

Extraction of natural antioxidants from apple by-products to enhance the shelf life and oxidative stability of South Tyrolean foods

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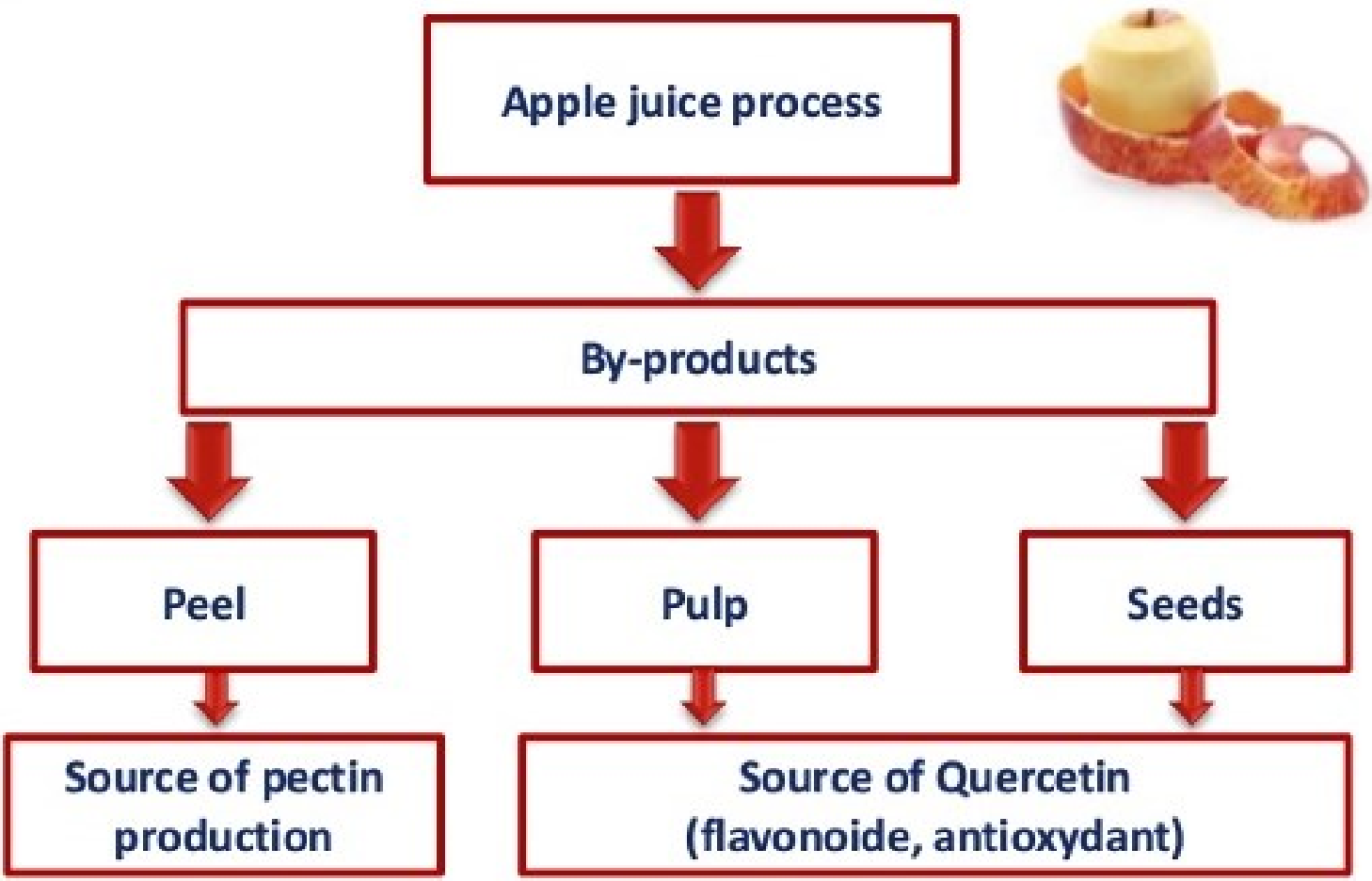
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Introduction



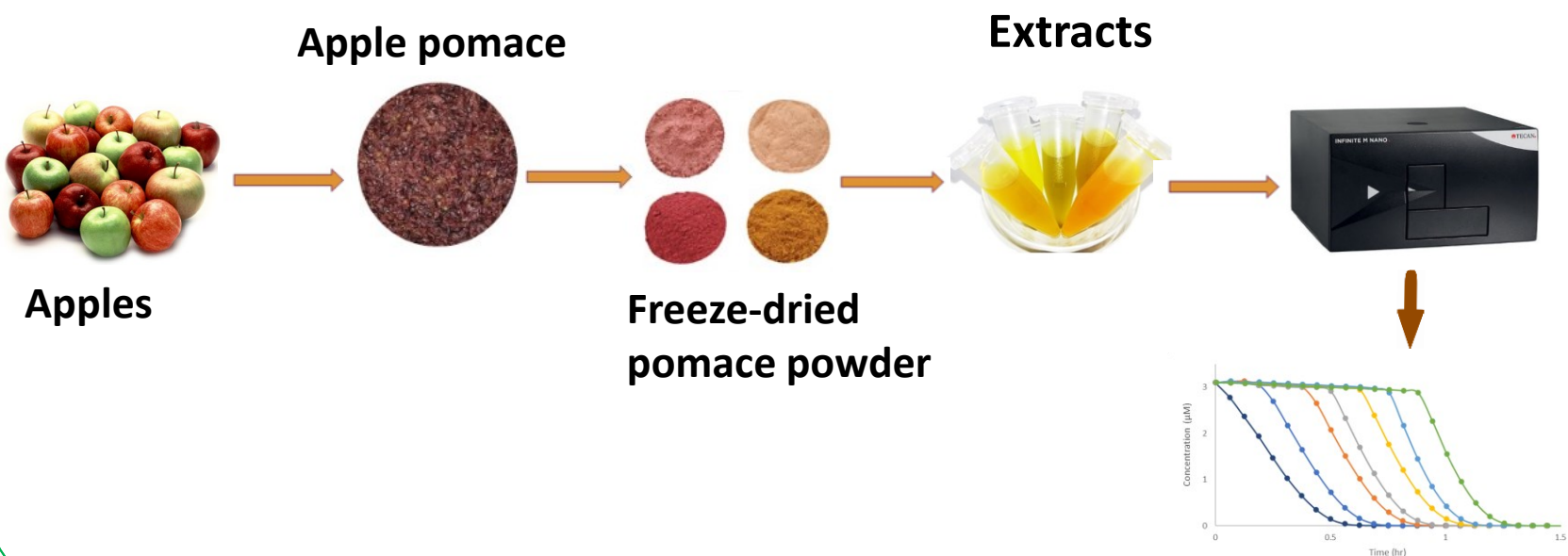
Appels: 87 million tons (FAO, 2019)
Apple product: Juice, puree
Apple pomace (By-product): 25%



