

Unlocking Potential: Byproduct extracts for sustainable leather tanning

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Introduction

The urgent need for sustainable leather tanning arises from the deep-rooted environmental and ethical challenges posed by traditional methods, particularly the harmful chrome-based processes. As society becomes increasingly more aware of these challenges, there emerges a growing demand for eco-conscious alternatives, such as vegetable tanning, which harnesses the richness of tannin extracts from plants. Embracing plant-derived tanning not only mitigates ecological footprints but also embodies a commitment to ethical sourcing.¹

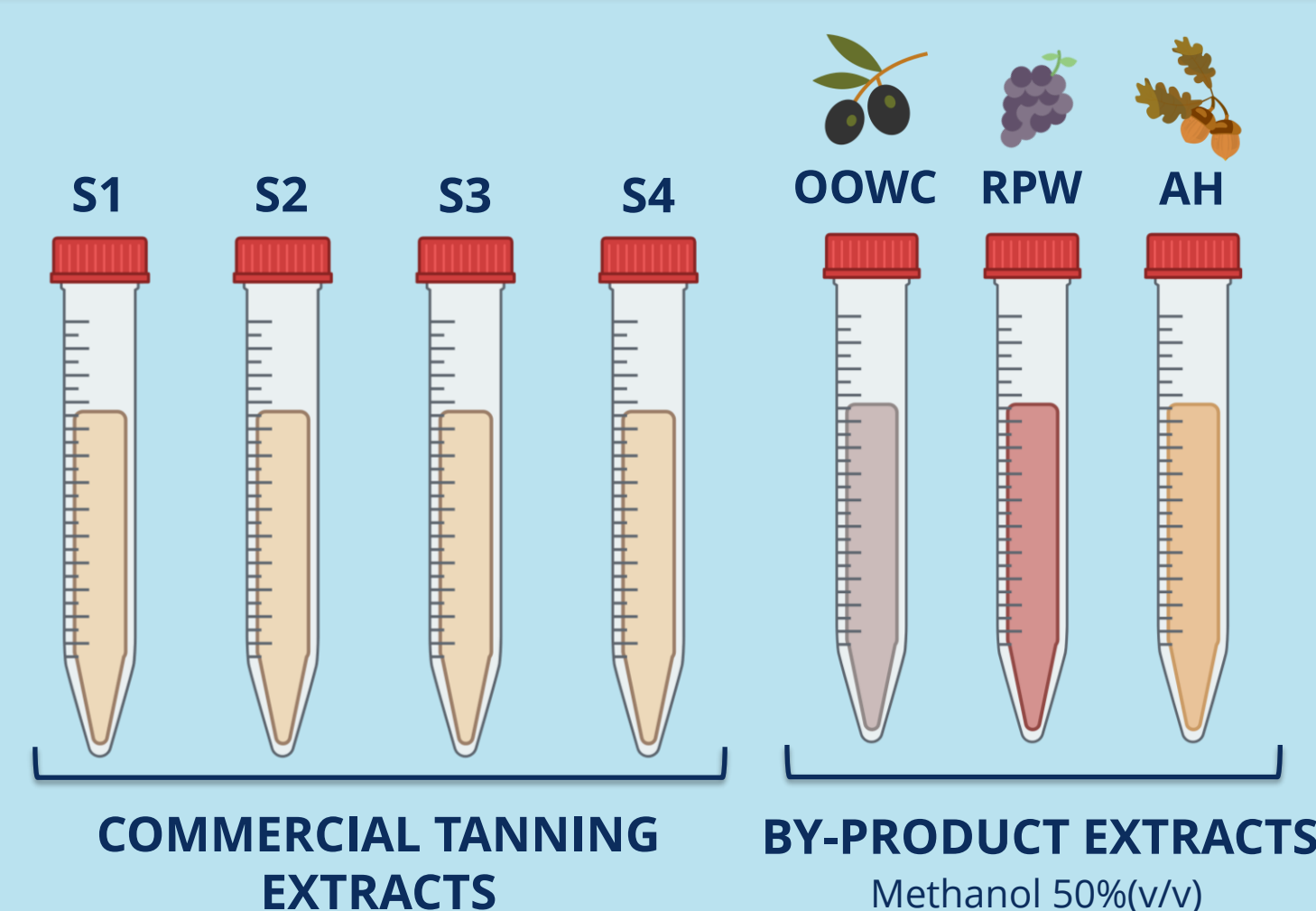
Moreover, incorporating industrial by-products into tanning processes represents a significant step toward embracing circular economy principles. By repurposing these resources, the leather industry not only minimizes waste but also cultivates a regenerative approach that nurtures sustainability at every stage of production. This comprehensive transition not only reduces environmental burdens but also fosters economic resilience by optimizing resource utilization and fostering innovation. In essence, the convergence of eco-friendly techniques and circular economy principles heralds a transformative era for leather tanning. It underscores a collective commitment to harmonize industry practices with environmental stewardship, thereby forging a path towards a more sustainable and ethically responsible future.¹

