EXTRACTION AND CHARACTERISATION OF ALOE VERA (*Aloe barbadensis*) PECTIN

FACULTY OF AGROTECHNOLOGY AND FOOD SCIENCE
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
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DECLARATION

I hereby declare that this research project is based on my original work except for quotations and summaries which have been duly acknowledged.

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ABSTRACT

The main objective of this study is to determine the yield of pectin from aloe vera using three different extraction methods and analyze the physiochemical properties of aloe vera. The extracted pectin will be subjected to analysis such as degree of esterification, emulsion stability, gel strength and viscosity of aloe vera pectin. The method using by Shkodina has highest pectin yield in both aloe vera rind and pulp with a mean of 4.370± 0.435% or 0.235± 0.031 g and 5.727± 0.582% or 0.286±0.029 g respectively. The method using by Mesbahi with a mean of 1.657± 0.080% or 0.083± 0.004 g and 2.493± 0.057% and 0.125± 0.003 g for aloe vera rind and pulp has second highest pectin yield. The extraction method using by Kertesz has lowest pectin yield with a mean of 0.557± 0.125% or 0.028± 0.006 g and 0.630± 0.082% or 0.031± 0.004 g respectively for aloe vera rind and pulp. The degree of esterification (DE) of apple and aloe vera pectin obtained from FTIR spectra was calculated by the method proposed by Manrique et al, (2002). DE of apple pectin was 62.62±0.73% and for aloe vera was 56.83±0.24%. In the emulsion capability, emulsion which containing 30% of oil was more stable (25.33±1.53 minutes) than the one with 10% oil concentration (4.67±0.58 minutes). For the gel strength, the gel which contains 16ml water and 0.26g commercial apple pectin has highest gel strength which needed 208.23±24.22 g force. The gel strength of the samples decrease as concentration of aloe vera pectin increase. Texture analyzer unable to analyze samples which contain 20 ml water, 0.26 g aloe vera pectin and 16 ml water, 0.26 g aloe vera pectin respectively because both samples just formed a very weak gel. Thus, viscosity test was carried out for both samples and their control. The sample with 16 ml water and contain 0g aloe vera pectin contribute to lowest viscosity, 0.48±0.14 Pa s^{-1}; while sample which contain 16 ml water and 0.26 g of aloe vera pectin has highest viscosity, 1.14± 0.25 Pa s^{-1}. However, the viscosity of sample which contains 20 ml water and 0.26 g aloe vera pectin, 1.03±0.06Pas^{-1} does not have significant differences from sample which contains 16 ml water and 0.26 g of aloe vera pectin. A more satisfactory result for the functional properties may be obtained if can increase the solubility of aloe vera pectin.

PENGEKSTRAKAN DAN PENENTUAN CIRI-CIRI ALOE VERA (*Aloe barbadensis*) PEKTIN

ABSTRAK

Tujuan utama kajian ini adalah untuk menentukan kuantiti pektin yang dihasilkan dari aloe vera dengan menggunakan tiga kaedah ekstrak yang berbeza dan seterusnya menentukan ciri-ciri fisiokimia pektin aloe vera. Antara ciri-ciri yang akan dikaji untuk pektin aloe vera ialah darjah pengesteran, kestabilan emulsi, kekuatan gel dan kelikatan. Keadaan pengekstrakan yang digunakan oleh Shkodina mempunyai hasil pektin yang paling tinggi, iaitu dengan min 4.370± 0.435% atau 0.235± 0.031 g dan 5.727± 0.582% atau 0.286±0.029 g masing-masing untuk kulit aloe vera dan isi aloe vera. Keadaan pengekstrakan yang diaplikasikan oleh Mesbahi mempunyai min 1.657± 0.080% atau 0.083± 0.004 g dan 2.493± 0.057% atau 0.125± 0.003 g masing-masing untuk kulit dan isi menghasilkan kuantiti pektin yang kedua tinggi. Manakala keadaan pengekstrakan yang digunakan oleh Kertesz menyumbangkan kepada hasil pektin yang paling rendah, masing-masing 0.557± 0.125% atau 0.028± 0.006 g dan 0.630± 0.082% atau 0.031± 0.004 g untuk kulit dan isi. Daripada spektra FTIR yang diperolehi, darjah pengesteran (DE) pektin epal dan aloe vera dapat ditentukan dengan pengiraan yang disyorkan oleh Manrique et al, (2002). DE pektin epal adalah 62.62±0.73% dan untuk pektin aloe vera pula mempunyai 56.83±0.24%. Bagi kestabilan emulsi pula, emulsi yang mempunyai 30% minyak adalah paling stabil (25.33±1.53 minit) jika dibanding dengan emulsi yang mengandungi 10% minyak (4.67±0.58 minit). Bagi kekuatan gel pula, gel yang mengandungi 16ml air dan 0.26 g komersial pektin epal mempunyai kekuatan gel yang paling tinggi di mana memerlukan 208.23±24.22 g daya. Kekuatan gel semakin menurun apabila kuantiti pektin aloe vera yang digunakan semakin meningkat. Alat menganalisis tekstur tidak berupaya menganalisis gel yang mengandungi 20 ml air, 0.26 g pektin aloe vera dan 16 ml air, 0.26 g pektin aloe vera kerana kedua-dua sampel ini menghasilkan kekuatan gel yang terlalu lemah. Dengan itu, kedua-dua sampel serta kawalan telah dijalankan analisis kelikatan. Sampel yang mempunyai 16 ml air dan tidak mengandungi pektin aloe vera adalah sebagai kawalan memberikan kelikatan yang paling rendah, iaitu 0.48±0.14 Pa s^{-1}. Sampel yang mempunyai 16ml air dan 0.26g pectin aloe vera mempunyai kelikatan yang paling tinggi, iaitu 1.14± 0.25 Pa s^{-1}. Manakala kelikatan bagi sampel yang mempunyai 20ml air dan 0.26g pectin (1.03±0.06Pas^{-1}) tidak mempunyai perbezaan signifikan dengan sampel yang mengandugi 16ml air dan 0.26g sampel. Keputusan yang lebih memuaskan mungkin diperolehi sekiranya keterlarutan pektin aloe vera boleh ditingkatkan.