

UNIVERSIDAD DE LA FRONTERA

Facultad de Ingeniería y Ciencias

Doctorado en Ciencias de Recursos Naturales



**Bio-based solvents for hydrocarbon extraction from
Botryococcus braunii maintaining cell viability in a two-phase
extraction system**

**DOCTORAL THESIS IN FULFILLMENT OF
THE REQUIREMENTS FOR THE
DEGREE DOCTOR OF SCIENCES IN
NATURAL
RESOURCES**

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“Bio-based solvents for hydrocarbon extraction from *Botryococcus braunii* maintaining cell viability in a two-phase extraction system”

Esta tesis fue realizada bajo la supervisión del director de tesis Dr. Rodrigo Navia Diez de la Facultad de Ingeniería y Ciencias de la Universidad de La Frontera, y ha sido aprobada por los miembros de la comisión examinadora.

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Thesis summary

"The growing energy needs, climate change and pollution produced by production processes drive the search for clean methodologies to generate fuels. This thesis proposes the use of renewable bio-solvents to extract hydrocarbons in a two-phase system from a culture of the microalga *Botryococcus braunii*. The biosolvents of limonene, a fatty acid methyl ester (MAG) and other organic solvents are tested as comparison standards for hydrocarbon extraction. It is found that MAG is able to extract hydrocarbons at a high rate and maintain the highest survival rate of the microalgae. Although limonene extracts hydrocarbons, the survival rate of the microalgae is low. The system can be improved by controlling the time and surface area of solvent-biomass contact."