Objectives

The current work aimed to compare the phenolic content of extracts attained from 3 different industrial by-products (**olive pomace water fraction concentrate-OOWC**; **acorn husks-AH**; and **red wine pomace-RWP**) with 4 commercially available tanning extracts.



Methods



CHARACTERISATION OF PHENOLIC COMPOUNDS

QUANTIFICATION OF:

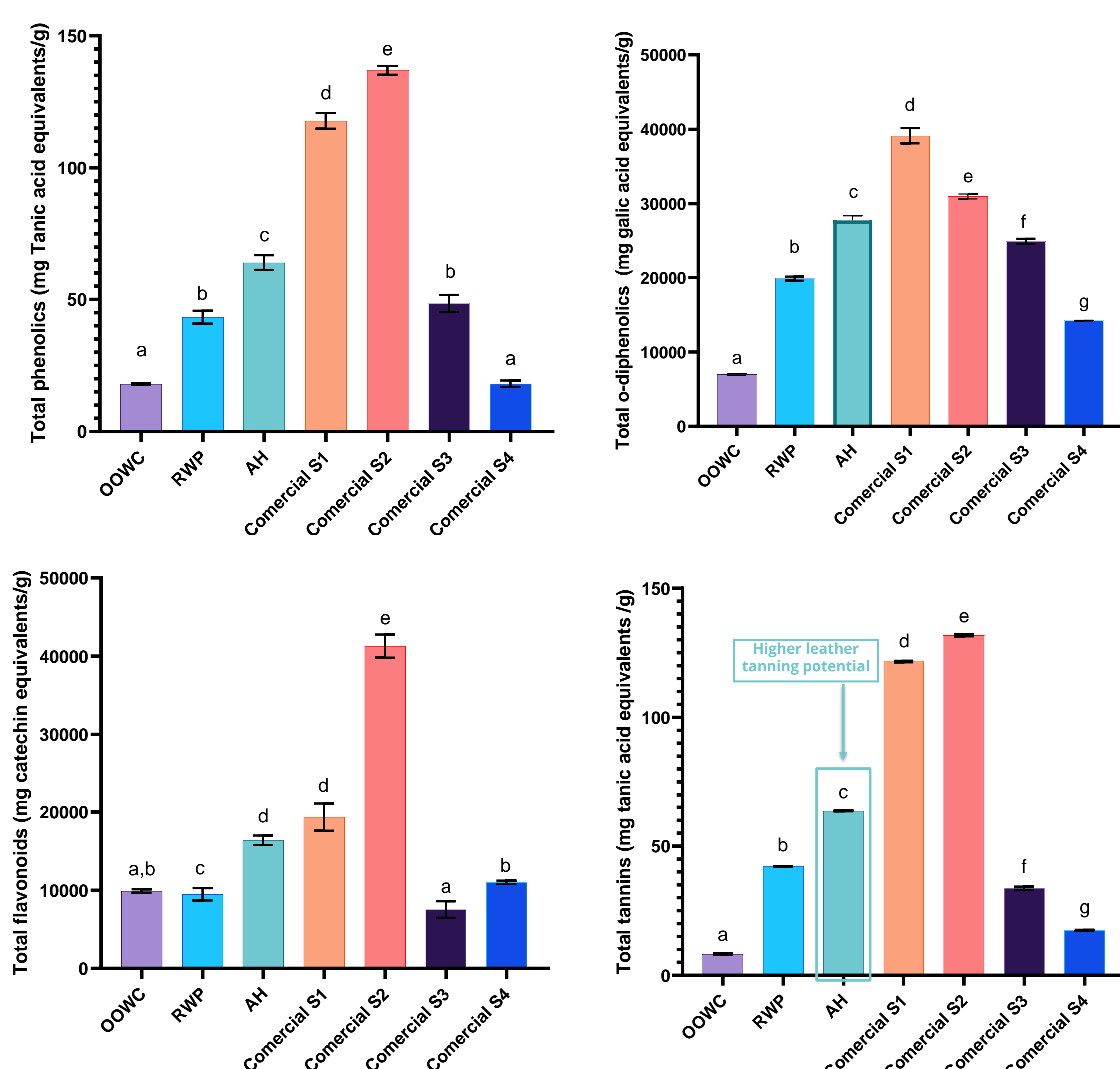
- TOTAL PHENOLICS (750 nm)²
- TOTAL O-DIPHENOLICS (375 nm)²
- TOTAL TANNINS (750 nm)³
- TOTAL FLAVONOIDS (510 nm)²

