RAD Story Lodge | Episode 4

Roots of a Stewardship Economy - Part 1: The Fungal Factor

Randi Russell: Oki and hello. Welcome to the RAD Story Lodge, a place where you will hear stories from the land and learn from Indigenous communities who are advancing regenerative economies and reshaping the way we think about conservation.

In today's episode, Amberly Quakegesic speaks with Mark Kean from Mikro-Tek who tells us about a fascinating nature-based technology and an innovative collaboration. Mikro-Tek is partnering with Wahkohtowin Development to apply mycorrhizal fungi to tree seedlings in the Boreal Forest in Treaty 9 Territory. This serves as an alternative to harmful herbicides and offers a potential new revenue stream from carbon finance as part of an indigenous stewardship economy.

Join us in the story lodge to hear from Mark and stay tuned for a follow-up episode where we'll hear more from Wahkohtowin about what this means for indigenous rights, jurisdiction and Guardians.

Amberly: Okay, welcome. So, let's just start with introducing yourself and tell us a bit about you.

Mark: Well, my name is Mark Kean, and I'm the president of Mikro-Tek, which is a biotech company based in Timmins.

We are now working on a project with Wahkohtowin. We're applying our biotech technology to seedlings in the forest to make them grow faster.

Mycorrhiza is a naturally occurring fungus that grows in the soil, and it forms an association with the tree or the plant.

90% of the plants worldwide have this association. So if you could picture the root of a tree, and then what happens is this fungus comes in and interacts with the root of the tree and extends that root system out into the soil. So the fungus takes moisture and nutrients that it gets from the soil back to the root of the tree.

And then that tree, they refer to as a symbiotic, meaning both organisms benefit. So the tree gives up sugars, carbohydrates that it makes through photosynthesis, and it gives out to the fungus. And the fungus can't make its own carbohydrates because it's growing underground, right? It can't photosynthesise.

So it gets the carbohydrates from the tree, mainly sugars. And then in exchange, it gives it nutrients and moisture that it has collected beyond the root system of that tree. So you could picture it as it's kind of supercharges the root system, you could, you know, dig up and see the roots on the tree.

But then the hyphae goes into the soil like 10 or 15 meters further than that. So it gives you a bigger surface area. Because the tree now, if it's got this right association with the right fungi, soil, fungus. It takes in more moisture, which helps in survival. You know, if you have a really hot summer, some of the trees just dry out before they get going, and they die, so they don't make it.

And then, even if they do, they don't have an extended root system. So if you have this extended root system, the trees would grow faster because it's got more access to moisture. And with that moisture is the nutrients. So, that gives you the faster-growing tree. The idea is if you can put a faster-growing tree in there, maybe you could get above the broadleaf trees before you have to spray.

And then you leave the broad leaf trees there, and then the conifers grow up, and then you have more of a mixed forest, which is, you know, better for birds, nesting birds, and different things like that. That's the idea, to use the technology as an alternative to spraying the trees with helicopters, which has a whole bunch of negative aspects associated with it.

Amberly: That's amazing. I love the way you explained it too.

Mark: We could use this technology to increase the biomass in the forest and generate carbon offset credits, but also to reduce the amount of herbicide applied in some of the reforestation sites.

And then that would, in turn, give us some biodiversity benefits, like a more mixed forest. Broadleaf and conifer, and also better for the animals, nesting birds, things like that.

Amberly: Awesome.

Amberly: Can you tell us a little bit about your relationship with Wahkohtowin?

Mark: I first met David Flood, I don't know, like probably 20 years ago, long before he was with Wahkohtowin.

He would stop by our facility every once in a while. He was very interested in the technology. He had worked in different aspects of forestry throughout his career, so he was well aware of what we were doing and interested and wanting to have an update on the growth data we were collecting all the time.

So it just sort of evolved over time. And then, you know, one time he came in, and he said, well, I now work with Wahkohtowin. And explained what they were doing, and can I give a talk? I think I gave a talk at one of the first, I'm not sure if it was the first symposium in Chapleau, probably four or five years ago.

It was very small. I think it was held in the Legion basement. So it was just more of a, you know, smaller gathering. Mostly, I think with the Chapleau group there. And I think they called it the Northeastern Superior Chiefs Forum. And then that, over the years, got bigger and bigger. And then until today it's a fairly big gathering, now a symposium.

