# Cooking with microwave bags affects the quality of broccoli: easy-to-cook is a friend or foe?

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**PAULSEN, E. (1); MORENO, D. A. (2); PERIAGO, P. M. (3); LEMA, P. (1).**
**(1) Instituto de Ingeniería Química, Facultad de Ingeniería, Universidad de la República, Montevideo, Uruguay**
**(2) Phytochemistry and Healthy Foods Laboratory, Department of Food Science and Technology, CEBAS-CSIC, Campus Universitario de Espinardo, Murcia, Spain**
**(3) Departamento de Ingeniería Agronómica (ETSIA), Instituto de Biotecnología Vegetal, UPCT, Cartagena, Murcia, Spain**

## INTRODUCTION

Cooking vegetables in microwave-bags has become a popular cooking method. However, information about the effect of this cooking method on phytochemicals content and microbiological safety of vegetables is limited.

## OBJETIVE

Study the effect of microwave-bag cooking vs. conventional microwaving on phytochemical content and microbiological quality of broccoli florets. The influence of cooking time on these quality parameters was also evaluated.

## MATERIAL AND METHODS

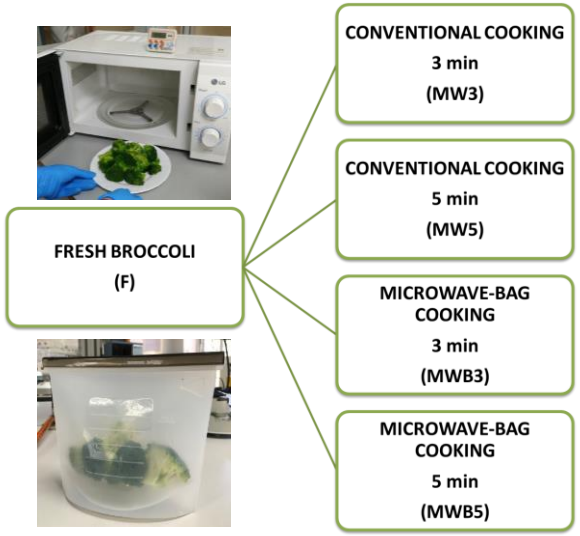


**Figure 1.** Diagram of experimental design

Broccoli florets (*Brassica oleracea* var. *Italica* cv. Parthenon) were placed into microwaveable bags and cooked in a microwave oven for 3 and 5 min. Product cooked under the same conditions, without using bag, was used as a control.

Samples were taken before and after cooking. Glucosinolates (GSL) content and hydroxycinnamic acids (HCAs) content were analyzer by HPLC-DAD-ESI-MSn. To evaluate microbiological quality, aerobic mesophilic bacteria, aerobic psychrotrophic bacteria and moulds and yeasts were analyzed.

## RESULTS AND DISCUSSION

Microwaved broccoli for 3 min showed no significant losses of total GSL content, regardless of cooking method. For 5 min cooking, microwave bag cooked broccoli showed higher total GSL content than conventional microwaved broccoli (Figure 2).

HACs content declined by 40% compared to fresh broccoli, in all conditions (Figure 3).

Microwave-bag cooking showed higher reduction of mesophilic and psychrotrophic bacteria than conventional microwaving (Figure 4). The counts of moulds and yeasts were < $10^2$ cfu/g, independently of cooking method and time applied.

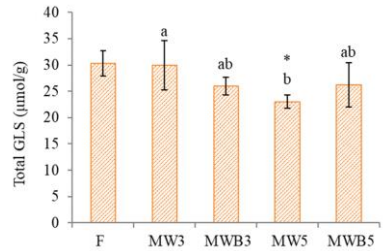


**Figure 2.** Total glucosinolate content.

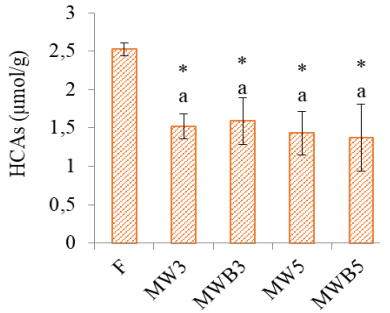


**Figure 3.** Hydroxycinnamic acids content.

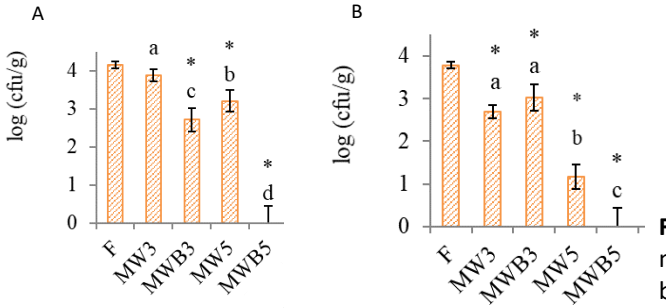


**Figure 4.** Mean value of log CFU/g for aerobic mesophilic bacteria (A) and aerobic psychrophilic bacteria (B).

## CONCLUSION

Microwave-bag cooking is a novel method that showed to be microbiologically safe and preserved GSL content, main bioactive compound of broccoli.