

# Colouring and Decolourizing Wood via Biotechnology

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# Introduction

- Would you like products with attractive appearance?
- Would you like to get higher quality and enhance value of your lower grade material?
- **Biotechnology can help you!!!**



# Needs

- Enhance low grade hardwood value (non-uniform or undesirable colors)
  - Lumber: Regular vs Sap : ↑ 200 to 450 \$/Mbfm;
  - Floor board: uniform color = ↑ 1 to 2 \$/sq.ft.
- Market release of new exclusive and attractive products
- Access to wood products with wider color spectra (attractive, consistent and specific or multiple colors patterns)
  - Durable product, resistant to stain and derived from a biological process
- Alternative biological process:
  - Finishing products (Surface coloration)
  - Thermo modified wood (Less color variety, expensive and high energy-consuming)

# Approach

- Sugar maple, white birch, yellow birch (sapwood, heartwood)
- Dip-treatment for 30 seconds in spore suspensions
- Incubation at 25°C and 75% RH
- 4 weeks for coloration
- 8 weeks for decoloration
- Wood color changes visually inspected weekly and final colors measured with a colorimeter
- Evaluation of color uniformity, penetration and weathering (indoor sunlight exposure)



# Results and impacts

- Wood **coloration** with fungal cultures is promising

- 15 fungal species identified



- Colors: pink, red, brown, orange, yellow, green, black, blue and purples

- Uniformity



- Penetration



- Sapwood vs Heartwood



- Rainbow pattern



# Results and impacts

- **Decolorizing** wood with fungal cultures is promising
  - 17 fungal species identified
  - Chemical stain and biological stain decoloration

- White pine blue stain



- White pine coffee stain



- Sugar maple stains



- Yellow birch stains



# *Results and impacts*

- Patent deposit
  - Canada /US (2010)
  - International (2011)
- Increase the average value of the hardwood lumber product mix by production of attractive and consistent wood colours and patterns
- Increase low grade lumber value for the primary industry
- Reduction in value losses by elimination of undesirable wood colours for the secondary industry
- Biological stain, environmentally-friendly and attractive product for end-users

# Conclusion

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- Biotechnology developed in this project has high commercial potential to produce attractive wood colors and patterns and to eliminate undesirable wood colors



# Conclusion

- Phase 2 is needed for :
  - Develop a large-scale treatment process
  - Process optimization:
    - uniformity, penetration depth, color intensity
    - treatment time
    - Repeatability with different batches and resources
  - Determine costs on a commercial scale
    - Estimated product cost: 4 to 8\$ per Mbfm (based on similar products)