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Evaluation of microalgae growth in North Argentine: Response to temperature variations

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We assumed that it would be possible to offset sewage water treatment costs by utilizing microalgae in tertiary processes of sewage treatment in the north of Argentina - one of the seven regions with higher levels of solar radiation in the world. Because the temperature strongly influences the cellular chemical composition, uptake of nutrients, CO_2 and the growth rates for every species of algae, we first wanted to explore the effect of temperature on the growth of Scenedesmus quadricauda. We reported the results of autumn growth (measured with Neubauer chamber) for two temperature conditions in a standard culture medium (modified Detmer) with 1820 lux, photoperiod 12:12: i) controlled temperature (18°C) and ii) room temperature, recorded with 2 parallel measuring sensors. The mean temperature was 13.6 ± 3.1°C (minimum/maximum were 7.6°C and 23.4°C). Assays were performed in all cases in triplicate, inoculating $2.5x10^5$ cells/ml in 250 ml of sterile culture medium. Growth cycles were 20 days. Four cycles were repeated with daily shaking. Growth has accelerated in the second trial: the maximum specific growth rate (μ) of the exponential phase was 0.33 d^{-1} versus 0.19 d^{-1} of the first trial, which could indicate that Scenedesmus responds better against a thermal stress or incidence of higher temperatures. However, we compared statistically the meteorological records for the same date and time (average exterior: 11.12 ± 5.1°C; rank: 1.25°C - 29.45°C), and significant differences were observed between temperature series room/exterior (H = 666.28; p <0.0001). So it is evident that the room buffers the external temperature changes and providing more favorable conditions for growth. Next steps will investigate the resistance of the microalgae against these extremes of temperature in the same season, in order to estimate its possibility of survival under local conditions.

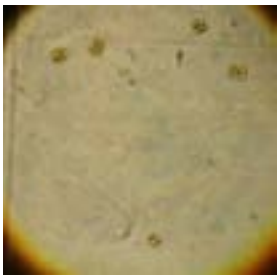

Figure1: *Fotografía al MO de la especie Scenedesmus quadricauda*

Biography

Silvina Manrique has her expertise in biomass and bioenergy evaluation and all projects are focused in a comprehensive way, covering the territory, in order to provide solutions and alternatives that promote a more sustainable territorial development. Her environmental training has allowed her to develop this integral approach for specific projects, but always considering the interrelation of the different elements of the system. In particular, in the very diverse field of biomass, her approach is the recycling of unused organic fractions or the development of multipurpose solutions, as in the case of microalgae. She is interested in contributing to the purification of different effluents, that allows reuse the water, to diminish infectious center, but also to generate a growth of microalgal biomass that can be used for energetic purposes.

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