

Ecological Dynamics and Growth Patterns of European Flat Oyster (*Ostrea edulis* L. 1758) in a Mediterranean Mussel Farm

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Abstract: This study examined the growth and morphometric development of *Ostrea edulis* cultured in suspended net bags within an active mussel farm on the Erdek coast of the Sea of Marmara, Türkiye, from March 2018 to March 2019. Monthly measurements of shell length, shell width, shell thickness and wet weight were recorded together with seawater temperature, salinity, dissolved oxygen and chlorophyll-a concentration. During the study period, seawater temperature ranged from 9.0 to 25.9 °C, while salinity varied between 23.8 and 26.2 PSU. Mean shell length increased from 22.97 ± 6.48 mm to 84.03 ± 11.16 mm, and mean wet weight increased from 2.06 ± 1.82 g to 72.85 ± 18.97 g. Survival was 95%. The highest length- and weight-based specific growth rates were observed during the May–June interval, followed by a gradual decline toward winter. Growth showed a possible seasonal association with seawater temperature, whereas the relationship with chlorophyll-a was less direct. These results provide preliminary, site-specific information on the suspended culture performance of *O. edulis* within an active mussel-farm environment in the Sea of Marmara.

Keywords: *Ostrea edulis*, Mediterranean mussel farm, growth dynamics, aquaculture viability, environmental parameters

Akdeniz Midye Çiftliğinde Avrupa İstiridyasının (*Ostrea edulis* L. 1758) Ekolojik Dinamikleri ve Büyüme Şekilleri

Öz: Bu çalışmada, Mart 2018 ile Mart 2019 tarihleri arasında, Marmara Denizi'nin Erdek kıyısında yer alan aktif bir midye çiftliğinde askılı ağlarda yetiştirilen *Ostrea edulis*'in büyüme ve morfolometrik gelişimi incelenmiştir. Kabuk uzunluğu, kabuk genişliği, kabuk kalınlığı ve yaş ağırlık aylık olarak ölçülmüş; aynı dönemde deniz suyu sıcaklığı, tuzluluk, çözünmüş oksijen ve klorofil-a konsantrasyonu izlenmiştir. Çalışma süresince deniz suyu sıcaklığı 9,0–25,9 °C arasında, tuzluluk ise 23,8–26,2 PSU arasında değişmiştir. Ortalama kabuk uzunluğu 22,97 ± 6,48 mm'den 84,03 ± 11,16 mm'ye, ortalama yaş ağırlık ise 2,06 ± 1,82 g'dan 72,85 ± 18,97 g'a yükselmiştir. Yaşama oranı %95 olarak belirlenmiştir. En yüksek uzunluk ve ağırlığa dayalı spesifik büyüme oranları Mayıs–Haziran aralığında gözlenmiş, bunu kışa doğru kademeli bir azalma izlemiştir. Büyüme, deniz suyu sıcaklığı ile olası bir mevsimsel ilişki göstermiş; klorofil-a ile ilişkisi ise daha dolaylı kalmıştır. Bu sonuçlar, Marmara Denizi'nde aktif bir midye çiftliği ortamında *O. edulis*'in askılı yetiştiricilik performansına ilişkin öncü ve sahaya özgü bilgiler sunmaktadır.

Anahtar kelimeler: *Ostrea edulis*, midye çiftliği, büyüme dinamikleri, su ürünleri yetiştiriciliğinin sürdürülebilirliği, çevresel parametreler

INTRODUCTION

Ostrea edulis Linnaeus, 1758, the European flat oyster, has long been valued as both a commercial shellfish species and a habitat-forming bivalve with ecological importance. In recent years, interest in the species has increased not only because of its aquaculture potential, but also because of its role in native oyster restoration and the recovery of degraded coastal habitats (Bergström et al., 2021; Colsoul et al., 2021; zu Ermgassen et al., 2023). Successful culture and restoration, however, depend strongly on local environmental conditions. Temperature, salinity, food availability, dissolved oxygen, depth, culture system and site-specific hydrodynamics can all influence growth, survival and condition in *O. edulis* and other oyster species (Carlucci et al., 2010; Pogoda et al., 2011; Çelik et al., 2015; Kamermans & Saurel, 2022; Bos et al., 2023).

