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EPISODE NAME: Research on Tillage Radishes to Improve Soil & Water Quality

We're trying to apply some high tech science to a solution that is really simple and accessible to most farmers in the area.

Today on Across the Fence we look at how farmers are using a one of a kind crop to get some big results that go a long way towards improving water and soil quality on farms and across Vermont. Good afternoon and thanks for joining us I'm Judy Simpson. It said that timing is everything and when it comes to farming timing is all there is. The same can be said for research. When farmers and researchers get together the results extend far beyond the farm or the university. UVM Extension of works with farmers in a number of fields to find ways to improve crops and cattle while keeping costs low. At a dairy farm and Heidi UVM faculty and students are collaborating with farmers on a project that short take root in the years to come. Across the fence is Keith Silva has this report.

((p-radishes))

Bridgett Jamison VO: This isn't as big as they can get, but it’s still pretty big. I guess we'll take a look ...
Bridgett Jamison is attempting to pull a giant radish out of the ground, but we’re getting ahead of ourselves. This story begins out in the pasture ... where cows make quite an impact on the soil.
Jamison VO: “A cow walking on the soil will compact the soil about as much as a car or a large truck even.”

Grass-based farming is rising in popularity due to public’s demand for locally-raised beef, organic milk, and specialty cheeses. Dairy farmer, Guy Choiniere collaborates with University of Vermont Extension on a variety of projects that use applied research to improve pasture quality, extend the grazing season, and address soil compaction.
Guy Choiniere//Choiniere’s Dairy Farm: “So everything I do here is to improve soil health and everything I feed the soil, do with the soil, the soil knows exactly what to do, all I need to do is to make sure it’s in good shape. My definition of sustainability has always been is creating a system that will work through the good times and in bad and this is a great year to test those systems out. I mean this is a tough year with flooding this spring and drought in the summer and I want to see what’s working and trying some of these new projects,
working with some fine people I get to see which projects are working the best, because it’s a survivor year.”

Choiniere has been working with Jamison on a three-year study looking at how forage radishes improve pasture quality.

Bridgett Jamison//UVM Plant & Soil Science Graduate Student: “The theory is called bio-drilling and it’s fairly new and it’s tillage with plant roots is what they call it too. The idea is that the radish has a really big taproot and it’s capable of breaking up compact soil. So we’re putting the radishes in these pastures in the hope that it’s going to grow down and break through some of the compact soil layers that the cows have created and then when the radish dies in the winter -- which they always do -- all those nutrients that were locked up in the radish will enter the topsoil and that creates for a really good forage, more high-quality soil with better tilth and better nutrients and better water relations.

Pasture land in Vermont is often found on a hillside or on other land that’s not always accessible to tractors and equipment ... not to mention that any machinery increases soil compaction. For this study ... Jamison and Choiniere have come up with a “handy” solution to both of these problems.

Jamison: “The idea is that we want this to be cost-effective and available on lands that are maybe too rocky or too steep for tractors and so we’re doing what’s called broadcast seeding where you literally just take it and you throw the seed around somewhat evenly, hopefully, and the radish grows where it grows and you do that year after year after year and eventually we expect there to be a pretty big difference in the soil. We’re trying to apply some pretty high-tech science to a solution that is really simple and accessible to most farmers in the area.

Choiniere plans to graze this pasture at least once more before it’s time to bring the cows in for the winter. Which brings us back to the beginning ...

Jamison: “So it’s been about two months and we’re back at Guy’s farm looking at some forage radishes. These radishes were actually grazed a little over a month ago so this is mostly regrowth and as you can see they’ve gotten pretty big despite the fact that they were grazed. I guess we’ll take a look. See how deep it really went. Hopefully I can pull this baby out. Alright, here’s what the radish looks like you can see it’s about maybe a good 6 to 8 inches of it were actually underground and the thought is that this is going to decompose and it’s going to add that organic matter into the topsoil and that a lot of the nutrients that were collected from down here at the bottom are going to be brought up to the top where they can decompose. So, the radish will die after a couple of frosts in the fall and then it decomposes and it will create this area of really rich soil and it won’t be a hole it will fill in so it will just be loose, rich, nutrient-rich, organic-matter-rich soil that will allow for water to infiltrate the soil a little better and it will hopefully facilitate better grass growth the next year.

