

**Desert
Bioenergy**

In situ transesterification of wet microalgae biomass: influence of process conditions on FAAE yield

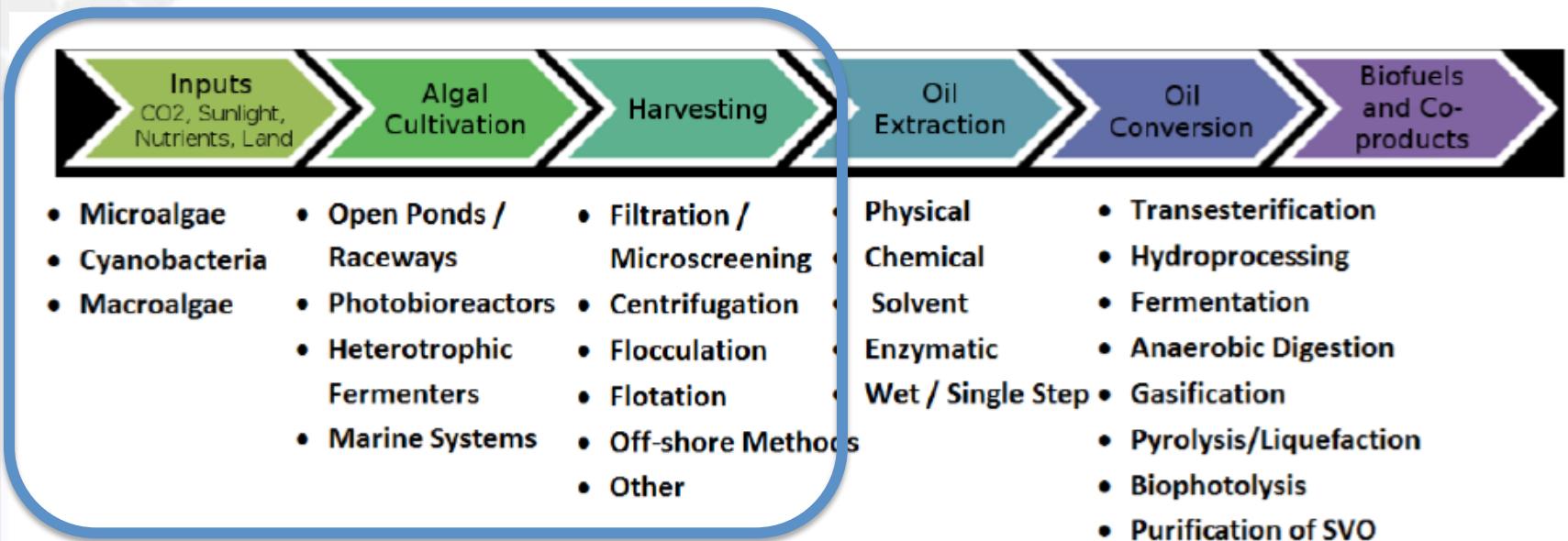
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Financiado por



