

Integrative and sustainable approach to obtain functional ingredients from orange by-products – case study on Algarve’s Citrus PGI

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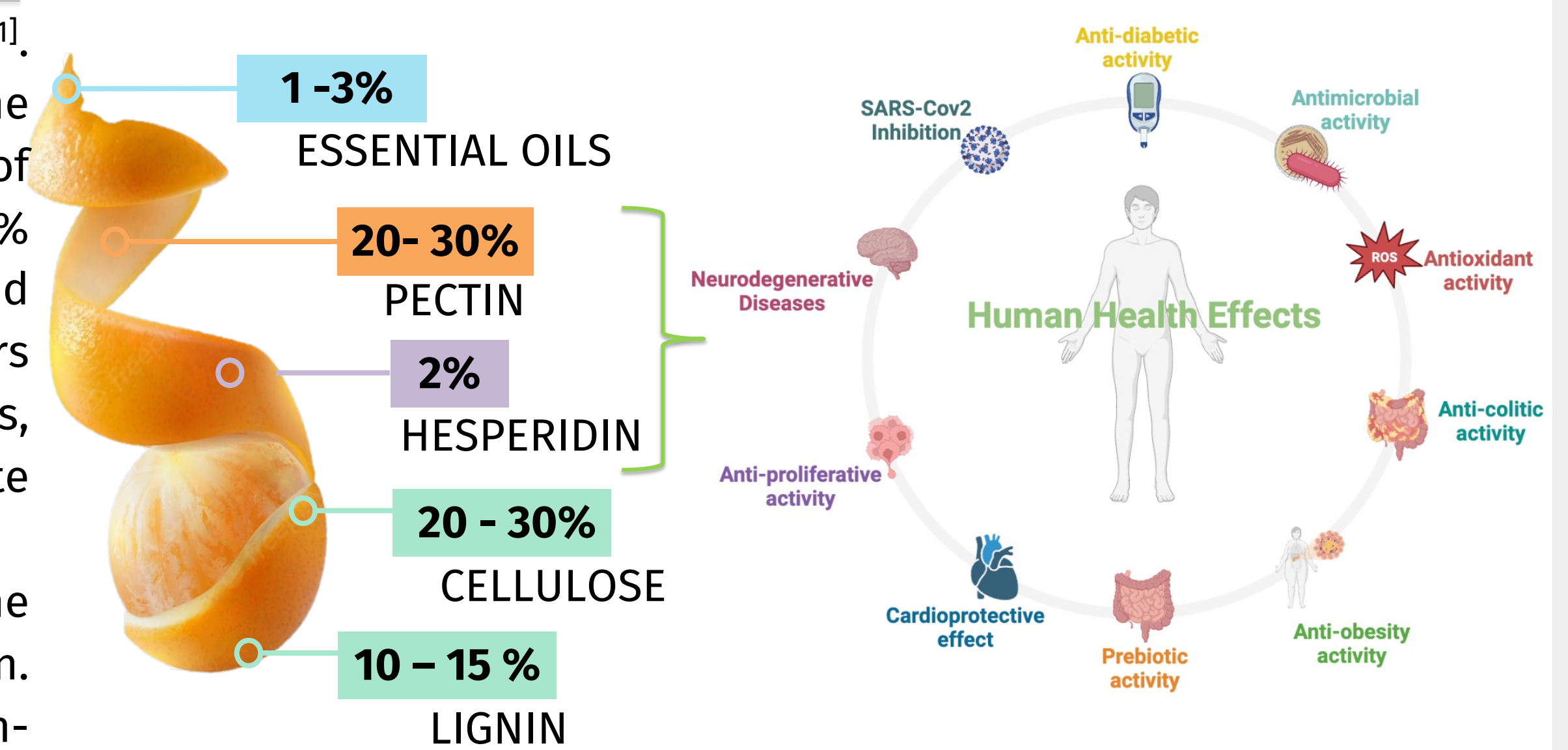
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Background

