

Parichart Thumnaratip 2007: Development of Antimicrobial Coating and Film for Extending Shelf Life of Food Products. Master Degree of Science (Agro-Industrial Product Development, Major Field: Agro-Industrial Product Development, Department of Product Development. Thesis Advisor: Associate Professor Kamolwan Jangchud, Ph.D. 233 pages.

Microorganisms are one of the most important factors causing food deterioration. Therefore, antimicrobial coating is significant for shelf life extension of food. The objective of this study was to study the effect of natural antimicrobial agents incorporated with edible coating or film on shelf life of tomatoes, bread and Kha-nom Thong Yod (a traditional Thai dessert). The inhibition activities of antimicrobial agents (10,000 IU/ml nisin, extract of lactic acid bacteria (PD119), 1,000 ppm eugenol and 1,000 ppm thymol) were determined using the disc agar diffusion method. The results showed that 10,000 IU/ml nisin had the highest inhibition efficiency to total plate counts and MRS plate counts, while 1,000 ppm eugenol and 1,000 ppm thymol inhibited some total plate counts, yeasts and molds. PD119 had the lowest inhibition efficiency when compared to the other antimicrobial agents. The efficiency of combined antimicrobial compounds was studied using the 2×2 factorial in a completely randomized design: two levels of nisin concentration (1,000 and 10,000 IU/ml), and two levels of eugenol or thymol concentration (500 and 1,000 ppm). The antimicrobial activity of combine compounds was determined using the disc agar diffusion method. The results revealed that 10,000 IU/ml nisin and 1,000 ppm eugenol had the highest capacity to inhibit microorganisms of tomato and bread, while 10,000 IU/ml nisin, 1,000 ppm thymol and 500 ppm eugenol had the highest activity to inhibit microorganisms of Kha-nom Thong Yod. For the study of tomato shelf life, tomatoes were prepared by coating with antimicrobial agents incorporated with 1.5% (w/v) chitosan solution stored at 25±2°C and 65±5%RH. The optimum antimicrobial agents used for tomato coating were 10,000 IU/g film nisin and 15,000 ppm eugenol. The shelf life of tomatoes with this antimicrobial coating was 21 days whereas non-coated tomatoes only had a shelf life of 14 days. Bread, wrapped with antimicrobial agents incorporated with 1.5% chitosan film, was stored at 25±2°C and 55±5%RH for the shelf life study. The optimum antimicrobial agents incorporated with edible film for bread were 10,000 IU/g film nisin and 10,000 ppm eugenol, which had a shelf life of 6 days, while that of non-coated bread was only 3 days. Finally, Kha-nom Thong Yod had antimicrobial agents incorporated with 1.5% chitosan film laid between its layers, stored at 30±2°C and 65±5%RH. The antimicrobial film that combined 10,000 IU/g film nisin, 1,000 ppm thymol and 500 ppm eugenol extended Kha-nom Thong Yod shelf life from 2 to 3 days.

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Thesis Advisor's signature