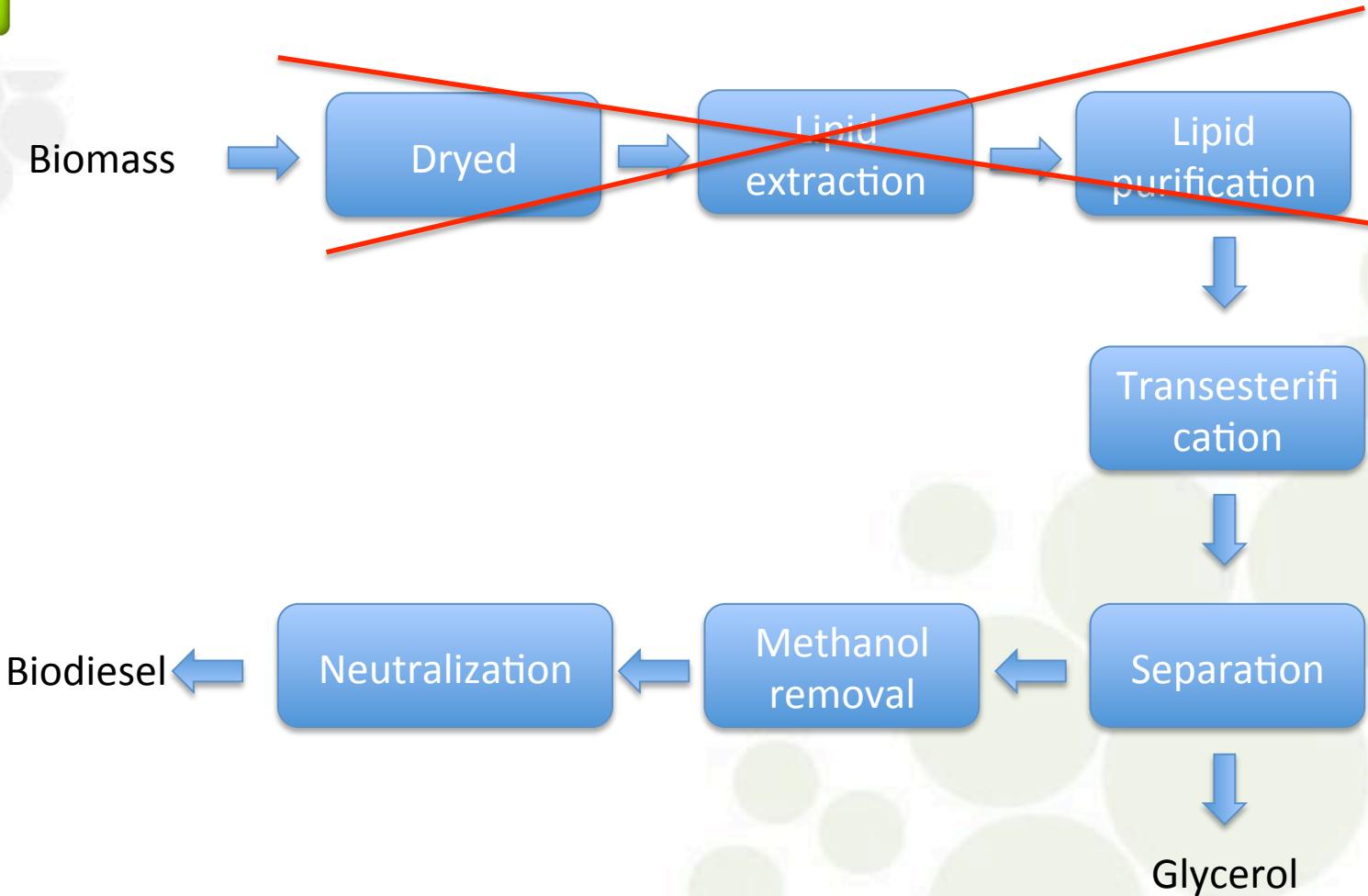


Culture v/s downstream





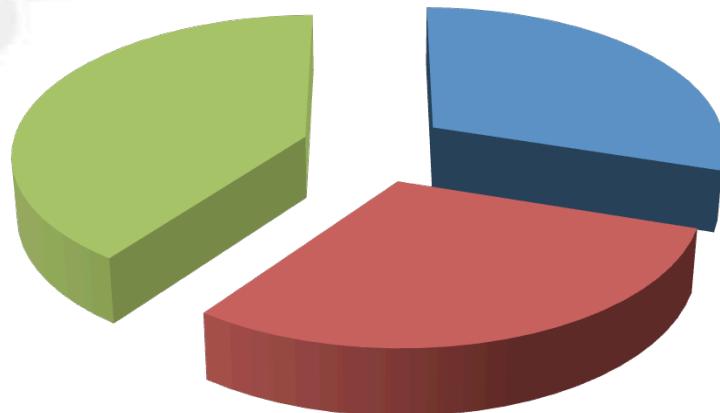
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Direct transesterification



