Product to-be Pectin CH-NPs edible film

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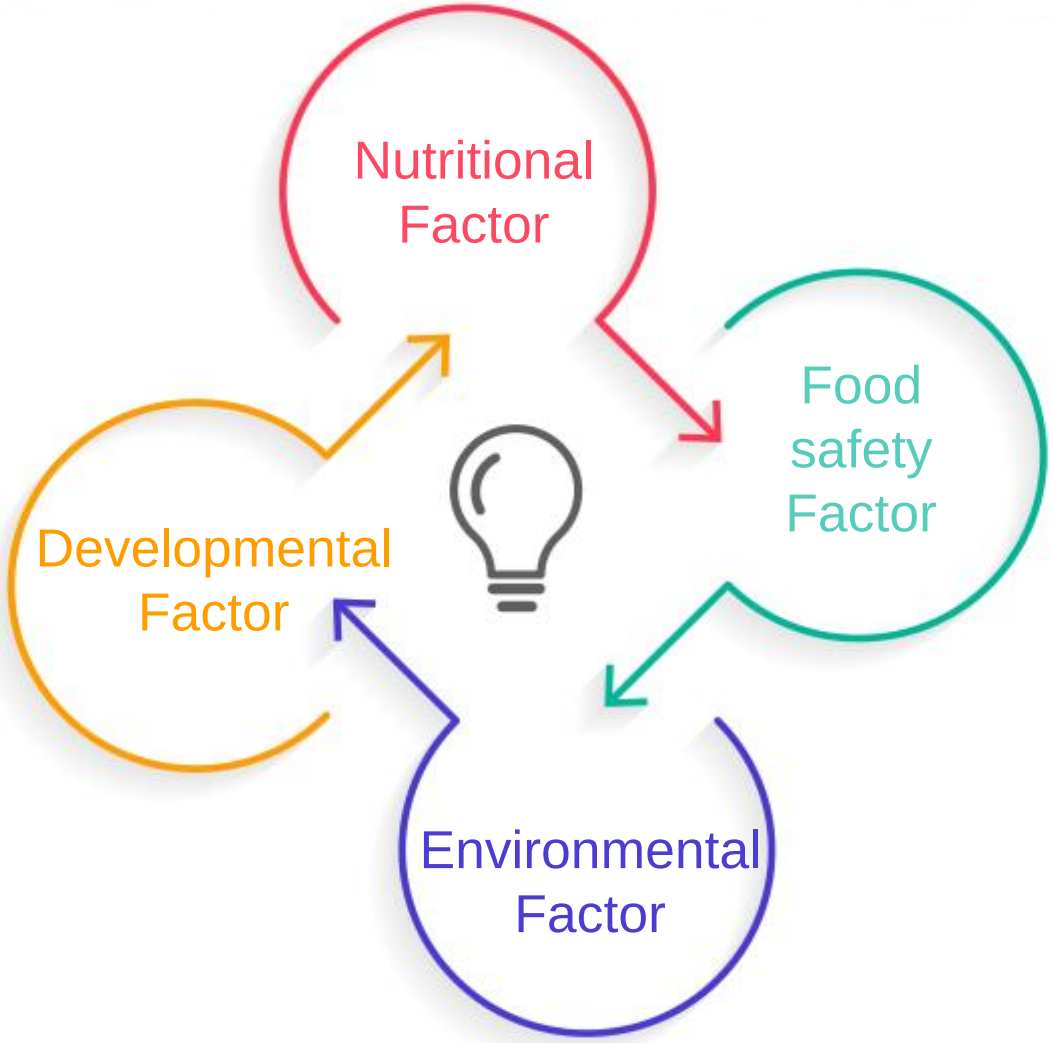
Why this project ?



Edible Film Properties

1. Prevent moisture migration
2. Prevent microbial growth
3. Prevent texture change
4. Prevent undesirable reactions
5. Good oxygen barrier

Main Objective

Create a product which is fortified flavoured cheese slices warpped individually with edible film.