Amberly: Mm-hmm.

Mark: But, uh, yeah, that's how we sort of got together, and we talked about the growth data that we had from our technology in the Boreal and how it could be used in the herbicide alternative. So that was really what started the more formal partnership, and we put in an application to SDTC, that's Sustainable Development Technology Canada, with the idea of commercialising the technology.

Because we had 20 years of growth data that was fairly positive. And so we had approved the technology over the years. And, uh, now the question was, well, how do we commercialise it, what partners do we need? So that was the idea. We would go in, look at the idea of using the technology to generate carbon offsets in the boreal forest, and then, register those offsets and then sell them into the carbon market.

And, with the idea of the funds from the carbon, offsets would generate other projects in the forest, just different land use projects, uh, you know. Non-timber products, things like that. So that was the idea behind it.

Before we started this project, we went down to Chile. We had a contract in Chile to test our inoculant products, plant inoculants on trees to grow down there in South America. We wanted to do that because the trees grow faster down there. You could grow, say, a pine tree; they call it a radiata pine. And it would grow in 20 years.

It would be the same size as a sort of red pine here at 60, 70 years. So the idea was we could test our technology down in South America, where trees grow. They have the area where in South America and Chile, there's no winter. So the trees basically grow year-round.

In the boreal, you know, we have six months where things are under snow. That's why the trees grow faster. So we figured we could get growth data in 20 years as opposed to, you know, 70, 80, 90 years during the Boreal. So it worked out very well.

We registered our first carbon projects in Chile. And, we brought those through the whole registration system. We generated approximately 1.4 million tons of CO_2 that we registered and sold into the market.

In a shorter period of time, we partnered with different landowners there. There were small-scale owners of the land, farmers mainly. So we had 24 Chilean partners and different sites around Central Chile and we applied our inoculants to the trees. They were growing in their nurseries, and they were planted on our reforestation sites, which means sites that didn't have a forest on them.

They were cleared maybe 50 years ago for agricultural production, but they were in the foothills of the Andes, so it wasn't really productive land, so it wasn't an agricultural production; it was more just grazing for goats and horses. So, the idea was, can they, you know, reestablish a forest on that land?

And then that's why we went in, we collected native strains from those plants in Chile, and they identified a couple of different species they were interested in. So we got the inoculants for those tree species. We planted out about a million seedlings in trials in maybe 10 different sites. And then we measured the growth over a number of years, and we had probably an average of 40% increase in growth on some sites. So, that was sort of the research trials we did before we started the carbon projects. The carbon registration growing projects are more advanced in South America, just 'cause the trees grow faster.

But so now what we're trying to do is take the success we had down there in our carbon projects and repeat that here in the Boreal. So that's sort of the basis of this, Sustainable Development Technology we're working on, and Northern Ontario Heritage is also involved. They've given us some funding for it.

Randi Russell: Since this conversation took place, Wahkohtowin and Mikro-Tek have taken huge steps forward on the project. To date, 45 million trees have been inoculated, and 15 million were planted just last year. By summer 2026, 40 million trees will have been planted. Wahkohtowin’s Guardians took part in the planting last year and will do so again this summer.

Mark: So that's sort of our first carbon project, and we're gonna bring that through the registration system and offer those for sale into the carbon market. It's gonna take us a couple of years to get them all registered and up and growing. But that's the plan, that's the project in a nutshell.

Amberly: I feel like a lot of times today, we just want, we want it fast, whatever it is. I really love that it's not quick. Right. and it's a commitment to wanting a better future.

I'm just curious if you could tie in what, how do Guardians fit into all this?

Mark: The methodology for doing a carbon project is pretty complex. Like you have to do what they call a baseline study. So you have to measure the amount of carbon that's on the site, and the carbon is in the biomass and the trees. So basically, we go out, and we measure the trees, we put plots in circular plots, into these, cutover areas and planting areas.

And then we have to physically go in and measure those trees. So, a plot. They refer to it as a VSN plot, a Vegetation Survey network, which is a standard sort of forestry plot that the Ministry of Natural Resources has developed for measuring the biomass and the forest right across Ontario.

It involves measuring and putting in this 16-meter radius, a plot. And then we measure every tree in that plot. So we drive a stake in the middle of it using a GPS. It's all predetermined on the map. So we go to that site, and then we have a big rope that goes around in a circle, and we go around slowly, like in a clockwise direction, walking around.

