

Circular economy and valorization of pomegranate peel: Innovation for multifunctional applications

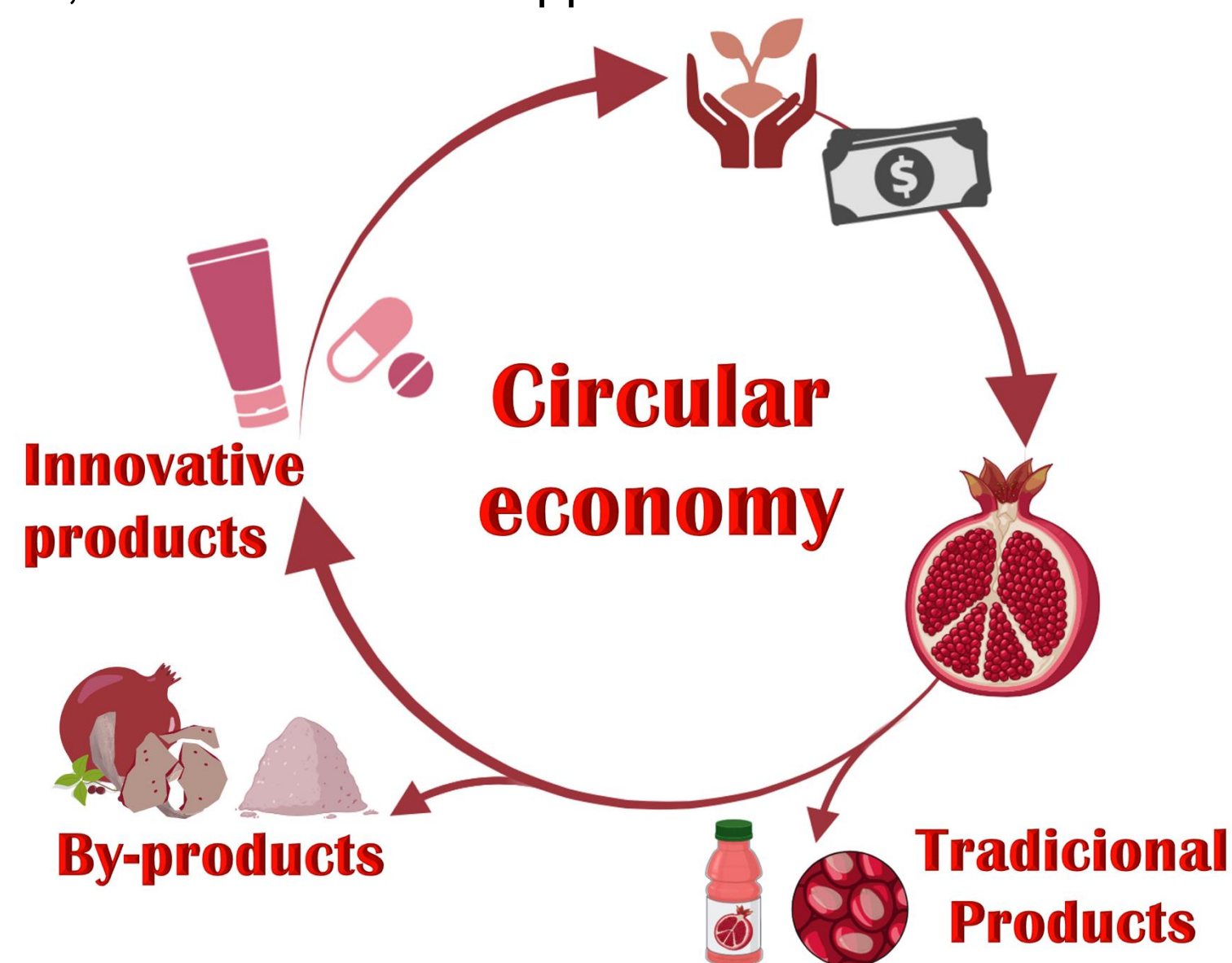
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INTRODUCTION & AIM

