

Sustainable exploitation of *Citrus* by-products for pesticide reduction, pectin extraction and bitterness reduction in beverages

Author: Julio Salazar-Bermeo^{ab*} | **Doctoral program:** Science, Technology and Food Management | **Year:** 1
Partners: Bryan Moreno-Chamba^{ab}; Ma. Concepción Martínez-Madrid^b; Manuel Valero^b; and Domingo Saura^b,
Directors: Victoria Lizama^a and Nuria Martí^b

^a Instituto de Ingeniería de Alimentos para el Desarrollo, Universitat Politècnica de València, Avda. Fausto Elio s/n, Edificio 8E, Planta 0, 46022 Valencia, España

^b IDiBE, Universidad Miguel Hernández de Elche, Avda. de la universidad s/n, Edificio Torregaitán, 03202 Alicante, España.

*jsarber@doctor.upv.es | julio.salazar@goumh.umh.es



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA



Background:

- The citrus by-products are used for extracting essential oils and polysaccharides for beverages.
- Citrus by-product-derived compounds have faced different challenges for their application, such as reducing pesticides in citrus oils, increasing pectin yields and modulating the bitterness.
- Approaches: enzymatic action, pressurization or sonication processes to upcycle citrus by-products.

General aims:

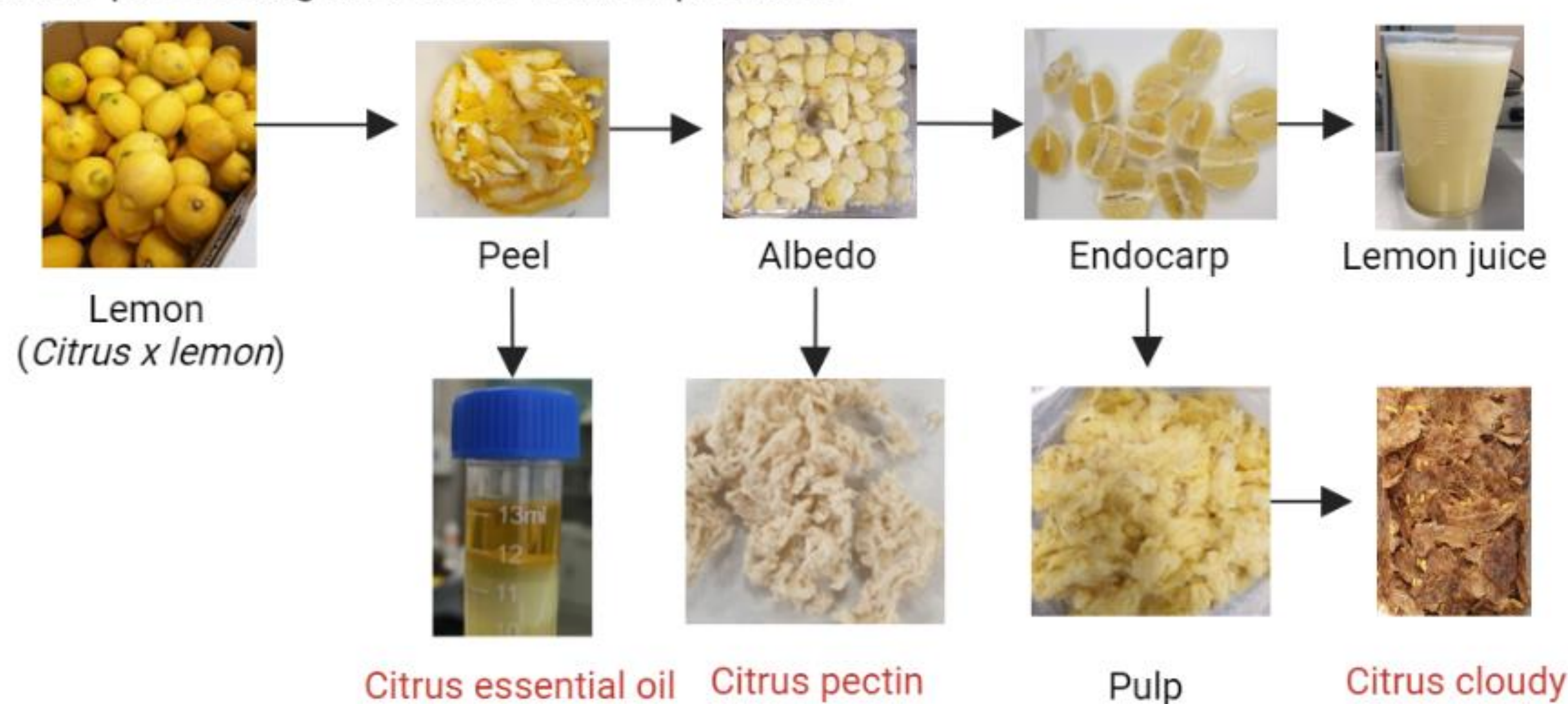
To determine an effective solution for the citrus processing industry to produce high-quality products derived from citrus by-products.