Sweet orange is the most widely consumed citrus fruit worldwide, with a production rate of 76 million tons in 2021^[1]. The Mediterranean Basin accounts for 20% of the total worldwide production where Portugal produces in the south region the uniqueness and quality Algarve’s Citrus PGI (Protected Geographical Indication). The Algarve region represents 73% of national production reaching a total production of 0.36 M tons in 2021. In Portugal, orange juice production accounts for 21% of the total production and, during this process almost 50% of orange weight by-products (OBP)^[2]. Currently, sustainable food waste management is considered a vital approach to promote the environment, economic and social sustainability’s pillars therefore, OBP could be a profitable and sustainable source of bioactive compounds (BCs) since are rich in essential oils, phenolic compounds, pectin and cellulose^[2]. Furthermore, pectin associated with hesperidin are promising to alleviate inflammation of intestinal regions, mainly due to its antioxidant, anti-inflammatory and prebiotic effect^[3,4].

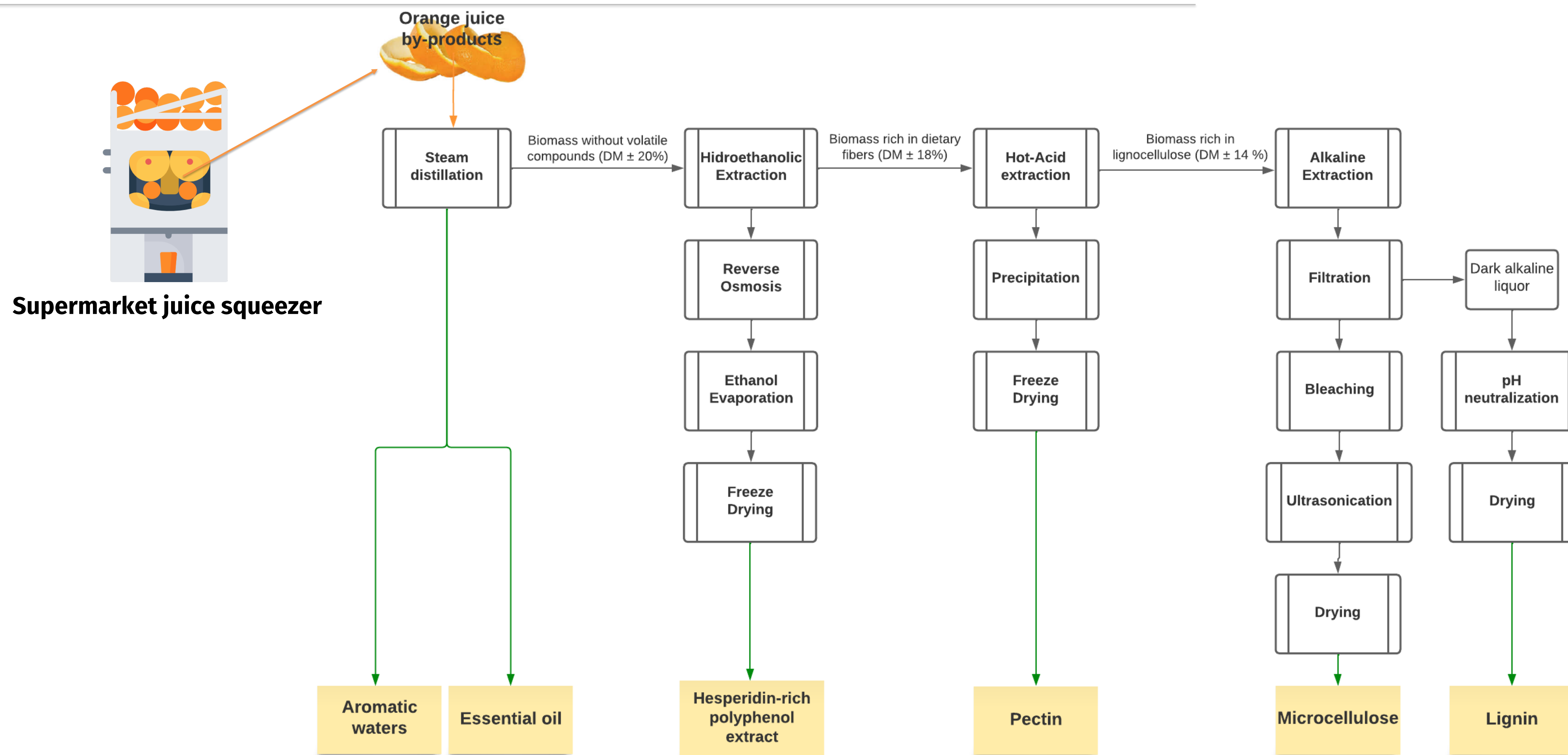
To aligned with the EU directives, related with reduction of waste deposited in landfills, some companies have started the exploiting the OBP to extract essential oils, after the orange juice extraction, while others have focus on the pectin extraction. However, these companies focus in the extraction of individual BCs, since most of the extraction process employs non-environment friendly techniques, inhibiting the re-use of OBP biomass. Therefore, new sustainable alternatives focusing on integrative approaches, are urgent for processing companies to become more sustainable.



