

Biomass Crops

A Chicken and Egg Story (Part 2)

Submitted by: J. Kevin Vessey, Biology Dept., Saint Mary's University

In my article in the August/September edition of News and Views, I described a dilemma in the introduction of 2nd-generation biomass crops (i.e. fast-growing grass and tree species grown solely as feedstocks for processing into biofuels and other bioproducts). Part of the problem is that developers and investors will not spend the 10's to 100's of millions of dollars to build a biorefinery to convert the biomass into the bioproducts without having a guaranteed supply of biomass at a price they can afford and with the appropriate quality characteristics. The other part of the problem is that agricultural producers will balk in making investments in time, land and planting materials (i.e. seeds, rhizomes and cuttings) unless they know they will have a market for the biomass they produce. Hence the "chicken and the egg story" – which comes first, the biorefinery to process the biomass, or the biomass to feed into the biorefinery?

A potential solution to this dilemma is being pursued in Nova Scotia. Research is underway to determine the yield potential and quality characteristics of four biomass crops (switchgrass, Miscanthus, hybrid-poplar and willow) at sites across Nova Scotia. The research is being carried out by my research team at Saint Mary's University and in collaboration with colleagues at the Agriculture and Agri-Food Canada (AAFC) Research Station in Nappan, and NSFA members across Nova Scotia.

The research involves establishing 10 experimental sites across Nova Scotia. The yield of switchgrass, Miscanthus, coppiced hybrid-poplar and coppiced

willow will be determined on these sites for 4 years. Each crop will also receive one of three biofertilizers – organic amendments that will be tested for their ability to improve the growth of the crops. We will also determine quality characteristics of the harvested biomass (e.g. nutrient and ash content) and test the soil for changes in quality, especially carbon content.

The biofertilizers that will be tested on these crops may include things like biochar, digestate from anaerobic digesters, and a mixture of mechanical-pulp-mill residual fiber and fly/wood ash. These organic amendments have all been shown in other studies to improve soil health and crop growth, but their effects on the growth of biomass crops have not been well studied. These biofertilizers are all by-products in the processing of biomass into biofuels and other bioproducts. Biochar, which is almost pure carbon, is a by-product in the making of bio-oil in a process known as pyrolysis. Digestate is a largely liquid by-product of anaerobic digestion, the fermentation of biomass in the absence of oxygen to produce biogas. Pulp-mill residual is a non-toxic by-product of paper making that is composed largely of very short wood fibers, too short for paper production. Utilization of these by-products as biofertilizers in the production of more biomass is a beautiful example of adding value to both the by-products and the biomass feedstocks within the value chain.

Our goal in this research project is to address the "chicken and egg story" in the supply and demand for biomass crops. We hope to demonstrate the

Carbon Pricing in Nova Scotia

The regulations for the Nova Scotia Cap and Trade program were released in late November 2018 – around the time of the announcement of the Federal Backstop Program.

As you have likely heard, the Federal Program will deliver a rebate to households in the provinces that there isn't a provincial program in place. While here in Nova Scotia we won't receive those rebates, we will see a much less increase on fuel and energy prices. According to reports by the provincial government, we will see an increase of about 1 cent per litre to the price of gas, compared with about 11 cents per litre by 2022 under the federal approach.

It is unfortunate that there isn't a fuel tax exemption in Nova Scotia's model of Cap and Trade; however, it looks as though we will be in a better position than if we had to comply with the Federal Backstop.

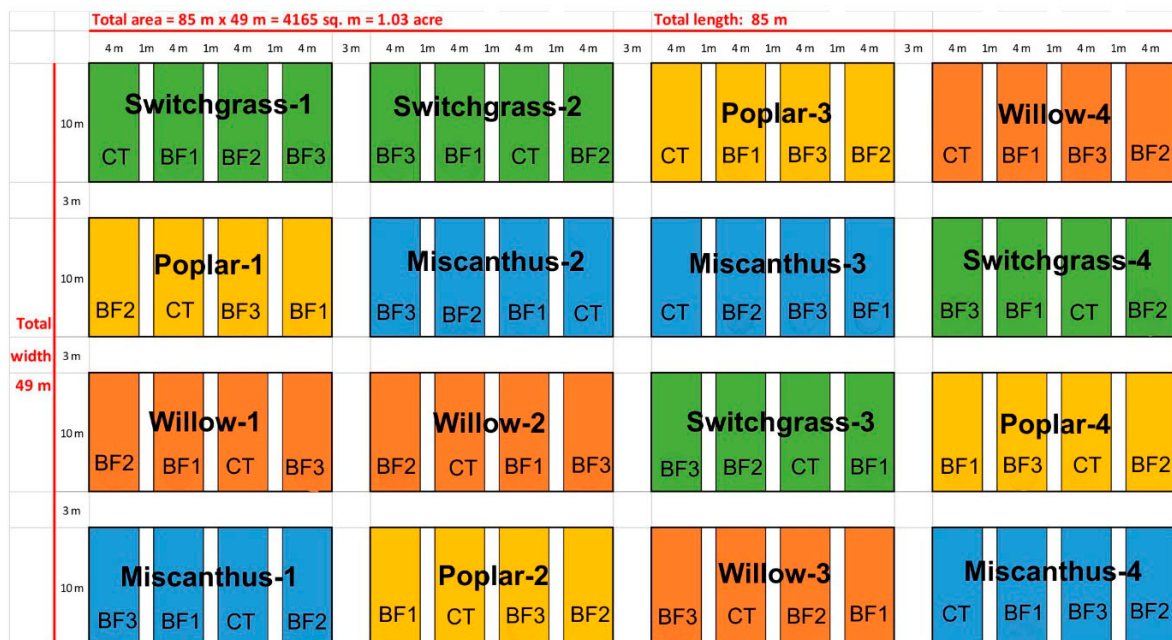
Beyond the price of fuel and its implication, a major concern is competitiveness. Not only are we competing against imported food from jurisdictions without Carbon Pricing, we are now competing with other provinces that have different Carbon Pricing schemes in place.

Be sure to check out climatechange.novascotia.ca, a website developed by the province, which highlights actions, including details of the Cap and Trade Program, taking place to combat climate change.

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yield potential of these crops and decrease their production costs in ways that will de-risk the supply chain for biomass for both the producers and processors of biomass. If you would like to be a part of this research project, please contact me directly at kevin.vessey@smu.ca.



Layout of a field site to test the growth of switchgrass, Miscanthus, hybrid-poplar and willow with three biofertilizers (BF1, BF2, BF3) and a control (CT). Total area of the site is approximately 0.42 ha or 1.1 acres. The experiment will be replicated at 10 sites across Nova Scotia.



Students standing in plots of switchgrass (foreground) with coppiced hybrid-poplar in the background at the AAFC Research Farm in Nappan, NS (November 2017).