

Niporn dejsuk 2008: Release of Cinnamaldehyde and Eugenol from Cellulose Ether Films and Application as Antimicrobial Packaging Film. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging Technology. Thesis Advisor: Assistant Professor Panuwat Suppakul, Ph.D. 135 pages.

The present study generally aimed at investigating AM packaging films containing either cinnamaldehyde or eugenol, regarding to release of AM, application in Vietnamese bologna and shelf-life of AM packaging film. For release experiment, either cinnamaldehyde or eugenol was incorporated into cellulose ether solution, and then followed by casting in the Petri-dish. Release of either cinnamaldehyde or eugenol into n-heptane was investigated. It showed a non-Fickian behavior at low temperature. An increase in temperature from 4 °C to 25 °C resulted in an increase in the diffusion coefficient from  $2.22 \times 10^{-14} \text{ m}^2 \text{ s}^{-1}$  to  $4.25 \times 10^{-14} \text{ m}^2 \text{ s}^{-1}$  for cinnamaldehyde and  $2.59 \times 10^{-14} \text{ m}^2 \text{ s}^{-1}$  to  $6.36 \times 10^{-14} \text{ m}^2 \text{ s}^{-1}$  for eugenol. An increase in temperature resulted in an increase in the diffusion coefficient. The temperature dependence of the diffusion coefficient is well described by an Arrhenius equation with activation energy of  $20.88 \text{ J mol}^{-1}$  and  $30.91 \text{ J mol}^{-1}$  for cinnamaldehyde and eugenol, respectively. Either cinnamaldehyde- or eugenol-incorporated cellulose ether-coated LDPE film was applied to wrap samples of Vietnamese bologna and stored at 4 °C. They showed significantly lower thiobarbituric acid (TBA) value ( $P \leq 0.05$ ) whereas pH of decreased during storage period. Color values ( $L^*$ ,  $a^*$  and  $b^*$ ) were not considerably affected by both treatments or storage time ( $P > 0.05$ ). However,  $\Delta E$  of eugenol-incorporated cellulose ether-coated LDPE tended to increase as increasing storage time. Shelf-life of Vietnamese bologna wrapped with either cinnamaldehyde- or eugenol-incorporated cellulose ether-coated LDPE film was longer than 30 days. In addition, sensory panelists did not perceive a difference in flavour between Vietnamese bologna wrapped in cinnamaldehyde-incorporated cellulose ether-coated LDPE and in the control film throughout the storage period of 5 days at 4 °C. In film storage tests of 210 days at ambient conditions, the AM cellulose ether films showed a loss of AM activity against *Listeria monocytogenes* and *Esherichia coli* O157: H7. These studies highlight the encouraging potential use of cellulose ether film containing cinnamaldehyde as AM packaging film for enhancing quality and safety of packaged foods.

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Thesis Advisor's signature