

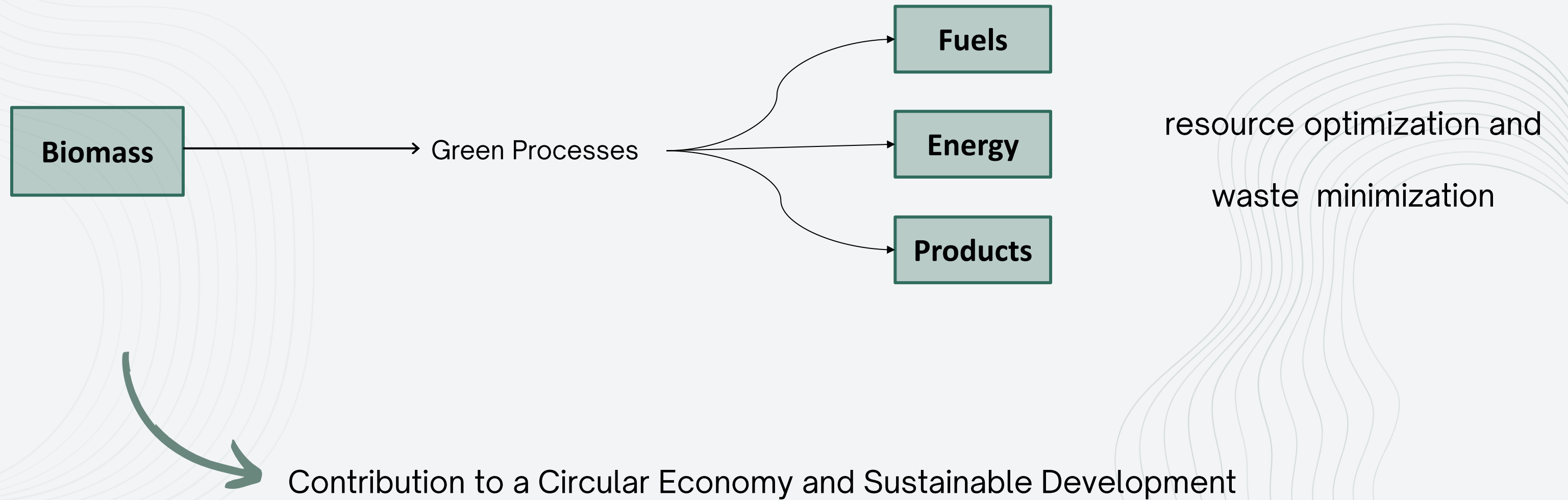
# An *Arthrospira maxima* based biorefinery

Presenter - Carolina Santos

Carolina Ascenso dos Santos (CIETI - ISEP); Rachan Karmakar (Department of Environmental Science, Graphic Era (Deemed to be University)); Nídia Caetano (CIETI - ISEP)