Growth monitoring is therefore an important component of field-based oyster studies. Specific growth rate (SGR) is useful in this context because it expresses proportional growth over time and allows seasonal changes in growth performance to be compared. In oysters, length-based SGR mainly reflects shell growth, whereas weight-based SGR provides information on biomass accumulation. When interpreted together with environmental measurements, these two indicators can help describe how culture performance changes under field conditions (Pogoda et al.,

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2011; Çelik et al., 2015; Kamermans & Saurel, 2022; Bergström et al., 2024).

In Türkiye, studies on *O. edulis* have examined several aspects of the species' biology and culture potential. Growth, survival and condition index were evaluated in Mersin Bay by Acarlı et al. (2011), while Yıldız et al. (2011) reported seasonal changes in condition index, meat yield and biochemical composition in the Dardanelles. Reproductive activity and biochemical composition were later studied in Homa Lagoon, Izmir Bay (Acarlı et al., 2015). Çelik et al. (2015) showed that environmental factors, especially salinity, affected the survival, growth and biochemical composition of oysters transplanted from the Aegean Sea to the southern Black Sea. More recently, morphometric and growth-related data have been reported from the southern Black Sea and the Çanakkale Strait (Ayдын & Biltekin, 2020; Çolakoğlu et al., 2024). Despite these contributions, field data on the growth of *O. edulis* in the Sea of Marmara, particularly under active shellfish-farming conditions, remain limited.

Existing mussel farms may provide a practical setting for testing the suspended culture potential of *O. edulis*. They already have longline structures, buoy systems, access routes, routine maintenance practices and water-column space suitable for suspended grow-out units. Similar suspended or tray-based systems have been used in previous oyster culture trials, including studies with *O. edulis* in lantern nets and Pacific oyster rearing in tray systems (Pais et al., 2007; Roncarati et al., 2010). At the same time, such

environments are not necessarily favourable in every case. Fouling, natural mussel spat settlement, biodeposition, seston availability, water renewal and interspecific interactions may all affect oyster growth or condition depending on local conditions (Joyce et al., 2021; Khan et al., 2023; Sakamaki et al., 2025). For this reason, evaluating *O. edulis* within an active *Mytilus galloprovincialis* farm is relevant not only from a production perspective, but also for understanding the practical constraints of using existing shellfish-farming infrastructure.

The present study aimed to describe the growth, survival and seasonal SGR patterns of *O. edulis* cultured in suspended net bags within an active *M. galloprovincialis* farm on the Erdek coast of the Sea of Marmara. The study also explored the relationships between monthly growth and basic environmental parameters, including temperature, salinity, dissolved oxygen and chlorophyll-a. By focusing on a mussel-farm setting in a region where long-term field data for *O. edulis* are scarce, this study provides preliminary site-specific information for evaluating the feasibility and limitations of suspended European flat oyster culture in the Sea of Marmara.

MATERIALS AND METHODS

This investigation was conducted at a privately owned Mediterranean mussel (*Mytilus galloprovincialis* Lamarck, 1819) farm located at 40° 25' 39.54" N, 27° 45' 10.37" E, along the coast of Erdek in Balıkesir Province, Türkiye (Figure 1). The study was conducted over a 13-month period from March 2018 to March 2019.



Figure 1. Location of the study site on the Erdek coast (Sea of Marmara, Türkiye).

Twenty European flat oyster (*Ostrea edulis* Linnaeus, 1758) spat were collected from the Fatya Burnu area on the Erdek coast, Balıkesir, Türkiye, and used at the start of the culture trial. The oysters were placed in knotted net grow-out bags with an initial mesh size of 10 mm and suspended 1–2 m below the surface between two buoys on longline ropes within an active *Mytilus galloprovincialis* farm. The stocking density was 10 oysters per metre of net length, with a net width of 15 cm. Mesh size and net condition were checked monthly, and husbandry adjustments were made when needed to maintain water exchange and retain the oysters. One oyster died during the first month of the study, and no further mortality was recorded thereafter; therefore, final survival was 95%. Because the site is an active mussel farm with continuous natural spawning of *M. galloprovincialis*, wild mussel spat and other epiphytic organisms regularly settled on the oyster nets. To prevent fouling and maintain water flow, the nets were cleaned weekly with pressurised water and brushes.

