Notice to Contributors

1. General
1. Each manuscript should be sent by online submission in Microsoft Word format (e-mail: oi.hiroshi.gm@u.tsukuba.ac.jp). Manuscripts are limited to original works previously published or unpublished in any other journal, and can be printed in Japan TAPPI Journal as a Peer Reviewed or a Technical Report.
2. The length of a submitted manuscript, including Figures, Tables, and References, should be 1400 to 3500 words: A4: (30×21 cm) paper 4 to 8 pages in English.
3. The paper is published in English.

2. Format
1. The manuscript must be in computer-printed form of A4 (30×21 cm) paper. The printed page must be single-spaced, and there should be 3-cm margins on the top, bottom, left, and right of the text. The paper should be organized in the sequence: Title, Author(s), Abstract, Key words, 1. Introduction, 2. Materials and Methods, 3. Results and discussion, 4. Conclusions, Acknowledgments, and References as an extended abstract format.
2. The Abstract (Summary) should not exceed 200 words. No more than 5 phrases are suggested for the list of Key words.
3. Affiliation of the author(s) shall appear beneath the line of author names and in Time New Roman 10 point plain. Please include the address and e-mail of the Corresponding Author. Underline the author who will present the paper.
4. The title shall use Times New Roman 14 point bold. The text shall use Times New Roman 12 point plain. Section titles shall use the same font and size bold.
5. The subsection titles may be organized using the order: 1.1, 1.1.1.
6. Submitted manuscript should be printed in uniform character sizes.
7. Sequences of Figures and Tables shall present in Arabic numerals (Fig. 1, and Table 1). The Fig. title shall be under the graph, and the Table title shall be above the table. Both shall be in bold fonts.
8. When the subject of study is an animal or plant, the first appearance of its name should be accompanied by the Scientific name in italics.
9. Expressions of numbers, units and symbols should follow the rules below:
   (a) All numerals and quantities should be expressed in Arabic numbers, except as the first word in a sentence.
   (b) Length, area, volume, and weight should be expressed or in accordance with SI (System International) units.
Screening of *Ophiostoma* Species for Removal of Hardwood Extractives (Times New Roman 14 point bold)

Yu-chang Su\(^a\), Chen-lung Ho\(^b\), Kuang-ping Hsu\(^b\), Hou-min Chang\(^c\), Roberta Farrell\(^d\), Eugene I-chen Wang\(^b\)* (Time New Roman 12 point plain)

\(^a\)Department of Forestry, National Chung Hsing University, Taiwan (Time New Roman 10 point plain)

\(^b\)Department of Wood Cellulose, Taiwan Forestry Research Institute, Taiwan

\(^c\)Department of Wood & Paper Science, North Carolina State University, USA

\(^d\)Department of Biological Sciences, The University of Waikato, New Zealand

* Corresponding Author, 53 Nanhei Road, Taipei, Taiwan 100, Email: iwang@tfri.gov.tw

Abstract (Times New Roman 12 point plain)

*Ophiostoma* species have been demonstrated to metabolise wood extractives and be useful to the pulp and paper industry. In order to have new isolates for the Asian market, *Eucalyptus camadulensis* logs were harvested from forest sites in central Taiwan and 28 strains of the *Ophiostoma* genus were isolated from them. These strains were subsequently inoculated onto *Eucalyptus* wood chips to evaluate their effects on weight losses of wood and the amounts of acetone extractives degraded. At the same time, Gas Chromatography-Mass Spectroscopy (GC-MS) analysis was conducted and by using internal standards and a database of GC-MS mass spectra, changes in lipophilic compounds were analyzed. Fatty acids, hydrocarbons, sterol compounds, sterol esters and triglycerides were significantly reduced after two weeks inoculation by the fungal strains. The results show that 6 of the strains were capable of reducing the lipophilic fractions by more than 60% in a 2-weeks treatment. DNA of the most effective strains were analyzed and found to be a variant of *Ophiostoma querci* (164 words).

Key words: *Eucalyptus camadulensis*, *Ophiostoma*, lipophilic, pitch.

1. Introduction (Times New Roman 12 point bold)

Organic solvent extractable substances from wood are complex fractions consisting of fats, waxes, resin acids, free and esterified sterols, alcohols, terpenoids, and phenolics. These substances often interact during the pulping and papermaking processes to cause serious pitch troubles, causing decreased quality in paper products and hampering production. Compositions of the extractives vary depending on tree species and seasons of wood harvesting. Lipophilic extractives in particular exert strong negative impact on manufacturing processes, causing so-called pitch deposits on pulp and paper and on
paper machine parts.

