Good afternoon and thanks for joining us; I'm Judy Simpson. There is a lot of talk about renewable energy these days. Discussions and debates tend to center around alternatives like solar power and wind power or on renewable biomass energies like wood and seed oil. But it is often said that one of the things that grows best in Vermont is grass. So why not use grass as renewable biomass energy? In fact an agronomist at the University of Vermont is trying to do just that. His research has been conducted around the state as we learn in this report from Across the Fence’s Rebecca Gollin.

A field of grass in Vermont is not generally something to talk about. But this is no ordinary field of grass – and it does have a story to tell.

Sid Bosworth, UVM Extension - “…these grasses can last, persist for 20, 30 years if they’re in the right soil and environment.”

Sid Bosworth is an agronomist at the University of Vermont who specializes in field and forage crops. With a focus on forage nutrition and management, Bosworth’s work ranges from research in the field to educational programs for students, farmers and land managers – which are also in the field most of the time.

For several years, Bosworth has been researching how well cool season grasses grow in Vermont in several plots around the state.

Bosworth – “we're looking at it on 3 different soil types to see how well they're adapted, and this one looks very promising, it’s a very beautiful plant, you can see... the seed head gets quite tall.”

This research is not about growing plants that look nice – although some, like switchgrass and miscanthus, ARE common in Vermont as ornamentals. But what Bosworth is hoping to do with all this grass – is burn it.

Bosworth - “So these grasses have to be densified to effectively burn, and one of the methods and probably the most common would be to make pellets like this”
Research on alternative biomass sources is not a new idea - 60% of the fuel used in Vermont’s homes and businesses is no. 2 heating oil, which is petroleum based and subject to price fluctuations. A number of crops, such as sunflower and canola, are already used as alternatives to oil in Vermont, and just as many more are being grown and studied.

Bosworth – “My objective in this research is to evaluate different varieties and see how well they’re adapted to Vermont for both persistence under different soil types, diseases, yield and also combustion quality characteristics which is our ultimate goal for the biomass crop.”

In Vermont, wood is the primary alternative biomass, but based on work that’s already been done elsewhere, and Bosworth’s own observations, these grasses have a lot of potential. They can be grown on unused or marginal land, and require little maintenance once they’re established. Bosworth is working with non-invasive and sterile varieties, and he’s finding that some of the grasses are even more suited to Vermont’s unique soil than he had hoped.

Bosworth - “…they're perennial, so they form a sod, so they protect the soil from erosion. They’re good at water infiltration so they protect against runoff. So there can be water quality improvement….since they're not harvested until the fall, there's opportunities for wildlife to nest within the grasses, and actually something like grassland birds could nest and successfully fledge and continue their life cycles, so I think from that perspective, it’s good for the land, there's very low input in terms of fertility or fertilizer, and pesticides, and that sort of thing. Once these grasses are established there really are minimal inputs compared to the output that you can get from them.”

To get the most information from this study, Bosworth is testing a variety of species at several sites around the state. The different locations will give a sense of how the plants will grow in Vermont’s diverse soil.

Bosworth - “Our soils in Vermont can vary quite a bit, even in the same field…”

Christopher Davis/ manager, Meach Cove Farm – “There are a number of variables, we know the soil, the growing conditions, the weather, the way the crop is harvested, the way its processed and what is in the makeup of the type of, in this case, grass that we're using.”

Christopher Davis manages Meach Cove Farm in Shelburne, where the owners wanted a crop they could grow to replace some of the heating oil used on the farm.

Christopher Davis, Meach Cove Farm, Shelburne – “We've already done the obvious things, with Efficiency Vermont, more insulation, weather stripping, new windows on a number of the buildings - we needed the next...step.”

The test plots that Bosworth put in several years ago are reaching maturity, and the full potential of their production ability. Davis helps maintain the plots, and when they are mature, he will pelletize the grass and do burn studies over the winter.

Davis - “…the hope is we're going to able to save a lot of time and effort for anybody else going forward who wants to be putting a grass crop that they can grow on their property into a heating unit. So we hope we're going to take a lot of the guesswork out of that…”
So far the research has been promising, showing which varieties grow well in wetter or dryer soils, and under other condition, and which don’t. One answer for Vermont could be to focus on a mix of grasses that will provide a variety of benefits.

Bosworth – “This is a plot of switchgrass, the particular variety is craven rock, with blue stem, the variety is prairie blue…. it’s very hard to establish this grass so it might be risky to plant it alone, whereas the switchgrass is a little more successful, and it has attributes, such as the carbon sequestration, so I think together they could make a nice blend.”

Although this research is a start, many questions remain, about how and where and what kind of grasses to grow, and how much biomass they will yield, and how well they will pelletize and burn.

While there are still a lot of questions, Sid Bosworth plans to answer them all. In Shelburne, I’m Rebecca Gollin with Across the Fence.

Judy.: Thanks Rebecca. The University Extension researcher featured in Rebecca’s story joins me now in the studio. It's a pleasure to welcome Sid Bosworth; thanks for being with us. That's a big tall order.

Sid.: It is a big tall order.

Judy.: How long have you been doing this and who are some of the partners that you worked with?