Specific aims:

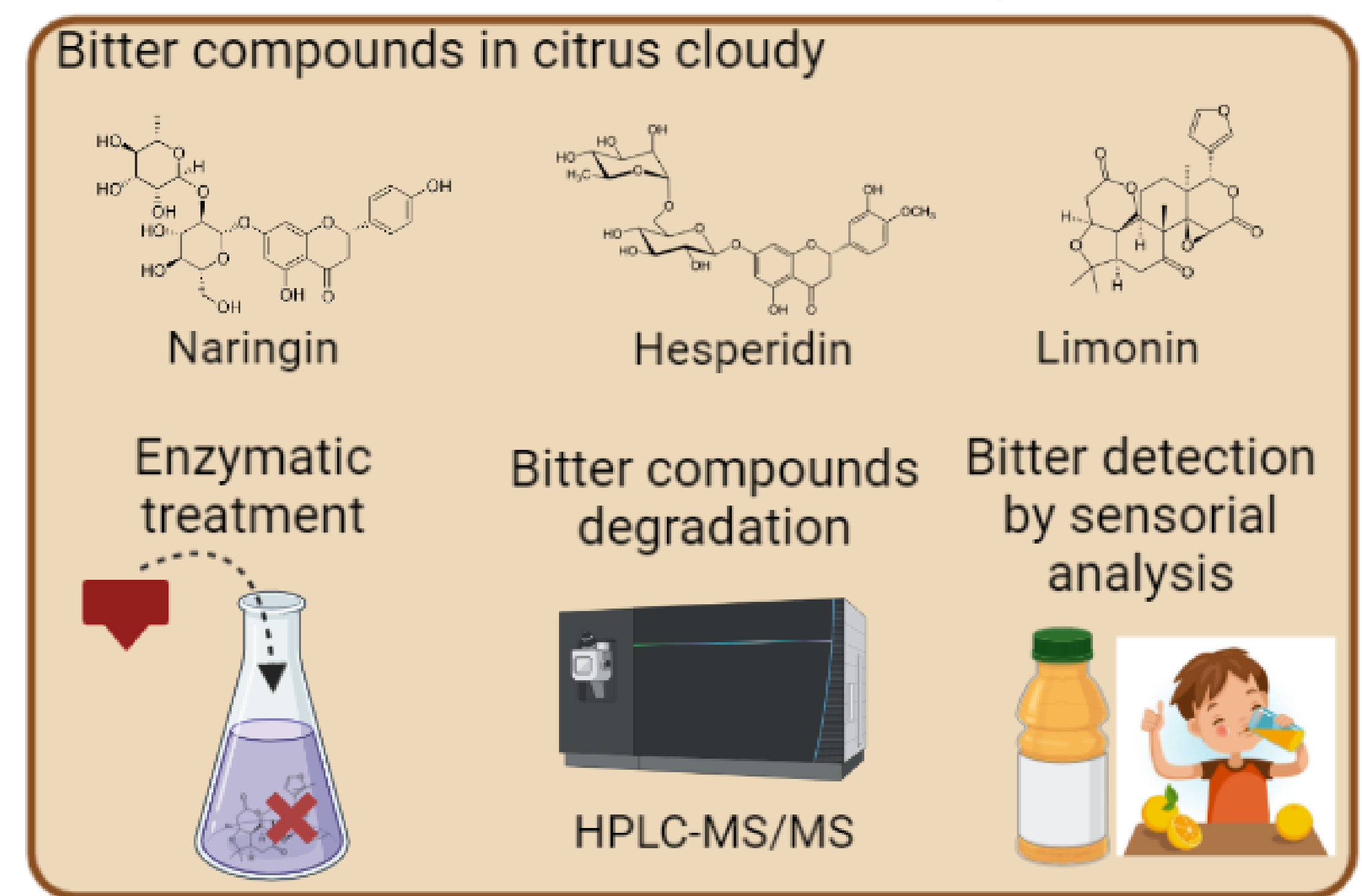
- To reduce pesticide content in citrus essential oil by green technologies.
- To increase the yield and functionality of citrus pectin by vacuum-pressure technologies.
- To modulate the bitterness of citrus additives in beverages.

