Use of Prickly Pears In Cod Fish-Burgers As Functional Ingredients

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Introduction

The amount of FOOD WASTE produced and lost through the supply chain in the past few years, has brought to the Zero Waste approach. Therefore the aim of this risearch is to use all the parts of a fruit without producing any kind of waste.

25-30% of food waste cames from fruit and vegetables

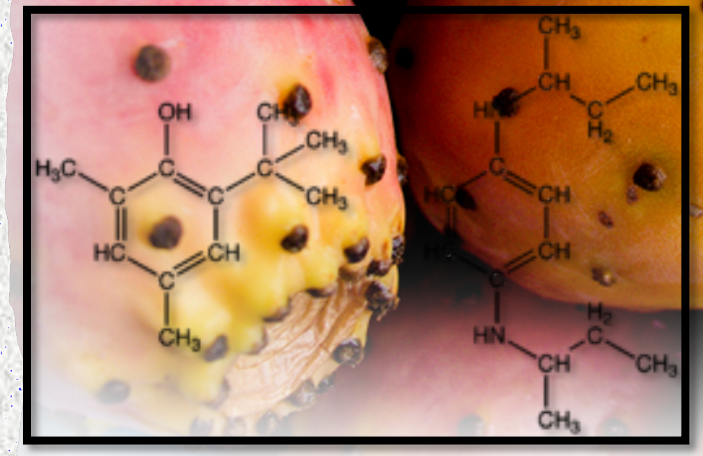
Seeds, peel and pomace are usually discarded in landfill or incinerated, used for animal feeding or to produce biogas and bio-fertilizers.

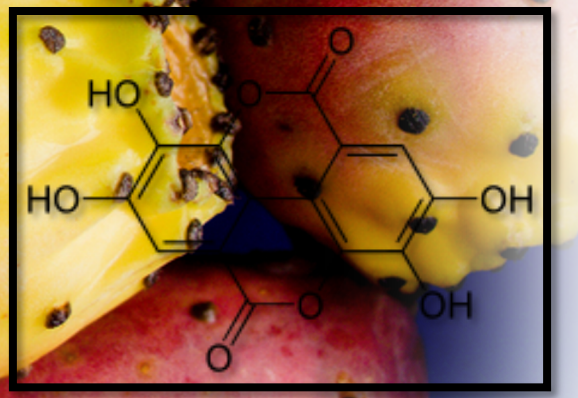
They are rich in bioactive compounds like polyphenols, flavonoids, vitamins and antioxidant

Prickly pear cactus (*Opuntia ficus-indica (L.) Miller*) is a tropical plant. Its fruit consists of peel (35-55%), pulp (45-67%) and seeds (2-10%). The fruit is rich in polyphenolic compounds, while the peel is a source if dietary fibers and antioxidant compounds.

Uses of the by-products in the literature:

- Shelf-life prolongation of sliced beef;
- Margarine preservation;
- Fortified bread and biscuits.





Aim of the case study

Application of all the parts of prickly pear in a cod fish-burger in order to preserve its quality during storage

Materials and Methods

Prickly pear peel and pulp powder preparation

Red Prickly pears

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Washing with water

↓

Chlorinated water (20 mL/L) for 1 minute

↓

Separation of peel from pulp and cutting into small pieces

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Dehydration at 37°C for a week

↓

Fine powder of peel and pulp

Cod Fish-burger preparation

Mixing potato flakes and potato starch

↓

Addition of salt

↓

Addition of mix of peel and pulp prickly pear powder in 3 amounts (i.e. 2.5, 7.5 and 12.5 g)

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Addition of extra-virgin-olive-oil