And every tree we come to, we measure. So we have a guardian that we've trained, and they measure the diameter. And then another one records it. And then we have an exometer, which measures the height of a tree. It's a laser instrument. Another guardian would step back from the tree, 20 feet back, and we call it shooting the top of the tree.

So it's just a little telescope thing that they point at the top of the tree, and when they get it right at the top of the tree, they press a button, and then we get the height from that diameter, but that's just with a tape. So there's a recording of the diameter, and then you record the height. And from that, we could tell the volume of the tree. There's a mathematical formula to figure out how much biomass is in that tree. So that's the start of measuring, but how big are those trees, right? And then, you go around, and you measure all those trees. So there could be like a hundred trees, 200 trees in a plot, depending on the density of the plot.

And then once you get those, those are all the big trees, anything over five centimetres in diameter. You do the heights and diameters. Anything smaller, we do another plot that's half the size in the middle, and we measure all the small plants like, you know, blueberries or any kind of fern, or so that's called the understory.

So we measure the overstory, the big trees, and then the species and the heights and diameters, and then we measure the understory, which has, you know, more species. So that together is the growth data. And then mathematically, they figure out how much biomass. So, we do say in one site we may do 20 of these plots, and then they use that to estimate how much biomass is on that site per hectare.

And then we use that to calculate the carbon. So there's a number of steps. So the Guardians are basically the guys who do, uh, they're gonna be trained in all aspects of it, but right now it's, mainly the VSN - vegetation surveys. And it's a lot of work 'cause you gotta walk into these sites and it's hot and it's buggy and they're not close to the road.

The ones we were measuring the last two years were planted 25 years ago. So in a lot of the cases, the roads that get in there are overgrown or the bridges are out. So we gotta cross the bridge.

You know, so that's why we take the bikes in and the access is a problem. So, you know, it'll take us maybe a day to get into or half a day to get in. And then we measure three or four plots and we're gonna go back the next day. So we spent, basically all the summer season for the last two years measuring plots nonstop.

So it's lots of traveling, some of 'em out in Thunder Bay. So staying in hotels, sometimes they camp out, depending if it's far from town. We camp out a couple times and just bring tents and close to the site. 'cause sometimes it's a two-hour drive, like on a dirt road to get there, so two hours in, two hours out, you don't have a lot of time to actually do the measurements. So we try to get as close as we can. And, get as many plots as we can on the day. So it's tough work.

Amberly: Hmm.

Mark: You gotta carry all this gear in. We gotta carry sledgehammers and, you know, pound the stakes in there. Steel stakes that go in the middle. There's this whole process that we train them on and then they take that, but it's just a lot of bush work. Clearing the trails to get in sometimes to get the truck close. We brush the trails to open them up a little bit. They'll kinda get closed in over time if they're not in heavy use. So anyway, you know, trees are down over top. So we had electric chainsaws, cut the trees open up the road, 'cause we have to go back into a planting site. There may be, say, 200,000 trees planted there, so we'd have to go back. Sometimes the site would take a whole week, you know, we were there for, you know, six days; back and forth from the motel, back to the site. It's tough work, but you know, it's a lot of fun sometimes.

Amberly: Absolutely. There's the whole like crew aspect, there's all the skills that you learn. And I feel like in my experience with Guardians, when we introduce the idea of spray and say like the veg index, and you know, a lot of people, I feel, have no idea that herbicide is sprayed on the forest and just how toxic it is.

And, maybe you could speak a bit to how this project is trying to lessen that.

Mark: Well, in the forestry operation, how it normally works I'd say in the last 15, 20 years since we started planting these trees, which was, as I mentioned, you know, in early, uh, 2000. So, we've been doing this for over 20 years, like planting these sites out. And when we did that, it was standard practice. The area would be cleared one year. The next year, the forest companies would go in, and they would do a scarification process, which means they'd go in, with a skidder or a bulldozer, and they would prepare the site, knock down some of the trees that were still standing, and make plantable sites, so the planters could get in.

They're fairly rough sites, these cut over sites. And then the following year, they would be planted. So, the seedlings would be grown previously and they'd be packed in boxes, like standard seedlings, plantings. They would take the plant crews into the site and plant that site.

