Tr. J. of Veterinary and Animal Sicences
23 (1999) 183-189

Growth of The Mediterranean Mussel (Mytilus galloprovincialis Lam., 1819) on Ropers in The Black Sea, Turkey*

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Received: 23.06.1997

Abstract: In the present study, the growth of the Mediterranean mussel Mytilus galloprovincialis Lam., 1819 in the Black Sea on ropes has been studied. The result of a 18 month-trial showed that the mussels grew 72.84±0.74 mm in lenght. Temperature of seawater has been measured (minimum of 7˚C in the month of February and maximum of 27.7˚C in August). Salinity varied from 17.2 to 19.3‰.

Key Words: Mediterranean mussel, Black Sea, Growing.

Karadenizde Halatlarda Akdeniz Midyesi (Mytilus galloprovincialis Lam., 1819) Yetiştirciliği

Özet: Bu araştırmada, Karadeniz'de Akdeniz midyesinin (Mytilus galloprovincialis Lam., 1819) halatlarda yetiştiricilik olanakları ile büyüme özellikleri araştırılmıştır. 18 ay süren deneme sonucunda midyeler, 72.84±0.74 mm uzunluğa gelmişlerdir. Denizsuyu sıcaklığı en düşük şubat ayında 7˚C, en yüksek ise ağustos ayında 24.7˚C olarak saptanmıştır. Tuzluluk ise ‰17.2 ile ‰19.3 arasında değişim göstermiştir.

Anahtar Sözcükler: Akteniz midyesi, Karadeniz, Yetiştiricilik.

Introduction

Today in the world numerous species of mussels are being farmed. Some species including (Mytilus edulis L., 1758, Mytilus galloprovincialis Lam., 1819, and Mytilus smaragdinus L., 1758) are of economic significance and grow in large quantity For example, the growth rate of the common mussel M.edulis is 54.38%, whereas the growth rate of the Mytilus galloprovincialis is 9.28% (1, 2).

The Mediterranean mussel, (Mytilus galloprovincialis Lam. 1819). is a sedentary, filter - feeding mollusc of wide distribution in Turkish waters. It occurs throughout the Black Sea, Aegean Sea and Sea of Marmara. It has also been reported from Italy, Spain, France, Tunisia, Yugoslavia and Atlantic (3, 4, 5).

Although natural mussel beds in Turkey are no quite abundant commercially significant breeding has been made. According to data in 1992 annual production of mussels in the World (M. galloprovincialis Lam., 1819) is 137900 tons. The share of Turkey in this production is 6557 tons (6).

Three methods are commonly used for growth of mussels (Bouchot, Raft and Long Line (1, 7).

Studies related to Mediterranean mussel in Turkey have been generally focussed on the determination of natural mussels beds, biometrical features and productivity (3, 8-12).

Rapid growth of mussels in the Black Sea has been recorded in summer and in autumn. In spring, as seawater temperature is low and the mussels spend most of their energy for reproduction. Therefore, the growth of mussels is slow in spring (13).

Size of mussels for marketing ranges between 50 mm and 80 mm. In terms of Turkey, minimum size of mussels for consumption is approximately 70 mm in lenght. Size of mussels has been affected by temperature, species of mussels, amount of plankton and salinty rate. The lowest marketing size of mussel is 50 mm in England, 55 mm in Holland 40 mm in France and 80 mm in Spain and the period to reach to this farming size is 23-24, 15-16, and 12-14 and 17 months, respectively (14, 15).

Zelimir and Mirjana, 1973 (15), reported that mussels grew rapidly within the first 14 months after attacking to the ropes and their sizes reached to 52.84 mm. When they reached to 60 mm, the growth wen at a slower speed.

* This study was supported by the research fund of Ondokuz Mayıs University. The Project Number: SSU-AF026