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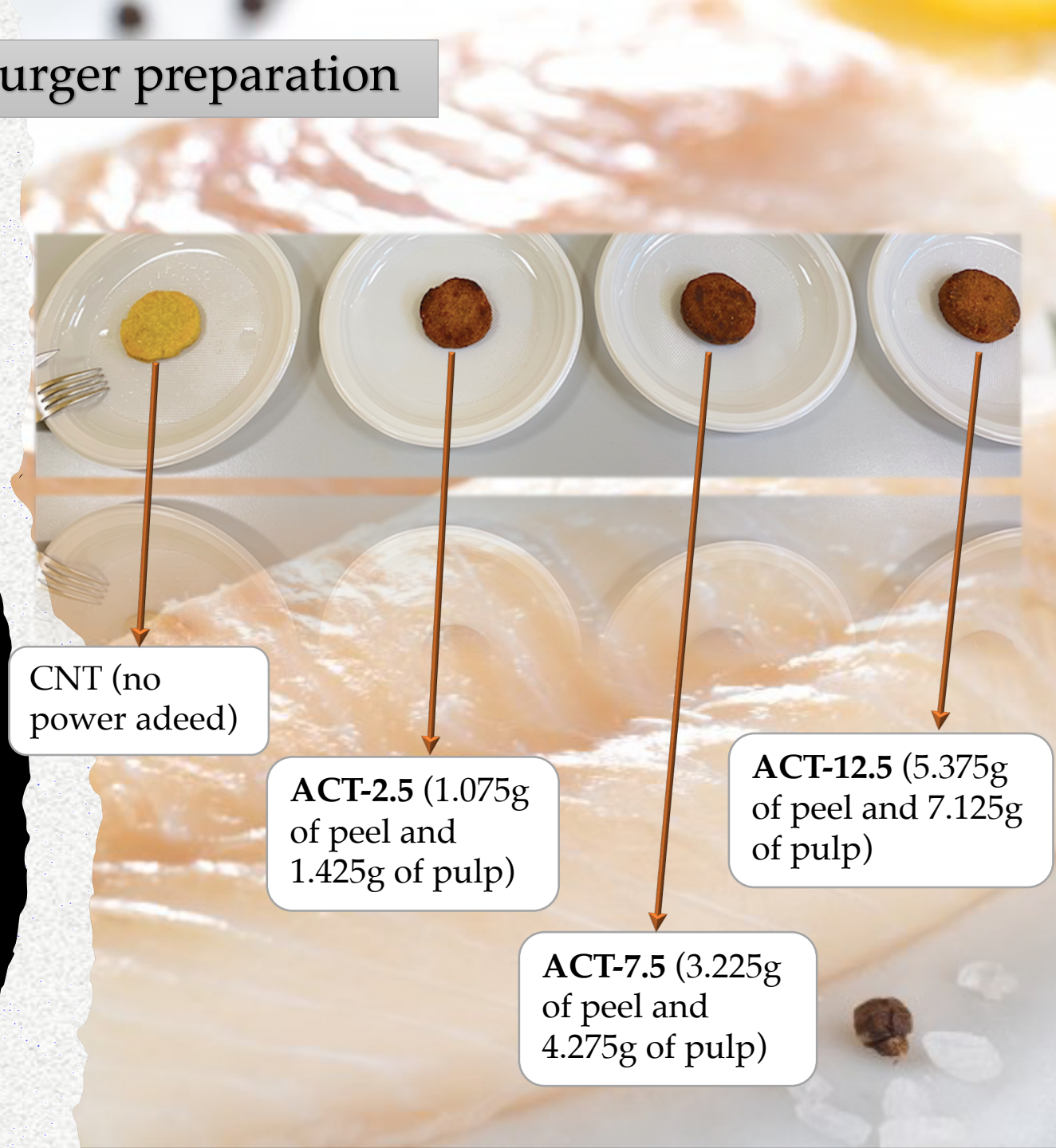
Addition of minced cod fillets

↓

Final burgers



Sensorial analyses performed by 7 experienced panelists for both raw and cooked Fish-burgers.

Analysis carried out

Microbiological analyses searching several groups (i.e., *Pseudomonas* spp., psychrotolerant and heat-labile aerobic bacteria and psychrotropic bacteria)