Now what happens then is the next year, the year after the plant. So this is two or three years after the harvest. Those small seedlings would be coming up, but there's also a lot of broadleaf seedlings, like birch and a lot of poplar. They would come up a lot faster. They're faster-growing, and they would shade out the planted pines and spruces.

Broadleaf trees would become the over story and then shade out the seeds that were under, and sometimes those would die or would not grow. As well as they should be because they're in the shade. So what the forest companies were doing is they would spray with the glyphosate-based fertiliser.

Sometimes it would be by hand, you know, either by airplane or helicopter. Normally, it's helicopter now. So these helicopters have this spray and they go over these forestry sites. It's usually about two years after planting where the broadleaf is all out and they spray those sites in the fall.

And the glyphosate kills the broadleaf, and it doesn't kill the conifers because the conifers in the fall develop a wax coating on the needles. They're getting ready for winter, and that's how they last through the winter without drying out. So there's a wax coating on the needles.

The foresters wait for that wax coating usually in the end of August. They're starting in September. So they form this wax, and then when they spray. The spray doesn't get soaked into the needles of the conifers, the pines and spruces because it has this wax on it. But the leaves are still out on the poplars, birch, and you know, any of the broad leaves; maple that happen to be there.

So the maples take in the glyphosate into the leaves, and then that kills the broadleaf. The idea was that the broadleafs are killed with the spray, and then the following year, the pines and spruces that were planted can form the upper canopy and grow, just grow faster, with the idea of producing the maximum amount of conifers.

'cause that's what the foresters refer to as the crop tree. That's the trees they wanna harvest for making our lumber.

Amberly: Mm-hmm.

Mark: You know, two by fours, two by sixes for building products and whatever.

Amberly: I was just gonna say like, clearly you have a brilliant mind. I'm just curious about some of the things that you've learned along the way in all of these. And kinda like experimenting and trials and studies.

Mark: I'm not a scientist or a microbiologist or a forester. I'm more on the business side. When I started this, I had a greenhouse nursery and I was growing seedlings, selling them to the forest companies. And the MNR, Ministry of Natural Resources, was planting trees at the time.

This is like in the late eighties. I was just a nursery operator and I ran across this technology. There were scientists for the Canadian Forestry Service at Petawawa. And it was the scientist giving a talk at a conference, much like this conference, and he was explaining about this mycorrhizal fungi, which I had never heard of before.

And he explained the whole process, how it was symbiotic and it's naturally occurring and it helps the plants grow. And they were studying this. It's been known for like, you know, 50, 100 years in the research community.

Dr. Chatarpaul and Dr. Priyotosh. They came over from India years ago and have been working with the Canadian Forestry Service because they had an expertise in this mycorrhiza, and they were looking at it.

So, I asked them if it would work on forestry sites, and he said yes. They were looking for someone who wanted to apply it. And I said, well, okay, I'll try it. So he gave me a little bottle, just like a, you know, one-litre bottle that he grew in the lab. And he told me: “Just grind the spores and then put it in a watering can and water it onto the trees. The spores would go into the soil, and they would colonise the roots of the trees.”

I did it with about a thousand trees. You know, it wasn't a lot of trees, maybe in a greenhouse, a thousand trees would be maybe about a square meter. So we just did it with a watering can, and I followed his directions, then we planted them out.

We planted some of them on a mine site. There was a mine reclamation site that we had tried to plant trees on the year before, just as a small trial. It was in Timmins, and it was one of the gold mines in Timmins that had the leftover, mine tails, they call it, which is crushed rock from the mining process.

And they were trying to get trees to grow on it 'cause it was a dusty problem. The idea was that there's no natural fungi in that soil, 'cause it's basically not soil. It's a crushed rock. So it's hard to get things to grow on it. So the idea is, well, maybe if these are beneficial microbes, we could get it onto the seedlings, and they would grow better.

We had tried it one year without the mycorrhiza, the year before. Basically, the next spring, everything died. It grew a little bit over the summer, but the winter just did them in, I guess the next spring everything died. So I said, well, that's not gonna work. Right?

And then the following year, I ran across this talk about mycorrhiza. So I asked him: " Would it work on minetail sites?" And he said, well, it should. I've never tried it. But you know, the theory is there's no natural microbes there and the trees need these microbes to grow, so it's gonna help."

So we tried it on the mine site as a trial, 'cause we figured, you know, if it works on the mine site, it'll work on a forestry site. The next spring, we had 60-70% survival. So it was a big increase in survival. They weren't growing really well, but at least they survived.