Seawater physicochemical parameters — temperature, salinity, dissolved oxygen, and chlorophyll-*a* concentration — were recorded monthly for 13 months to examine the influence of environmental conditions on oyster growth and morphology. Temperature was measured with a calibrated mercury thermometer, salinity with a hand-held refractometer (Ertick Instruments Refractometer 0-32 Brix), and dissolved oxygen with a portable oxygen meter (WTW Profiline Oxi 3210). Water samples for chlorophyll-*a* analysis were collected monthly, transported to the laboratory in cooled, light-proof containers, and processed immediately. For chlorophyll-*a* determination, a known volume of each sample was filtered through Whatman GF/C filters under vacuum. Filters were extracted in 90 % acetone in the dark at 4 °C for 24 h, centrifuged, and the supernatant read spectrophotometrically at 630, 647, 664, and 750 nm. Chlorophyll-*a* concentrations were calculated using the trichromatic equations of Strickland and Parsons (1972). Shell length and body weight of each oyster were measured monthly. Shell length was taken as the maximum distance between the dorsal (hinge) and ventral margins using a Mitutoyo digital caliper (± 0.01 mm) and whole wet weight was recorded with a Sartorius digital balance (± 0.001 g) (Sartorius GL323 I-1S) after blotting excess water. Specific growth rate (SGR) was calculated for both shell length and body weight of *O. edulis* to describe temporal growth patterns, using:

$$SGR (\% \text{ day}^{-1}) = [(ln X_2 - ln X_1) / t] \times 100$$

where X_1 and X_2 are the initial and final values of shell length or wet weight, respectively, and t is the time interval in days used for the calculation.

Monthly SGRs were calculated descriptively from successive monthly cohort mean values. Seasonal SGRs were calculated from cohort mean shell length and wet weight over four consecutive intervals: spring, summer, autumn, and winter, respectively. The corresponding time intervals were 84, 98, 80, and 102 days.

Relationships between monthly growth and environmental parameters were explored using Spearman's rank correlation analysis. Monthly length- and weight-based SGRs were calculated from successive monthly cohort mean values. For each monthly growth interval, environmental values were expressed as the mean of the two monthly measurements bracketing that interval. Correlations were therefore calculated using 12 monthly growth intervals. Because of the limited number of observations and the descriptive nature of the study, these analyses were considered exploratory.

RESULTS

Environmental parameters

Seawater temperature showed clear seasonal variation between March 2018 and March 2019, whereas salinity fluctuated within a relatively narrow range (Figure 2A). Temperature reached its maximum of 25.9 °C in August 2018 and its minimum of 9.0 °C in February 2019, with a mean of 16.86 ± 6.10 °C over the monitoring period. Salinity was highest in March 2018 (26.2 PSU) and lowest in January 2019 (23.8 PSU), with a mean of 24.91 ± 0.73 PSU.

Chlorophyll-*a* concentration and dissolved oxygen also varied seasonally (Figure 2B). Chlorophyll-*a* increased markedly during winter and peaked in January 2019 at $4.82 \mu\text{g L}^{-1}$, while the lowest values occurred during July–September 2018, with a minimum of $0.15 \mu\text{g L}^{-1}$ in July. Dissolved oxygen was highest in February 2019 (8.4 mg L^{-1}) and lowest in August 2018 (7.5 mg L^{-1}).

Oyster growth: shell length

Ostrea edulis showed substantial shell growth over the study period (Figure 3A; Table 1; Figure 4). Mean shell length increased from 22.97 ± 6.48 mm in March 2018 to 84.03 ± 11.16 mm in March 2019. Growth was most rapid during late spring and summer, with the highest monthly length-based SGR recorded in June 2018 ($1.14 \% \text{ day}^{-1}$). Growth slowed markedly in autumn and turned slightly negative between December 2018 and February 2019, coinciding with the lowest seawater temperatures, before recovering in March 2019. The monthly distribution of individual shell lengths showed an upward shift in median values and a wider length range toward the end of the culture period.

