

ZEBRA MUSSEL IN IZNAJAR RESERVOIR. THE INFLUENCE OF THE DROUGHT IN THE LIFE CYCLE AND SURVIVAL

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SUMMARY

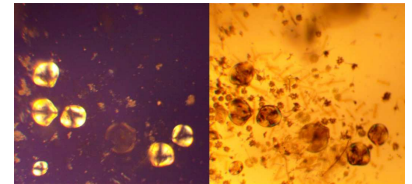
The zebra mussel is an invasive species from the Caspian and Black seas, with a big capacity for colonization. This organism causes great damages in the ecosystems and infrastructures in which it is based, being practically impossible its eradication once settled in the natural environment.

Among the factors that influence its adaptation and survival, there are calcium concentration, pH, dissolved oxygen and temperature, the latter being a determining factor in the start and duration of its reproductive cycle. Since its discovery in the Iznájar reservoir, the presence and larval concentration are being monitored monthly, together with the values of oxygen and temperature and the stratification of the reservoir, to determine its life cycle and, therefore, its reproductive period. This information is essential for the prevention and application of the necessary measures for the protection of infrastructures.

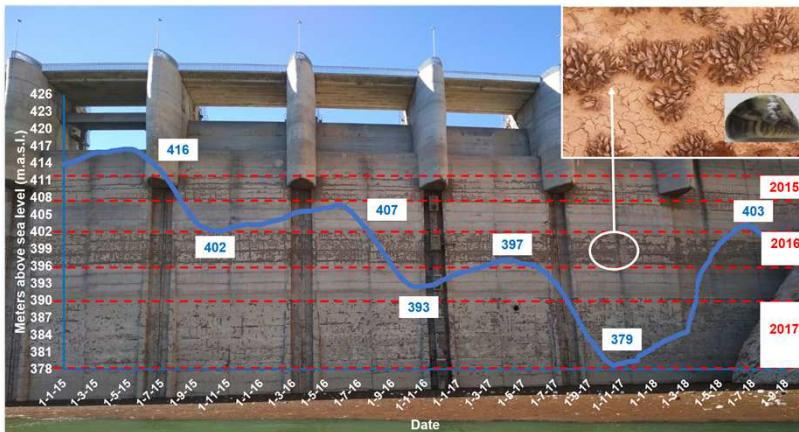
Surprisingly, in 2018, due to the great mortality of adult individuals in the reproductive stage caused by the great decrease in level in the reservoir, because of the period of drought, no larvae were found, despite being in the same period of previous years. However, some adult individuals have been found alive, so we will have to wait until the reproductive period of 2019 to have a global view of the effect of the drought in the coming years.

METHOD

- Larval samples were collected monthly using a 50 µm plankton net, at different depths, the mean value being calculated.
- The identification and quantification of the larval stages was performed using normal/polarized light microscopy.
- Thermal and oxygen characterization of the reservoir was monthly carried out using an oximeter with oxygen and temperature probes.



RESULTS



The Iznájar reservoir is hot monomictic, producing the thermal stratification and oxygen in the summer, resulting in the formation of thermoclines and oxyclines. This fact will limit the aerobic zone to the first meters of depth.

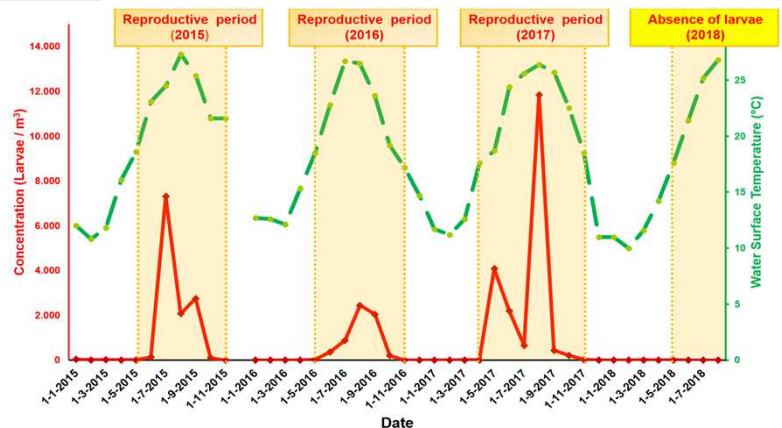
On the other hand, with the increase of the temperature in the summer season begins the reproductive period of the zebra mussel, moment in which the adult individuals release larvae in the body of water. These larvae later tend to fix and convert to the plantigrade phase becoming adult individuals. This process coincides with the thermal and oxygen stratification in the reservoir previously mentioned, so that the presence of adult individuals in the water body will be delimited by the oxygenated upper layer.

As a consequence, three bands of adult mussels are clearly defined in the wall of the dam (delimited in red), coinciding with the annual decreases due to the water discharge (line in blue) and delimited by the aerobic zone.

The following graph shows the profiles of larval concentrations from January 2015 to August 2018. As can be seen, in the years 2015 and 2017 two increases of larvae concentration are observed more clearly in the summer season compared to 2016.

The beginning of the reproductive cycle of zebra mussel in Iznájar reservoir coincides with the increase of the temperature, registering concentrations considered positive ($\geq 0,05$ larvae/liter, ≥ 50 larvae/cubic meter) with temperature surface values close to 20 °C.

With respect to 2018, it is the first time that no larvae have been detected in the summer season since the monitoring. This fact may be attributed to the decrease in water level of the reservoir, due to the period of drought that occurred, which has led to a great mortality of adult reproductive individuals after being left out of the water.



CONCLUSIONS

- ✓ The reproductive period of the zebra mussel in the Iznájar reservoir is clearly defined, registering positive larval concentrations between the months of May to October. This fact coincides with the increase in temperature.
- ✓ The decrease of the level due to the period of drought, has greatly affected this invasive species. As a consequence, not quantifying larvae during 2018. This fact demonstrates the effectiveness of the management of water body levels as a control tool for this species.

ACKNOWLEDGEMENTS

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