That's what really twigged my interest in it. I said, well, this has gotta work. How come no one is doing this? So I asked him, where can I buy it? And he said, well, you can't because, uh, no one sells it commercially, right? He's just doing it in the lab and he could grow a little, you know, one liter bottles here and there.

And I said, well, why doesn't someone make a business out of this? 'cause that was my idea. It was a business idea. He said, "Nobody's doing it. Why don't you do it? "

And that's how it started.

Amberly: Wow.

Mark: So it was these two scientists, Dr. Chatarpaul and Dr. Priyotosh, and one of them came and worked for me at the time.

But initially, he just taught me how to grow it myself. So I went down to Petawawa. He brought me into the lab, and we got all the bottles. He showed me how to make the nutrients. You needed an autoclave 'cause it had to be sterile. So I bought a small autoclave, and we did everything small.

And the idea was I grew 2 million seedlings a year in my nursery and I wanted to inoculate just my seedlings. And that's what I did. I built this little lab, just enough to grow 2 million seedlings. And then that's how it started. I don't have the nursery now. I sold that.

We just have the biotech facility, 'cause we wanted to expand it and focus on growing the microbe. So it's just grown from there. And then he said, well, it works good, but I could only grow enough for 2 million. And that was a lot of work. It was just a whole bunch of small little bottles that I had.

And then I had a fridge stored 'em in the fridge. So, that was the lab. It was like a small autoclave, a little transfer table and a fridge. So it wasn't anything fancy. And then I said, well, you know, we gotta ramp this up if we're gonna sell it to other nurseries, so it just evolved from there.

And he said, why don't you build a lab? Dr. Priyotosh came and worked for me I needed some help right there. It took a lot of time. And he said, well, you need a bigger autoclave. You need a bigger lab, you need, storage and all this.

So anyway, we built this lab 10 years ago and expanded it. So now we could grow an inoculum for 50 to 60 million seedlings. So that's what we're doing now with the Wahkohtowin and Mikro-Tek partnership, commercialising it.

Amberly: That's amazing.

I loved hearing that. From an idea to become what it's become and just, it's beautiful.

Mark: Yeah, it took a lot longer than we originally thought. Anyway, that's just the process, you know?

Amberly: Yeah. we're always talking about seven generations and thinking about the future. I feel like there's gonna be a lot of good things that come from this in the future. I just wanna say miigwetch for your work, that's really impressive.

Amberly: So we're here at the Land Symposium and you were sharing, you just did a presentation. How did that go?

Mark: It went pretty good. It was a panel with a number of different suppliers of technology talking on the panel. So there were lots of questions from the audience, and we're looking for First Nation groups and forestry companies that wanna partner with us on these commercialisation projects.

Like I say, we're planning on treating or inoculating 36 million seedlings this coming summer. The seedlings are grown over the summer and then, like I mentioned earlier, they're overwintered, and they're planted the following year. So we have 16 million now that we grew last year, and we have partners for that number of First Nation communities around Northern Ontario.

What we're trying to do here is expand it to other First Nation groups that are willing to partner with us on these carbon projects. If there are forestry operations on traditional lands, they could inoculate the seedlings that are being planted anyway by the forest companies.

Those seedlings would grow 20% faster, and they would generate an additional amount of carbon because of that additional growth. So there's a process for measuring it. As you mentioned, the guardians are gonna have to set up these plots. We have to measure where they were planted. And then every five years we have to go in and put in these vegetation plots where we'd go in to the sites and measure them.

We have ideas to expand that, maybe by doing some of the measurements, in future years, using drones and satellites, it could make the data collection streamlined a little bit quicker because we're gonna have a lot of trees. Like I say, the 3 million seedlings, that's over 4,000 hectares, and that was just last year.

So if we're gonna have 40,000 hectares by the end of this pilot project, and then maybe 40,000 hectares a year from that. It's an exponential thing. Now we have to go back and measure all those, right? So every year we have an additional 40,000 hectares. It's another 40,000.

We have to measure the original ones we put in. That's why we wanna work within the land departments of the various First Nations or the Guardians to train the young guys coming up on how to do this.

How to monitor it, how to register it, set up crews, we need the trucks, we need the four-wheel bikes to get in, and they would know the roads, if it's in their territory, the access to the roads, and that's the idea of looking at that.

