



**Evaluation of the viability of
encapsulated probiotic in some food-
waste products.**

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Introduction



There are huge quantities of agricultural waste around the world estimated at 5.5 billion tons annually, according to the Brazilian study in 2018

One of these waste coconut waste, the countries famous for its cultivation are Southeast Asia, 92 countries, and the outer shell is used in several industries .



coconut



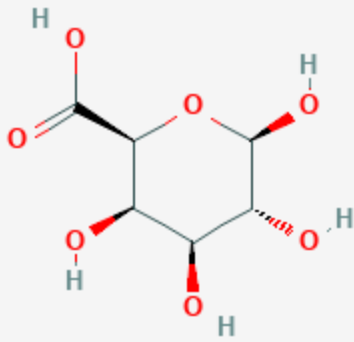
The coconut palm (*Cocos nucifera*) is one of the most useful tropical trees. This multipurpose tree is used for food, beverage, shelter, animal feed, and is grown industrially for the edible and highly saturated oil contained in the flesh of its fruits.

Depending on the oil extraction method, the oil residue in the marketed product ranges from 1% to 22%

1. Suitable for people with lactose intolerance.
2. It is widely available as an industrial by-product.
3. It has good taste as coconut is used in many alike products.

Table 1 : chemical composition of cocos nucifera

Composition	Cocos nucifera
Protein	18.07 %
Ash	6.8 %
Fiber	18.11%
Fate	0.42%
Water	7.3%



Pectin

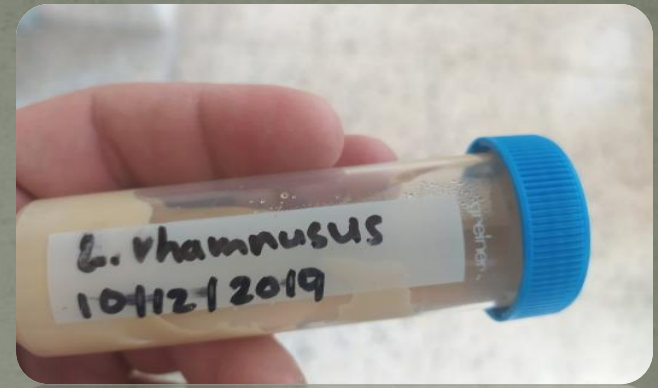
1. Pectin is available commercially as a white to brown powder
2. mainly extracted from citrus fruits.
3. It is used in the food field and the food industry such as sweets and jams
4. And as a substance installed in fruit juices and as a source of dietary fiber.
5. **Gelling agent**



whey

1. Is a by product resulting from the manufacture of rennet
2. types of hard cheese.
3. every 100 kg of milk used for the cheese industry, produces 70-80% whey .
4. High protein and low cost

L.rhamnosus



- *L. rhamnosus* is a type of bacteria found in human intestines.
- Safe for human use.
- *L. rhamnosus* is available as a probiotic supplement and often added to yogurts, cheeses, milk, and other dairy products to boost probiotic content.

TGase Enzymes

{ Transglutaminase }



1. It works to achieve protein clotting .
2. Stimulating the acyl transfer reaction that forms the covalent bonds of glutamine .

Objectives

1. To Enhance the functionality of product by adding (probiotics *L. rhamnosus*) and defatted coconut flour.
2. The main aim was to evaluate the viability of encapsulated *L. rhamnosus* in coconut and whey puddings.

Materials

the materials we are used in the Experimental

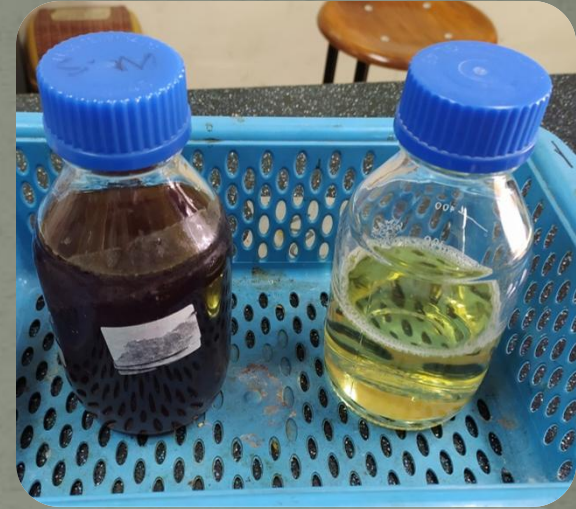
✓ Whey	400 ml
✓ Water	400 ml
✓ Coconut	7.5 %
✓ Pectin	7.5 %
✓ Lactobacillus rhamnosus	
✓ TGase Enzyme	0.28 g
✓ Cacl 10%	
✓ Alginate	1 g
✓ MRS agar	
✓ Pepton water	



