



UNIVERSITI PUTRA MALAYSIA

***EFFECT OF DIFFERENT FORMULATIONS OF
COATING MATERIALS ON KENAF PAPER***

HAZWANI HUSNA BINTI ABDULLAH

IPTPH 2012 4



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BERILMU BERBAKTI

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**MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA**

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ON KENAF PAPER**

By

HAZWANI HUSNA BINTI ABDULLAH

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirement for the Degree of Master of Science**

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Abstract of thesis presented to the Senate of Universiti Putra
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Science

**EFFECT OF DIFFERENT FORMULATIONS OF COATING
MATERIALS ON KENAF PAPER**

By

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SEPTEMBER 2012

Chairman: Luqman Chuah Abdullah, PhD

Institute: Institute of Tropical Forestry and Forest Products

Kenaf (*Hibiscus cannabinus L.*), is relatively new industrial crop which has been identified as an alternative sources of fiber supply in the papermaking industry in Malaysia. The hydrophilic character of cellulosic material such as paper has directed many explorations in inventing hydrophobic paper which able to stay dry at certain conditions and period after exposing to water or moisture. In this study, experimental unbleached kenaf kraft paper was prepared as substrate to produce water resistant paper by using coating method. Coating formulation consists of commercial precipitated calcium carbonate (PCC) was used as filler in addition to 20/0 w/w g, 20/0.08 w/w, 20/0.16 w/w amount to hydrophobic stearic acid

(SA). Polymer latex (PL) amount at 20/0.2 w/w, 20/0.4 w/w, 20/0.4 w/w and 20/0.8 w/w were also added into the coating compound to bind the filler particles present in coating formulation. The water absorptiveness of paper was measured via water contact angle and Cobb test while the observation of paper morphology was conducted by employing scanning electron microscope (SEM). The mechanical properties of the coated water resistant paper were measured in order to determine the paper strength. Hydrophobic kenaf kraft paper prepared in this study exhibited reading of water contact angle (θ) greater than 90° which indicates to almost non-wetting condition. Hydrophobic paper of formulation PL4c resulted in the highest value contact angle of 147° . The process of dipping treatment resulted in higher water contact angle reading of the paper surface. This paper surface acquired higher hydrophobic level. However, the coated paper demonstrated decrement in mechanical strength by the increasing addition of stearic acid.

Abstrak tesis yang dikemukakan kepada Senat Universiti
Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master
Sains

**KESAN PERBEZAAN FORMULA BAHAN PENGLITUP KE ATAS
KERTAS KENAF**

Oleh

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SEPTEMBER 2012

Pengerusi: Luqman Chuah Abdullah, PhD

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Kenaf (*Hibiscus cannabinus L.*) merupakan tanaman yang telah dikenalpasti berpotensi sebagai sumber gentian alternatif dalam industri pembuatan kertas di Malaysia. Sifat semulajadi bahan-bahan berasaskan selulosa seperti kertas yang cenderung untuk menyerap air telah membawa kepada penerokaan dalam penghasilan kertas yang kalis air dan sentiasa berada di dalam keadaan kering apabila terdedah kepada cuaca lembap atau basah. Dalam kajian ini, kertas berasaskan kenaf tanpa perlunturan telah disediakan. Ia berfungsi sebagai kertas asas dalam penghasilan

kertas kalis air menggunakan kaedah salutan. Kandungan penyalut terdiri daripada mendakan kalsium karbonat yang bertindak sebagai pengisi, disertakan bersama 20/0 berat/berat g, 20/0.08 berat/berat g, 20/0.16 berat/berat g jumlah PCC kepada asid stearik (SA). Sebanyak 20/0.2 berat/berat g, 20/0.4 berat/berat g, 20/0.6 berat/berat g and 20/0.8 berat/berat g jumlah PCC kepada polimer lateks (PL) juga ditambah untuk pelekatan partikel. Penyerapan air oleh kertas dikira melalui ujian sudut titisan air dan ujian Cobb, manakala pemerhatian terhadap morfologi kertas dijalankan menggunakan Mikroskop Pencerapan Elektron (SEM). Kajian terhadap sifat mekanikal kertas kalis air juga turut dilaksanakan bagi mengetahui kekuatan kertas. Hasil daripada kajian ini menunjukkan kertas kalis air yang disediakan memberikan bacaan sudut titisan air melebihi 90° yang mana ia menunjukkan kertas tidak basah apabila didedahkan kepada air. Kertas kalis air pada formulasi PL4c telah menunjukkan bacaan sudut titisan air yang terbaik. Rawatan perendaman kertas kalis air menggunakan 'potasium stearate' telah terbukti mampu meningkatkan lagi bacaan sudut titisan air seterusnya menjadikan kertas lebih kalis terhadap air. Bagaimanapun penurunan kekuatan mekanikal kertas dilihat dengan penambahan kandungan asid stearik ke dalam penyalut.

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In the name of Allah, the most Gracious and the Most Merciful.