Main stages of the research

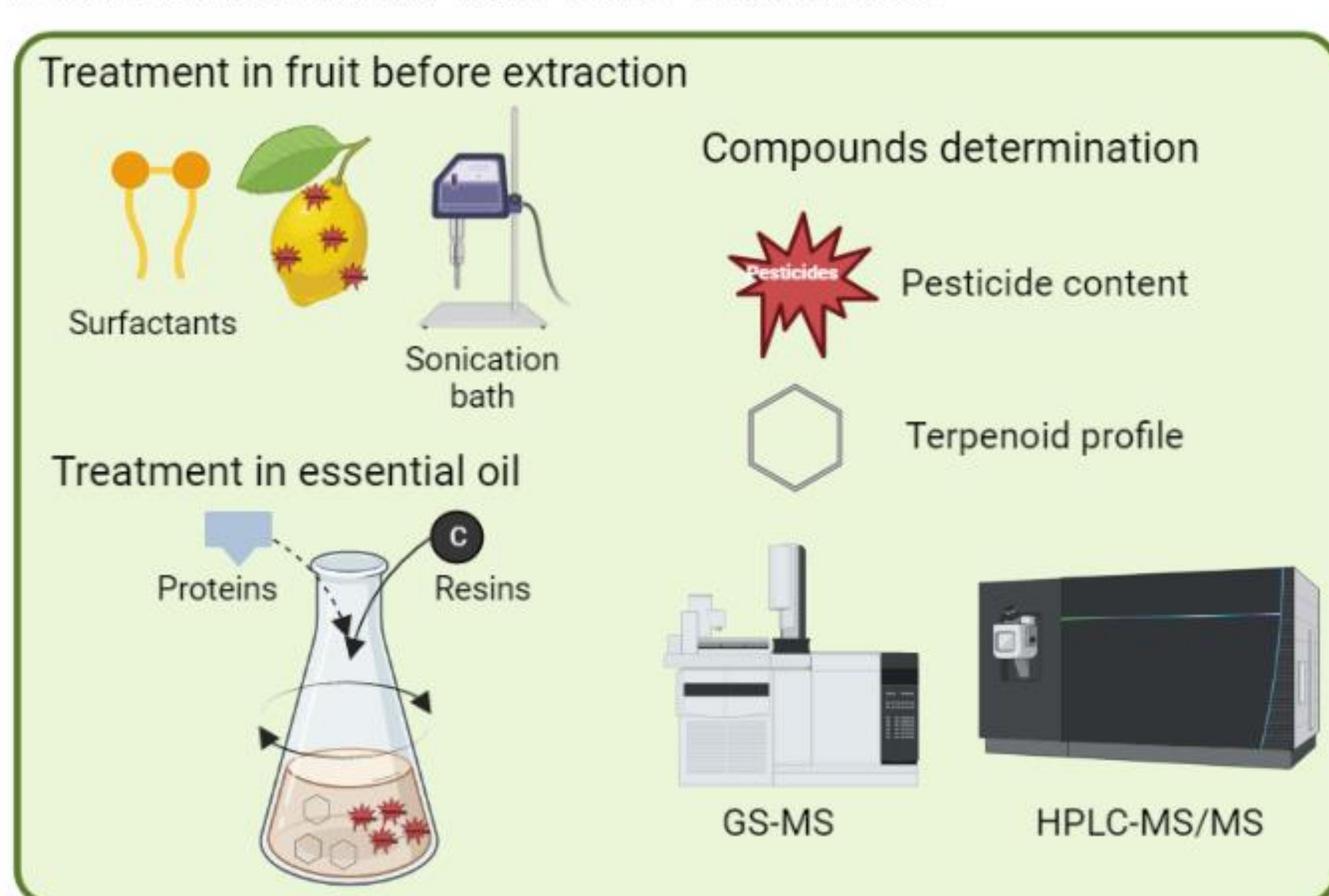
Citrus processing and citrus-derived products