The main three stages

1. Cheese preparing

2. Fortification

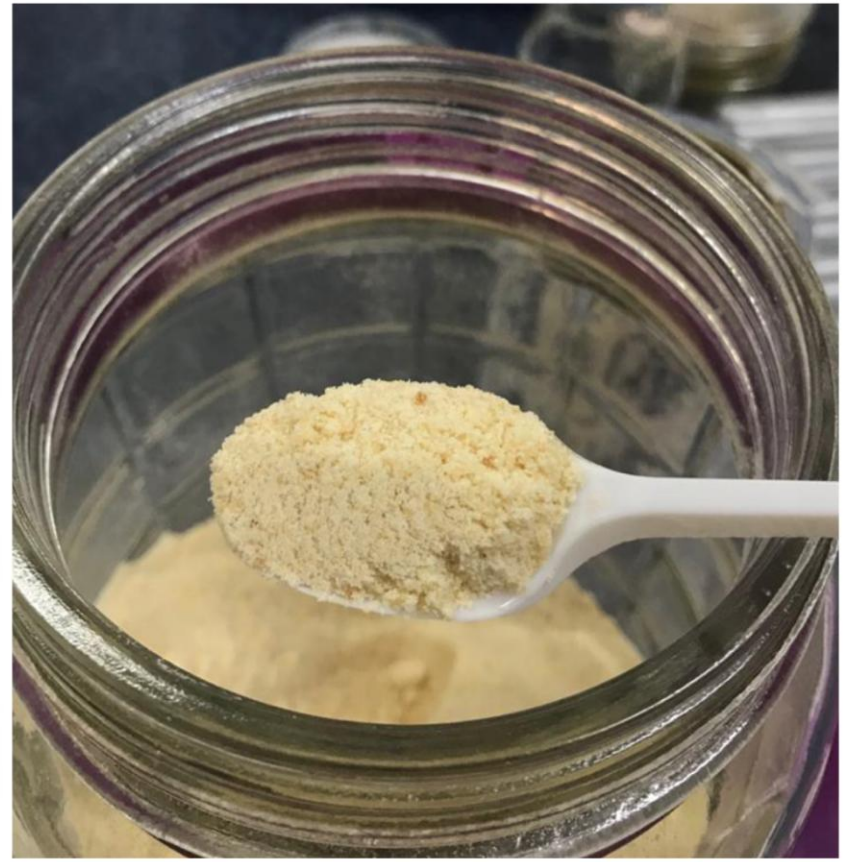
3. Wrapping

Steps Completed

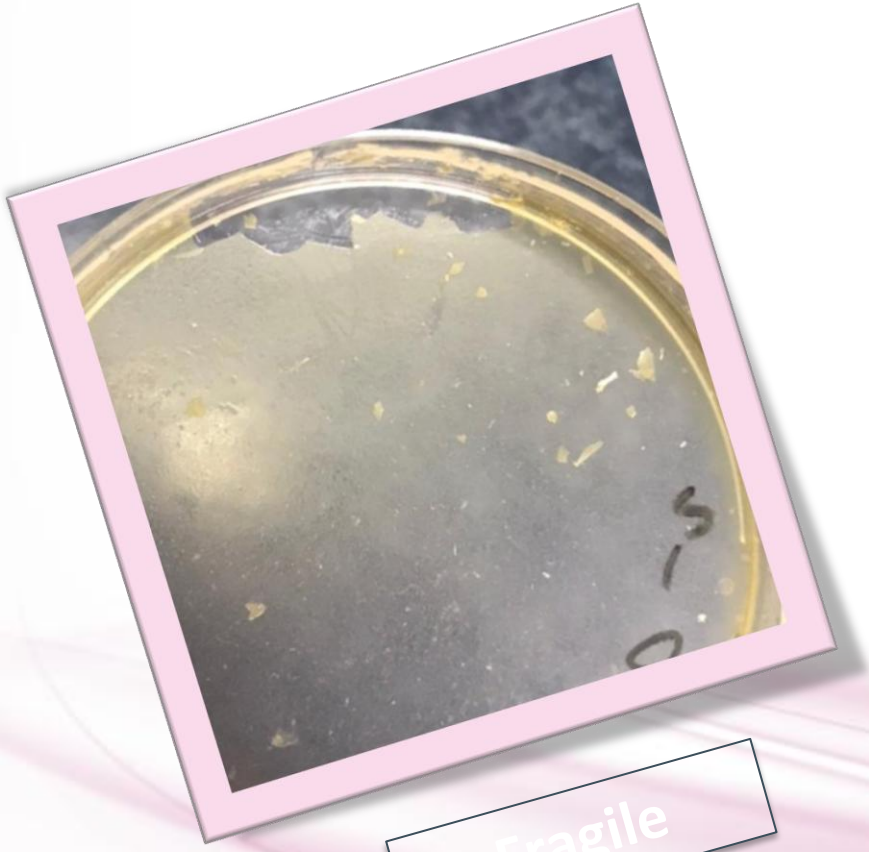
Production of edible film with antimicrobial characteristics to use in several applications.

