Exploring non-edible parts of pineapples as fat replacers in cake formulations

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Introduction

- Non-edible parts of many fruits, such as peel and seeds, are sources of compounds with important nutritional properties.
- They are also rich in fibres, which gives them the potential to be used as functional ingredients since fibres may be fat replacers in many food formulations.
- If these parts of fruits are properly transformed into edible forms, there will be potential reuse and recovery of food waste. In the case of pineapple, approximately 70% of the total weight of the fruit is not consumed, being rinds, core, and crown usually discarded.

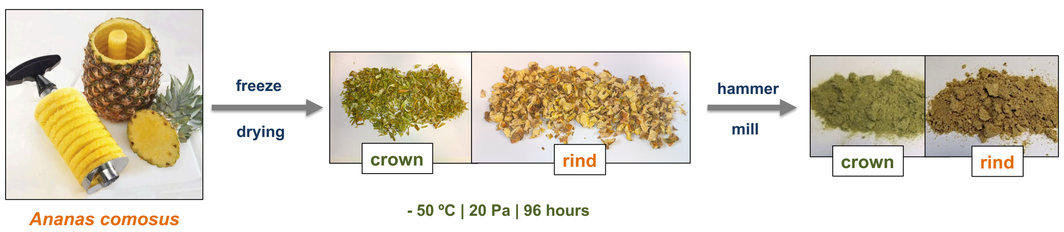
Objectives

- To transform pineapples' non-edible parts (rinds and crowns) into powders by freeze-drying with posterior micronization.
- To assess protein and dietary fibre contents in the powders.
- To characterize the powders in terms of water and oil absorption capacities.
- To use the powders as fat replacers in a traditional cupcake recipe and assess the texture profile of the baked cakes.

Materials & Methods

1. Sample preparation

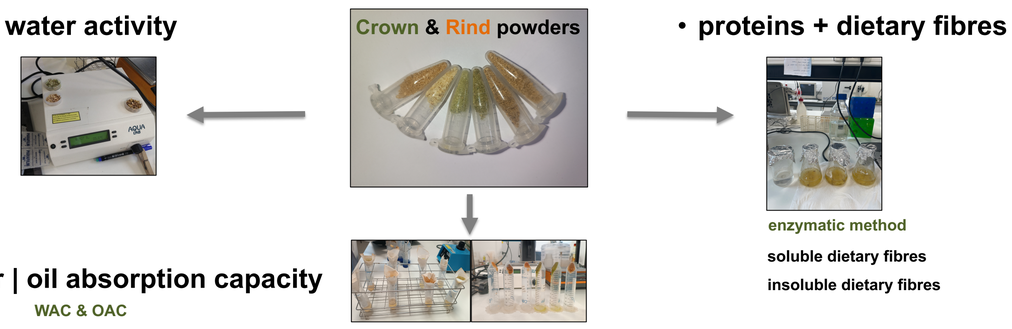
- Crown and rind were removed + cut into small pieces + freeze-dried + micronized



Ananas comosus

- 50 ºC | 20 Pa | 96 hours

2. Water activity + Water | Oil absorption capacity + Proteins + Fibres

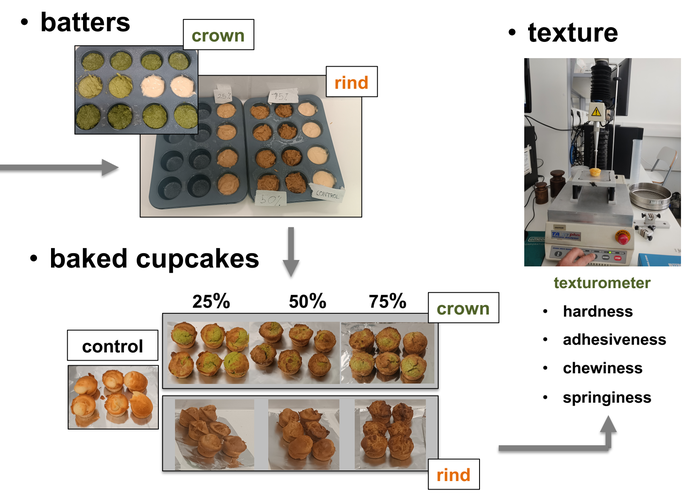


3. Cupcake formulations

- traditional recipe | control

Ingredient	Amount (g)
wheat flour	66
sugar	34
egg	28
milk	34
baking powder	2
butter	31

butter was replaced with crown & rind powders in different proportions 25% - 50% - 75% (weight)



4. Data analysis

Three replicates were performed | ANOVA + Post-hoc tests

Results

- **Water activity**
  - crown: 0.49 ± 0.03
  - rind: 0.36 ± 0.02



- **Dietary fibres**

Dietary fibres were mainly insoluble
- crown: 18%
- rind: 37%

- **Proteins**

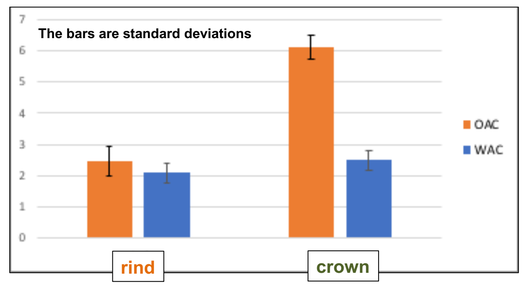


Protein content was significantly higher in the crown
- crown: 8.1 ± 0.9 g/100 g (d.b.)
- rind: 4.4 ± 0.4 g/100 g (d.b.)

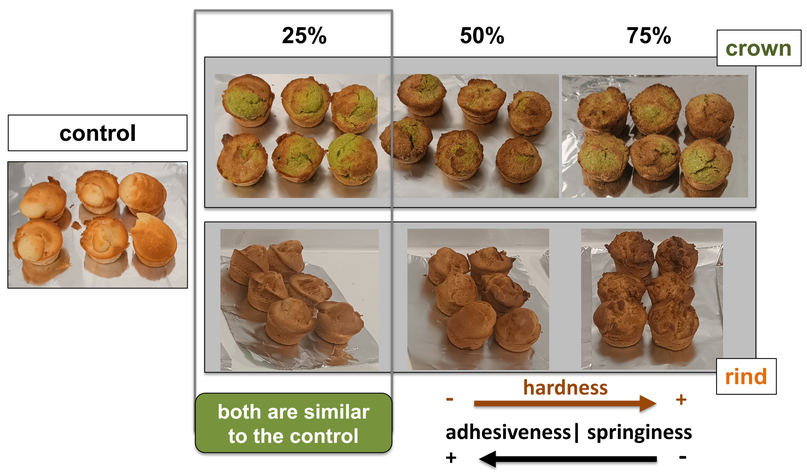
- **Water | Oil absorption capacity**

WAC of both flours were similar: 2.3 ± 0.3 g_{water}/g (d.b.) (mean value)

OAC was higher in the crown
- crown: 6.1 ± 0.4 g_{oil}/g (d.b.)
- rind: 2.4 ± 0.4 g_{oil}/g (d.b.)



- **Texture profile**



Increasing proportions affected texture, especially in crown-based recipes, resulting in harder cakes with reduced adhesiveness and springiness

Key achievements

- Replacing 25% of the butter with crown and rind powders allows for a texture profile that is close to that of a traditional cupcake.
- The inclusion of pineapple waste parts in the cupcake recipe can serve as healthier ingredients, offering improved functional properties and enriching the protein and fibre content of the cupcakes. Before consuming these powders, it is important to conduct a safety assessment of their features.