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Characterization of complex phenolic compounds in rapeseed and sunflower biomass generated during biorefinery

Introduction

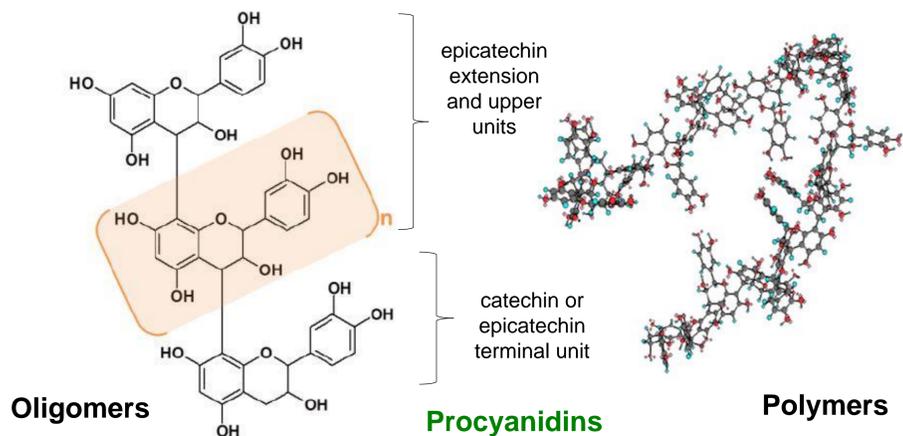
In addition to lipids, proteins and polysaccharides, rapeseed and sunflower seeds are known to contain significant amounts of phenolic compounds. They are located both in the kernels and in their fibrous hulls. After oil production, valorization of those phenolic compounds can be considered due to their putative health benefits. Previous studies reported that the concentration of some complex polyphenols such as condensed tannins in rapeseed hulls tends to decrease with advanced plant maturity. They may be oxidized or form strong interactions with other polymers in the plant (proteins, polysaccharides). Our work aims at evaluating the applicability of acidolysis methods (i.e. direct phloroglucinolysis and butanol-HCl acidolysis) for determining complex phenolic compounds in rapeseed and sunflower biomass (oil cake and hull).

Main phenolic compounds in the rapeseed

Kernel : sinapine, sinapic acid and sinapoyl glucose

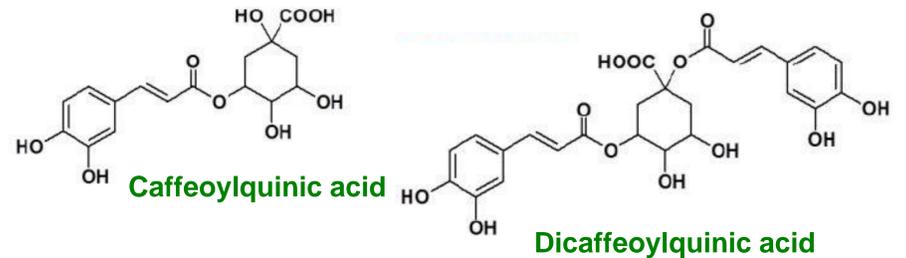


Hull : condensed tannins & flavonols (Auger et al. 2010)