Trial Data

First trial was with coconut waste presenting as basic material of the film, but we still haven’t got the true way to synthesise this film with our available facilities.



Coconut film results



Fragile

Very sticky

Pectin – Chitosan Nanoparticles film

What is pectin?

“Pectin is structurally and functionally the most complex polysaccharide in plant cell walls.
It’s a key ingredient in jams and jellies and as thickening agent.”

Why Pectin?

Bio-degradable

Bio-compatible

Selective Gas Permeable

Gel forming

Edible

What is Chitosan?

> Chitosan is a sugar that is obtained from the hard outer skeleton of shellfish, including crab, lobster, and shrimp. It is used in medicine and processing.

Why Chitosan?

- Due to its particular physio-chemical properties.
- Short time biodegradability.
- Biocompatibility with human tissues.
- Antimicrobial and antifungal activities.
- Non-toxic.

Material and Method

Film Ingredients

Pectin
2% as a base

Chitosan nano-particles
0.2%

Glycerol
as plasticizing agent

Procedure

1. Stir pectin on magnetic stirrer
2. Add chitosan drop by drop

3. Adjust PH within 4-4.5

4. Homogenize well

5. Add glycerol
6. Cast & Dry overnight

Antimicrobial characteristics test 1

2%
CH-NPs

Spread plate method

- *Staphylococcus aureus*
- *Proteus vulgaris*
- *Klebsiella Peumonia*
- *Candida*

1%
CH-NPs

Spread plate method

- *Staphylococcus aureus*
- *Proteus vulgaris*
- *Klebsiella Peumonia*
- *Candida*

Antimicrobial characteristics test 2

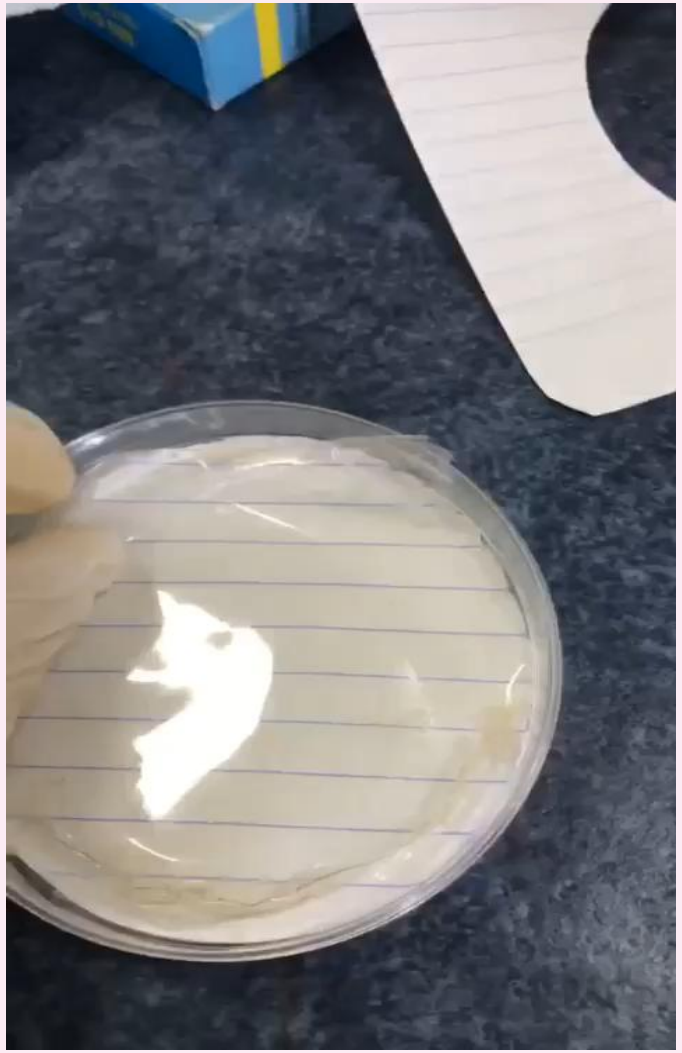
Minimum inhibition concentration (MIC)

