



## IS THIS GRASS GREENER?

*Switchgrass proponents like Don Nott think Ontario's original grass crop could be a profitable, environmentally low-tech alternative to high-input crops like corn and soybeans*

*Story and photos by Keith Roulston*

**D**on Nott made the case for growing switchgrass sound-bite simple: “This is the greatest crop I’ve ever grown and I’ve been growing crops for 48 years.”

Nott was speaking to the converted as he addressed several dozen people gathered in his shed at Nott Farms near Clinton for the Ontario Biomass Producers Co-operative Inc.’s Biomass Field Day, September 5. The others – pioneering biomass growers, researchers, OMAFRA officials and representatives of various industries – had come to see the operation of probably Canada’s foremost proponent of switchgrass. Of an estimated acreage of 2,500 of both switchgrass and miscanthus in eastern Canada, Nott and his son Dan grow 500.

The family’s credentials in the industry were highlighted by Dr. Gord Surgeoner, president of Ontario Agri-Food Technologies, when he spoke after the chicken barbecue at the end of the session.

The Nott family not only was among the first to grow switchgrass on a commercial scale in Ontario, starting back in 2006, but also pioneered improved methods to plant and harvest the crop and worked to develop new markets

“Don said ‘I’ve only got a Grade 10 education’ but he’s got about four PhDs from the university of life,” Surgeoner said.

Using detailed production and expense records kept by the Notts, Surgeoner also made the economic case that



*Don Nott (white shirt) and Roger Samson (hat) point out the advantages of a new switchgrass variety, Tecumseh, in a first-year planting (top). Above, Nott shows a head-high eight-year-old field of switchgrass.*

more farmers should diversify their risk by planting some of their land to switchgrass, especially now that prices for corn, soybeans and wheat are a shadow of their record highs of recent years. While switchgrass isn't going to match the higher profits for growing corn when it was nearly \$8 a bushel it's not going to lose growers money as corn probably will at the \$3.65 per bushel price now in effect.

Once a crop of switchgrass is established after three years, it can last 25 years, unless improvements in genetics make it attractive to plow it up and replant. There's very little expense once the crop is growing – a small amount of nitrogen each year to boost yield, plus the cost of harvest. The average net profit, based on years of the Notts' records, is \$358 an acre.

**W**hat's more, Surgeoner pointed out, switchgrass is very resilient so there's little danger of a crop failure.

Nott has called switchgrass his retirement crop – a crop you can just drive by and watch it make money.

The afternoon included two busloads of people being transported out to both the Notts' newest and oldest fields of switchgrass.

First they visited a field planted this past spring. Using a technique developed by his son Dan, the Notts planted switchgrass and spring wheat together. Planting the grass with wheat gives the grass protection while it's sprouting and getting established and also gives you a return on the land in the first season, Don explained.



*Dr. Gord Surgeoner  
It's a low cost, low risk crop.*

The beauty of switchgrass, he said, is that you can plant it with a simple grain seed drill with the wheat in the main seed box and the switch seed in the grass-seed compartment. He planted the wheat at 90 per cent of the normal rate and the grass at just three pounds per acre. The new variety of the grass grew so quickly that when they harvested the wheat, they raised the combine's cutting bar high to get the seed but leave as



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much of the grass growing as possible.

A good crop of switchgrass in the planting year is a relative thing in terms of appearance. Looking at the field, the grass which will someday be six to eight feet high is still barely taller than the wheat stubble. To Nott, though, who remembers the ugliness of his very first year-one planting which he was ashamed to show other farmers, this is a remarkable crop. Switchgrass has many seeds that lie dormant the first year and sprout in year two, thickening the stand.

Part of what had Nott speaking in superlatives is that he planted Tecumseh, a new variety of switchgrass developed by Roger Samson at REAP-Canada. Samson, who has been promoting switchgrass since planting first test plots in Ontario in near Tavistock back in the early 1990s, told the group earlier of the work his organization is doing to improve the genetics of the grass to increase germination, reduce lodging and tillering and make switchgrass more productive. The genetics of other crops have been improved through selective breeding programs for decades, Samson pointed out, but switchgrass is still close to the original plant that populated native grasslands in eastern North America.

REAP-Canada's plant breeders collect seed from the most vigorous plants in older plantings, then plant them thickly in pots in the greenhouse. After the plants have sprouted and started to grow, all but a few of the strongest, fastest-growing plants are removed. This culling process is continued until there is one strong plant left in each pot. These are grown a little longer in the greenhouse to get a good start, then transplanted outdoors. Seed from the best of these will be chosen for the next year's tests.

"We have seven points where we select plants in the first year," Samson explained. The resulting plants are expressing their genetic potential in the first year. New varieties like Tecumseh are showing a 15-20 per cent yield advantage over older varieties, Samson said. Because they establish themselves faster, by year two a grower can expect to harvest a crop about half as large as a

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mature planting.