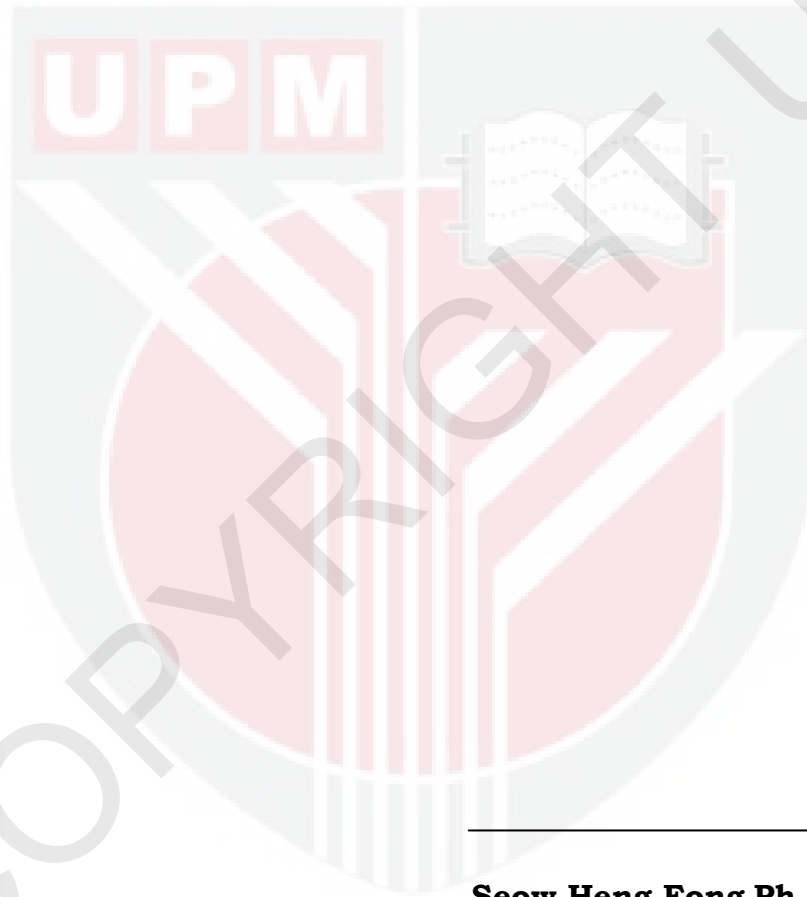
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I certify that the Examination Committee met on Jun 2012 to conduct the final **examination of Hazwani Husna Abdullah on her Master of Science thesis entitled “Effect of Different Formulations of Coating Materials on Kenaf Paper” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981.** The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:



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This thesis submitted to the Senate of Universiti Putra Malaysia has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee are as follows:

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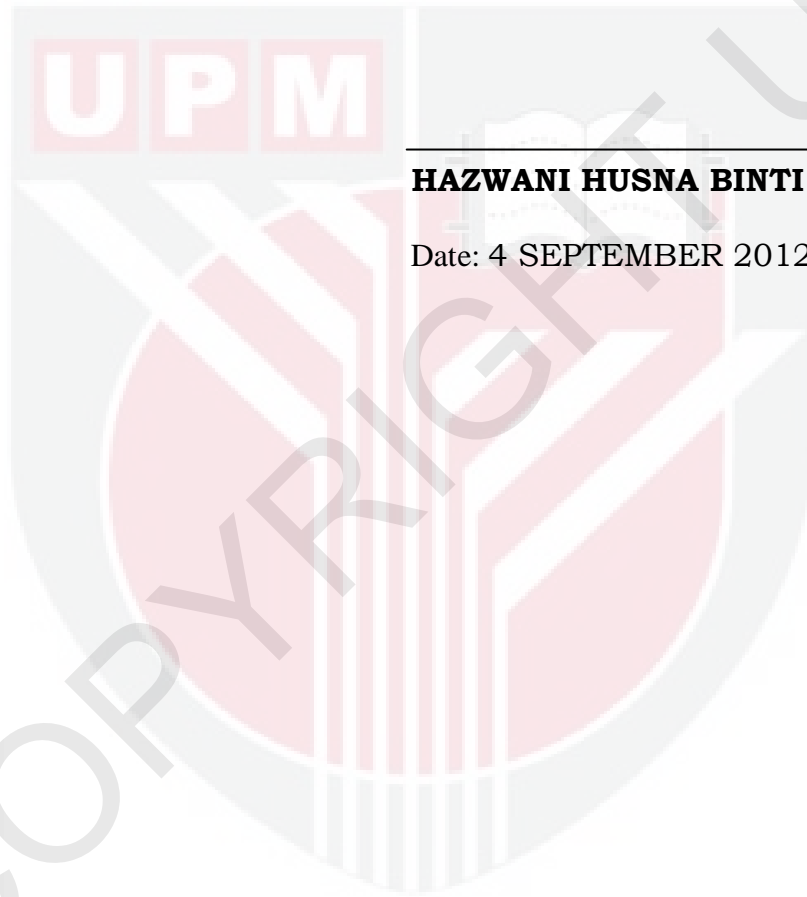
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Date: 19 DECEMBER 2012

DECLARATION

I hereby declare that the thesis is based on my original work except for the quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



HAZWANI HUSNA BINTI ABDULLAH

Date: 4 SEPTEMBER 2012



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