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Effect of weight loss occuring in winter season on growth of sea bass (*Dicentrarchus labrax*) reared in the Black Sea

Kardeniz' de büyütülen Levrek (*Dicentrarchus labrax*) lerde kış aylarında görülen ağırlık kaybının büyüme üzerine etkisi

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Abstract:

In this research, growth performance of sea bass (*Dicentrarchus labrax* L., 1758) taken from Bodrum were studied in cages on Eastern Black Sea coast and weight loss of this species in the winter season has been investigated. Fish (n=2000) were stocked in a cage on 03 October 1996 and growth performance was followed until 03 November 1997. Fish were fed by hand three times a day, morning, noon and evening, up to they were satisfied.

At monthly intervals, 60 fish were taken as sample and their total lengths and body weights measured to determine growth, food conversion, feeding rates and condition factor. Sea water temperature was measured daily.

In the experiment, fish with initial mean total length of 11.2±0.136 cm, body weight 20.1±0.771 g and condition factor of 1.35 were stocked in a cage and after 424 days at the end of the experiment, mean values of total length, body weight and condition factor were determined as 23.6±0.249 cm, 176.0±6.64 g and 1.30 respectively.

It is observed that growth almost ceased after November when the seawater temperature dropped below 16 °C, the fish have lost weight between December

and April, then growth rate increased depending on rising the seawater temperature.
To conclude, in Eastern Black Sea conditions, sea water temperature seems to be the main factor limiting the growth. However, the cage farming provided with good management may be advisable.

Key Words : Sea Bass, *Dicentrarchus labrax*, Weight loss, Growth, Eastern Black Sea, Cage Culture

Introduction

In recent years, aquaculture activities have been started on the Black Sea coast and many enterpreneurs begun to rear rainbow trout in sea cages, but they have faced important problems in summer when sea water temperature increased above 20 °C. Some of them stopped their activities and others started to find alternative ways and different species. Thus, sea bass as an alternative species has been thought it could be cultured in the brackish water such as Black Sea.

Sea bass (*Dicentrarchus labrax* linne 1758) belongs to Serranidae family and is a species of Dicentrarchus genus. Geographic distribution of sea bass extents from Black Sea to Atlantic, Baltic Sea and even North Sea, but mostly is caught in the Aegean and Mediterranean. Sea bass tolerates temperatures of 5 – 28 °C and salinity of 5 – 50‰. Optimal temperature ranges between 22 – 24 °C for best growing (Benli and Uçal, 1990; Gökoğlu and Baran, 1991; Uçal and Benli, 1993).

Nowadays, sea bass have been reared in some private cages in the farms around Trabzon and Ordu on the Black Sea coast. There is not sufficient data on rearing of this species in the subtropical seas such as the Black Sea. Thus, especially such a study is considered to help the practical farming of this species.

In this study, weight loss and growth of the sea bass that reared in cages on Eastern Black Sea coast were investigated and culture potential has been evaluated for this species in the Black Sea.

Material and Method

The study was carried out in marine cages located in Trabzon-Yomra Fisherman Shelter between 03 October 1996 and 03 November 1997. Sea

bass juveniles (n=2000) of 11.2±0.136 cm in length and 20.1±0.771 g in weight were transferred from Bodrum to marine cages belonging to Central Fisheries Research Institute and their growth followed up until 03 November 1997.

The 4x4x3.5 m floating cages were made of timber, galvanised 1 inch pipes and Styrofoam construction supporting 4, 12, 18 and 24 mm mesh knotted nylon nets. Temperature, dissolved oxygen, pH and salinity values were measured daily.

All fish in the stages received a dry pelleted commercial feed of following composition; crude protein 46%, crude fat 10%, crude fibre 3%, ash 13%, calcium 2.2% and phosphate 1.5%. The fish fed at libitium by hand three times a day, up to they were satisfied. Before being weighed and measured, the fish were fasted 24 hours to allow the gut to be emptied. They were anaesthetised in a 1:25000 solution of MS-222 (meta-aminobenzoic ethylester) in water.

At monthly intervals, 60 fish were randomly taken as sample and their lengths were measured by Von Bayer box and weighed by an electronic balance.

Results and Discussion

During this study, maximum monthly average sea water temperature (27.4 °C) was measured in August and minimum average temperature (8.1 °C) was observed in February. Dissolved oxygen concentration was found low (6.06 mg/lt) when temperature became maximum and it increased (10.24 mg/lt) when temperature decreased in winter season. Salinity changed between 16.52 – 18.11 ‰ and pH ranged 7.88 – 8.28. These salinity values were lower than Aegean and Mediterranean, but not limited growth of sea bass in the Black Sea.

The optimum temperature for growth varies with fish species. In spring and summer, growth rates tend to be high, while in autumn and winter at low temperatures food intake and growth are low and many fish species may loss weight (Bond, 1979; Dobson and Holmes, 1984; Bone *et al.*, 1995).

At the end of growing season, the fish that were 11.2± 0.136 cm in length and 20.1±0771 g in weight with 1.35 condition factor at the beginning,

reached to 23.6±0.249 cm in length and 176.0±6.64 g in weight with 1.30 condition factor after 424 days (Table 1).