Methods

Autoclave

- Distilled water
- Peptone water
- MRS agar
- Cacl



MRS agar

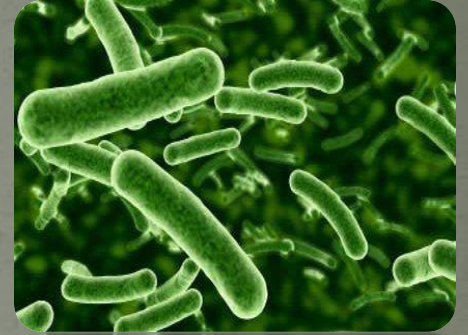
Peptone water



Autoclave



Preparation *Lactobacillus rhamnosus*



Small amount from *Lactobacillus rhamnosus* by loop mixing with 6 ml distilled water.



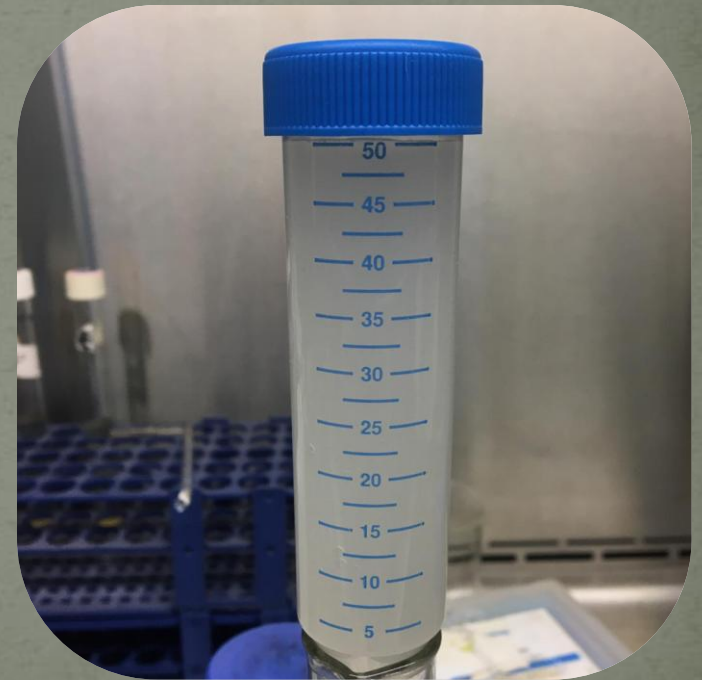
← loop

Methods

Prepare

Free cell

3 ml lactobacillus
rhamnosus with 47 ml
Distilled water





Encapsulation

3 ml lactobacillus
rhamnosus with 47 ml