Results

Film physical trait results

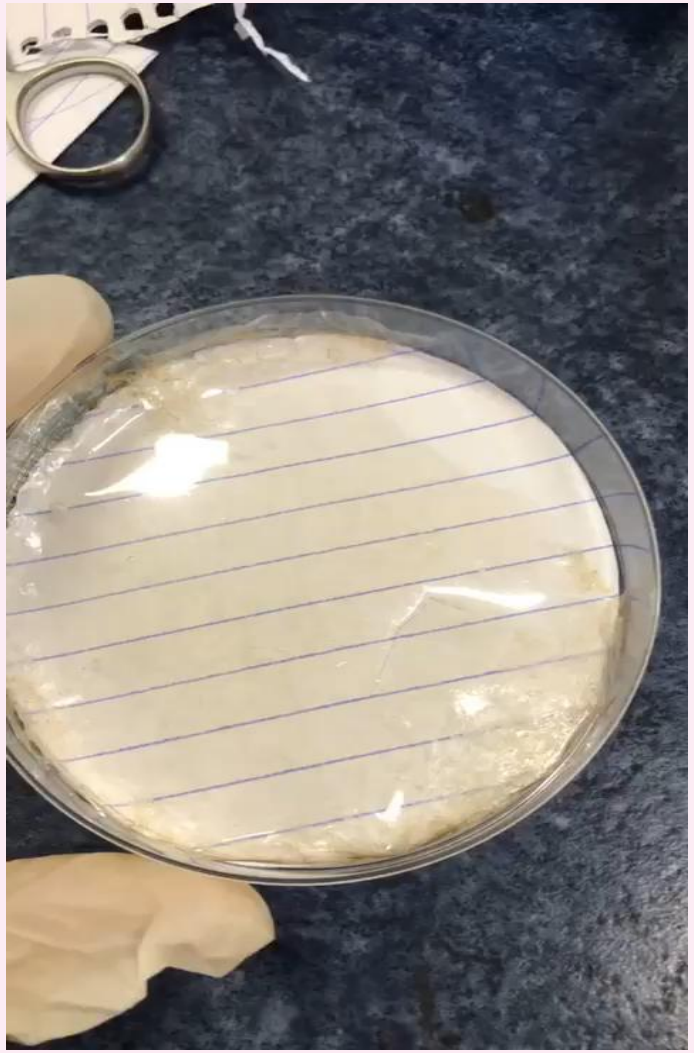
With glycerol

The film is elastic and malleable



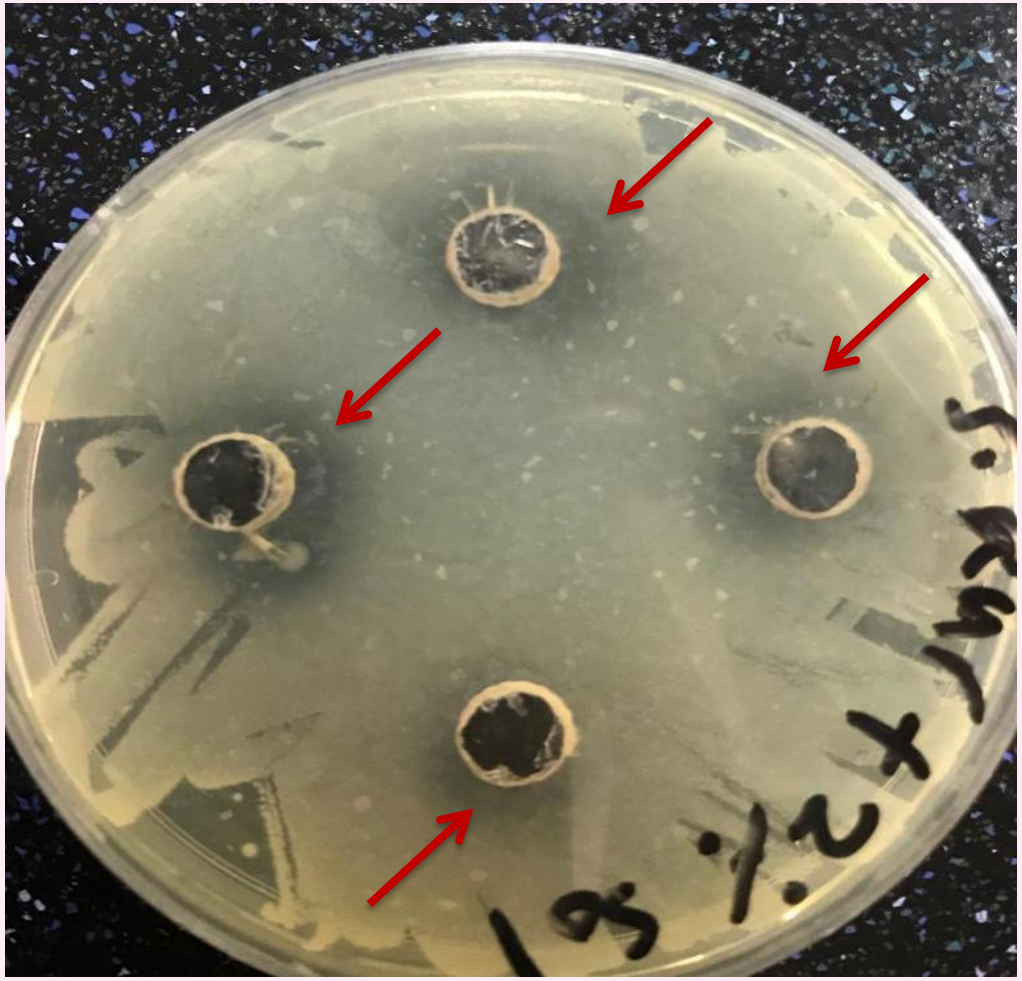
