Antioxidant and anti-browning activity of different bioactive compounds

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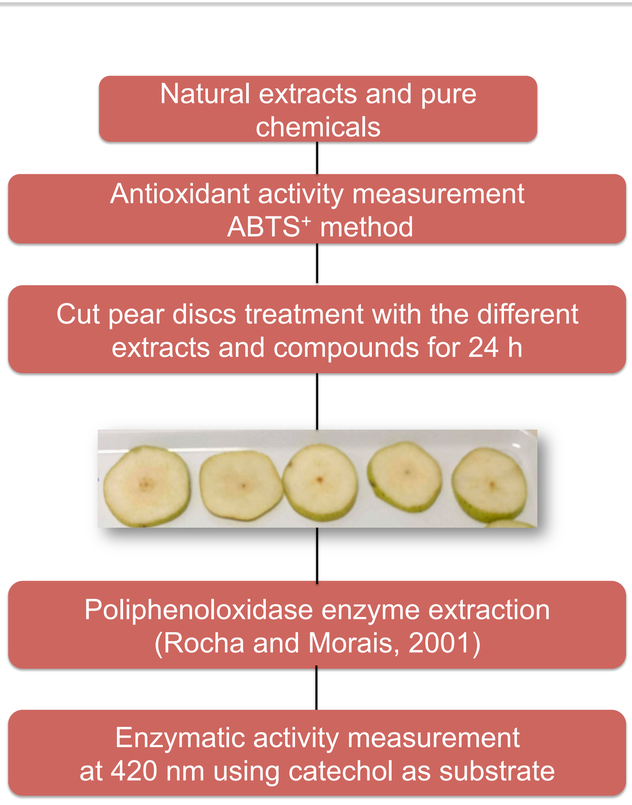
Introduction/Resume

Enzymatic browning in fruits and vegetables causes significant losses due to its negative effects on colour, taste, flavour and nutritional value. This physiological disorder is mainly due to the oxidation of natural phenolic compounds into quinones that are polymerized to brown pigments by polyphenol oxidase (PPO). Partial control of this disorder can be obtained with the application of antioxidants, which can reduce back the reactions catalysed by browning enzymes, and thus, inactivate them (Di Guardo et al., 2013; Macheix, Fleuriet, & Billot, 1990). There is a rising interest in natural antioxidants as bioactive components of foods. In this study the antioxidant activity of a total of 14 natural extracts, rich in phenolics compounds, triterpenic acids and amine groups and 17 pure chemical compounds found within a number of natural substances was investigated.

Objectives

In this work, 25 natural extracts obtained from vine, strawberry tree, elder flower, pear, apple, bitter melon, olive tree, potato plant, brewer yeast, soy protein and sheep whey protein, natural sources of phenolics compounds, triterpenic acids and amine groups and 17 pure chemical compounds found within a number of natural substances (rutin, arbutin, catechin, caffeic acid, d-quinic acid, p-coumaric acid, quercetin, apigenic acid, malic acid, syringic acid, fumaric acid, vanillic acid, polyethylenimine, ellagic acid, triterpenic acids and chlorogenic acid) were tested regarding their **i) antioxidant** and **ii) anti-browning activity.**