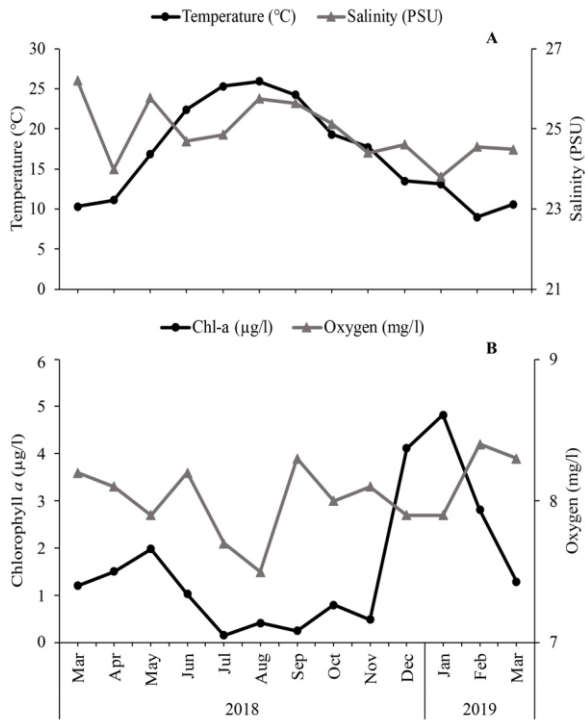


Figure 2. Monthly variation of seawater temperature and salinity (A) and chlorophyll-*a* concentration and dissolved oxygen (B) at the study site, March 2018 – March 2019.

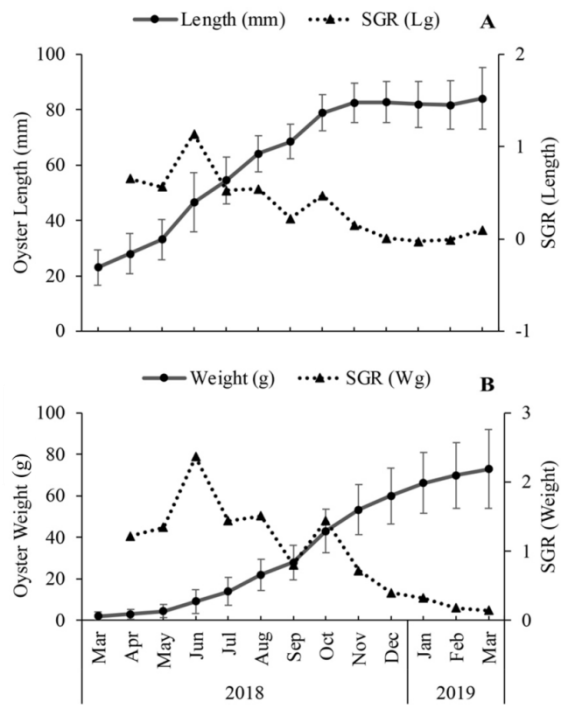


Figure 3. Growth of *O. edulis* over the study period: (A) mean shell length and length-based specific growth rate; (B) mean wet weight and weight-based specific growth rate (monthly SGRs based on a 30-day interval). Error bars for shell length and wet weight indicate SD.

Table 1. Monthly morphometric measurements of *Ostrea edulis* during the study period, presented as mean $\pm$ SD. The initial sample size was 20 oysters; one oyster died during the first month, and the remaining 19 oysters were monitored until the end of the study.

