Recovery of antioxidants and xylose production from almond tree pruning biomass

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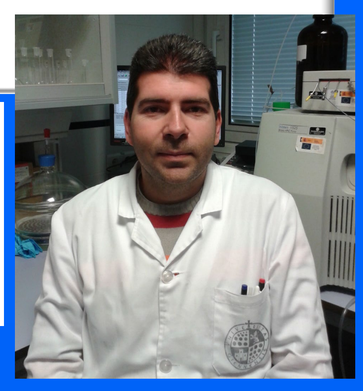

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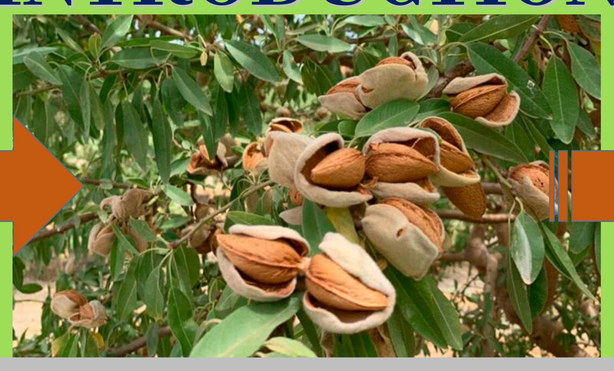
INTRODUCTION

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: >0.8·10⁶ t /year Almond tree pruning biomass[1]

METHODOLOGY

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) (ºC)	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

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

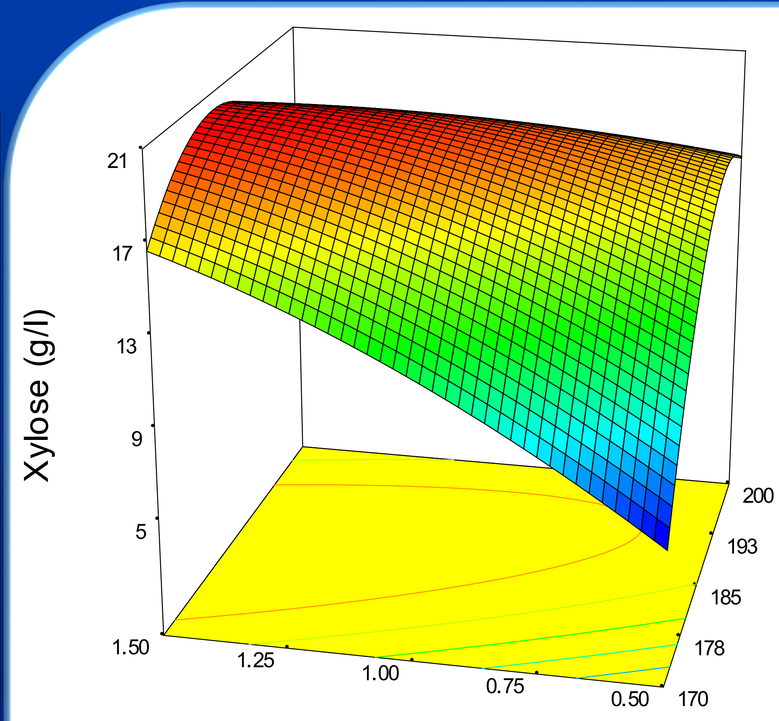
Analysis of results by response surface methodology (RSM) (Design-Expert 8.0.7.1 software)

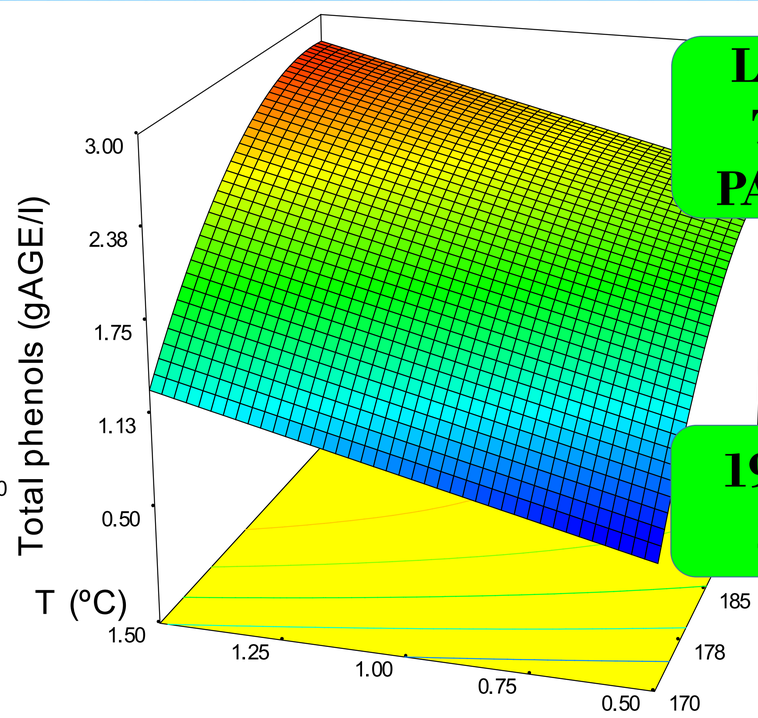
OBJECTIVE

Almond tree pruning biomass

Pretreatment optimal conditions

Maximum concentration of Xylose and Antioxidants





L/S 20%w/v
T 188.5 ºC
PAC 1.5%w/v

19.45 g xylose/l
2.64 g AGE/l

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 ºC 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[2]**

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BIOSOS Red de Biorrefinerías Sostenibles

Chemical and Environmental Engineering Research Group (TEP-233)

References

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