Microalgae composition

- lipids
- carbohydrate
- protein

+

Strong catalyst

70 % of spent
microalgae biomass



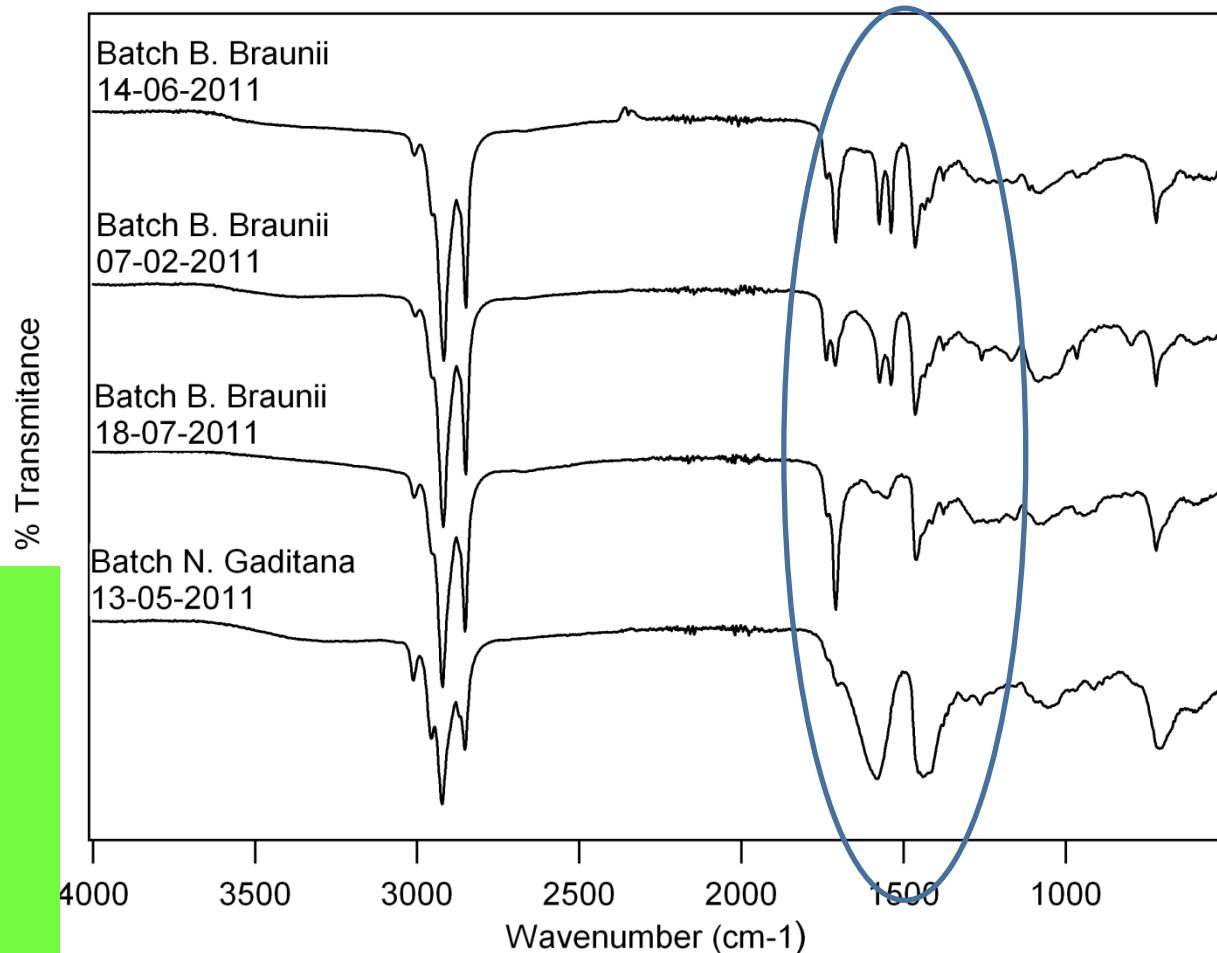
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Biodiesel from microalgae

✓ FTIR Analysis for oils

Functional groups

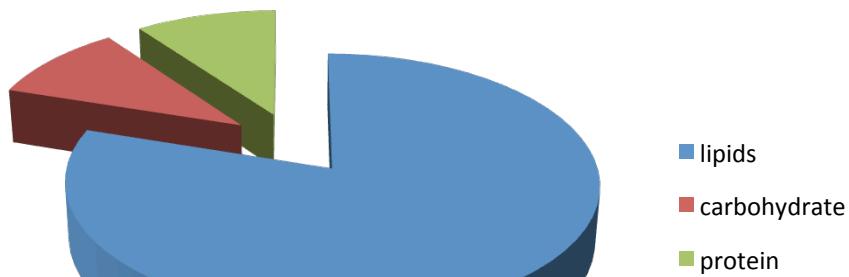
3300-2500	(O-H) alcohol, carboxylic acid
2950-2932-2855	(C-H) aliphatic, fats
1720	(C=O) ester
1439-1371	(C-H) methyl
1215	(C-C) ester
1800-1000	protein molecules
• 1050	(C-N) amino acid
• 1620	(N-H) amino acid





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Microalgae biomass after to extract
protein and carbohydrate

- lipids
- carbohydrate
- protein



Biomass with a
higher lipid content

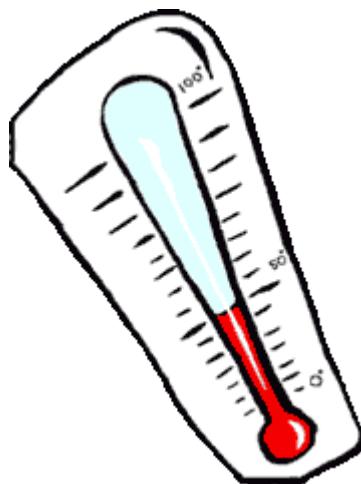


Biodiesel



Direct transesterification Parameters

Biomass condition: water content, lipid content





Objetive

- To study the temperature, catalyst dosage and alcohol dosage in direct transesterification of microalgae with 90% of water



Material and methods

- Microalgae with 90 % of water content
- 9% fatty acid content
- 46 % carbohydrate content
- 32 % protein content



