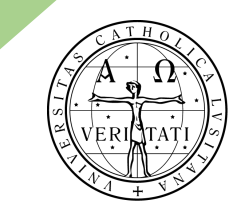


Bromelain functional hydrogel from upcycled *Ananas Comosus* targeting inflammatory bowel diseases

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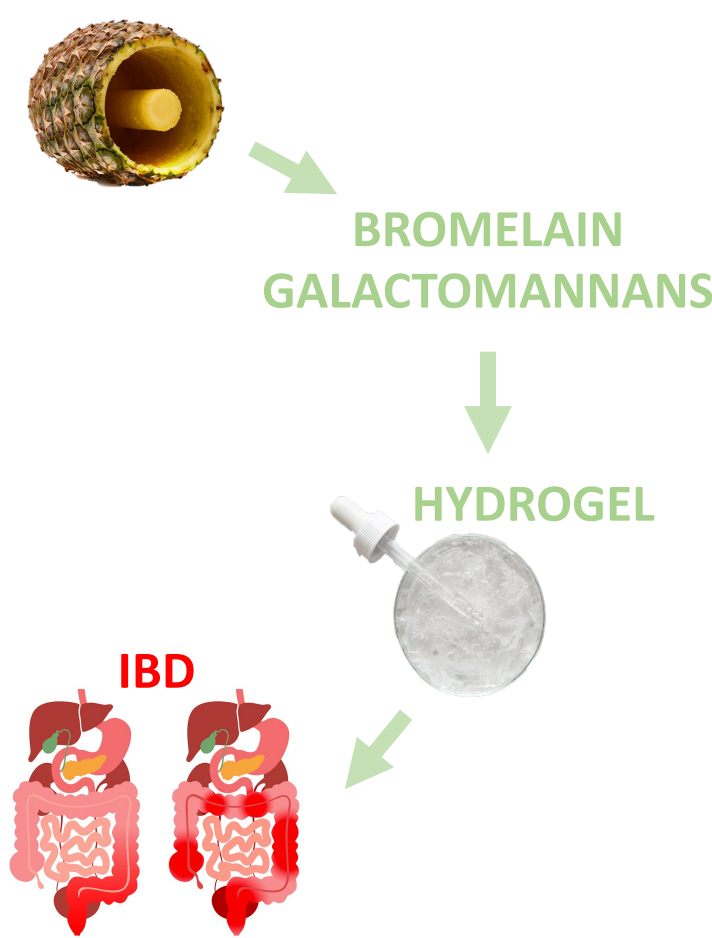
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ABSTRACT