distilled water + 1 g
Algenate

Add 5 ml

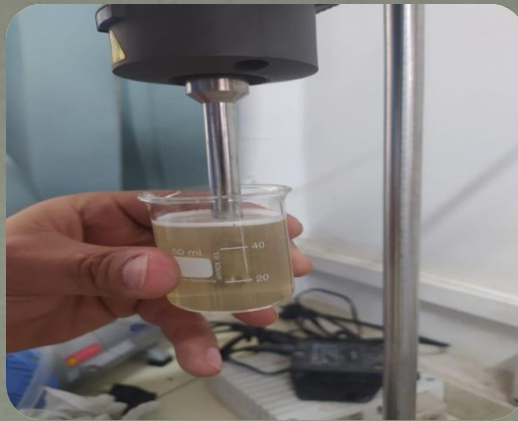
CaCl with magnetic
On hot plate 6

Filtration by filter
paper

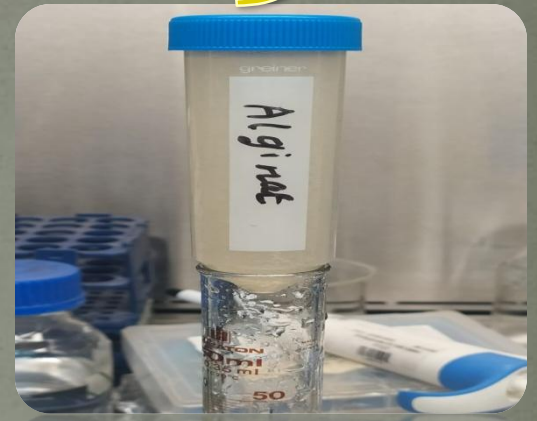
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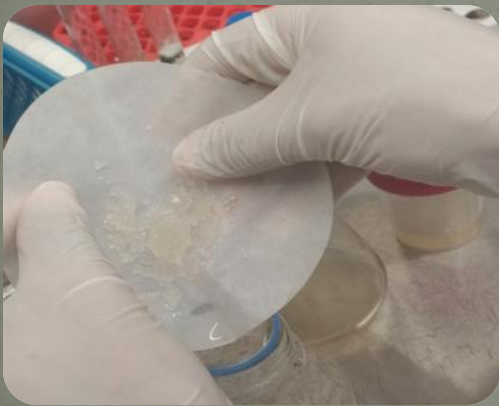
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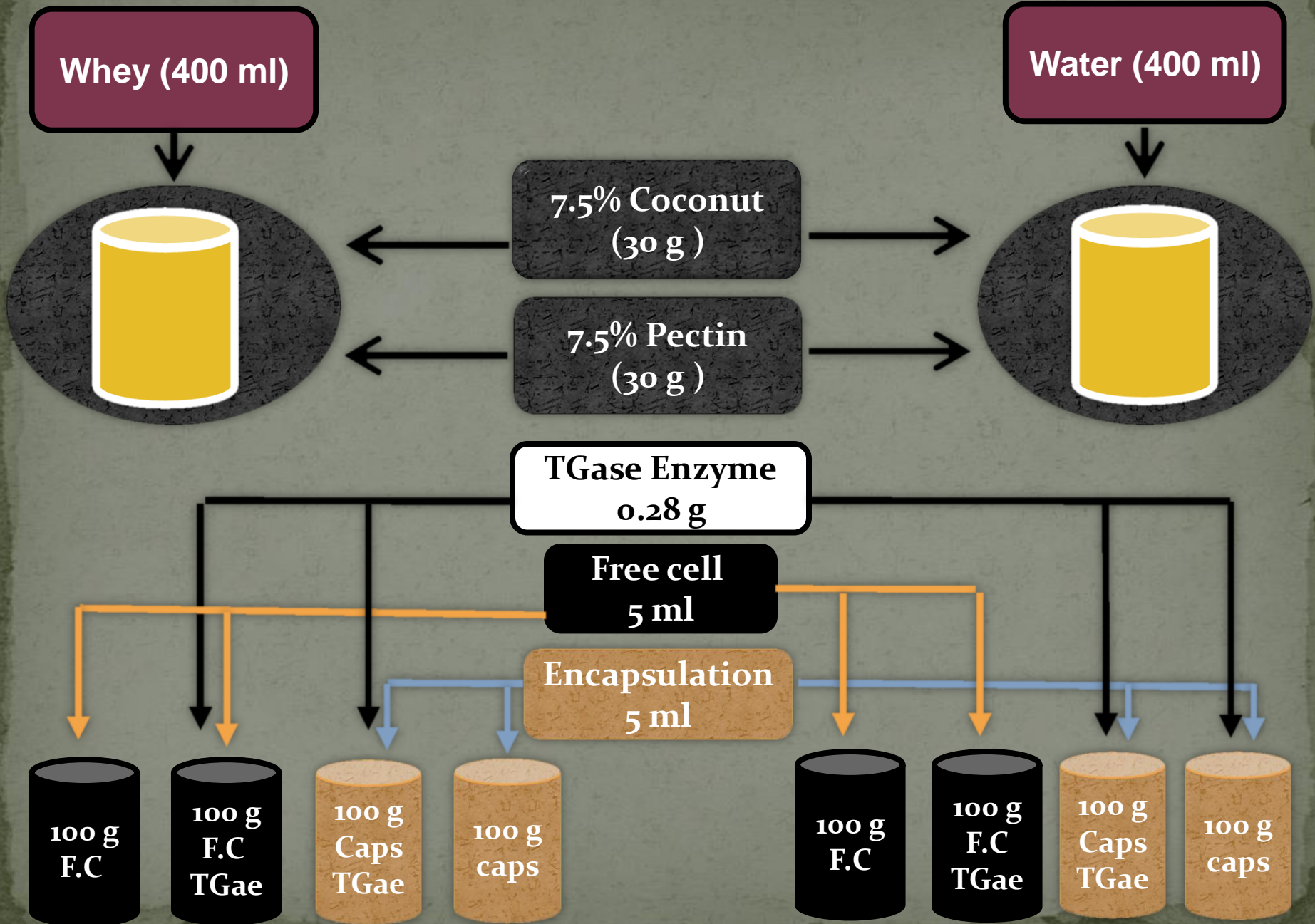


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Whey (400 ml)

Water (400 ml)

7.5% Coconut
(30 g)

7.5% Pectin
(30 g)