Methods and Results



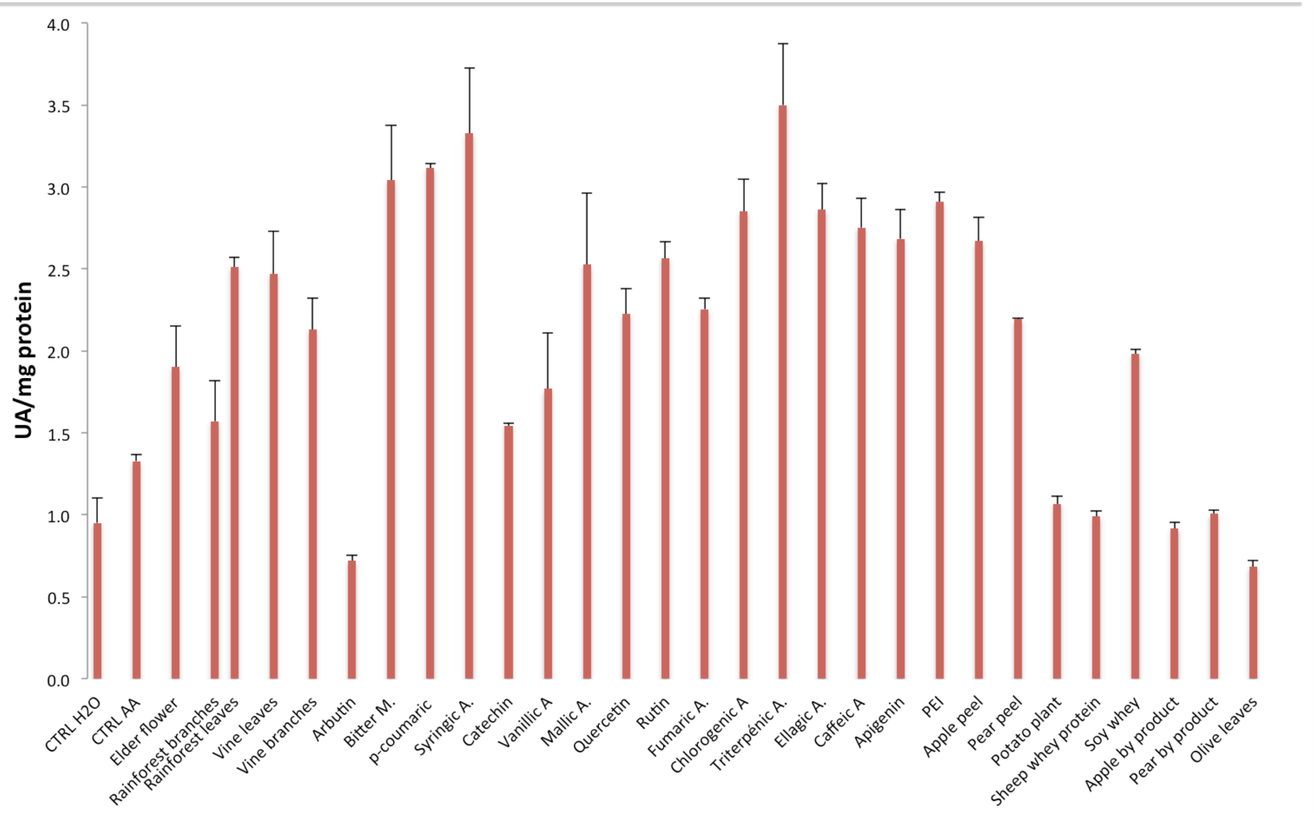


Figure 1. Polyphenoloxidase activity of different compounds treated cut pear discs. Water and ascorbic acid 1% treatments were used as controls. Values are expressed in units of activity (UA)/mg protein and represent an average of three analytical replicates.

Table 1. Antioxidant activity of a) natural extracts and b) pure chemical compounds, through the ABTS+ method. Values are expressed in mg/mL ascorbic acid and represent an average of three analytical replicates

a)

Natural extract	Elder flower	Bitter Melon	Potato plant	Brewer yeast	Soy protein	Sheep whey protein	Pear peel	Pear byproduct	Apple peel	Apple byproduct	Rainforest branches	Rainforest leaves	Vine branches	Vine leaves	Olive leaf
C (mg/mL)	7.42	20.43	10.94	38.3	47.62	100	23.4	18	18.97	16	5.03	9.53	4.13	9.54	4.13
ABTS ± SD	0.37± 0.03	0.29 ± 0.01	0.93 ±0.01	0.52 ± 0.02	0.44 ± 0.02	0.16± 0.01	0.53 ± 0.01	0.29 ± 0.01	0.35 ± 0.01	0.09 ± 0.01	1.68 ± 0.01	4.63 ± 0.02	2.69 ± 0.01	3.15 ± 0.03	2.69 ± 0.01

b)

Natural extract	Fumaric acid	Malic acid	Quercetin	D-quinic acid	Rutin	Ellagic acid	Apigenic acid	Triterpénic acid	Caffeic acid	p-coumaric acid	Chlorogenic acid	PEI	Vanilic acid	Catechin	Syringic acid	Arbutin
C (mg/mL)	7	558	0.125	400	0.16	98	0.18	26.67	0.5	10	4	0.03	4	1.13	5.78	77.43
ABTS ± SD	0.03 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.05 ± 0.01	0.07 ± 0.01	0.10 ± 0.01	0.20 ± 0.01	0.12 ± 0.02	0.55 ± 0.01	1.86 ± 0.01	2.38 ± 0.01	0.01 ± 0.01	3.20 ± 0.01	3.97 ± 0.01	12.61 ± 0.01	15.09 ± 0.01

Conclusions

The present study demonstrated that leaves from vine (4.63 ± 0.02) and arbutin (15.09 ± 0.01) showed the highest values of antioxidant activity within the natural extracts and pure chemical compounds, respectively. Arbutin was also the most effective compound in suppressing the activity of PPO enzyme compared to ascorbic acid. Regarding the group of natural extracts, it is important to highlight the inhibitory effect of olive leaves on PPO activity. The present report has practical implications in generating novel natural extracts with potential application as anti-browning agents.

References

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