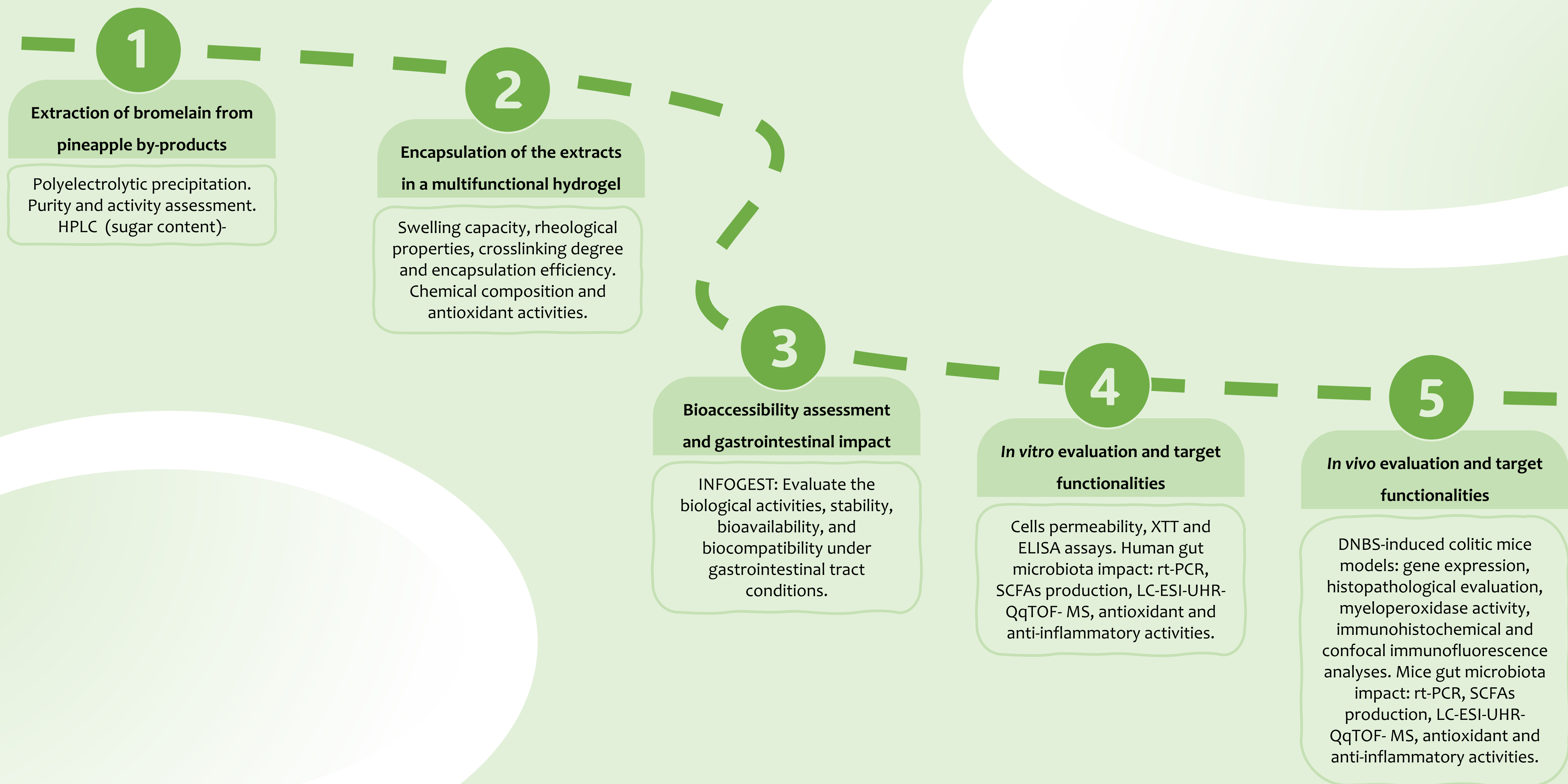
Natural substances derived from plants have been extensively studied due to their significant bioactive properties and multiple applications in the food, cosmetic, and pharmaceutical industries. Bromelain, an endopeptidase composed of proteolytic enzymes found throughout the pineapple plant, is known for its anti-inflammatory, antioxidant, cardioprotective, immunomodulatory, and anticancer properties. Previous research has developed a technique for extracting bromelain using polyelectrolyte precipitation with carrageenan, a green separation system that complexes with bromelain under controlled conditions, isolating it from the rest of the pineapple juice. Inflammatory bowel disease (IBD), which includes Crohn's disease, is a group of chronic conditions characterized by persistent inflammation of the gastrointestinal tract. The incidence of IBD has risen to millions of cases worldwide, yet there are limited solutions to prevent its occurrence and manage its prevalence. Therefore, this study aims to develop and characterize multifunctional bromelain hydrogels for the management of inflammatory bowel diseases.



OBJECTIVES

- i Extraction of the bromelain and galactomannans from pineapple fractions (*Ananas Comosus* Merr.)
- ii Encapsulation of the extracts in a multifunctional bromelain hydrogel matrix
- iii Assessment of anti-inflammatory capacity of the matrix

METHODOLOGY



EXPECTED OUTCOMES

With this research it is expected the development of a multifunctional hydrogel containing bromelain with controlled-release properties and active anti-inflammatory effects throughout the gastrointestinal tract. Additionally, it seeks to determine if bromelain can positively influence gut microbiota modulation and intestinal barrier dysfunction, which are recurrent issues in IBD. Furthermore, this study will culminate in the production of a new health-oriented product, promoting a zero-waste and circular economy approach in pineapple production and consumption.

REFERENCES

1. Campos, D.A., Coscueta, E.R., Valetti, N.W., Pastrana-Castro, L.M., Teixeira, J.A. and Picó, G.A. (2019) 'Optimization of bromelain isolation from pineapple byproducts by polysaccharide complex formation', Food Hydrocolloids, 87(January 2018), pp. 792–804. 2. Ataide, J.A., Gérios, E.F., Cefali, L.C., Fernandes, A.R., Teixeira, M. do C. and Ferreira, N.R. (2019) 'Effect of Polysaccharide Sources on the Physicochemical Properties of Bromelain–Chitosan Nanoparticles', Polymers (Basel), 11(10), p. 1681. 3. Setiasih, S., Reyhan, A., Hudiyono, S. and Saepudin, E. (2019) 'Dissolution Study of Purified Bromelain from Pineapple Cores (*Ananas comosus* [L.] Merr) Encapsulated in Alginate-Chitosan Microcapsule', Journal of Physics: Conference Series, 1245(1), p. 012037.

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