The idea of using radishes to increase production and improve soil quality was a new idea for Choiniere, but he’s happy with the results and to have another way to manage his business. Choiniere: “I was happy to try the tillage radishes because it did add a tool to my toolbox and there are places on the farm that I can’t manage with equipment or any other way so the biological method is worth having here on the farm, living on mainly a riverbank, it’s a great
place for me to try the tillage radishes to see if I can address the compaction and the fertility using those. Who would have thought a tillage radish would improve your farm, it’s definitely something to think about if you’re in the farming business.

Who knew that ‘having the radish’ could be so good. In Highgate, I’m Keith Silva with Across the Fence.

I’m joined in the studio now by Bridget Jamison and Jen Colby from the University of Vermont center for sustainable agriculture. Jenna oversees the center's pasture program welcome to both of you. Bridget the radish we just saw looked enormous but am sure the camera does not do it justice. You brought some more examples maybe you could show us what we’re talking about.

Bridget.: They vary in size pretty great. This is an example of one that was grazed it was a lot longer. This is probably about 10 weeks old. This is one that was grazed a few times so it didn't have as much time to sequester energy down to the root. So they vary in size a lot.

Judy.: When you say graze to that means the cows actually eat the tops?

Bridget: Yes.

Judy.: They don't mind that?

Bridget.: No it's delicious forage they love it.

Judy.: What about for other animals?

Bridget.: I'm not really sure Jen?

Jenn.: Yes actually the slightly smaller I planted those for viewers who may have seen our show last year on soil compaction. I brought in some soil samples from my pig area from my pig pen. The pigs are out to pasture and they compact the pasture quite a lot so I planned to just do some broadcasts eating out there to see how they would address more surface compaction from the pigs. I broadcast seeded this year it was clicked several times and also grazed with sheep several times and the sheep eat it right down to the very top of the root twice in addition to mechanical clipping too. They are smaller but they have come back.

Judy.: Can you talk a little bit about Bio drilling and other plants that are used for the purpose?

Bridget.: There are a couple other species of plants. This is the most popular because it has the largest root. Some other examples might be rye is one example. There are other kinds of brassicas that can be used but for the most part people have adapted to forge radishes the best. It's been shown to reduce compaction the most and be able to grow in the most compact soils.

Judy.: It's amazing because once you plan it you just leave it as nothing else to do.
Jenn.: There's nothing else to do.

Judy.: Jenn what if farmers that you talk to want to know about this kind of research?

Jenn.: They are really curious about whether they can put in radishes. Do they need to tell do they need to prepare the land in any way what do they do in areas that are very rocky or have very steep slopes. They want to know what the seeding rates are and the seating rates as I understand it through our project have been fairly low 1 to 2 pounds per acre. We've been working with that through testing what is the best great. Us they want to know how easy it is and whether it works so I think we're starting to see that at least anecdotally observationally it's working well.

Judy.: Let's talk a little Bridget if you could about the whole research that goes on behind this. I know you said you are on your second year of this. What are some of the things you look for and the kind of data you collect?

Bridget.: The data falls into two primary categories and collect information on the forage quality so we're trying to determine if the grass is growing around the radishes is more nutritious or their growing better in the area surrounding radish and also if the radish contributes extra nutrients that supplement the cows diet and in addition were collecting soil sample. With collect book a density samples to determine how compacted is and then nutrients samples to determine if there's any kind of traditional nutrients or any carbon sequestration that's the result of the reddish.

Judy.: Is there any to worry that the radish might take over the grass?

Bridget.: No the great thing about radish is they can't they're not likely to be an invasive species because they're always winter killed.

Judy.: So they're not going to run wild.

