

**KESAN PENAMBAHAN *Eucheuma cottonii* DAN  
KARAGINAN SEPARA TULENNYA KE ATAS  
CIRI-CIRI PEMPELAN BEBERAPA  
JENIS KANJI**

**ONG CHEE KONG**

**SEKOLAH SAINS MAKANAN DAN PEMAKANAN**

**2005**



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TULENNYA KE ATAS CIRI-CIRI PEMPELAN BEBERAPA  
JENIS KANJI

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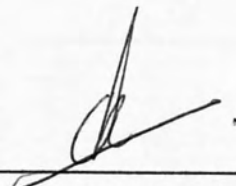
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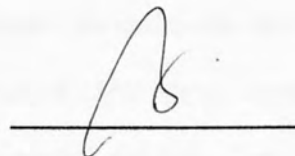


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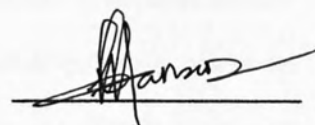
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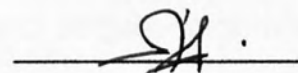
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## PENGHARGAAN

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## ABSTRAK

Kajian tentang kesan penambahan serbuk *Eucheuma cottonii* dan karaginan separa tulennya ke atas retrogradasi dan ciri-ciri pempesan beberapa jenis kanji telah dijalankan. Serbuk *Eucheuma cottonii* disediakan dengan mengisar rumpai laut *Eucheuma cottonii* yang kering. Peratusan perolehan penghasilan serbuk rumpai laut (SRL) adalah sebanyak 73.3% hingga 79.2%. Karaginan separa tulen (KST) diekstrak secara langsung daripada rumpai laut *Eucheuma cottonii* dengan menggunakan kalium hidroksida (0.2 N) pada suhu 80°C selama satu jam. Peratusan perolehan pengekstrakan KST adalah sebanyak 6.5% hingga 7.3%. Analisis spektrum inframerah dengan menggunakan *Fourier Transform Infrared Spectroscopy* (FTIR) mengesahkan bahawa kandungan utama karaginan separa tulen yang terekstrak daripada *Eucheuma cottonii* adalah karaginan jenis kappa. Kandungan amilosa kanji jagung, kanji ubi kentang dan kanji ubi kayu adalah sebanyak  $25.9 \pm 0.74\%$ ,  $21.0 \pm 0.57\%$  dan  $10.3 \pm 0.11\%$  masing-masing. Penambahan 1% SRL meningkatkan peratusan retrogradasi kanji ubi kayu dan kanji ubi kentang ( $p < 0.05$ ) tetapi tiada perbezaan yang signifikan ( $p > 0.05$ ) didapati terhadap peratusan retrogradasi kanji jagung apabila ditambah dengan 1% SRL atau 1% KST. Selain itu, penambahan 1% KST hanya meningkatkan peratusan retrogradasi kanji ubi kayu sahaja ( $p < 0.05$ ). Kesan penambahan 1% SRL atau 1% KST terhadap retrogradasi kanji adalah mengikut turutan kanji ubi kayu > kanji ubi kentang > kanji jagung. Kesan penambahan SRL (1%, 2%, 4%, 6%, 8%, 10% and 20%) dan KST (0.2%, 0.4%, 0.6%, 0.8%, 1% and 2%) terhadap ciri-ciri pempesan kanji telah dikaji. SRL dan KST menghasilkan pelbagai kesan terhadap ciri-ciri pempesan kanji dan didapati mengakibatkan perubahan pada lengkung pempesan kanji. Kesignifikanan kesan penambahan KST dan SRL terhadap ciri-ciri pempesan kanji adalah mengikut turutan kanji ubi kentang > kanji jagung > kanji ubi kayu. Penambahan KST memberi kesan yang lebih nyata ( $p < 0.05$ ) daripada SRL. Kelikatan puncak kanji ubi kentang direndahkan dengan ketara ( $p < 0.05$ ) kerana cas negatif pada kappa-karaginan menghadkan pengembangan granul kanji ubi kentang. Telah didapati bahawa penambahan SRL atau KST yang tinggi (>1%) akan menghasilkan dua puncak pada lengkung pempesan kanji ubi kentang. Pemerhatian mikroskop membuktikan bahawa puncak pertama dihasilkan akibat pengembangan granul kanji, manakala puncak kedua adalah disebabkan oleh kesan pemekatan kandungan kappa-karaginan dalam SRL atau KST. Secara umumnya, penambahan SRL dan KST cenderung menganjakkan lengkung pempesan kanji ke kiri dan memanjangkan masa ke puncak ( $p < 0.05$ ).



