

DIMENSIONAL STABILITY AND STRENGTH PROPERTIES OF
OIL PALM LUMBER WITH BIORESIN TREATMENT

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BIOGRAPHY

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ABSTRAK

Tujuan kajian ini adalah untuk mengukur kestabilan dimensi dan sifat kekuatan kayu sawit yang dirawat dengan gum rosin. Sebanyak 30 pokok sawit yang menghasilkan varieti tenera yang tinggi diperolehi dari Ladang Sungai Kahang di Johor. Bagi sifat-sifat asas, sampel diuji dari zon pith sampai ke pinggir di ketinggian pokok yang berbeza dianalisis dengan menggunakan pelbagai teknik analitik. Semua ujian dijalankan mengikut prosedur ujian standard. Berdasarkan keputusan, parameter dasar yang berkaitan dengan kandungan kelembapan (MC) dan ketumpatan dasar kayu kelapa sawit sangat bergantung pada jarak dalam satah radial dengan ketinggian pokok. Berkenaan dengan rawatan resin, baja kelapa sawit telah dihirup ke dalam batang kayu dan dikeringkan hingga $10 \pm 2\%$ MC. Selepas pengeringan, kayu kering yang telah diresapi dengan gum rosin menggunakan sistem infusi vakum dan diikuti dengan proses densifikasi. Dengan pengenalan alur dan saluran, aliran resin disebarkan secara homogen dalam matriks kayu. Kestabilan dimensi kayu kasar resin yang dipadatkan ditentukan dengan mengukur kecekapan antisuapannya (ASE) manakala tatapan tiga titik lenturan digunakan untuk sifat kekuatan lenturan. Nilai ASE positif menunjukkan bahawa gum rosin telah menembusi dinding sel dan kemudiannya bersilang, yang membawa kepada penumpuan di sepanjang ruang kepingan sel parenchyma. Kekuatan lenturan kayu yang telah menyerap gum rosin dengan ketara lebih kuat dari kayu yang tidak menyerap gum rosin, yang pada gilirannya, berkaitan dengan sifat asas mereka yang berkaitan dengan parameter. Hasil ini secara kolektif harus memberikan sedikit pemahaman untuk memahami faktor-faktor yang mempengaruhi sifat fizikal dan mekanik batang kelapa sawit, yang apabila digabungkan dengan perubahan yang sama dalam pengendalian dan pemrosesan bahan dapat menunjuk jalan ke depan untuk penukaran yang memuaskan dan penggunaan yang efisien untuk pengeluaran kayu gergajian.

ABSTRACT

The purpose of this study was to measure the dimensional stability and strength properties of oil palm lumber treated with gum rosin. A total 30 of oil palm trees of high yielding *tenera* variety were obtained from Sungei Kahang Estate in Johor. For basic properties, test samples in pith to periphery zone at different tree heights were analyzed by using various analytical techniques. All tests were conducted according to standard test procedures. Based on results, basic properties related parameters that include moisture content (MC) and basic density of oil palm lumber were highly dependent on the distance in radial plane with tree heights. With regards the resin treatment, oil palm billets were sawn into lumber scantlings and dried to $10 \pm 2\%$ MC. After drying, dried lumber was impregnated with a gum rosin using a vacuum infusion system and followed by a densification process. With the introduction of grooves and channels, the resin flow were dispersed homogenously within the lumber matrix. The dimensional stability of densified resin treated lumber was determined by measuring its antishwelling efficiency (ASE) while three point bending procedure were employed for flexural strength properties. A positive ASE value indicated that the gum rosin had penetrated into the cell wall and subsequently cross-linked, leading to bulking along interstitial spaces of parenchyma cells. The flexural strength of densified gum rosin-treated lumber was significantly stronger than those lumbars devoided of gum rosin, which in turn, was related to their basic properties related parameters. These results collectively should provide some insight to understanding of factors that influence the physical and mechanical properties of oil palm trunk, which when combined with a corresponding changes in material handling and processing may point the way forward to a satisfactory conversion and efficient utilization for sawn lumber productions.

الملخص

يهدف هذا البحث إلى قياس تحكم وقوة خشب زيت النخيل المعالج بمادة روسين غم (آر جي). وقد تم تحويل خشب النخيل (أو في تي) إلى لوح خشبي باستخدام مم 100 مم عرضاً في 100 مم طولاً في 400 المنشار على شكل لوح بمقياس مم، فقد قسمت العينة إلى 300 عاموداً. وبما أن مساحة قطر الخشب (أو في تي) عينة ، و 60 قسمين هما قسم خارجي وقسم وسطي. وتتكون العينة من عينة للقسم الوسطي. و المادة 30 عينة للقسم الجار جي، و 30 المقسمة على اللزجة المستخدمة في العملية هي روسين غم (آر جي) و هي مادة طبيعية ، وقد تم الحصول عليها من شركة أكروس أور غانك على شكل مادة لزجة، وقد استخدمت 30% استخدمت المادة لإجراء العملية بسهولة

وقد أجرت هذه الدراسة على أنواع خشب زيت النخيل المختلفة كعينة تجريبية و بطرائق متعددة، وتم الاختبار بطريقة من القهم اثار جي ثم الو سطى للخشب. وقد تم تحكم المادة آر جي للخشب المعالج كيمائياً بقياسه ضد الانتفاخ (أس إي)، وتقليل نسبة الماء في العينة، واستخدام جهاز (أس إي أم) لتحديد نسبة تسرب مادة (آر جي). و الطريقة المستخدمة في هذه العملية تسمى بطريقة (أمبر جناسي) وهي عملية تسرب المادة السائلة إلى المواد المضغوطة في اسطة عملية الشفط أو السحب لمادة (آر جي).

