

# Design of a process for the production of polyphenols, essential oil, and pectin, from orange peel, considering ultrasonic assistance

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## PROBLEM

Orange is one of the most cultivated fruits in the world, with a production of more than 52 million tons per year. In Ecuador, its annual production is around 142 000 tons. The main usage is juice, but only 50% of the fruit is used. The remaining 50% corresponds to pulp, seeds, and peels discarded as municipal waste. These solid wastes when not treated generate problems in their degradation and bad smell, also, due to the high content of moisture promotes the generation of leachates affecting soils and the possible pollution of groundwater resources, Treating them implies a high benefit including better management in landfills.



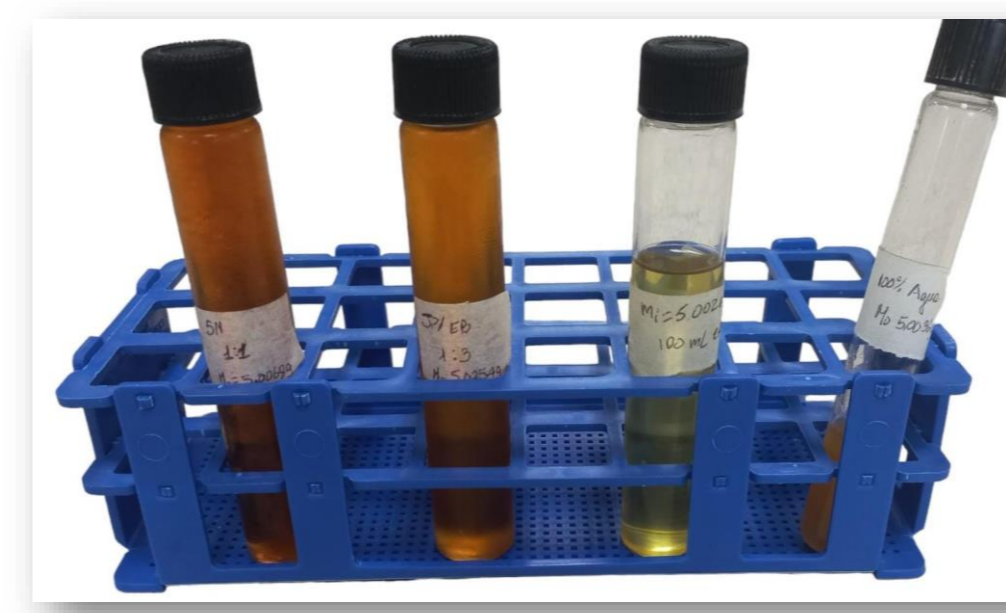
Daniel Janzen y Winnie Hallwachs-BBC News Mundo



Author property- reception of orange peel

## OBJECTIVE

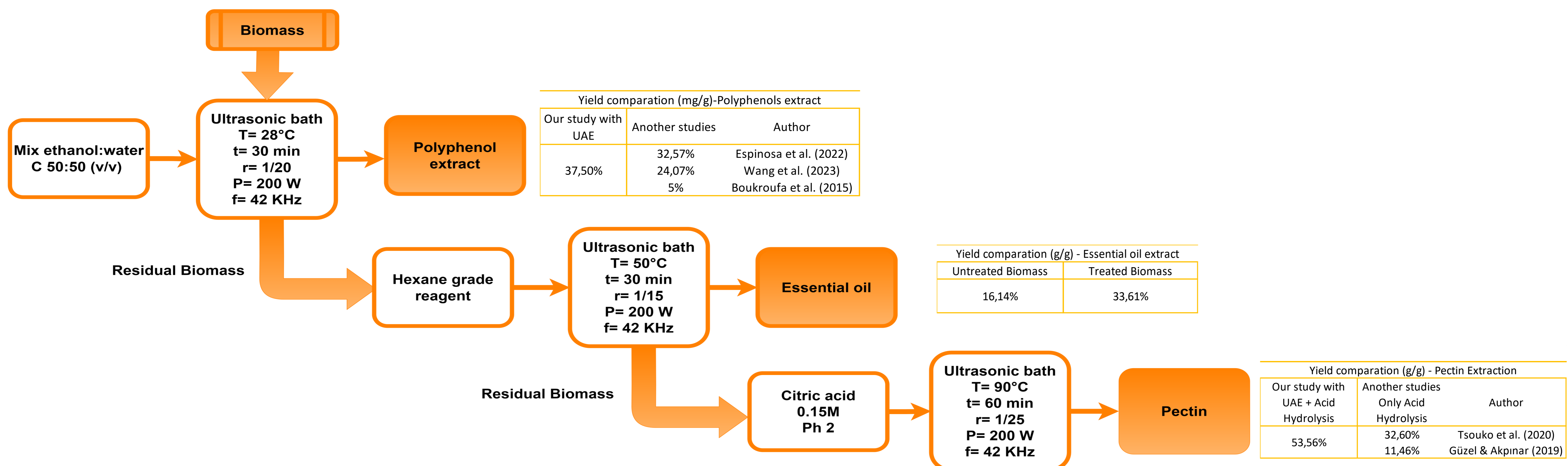
To propose an experimental methodology for transforming agro-industrial waste, i.e., orange peel. For its conversion into essential oil, total polyphenols and pectin by applying physical-chemical techniques.



Author property – Extraction of polyphenols extract, essential oil and pectin

## PROPOSAL

The developed process design allowed the purpose of a sequential production line according to the properties related to each molecule, therefore taking advantage of the treated biomass from the preceding process; importantly, we integrated the ultrasonic bath into each stage, 3 in total.



## CONCLUSION

- The experimental trials allowed knowing the water-ethanol concentration viable to perform the extraction of total polyphenols obtaining a yield of 37.50%.
- On the next stage, the analyzed molecule was limonene, which reported a concentration of 22,9 ppm with a yield of 33,61% of essential oil.
- Finally, a hydrolysis ultrasonic assistance was used with a yield of 53.56% for extracted pectin.

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