Contribution to the study of the technical feasibility of the mussel *Mytilus galloprovincialis* on a surface longline in Amsa bay (Mediterranean coast, Tetouan, Morocco)

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Introduction

In the face of increasing of human population and the decrease in marine fisheries which are an essential source of protein for billions, there is a requirement to source alternative means of sustainable protein.

Shellfish are among the largest sources of animal protein (FAO, 2016) and other nutrients including peptides, amino acids, vitamins and minerals (Venugopal and Gopakumar, 2017).

The United Nations 2030 development agenda adopted in 2015 outlines 17 Sustainable Development Goals (SDGs), concerning the contribution of fisheries and aquaculture to food security and nutrition.(FAO,2016)

In the aim to contribute in the development of marine aquaculture in Mediterranean part of Morocco, the present study test the technical feasibility of culture of the Mediterranean mussel *Mytilus galloprovincialis* on surface longlines in Amsa bay.

Figure 1: Map showing the study area

Materials & methods

Mussels spats of *M. galloprovincialis* were collected from naturel area. Than, it was sorted and fixed in longlines.

Sampling was carried monthly for biometric study. In parallel, environmental parameters were taken (fig.2).
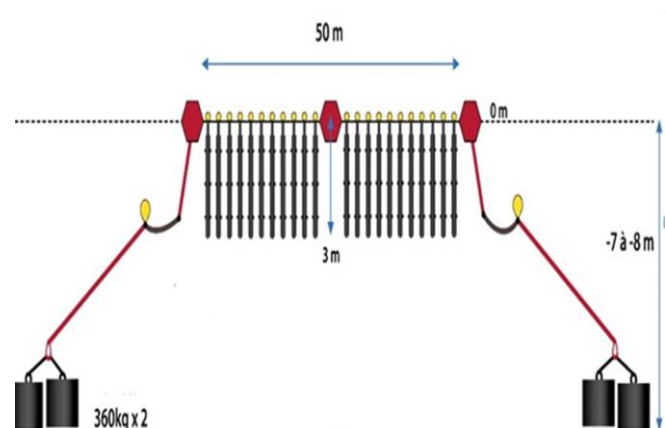

Figure 2 : Schematic illustration of surface longline.

Growth parameters :

- Growth of Von Bertalanffy (1938) was estimated as:

$$Lt = L\infty [1 - e^{-k(t-to)}]$$

With, Lt: total length (in mm) at time t, K: growth coefficient, L∞: asymptotic maximum length, e: the theoretical maximum length that the bivalve can reach, to: theoretical age for which the mussel has zero length.

- Relative growth was calculated as:

$$Y = a \times X^b \quad (Ricker\ 1980)$$

With, X:Total length of the mold in millimeters, a:Proportionality constant ,Y: dimension of the organ or proportion of the body studied, b: Growth coefficient

Results

- The assessment of the relationship intensity between the total length and weight of *M. g*, reveals the existence of a minorante allometry (b<3) reflecting the increase in the size of individuals more rapid than that of the weight (fig. 3)
- The evaluation of the growth parameters, by applying the Von Bertallanfy equation, allowed us to estimate the value of the growth coefficient k (0.518) and the asymptotic length L∞ (84.21),testifies a fast increase in size of individuals. After 7 to 8 months of culture, the mussel reached a size of 90 mm (fig.4,5)
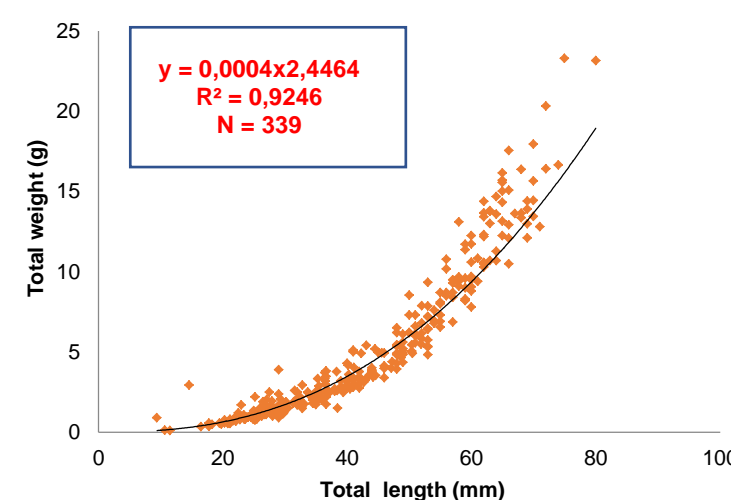

$$y = 0,0004x^{2,4464}$$
$$R^2 = 0,9246$$
$$N = 339$$

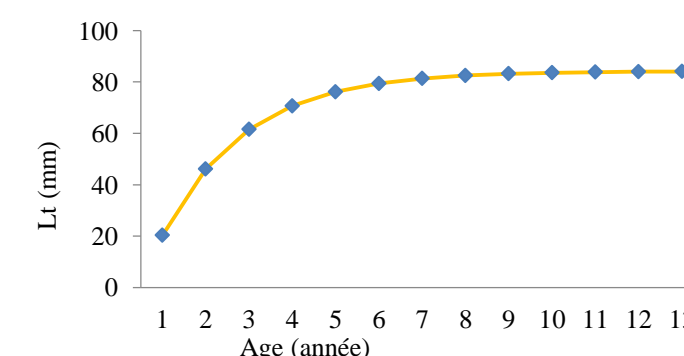**Figure 3** : length-weight relationship of *M.galloprovincialis*.