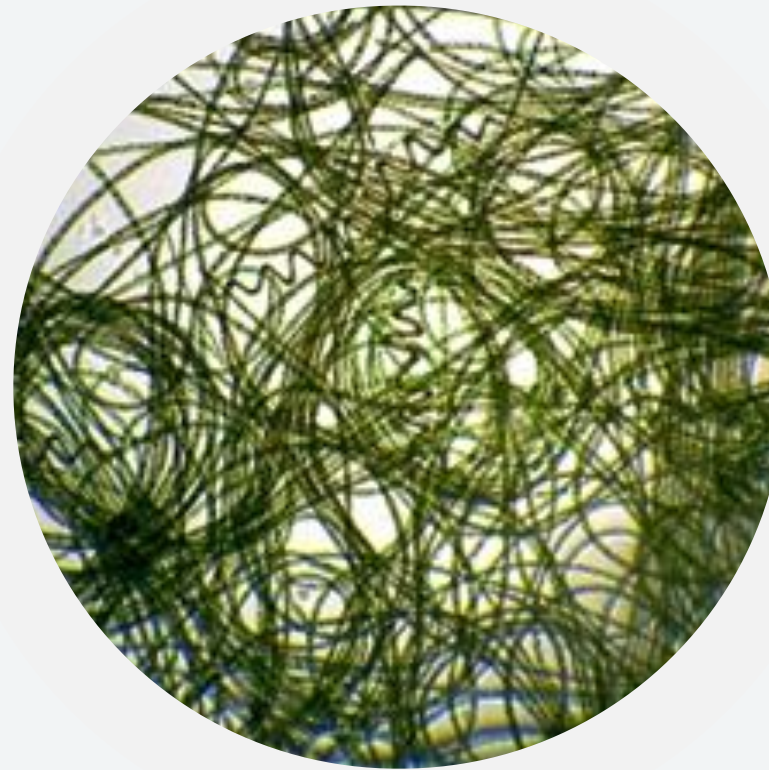
## Biorrefinery

- Co-production of transportation biofuels, bioenergy and/or marketable chemicals from renewable biomass sources

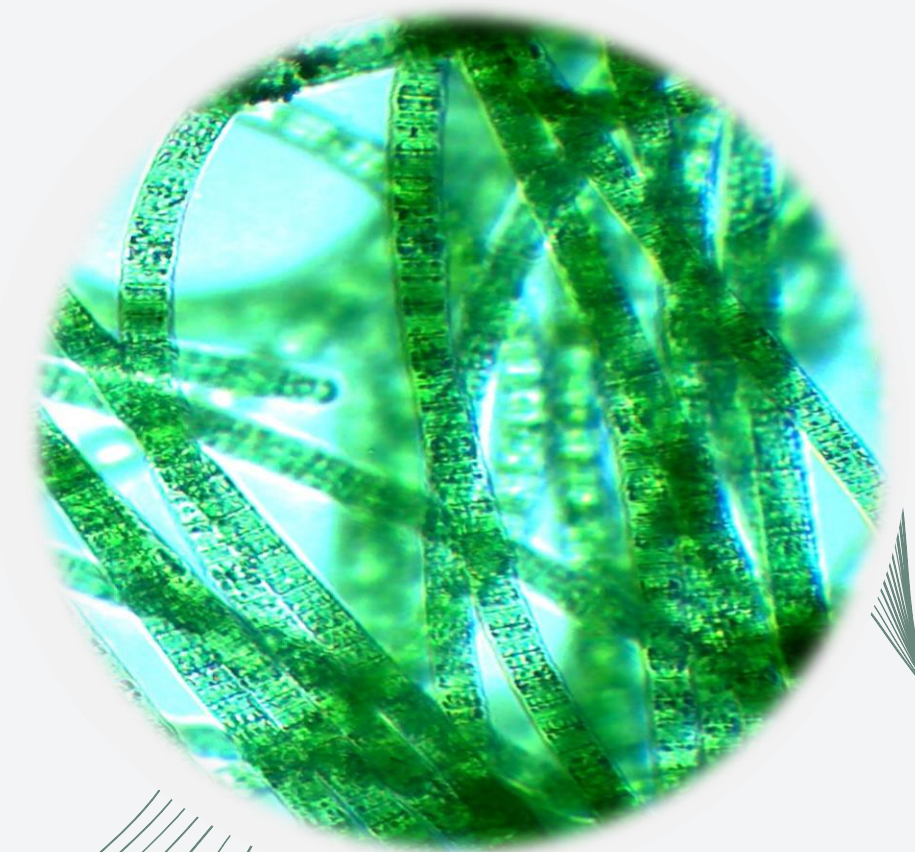


## *Arthrospira maxima*

- Cyanobacteria
- Filamentous morphology
- High content in protein
- Rich in value-added compounds, such as phycocyanin
- Composition can be easily changed by controlling cultivation conditions



