

## Obtaining fungal chitosan from the valorisation of agro-food by-products generated in the Region of Murcia: Validation in food use and sustainable materials. ET4CHITOSAN

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### OBJECTIVES

The general objective of the QUITOSAN project is the complete valorisation of plant wastes from the food sector in the Region of Murcia, by processing it into substrates for the fungal production of chitosan and obtaining extracts rich in dietary fibre, with the aim of developing new food formulations and sustainable materials for the furniture sector.

### RESULTS

**Food formulations** have been developed including:

- **Recovered fiber** obtained from the solid phase of processing by-products to obtain substrates suitable for the fermentation of microorganisms.
- **Fungal chitosan** obtained from producing microorganisms.

These products have been evaluated at nutritional and organoleptic levels to determine consumer acceptance, and their sanitary quality has been verified. In addition, the shelf life of the products has been studied to verify the antioxidant and antimicrobial properties attributed to chitosan.

#### RECOVERED FIBER

- ✓ They have been used in the production of cakes and jams so that they can display the nutritional declaration “source of fibre” (3 g of fibre per 100 g of product).
- ✓ Although the sponge cakes' fluffiness has decreased with the addition of recovered fibre extracts, the products have been well accepted by consumers.
- ✓ Apple fibre has been well incorporated into the preparations, as its flavour is not discordant; while lemon fibre provides a certain bitterness and citrus touches due to the antioxidant compounds in the fruit's rind.

#### Obtaining chitosan

Following screening of fungi and substrates from by-products, different chitosan-producing fungi and sugar-rich substrates have been selected based on the best yields obtained:

- **Substrates** : grape (U), peach (Me) and apple concentrate (Cma).
- **Fungi** : *Aspergillus niger* (AN), *Aspergillus terreus* (Atr) and *Cunninghamella elegans* (CE).

| Yield .<br>(mg/g) | OR   | Me   | Cma  |
|-------------------|------|------|------|
| AN                | 0.53 | 0.02 | 0.09 |
| EC                | 1.62 | 0.05 | 0.2  |
| Atr               | 0.04 | 0.34 | 0.41 |

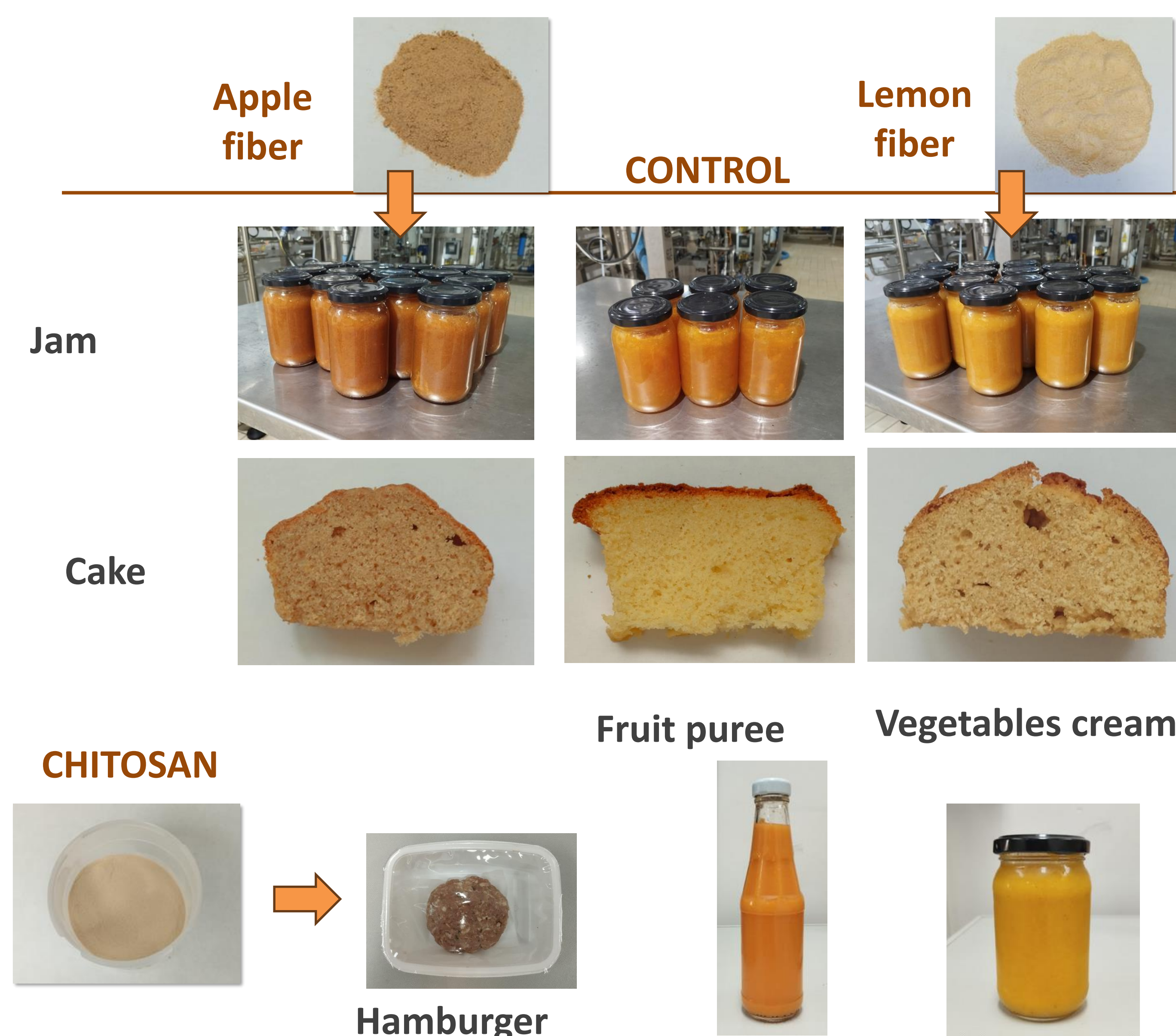
Evaluating the results, trials have been scaled with **CE** for all substrates (**grape**, **peach** and **apple concentrate**) and **Atr** for **peach**.

### ACKNOWLEDGEMENTS

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#### CHITOSAN

- ✓ It has been used in the preparation of hamburgers, fruit purees and vegetable cream. This compound has functional properties in the preparation of foods as a thickener, texturizer, gelling agent, etc.
- ✓ Different doses have been studied in order to obtain products with good organoleptic acceptability and antioxidant capacity.
- ✓ This compound did not affect attributes such as colour, flavour and odour of the preparations, but the texture did suffer modifications. Therefore, this last attribute limited the amount of chitosan used in the formulations, since very high doses induced the formation of lumps and phase separation in certain products, such as creams or baby food.

#### Applications in the furniture sector

Bio-based and non-toxic products have been developed:

- Adhesives for composites and fibreboards (a)
- Wood coatings and finishes (b)