Direct transesterification

- Different temperature
- Different alcohol dosage
- Different catalyst dosage

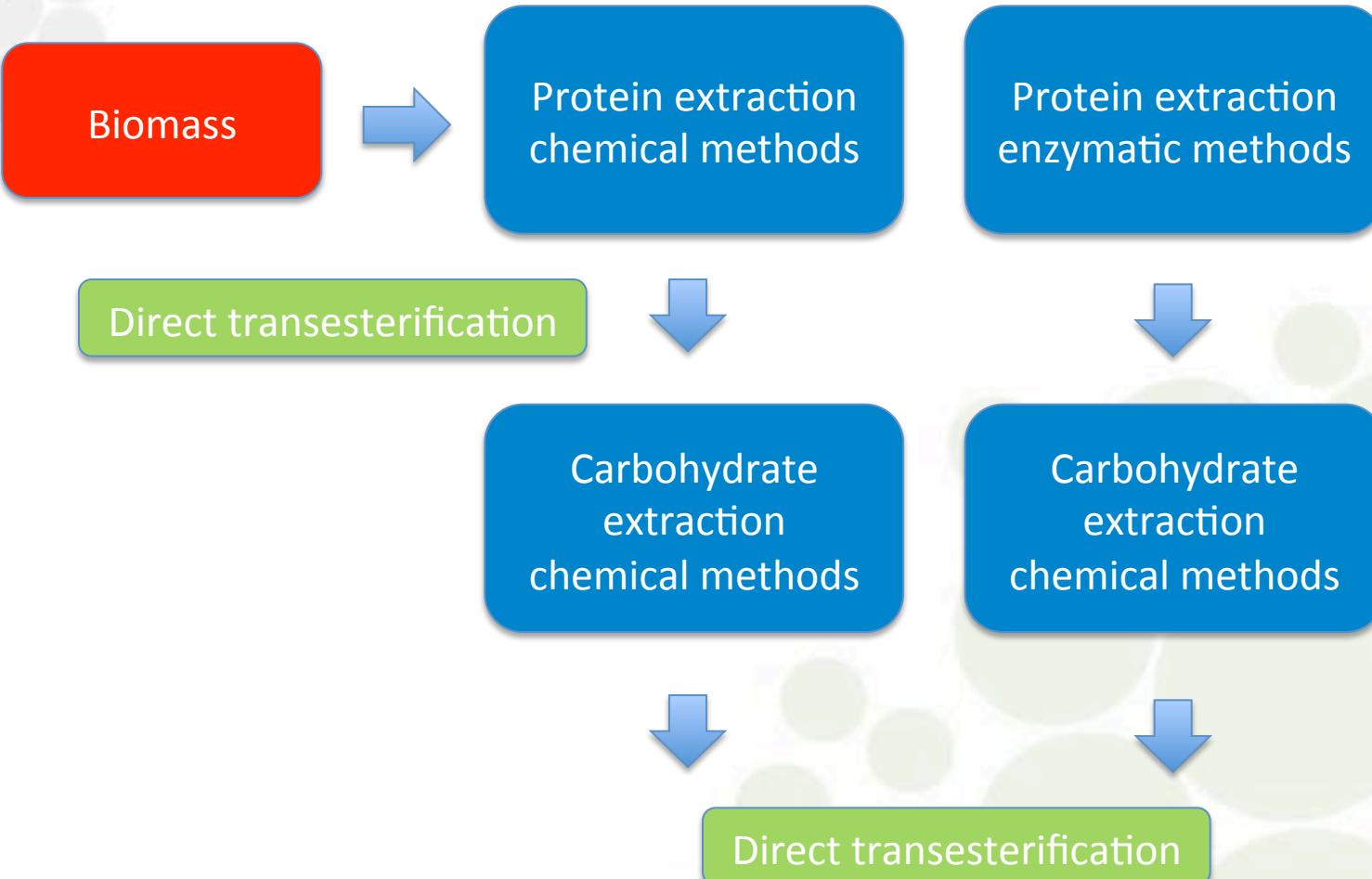