## ABSTRACT

### **EFFECT OF *Eucheuma cottonii* AND ITS SEMI-REFINED CARRAGEENAN ON PASTING PROPERTIES OF A FEW STARCHES**

The studies of the effect of *Eucheuma cottonii* and its semi-refined carrageenan on pasting properties of different starches had been carried out. Seaweed powder (SRL) was prepared by grinding dried *Eucheuma cottonii* seaweed. The percentage recovery of SRL was range from 73.3% to 79.2%. Semi-refined carrageenan (KST) was extracted directly from *Eucheuma cottonii* seaweed using Potassium hydroxide (0.2 N) at temperature 80°C for an hour. The percentage of recovery from the extraction of KST was in the range of 6.5% to 7.3%. Infrared spectra analyses using Fourier Transform Infrared Spectroscopy (FTIR) confirmed that the extracted semi-refined carrageenan from *Eucheuma cottonii* contains mainly  $\kappa$ -carrageenan. The amylose content of corn starch, potato starch and tapioca starch were found to be  $25.9 \pm 0.74\%$ ,  $21.0 \pm 0.57\%$  and  $10.3 \pm 0.11\%$  respectively. Addition of 1% seaweed powder increased the retrogradation of both tapioca starch and potato starch ( $p < 0.05$ ) but no significant difference ( $p > 0.05$ ) was found on corn starch when added with 1% SRL and 1% semi-refined carrageenan (KST). Besides that, addition of 1% KST will only increase the retrogradation of corn starch ( $p < 0.05$ ). The effect of SRL and KST on starch retrogradation was found to follow the sequence of tapioca starch > potato starch > corn starch. Effect of SRL (1%, 2%, 4%, 6%, 8%, 10% and 20%) and KST (0.2%, 0.4%, 0.6%, 0.8%, 1% and 2%) on the pasting properties was also studied, and found to cause changes of pasting profiles. The effect of SRL and KST on starch pasting properties was found to follow the sequence of potato starch > corn starch > tapioca starch. The addition of KST resulted in more pronounced effect ( $p < 0.05$ ) than SRL. The peak viscosity of potato starch was greatly decreased due to the negatively charged kappa-carrageenan that limits its granule swelling. It was found that the addition of higher percentage (>1%) of SRL and KST produced two peaks in the pasting curves of the potato starch. Microscopic examination attributed the first peak to granule swelling while second peak to the thickening effect of kappa-carrageenan in the SRL and KST. Generally, addition of SRL and KST on starches tends to shift the pasting curves to the left and lengthen the peak time ( $p < 0.05$ ).



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**SENARAI SIMBOL**

|                    |   |                    |
|--------------------|---|--------------------|
| >                  | = | Lebih daripada     |
| <                  | = | Kurang daripada    |
| $\kappa$           | = | Kappa              |
| $\dot{I}$          | = | Iota               |
| $\lambda$          | = | Lambda             |
| $\mu$              | = | Mu                 |
| %                  | = | Peratusan          |
| $\alpha$           | = | alfa               |
| $^{\circ}\text{C}$ | = | darjah Celcius     |
| mm                 | = | milimeter          |
| $a_w$              | = | keaktivitipan air  |
| $\text{cm}^{-1}$   | = | persentimeter      |
| $\text{min}^{-1}$  | = | perminit           |
| $\mu\text{m}$      | = | micrometer         |
| rpm                | = | pusingan per minit |
| nm                 | = | nanometer          |
| w/w                | = | berat/berat        |



**SENARAI SINGKATAN**

SRL = Serbuk Rumpai Laut

KST = Karaginan Separa Tulen

RVU = Rapid-Visco Unit



## SENARAI LAMPIRAN

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|                                                                                                                                                                                                                                     |     |
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