100x magnification



400x magnification

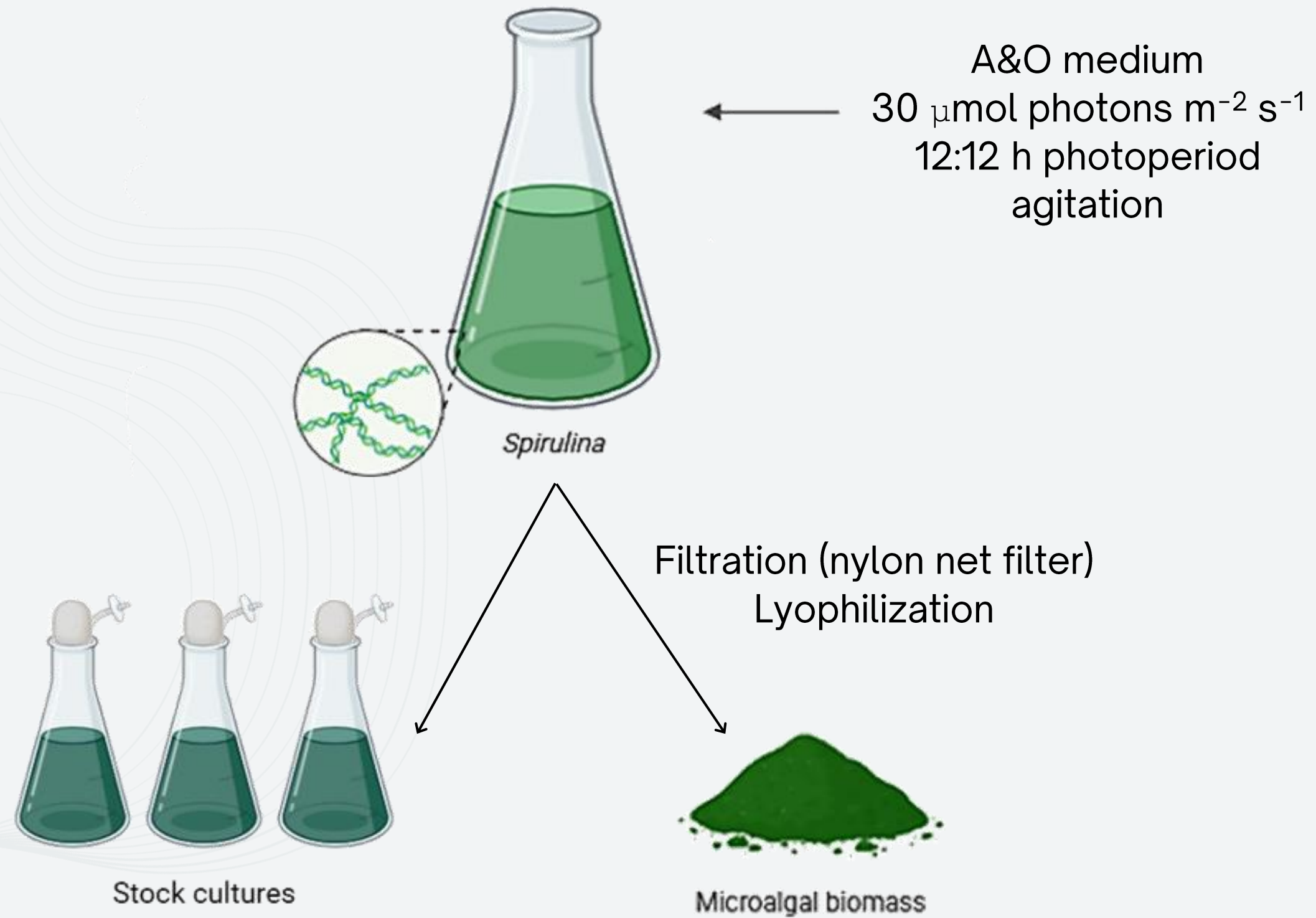
## Goals

- Propose a biorefinery approach to *Arthrospira maxima* exploration

## Content

- Evaluation of *Arthrospira maxima* cultivation and growth in residues from the food industry
- Application of *Arthrospira maxima* in the food industry (short results)
- Proposed biorefinery model based on results and literature review
- Conclusions and Future work

