



Abstract

# Cooking with Microwave Bags Affects the Quality of Broccoli: Easy-to-Cook Is a Friend or Foe? <sup>†</sup>

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**Abstract:** Cooking vegetables in microwave bags has become a popular cooking method. However, information about the effect of this cooking method on the phytochemical content and microbiological safety of vegetables is limited. The aim of this work was to study the effect of microwave-bag cooking vs. conventional microwaving, on the phytochemical content and microbiological quality of broccoli florets. The influence of cooking time on these quality parameters was also evaluated. Broccoli florets were placed into microwaveable bags and cooked in a microwave oven for 3 and 5 min. The product cooked under the same conditions, without using bag, was used as a control. Samples were taken before and after cooking. Glucosinolate (GSL) content and hydroxycinnamic acid (HCAs) content were analyzed by HPLC-DAD-ESI-MSn. To evaluate the microbiological quality, aerobic mesophilic bacteria, aerobic psychrotrophic bacteria and moulds and yeasts were analyzed. Microwaving 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 ( $32.3 \pm 2.6 \mu\text{mol g}^{-1}$ ) than conventional microwaved broccoli ( $26.4 \pm 1.3 \mu\text{mol g}^{-1}$ ). HCAs content declined by 40% compared to fresh broccoli, in all conditions (from  $2.52 \pm 0.08 \mu\text{mol g}^{-1}$  to  $1.52 \pm 0.31 \mu\text{mol g}^{-1}$ ). Microwave-bag cooking showed a greater reduction in mesophilic and psychrotrophic bacteria than conventional microwaving. The counts of moulds and yeasts were  $<102 \text{ cfu/g}$ , independently of cooking method and time applied. Microwave-bag cooking is a novel method that has been shown to be microbiologically safe, as well as preserving GSL content, the main bioactive compound of broccoli. Furthermore, this option is a fast, easy and clean cooking option, to fulfill modern consumers' needs.

**Keywords:** microwave cooking; microwaveable bag; microbiological quality; bioactive compounds; broccoli florets



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