Results and Discussion

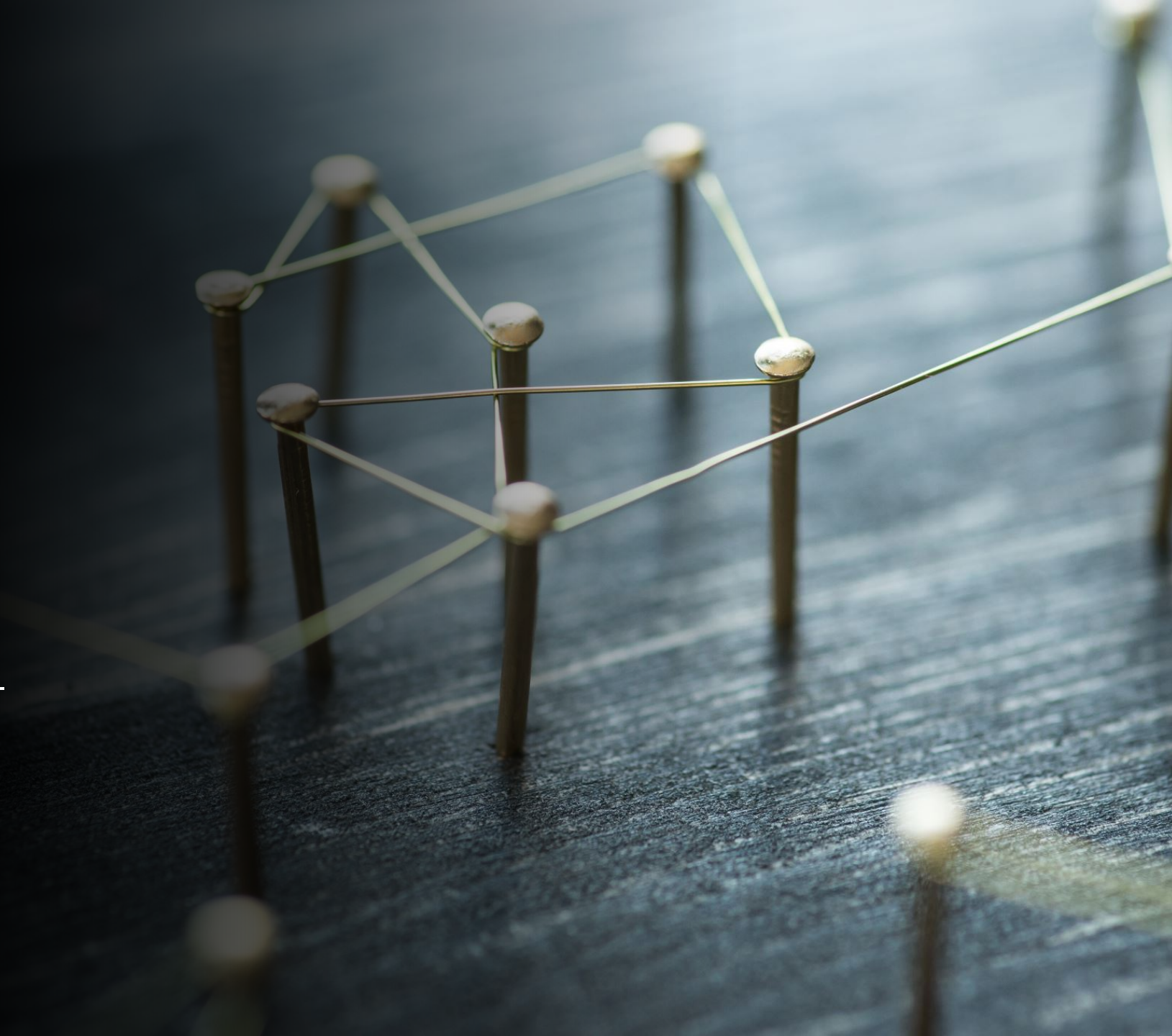
