

เป็นหนังสือภาษาอังกฤษ

รายงานการวิจัยฉบับสมบูรณ์

เรื่อง

การศึกษาสารเชิงซ้อนของ เบต้า-ไซโคลเด็กซ์ทรินกับน้ำมันตะไคร้หอม

เพื่อได้ยุง

**Investigation of beta-cyclodextrin complexes with
citronella oil for mosquito repellent**

โดย

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งานวิจัยนี้ได้รับทุนอุดหนุนการวิจัยจากเงินรายได้คณะเภสัชศาสตร์

ประเภททั่วไป ประจำปี 2553

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Abstract

The aims of this study were to prepare citronella oil- β -cyclodextrin inclusion complexes, to investigate the physicochemical properties of the citronella oil- β -cyclodextrin inclusion complexes, and to evaluate *in vitro* release characteristics and *in vivo* mosquito protection of the lotions containing citronella oil- β -cyclodextrin inclusion complexes. In this work, a kneading method was employed to prepare the inclusion complexes between β -cyclodextrin and citronella oil. The ratios between citronella oil and β -cyclodextrin were 1:1 and 1:2 by weight. For comparison purposes, the physical mixtures between citronella oil and β -cyclodextrin were also prepared at the same weight ratios. The physicochemical properties of the citronella oil- β -cyclodextrin inclusion complexes and physical mixtures were examined using Scanning Electron Microscope (SEM), Fourier Transform Infrared Spectroscopy (FTIR) and Differential Scanning Calorimetry (DSC). The SEM technique revealed no observable changes in particle shapes and morphologies of the physical mixture products in comparison with the original morphology of β -cyclodextrin. There were drastic changes in the shapes and morphologies of the particles in the case of the inclusion complexes. The SEM pictures showed that the inclusion complexes at both ratios (1:1 CPX and 1:2 CPX) appeared agglomerate and clumping to each other. In the case of FTIR analysis, there were some minor differences in the FTIR spectra of the inclusion complexes, the physical mixtures and the individual components (citronella oil, or β -cyclodextrin). Furthermore, the DSC results seemed to confirm some interactions between citronella oil and β -cyclodextrin. The lotions which contained 10%w/w citronella oil were formulated using Cremophor A6 and Cremophor A25 as emulsifiers. The pH of the lotions was about 4.5-5.5. The modified Franz diffusion cell and synthetic membrane were employed to investigate the *in vitro* release profiles of citronella oil. For comparative study, a commercial product of 10% citronella oil (F1) was selected for the evaluation of its effectiveness. The results showed that release rates of citronella oil from the lotions containing the inclusion complexes (F3, 1:1 CPX and F4, 1:2 CPX) were significantly lower than that from the prepared lotion containing normal citronella oil (F2). Nevertheless, there were no significant differences in the release rates of citronella oil from such two inclusion complex loaded lotions (F3 and F4). The lowest release rate was found in the commercial product. The mosquito (*Aedes*

aegypti) repellent efficacy of the citronella oil lotions was further evaluated by human-bait technique. The highest mosquito repellent activity was observed in the formulation F3 which contained citronella oil- β -cyclodextrin inclusion complex at ratio of 1:1.

Keywords: citronella oil, β -cyclodextrin, inclusion complex, mosquito, lotion