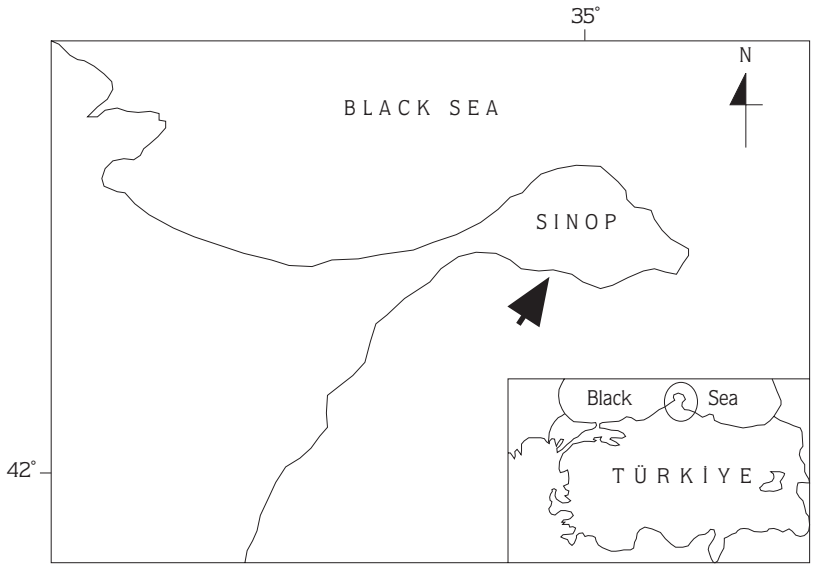

Figure 1. Study Area.

Materials and Methods

In the present study the Mediterranean mussels were cultivated on ropes. It was completed a 18 months period which is recommended for reaching marketing size.

Mussels production unit where in the research has been carried out is 200 m distant to Sinop Outer Port, at a water depth of 15 m. It has been based on "Long Line mussel growing system" (7). The study area is shown in Fig. 1.

18 Units of loose nylon ropes which were 4 mm. diameter have been used as growing rope. Such kind of ropes were prepared as unit as 1.5 m long. Each rope was fastened to a float and the main system was fixed at the both ends (Figure 2).

The ropes were dropped in the natural mussel beds in February 1994. Attachment of mussel larvae to the ropes has been checked weekly. Having observed that adequate number of the larvae were held they were transferred to the production unit on April 1, 1994.

The samples were taken average 50 specimen from 3 different section of the rope (head, middle and end) in the beginning of each month. Length, thickness and width of the samples were measured by the 0.05 mm scale calipers. The fact that mussel larvae were too small in the first months, thereforeonly lenght of the samples could be measured in the first two months.

During the course of the experiment temperature and salinity were measured by Horiba analyzer in every weet at the water depth of 1 m and the average measured values were used in subsequent data analysis.

Results

Seawater temperature from the Sinop peninsula of the Black Sea between April 1994 and September 1995 was minimum 7°C in February and maximum 24.7°C in August and salinity was minimum 17.2‰ in May and maximum 19.3‰ in October (Table 1, Fig. 3).

During the course of the study which has been carried out for a period of 18 months between April 1994 and September 1995 mussels length, thickness and width have been determined in reference to months and these values along width proportional growth characteristics according to months are shown (Table 2).

As the result of 18 months research period lenght, thickness and width of mussels andtheir growth values are shown in Figs.4 and 5.

Discussion

The present study shows that there is a possitive correlasyon between the water temperature and the growth of mussels (see Table 1, Figure 3).

While mussels have been growing in optimum size between 18°C and 28°C, their biological activities are decreased at 10-28°C. Similarly, they are resistible againsts 5-40‰ salinity, this optimal salinity rate should be between 15‰ and 25‰ (1, 2, 3). Therefore the Black Sea provides on appropriate ecosystem for the mussels population. The Black Sea does not present differences all over the year in respect to its salinity rate. In the present study the mean salinity was ranged between 17‰ and