Sid.: Thanks Judy. I think it's been about five or six years since I've been involved and this grass energy type of effort. Most of our work in the past has been with pasture management and forage crops and I still work in those areas. First the state provided a little funding and I worked with some farmers establishing some switchgrass five are six years ago. One of those stands is up in Alburgh at Borderview Farm that we're still using for research. That a very small stand. I was fortunate to work with some excellent partners in the state over the last 4 to 5 years. The Vermont Sustainable Jobs Fund has been a partner and a support for this project through the support of Senator Leahy's office we've been able to get funding to do this research. The Biomass Energy Resource Center is a nonprofit organization that has been very involved with this partnership providing some engineering expertise and Vermont Technical College we have some projects going together. Looking at some of the grasses and how they might pelletize. So it's pretty exciting along with my excellent farm and landowner collaborators. Lincoln Farm in East Randolph, Borderview up in Alburgh and Meach Cove Farm in Shelburne.

Judy.: This is ongoing research because as we learned in the piece it takes some of these grasses years to establish and mature so they can be used for some of the things you're testing them for. What are you finding so far?

Sid.: First is some of these grasses it takes about 3 years for full yield potential. But we're actually fortunate in this trial on the screen right now that we established and planted in June and actually took the harvest off some of those crops the first year. That they are slower to get established so for most cases you're not going to get a harvest until the second year that might be the third or fourth year that you reach a maximum potential. We've learned a lot of about some
of the varieties that we planted that are not doing well. Others are doing very well in different soils that were growing in. I was pleasantly surprised with one of the big blue stem varieties has been showing excellent results. I think we're ready to make some recommendations with what looks good here if farmers and other landowners are interested in planting some of these grasses.

Judy.: What are the advantages of grass as opposed to wood?

Sid.: That's always a good question. We're primarily a forested ecosystem here in Vermont. We still have a lot of open land we are an agricultural state, there's a lot of marginal land that could potentially be utilized if we want to keep it open. These crops for biomass are harvested once a year. It might help keep the land open and optional for other uses as well for livestock farmers.

Judy.: Are you able to say how soon this technology might be available and used in Vermont?

Sid.: So there's some challenges in this technology but actually most of the technology is here. We can make hay. That's an advantage for farmers have the knowledge and hay equipment for the growing and harvesting. There's actually a company that started based out of Bennington that this contract and with landowners around the northeast not just Vermont and they're trying to set up contracts with things like hospitals and churches and institutions. They're going for not homeowners but setting up systems that can burn these grasses with bigger boilers that can handle this kind of material. So it's actually starting in a slow way. My feeling is you crawl before you walk or run and that's where we've been.

Judy.: Right, and as we saw in the package, the farm we saw was actually being a pioneer in this respect as far as being one to go ahead from the stuff see what grows best how to pelletize what pellets work best what doesn't work with it.

Sid.: Right, we're trying these on farm demonstrations were scenarios and to document all the different aspects of that. Where are the constraints where's the estimated cost to harvest. You actually have to grind this grass and running through a pellet mill or some other form of densification so we're trying to work of those numbers.

Judy.: So we don't know quite yet if it's going to be economical for farmers or how much grass they'd have to grow to process to make it economical?

Sid.: First it's not going to be a high end crop economically. Don't think you'll ever compete with good land. It will never compete with crops for grain or even hay crops. I think a farmer can make a lot more money off of that. Really is more for a less than ideal site economically. I think at least if you get yields and my estimate if we can get five times or more per year than at least can break even it might be supplemental for landowners it might pay the property taxes or for a farmer it might be supplemental or a way to spread the manure and another source of land for their nutrient management program.

Judy.: Or heat their homes for a year.

Sid.: At the same time as providing that this commodity for heating for their business or farm or barn or going into a commodity strain which is not there yet.
Judy.: How can people get more information about the work that you are doing or if they're interested in finding out if their land would be suitable?

Sid.: I have a website that I maintain, it's on the Plant and Soil Science UVM website. The URL is showing now. On there are links to other sites as well. There's research going on at Cornell, the Vermont Sustainable Jobs Fund has a lot of excellent information on their website and so does the Biomass Energy Resource Center.

Judy.: Do you have to be worried about invasives?

Sid.: I try to look at grasses that are considered non-invasive. The only grass-evaluating that's some ecologists consider potentially or is invasive in wetland areas is one that we already have here weed canary grass. Because such a potential for biomass I had to at least look at it. So I do have that one in my studies but mainly because it's already growing in our marginal lands.

Judy.: What do you look for in a grass that makes it so attractive to this project?

Sid.: We have two kinds of grasses. A cool season grass, and that's the one we typically grow here for our hay crops and our pasture. We're looking for harvesting after its mature when it's headed out. Those grasses are usually ready in late July or early August. So we're looking for high yield some of the grasses that would fit that. These warm season grasses like switchgrass many people have heard of switchgrass that was on the tape those take longer to mature. They start heading out in midsummer and they are more suited for harvesting in the fall. So that's another factor is what's our risk of getting successfully harvested considering our weather and conditions.

Judy.: We talked briefly about turning grass into pellets. There's a whole other story, about your research in pelletization so you've agreed to come back with us tomorrow to explore some of those aspects.

Judy.: That's our program for today. I'm Judy Simpson; we will see you again next time on Across the Fence.

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