Biodiesel content



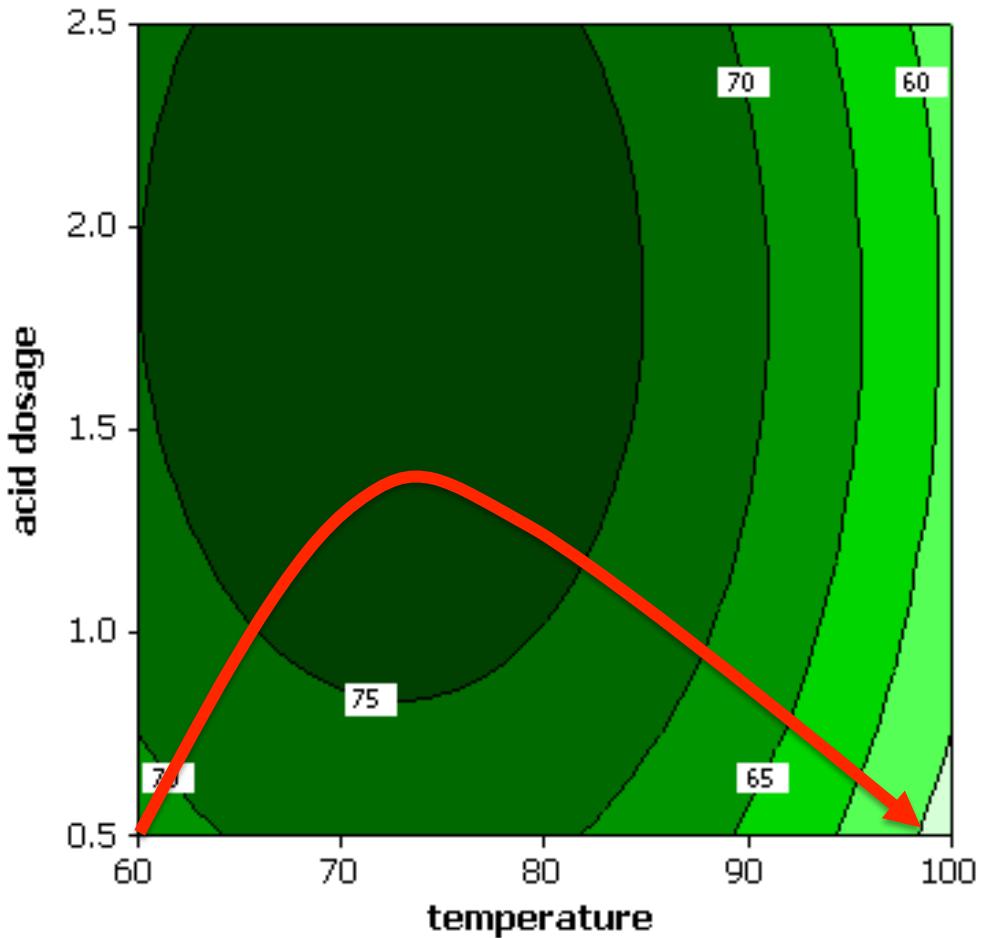
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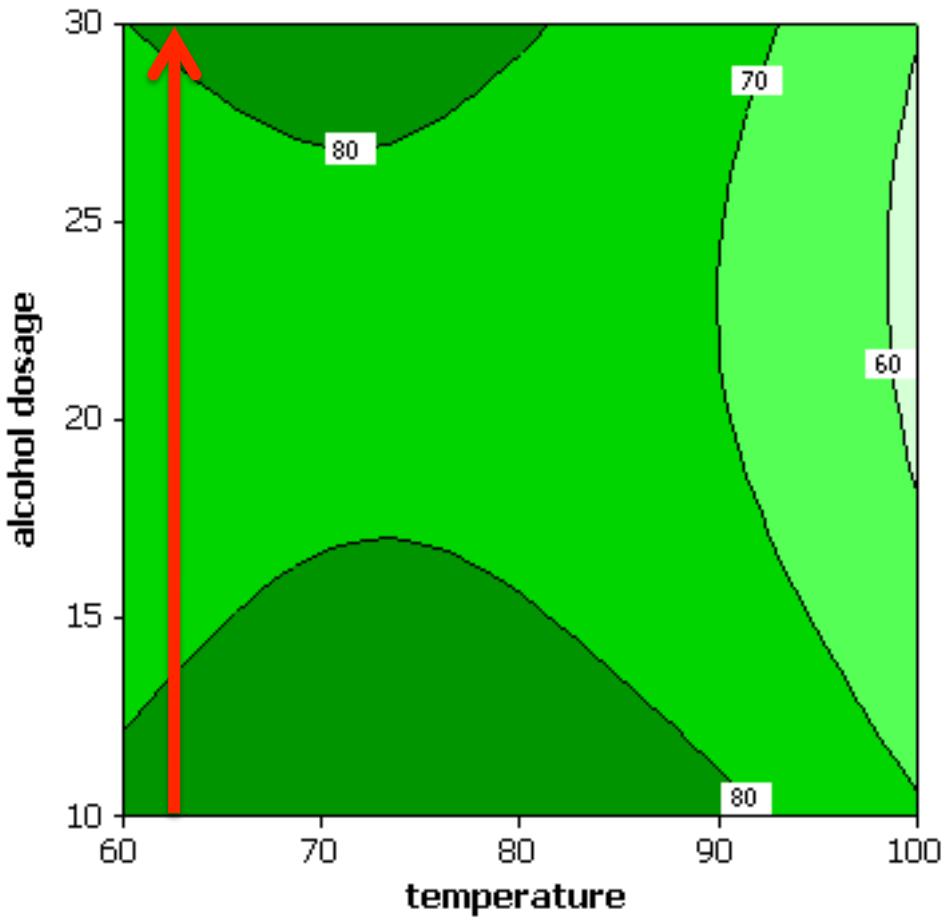




