

Title Application of CO₂ micro- and nano-bubbles at lower pressure and room temperature to inactivate microorganisms in cut wakegi (*Allium wakegi* Araki)

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Keyword Wakegi; Micro- and Nano-bubbles; microorganisms

Abstract

Cut vegetables have become popular among consumers in the past few decades. Washing with sodium hypochlorite (NaOCl) solution is the most common method used for preventing cut vegetables from spoiling. However, some organic compounds react easily with available chlorine to form toxic chlorinated products. Thus, other disinfection methods to replace NaOCl treatment are being explored. We previously devised an instrument with CO₂ micro- and nano-bubbles under pressure less than 2.0 MPa (MNB-CO₂) for inactivating microorganisms in food at room temperature. The aim of this study was to investigate the effect of MNB-CO₂ on the inactivation of microorganisms in cut wakegi (*Allium wakegi* Araki), which are difficult to inactivate with NaOCl.

Ten grams of wakegi cut into about 1.0 cm² pieces was used as a sample. MNB-CO₂ treatment was conducted at each condition of pressure (0.1-2.0 MPa), temperature (20-30°C) and solution pH (3.0-6.5) for 10-30 min. Also, for comparison, cut wakegi was immersed in 100 ppm NaOCl solution at 20-30°C for 10-30 min and washed for 5 min to remove residual NaOCl. The numbers of total and coliform bacteria in cut wakegi before and after MNB-CO₂ and NaOCl treatments were measured by the colony count method.

Total and coliform bacteria in cut wakegi were effectively inactivated by MNB-CO₂. The inactivation effect of MNB-CO₂ treatment was almost the as that of NaOCl treatment. The number of total and coliform bacteria significantly decreased with increasing pressure and temperature in the MNB-CO₂ treatment, and especially with decreasing the solution pH. These results suggested that MNB-CO₂ treatment at pressure less than 2.0 MPa and room temperature was very effective at inactivating microorganisms in cut wakegi as an alternative to NaOCl treatment.