A green approach to valorize soy agro by-products

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Introduction

- Soybean is the major oilseed crop worldwide[1].
- In 2020/21, 362, 254, and 61 million metric tons of soy grains, meal, and oil will be produced[1].
- It is estimated that the straw:grain ratio in soy crops is **1.65**[2]. Then, in this year, approximately **597 million metric tons** of underused soy parts will be produced[3]. Most of such by-products will be left on the ground, which may cause environmental problems.

Objective

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Branches Leaves Pods Roots

GREEN CHEMISTRY → Potential source of bioactive compounds[4]

Part 1. Identification

- An **untargeted metabolomics** approach was performed to identified bioactive compounds in the **underused soy parts**.
- A **two-liquid-phase dynamic maceration** composed of a **EtOH:H_2O (7:3 v:v)** and **heptane** fraction was used to extract a wide range of compounds, and the produced extracts were analyzed by LC-MS/MS and GC-MS (Figure 1).

Figure 1. Main classes of bioactive compounds identified in the **EtOH:H_2O (7:3 v:v)** and **heptane** extracts of underused soy parts.

Part 2. Extraction

- A green approach combining **Natural Deep Eutectic Solvents (NaDES)** and **Pressurized Liquid Extraction (PLE)** has been employed for generating extracts with potential bioactive properties.
- **Choline chloride: citric acid: water (1:1:11 molar ratio)**[4,5] and **EtOH:H_2O (7:3 v:v)** were employed to extract the underused soy parts at 60, 90, and 120 °C, 100 bar, and 20 min using PLE.
- Total phenolics and flavonoids content (TPC and TFC) of the extracts were evaluated (Figure 2).

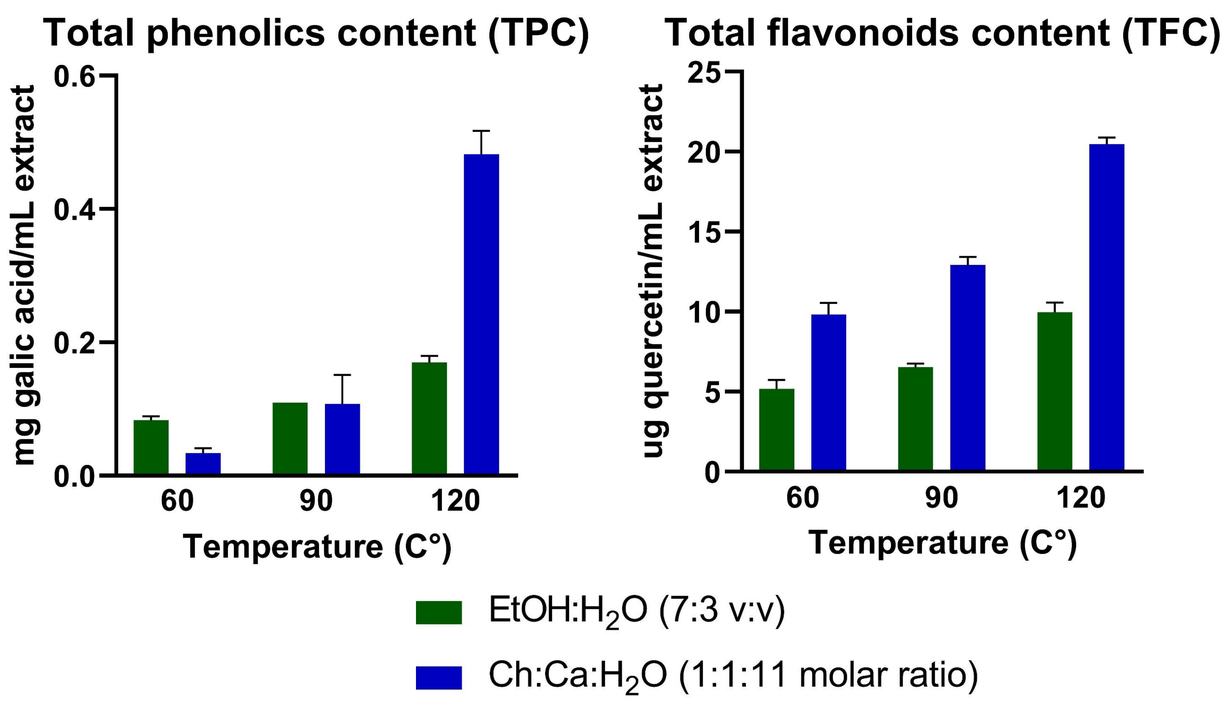

Figure 2. TPC and TFC of **Ch:Ca:H_2O (1:1:11)** and **EtOH:H2O (7:3)** extracts from a mix of underused soy parts.

Next steps – Conclusion

- Individual parts of soy will be extracted using the optimized condition of PLE.
- Bioactivity and composition of the extracts will be evaluated.
- Underused soy parts are sources of bioactive compounds.
- Associate PLE and NADES is a potential approach to extract bioactive compounds of such by-products

References

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