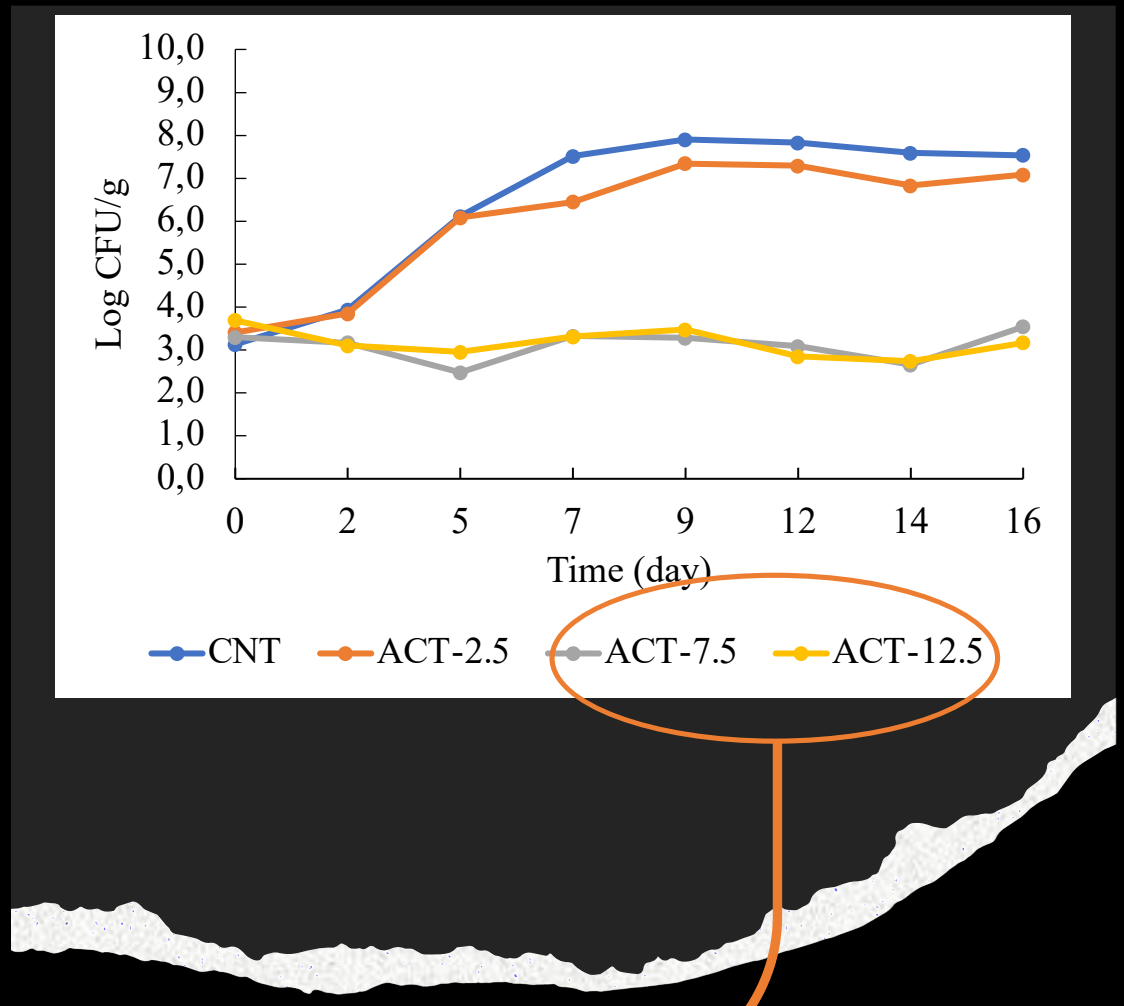
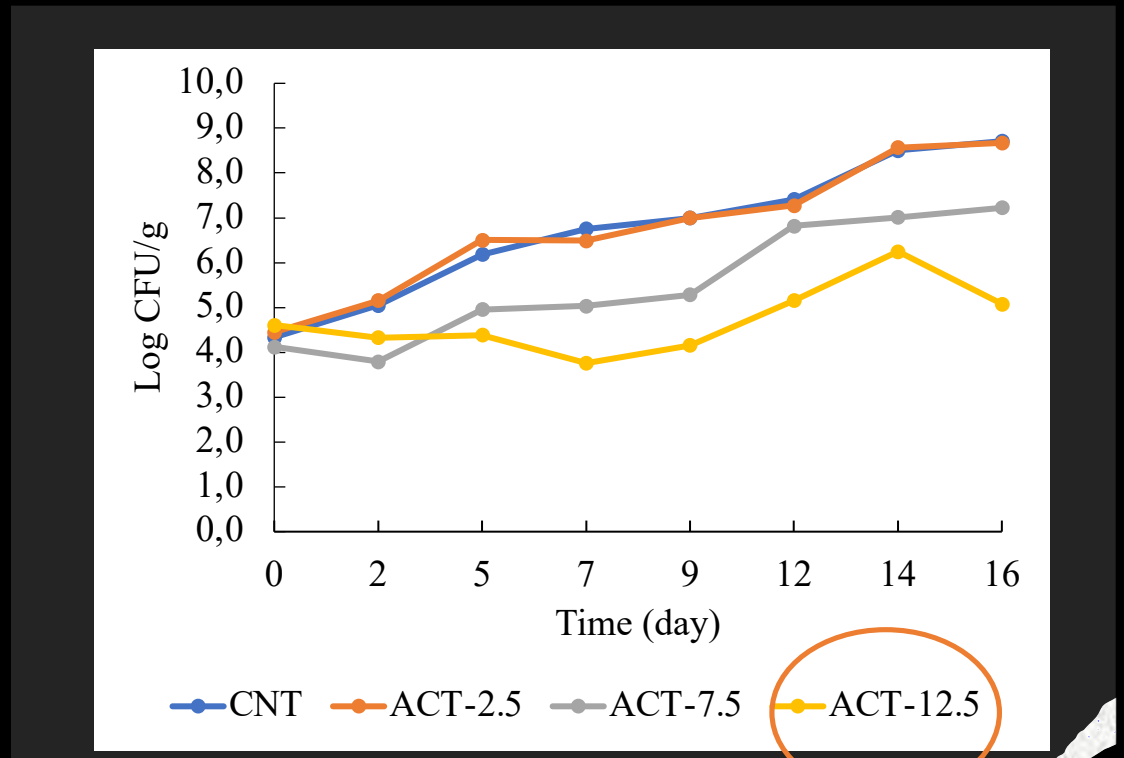