Main phenolic compounds in the sunflower

Kernel : chlorogenic acids

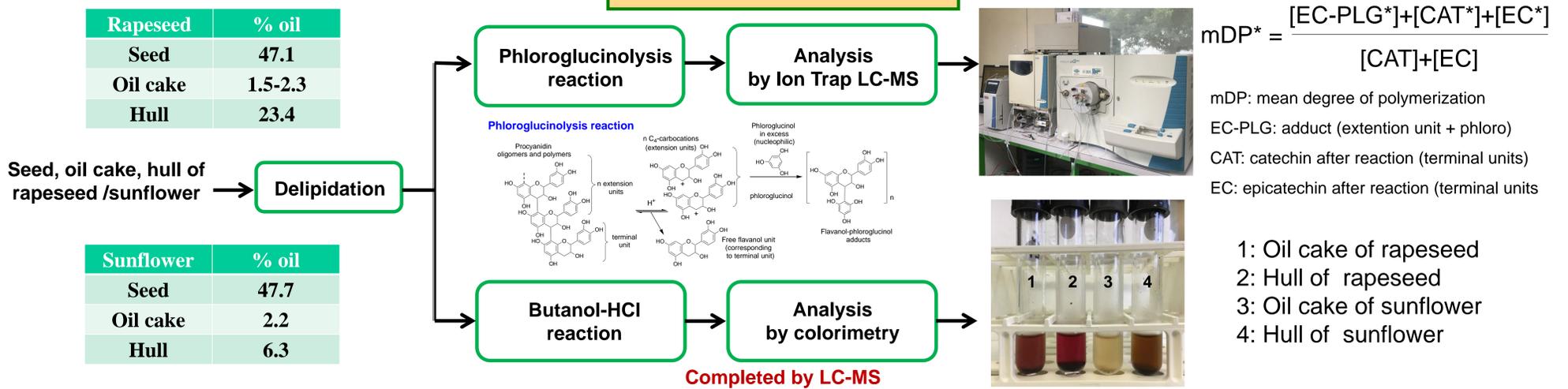


Enzymatic oxydation ?
(dimerisation, oligomerization)

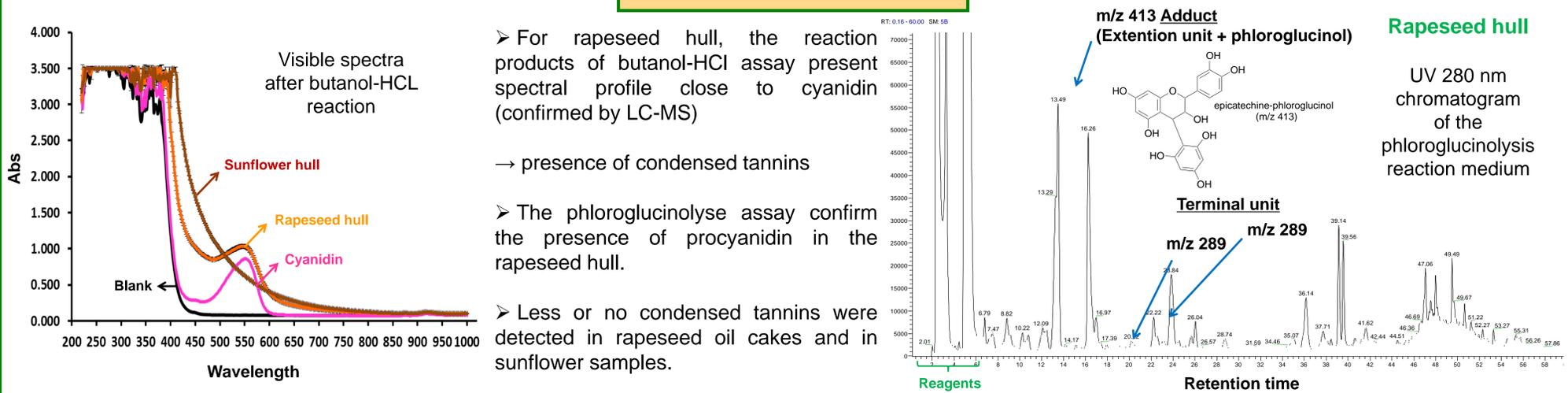
Complex phenolic oxidation products

Hull : few information
(Possibly "oxidized polyphenols")

Materials and methods



Results



Conclusions

- ✓ After delipidation, phloroglucinolysis or butanol-HCl reaction can be applied directly on rapeseed or sunflower samples for the determination of complex phenolic compounds (e.g. condensed tannins).
- ✓ Contrary to rapeseed hulls, few condensed tannins were detected in rapeseed oil cakes and in sunflower samples.
- ✓ Further work will be done to improve the estimation of oxidized phenolic compounds.

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This work was performed, in partnership with the SAS PIVERT (PHENOLEO Project), within the frame of the French Institute for the Energy Transition (Institut pour la Transition Energ etique - ITE) P.I.V.E.R.T. (www.institut-pivert.com) selected as an Investment for the Future ("Investissements d'Avenir"). This work was supported, as part of the Investments for the Future, by the French Government under the reference ANR-001-01.