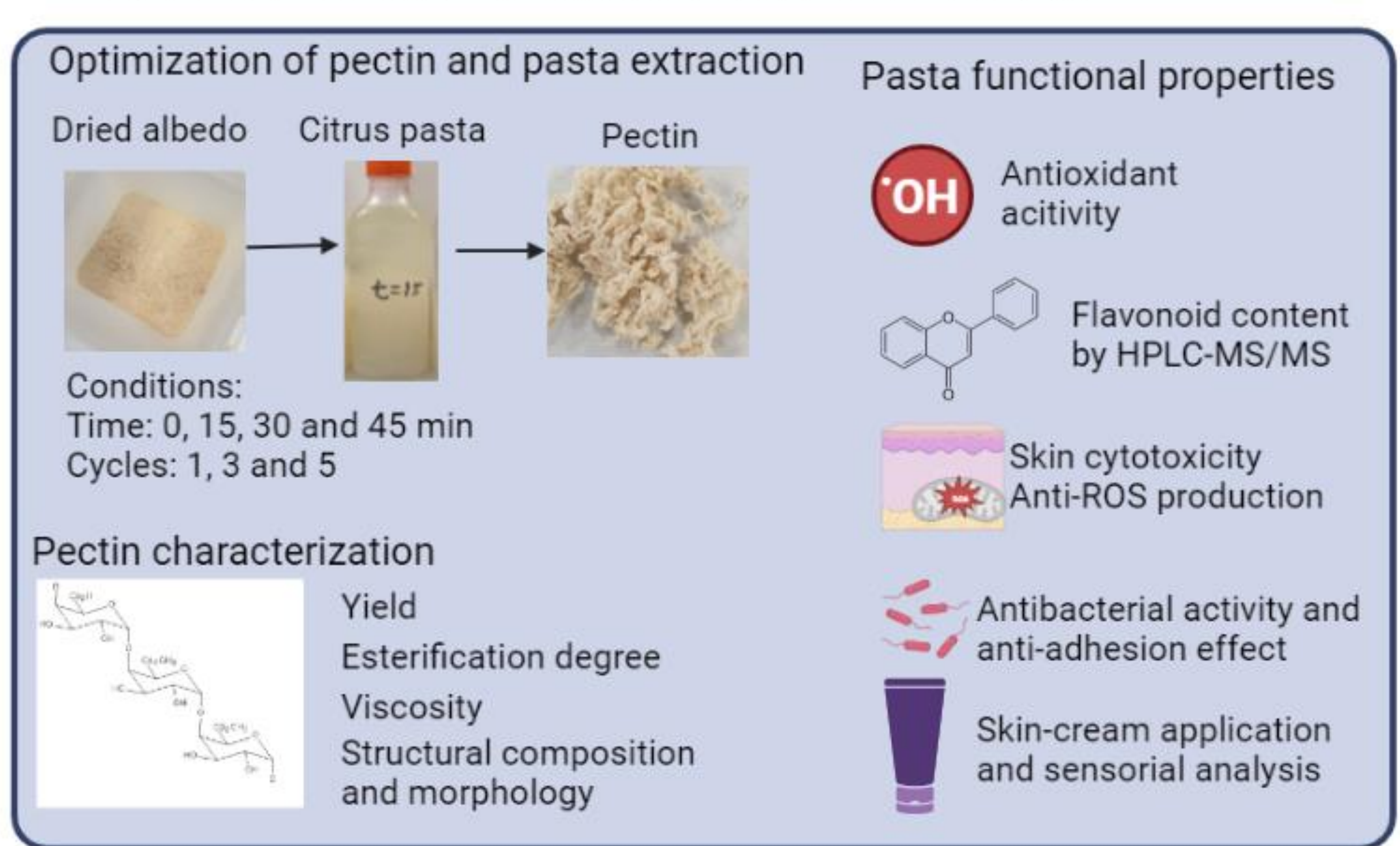
Bitterness reduction from citrus cloudy



Pesticide elimination from citrus essential oil



Pectin extraction and optimization by new technologies