Microplate assays performed in a Synergy H1 - Multidetector microplate reader

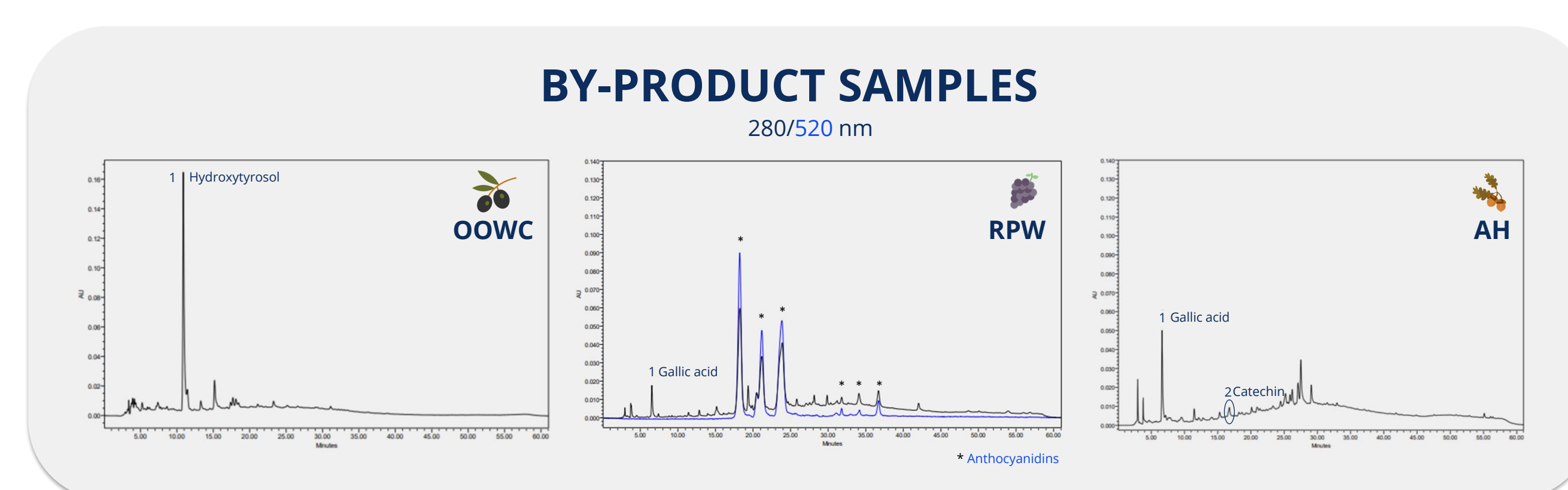
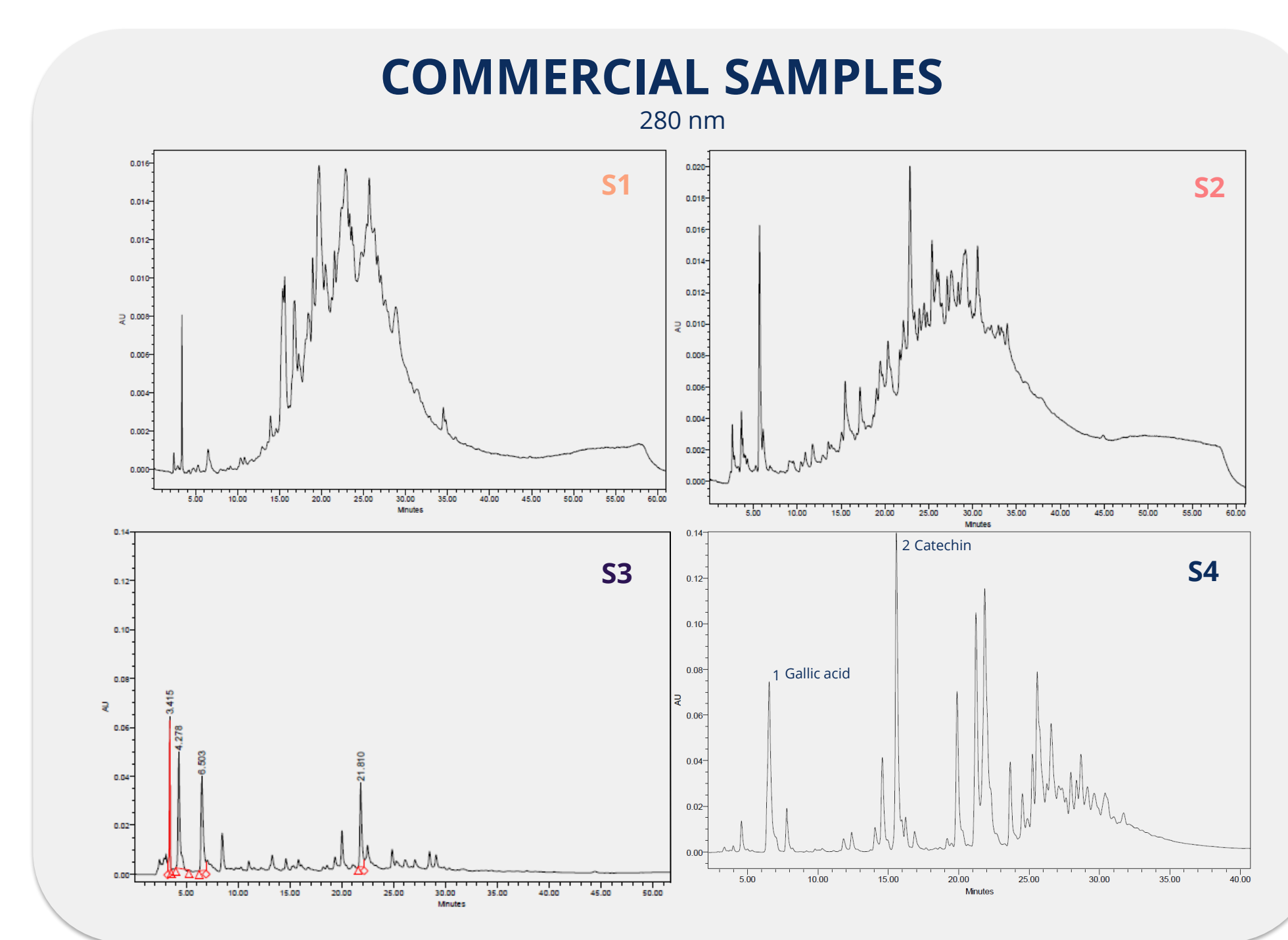
DETERMINATION OF THE HPLC-DAD profile
According to (Vilas-Boas *et al.*, 2021)⁴
Waters Alliance e2695 separation module system interfaced with a photodiode array UV/Vis detector 2998 (PDA 190-600 nm)
Wavelength: 280/520 nm



Results: Phenolic compound content



Results: HPLC-DAD profile



Conclusions

- AH (a specific by-product extract) displayed the highest total tannin levels among the three evaluated extracts, surpassing OOWC by 1.5 times and RWP by 7.8 times.
- In comparison to commercially used extracts, AH ranked third out of five in terms of tannin content, with levels 3.6 times higher than the commercial extract in fourth place, but 2.1 times lower than the richest commercial extract.
- Additionally, the RWP extract demonstrated notable tannin levels, ranking third among industrially used extracts. Its tannin content was 1.2 times higher than the commercial extract ranked fourth and 3.1 times lower than the richest commercial extract.

Acknowledgments

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