Aim

- Determination of the most suitable extraction technology
- Development of a kinetic approach to determine the radical scavenging activity of water-soluble extracts

Materials and Methods



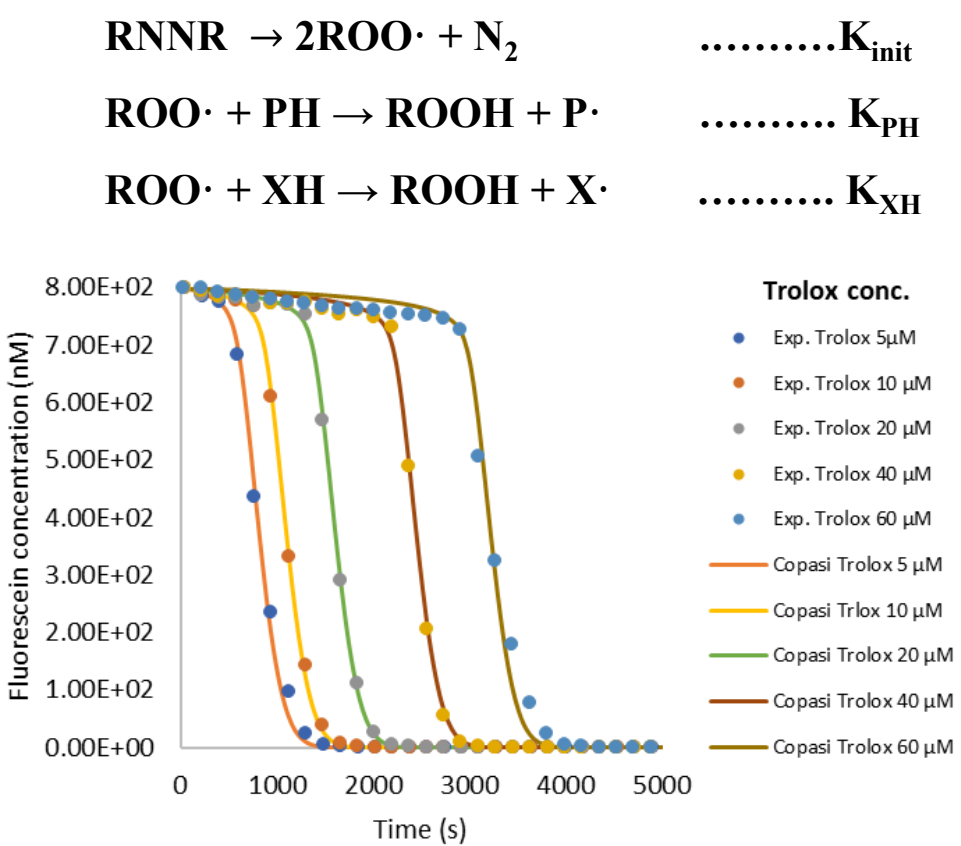
Result

Initial conditions:

[AAPH]₀ = 100 mM
[PH]₀ = 800 nM
[Trolox]₀ = 5-60 μM
[ROO•]₀ = 0 μM

Rate constants:

$K_{init} = 1.55 \times 10^{-07} \text{ s}^{-1}$
 $K_{PH} = 450 \text{ M}^{-1} \text{ s}^{-1}$
 $K_{XH} = 2 \times 10^4 \text{ M}^{-1} \text{ s}^{-1}$



Antioxidants Standards	Kinetic ORAC assay $K_{AH} (M^{-1} s^{-1})$
Trolox	20000
Gallic acid	15000
Vanillic acid	6000
Syringic acid	10000
Protocatechuic acid	6000
Caffeic acid	6000
Trans-ferulic acid	7000
p-Coumaric acid	2000
Chlorogenic acid	9000
Quercetin	4100
Catechin	5500

Apple variety	Total Phenol Concentration on mg GA/g of extract	Kinetic ORAC of assay $K_{AH} (M^{-1} s^{-1})$	R ²
Granny smith	2.585	3000	0.9998
R201-kissabel	1.295	3500	0.9994
Pink lady	1.837	3500	0.9993

Conclusion

The kinetic value of different antioxidant standards and extracts derived from apple pomace significantly refers which antioxidant is more potent. This outcome strongly reflects why a kinetic approach is superior rather than the classical ORAC assay. However, in this study we cannot minimize the issue regarding the stoichiometric factor for some antioxidant standards. So, we need to do further studies for solving this drawback by considering the dominant role of alkoxyl radicals (RO•) in the ORAC assay.