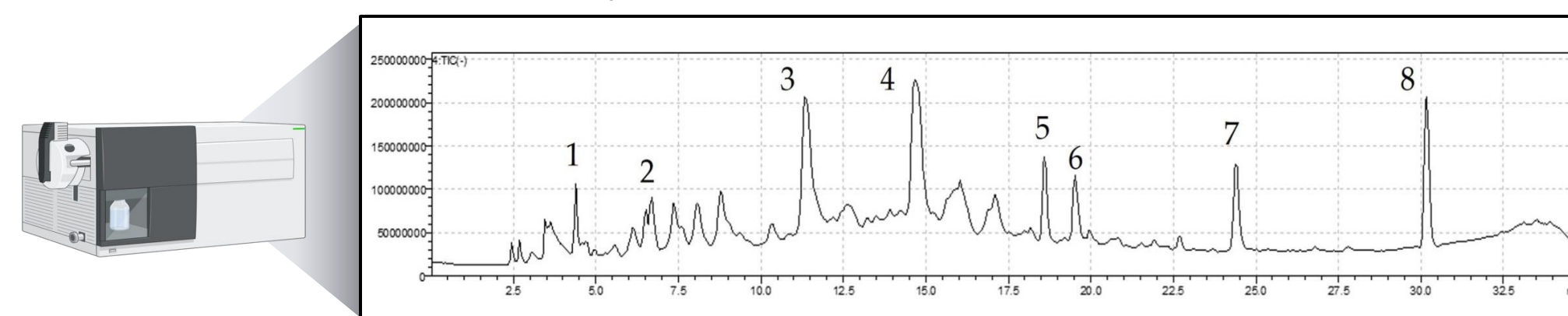
Valorization of pomegranate peel (*Punica granatum* L.) as a polyphenol-rich by-product with bioactive potential for antioxidant, anti-inflammatory, dermocosmetic, and nutraceutical applications.



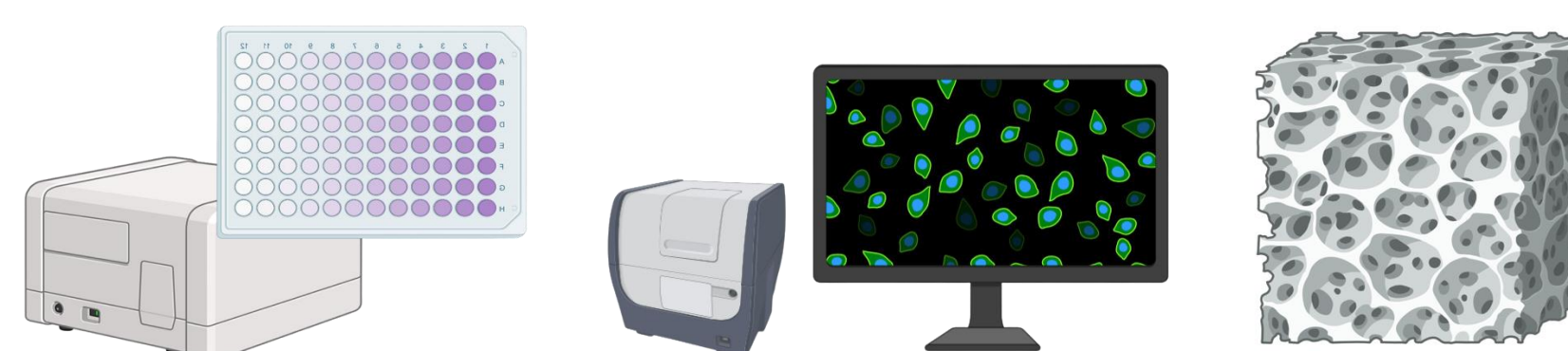
METHODOLOGY

Conversion of residual biomass into high-value resources

- Biotechnological extraction of bioactive compounds
- Characterization and analysis of extracts