Figure 4: Plot of age and growth *of M. glloprovincialis* based on computed growth parameters.
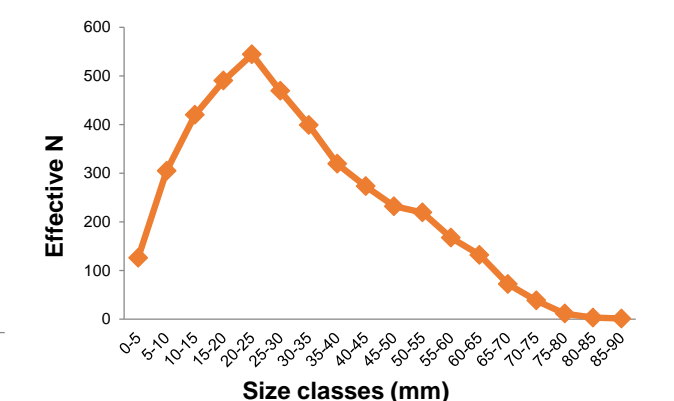

Figure 5 : Effective of the different size classes.

The analysis of the physicochemical parameters of water is important in the study of the growth of the mussel M.g; this was supported by the results of statistical analysis (PCA) which revealed a very important correlation between growth and water temperature(fig.6,7)
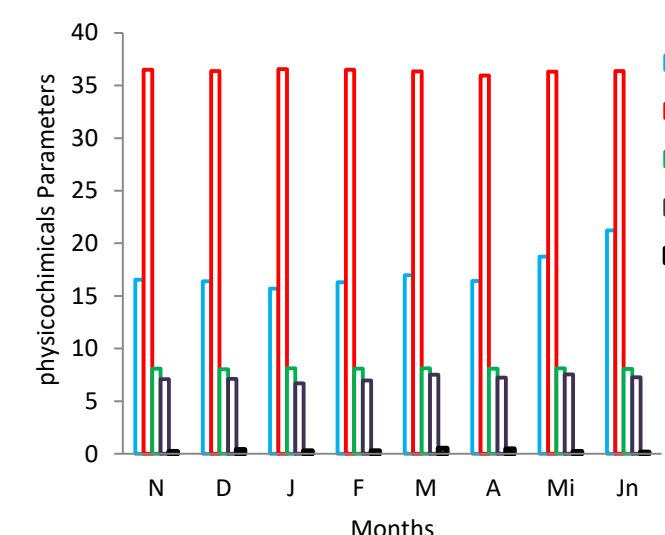

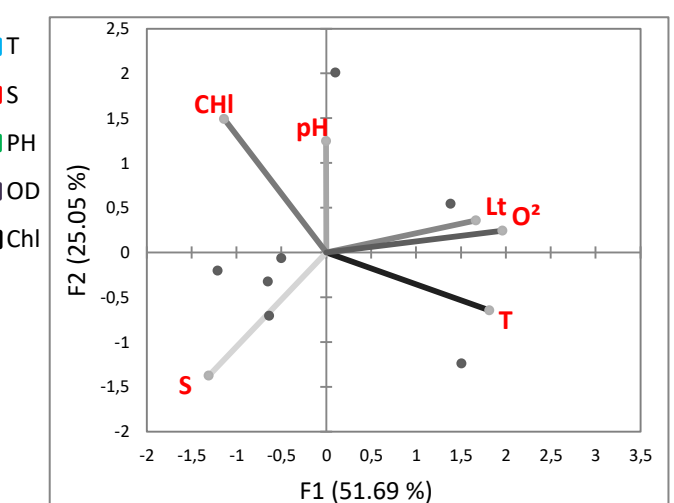**Figure 6**: Temporal variations in water T, OD, S and pH

Figure 7: Correlation (PCA) of the total growth and oceanographic parameters

Conclusion

The biological data obtained during the monitoring of mussels of *M. galloprovincialis* in culture, show that this species present a potential and very promising. Mussels culture, could therefore constitute one of activities for fisherman/marine cooperatives in the region.

References

FAO, (2016). *The State of Food and Agriculture. Climate Change, Agriculture and Food Security.* Rome: FAO.

Venugopal, V., and Gopakumar, K. (2017). Shellfish: nutritive value, health benefits, and consumer safety. Compr. Rev. Food Sci. Food Saf. 16, 1219–1242. doi: 10.1111/1541-4337.12312