Results obtained so far

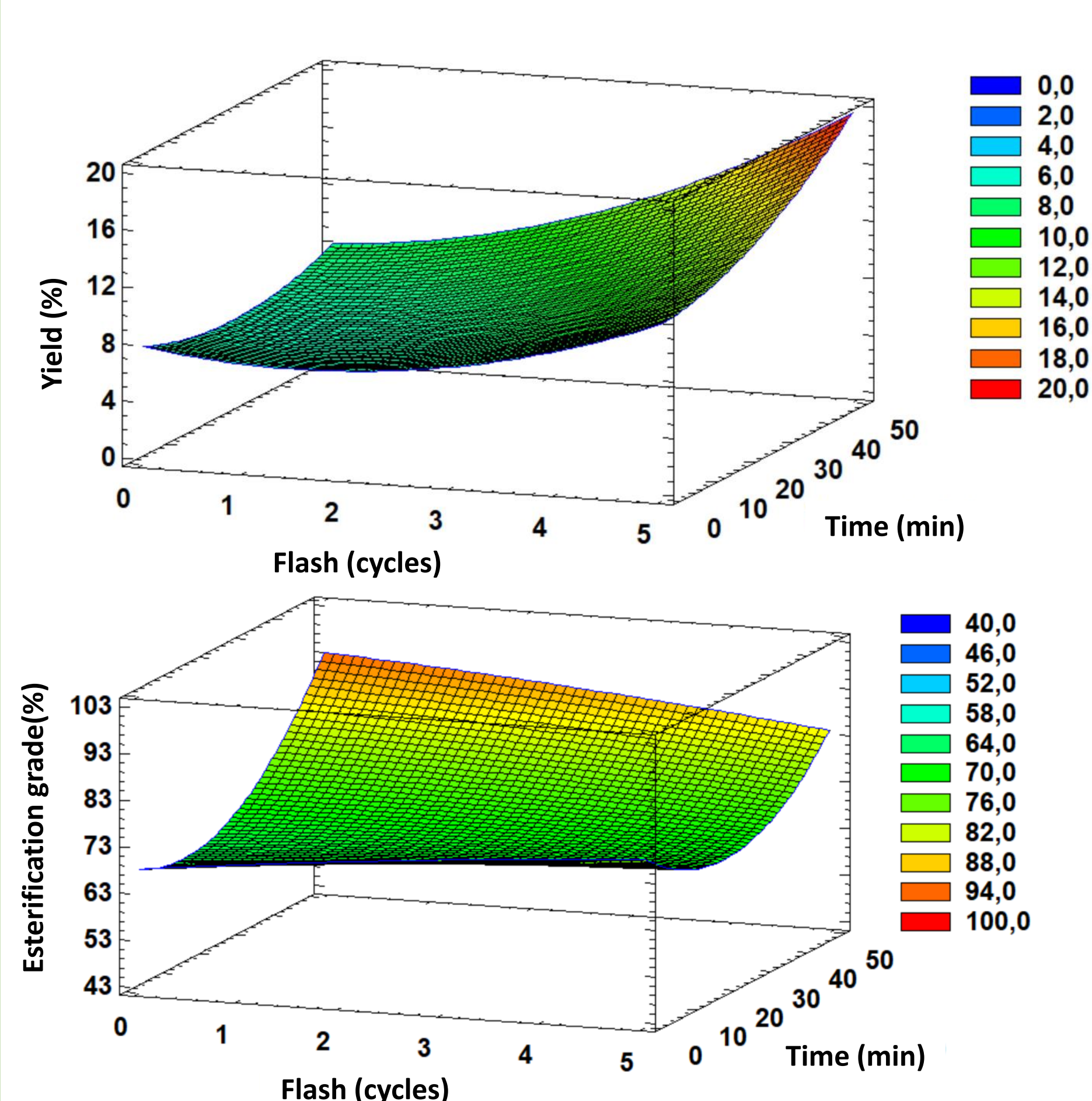


Figure 1. Surface response of pectin yield (%) (upper) and esterification grade (below)..

