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Effect of natural detergent solutions against *E. coli* growth in fresh-cut lettuce

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Over the past few years there has been an increasing consumption of fruits and vegetables that have beenassociated with healthy eating. However, contamination in ready-to-eat salads by microorganisms mighty be a potential threat to consumers because they are not washed and disinfected before consumed. Besides, recent outbreaks of *E. coli* in Germany, in May 2011, have raised the attention of European Community to the risk of microbial contamination in fresh-cut produce and the need to encourage safer procedures of sanitization during their processing in the agro-industry. In this context, the aim of this work was to propose the use of natural detergent with disinfection action to against growth of bacteria during pre-washing step.

Experiments were carried out by inoculating *Escherichia coli* (10_6 CFU) in100g of fresh-cut lettuce and incubated at 25 °C. After 2h, the samples were immersed in two different detergent solutions (DS) containing Tween 20, citric acid and lime oil (A: 1.0% lime oil and 0.5% of citric acid; B: 1.0% lime oil and 0.3% of citricacid) during 1, 5 and 10 minutes. The control treatment was washed only with water. The samples (treated lettuce) were withdrawn and evaluated to determine the reduction of *E. coli* colonies formed, after a sequential ofdilutions (1:10) of the samples flasks, from which 100 _L were spread onto the MacConkey agar plates and incubated at 37 °C for 24 h [1]. The microbial plate count was expressed as the logarithm of colony-forming units per 25 gram of fresh weight of lettuce (log CFU/25g FW).

The results showed that survival of microorganisms of minimally processed lettuce immersed in solution A and B decreased significantly with increasing time of immersion, while washing with water (control) presented only a reduction at first minute (from 7.8 to 4.34 log CFU/25g), but kept growing after 1minute of treatment. Ten minutes of sanitizing solution contact significantly reduced bacteria populations for both detergent solutions tested by 7.80 to 1.60 log CFU/25g FW (solution A) and 7.80 to 3.25 log CFU/25g FW (solution B). There has been no significant reduction of colonies formed after 1 minute of treatment with solution B: 3.56 log CFU/25g at 1 minute and 3.51 log CFU/25g at 5 minutes. Detergent solution A was the most effective on reducing *E. coli*, although the best organoleptic results were shown by solution B.

The findings suggest that washing fresh produce for 1 minute in a solution containing citric acid at low concentration improves the shelf life of lettuce by decreasing the metabolism of the vegetable. Thus, lime oil and citric acid formulated as a detergent solution with Tween showed a synergistic action against *E. coli* growth [1] and it can be considered to be used as a natural alternative of conventional sanitizing agents in the food industry.

Keywords: pathogens; contamination; citrus oil; citric acid; ready-to-eat vegetables; sanitazer agents

References

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