***Figure 1**. The evolution of Pseudomonas spp. viable cell concentration in fish burgers during 16 days of storage at 4 °C. CNT: fish burger without prickly pear powder; ACT-2.5: fish burger enriched with 2.5 g of prickly pear powder; ACT-7.5: fish burger enriched with 7.5 g of prickly pear powder; ACT-12.5: fish burger enriched with 12.5 g of prickly pear powder.*



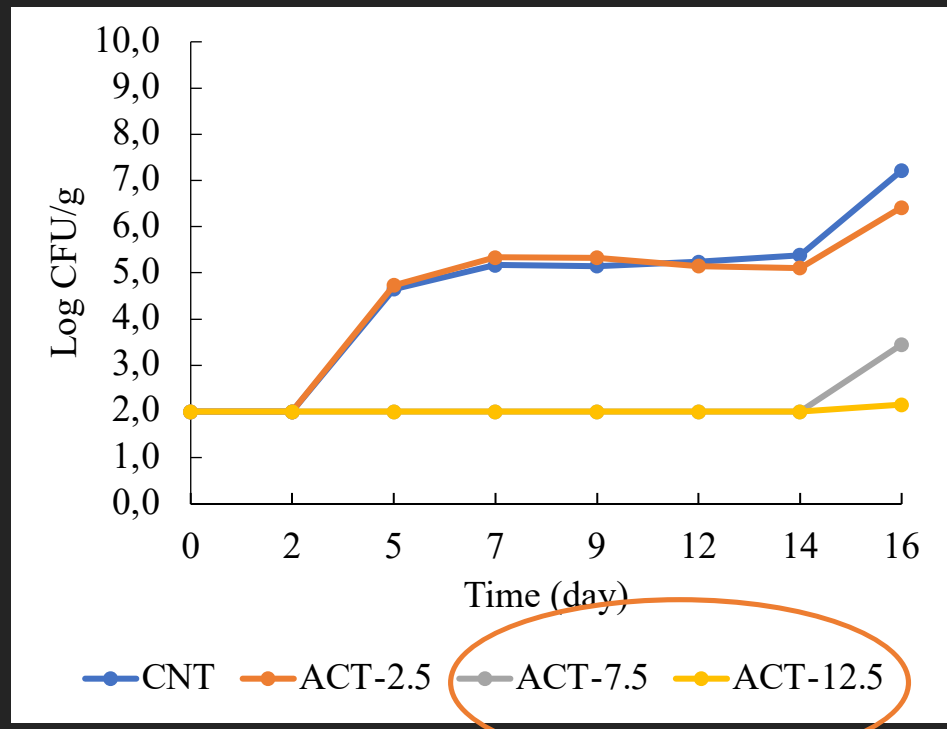
No Microbial Growth Rate was observed for ACT-7.5 and ACT-12.5 during the entire storage period

Figure 2. The evolution of total psycrhrotrophic bacteria in fish burgers during 16 days of storage at 4 °C. CNT: fish burger without prickly pear powder; ACT-2.5: fish burger enriched with 2.5 g of prickly pear powder; ACT-7.5: fish burger enriched with 7.5 g of prickly pear powder; ACT-12.5: fish burger enriched with 12.5 g of prickly pear powder



