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Utilizing egg shell powder to inactivate bacteria on the surface of fresh produce and shell eggs

Hou Chih-Yao and **Chia-Min Lin**
National Kaohsiung Marine University, Taiwan

Four hundred and eighty thousand tons of egg shell were produced in Taiwan in 2014 only and treated as waste. The major composition of egg shell is $CaCO_3$ and the incinerated egg shell powder forms a high alkali suspension which possesses an antibacterial activity. Thus, utilizing the egg shell powder is not only a potential way to inactivate bacteria but also effectively reduces the negative impact of egg waste. Therefore, this research used two concentrations, 0.1% and 0.5%, of the suspension of egg shell powder to inactivate *Salmonella enterica* subs. enterica serotype Typhimurium, *Escherichia coli, Staphylococcus aureus* and *Vibrio parahaemolyticus* on fresh cut guava and lettuce as well as and *Salmonella Enteritidis* on shell egg surface. Sterile deionized water and 20 ppm ClO_2 were used as negative and positive control, respectively. The food samples were cleaned, inoculated with bacteria, dried and washed for 1 min. One to two log reductions was achieved comparing with the negative control on fresh produce. Greater reductions were obtained from Gram- negative bacteria such as *E. coli*, *S. Typhimurium* and *V. parahaemolyticus*. No significant difference was observed between different concentrations of egg shell powder suspension and the positive control ($p>0.05$). For shell eggs, 0.1% and 0.5% suspension showed 2 and 4 log reduction, respectively, comparing with the negative control. For the physical characteristics of the fresh cut produce after treatment, the breaking and cutting forces of the fresh cut produce washed by egg shell powder suspension were significantly higher ($p<0.05$) than the negative and positive controls during storage. General sensory reception was also significant higher ($p<0.05$) than controls. These results showed egg shell powder was able to effectively inactivate the tested bacteria and maintain the physical and sensory quality during storage.

Biography

Hou Chih-Yao has his expertise in evaluation formation and reduction, cytotoxicity of methanol in fruit and vegetable juices and fruit wine and also include detecting the pectin esterase activity of fruit and evaluation of the pectin esterase inhibitor (for example polyphenol or jelly fig (*Ficus awkeotsang Makino*) extract) and application of fruit wine fermentation. In recent years, he has worked in the food factory like Want-Want group and Fu-Che frozen food Co., Ltd. He is currently working in the National Kaohsiung Marine University developing the paper-based chip for food rapid analysis, egg shell surface antibacterial treatment technology.

chihyaohou@gmail.com

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