Month	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mar 2018	22.97 $\pm$ 6.48	20.86 $\pm$ 4.67	6.52 $\pm$ 2.17	2.06 $\pm$ 1.82
Apr 2018	27.94 $\pm$ 7.26	24.85 $\pm$ 5.79	7.50 $\pm$ 2.37	2.98 $\pm$ 2.39
May 2018	33.09 $\pm$ 7.24	29.82 $\pm$ 5.24	9.26 $\pm$ 2.85	4.45 $\pm$ 3.30
Jun 2018	46.53 $\pm$ 10.57	40.54 $\pm$ 6.55	12.09 $\pm$ 4.40	9.05 $\pm$ 5.90
Jul 2018	54.45 $\pm$ 8.50	47.61 $\pm$ 5.88	13.15 $\pm$ 4.59	13.93 $\pm$ 6.64
Aug 2018	64.06 $\pm$ 6.60	53.78 $\pm$ 7.90	15.41 $\pm$ 4.44	21.89 $\pm$ 7.56
Sep 2018	68.46 $\pm$ 6.22	56.29 $\pm$ 8.45	17.44 $\pm$ 4.28	27.86 $\pm$ 8.43
Oct 2018	78.83 $\pm$ 6.59	65.31 $\pm$ 9.18	19.33 $\pm$ 4.54	42.95 $\pm$ 10.42
Nov 2018	82.50 $\pm$ 7.04	67.95 $\pm$ 9.43	20.89 $\pm$ 4.56	53.28 $\pm$ 12.19
Dec 2018	82.62 $\pm$ 7.41	67.90 $\pm$ 9.37	22.02 $\pm$ 4.69	60.06 $\pm$ 13.45
Jan 2019	81.87 $\pm$ 8.36	67.07 $\pm$ 8.72	22.34 $\pm$ 4.53	66.16 $\pm$ 14.67
Feb 2019	81.62 $\pm$ 8.71	66.42 $\pm$ 8.08	22.83 $\pm$ 4.88	69.78 $\pm$ 15.81
Mar 2019	84.03 $\pm$ 11.16	70.49 $\pm$ 8.55	23.44 $\pm$ 5.69	72.85 $\pm$ 18.97

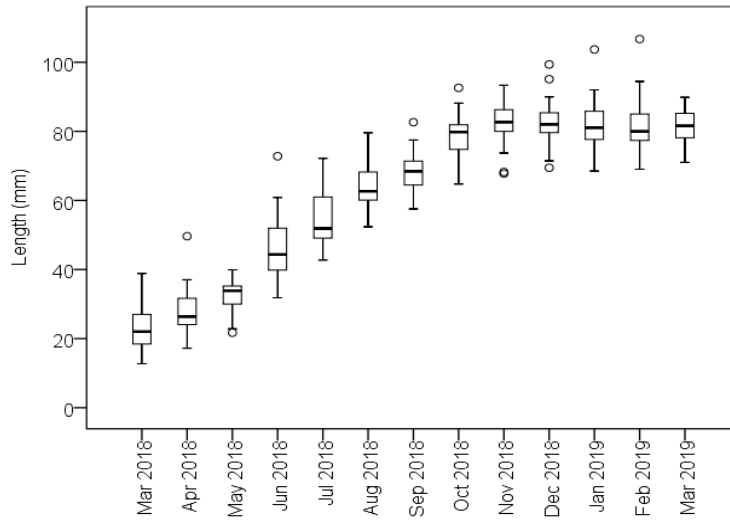


Figure 4. Monthly distribution of shell length in *O. edulis* during the study period. Horizontal lines within the boxes represent medians; open circles (°) denote outliers; extreme values are not shown.

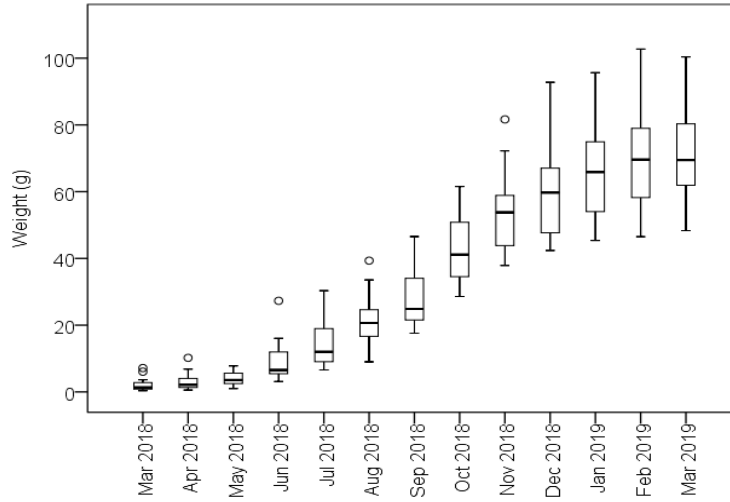


Figure 5. Monthly distribution of wet weight in *O. edulis* during the study period. Horizontal lines within the boxes represent medians; open circles (°) denote outliers; extreme values are not shown.

