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Effect of osmotic solutions on apple polyphenols diffusion

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Introduction

Polyphenols are beneficial to human health and their loss during processing is a major problem. The aim of this work is to study the diffusion of apple polyphenols when soaking in solutions at different osmotic pressures.

Material and methods

1. Determination of turgor pressure in apples (granny smith & golden delicious): volume changes vs osmotic pressure of different soaking solutions (1) (Mannitol solutions 0, 0.2, 0.4, 0.6, 0.8 M)
2. Mass transfer of apple Polyphenols in osmotic solutions by leaching process

Results and discussion

1. Turgor pressure

- Same range of values as obtained for other apple varieties (Lin & Pitt, 1986).
- Plasmolysis & rupture of cells at high turgor pressure.

2. Polyphenols loss

- 40 to 60% initial Procyanidins lost in distilled water.
- Solute loss decreased in Mannitol solutions (Devic *et al.*, 2010).

Table 1: Water potential, cell turgor pressure for Granny Smith (A) & Golden Delicious in various mannitol solution (B)

Mannitol (M)	Water Potential	Osmotic Pressure	Turgor Pressure
0	0.00	-1.41	1.41
0.1	-0.23	-1.41	1.18
0.2	-0.46	-1.40	0.94
0.4	-0.92	-1.40	0.48
0.6	-1.38	-1.38	0.00
0.8	-1.84	-1.35	-0.50
Fresh Matrix	-1.27	-1.35	0.08

Mannitol (M)	Water Potential	Osmotic Pressure	Turgor Pressure
0	0.00	-1.47	1.47
0.1	-0.23	-1.47	1.24
0.2	-0.46	-1.45	0.98
0.4	-0.92	-1.42	0.49
0.6	-1.38	-1.38	0.00
0.8	-1.84	-1.34	-0.51
Fresh Matrix	-1.50	-1.34	-0.16

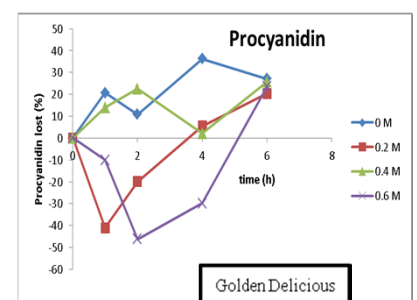
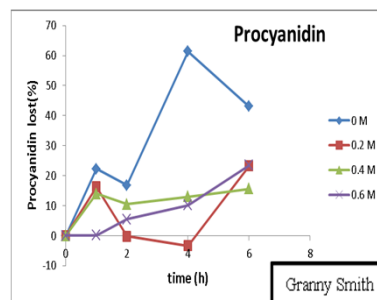


Figure 1: Comparison of osmotic pressure on procyanidin loss

Conclusions

Rupture of apple cells is responsible for loss of polyphenols in liquid-solid diffusion.
Osmotic solvent decrease polyphenols diffusion during leaching process

References :

- (1) Lin T. T., Pitt L.R. (1986). Journal of Texture Studies, 17, 291-313
- (2) Devic E., Guyot S., Daudin J-D, Bonazzi C. (2010). Food Bioprocess Technology, 3, 867-877.