After a short jaunt in the bus, the group disembarks beside the original field Nott planted in 2006, which this year he's expecting to yield 11,000 to 11,500 pounds per acre. (Dan, on his farm near Whitechurch, has harvested 14,500 pounds per acre).

Early on, following advice of his crop adviser, Nott applied 90 pounds of nitrogen per acre in an attempt to maximize yield but the grass got so tall it fell over, making it hard to cut properly. He reduced the application rate all the way down to 45 pounds before settling for about 65-70 pounds.

**H**arvesting procedure depends on the market. For dairy producers, whether for bedding or feed, he puts blades in the baler which chop the stalks in shorter lengths, while mushroom growers want longer stalks for their composting.

Though typically he cuts the grass in fall and bales it in the spring, one year he cut in August, when the grass was still green and produced a product similar to hay. In another experiment, one spring he chopped part of the crop with a forage harvester and blew it into a pile 35 feet in diameter by 15 feet high, leaving it until June 15 before picking it up. Though moisture drained out of the pile, the grass did not heat, he said, showing that's a possible way to store the grass.

Nott originally thought the market for his switchgrass might be in pellets for burning in biomass furnaces but that didn't work out. He turned to his second best market: dairy farmers. U.S. dairy farmers have been using switchgrass for bedding for some time but Ontario dairymen have been slower to adopt it. Lately, they have been buying, not only for bedding but some dairy farmers also have learned that switchgrass can be included in total mix rations for dry cows.

Currently, switchgrass fetches about seven cents a pound in the bale, five cents in the field if the buyer prefers to harvest it himself.

Nott has been pioneering the use of switchgrass mixed with recycled plastic in new composite materials. Through his company Switch Energy Corp. a truck picks up bale wrap

from 1,200 farms all over Ontario as well as greenhouse film from greenhouse operations and pallet wrapping – about 1.5 million pounds a year altogether. He has installed equipment to shred the material into 1.5-inch flakes that can be washed to remove any dirt. It's chopped again into even smaller pieces and finally ground into a powder which can be combined with switchgrass in materials like a fibre board that is 50 per cent stronger than regular fibreboard.

Items such as flower pots that were made with a plastic/switchgrass



*Roger Samson  
Switchgrass promoter works to  
improve breeding*

composite were on display throughout the day.

Looking at other potential markets, Jake deBruyn, an OMAFRA engineer who works with biogas producers, said many of the 35 Ontario farms with biodigesters are running at less than full production because they can't get enough food waste from restaurants and other food producers to mix with manure to get maximum gas production. In Europe, gas producers have made up for this food waste shortage by adding corn silage into the mix. Research is being done to see if switchgrass can replace corn silage in biogas production.

Surgeoner also made a point of the environmental benefit of switchgrass as a method of sequestering carbon in the soil to help combat the problem of too much carbon dioxide in the air. Switchgrass sends down a deep root system every year that later breaks down to build up carbon content in the soil.

To try to measure just how much benefit switchgrass can be for

removing carbon, Elke Eichelmann, a PhD candidate at the University of Guelph has been conducting experiments at the Nott farm. The graduate of the University of Heidelberg, Germany, explained to those attending the field day that her work is an attempt to take research beyond small test plots and apply it at a real-world, farm level.

On one hand, she said, biomass crops take up carbon dioxide from the air and deposit it in the stems and roots of the plants. The stems can't be counted on to store carbon long-term because they are used for things like bedding or mushroom compost but the roots will tie up carbon for a much longer period. (She noted, however, if the switchgrass is used to make composite materials like plastic pots, it will store up the carbon for years.)

On the other hand, carbon dioxide is released from both the plants and the soil.

During the summers of 2012 and 2013 (and again this year), Eichelmann installed equipment to meter the carbon dioxide near the switchgrass in one of the Nott fields. In 2012, despite a higher yield of grass from the field, the crop actually produced more carbon than it stored, she said. The yield was lower in 2013, but the plants actually stored more carbon than they released, so the crop acted as carbon sink.

**T**o get a true measure, the study needs to be kept up for 15-20 years, Eichelmann said.

Making another environmental argument for switchgrass was Urs Eggimann, a Grey County switchgrass grower who is vice-president of the Ontario Biomass Producers Co-operative. "I always emphasize the fact that wildlife, especially grass-nesting birds, do not get disturbed, as switchgrass is only cut at the very end of the growing season in late October," he said later. This answers the concern of environmentalists that harvesting of hay, for instance, disrupts nesting birds.

During the field day session, Eggimann made the case for more farmers to enter the business on a small scale. There's a steep learning curve, he said. "Would you prefer to learn on 10 acres or 1,000 acres?"

