



Bioprospecting for fast growing and biomass characterization of oleaginous microalgae from South–Eastern Buenos Aires, Argentina

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HIGHLIGHTS

- ▶ Thirty-four native-to-Argentina microalgae strains were isolated.
- ▶ Novel RNA sequences in the ITS1-5.8S-ITS2 region were reported.
- ▶ Some strains accumulated lipids up to 43% of their dry biomass.
- ▶ High ratios of mono-unsaturated to poly-unsaturated fatty acids are shown.
- ▶ Strains with doubling times up to 6 h were identified.

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ABSTRACT

As part of pioneering efforts to assess the potential of native microalgae as biofuel feedstock in South–Eastern Buenos Aires, 34 monoalgal cultures (corresponding to the Phylum Chlorophyta) were established and 21 were selected for further growth and biomass composition characterization.

Novel RNA sequences in the ITS1-5.8S-ITS2 region were identified. Some strains showed desirable traits as biodiesel feedstock such as (i) apparent maximal doubling times of 6 h, (ii) lipids accumulation of up to 43% of their dry biomass, (iii) high ration of mono-unsaturated to poly-unsaturated fatty acids, (iv) high response to CO₂ supplementation, and (v) complete sedimentation in 4 h. Data of the outdoors performance of some strains suggested they might represent valuable resources for future research towards the regional development of the technology for microalgae-based biofuels.

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1. Introduction

To address some of the major challenges of Humanity such as climate change, energy supply and poverty alleviation (Cockerill and Martin, 2008; Tilman et al., 2009). Most countries have made in the last years laws to switch the use of oil or natural gas to biofuels. In this context, the Argentine Congress approved in 2006, the law 26093, promoting the production and use of biofuels in the country, mandating bioethanol and biodiesel account for 5% of all fuel sold by 2010 (Tomei and Upham, 2011). More recently, increased soy production (one of the main sources of biodiesel) and commitment to pursue the goals of the law led to an amendment establishing a minimal 7% biodiesel for blending, with the

expectation to reach 10% by the end of 2012 (<http://www.energia.gov.ar>). Therefore, Argentina has become one of the world's largest producers and exporters of biodiesel in the last few years (Tomei and Upham, 2011). Despite the benefits that this flourishing industry the long term sustainability of first generation biofuels has been questioned by life cycle analysis regarding land use change, impact on food prize and carbon, water and nitrogen footprints (Huo et al., 2011; Searchinger et al., 2008). Thus, a diversification of the energy matrix (beyond and even among biofuels and/or feedstocks) appears to be mandatory for attaining goals of sustainable energy supply and for creating new opportunities towards socio-economical equity and poverty alleviation (Ewing and Msangi, 2009).

During the last years much interest was focused on the research and development (R&D) of third generation biofuels based on microalgae biomass as a feedstock for a diversity of biofuels, especially biodiesel from eukaryotic microalgae lipids. Some of the

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