Without glycerol

The film is fragile



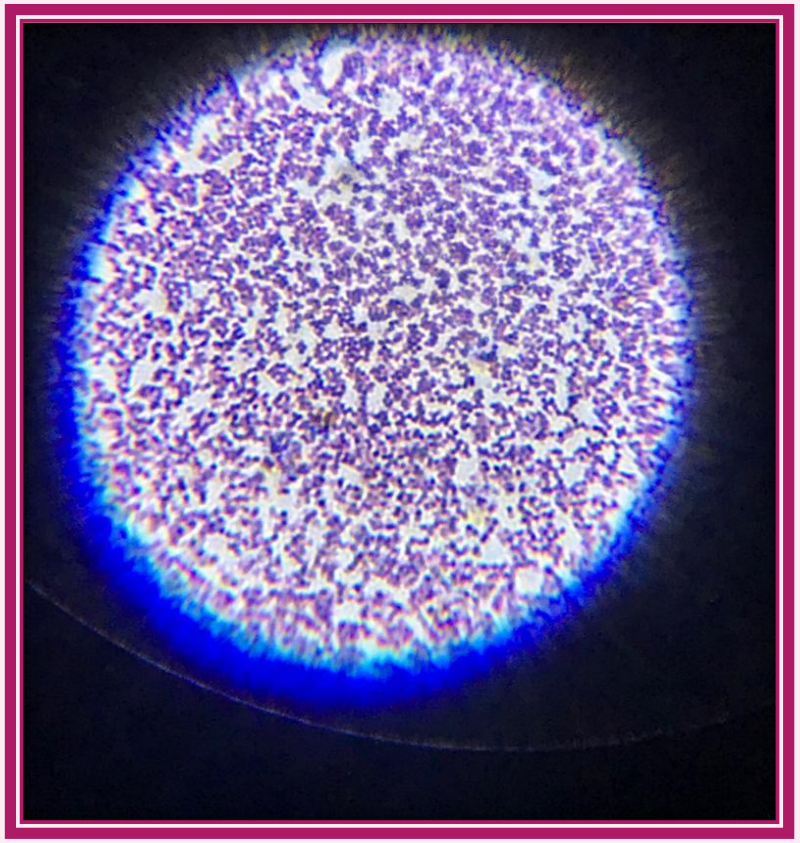
Antimicrobial traits results

S. aureus with 2% CH-NPs