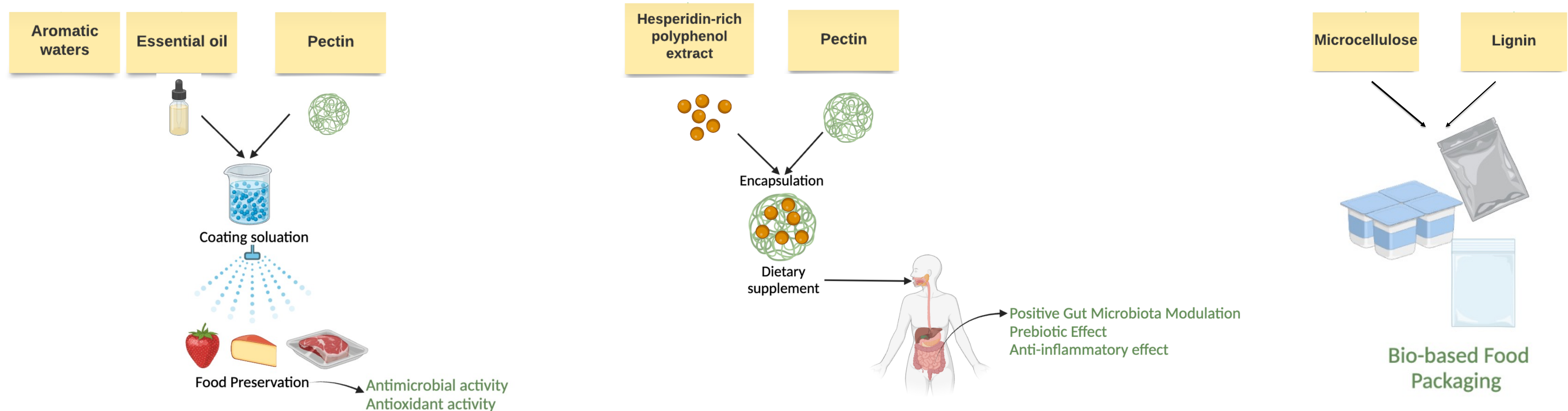
Objectives

The **MAIN GOAL** of this work was the development of an integrative and sustainable biorefinery approach to obtain bioactive and functional ingredients from orange juice by-products obtained from a supermarket juice squeezer (ZUMEX®) (Lane Late variety). The integrative extractions are based on green chemistry principles and the main bioactive compounds obtained from this process: hesperidin and pectin, which will be used for the formulation of a dietary supplement to promote a positive gut modulation in humans. The remain extracted important bioactive ingredients will be produced focusing the usage by other industries.

Methods



Applications & Expected Outcomes



References

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