Bridget.: Exactly.

Judy.: OK. Could homeowners use these tillage radishes in their gardens and lawns?

Jenn.: Absolutely that's actually where our work has been done in the past using tillage radishes and vegetables. To break up our compaction in the vegetable plot. Even pasture that pasture part is failing new? They're very accessible and very easy to put in

Judy.: It seems very easy you're talking about what farmers concerns were and I guess concerns are what is it going to cost me and how much work and my going to have to do?

Jenn.: Exactly.

Judy.: In both those cases?
Jenn.: Not that much and very little. One of the things that we have observed between this year and last year. In Gui’s example he did not graze where the radishes were last year he left that alone and you said the radishes were much larger in both length and diameter so the interesting comparison between these two years is checking to see trying to answer the question do farmers need to leave that area alone or can they still use it. And the answer is if you have deeper tillage needs then maybe you want to make the choice to leave it alone for the year and let the reddish get as deep as possible or you may say I need to graze it and I don't want to lose that pasture but it still will do a good job and it will still build some fertility so it's nice because farmers are getting some choices.

Judy.: Rights and they don't have to keep their animals off the land.

Jenn.: Right they don't have to. They will sacrifices slightly smaller radish but it may not be an issue for them.

Judy.: Has Bio drilling been used in other places?

Bridget.: It's predominately used mostly in Pennsylvania Maryland region and also in Brazil. There it is used on corn and soybean fields. It's a really popular cover crop in those areas because those fields tend to get very compacted because of the machinery that ended be low in organic matter because they use so much and right now it's really popular in those systems.

Judy.: Why's is the first time that this is been tried in Vermont? And from the university standpoint if this is if this has been so successful other places do you think?

Bridget.: I think one reason is that it is fairly new technology that only been around for 10 years and I think these ideas take a little time spread.

Judy.: How much does compaction affects soil and water quality?

Jenn.: Compaction can affect soil and water quality quite a lot. One of the issues with compaction is not only is not only a lack up it can cause some cresting so the water runs off. The compaction will mean that there’s no or reduced ability for water to infiltrate. Again that's a runoff issue so the more porous the soil is the more water can drain right through the soil instead of running off into Rivers and streams?

Judy.: What's the next step for research? We've gone through year two now are you gathering information or what's happening now?

Bridget.: I'm actually going to go collect some samples tomorrow and we are going to collect samples in fall are going to plant again next summer collect another set of examples and in addition were starting another project to do a more spatial analysis and in-depth analysis. And that's going to Shelburne farm.

Judy.: Can you tell me some of the differences that you've noticed already perhaps?
Bridget.: As far as in the research we haven't been able to show that's statistically there is any difference. The farmer seems to think that the field drains a lot faster. We notice it ourselves that forage quality has a little bit better. Homes but so far we haven't been able to draw a lot of concrete evidence.

Judy.: Are there more farmers that want to be involved with this or how did you find this farmer and Heidi that wanted to do this?

Jenn.: Actually Gui is a farmer who had been working was home on another project. This was something he said you know gosh it's great to work on this other project but can you guys come up with some way to help me with some compaction in my pastures? So our colleague Rachel Gilker has some connections in Maryland and have known about this tillage radish work so she brought it up and we started doing the project that way. As far as interest definitely there has been piqued interest we're getting more calls about where can we find this radish and how much does it cost? As the course of this project I think we'll end up making recommendations more formally and fact sheets and things like that to help farmers make those decisions.

Judy.: These can be used anywhere on the farm in any field been a particular to having special requirements?

Chen.: No they're great.

Judy.: If you'd like to learn more about the tillage radish research. Many of the other pasture products that are going on at UVM you can visit the UVM Center for sustainable agriculture web site or you can call them at (802)-656-5459. Thanks a lot for bringing in the radishes their amazing it sounds like it's a lot of fun to do the research.

Bridget.: Yes it's been really great to work on this project.

Judy.: Excellent thanks to both of you. That's our program for today I'll see you again next time on across the fence.

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