Microscopic results

S. aurues with 1% CH-NPs



S. aurus with 2% CH-NPs

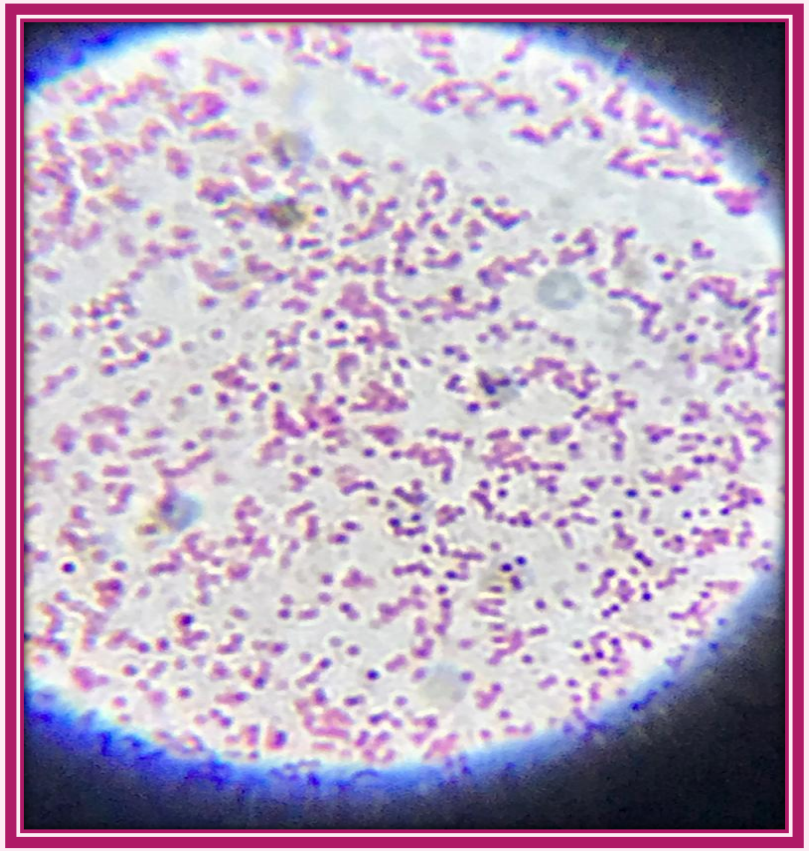
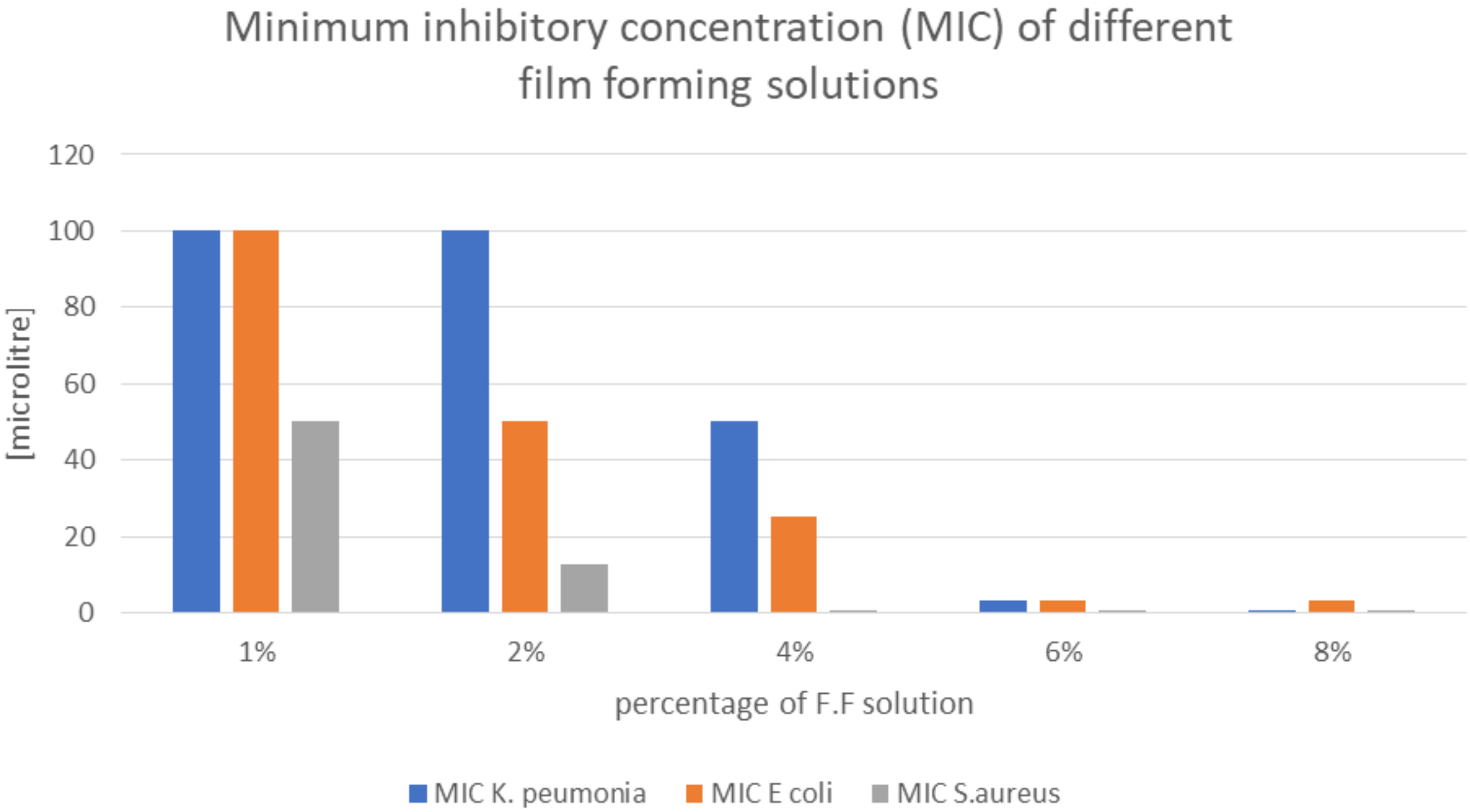


