Why revisiting the chemistry of apple pomace?

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Apple juice extraction follows an enzymatic digestion and pressing steps. Such process yields an insoluble material composed by the pulp, skin, seeds, and stalks of the fruit. This material is called apple pomace and is the most relevant byproduct of apple juice industries.

Apple pomace also represents one of the raw materials to produce fruit jams due to the presence of pectic polysaccharides components of apple pulp. This outcomes from the fact that pectic polysaccharides are widely viewed as hydrophilic structures, due to their capability to retain water and form gels when in solution. However, the retention of apple pomace pectic polysaccharides in hydrophobic C18 cartridges demonstrated that some polysaccharides behave hydrophobically.

While some *polysaccharides were shown to be hydrophobically retained* at neutral pH, others were shown to only behave hydrophobically in acidic conditions. These observations highlight the effect of pectic polysaccharide charge. However, the most relevant factor contributing to polysaccharides hydrophobic behavior was noted to result of polyphenols covalent bonding to the pectic polysaccharide arabinans.

As covalently attached polyphenols are not reported to be found in apple tissues, these linkages were noticed to be formed by means of polyphenol oxidation reactions occurring during the juice extraction process. This observation *reshapes the dogma of polysaccharides as hydrophilic compounds* and opens the opportunity for novel polysaccharide-based applications in food, environmental and biomedical fields by taking advantage of their pH tailored hydrophobicity. Ultimately, it will boost the mitigation of apple pomace as an industrial disposable and allows to define strategies for other agro-food wastes mitigation.

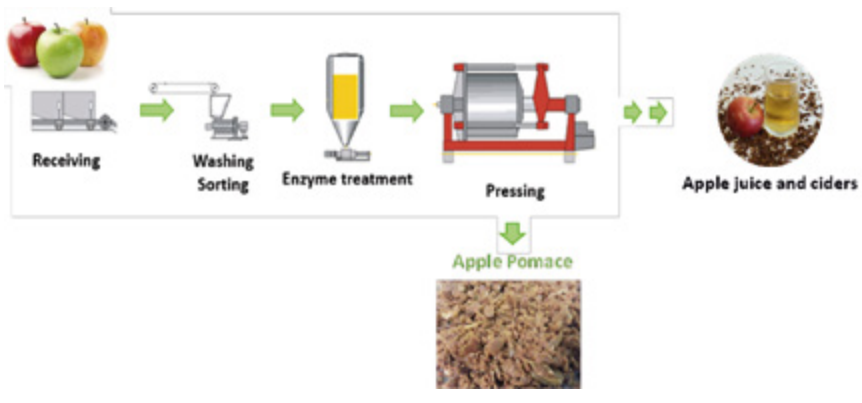

FIGURE 1
Schematic representation of apple juice flow chart.

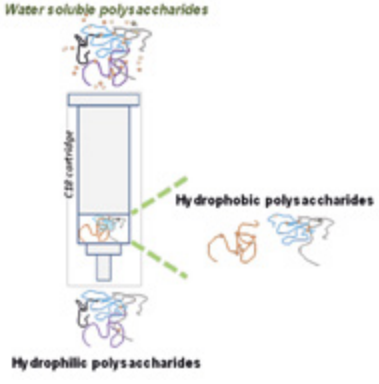

FIGURE 2
Scheme of hydrophobic pectic polysaccharides isolation from apple pomace.