Table 1. Growth of sea bass by months

Months	(°C)	LENGTH (cm) Min.	Max.	Mean±s.e.	WEIGHT(g) Min.	Max.	Mean±s.e.
October-96	19.6±0.16	8.7	14.4	11.2±0.136	8	42	20.1±0.77
November-96	15.6±0.08	10.8	15.3	12.9±0.227	13	49	30.7±1.64
December-96	11.7±0.20	13	16.4	14.5±0.167	25	58	42.7±1.49
January-97	9.2±0.06	12.5	17.1	14.5±0.203	22	64	37.5±1.81
February-97	8.1±0.06	11.1	17.8	14.4±0.301	16	71	37.4±2.34
March-97	8.3±0.07	12	16.9	14.9±0.217	21	70	34.7±2.07
April-97	11.9±0.18	10.5	16.8	14.8±0.304	15	62	33.5±2.27
May-97	16.2±0.16	10.8	18.9	14.9±0.211	14	89	35.2±1.76
June-97	22.6±0.30	12.5	19.5	15.8±0.186	26	101	51.9±2.36
July-97	25.3±0.15	13.7	19.3	16.8±0.153	35	82	58.7±1.52
August-97	27.4±0.12	16	22.6	18.6±0.174	48	154	84.8±3.38
September-97	24.5±0.10	16	23.2	19.7±0.175	49	151	99.3±3.18
October-97	20.2±0.16	18.2	27.5	22.1±0.250	77	250	139.3±5.05
November-97	15.2±0.09	19.2	31	23.6±0.249	101	407	176.0±6.64

In fisheries numerous mathematical formulas have been proposed to describe fish growth, but for commercial farm purposes it is best described in terms of Specific Growth Rate. The most useful and practical expression is that of specific growth rate which is the percentage daily increase in weight. Specific growth rate depends on food intake and so can be adjusted to produce fish for target selling dates. Specific growth rate is also dependent on various environmental factors. Exception occurs when temperature fluctuates with the seasons. Specific growth rate declines in winter and then increases again in spring as water warms up (Dobson and Holmes, 1984; Jackson, 1988; Priede and Secombes, 1988; Bone, 1995).

Gjerdem and Gunnes (1978) have reported that growth of rainbow trout (*Oncorhynchus mykiss*) almost ceased when winter sea water temperatures have fallen below 4 °C for long period and Okumuş *et al.*,

(1987) reported that growth of sea bass (*Dicentrarchs labrax*) almost ceased during winter season, when temperature dropped to 16 °C and that due to long fasting period important losses occured. The specific growth rate for sea bass, reported by Dendrinos and Thorpe (1985) as 0.75 at 20‰ salinity and 19 °C, Lanari *et al.*, (1991) 0.92 at 14.2‰ salinity and 20.4 °C, Ballestrazzi *et al.*, (1994) 0.57 at 15-20‰ salinity and 17-26 °C in ponds, Korkut *et al.*, (1995) 0.98 in 365 days in cages on the Aegean coast and Okumuş *et al* .,(1997) 0.37 in tanks on Eastern Black Sea coast.

In this study, specific growth rate was determined as the highest 1.37 in the first 30 days, but a negative SGR has been found between November and April. Average SGR was established as 0.54 and an acceptable growth (SGR□0.50) considered overall rearing period, although it was negative between November and April when temperature has fallen below 16 °C (Figure 1).

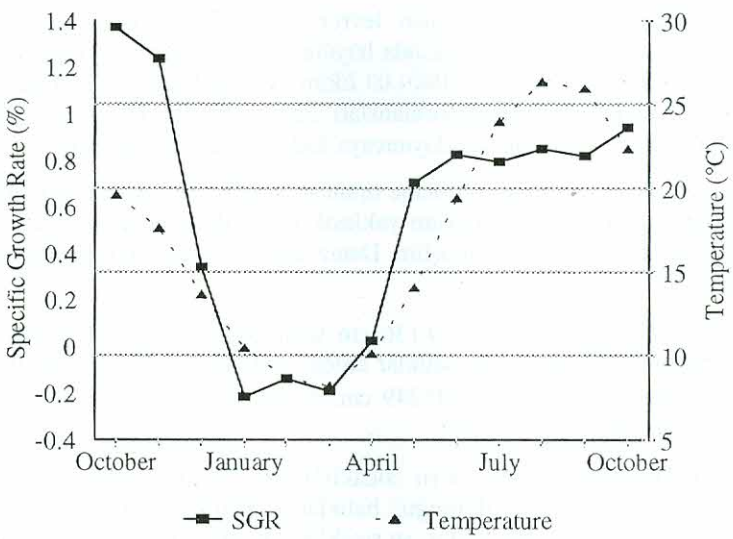

Figure 1. Specific growth rate of sea bass by months

It is observed that feed conversion varied with temperature in the overall rearing period and food intake almost ceased between November and April. Average FCR were calculated as 2.46 in the overall rearing season. Some authors have reported that FCR were found by Zanuy *et al* (1985) as 1.5 - 3.0 in tanks, Lanari et al (1991) 1.88 in tanks, Korkut *et al* (1995) 2.40 in cages on the Aegean and Okumuş et al (1997) 3.0 in tanks in Eastern Black Sea.