

Ratikorn Buakham 2011: Kinetics of the Reduction of Pesticide Residues and Microorganisms in Vegetables by Ultrasonic Cleaning. Master of Science (Food Engineering), Major Field: Food Engineering, Department of Food Science and Technology. Thesis Advisor: Mr. Sirichai Songsermpong, Ph.D. 95 pages.

The pesticide residues and microorganisms in vegetables have caused big problem for both Thai's consumers and Thai's exporters. In this research the new method of vegetables cleaning using ultrasonic waves is introduced to alleviate these problems. The four kinds of vegetables including coriander, kale, yard long bean, and red chili has been studied. The comparisons of the cleaning efficiency between method of ultrasonic cleaning and soaking in tap water were carried out. The cleaning was done at 20, 25 and 30 °C for 0, 3, 7 and 10 minutes for pesticide residues. The determinations of the reduction of pesticide residues in vegetables were performed using the cholinesterase inhibition technique. It was found that ultrasonic cleaning at 25 °C was the best to reduce the pesticide residues. The D values (Decimal reduction time) at 25 °C of coriander, kale, yard long bean and red chili were 22.32, 22.80, 16.07 and 17.84 min respectively. The k values (Reaction rate constant) at 25 °C of coriander, kale, yard long bean and red chili were 1.53×10^{-3} , 2.33×10^{-3} , 1.62×10^{-3} and $2.17 \times 10^{-3} \text{ s}^{-1}$ respectively and E_a values (Activation energy of the reduction) were 2.46×10^3 , 3.44×10^3 , 1.32×10^3 and $5.02 \times 10^3 \text{ cal/mole}$ respectively. Soaking coriander, kale, yard long bean and red chili in tap water at 30 °C was studied to reduce the pesticide residues. For soaking at 30 °C, the D values were 70.20, 66.17, 32.37 and 21.91 min respectively and the k values were 4.83×10^{-4} , 5.50×10^{-4} , 1.30×10^{-3} and $1.80 \times 10^{-3} \text{ s}^{-1}$ respectively. The E_a values were 1.05×10^4 , 2.29×10^4 , 1.69×10^4 and $0.71 \times 10^4 \text{ cal/mole}$ respectively. In addition, the ultrasonic cleaning was done at 25 °C for 0, 3, 7 and 10 minutes for microorganisms. The determinations of the microorganisms in vegetables were done by the aerobic plate counts. The D value of ultrasonic cleaning at 25 °C for coriander, kale, yard long bean, and red chili were 17.30, 11.79, 8.48 and 9.93 min respectively and the k values were 1.98×10^{-3} , 2.03×10^{-3} , 2.23×10^{-3} and $3.51 \times 10^{-3} \text{ s}^{-1}$ respectively. Soaking coriander, kale, yard long bean, and red chili in tap water have the D value of 24.39, 22.71, 11.48 and 13.47 respectively and the k values of 1.29×10^{-3} , 1.72×10^{-3} , 1.76×10^{-3} and $2.14 \times 10^{-3} \text{ s}^{-1}$ respectively. In conclusions, ultrasonic cleaning was a better method in reducing the pesticide residue and microorganism than soaking in tap water tremendously.

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Thesis Advisor's signature