وقد أظهرت التجربة والاختبار أن المادة (آر جي) قد تسربت لمادة العينة وفقاً لمقياس جهاز (أس إي إم). كما تدل نتائج الدراسة أن العينة من القسم الخارجى و الو سطى تمتلك درجة (أس إي) الإيجابية، مع نسبة تقليل المادة السائلة بمقدار للقسم الخارجى. و الخلاصة أن مادة (آر جي) 73.9% للقسم الوسط و 69.2% (جي) الطبيعية قادرة على مقاومة المواد السائلة المسببة لتغير الخشب، و أنها هي المادة الحافظة للخشب و المقوية له.

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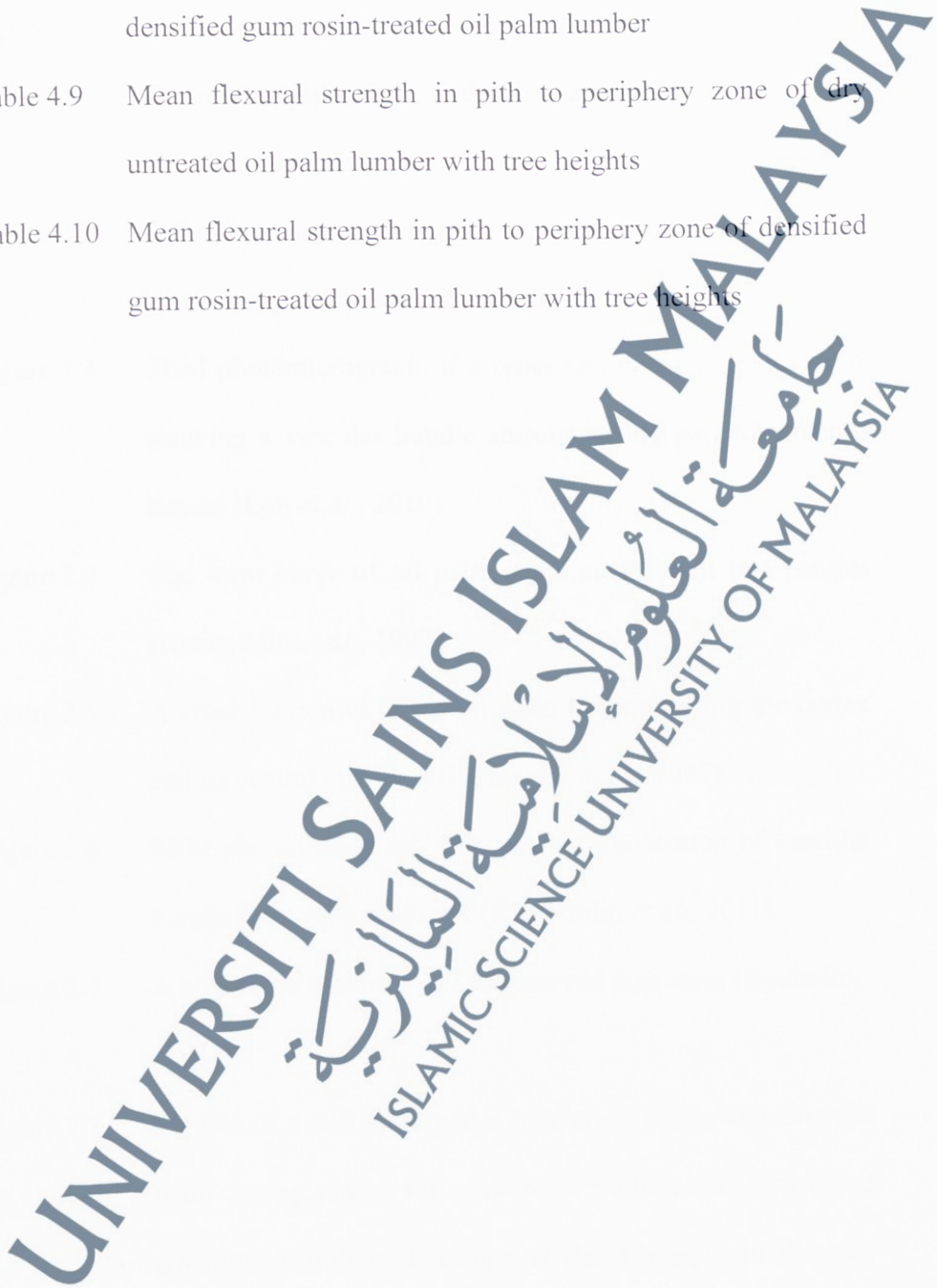
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