake. Therefore, the water quality should be maintained for the future.

There were two purposes of this paper. These were to determine effect of bait types on efficiency of fyke-net to catch crayfish, and whether it needs bait in the fyke-nets or not.

Materials and Methods

Lake Eğirdir has a surface area of 46,800 ha, and a mean depth of 8-9 m. The lake is 918 m above the sea level. The water temperature varies between 0-28°C. Experiments with fyke-nets (Figure 1) were conducted between October and December of 2001. A total of 300 fyke-nets, 60 fyke-nets for each bait type and empty one, were fastened to a nylon line at 2 m intervals. In each trial, 240 of fyke-nets were baited with bread, potato, apple and prussian carp, and the rest of them were set as without bait. They were checked the next day or a few days later depending on weather conditions. Average weight of each bread, potato, apple and prussian carp were 10, 15, 20 and 25 g, respectively. All traps were set and checked in the same area simultaneously. Total length of crayfish captured in the fyke-nets with bait types and without bait were measured in mm, and sex of them were recorded. Number, average size and sex rates of the crayfish caught with the bait groups and the empty ones were compared.

Differences in catch between the bait types and empty ones determined through two way ANOVA. LSD (Least Significant Difference) test was applied for comparison of average catches and sex ratios (Yurtsever, 1984; Çömlekçi, 1988).

Results

Catch

Catches with the different bait types and without bait ranged 1086-1639 crayfish (Table 1). The bread-baited fyke-nets catch was the largest. This bait type was followed by potato, prussian carp, apple and empty. As shown in Table 1, catches of baited fyke-nets were higher than those without bait. But, differences in catch between only bread and the others were found statistically significant ($P<0.05$).

Size of the crayfish

Crayfish caught with prussian carp and empty fyke-nets tended to be larger (in total length) than those caught with bread, potato and apple (Table 2). However, the size differences were not statistically significant ($P>0.05$).

Sex ratio

As shown in Table 3, sex ratios of crayfish captured in the fyke-nets without bait and with bread, apple and prussian carp were similar. Whereas, the rate of males captured with potato was higher than empty ones, and differences between potato and the other groups were significant ($P<0.05$).

Figure 1. The shape of the experimental fyke-nets

Table 1. The number of crayfish captured in the fyke-nets with different bait types and without bait

Experiments	Empty	Bread	Potato	Apple	Prus. carp	Total
1st trial	102	89	112	107	53	463
2nd trial	59	107	96	93	129	484
3rd trial	74	77	85	87	87	410
4th trial	77	186	180	120	92	655
5th trial	233	511	326	315	313	1698
6th trial	541	669	560	529	585	2884
Total	1086	1639	1359	1251	1259	6594
% of total	16.6	24.8	20.6	19.0	19.1	

Table 2. Mean total length of crayfish (TL) captured with bait types and without bait (± Standard Error)

Bait	TL (mm)
Empty	107±1.25
Bread	104±1.16
Potato	103±1.20
Apple	102±1.31
Prussian carp	108±1.20

Table 3. The percentages of male and female crayfish captured with different bait types and without bait

Bait	Male (%)	Female (%)
Empty	54.7	45.3
Bread	54.7	45.3
Potato	62.0	38.0
Apple	53.5	46.5
Prussian carp	53.1	46.0

Discussion

Trap catch is affected by numerous factors including water temperature, water quality, forage and feeding regime, population density and size structure, number of trapping days, and bait type and bait quantity (Romaire, 1995). In this study, it was determined that in the fyke-nets with bread, potato, prussian carp and apple were caught more crayfish 20.3%, 11.2%, 7.4% and 7.1% than those empty ones in Lake Eğirdir, respectively. The most effective bait was bread for catching crayfish, and its catching efficiency was also statistically different from the others ($P<0.05$). But, differences of catching efficiency between the other bait types and empty ones were not statistically significant ($P>0.05$). These results showed that effect of bait on catching efficiency of fyke-nets was slightly except for bread bait. Whereas, bait is the highest cost associated with producing crayfish (Baldridge and Hufman, 1993). In Lake Eğirdir, fishermen have bought bread, potato and apple from bait types. They have also caught prussian carp from Lake Eğirdir. It was shown that there is a cost of the producing naturally. Baits generally cost 150.000 to 1.000.000 TL (about $0.10 to $0.50) per kg depending on the bait type. In addition, labor is needed to prepare the bait. Some of the bait is consumed by crayfish and the rest of them are decomposed in the water. It is clear from the results of this study that the use of bait in the fyke-nets was not more economical than empty ones, and at the same time it affected the water quality of the lake negatively. But, there is a common view among the fishermen that the crayfish are not caught with fyke-nets without bait. This study has proved the otherwise.

Traps are size- and sex-selective (Abrahamsson, 1966), and sex selective also varies according to the season (Skurdal *et al*., 1992). In this study, in the fyke-nets with prussian carp and without bait were caught the larger crayfish than those with the other bait types. According to Qvenild and Skurdal (1989), baited traps are highly size selective. But, there was no significant difference in size of crayfish caught between fyke-nets with four different bait types and empty ones in Lake Eğirdir.

The catching rate of male crayfish in the fyke-nets with potato was higher than the other bait types and empty one. There were no difference between the other bait types and empty one. These results showed that the sex ratio may be different for some bait types. Males in the empty fyke-nets were dominant. Abrahamsson (1966) also found a male dominance in trap catches from the dense population of *Astacus astacus* in the RØgle ponds in South Sweden. This situation may be approximately due to population or fishing season. The rate of males may be higher than females in the population. Also, males and females are known to have different trapability (Abrahamsson, 1983), which also varies according to the season. In Lake Eğirdir, the legal crayfish fishing season lasted from 15 June to 24 December (TKB, 2002). But, experiments of this study were conducted only between October and December. The sex rates of bait types may change for all fishing season.

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