RÉSEAU BIOFUELNET CANADA

MISSION:POSSIBLE

Science Targets Better Growth, Lower Costs

Farmers may be hard to impress, but offer them more for less, and their eyes light up like it's Christmas morning. That's the goal of the project "Purpose-Grown Biomass Crops: Efficient Production, Yield Modelling and Real-world Verification". In seeking to gauge the ability of plant-growth promoting substances and organisms to enhance growth and decrease production costs in four biomass crops, this study could be the **gift that keeps on giving**.

"Our first objective is to assess the yield potential of two grass species - **switch grass and Miscanthus** - and two tree species, namely **hybrid-poplar and willow**," said **Dr. Kevin Vessey**, a professor of biology in the Faculty of Science at Saint Mary's University in Halifax. Dr. Vessey is co-lead of the project with **Dr. Yousef A. Papadopoulos**, research scientist, Science and Technology Branch, Agriculture and Agri-Food Canada (AAFC).

Putting research to the test

Researchers will test the four crops on poor quality, "marginal" land at eight sites across Nova Scotia, spanning from the far south to the northernmost point of the province. The range of locations should give a **sense of how the crops grow in various soils and climates of Nova Scotia**, a matter that as yet is not well researched.

At the same time, scientists are testing some locally sourced organic **soil amendments** to evaluate their impact on growth of the four crops.

The first of these substances is **pulp mill wood residue,** a waste product that pulp mills often end up burying in landfills and paying for the privilege. It is almost pure carbon fiber, and some research has found it to be an effective soil conditioner, especially in poor quality soils.

Liquid asset

Another possible treatment being examined is **liquid anaerobic digestate**. Digestate is produced from the processing of biodegradable materials like agricultural waste at an anaerobic digestion plant. Because it contains nitrogen, phosphorous and a wide range of organic compounds, it can also act as a strong soil conditioner.

Lastly, the research team is exploring something that sounds like the latest fad diet: **seaweed extract**.

"A local company has been producing this extract for a long time," said Dr. Vessey. "We work with it in various crops and find that it contains substances similar to plant hormones that can increase the growth rate of the roots, even in biomass crops."

In part, the uniqueness of this research stems from its focus on "closing the loop" by trying to find locally sourced, low quality products generated by biomass processes and putting them back on the land to grow more biomass crops. Since the quality of soil used in the study is lacking, scientists hope that these additives can help with crop establishment. If so, they could make the crops **more vigorous** in the first year and better able to thrive in the years to come.

The prospects for growers of biomass crops are intriguing, and the impact on Nova Scotia's economy could be considerable.

At present, the biomasss-for-biofuel industry in the province is extremely small. There are anaerobic digesters producing biogas to run turbines, the NS Power biomass power plant in Port Hawkesbury, and some sawmills using wood fiber residue to generate their own heat and power. But instead of just burning biomass, scientists want to use it for higher value products like biogas, biodiesel and biojet fuel.

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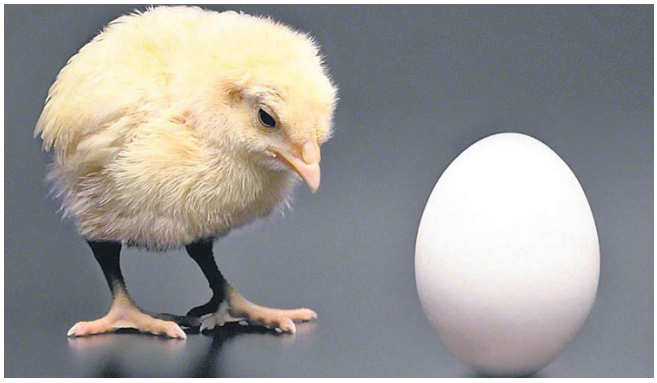

Which comes first?

"Nobody is producing these products in Nova Scotia right now because of the 'chicken and egg' dilemma," said Dr. Vessey. "When we try and attract biofuel-producing companies, they want to know how much biomass they can source, what the quality will be, and at what price they can get it delivered to their factory gate for the next 20 years. The reality is that we just don't have those answers, and no enterprise will spend tens of millions of dollars to build a factory without a defined supply chain for biomass."

By the same token, farmers won't invest the time and money to produce millions of tonnes of biomass unless they are assured of a market for it.

"With this project, we are taking data from the various sites and putting it into a modelling system," said Dr. Papadopoulos. "This will provide **real world verification** for what producers can expect when growing certain crops under certain conditions. We will then be holding field days for farmers to demonstrate how well these crops grow in different parts of Nova Scotia, and the data will indicate potential yields. If someone wants to put a biomass plant in a certain area and wishes to know how much switchgrass they can source within a 50 km radius, **we can tell them that**."

One of the most exciting aspects of the project is how many elements of society it could touch and benefit.

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Less risk, more reward

"For producers, we want to de-risk their work in this area and help them operate successfully both now and in the future," said Dr. Papadopoulos. "We can recommend which crops they should employ to start, and use the field days to make it real for them and show what we have to offer. It's wonderful that we can give growers viable choices of species and varieties within species, share our knowledge and see the impact on their businesses right away. At the same time, we are assisting rural communities in being able to use this land that was previously inaccessible. Finally, we may help convince manufacturers that all critical factors have been addressed to facilitate their investment in biomass."

There are a lot of moving parts to this project, but it's the implications for farmers that most inspire Dr. Vessey.

"Most of the farmers we are working with on this project, and many more around the province, have low quality land that is not making them any money. When they start to see these crops grow on farm, it's like a living lab showing them what is possible in terms of yield potential and improvements to soil quality."

As with any successful research, this project relies on a host of collaborators to make it possible, and Dr. Vessey is grateful to all of them: **Biomass Canada Cluster, Agriculture and Agri-Food Canada**, six **private farmers**, the staff of the **Nova Scotia Federation of Agriculture**, **Port Hawkesbury Paper**, the **Nova Scotia Innovation Hub** and **St. Mary's University**. The Biomass Canada Cluster is funded through Agriculture and Agri-Food Canada's AgriScience program and industry partners. The total value of the cluster is **$8.3 million** over 5 years (2018-2023), with funds from both AAFC and industry partners ($4 million).

With ambitious goals, impactful outcomes and multiple stakeholder support, it's hard not to be impressed by this project...even for a farmer.