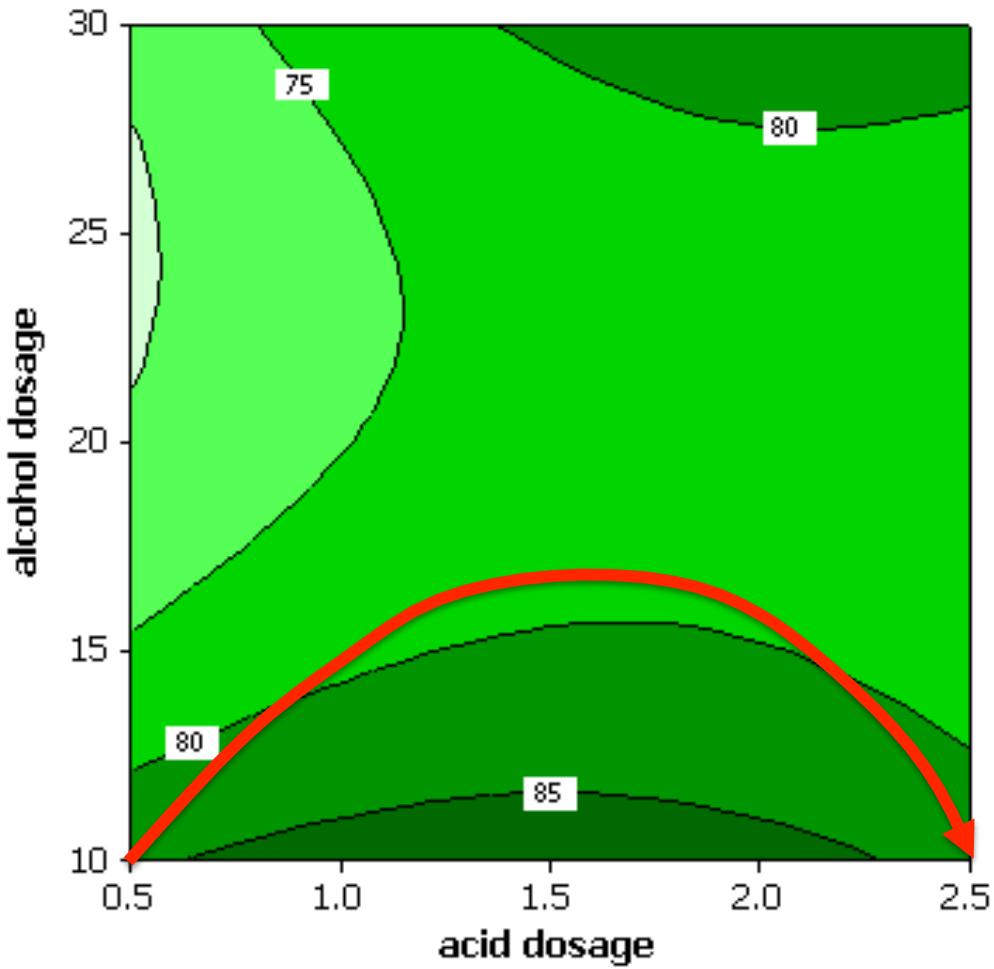
Results



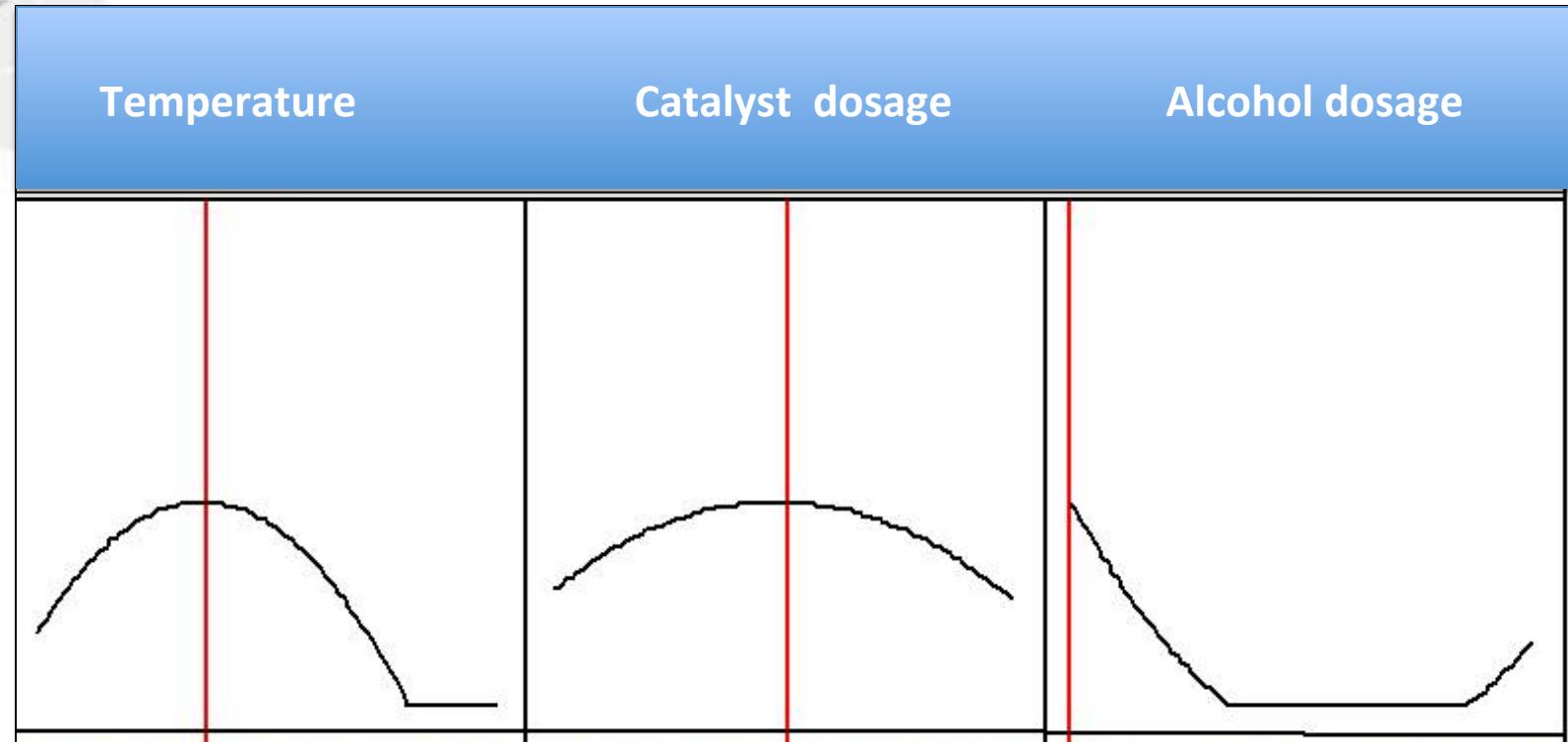
Effect of temperature and catalyst dosage