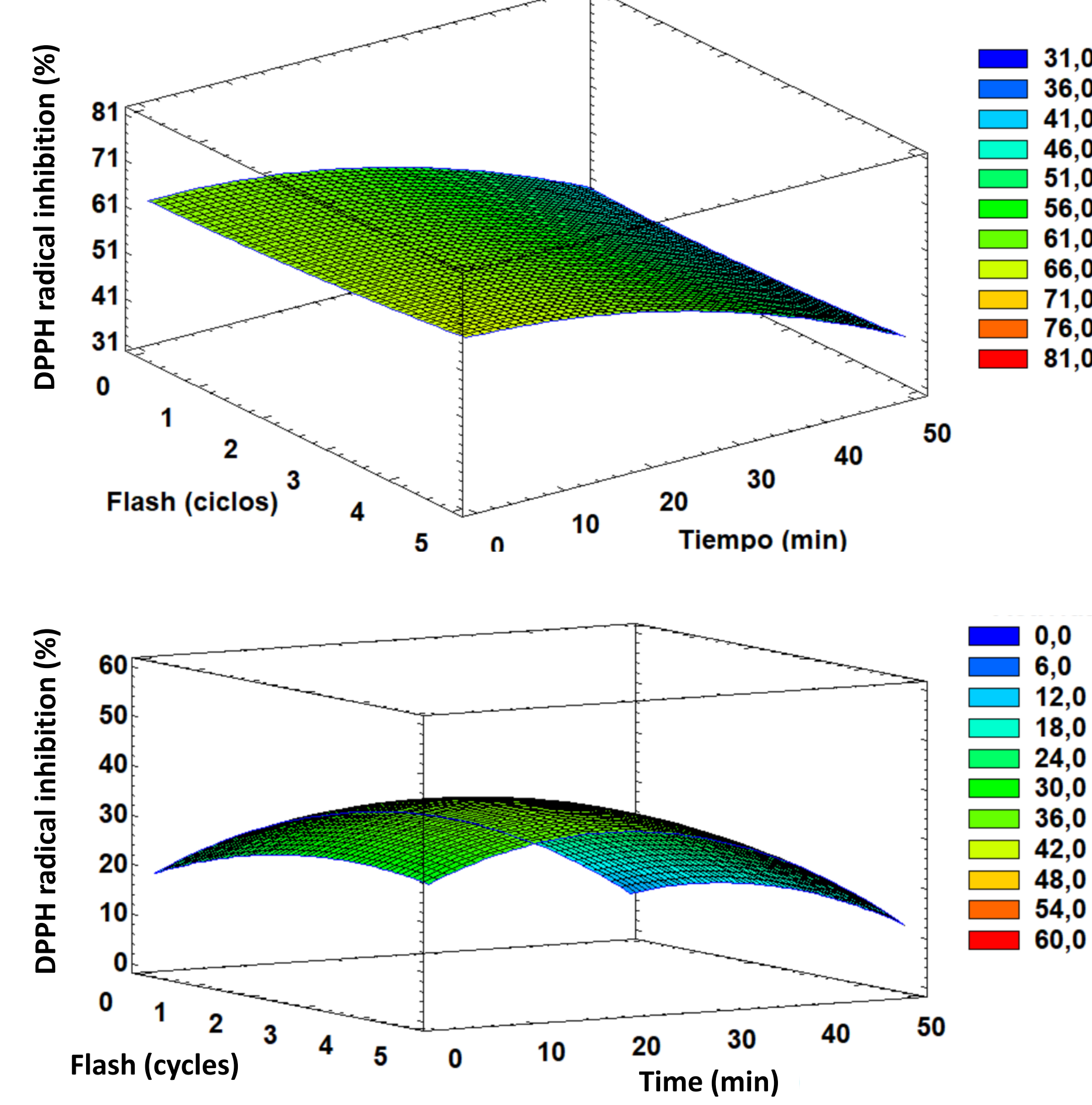


Figure 2. Surface response of optimal antioxidant activity of citrus paste (upper) and pectin (below) after FLASH treatment.

