



Impact Story n° 4

Short-rotation woody crops

For many, trees are a symbol of age and resilience. For example, in the right conditions, white spruce trees can live for more than 350 years.

Foresters may not have centuries to wait for a tree to grow, but the usual fifty or sixty years from planting to harvest is still a long time to wait. What if foresters could cut their waiting time from half a century to less than 20 years?

Old-growth forests, their ecosystems and species diversity would be left intact, while greenhouse gas emissions were mitigated and more wood fibre generated.

Between 2002 and 2005, Derek Sidders and Tim Keddy of the Canadian Forest Service's Canadian Wood Fibre Centre (CWFC), established an 18 hectare short rotation woody crop (SRWC) site at the University of Alberta's Ellerslie Research Farm in Edmonton, Alberta to do just that. Since 2005, Derek and Tim have expanded the amount of land planted with trees and the number of research partners; collaborating with universities, governments, private landowners and the forest sector.

2 year-old



14 year-old

3 year-old

The Ellerslie research site was a key part of forming a national network of forest innovators and practitioners, Indigenous community leaders, landowners, suppliers and carbon budget researchers. Together they found a way to produce quality woody biomass and quickly identified all environmental and economic benefits. First Nations peoples in the Prairies were key partners as the research group established several successful plantations while sharing new techniques so that communities could independently establish forests on land not previously forested.

Fast-growing tree crops

Compared to slower growing trees such as spruce, hybrid poplar and selected aspen grown in these plantations are ready for harvest in less than 20 years. The technology development specialists established a mixedwood crop to evaluate how short-rotation or fast-growing tree crops (12 to 17 years to maturity) could sustain and expand the bioenergy sector. High-yield crops like these are crucial for this sector, which relies on woody biomass to produce clean energy.

Mixedwood afforestation with these trees mimics existing natural mixedwood forests in western Canada, where the hardwood poplar canopy protects softwood trees. This crop maximizes the land's biomass, fibre and carbon storage potential. Testing the tree crop on non-forested agricultural land, the team also studied how to lower harvesting, processing and transportation costs; making the woody crops economical for everyone.

The bottom line - multiple positive impacts: environmental, economic and more

Tree crops are a low-cost, high-yield way to afforest land, store carbon, create a new source of fibre for commercial forest products and produce biomass for energy.

These positive impacts were well-demonstrated at the Ellerslie site where the CWFC researchers developed as well as tested non-chemical planting and management strategies that enabled the trees to grow at least eight times faster than the national forest growth average.

The trees in SRWC plantations are potential "cash crops." Landowner can grow, and sell, quality wood fibre and woody

biomass. Consumers benefit too as SWRC plantations can be a source of consistent, local high quality products.

SRWC plantations also help mitigate climate change by storing high amounts of carbon dioxide (CO₂). CWFC research shows that each year, each hectare of a plantation can store 17.8–24.3 tonnes of CO₂. This compares to rates of about 6 tonnes per year for mature forests in Canada. These higher rates for SRWC plantations can help mitigate climate change impacts. This is especially important given climate change and the change in the increase and intensity of many natural disturbances affecting forests. These disturbances, such as extreme weather events, wildland fires and forest pests are mostly uncontrollable and can significantly affect how consistently Canada's managed forests absorb more CO₂ than they emit. Improved forest management and use of harvested wood products can mitigate the effects of climate change.

The CWFC's short rotation wood crop research provides the knowledge and technology needed to mitigate the effects of climate change by improving how forests are managed and harvested wood products are used.

"Forestry is a long-term game," Tim Keddy says. "It doesn't happen very often in a forestry career where you get to establish a plantation and then get to harvest it for the products for which it was intended. It's been an exciting and fulfilling 18 years of research!"

Learn more

Read more about short rotation woody crops:

- http://www.biofuelnet.ca/nce/wp-content/uploads/2015/11/Sidders_Guelph-Field-Day_04Nov15.pdf
- <https://forestsfields.com/breakingnews/farming-trees-in-canada-blog-now-live>
- <https://www.processwest.ca/features/short-rotation-woody-crops-could-save-us-from-disaster/>

Read more about managed forests and carbon:

- <https://www.nrcan.gc.ca/our-natural-resources/forests-forestry/state-canadas-forests-report/how-does-disturbance-shape-canad/indicator-carbon-emissions-removals/16552>

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