Effect of temperature and
alcohol dosage



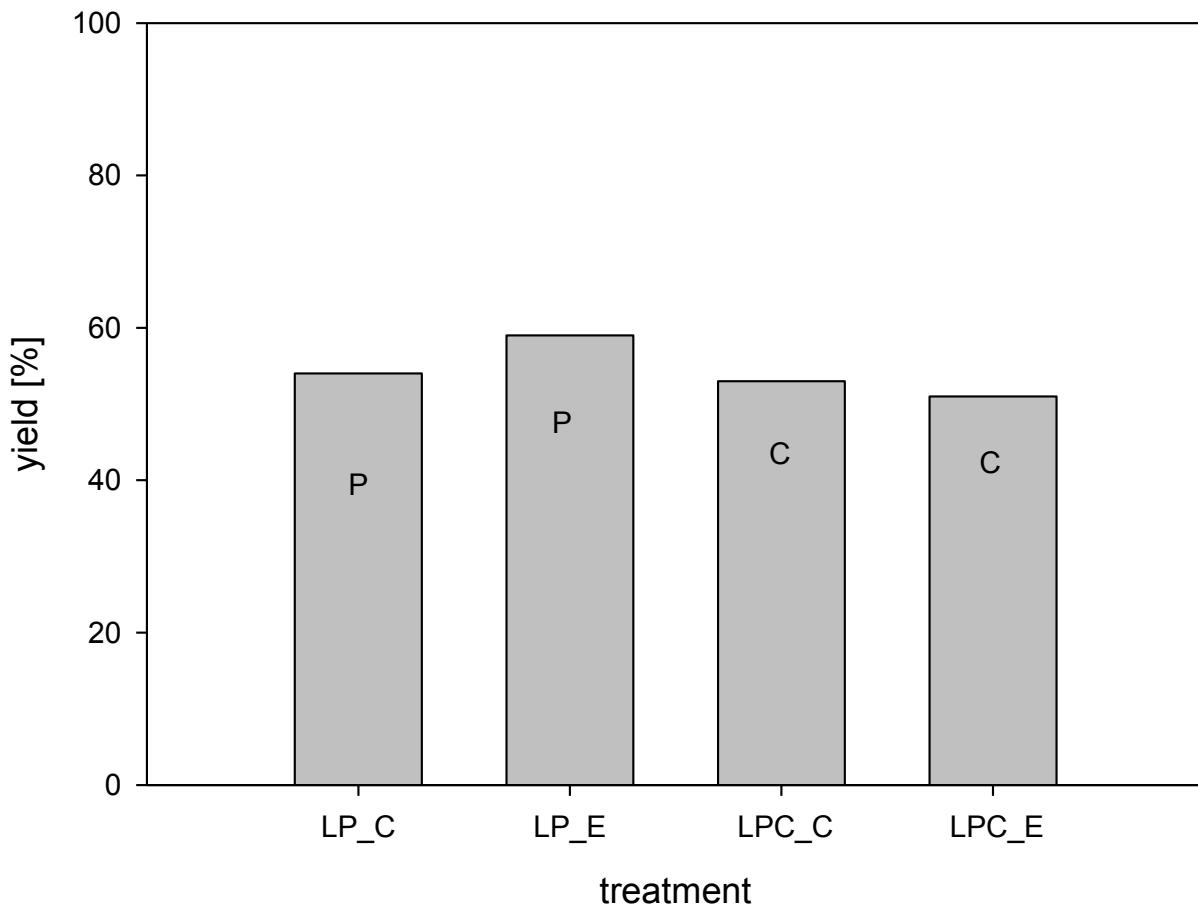
Effect of acid dosage and
alcohol dosage





