

Effect of Sub and Supercritical Carbon Dioxide Processing on Microbial Loads in Tempe

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Abstract

Sub and supercritical carbon dioxide is a non-thermal processing which can be a promising method of shelf life extension for tempeh as it induces microbial inactivation avoiding alterations of its quality attributes. Fresh tempeh was treated using supercritical CO₂ (7.6MPa, 35°C) and sub supercritical CO₂ (6.3MPa, 25°C) for 5, 10, 15 and 20 min of holding time. Inactivation of mold and bacteria were analyzed, and the color of tempeh was measured. The results showed that there was a significant interaction of pressure and holding times for bacterial and mold inactivation at >0.05 . Bacterial populations decreased to about 1.7 Log at supercritical CO₂ (7.6 MPa) and 1.08 Log at sub supercritical CO₂ (6.3 MPa) while molds decreased to about 4.88 Log and 3.73 Log. The identified bacteria resistance to the supercritical CO₂ processing at 7.6 MPa for 20 min was *Bacillus sp.*, and *Lactobacillus sp.* The molds were more affected by the treatments than the bacteria. However, sub supercritical treatment of 6.3 MPa, 25°C, 10min had less reduction effect on both bacteria and mold of tempeh. The L^* value of tempeh treated with sub supercritical CO₂ for 10 min was 72.1 ± 0.9 which was an indication of better color of tempeh compared to that of the L^* value of tempeh treated with supercritical CO₂. The conclusion was that the sub supercritical treatment can be an alternative preservation method for tempeh.

Key words: *tempeh, sub supercritical CO₂, non-thermal method, microbial numbers*