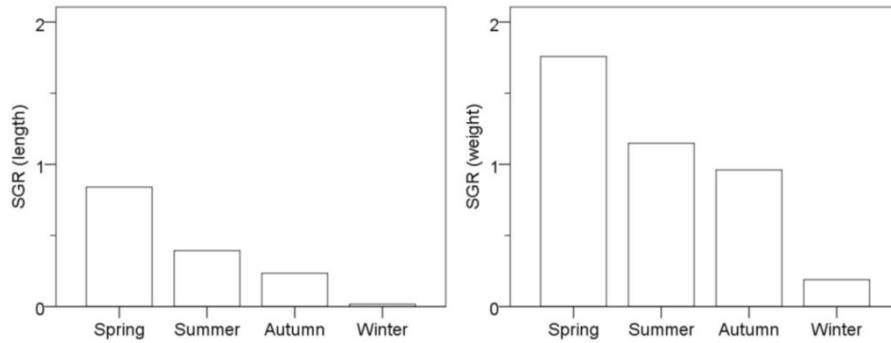


Figure 6. Seasonal length-based and weight-based specific growth rates (SGR, % day⁻¹) of *Ostrea edulis*, calculated from cohort mean shell length and wet weight over four seasonal intervals: March–June 2018, June–September 2018, September–December 2018, and December 2018–March 2019.

Oyster growth: shell width and thickness

Shell width and thickness followed a comparable seasonal trajectory to length (Table 1). Mean shell width increased from 20.86 ± 4.67 mm in March 2018 to 70.49 ± 8.55 mm in March 2019, while mean shell thickness rose from 6.52 ± 2.17 mm to 23.44 ± 5.69 mm over the same interval. As with shell length, the most pronounced gains in both parameters occurred between May and August 2018, whereas increments in width slowed during the winter months. Shell thickness continued to increase gradually during the colder period, whereas shell width remained nearly stable or decreased slightly.

Oyster growth: body weight

A similar pattern was observed for whole wet weight (Figure 3B; Table 1; Figure 5). Mean weight increased from 2.06 ± 1.82 g in March 2018 to 72.85 ± 18.97 g in March 2019, with the highest weight-based SGR recorded in June 2018 ($2.36\% \text{ day}^{-1}$). Weight-based SGRs declined during the winter months despite continued increases in mean wet weight, coinciding mainly with the lowest seawater temperatures. The monthly distribution of individual wet weights showed an upward shift in median values and a wider interquartile range toward the end of the culture period.

Seasonal growth dynamics

When calculated from cohort mean values, both length- and weight-based SGRs confirmed the monthly growth pattern described above (Figure 6). The highest seasonal SGR values were recorded in spring, with length- and weight-based SGRs of 0.84 and $1.76\% \text{ day}^{-1}$, respectively. SGR then declined progressively through summer and autumn, reaching the lowest values in winter, with $0.02\% \text{ day}^{-1}$ for shell length and $0.19\% \text{ day}^{-1}$ for wet weight. This temporal decline coincided with lower seawater temperatures and increasing oyster size, whereas chlorophyll-a concentrations increased during winter.

Relationships between monthly growth and environmental parameters

Exploratory Spearman correlation analysis showed that weight-based SGR was positively but not significantly associated with seawater temperature ($p = 0.48$, $p > 0.05$). Salinity was also positively associated with both length- and weight-based SGR ($p = 0.66$, $p = 0.02$), although this result should be interpreted cautiously because salinity varied within a narrow range. Chlorophyll-a showed a negative association with SGR for both growth measures ($p = -0.59$ and -0.57 , $p = 0.05$), whereas dissolved oxygen was not significantly related to either growth measure.