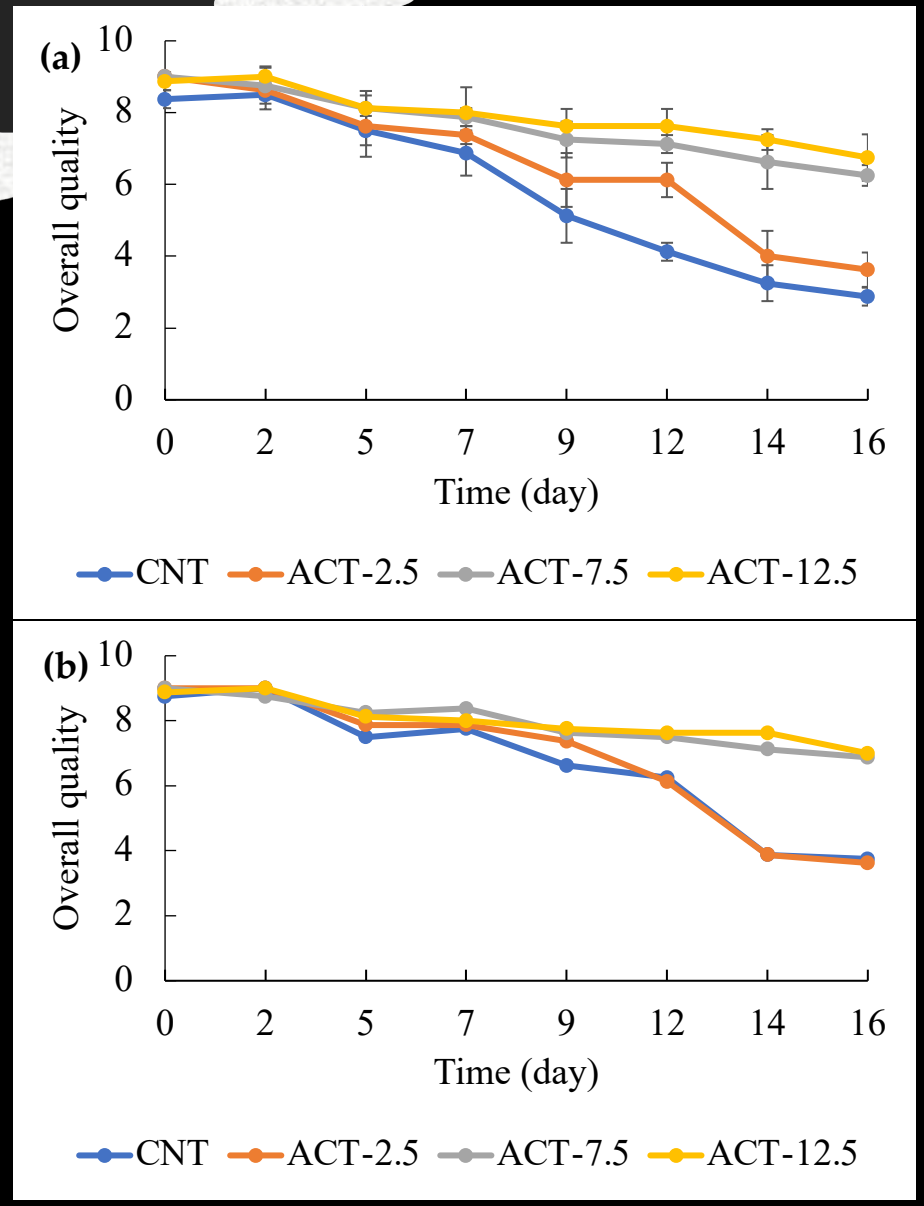
A slight decrease, followed by a gradual increased during 16 days

Figure 3. *The evolution of PHAB viable cell concentration of fish burgers during 16 days of storage at 4 °C. CNT: fish burger without prickly pear powder; ACT-2.5: fish burger enriched with 2.5 g of prickly pear powder; ACT-7.5: fish burger enriched with 7.5 g of prickly pear powder; ACT-12.5: fish burger enriched with 12.5 g of prickly pear powder.*



No Microbial Growth was found, while ACT-7.5 had a slight increase only on the last day of storage.

Figure 4. Evolution of Overall quality of both raw (a) and cooked (b) fish burgers during 16 days of storage at 4 °C. CNT: fish burger without prickly pear powder; ACT-2.5: fish burger enriched with 2.5 g of prickly pear powder; ACT-7.5: fish burger enriched with 7.5 g of prickly pear powder; ACT-12.5: fish burger enriched with 12.5 g of prickly pear powder.



The raw samples (a) had faster reduction of sensory quality than the cooked ones (b). Therefore, ACT-7.5 and ACT-12.5 showed a better overall quality even after two weeks (completely acceptable).

Conclusions

This research proved that:

- The two highest concentrations (ACT-7.5 and ACT-12.5) proved to be the most effective against the growth of spoilage microorganisms.
- Both of them slowed down also the sensorial quality decay of the cod fish burgers due to the aromatic compounds of the powder.

Therefore the use of pulp and peel from prickly pears can be advantageously used to promote fresh fish preservation.


Thank you for the attention!