PUSAT PENGAJIAN TEKNOLOGI INDUSTRI

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BORANG PENYERAHAN DISERTASI MUTAKHIR

SATU (1) NASKAH

Nama penyelia: Dr Maizura Murad

Bahagian: Teknologi Makanan

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mengenai disertasinya sebagaimana yang dipersetujui oleh Panel Pemeriksa di *Viva* Voce-nya.

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DEVELOPMENT OF DRIED BLACK GRASS JELLY (*MESONA CHINENSIS*) CONTAINING DIFFERENT TAPIOCA AND SAGO STARCH RATIO

by

OON LI JUEN

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Universiti Sains Malaysia

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DECLARATION BY AUTHOR

This dissertation is composed 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 which 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.

OON LI JUEN

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Abbreviations	Definitions
M. chinensis	*Mesona chinensis*
M_e	Equilibrium moisture content
Wt.	Weight

PENGHASILAN CINCAU HITAM KERING (*MESONA CHINENSIS*) YANG MENGANDUNGI NISBAH KANJI TAPIOKA DAN SAGU YANG BERBEZA

ABSTRAK

Cincau hitam ialah pencuci mulut yang dihasilkan dengan menggunakan ekstrak daun cincau kering daripada pokok *Mesona chinensis*. Cincau hitam komersial mempunyai jangka hayat pendek apabila disimpan pada suhu bilik. Ini adalah disebabkan oleh penggunaan kanji tapioka yang mengakibatkan kadar sineresis cincau menjadi lebih tinggi dengan tekstur yang tidak stabil. Oleh itu, objektif kajian ini adalah untuk menghasilkan cincau hitam kering dengan nisbah kanji tapioka dan sagu yang berbeza untuk meningkatkan jangka hayat cincau hitam. Cincau hitam dihasilkan dengan menggunakan nisbah kanji sagu dan tapioka yang berbeza (0:100, 25:75, 50:50, 75:25, 100:0) dan seterusnya dikeringkan pada masa pengeringan yang berbeza (0, 3, 6, 9, 12, 24, 30 jam) serta dihidrasikan semula pada 90 ℃ untuk 15 minit. Cincau hitam kering dengan menggunakan nisbah kanji sagu dan tapioka yang berbeza telah berjaya dihasilkan. Kesan nisbah kanji sagu dan tapioka yang berbeza serta masa pengeringan terhadap ciri-ciri fizikal cincau hitam telah diselidiki. Dengan ini, analisis-analisis seperti kandungan kelembapan, warna, tekstur, sineresis, kinetik pengeringan (kandungan kelembapan berlawanan masa pengeringan) dan keupayaan rehidrasi telah dijalankan. Kandungan kelembapan cincau hitam segar yang mengandungi kedua-dua jenis kanji berkurang secara signifikan ($p<0.05$) dengan peningkatan nisbah kanji sagu. Nilai-nilai parameter warna serta tekstur kecuali keanjalan, cincau hitam segar bertambah secara signifikan ($p<0.05$) berbanding dengan sampel kawalan apabila nisbah kanji sagu ditambah sehingga melebihi 75%. Penggunaan nisbah kanji sagu dan tapioka berbeza tidak mempunyai kesan signifikan ($p>0.05$) terhadap sineresis cincau hitam segar selepas disimpan selama 24 jam. Sineresis cincau hitam segar bertambah

secara signifikan ($p<0.05$) dengan pertambahan masa penyimpanan. Hubungan tidak linear telah dikesan pada graf keluk pengeringan cincau hitam yang dianalisakan. Cincau hitam dihidrasi semula yang dihasilkan dengan nisbah kanji sagu dan tapioka yang sama (50:50) mempunyai perbezaan warna yang paling tinggi ($p<0.05$) serta nisbah rehidrasi yang paling rendah ($p<0.05$) berbanding dengan sampel kawalan (100% kanji tapioka), dan ini adalah disebabkan oleh pemerhatian tahap pengecutan cincau hitam kering tersebut yang lebih tinggi. Kombinasi kanji sagu dan tapioka adalah tidak baik untuk sifat-sifat struktur cincau hitam selepas dikeringkan. Kesimpulannya, cincau hitam kering dihasilkan dengan 100% kanji tapioka atau kanji sagu mempunyai kualiti yang lebih baik berbanding dengan yang dihasilkan dengan nisbah kanji sagu dan tapioka yang sama (50:50).

DEVELOPMENT OF DRIED BLACK GRASS JELLY (*MESONA CHINENSIS*) CONTAINING DIFFERENT TAPIOCA AND SAGO STARCH RATIO

ABSTRACT

Black grass jelly is a herbal dessert made from dried leaves extracts of *Mesona chinensis* plant. Commercial black grass jelly exhibits a short shelf life when stored at room temperature due to the usage of tapioca starch which results in a higher syneresis rate and unstable texture. Hence, the objective of this research is to develop dried black grass jelly with different tapioca and sago starch ratio for increasing the shelf life of the black grass jelly. The black grass jelly was formulated with different sago and tapioca starch ratio (0:100, 25:75, 50:50, 75:25, 100:0), thereafter dried at different drying time (0, 3, 6, 9, 12, 24, 30 hr) and rehydrated at 90 ℃ for 15 min. The development of dried black grass jelly containing different tapioca and sago starch ratio was successful. The effects of different sago and tapioca starch ratio and drying time on the physical properties of black grass jelly were determined. Hence, analyses on the moisture content, colour, texture, syneresis, drying kinetics (moisture content against drying time) and rehydration capacity were conducted. The increase in sago starch ratio significantly decreased ($p<0.05$) the moisture content of fresh black grass jelly consisting of both starches. The values of all the colour parameters and textural parameters except springiness, of the fresh black grass jelly increased significantly ($p<0.05$) in comparison with control sample when the sago starch ratio was increased to more than 75%. Different sago and tapioca starch ratio did not significantly affect ($p>0.05$) the syneresis of black grass jelly after storage for 24 hr, however the syneresis of fresh black grass jelly significantly ($p<0.05$) increased with the increase in storage time. A non-linear relationship was observed on the drying curve of black grass jelly. Rehydrated black grass jelly with an equal sago to tapioca starch ratio (50:50) had the

greatest ($p<0.05$) colour difference with a significantly lower ($p<0.05$) rehydration ratio in comparison with the control sample (100% tapioca starch) due to the higher degree of shrinkage. The combination of sago and tapioca starches was not favourable for the black grass jelly structure properties after drying. Thus, it was deduced that the quality of dried black grass jelly containing either 100% tapioca or sago starch was better than that containing equal sago to tapioca starch ratio (50:50).