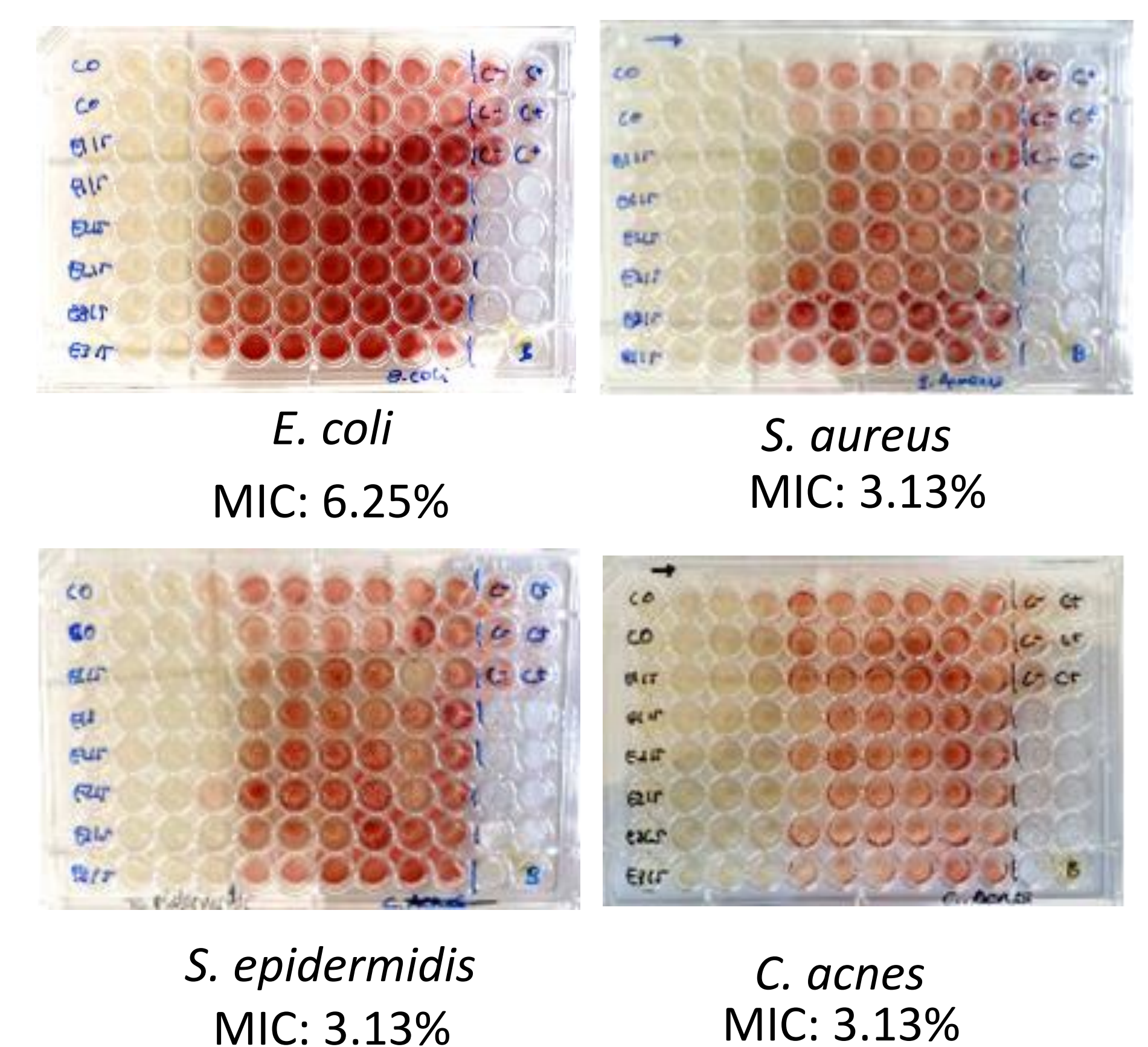


Figure 3. Antibacterial activity of citrus paste against human skin pathogens by microdilution method.

Applications:

- Technologies and procedures that reduces pesticides in essential oils.
- An increase in pectin yield as well as its functionality for cosmetic formulations.
- Reduction of bitterness in citrus polysaccharides as additives for thickened beverages.

Relevant literature DOI:

10.1007/s42452-019-0626-x
 10.1093/ajcn/72.6.1424
 10.1002/open.202000076