2. Materials and Methods (Times New Roman 12 point bold)

2.1 Materials

Twenty-eight strains of fungi were isolated according to the methods of Duncan and others\(^1\) from cut logs of Murray red gum (*Eucalyptus camaldulensis*) trees harvested from a plantation in central Taiwan. After harvesting the chipped wood was air-dried for a week before proceeding for treatments. *O. floccosum* and the Cartapip™ 97 were kindly provided by University of Waikato, New Zealand and Parrac Ltd, New Zealand, respectively.

2.2 Pulping procedure

*E. camaldulensis* wood chips (air-dried) were made 1-2 cm\(^2\) in size, and sterilized by autoclaving at 121°C for 15 min.

3. Results and Discussion (Times New Roman 12 point bold)

3.1 Lipophilic extractives in eucalypt wood and pulp

Table 1 shows changes in the amounts of wood extractives after autoclaving and after kraft pulping. Wood chips contained 0.82% (wt.% on dry wood) of acetone (at room temperature) fraction. The control wood chips, on the other hand, had only 0.58% cold acetone extractives, 80% of which is chloroform extractable, or lipophilic fraction. The wood extractive content and the amount of lipophilic extractives were similar to those of Gutiérrez et al. and Rencoret et al. After pulping, only 0.11% (with respect to dry wood) of cold acetone extractive remained, and most of which belonged to lipophilic fraction. Thus, most of the polar components dissolved during pulping and only lipophilic fraction remained. The lipophilic fraction is often blamed for causing pitch trouble and deposition problems.

Table 1. Changes in amounts of extractives after autoclaving and kraft pulping (Times New Roman 12 point bold).

<table>
<thead>
<tr>
<th>Extractives</th>
<th>Wood chips(^a)</th>
<th>Control(^b)</th>
<th>Pulp(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone extractive</td>
<td>0.82</td>
<td>0.58</td>
<td>0.11</td>
</tr>
<tr>
<td>Total lipophilos</td>
<td>0.66</td>
<td>0.47</td>
<td>0.1</td>
</tr>
<tr>
<td>Polar compounds</td>
<td>0.16</td>
<td>0.11</td>
<td>0.01</td>
</tr>
</tbody>
</table>
3.2 Composition of lipophilic extractives

Figure 1 shows the comparison of the GC-MS chromatograms of lipophilic compounds in wood chips and kraft pulp of *E. camaldulensis*. For wood chips, the most abundant lipophilic compounds were steryl ester and triglycerides which constituted 57% of all lipophilic fractions. These results are similar to the observations of Freire and others\textsuperscript{[2]}. However, these compounds were relatively rare in the kraft pulp. This was due to their saponification and hydrolysis in the alkaline cooking liquor. These results are similar to the observations of Chen and others\textsuperscript{[3]} on aspen. Sterols were the second most abundant compounds in wood, making up 18% of all lipophiles. Eleven of which had been identified, and β-sitosterol was the most abundant sterol, which tended to remain in the pulp as well. Although 2 compounds each of the steroid ketones and steroid hydrocarbons were found in wood, there were only trace amounts of these in the pulp. Five hydrocarbons were also identified in wood, but 40% of these still appeared in pulp. Though present in low amounts in wood, fatty alcohols tended to increase in the pulp. This was deemed to be the result of hydrolysis products.

Fig. 1 Composition of lipophilic extractives of *E. camaldulensis* wood.

As shown in Fig. 2, the most abundant lipophilic compounds were steryl ester and triglycerides which constituted of all lipophilic fractions. These results are similar to the observations previously found. However, these compounds were relatively rare in the kraft pulp. This was due to their saponification and hydrolysis in the alkaline cooking liquor.
liquor. These results are similar to the observations on eucalyptus kraft pulp. Sterols were the second most abundant compounds in wood, making up 18% of all lipophiles. Eleven of which had been identified, and β-sitosterol was the most abundant sterol, which tended to remain in the pulp as well. Although 2 compounds each of the steroid ketones and steroid hydrocarbons were found in wood, there were only trace amounts of these in the pulp. Five hydrocarbons were also identified in wood, but 40% of these still appeared in pulp. Though present in low amounts in wood, fatty alcohols tended to increase in the pulp. This was deemed to be the result of hydrolysis products.

4. Conclusions (Times New Roman 12 point bold)

When *E. camadulensis* wood chips are pulped using kraft process, more than 90% of its acetone extractives belong to lipophilic fractions. Lipophilic fractions from wood and pulp have compounds such as hydrocarbons, waxes, sterols, steryl ketones, steryl hydrocarbons, steryl esters and triglycerides, fatty acids, fatty alcohols and other compounds.

Acknowledgement (Times New Roman 12 point bold)

We acknowledge financial support from the Foundation for Research Science and Technology in New Zealand and from Council of Agriculture, Executive Yuan, Taipei, Taiwan. Contract/grant number: 95AS-12.2.2-FI-G7 for financial support for this investigation.

References (Times New Roman 12 point bold)