DISCUSSION

The present study followed the growth and morphometric development of *Ostrea edulis* cultured in suspended net bags within an active mussel farm on the Erdek coast of the

Sea of Marmara. Over the one-year monitoring period, shell length, width, thickness and wet weight all increased, indicating that the site supported the growth of European flat oysters under the tested suspended-culture conditions. The most pronounced increases occurred from late spring to summer, whereas growth slowed markedly during the colder months.

The rapid increase in shell length and wet weight during the early part of the culture period is consistent with previous observations that smaller *O. edulis* individuals may show higher relative growth rates, although performance may vary with initial size, local conditions and culture practices (Acarlı et al., 2011). In the present study, length- and weight-based SGR followed broadly similar seasonal patterns, both peaking during the May–June interval and declining thereafter. Shell thickness continued to increase gradually even during the winter period, while length and width showed little change. This may indicate that shell thickening can continue when longitudinal growth is reduced; however, because physiological, reproductive and biochemical measurements were not made, this pattern should be interpreted cautiously and should not be considered direct evidence of resource reallocation.

The observed temporal growth pattern broadly coincided with seawater temperature. Spring and summer coincided with increasing temperatures and active growth, whereas the winter decrease in SGR occurred during the coldest part of the study. The exploratory correlation analysis was consistent with this pattern, although the weight-based SGR–temperature correlation was positive but not statistically significant. This is in line with previous studies showing that temperature is an important driver of oyster growth and performance under both experimental and field conditions (Pogoda et al., 2011; Kamermans & Saurel, 2022; Bos et al., 2023). Nevertheless, the relationship between environmental parameters and growth was not simple. Chlorophyll-a concentrations increased during winter, while SGR remained low, and the negative associations between chlorophyll-a and SGR should therefore not be interpreted as an inhibitory effect of phytoplankton availability. Rather, it probably reflects the seasonal mismatch at the study site, where low temperature may have limited the capacity of oysters to convert available food into shell growth and biomass accumulation.

Salinity was positively correlated with both length- and weight-based SGR, but this result also requires caution because salinity varied within a relatively narrow range during the study period. A direct salinity effect cannot be separated from seasonal covariation among environmental variables in the present dataset. Even so, the sensitivity of *O. edulis* to salinity has been reported in Turkish waters; Çelik

et al. (2015) found that lower salinity negatively affected the growth and physiological performance of oysters transplanted from the Aegean Sea to the southern Black Sea. In the present study, dissolved oxygen was not significantly correlated with SGR, probably because oxygen values remained within a relatively narrow range throughout the monitoring period.

The decrease in SGR after the initial rapid growth phase should not be explained by temperature and chlorophyll-a alone. Relative growth commonly declines as individuals become larger, and seasonal physiological processes may also influence growth performance (Acarlı et al., 2011). In Turkish waters, seasonal variation in condition index, meat yield and biochemical composition has been reported for *O. edulis* from the Dardanelles and Homa Lagoon, indicating that reproductive activity and changes in energy reserves may vary substantially through the year (Yıldız et al., 2011; Acarlı et al., 2015). These findings suggest that the slower growth observed in the later part of the present study may also reflect size-dependent reductions in relative growth, reproductive allocation, changes in physiological condition, or other husbandry-related factors.

The final size and weight values recorded in this study were broadly within the ranges reported for *O. edulis* in previous studies. Aydın and Biltekin (2020) reported a mean shell length of 69.49 ± 27.10 mm and a mean body weight of 66.19 ± 60.78 g for wild individuals from the southern Black Sea, while maximum shell length for the species has been reported as 12 cm by Sealifebase (2019) and 20 cm by Fischer et al. (1987). In terms of body weight, values reported by Carlucci et al. (2010) and Çolakoğlu and Ormancı (2018) also provide a useful reference range for interpreting the present data. The final mean wet weight of 72.85 g recorded here therefore falls within the broader range reported for the species, although comparisons among studies should be made cautiously because of differences in initial size, culture duration, environmental conditions and sampling design. More recent morphometric data from the Çanakkale Strait also provide a regional reference point for interpreting the size and weight values observed in the present study (Çolakoğlu et al., 2024).