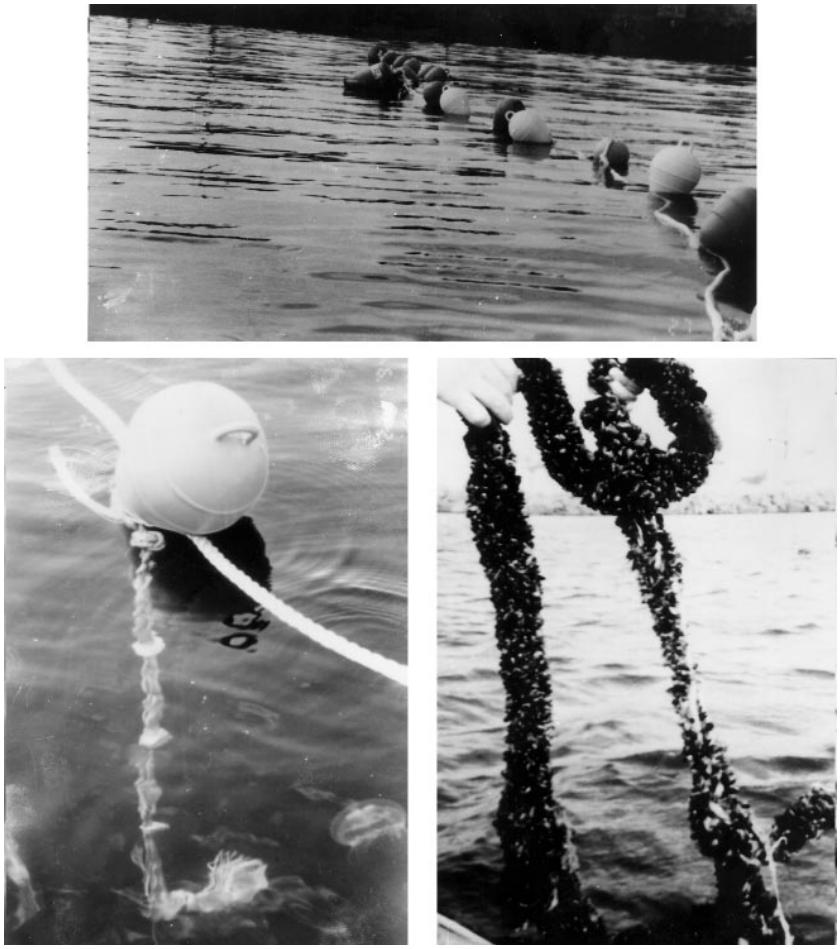

Figure 2. General view of the mussel culture unit.

MONTHS	TEMP.	SALINITY (‰)	MOHTHS	TEMP (°C)	SALINITY (mg/lt)
APRIL 94	8.7	18.7	JANUA95	8.7	18.7
MAY	12.2	17.2	FEBRUA.	7.0	19.2
JUNE	17.4	17.8	MARCH	8.0	19.1
JULY	24.2	18.0	APRIL	8.5	18.1
AUGUST	24.5	18.2	MAY	12.6	17.6
SEPTEMB.	23.3	17.9	JUNE	18.1	17.5
OCTOBER	18.0	19.3	JULY	23.8	17.9
NOVEMBER	10.9	18.9	AUGUST	24.7	18.0
DECEMBER	10.9	17.9	SEPTEMB	22.3	18.0

Table 1. Monthly average seawater temperature and salinity.

19‰. Highest valge of salinity found in October and lowest value of salinity is found in May, indicating that attachment of the mussels to the ropes are affected in the beginning of the season.

In the present study, the mussels start laying eggs in the beginning of March. Beacause of this, the mussels attaching large numbers of byssal threads to the ropes dropped in the second half of February. The mussels beds

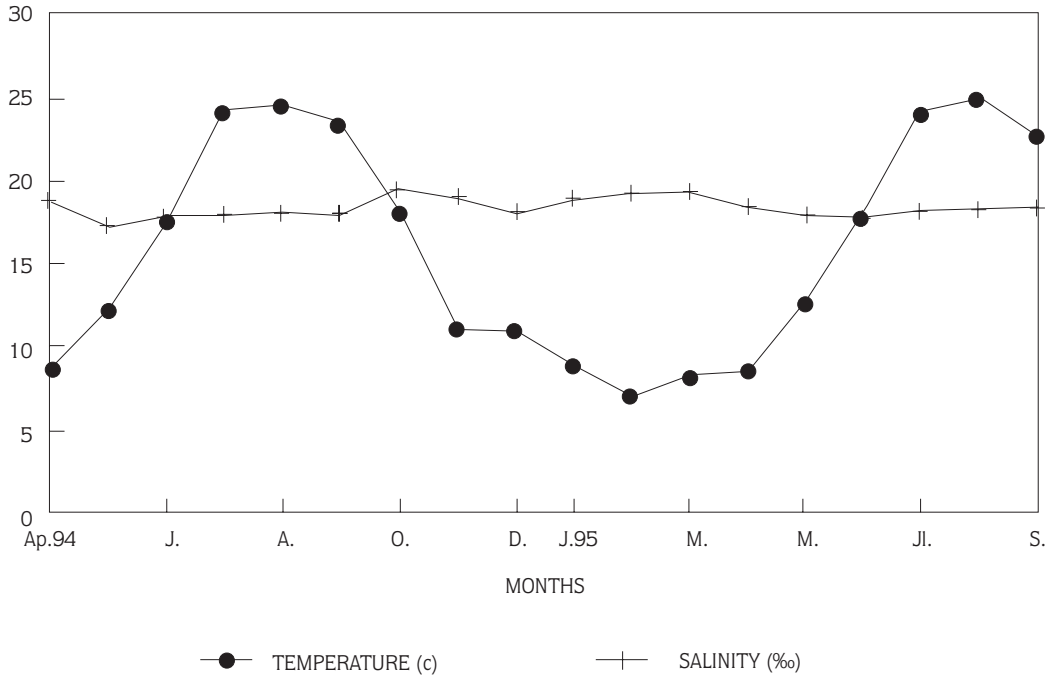

Figure 3. Monthly average seaweter temperature and salinity.

