The Canadian Ecology Centre
FORESTRY Research Partnership
TREE TIPS
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MAXIMIZING THE VALUE OF ONTARIO'S HARDWOOD RESOURCE THROUGH INTENSIVE SILVICULTURE AND IMPROVED UTILIZATION

Forest Research Partnership Project No. 150-301

The Aim

The overall objective of this project is to maximize the value of tolerant hardwood forests by investigating internal wood quality as a criterion for the evaluation of silvicultural treatments. Sugar maple lumber value is closely related to its grade which in turn depends on internal log characteristics. This study will 1) establish relationships between external tree characteristics and internal wood characteristics; 2) develop models to predict lumber volume, quality and value yield in sugar maple; 3) assess the impact of logging damage on lumber yield; 4) evaluate potential volume and value gains through complete utilization and optimized bucking and sawing practices.

The Approach

The study was established in 1983 to investigate the long term growth rates in a tolerant hardwood stand following a single tree selection harvest with a high frequency of logging damage. Stand growth was studied over one cutting cycle (20 years) following the harvest. The first phase of this project, started in 2003, permitted for the clear cut harvest of most commercial Sugar maple trees in 3 of the 12 study plots. Stems were bucked to maximize sawlog products and each of these were carefully processed in an experimental sawmill. Lumber volume, grade and value yield was calculated for each sample tree. All wounded logs as well as a sample of logs without previous harvesting damage were investigated using computer tomography (CT scanner) before they were sawn. Disks were also collected at both ends of each log to allow for a stem analysis. The second phase of the project will deal with CT images processing, virtual reconstruction of the stems, examination of internal log defect as related to wound size and location and the development of an optimized sawing software.

Harvest operations

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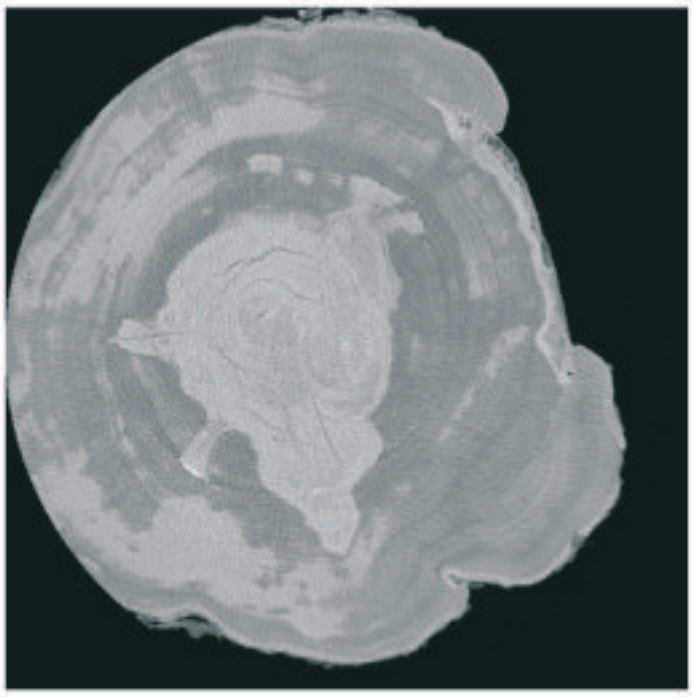

A Sugar Maple log as seen through the CT scanner

The Tree Tip

TREE GROWTH

Growth rates after the first single tree selection harvest varied with initial tree size. Relative dbh growth was greatest in poles and gradually decreased with increasing tree size. Overall, good quality trees (AGS) showed higher relative dbh growth when compared to trees with poor quality attributes (UGS).

VOLUME YIELD AND LUMBER VALUE

In AGS trees, decay content in stem (%) remained constant from one size class to the other. In UGS trees, however, decay content increased proportionally with increasing tree dbh. Consequently, a difference appears in UGS trees between gross (total) and net (total minus rot) stem volume. In large trees (dbh > 49 cm), this difference is 16 % on average. Lumber yield in board foot (bf) and lumber value ($) show a plateau in medium UGS trees (37-49 cm in dbh) and then tend to decrease. In this study, the largest AGS tree harvested was 47 cm in dbh, so that no large AGS trees were available for analysis. However, the volume (m^3), lumber (bf) and value ($) curves don't show any decreasing trend with increasing size in AGS trees.

IN CONCLUSION

Growing large sized Sugar maple trees seems highly valuable in hardwood stands managed under single tree selection harvests as long as these trees are of adequate quality (AGS). These trees show a stronger reaction after partial harvest and produce stems that are practically free of decay. Their rapid growth contributes to an increased lumber volume production in the stand. In addition, their board foot and lumber value yield show an exponential increasing trend with increasing tree size.

The Team

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For more detailed information, please visit:
http://forestresearch.ca/partnership_projects/forest_management_context/150-301.htm