



HAL
open science

Effect of osmotic solutions on apple polyphenols diffusion

Mouhamadou Kebe, Jean Francois Maingonnat, A. N'Guessan, Catherine
M.G.C. Renard

► **To cite this version:**

Mouhamadou Kebe, Jean Francois Maingonnat, A. N'Guessan, Catherine M.G.C. Renard. Effect of osmotic solutions on apple polyphenols diffusion. Green Extraction, Apr 2013, Avignon, France. 2013. hal-02804137

HAL Id: hal-02804137

<https://hal.inrae.fr/hal-02804137>

Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Kebe M.^{1,2}, Maingonnat J.F.¹, Nguessan A.², Renard C.M.G.C.¹

¹UMR 408 INRA UAPV, Avignon, France

²UFR STA, University Nangui Abrogoua, Abidjan, Côte d'Ivoire



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 |

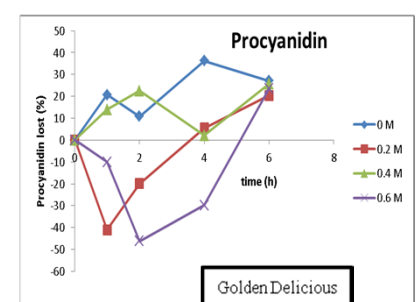
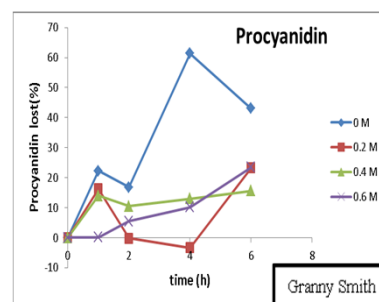


Figure 1: Comparison of osmotic pressure on procyanidin loss

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.