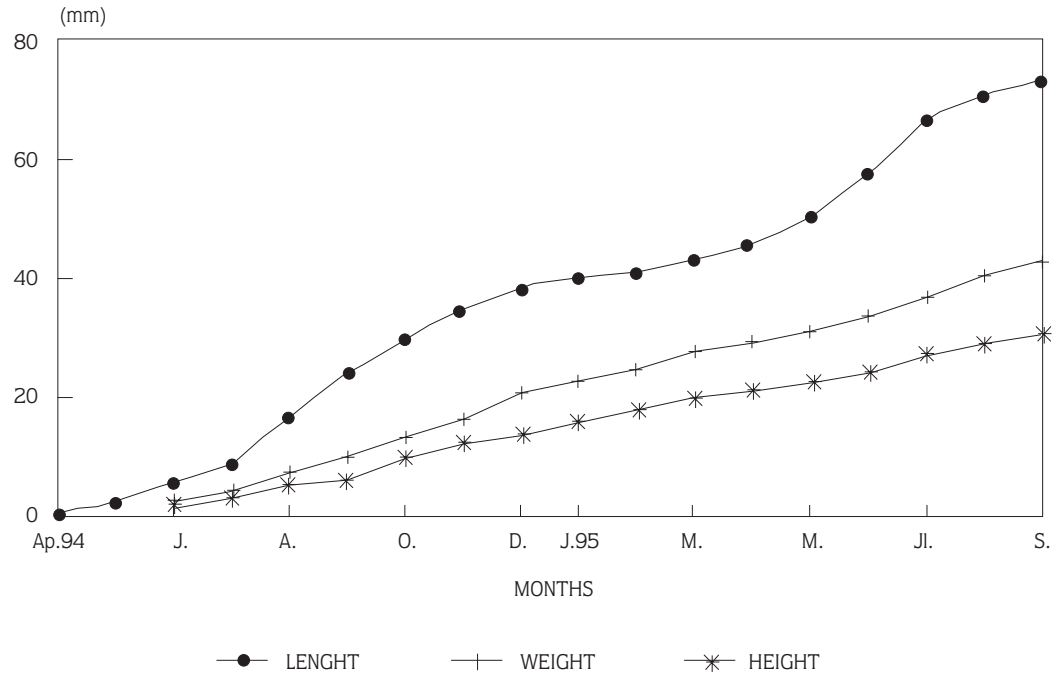

Figure 4. Growthly average growth of the Mediterranean Mussel.

have been checked each week and it was observed that mussels larvae intensively attached to the ropes in the second half of March.

In the first measurements on mussels that were taken into the production unit in April 1994, the mean length of mussels were found as 0.73±0.25 mm. Due to the fact

Table 2. Growth parameters of the mediterranean mussel during April 1994 to december 1995.

MOHTH	GROWTH (mm) PARAMETERS		GROWTH RATES %	MONTHS	GROWTH (mm) PARAMETERS		GROWTH RATES %
	L.**	0.73±0.025			40.00±0.44		4.9
APRIL	W.**	.....±.....		JANUARY	22.85±0.21		9.9
1994	H.***	.....±.....		1995	15.94±0.18		16.8
	L.	2.09±0.32	186.2		41.08±0.36		2.7
MAY	W.	.....±.....	....	FEBR.	24.55±0.023		7.4
	H.	.....±.....	....		17.87±0.19		12.1
	L.	5.41±0.26	158.8		43.14±0.31		4.9
JUNE	W.	2.82±0.21	....	MARCH	27.45±0.20		11.8
	H.	1.58±0.09	....		19.79±0.22		10.7
	L.	8.56±0.22	58.2		45.73±0.30		5.9
JULY	W.	4.04±0.28	43.2	APRIL	29.31±0.18		6.7
	H.	2.98±0.12	88.6		21.05±0.20		6.3
	L.	16.69±0.43	94.9		50.10±0.46		9.5
AUGUST	W.	7.17±0.44	77.4	MAY	30.85±0.29		5.2
	H.	5.24±0.30	75.8		22.16±0.26		5.2
	L.	23.57±0.28	41.2		57.40±1.11		14.5
SEPT.	W.	9.84±0.47	37.2	JUNE	33.78±1.56		9.4
	H.	6.11±0.36	16.6		24.34±1.40		9.8
	L.	29.67±0.47	25.2		66.31±1.08		13.7
OCTOB.	W.	13.30±0.36	35.1	JULY	37.18±0.71		10.0
	H.	9.50±0.21	33.6		27.13±0.80		11.4
	L.	34.45±0.52	16.1		70.43±0.81		7.8
NOVEMB.	W.	16.35±0.35	24.4	AUGUST	40.56±0.80		9.0
	H.	11.88±0.28	25.0		28.86±0.68		6.3
	L.	38.12±0.52	10.6		72.84±0.74		4.8
DECEMB.	W.	20.78±0.45	25.5	SEPT.	42.63±0.48		5.1
	H.	13.72±0.23	15.4		30.47±0.42		5.5

