Title	Prediction of total microorganism and coliforms in two types of vegetable after washing sanitizers by using artificial neural networks
Author	S. Keeratipibul, A. Phewpan and C. Lursinsap
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Keyword	total microorganism; coliforms; Artificial Neural networks

Abstract

The objectives of this study were to investigate the efficacy of two sanitizers, i.e. hypochlorous and peracetic acids, in reducing total microorganism and coliforms levels on tomato and lettuce and to mathematically predict the relationship among the initial load, types of vegetable, types and concentration of sanitizer, and residual micro-organism levels after the sanitizing by applying artificial neural networks (ANNs). The total microorganisms on tomato fruits and lettuce showed $2.18 - 2.38$ and $0.48 - 0.65$ log 10 cfu/g reduction ($p < 0.05$) respectively, when sanitized with hypochlorous acid (as aqueous chlorine at 25, 50 and 75 ppm). Whilst in peracetic acid (at 30, 40 and 50 ppm), the total microorganisms on tomato fruits and lettuce showed $2.86 - 3.75$ and $1.21 - 1.44$ log 10 cfu/g reduction ($p > 0.05$) respectively. The same treatments for coliforms on tomato fruits and lettuce showed $2.63 - 3.12$ and $0.89 - 1.37$ ($p < 0.05$) log 10 cfu/g reduction respectively, for hypochlorous acid treatments, whilst with peracetic acid treatments, $3.86 - 4.04$ and $2.05 - 2.39$ log 10 cfu/g reduction ($p > 0.05$) were found respectively. The best sum square error from the artificial neural prediction of residual total microorganism and coliforms were 0.72 and 0.50, respectively, and the maximum R^2 of residual total microorganisms and coliforms were 0.76 and 0.85, respectively. Only one hidden layer and four or three hidden neurons were required for total microorganisms and coliforms, respectively. Factor analysis in the ANN models supported intuition in that the residual microorganism level depends upon the initial load of microorganism, types of vegetable, types and the concentration of sanitizer used.