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Protein extraction
chemical methods

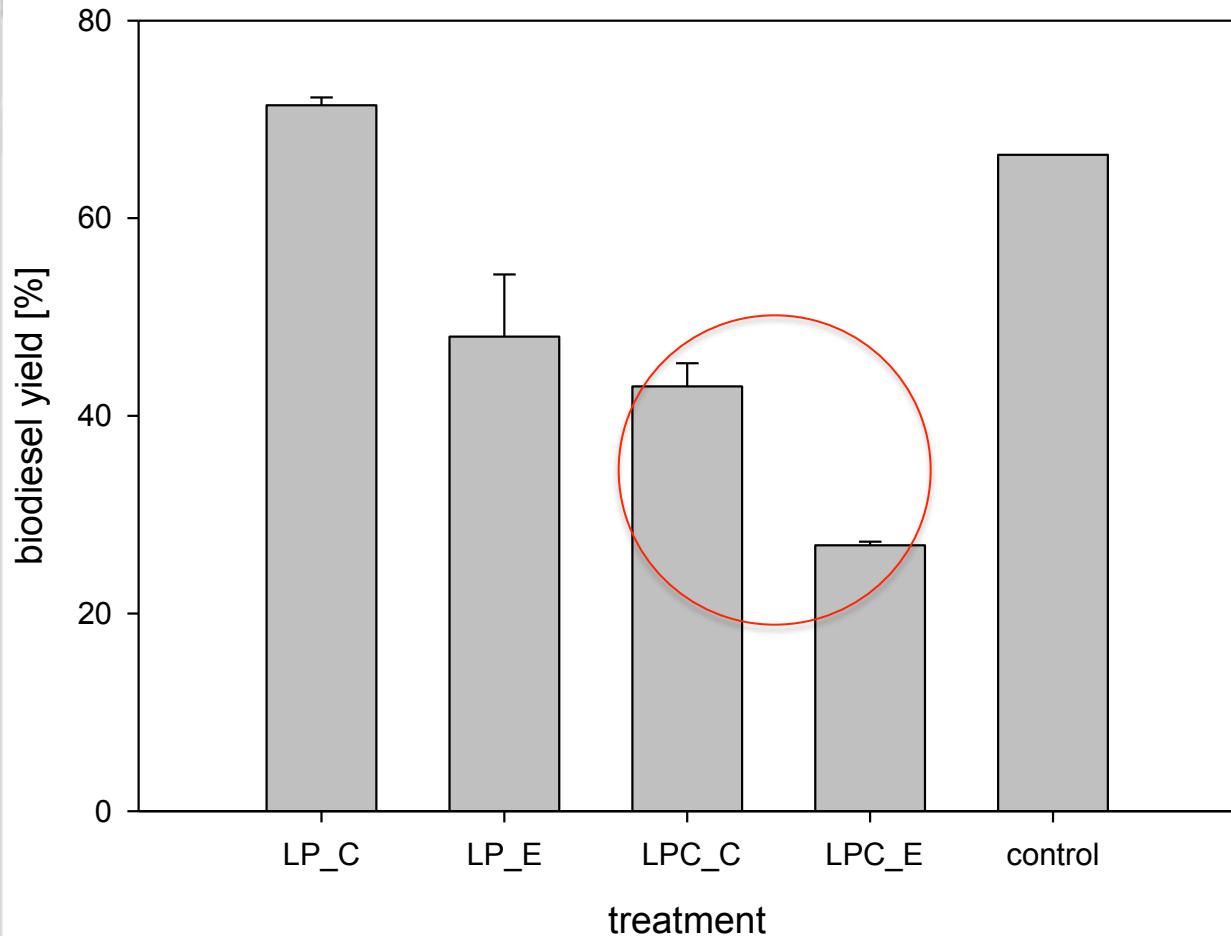
Protein extraction
enzymatic methods

Carbohydrate
extraction
chemical methods



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Protein extraction
chemical methods

Protein extraction
enzymatic methods

Carbohydrate
extraction
chemical methods

Control

Protein extraction
chemical methods

Protein extraction
enzymatic
methods

Carbohydrate
extraction
chemical methods

Carbohydrate
extraction
chemical methods

Sin
tratamiento

Sin P
químico

Sin P
enzimático

Sin P y C
químico

Sin P y C
Enzimático



Conclusion

- Direct transesterification is a suitable process to produce biodiesel from raw material with a high water content
- Direct transesterification must be supported by a biorefinery process in order to reduce the waste generate and to improve the biodiesel quality



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