* L= Shell length ** W= Shell width *** H= Shell height

that mussels were too small in the first two months, their thickness and width could not be measured. It has been found that mussels have reached at a length of 72.84±0.74 mm after 18 months. When it is compared with the results of other studies conducted in the same amount of period in different countries, (7, 15), it is seen that Mediterranean mussels (Mytilus galloprovincialis Lam., 1819) are being grown of the length of 72.84 mm which was longer than the length of 70 mm in Italy and smaller than the length of 80 mm in Spain.

As it will also be seen from the ratios of monthly growth calculated in connection with growth of Mediterranean mussels in the first three months. There has come up a wery excessive rate of growth due to smallness of numbers in terms of ratio. During other months, however, the ratios of growth have been also increased particularly since June in reference to other months and started decreasing in September. The case same for the length this characteristics has been observed also both in rates of thickness and width. This characteristic has been caused by variation of

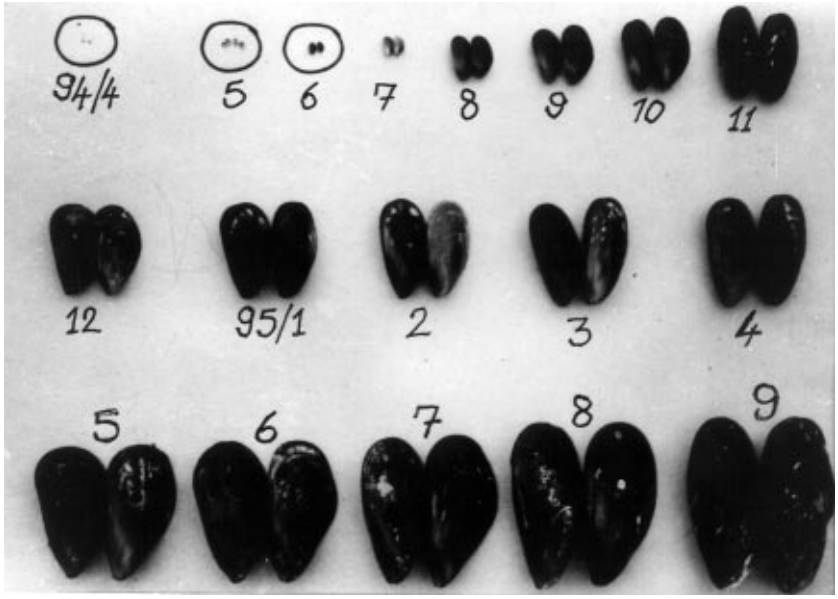

Figure 6. Mothly average growth of the Mediterranean Mussel.

temperature. Because it has been stated that mussels reach optimum growth between 18°C and 28°C (1, 3, 12) and the maximum ratios of growth determined in the present study have been also coincided with the months in which temperature is 24°C to 25°C

Consequently along with development in the processing technology in recent years in Turkey flesh of mussels has reached to a position that could be benefited as both in domestic market and abroad through exportation. Furthermore, mussels could be particularly used today specifically in the Black Sea where production facilities have been gradually increasing as wet food by itself or by mixing with other foods. However, cultivation of our mussels today has been completely depent on catching. Consequently, it is inevitable that in the course of time natural mussels beds could be damaged as was the case same for the other aquatic products. Therefore, the cultivation of mussels should also be tried. For this purpose mussels breeding units should be planned in addition to specifically breeding facilities in the sea and thus cost of fish feed which constitute major input in the fish growing process could be decreased to same extent.

At some localities mussels may also be farmed, banks of small overcrowded mussels can be moved to more favourable areas where growth is rapid.

Exclusive of growing system on poles based on tides, which has been implemented in the world, mussels breeding on rafts or long lines may be practiced in the Black Sea easily and successfully.

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