From a practical aquaculture perspective, the use of an active *Mytilus galloprovincialis* farm as the culture setting is important. Mussel farms already provide longline infrastructure, buoyancy systems, access routes and routine husbandry operations, which may reduce the need for additional infrastructure when testing suspended oyster culture. Similar suspended or tray-based systems have been used in previous oyster culture studies, including *O. edulis* trials in suspended systems and Pacific oyster rearing in tray systems (Pais et al., 2007; Roncarati et al., 2010). At the same time, the mussel-farm environment may also impose

constraints. In the present study, wild mussel spat and other epiphytic organisms settled regularly on the oyster nets, requiring weekly cleaning. Such fouling may reduce water exchange through the nets, increase handling effort and influence food availability at the net-bag scale. In addition, mussels and oysters may interact through shared seston resources, biodeposition and other local-scale processes. Previous studies have shown that interactions between oysters and mussels may vary among systems and may affect condition or survival depending on environmental and husbandry conditions (Joyce et al., 2021; Khan et al., 2023; Sakamaki et al., 2025).

These findings also fit within the broader context of Turkish *O. edulis* studies. Earlier work in Mersin Bay showed that growth, survival and condition index can differ among size groups (Acarlı et al., 2011), while studies from the Dardanelles, Homa Lagoon, the southern Black Sea and the Çanakkale Strait have provided information on condition, reproduction, biochemical composition, morphometry and growth-related traits (Yıldız et al., 2011; Acarlı et al., 2015; Aydın & Biltekin, 2020; Çolakoğlu et al., 2024). The present study adds to this regional literature by providing a one-year field dataset from the Sea of Marmara and by evaluating *O. edulis* under active mussel-farm conditions. This setting is relevant because existing shellfish-farming infrastructure may offer opportunities for diversification, although its suitability needs to be assessed locally rather than assumed. Several limitations should be considered when interpreting the results. The study was conducted at a single mussel-farm site over one annual cycle and did not include a non-farm control area; therefore, the specific effect of mussel-farm conditions on oyster growth and survival cannot be separated from general site effects. In addition, seston quantity and quality, particulate organic matter, particulate inorganic matter and reproductive condition were not measured, although these factors may influence oyster growth and seasonal SGR patterns. The environmental-growth correlations were exploratory and based on 12 monthly growth intervals, which limits statistical power and prevents causal inference. Because the same cohort was followed throughout the study, size-dependent changes in relative growth could not be separated from seasonal variation in environmental conditions. Despite these limitations, the dataset provides useful preliminary information on the growth of *O. edulis* under suspended culture conditions in the Sea of Marmara.

Overall, the present results suggest that *O. edulis* can grow under the tested suspended-culture conditions within an active mussel farm on the Erdek coast. Growth was strongest during late spring and summer and declined during winter, with temperature appearing to be a possible environmental correlate of seasonal performance. Rather than

demonstrating a general advantage of mussel-farm environments, the study provides a site-specific assessment that may help guide future work on suspended European flat oyster culture, environmental monitoring and possible co-use of existing shellfish-farming infrastructure in the Sea of Marmara.

CONCLUSION

This one-year field study provides preliminary information on the growth and morphometric development of *Ostrea edulis* cultured in suspended net bags within an active mussel farm on the Erdek coast of the Sea of Marmara. Shell length, width, thickness and wet weight increased during the monitoring period, with the highest growth rates observed from late spring to early summer and a clear slowdown during winter. Among the environmental parameters examined, seawater temperature showed a possible association with seasonal growth, whereas the relationship with chlorophyll-a was less direct. Because the study was conducted at a single site, over one annual cycle, and without a non-farm control, the results should be interpreted as a site-specific assessment rather than as general evidence for the suitability of mussel farms for *O. edulis* culture. Even so, the findings provide a useful regional reference for future studies on suspended European flat oyster culture, environmental monitoring and the possible use of existing shellfish-farming infrastructure in the Sea of Marmara.

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