



**PHYSICOCHEMICAL PROPERTIES AND ANTIOXIDANT  
ACTIVITY OF GREEN GRASS JELLY CONTAINING  
SAGO STARCH**

by

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Sekian, terima kasih.

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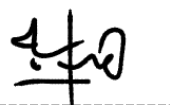
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Tarikh

## **DECLARATION BY AUTHOR**

This dissertation is consist of my original work and contains no material previously published or written by another person except where due reference has been made in the text. The content of my dissertation is the result of work I have carried out since the commencement of my research project and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution.



NIK NUR HIDAYAH BINTI NIK HASAN

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## LIST OF ABBREVIATIONS

<b>Abbreviations</b>	<b>Definitions</b>
DPPH-SA	2,2-diphenyl-1-picrylhydrazyl Free Radical Scavenging Activity
TPC	Total Phenolic Content

# **SIFAT-SIFAT FIZIKOKIMIA DAN AKTIVITI ANTIOKSIDAN TERHADAP CINCAU HIJAU YANG MENGANDUNGI KANJI SAGU**

## **ABSTRAK**

Cincau hijau ialah salah satu pencuci mulut tradisional di negara Asia terutamanya di Indonesia. Kebiasaannya, cincau hijau dihidang dengan minuman panas atau sejuk bersama dengan asas yang manis seperti sirap buah, santan dan ais. Cincau hijau mempunyai kadar sinerisis tinggi ketika penyimpanan. Oleh itu, dalam kajian ini, kanji sagu dengan kepekatan yang berbeza (0, 5, 5.5, 6, and 6.5%) telah ditambah dalam resepi cincau hijau untuk mengatasi masalah sinerisis yang berlaku. Selain itu, kesan kanji sagu terhadap sifat-sifat fizikokimia dan aktiviti antioksidan cincau hijau telah dianalisis. Cincau hijau yang diformulasikan telah dianalisis keatas sifat-sifat fizikokimia sineresis, warna, tekstur (kekerasan, kelekatan, kekenyalan, konsistensi, kelekitan, keliatan)) dan sifat antioksidan (jumlah kandungan fenolik (TPC) dan aktiviti antioksidan (aktiviti pemerangkapan radikal bebas 2,2-diphenyl-1-picrylhydrazyl (DPPH-SA)). Keputusan menunjukkan nilai sineresis telah menurun secara signifikan ( $p < 0.05$ ) dengan adanya peningkatan kepekatan kanji sagu. Dari ujian warna, nilai  $L^*$  yang mewakili kecerahan telah meningkat secara signifikan ( $P < 0.05$ ) dengan adanya peningkatan kepekatan kanji sagu. Selain itu, nilai  $-a^*$  yang mewakili kehijauan telah menunjukkan bahawa cincau hijau tanpa penambahan kanji sagu (kawalan) berbeza secara signifikan ( $p < 0.05$ ) berbanding cincau hijau dengan penambahan kanji sagu. Ini disebabkan berlakunya proses gelatinisasi keatas butiran kanji semasa memasak. Selain itu, peningkatan kepekatan kanji sagu juga telah meningkatkan nilai kekuningan secara signifikan ( $p < 0.05$ ). Keputusan ujian tekstur juga menunjukkan terdapat perbezaan secara significant ( $p < 0.05$ ) terhadap

nilai kekerasan cincau hijau di antara cincau kawalan dan cincau dengan penambahan kanji sagu. Cincau dengan penambahan 5% kanji sagu mempunyai kekerasan tertinggi. Cincau tanpa kanji sagu (kawalan) mempunyai nilai kelekatan yang terendah secara signifikan ( $p < 0.05$ ). Cincau dengan penambahan 5.5% kanji sagu telah menunjukkan nilai kekenyalan tertinggi secara signifikan ( $p < 0.05$ ). Cincau dengan 6.5% kanji sagu menunjukkan nilai konsistensi yang tertinggi yang mana telah membuktikan peningkatan kepekatan kanji sagu (5%, 5.5% and 6%) tidak mempengaruhi nilai konsistensi. Ini adalah disebabkan penambahan kanji sagu yang berlebihan memerlukan kadar pengacauan yang tinggi yang mana telah menyebabkan semua butiran kanji hancur. Cincau dengan penambahan 5% kanji sagu mempunyai nilai kelekatan tertinggi dan cincau dengan penambahan 5.5% kanji sagu mempunyai nilai keliatan tertinggi. Bagi keputusan aktiviti antioksidan pula, TPC dan DPPH-SA tidak menunjukkan keputusan yang signifikan ( $p > 0.05$ ) dengan peningkatan kepekatan kanji sagu. Sebagai konklusinya, kepekatan yang terbaik ialah cincau hijau dengan penambahan 5.5% kanji sagu kerana ia menunjukkan nilai sineresis yang rendah, memiliki warna hijau yang terang serta tekstur yang optima.

# PHYSICOCHEMICAL PROPERTIES AND ANTIOXIDANT ACTIVITY OF GREEN GRASS JELLY CONTAINING SAGO STARCH

## ABSTRACT

Green grass jelly also called “Cincau hijau” is one of the popular traditional dessert in Asia country especially Indonesia. Normally it served with hot or chilled drinks together with a sweet base like fruit syrup, coconut milk and ice. Green grass jelly however exhibits very high syneresis during storage. Hence, in this study, sago starch at different concentrations (0, 5, 5.5, 6 and 6.5%) were added into the green grass jelly formulations to overcome the syneresis issues. Besides, effects of the sago starch on the physicochemical and antioxidant activity of the newly developed green grass jellies were analyzed. Formulated green grass jellies were analyzed for physicochemical analysis syneresis, colour, texture and antioxidant properties (total phenolic content (TPC) and antioxidant activity (2, 2-diphenyl-1-picrylhydrazyl free radical scavenging activity (DPPH-SA)). The value of syneresis decreased significantly ( $p < 0.05$ ) with increasing the sago starch concentration. As for the colour analysis,  $L^*$  values which indicate the lightness were increased significantly ( $p < 0.05$ ) with increasing of sago starch concentrations. Besides,  $-a^*$  value which indicate the greenness showed that jelly without addition of sago starch (control) was significantly different ( $p < 0.05$ ) compared to those added with sago starch. This is probably due to gelatinization of starch granules occurred during the cooking process. Yellowness ( $b^*$ ) value of the jelly were significantly ( $p < 0.05$ ) increase with increases in sago starch concentration. As for texture analysis there were significant different ( $p < 0.05$ ) in hardness values of green grass jelly between control and those added with sago starch. Jelly with addition of 5% sago starch appeared to have the

highest hardness. While control samples showed significantly ( $p < 0.05$ ) lower in adhesiveness. In term of springiness, higher in jelly added with 5.5% sago starch. Jelly with 6.5% sago starch showed highest cohesiveness value which indicates small increase in sago starch concentration (5%, 5.5% and 6%) did not affect the cohesiveness. This is because of excessive sago starch needed excessive stirring which can cause completed rupture of the granules. Gumminess and chewiness showed similar trend where jelly added with 5% sago starch have highest gumminess and jelly with 5.5% sago starch have highest chewiness. TPC and DPPH-SA showed no significant different ( $p > 0.05$ ) with increasing sago starch concentration. As conclusion, the best concentration is green grass jelly with 5.5% sago starch since it has the lower syneresis value, exhibit darker green colour together with optimum texture.