

Efficacy of portuguese propolis in controlling superficial scald of 'Rocha' pear

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Introduction

One of the major problems associated with long-term storage of pears is the development of physiological disorders. Superficial scald is a postharvest disorder manifested as brown patches on the fruit skin. Scald is associated with the presence of α -farnesene and the conjugated trienols resulting from its oxidation. During the last 40 years, scald has been efficiently controlled by the application of the antioxidants diphenylamine and ethoxyquin. However, both compounds are currently not allowed in some European countries. Recently, new approaches have been investigated, such as the use of natural antioxidants to prevent α -farnesene oxidation.

Objetives

The present study aims to evaluate the antioxidant properties of a portuguese propolis extract and its potential to reduce superficial scald in Rocha pear.

Materials and Methods

Propolis was collected in the Caramulo region (Portugal) and extracted by maceration in 96% ethanol, during 5 days, at 20°C, in the dark. The insoluble residue was removed by filtration and the ethanolic extract was diluted with water (1:10 v/v). The antioxidant activity of the extract was characterized by the Folin-Ciocalteu, DPPH and FRAP assays. The aqueous extract was acidified to pH=2 and applied to a SPE column C18 and the phenolic compounds were eluted with acetonitrile (1% formic acid). The sample was analysed in a HPLC-DAD system with a C18 column, using as eluents aqueous formic acid (1%) and acetonitrile with 1% formic acid. Data acquisition was performed at 280, 320 and 360 nm. After 3 months of cold storage (0°C, 90-95% RH), pears were sprayed with the aqueous extract (E1: not diluted; E2: 1:2 dilution) or water (control), and kept at 20°C and 70% RH for 14 days or at 1°C and 90% RH for 2 months. Periodically, the evolution of the skin color (hue) and the α -farnesene and conjugated trienols contents were evaluated.

Results

Propolis extract characterization

Folin-Ciocalteu	DPPH	FRAP
1086 mg gallic acid equivalents/L	1257 mg Trolox equivalents/L	16,2 mmol FeSO ₄ equivalents/L

Table 1: Total phenol content and antioxidant activity of the aqueous propolis extract.

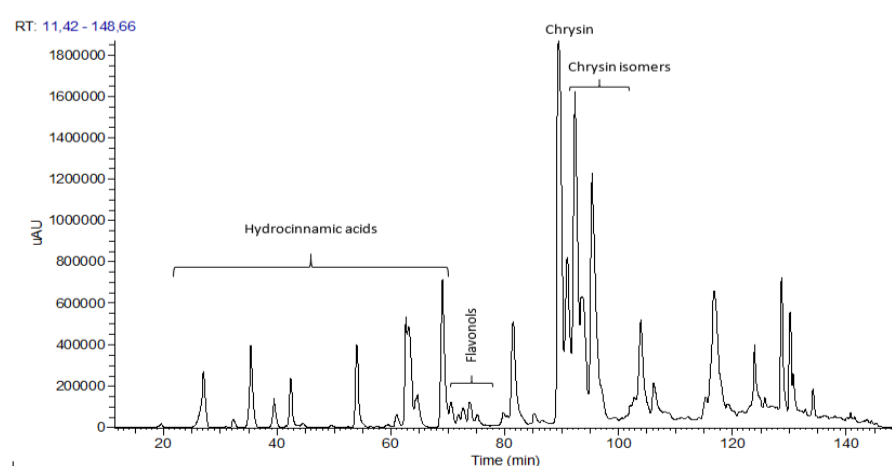


Figure 1: Phenolic profile of the aqueous propolis extract determined by HPLC-DAD. It was possible to identify hydrocinnamic acids, flavonoids, chrysin (major compound) and some chrysin isomers.

Propolis extract effect in 'Rocha' pear

Under shelf-life conditions, a change in fruit skin color from yellow green to yellow was observed, confirmed by a decrease of hue values from about 100 to 88. No differences were observed among treatments.

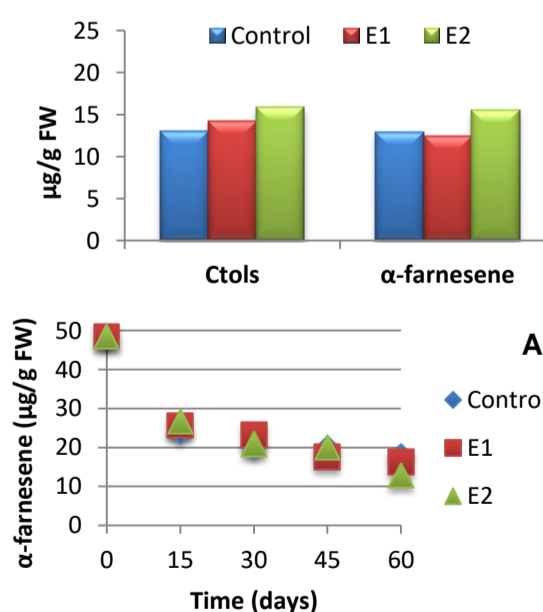
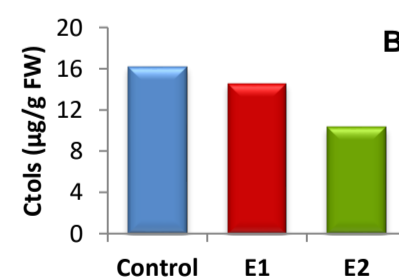


Figure 3: During cold storage, α -farnesene levels in pears treated with propolis were similar than in untreated control (A). However, after 2 months, its oxidation to conjugated trienols was significantly reduced by propolis treatment (B).

Figure 2: After 14 days at 20°C, the accumulation of conjugated trienols (Ctols) in treated pears was slightly higher than in the control. Any scald symptom was observed.



Conclusions

- Propolis aqueous extract showed a high phenolic content and antioxidant activity.
- Preliminary results showed that propolis treatments can be an alternative to reduce scald in 'Rocha' pear.
- Propolis extract decreased α -farnesene oxidation during cold storage and no treatment-related toxicity signs were observed on fruit skin.