# *Arthrospira maxima* cultivation



## *Arthrospira maxima* cultivation



COD:  $69 \pm 1$  g/L

pH: 4.3

Total N:  $822 \pm 5$  mg/L

Goat cheese whey



Clarification (filtration)  
pH correction  
Dilution (according to  
literature and previous tests)



- 5% whey

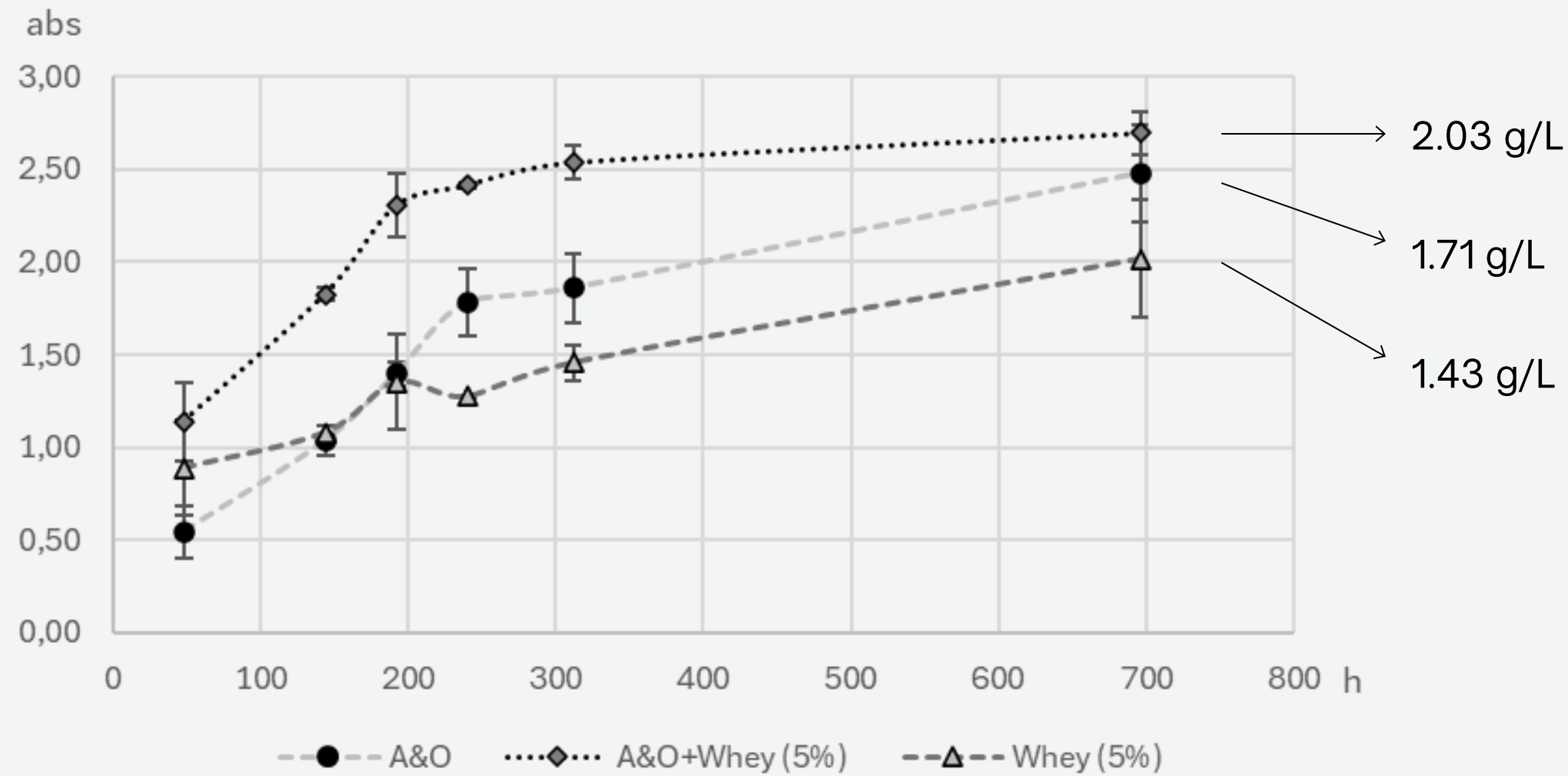


- 5% whey + A&O



- A&O

