

# Optimization of xylose production and recovery of antioxidants from almond tree pruning

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CEACTEMA  
CENTRO DE ESTUDIOS AVANZADOS EN CIENCIAS DE LA TIERRA, ENERGÍA Y MEDIO AMBIENTE

## INTRODUCTION



Almond trees



The world almond crop in 2020 is near to 2.2 million ha. Spain has the largest area with about 720,000 ha (FAOSTAT, 2022)



Spain:  $>0.8 \cdot 10^6$  t /year Almond tree pruning biomass<sup>1</sup>



ALMOND TREE PRUNING BIOMASS

### Major components

	% dry weight
Extractives	11.2
Cellulose	34.9
Hemicellulose	19.2
Xylose	18.0
Galactose	2.2
Arabinose	1.2
Lignin	20.6
Ash	3.0



PARR REACTOR

Liquid-solid ratio 20 %w/v

### Central composite experimental design

Run	1	2	3	4	5	6	7	8	9	10	11	12	13
Temperature (T) (°C)	185	163.8	206.2	200	185	170	185	185	185	170	185	200	185
Phosphoric acid concentration (PAC) (%w/v)	1.7	1	1	1.5	1	0.5	1	1	1	1.5	0.3	0.5	1



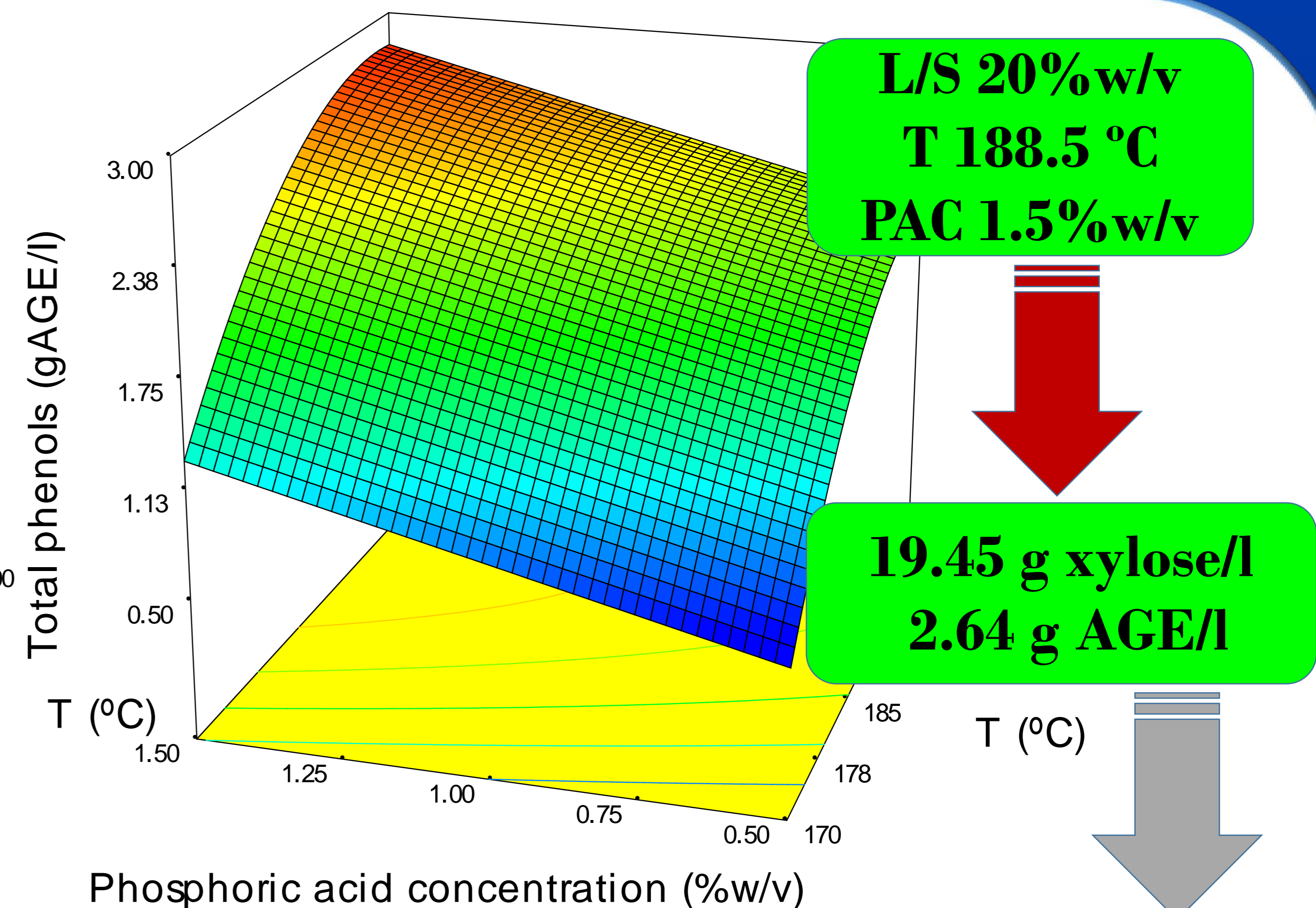
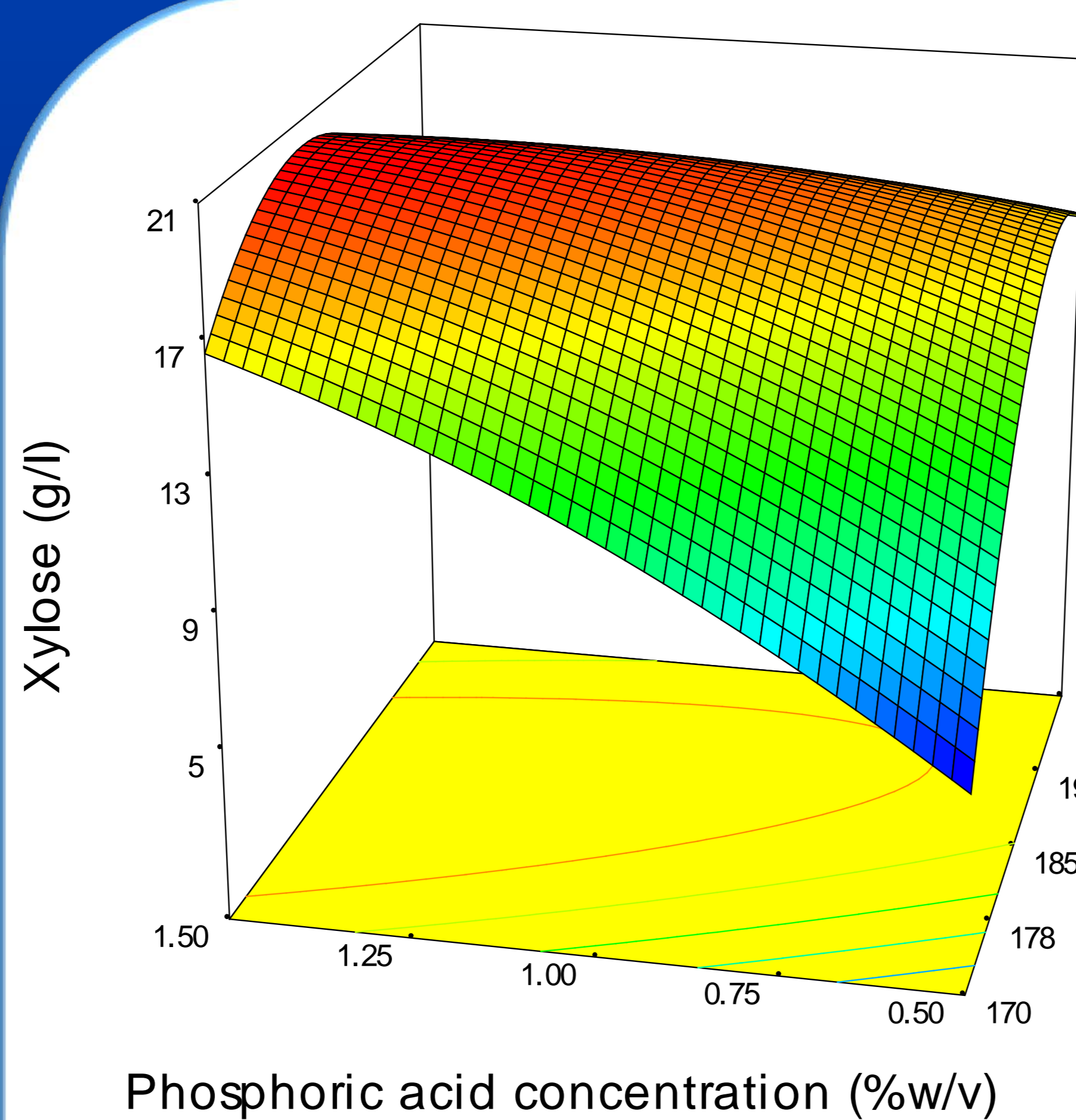
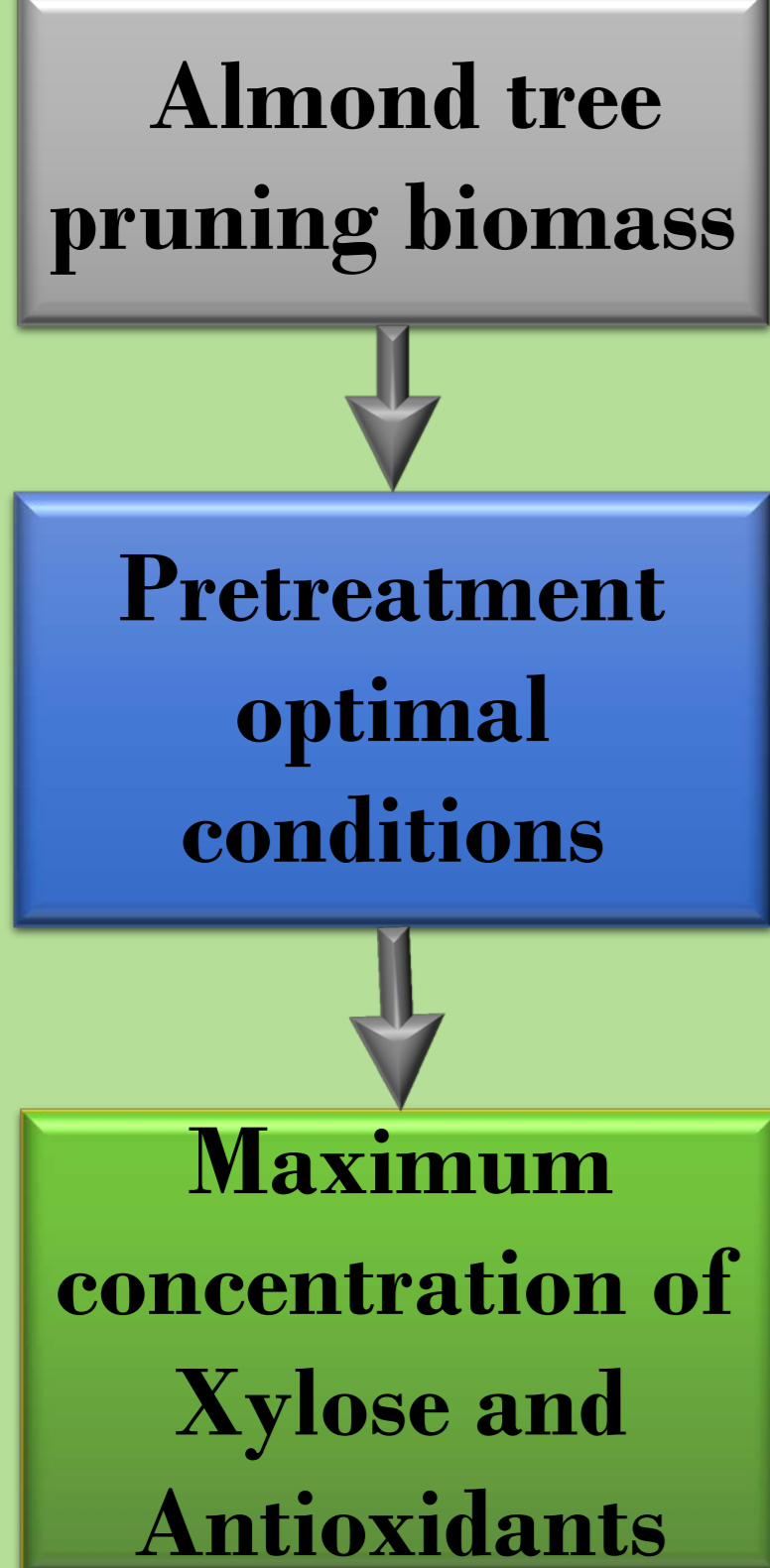
PREHYDROLYZATES

## METHODOLOGY

- Determination by HPLC
- Free sugars
- Oligomeric sugars
- Inhibitors (acetic acid, formic acid, levulinic acid, furfural, hydroxymethylfurfural)
- Total phenols

Analysis of results by response surface methodology (RSM) (Design-Expert 8.0.7.1 software)

## OBJECTIVE



## CONCLUSIONS

The analysis of results with Response Surface Methodology indicates that the maximum xylose and antioxidants concentration together in liquors was obtained at 188.5 °C and 1.5% phosphoric acid concentration. The recovery of 60% of xylose is not very high but it is interesting to study its recovery in the form of xylooligosaccharides. On the other hand, the high concentration of antioxidants is very interesting.

- Xylose
- Xylooligosaccharides
- Antioxidants
- Other biorefinery products<sup>2</sup>

## ACKNOWLEDGEMENTS

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## References

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