PREPARATION OF PHYTOL FROM THE BIOMASS OF THE OIL PALM INDUSTRY

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By

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Dengan ini disahkan bahawa saya telah menyemak laporan projek ini dan

i. semua pembetulan yang disarankan oleh pemeriksa-pemeriksa telah dibuat
ii. laporan ini telah mengikut format yang diberikan dalam Panduan KIM 4999 (Projek Dan Seminar), Fakulti Sains Gunaan dan Teknologi, University Putra Malaysia, Terengganu, 2000.

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ABSTRACT

The cultivation of oil palm (*Elaeis guineensis)* in Malaysia has led to an increase in its biomass which could be used to produce value-added products. In this project, a study has been carried out to assess the potential of using oil palm leaves as a source of phytol, which is currently being used as one of the precursors for preparing vitamin E and K. In this study, phytol was isolated and purified from the chlorophylls extracts obtained from the oil palm leaves and the structure of the phytol isolated was elucidated by using uv and IR spectroscopy. In this study, chlorophylls were extracted from the oil palm leaves by using two methods: the first method was the soxhlet extraction and the second was homogenizing the leaves in methanol using blender. The purified chlorophylls extracts were later subjected to hydrolysis using KOH and MeOH to isolate the phytol. In this present study, it was found that in the case of extraction using soxhlet method, significantly lower yield of chlorophylls was extracted (0.024%) thus no phytol was isolated while 0.054% of purified chlorophylls were successfully extracted by using blender and was used to produce phytol. In addition, for comparison, unpurified chlorophylls extracted from blender were also used to produce phytol. This study also showed that chlorophylls extracted from both the methods have to be analyzed immediately after extraction because of its instability and sensitivity to heat, oxidation and sunlight. The phytol isolated from the chlorophylls extracted using the blender method were purified by using column chromatography technique while the presence of phytol (pale yellow oily liquid) in the eluted fractions was determined using thin layer chromatography (tlc) method. The phytol spot in tlc was visualized under uv light or after sprayed with 0.25% w/v $KMnO_4$ and its R_f value were compared with the standard phytol to varify the

presence of phytol. In this study, phytol was successfully isolated from both the purified and unpurified chlorophylls extracts in which the amount of phytol obtained from the purified chlorophyll (36mg phytol/ 1500g leaflets) was higher that the phytol obtained from the unpurified chlorophylls (0.70mg phytol/ 50g leaflets). In view of the importance of phytol as one of the precursors for preparing vitamin E and vitamin K, further studies on phytol extracted from oil palm leaves as a potential commercial value resource is recommended.

ABSTRAK

Perusahaan kelapa sawit (*Elaeis guineensis)* di Malaysia telah mempercepatkan pembangunan biojisimnya kepada bahan bernilai. Dalam projek ini, satu kajian telah dijalankan untuk mengguna-semula daun kelapa sawit dan menukarkannya kepada bahan bernilai, fitol yang digunakan sebagai bahan pemula bagi menyediakan vitamin E dan vitamin K. Dalam kajian ini, fitol telah diasingkan dan ditulenkan daripada ekstrak klorofil dan struktur fitol diperolehi telah dikenalpasti dengan menggunakan spektroskopi uv dan IR. Klorofil telah diekstrakkan daripada daun kelapa sawit dengan menggunakan dua kaedah yakni kaedah 'soxhlet' dan pengisar dalam larutan metanol. Ekstrak klorofil kemudiannya dihidrolisiskan dengan menggunakan larutan KOH dan metanol bagi mendapatkan fitol. Dalam kajian ini dengan menggunakan kaedah 'soxhlet', didapati klorofil yang dapat diekstrak adalah rendah (0.024%) dan oleh itu, tiada fitol yang dapat diasingkan daripada ekstrak klorofil manakala 0.054% klorofil tulen telah berjaya diekstrakkan dengan menggunakan pengisar dan telah digunakan untuk menghasilkan fitol. Sebagai tambahan untuk perbandingan, klorofil tak tulen yang diekstrakkan daripada pengisar juga telah digunakan untuk menghasilkan fitol. Kajian ini juga menunjukkan bahawa klorofil yang telah diekstrak daripada dua kaedah diatas perlu dianalisis secepat mungkin selepas pengekstrakan disebabkan ketidakstabilan dan kepekaannya kepada kepanasan, pengoksidaan dan cahaya matahari. Fitol yang diperolehi daripada pengekstrakkan klorofil menggunakan kaedah pengisar telah ditulenkan dengan menggunakan teknik kromatografi turus manakala kehadiran fitol (cecair kuning cerah berminyak) dalam pecahan elusi telah ditentukan dengan menggunakan kaedah kromatografi lapisan nipis (k.l.n.). Tompok fitol dalam k.l.n. dapat dilihat di bawah cahaya ultralembayung

nipis (k.l.n.). Tompok fitol dalam k.l.n. dapat dilihat di bawah cahaya ultralembayung atau selepas disemburkan dengan 0.25% $KMnO_4$ dan nilai R_f bagi fitol dibandingkan dengan nilai fitol rujukan bagi membuktikan kehadiran fitol. Dalam kajian ini, fitol telah berjaya diasingkan daripada ekstrak klorofil tulen dan klorofil tak tulen di mana jumlah fitol yang diperolehi daripada klorofil tulen (36mg fitol/ 1500g daun) adalah lebih banyak daripada yang diperolehi daripada fitol tak tulen (0.70mg fitol/ 50g daun). Memandangkan kepentingan fitol sebagai bahan pemula bagi menyediakan vitamin E dan vitamin K, kajian lanjutan ke atas pengekstrakkan fitol daripada biojisim kelapa sawit sebagai potensi sumber bernilai komersil adalah disarankan.