## *Arthrospira maxima* cultivation



Increased *Spirulina* yield + Valorization of residues

# Food enrichment

## Nutritional profile

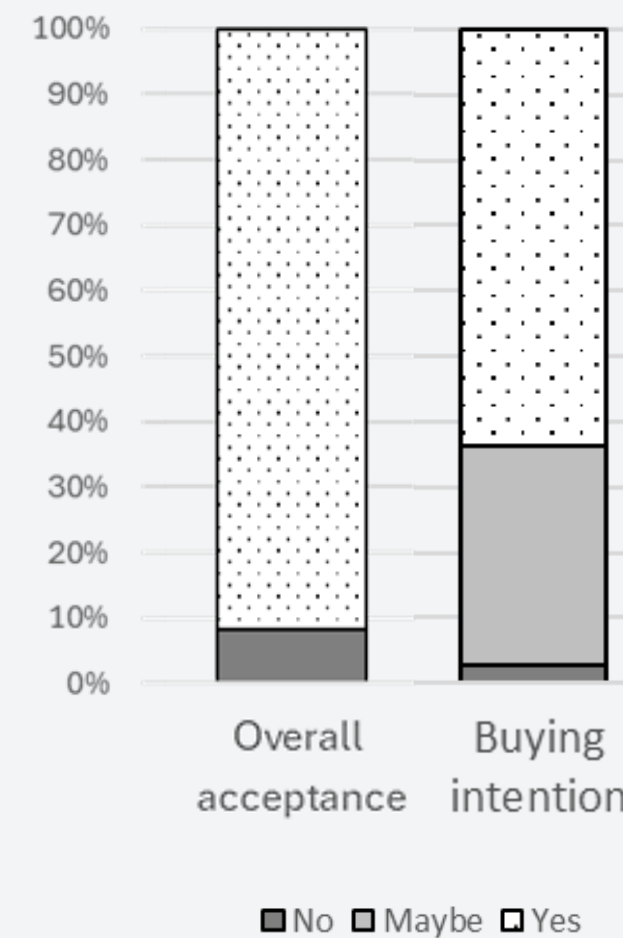


Addition of fiber  
227% increase in the protein content

EC 1924/2006  
Regulation

## Sensory testing

111 individuals answered, aged between 12 and 63



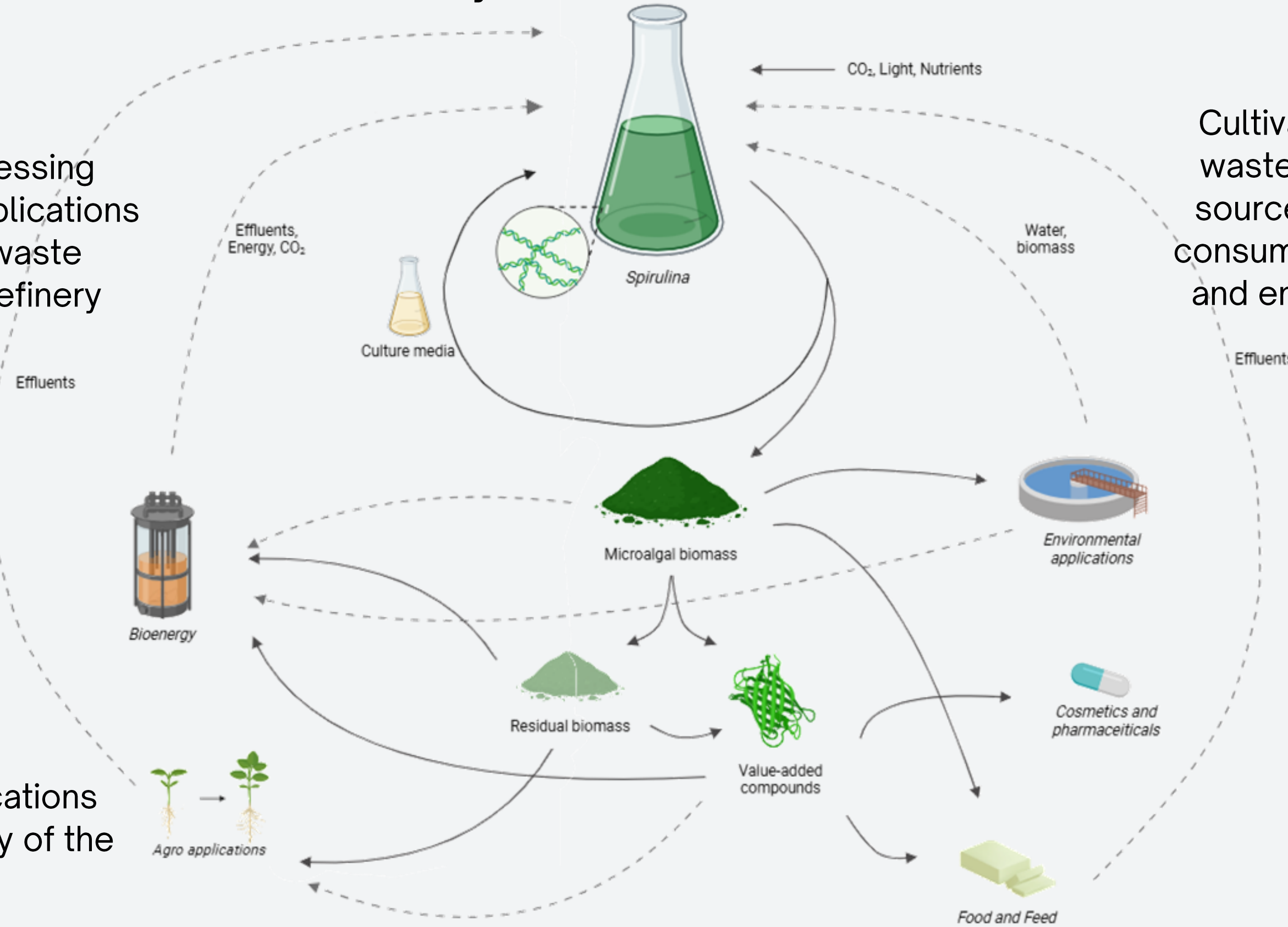
Overall acceptance of  
92% and over 60% in  
buying intentions

Potential of *Spirulina* as  
a food supplement,  
specifically in butter

# *Arthrospira maxima* based biorrefinery

Redirection of processing residues into other applications aligns with a zero-waste philosophy of a biorefinery

Cultivation using industrial waste streams as nutrient sources reduces resource consumption, waste disposal and environmental impacts