TGase Enzyme
0.28 g

Free cell
5 ml

Encapsulation
5 ml

100 g
F.C

100 g
F.C
TGae

100 g
Caps
TGae

100 g
caps

100 g
F.C

100 g
F.C
TGae

100 g
Caps
TGae

100 g
caps

Water bath on 43 c for 2 h



Stored in the refrigerator 4 C

Micro biological preparation



- 1- We pour 10 g of each sample into the mixer and add 90 g of sterile water to it.
- 2 - We put it on the mixer for a minute to make it homogeneous.
- 3-We prepare the micro byte and take 1000 microns of the mixture and put it in the first test tube.
- 4-Then we go back and take 1000 microns from the first tube and put it on the second and move well.
- 5-Finally we take 100 microns and are working on two samples

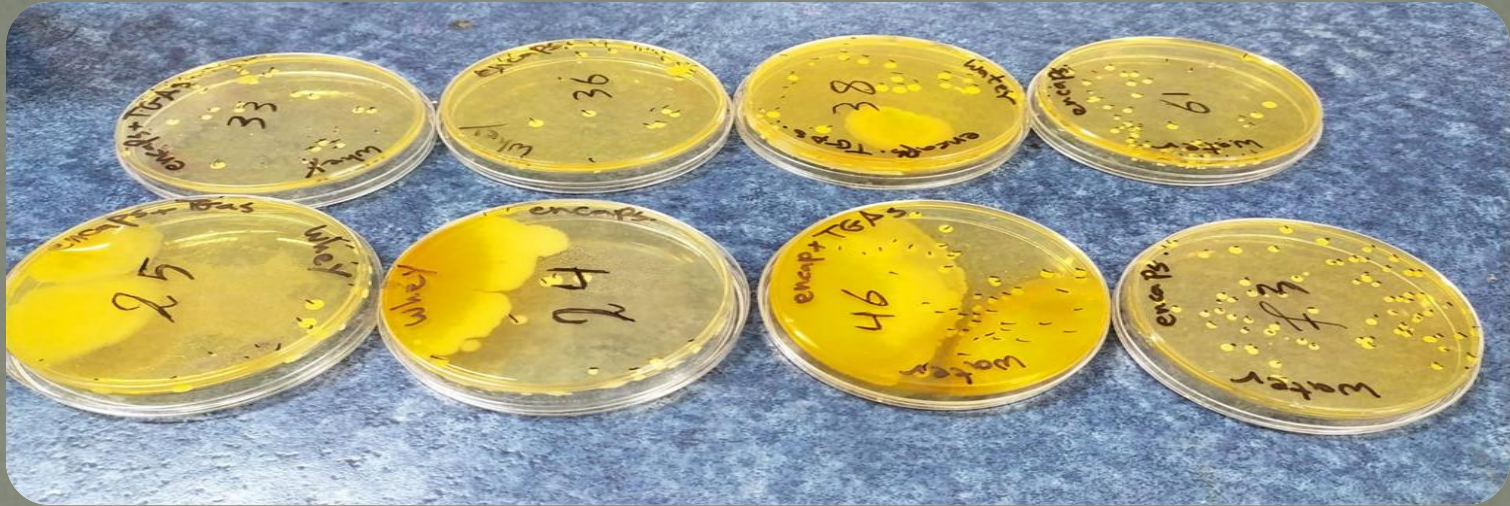
Result

A-Effect of in encapsulation



sample	Number of bacteria
Whey / free cell	203 cell
Whey / free cell / TGAs	174 cell
Water / free cell	132 cell
Water / free cell / TGAs	137 cell

Dilution 10^{-5}



sample	Number of bacteria
Whoy / encap	30 cell
Whoy / encap/ TGAs	29 cell
Water / encap	51 cell
Water / encap / TGAs	83cell

Dilution 10^{-5}

B - Viability test

Sample	Number of bacteria 0 day	Number of bacteria 8 day	Number of bacteria 20 day
Whey / encap	7 cell	30 cell	50 cell
Whey / encap/ TGAs	3 cell	29 cell	70 cell
Water / encap	4 cell	51 cell	80 cell
Water / encap / TGAs	7cell	83cell	9 0cell
Whey / free cell	8 cell	94 cell	110 cell
Whey / free cell / TGAs	6 cell	100 cell	120 cell
Water / free cell	5 cell	120 cell	140 cell
Water / free cell / TGAs	8 cell	83 cell	80 cell

Dilution 10^{-6}

Dilution 10^{-5}

Conclusion

- The pudding was able to conserve the probiotics for at least 14 days with no significant decrease .
- The pudding also provide better nutritional values than commercial products .

Recommendation

- Producing a product for people with lactose intolerance from industrial waste is widely available using I. Rahmans .
- Produce product a rich-protein for all people .
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