Image details

Previous microscopic pictures shows the effect of the increasing of chitosan concentration on S.aurues , which is naturally lives in colonies but 2% chitosan disassembles these colonies

After the previous results , an additional test has been applied in order to determine the relationship between chitosan nano particles concentration and antimicrobial traits and specify the ideal concentration to use .


Minimum inhibitory concentration (MIC) of different film forming solutions
120
100
80
60
40
20
0
[microlitre]
1%
2%
4%
6%
8%
percentage of F.F solution
MIC K. peumonia
MIC E coli
MIC S.aureus

Data Results

- All bacteria were inhibited as the concentration of film-forming solution increased.
- *S.aureus* was the most affected bacteria by the solutions.
- This experiment need to be replicated to find IC 50 for each solution/bacteria.

Conclusion

Project Conclusion

Chitosan Nano-Particles are considered an added value for pectin film , by adding antimicrobial activity, which is a very important and special trait for ready to eat products .

Recommendation

Pectin - 1-2% CH-NPs edible film is an interesting invention and has a promising future and a wide range of applications.

I recommend focusing on the principle of the edible films because it’s compatible with human health and the environmentally friendly global development.

References

Debra Mohnen, Pectin structure and biosynthesis . In Current opinion of plant biology. Elsevier 2008;pp1

Rolin C., De Vries J. (1990) Pectin. In: Harris P. (eds) Food Gels. Elsevier Applied Food Science Series. Springer, Dordrecht.

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