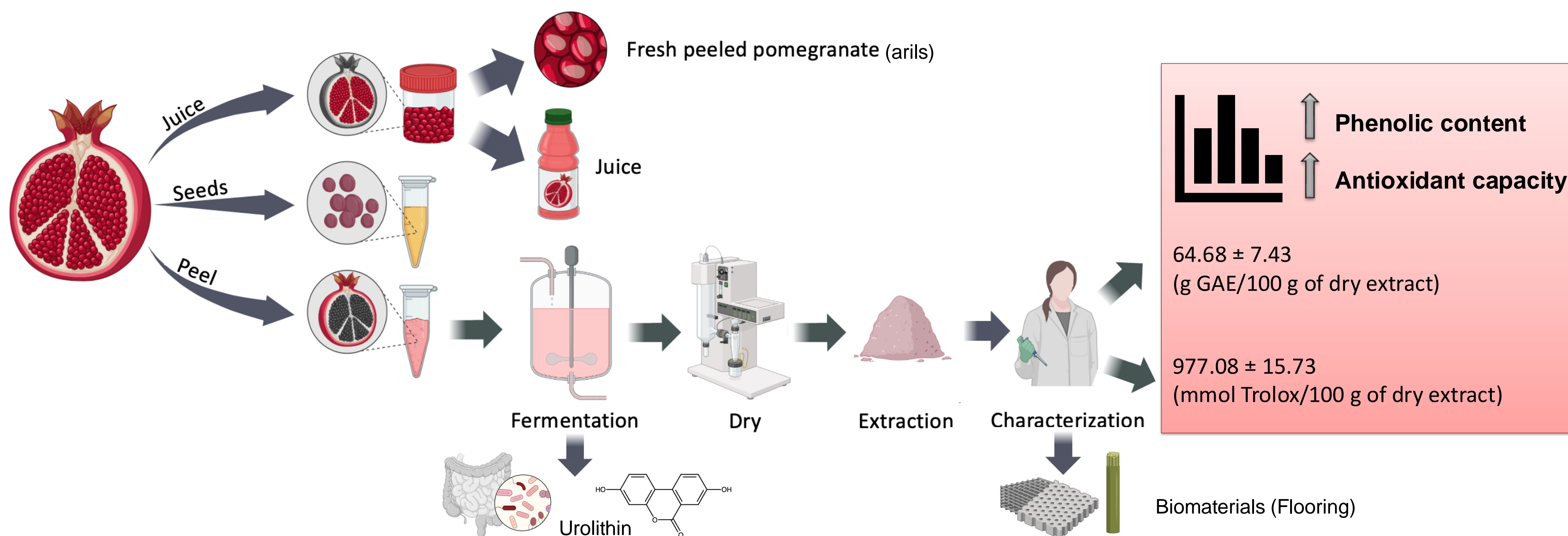


- Evaluation of dermocosmetic and nutraceutical potential
- Development of innovative biomaterials from post-extraction vegetal residues



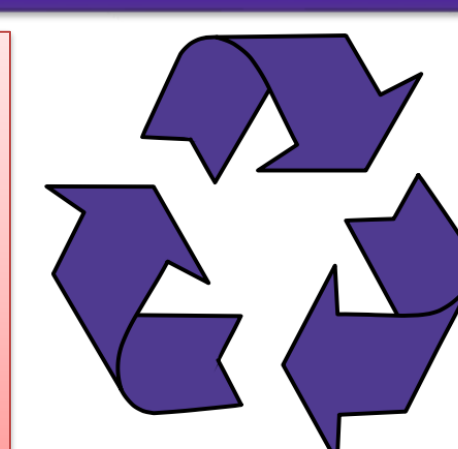
RESULTS & DISCUSSION

Pomegranate peel is a valuable resource for **cosmetic** and **nutraceutical** formulations due to its high polyphenol content and antioxidant properties. It helps regulate reactive oxygen species (ROS), reducing oxidative stress and supporting cellular **health**. Additionally, its bioactive compounds **promote gut microbiota balance** and may aid in **preventing oxidative stress-related diseases**. The residual plant material from extraction has also been optimized for innovative **biomaterial** development.



CONCLUSION

Pomegranate peel proves to be a valuable resource for **cosmetic** and **nutraceutical** products due to its **antioxidant** capacity and the presence of biomolecules such as **urolithins**, which support **gut microbiota** balance, while residual plant material is optimized for **innovative biomaterials**, enhancing sustainability. This approach fosters collaboration among stakeholders and exemplifies a scalable model of **circular economy**, delivering environmental, social, and economic benefits.



FUTURE WORK

Future research will be directed towards assessing the **efficacy** of the identified bioactive compounds **in vivo models** to validate the findings obtained from in vitro experiments. Additionally, efforts will be devoted to the **development of cosmetic or nutraceutical formulations** leveraging these bioactive constituents. In the long term, the objective is to **investigate the potential reuse of other pomegranate by-products, such as seeds**.