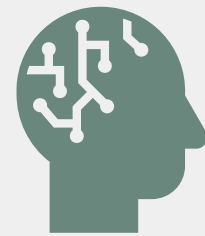


The diversity of applications potentiates the viability of the biorrefinery

## Conclusions and Future work



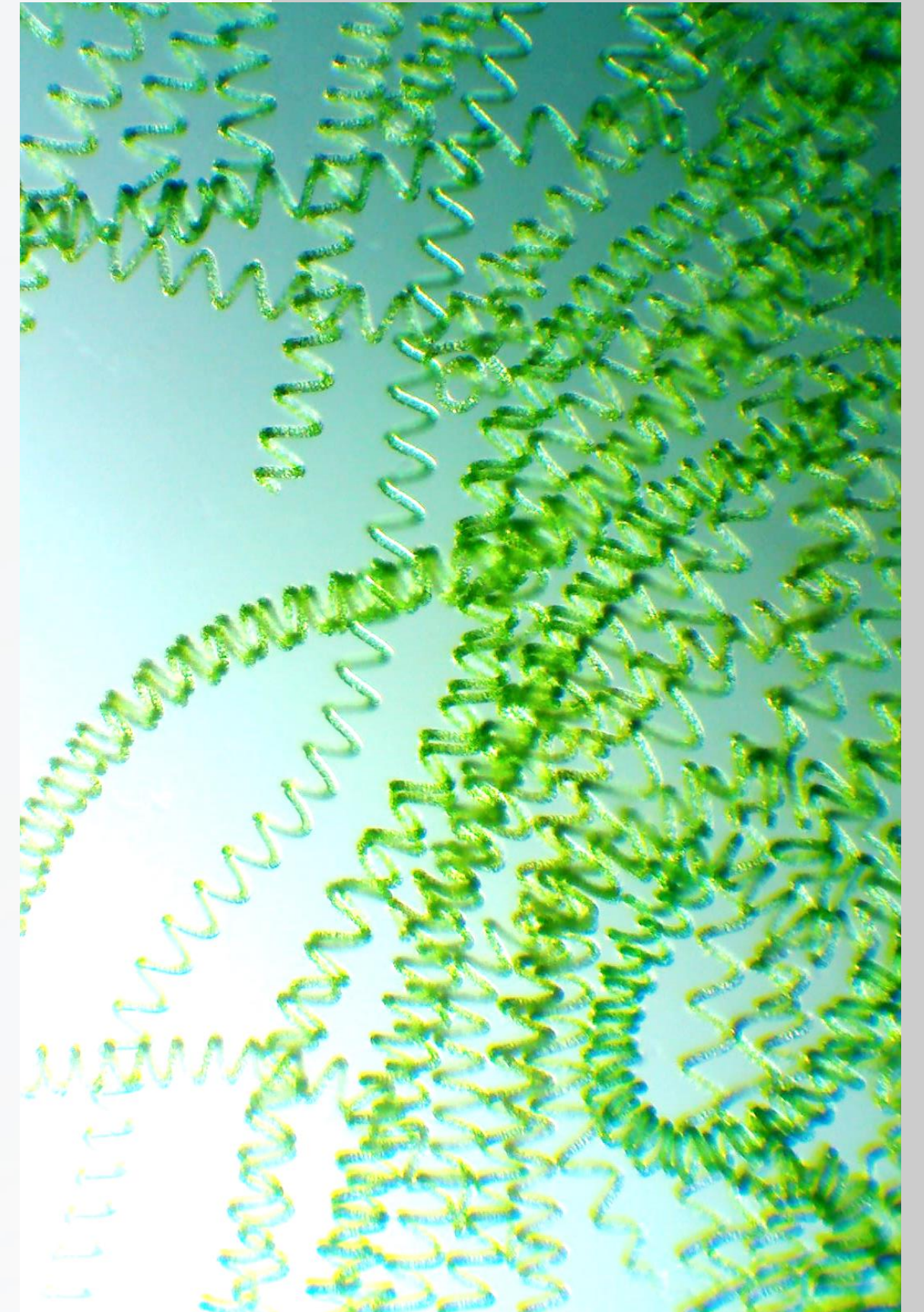
*Spirulina*'s morphology, adaptability and versatility aligns with the concept of a biorefinery and may play a critical role in a circular and sustainable economy



Genetic engineering and AI optimization may address several challenges such as high costs and technological barriers, contributing to the economical viability of the biorefinery



Future studies must include scalability and economical viability, not only of the processes individually but also integrated in a biorefinery



# Thank You!

Carolina Ascenso dos Santos

Email: [cads@isep.ipp.pt](mailto:cads@isep.ipp.pt)

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## An *Arthrospira maxima* based biorefinery