We had a pilot project this year with nesting bird monitors. So they're a recording device that goes in, and it measures around 250 meters around any nesting birds. In the morning, they call in a certain way in the spring. The birds do this calling as they're nesting and mating, but after they lay the eggs, they don't call anymore because they don't want anyone to know where they hid the eggs.

It's a really interesting process. We're working with a bunch of scientists on how to set this up. How do you do it? What species is there?

So that's one of the benefits, if you have a mixed forest, you'll have more biodiversity. So we're always looking for trail cams we're gonna be putting in. That's the biodiversity benefits that go hand in hand with the carbon.

And again, you would need the guardians to do that 'cause you have to collect the little recording cards in these bird monitors. You have to go get them every two weeks, and you have to switch them out 'cause they get full.

And then we have insect monitors, which are similar, but it measures the frequency of insects flying by, and you have to go and collect those. So that's another sort of technology we're looking at. Then the trail cams for different animals, moose and smaller animals using the area. We wanna be able to record the biodiversity, that's of what Mikro-Tek does.

We're looking to the elders, and even here, you know, just talking to people about it. One fellow told me that, when elders said that, he noticed now that he was looking at bears' scat and the bears eating mountain ash berries, which they never did before because of climate change.

And he thinks it's because there's less food for them for some reason. Something like that, you would never know, right? So maybe that's a biodiversity monitoring technique. We look for a bear scat, and we see what's in it. And then, record that. It's not being recorded.

You know, it's being observed by certain people, but I would've never thought of that. That's the indigenous knowledge that's out there. Another person was giving a talk today about the medicinal plants.

What plants are there that are collected for certain medicines that are being damaged by the spray? That's another whole thing. How does that affect the medicine? Obviously, I don't think it would be very good.

There are all kinds of other things that damage biodiversity and certain other things that could enhance it. So obviously we wanna do the ones that enhance it, right? And try to minimize the damage we're doing.

Amberly: Absolutely. I feel like I'm hearing so many benefits, it's all kind of green flags.

I'm curious how, industry response to this how does that look to them? In like maybe doing the substitution, not doing the spray, but doing the inoculated seedlings.

Mark: Oh, they're very open to the concept. They're partnered with us on this SDTC project, both Interfor and Green First, and other forest companies we're talking to now that want to join in, and they're looking at our data.

We did the 20-year measurements. I spoke to the Guardian groups and the different First Nations. We just got that data assessed by our scientific group that's doing the actual assessment.

Dr Nelson to fault from the federal government, Federal Sciences, and Dr Dave Morris, he's in Thunder Bay with the provincial group. So they designed the data collection process, and they're gonna be publishing a paper on that now. But, in a nutshell, we did, five sites with pine and five with spruce.

The pine, we had 29% increase in volume. And for the spruce, we had 13%. The pines go quite a bit faster than the spruce, so that's why you have more. But I think the spruce will catch up in later years. So we have that growth data, which interests the forest companies; no one else has 20-25 year growth data. That's why it's taken so long. You gotta put the trees in, you gotta wait 25 years, right?

Amberly: Mm-hmm.

Mark: I didn't realize that when we first did it, but you know, you'll find that out actually. We've got positive 25-year data, and I think that's the longest-running trials that I've been able to find across Canada anyway.

Amberly: You know, a lot of people bring up how Quebec doesn't use spray. It sounds like this could change forestry in Ontario. Is this part of the other provinces too?

Mark: We have done some trials out in Alberta.

We had some funding from the Alberta government at one time. Those were just done two years ago, so we don't have the 20-year data. We have positive two-year data on those sites.

We've proven that we could get a positive response in Ontario in the first three years. And then again in 2025, so if you have it in the beginning, it should be there. So we're hoping they'll accept our Ontario data out there. We met some people at this conference, actually from out of Manitoba, who are interested.

They're also looking at the data. The idea is to do it, across the Boreal.

Amberly: That's incredible. It's very exciting.

Mark: And then another fellow in New Brunswick, whom we just met this morning. He wants to look at the data also. They've got some land in New Brunswick First Nations groups, and we want to get it further afield.

We're concentrating in Ontario 'cause it's our backyard. We know the area. That's where we have our most trials. But there's no reason why it wouldn't work across the boreal. It's worked in Chile; the microbes from Chile have to be matched to the trees growing in that area.

We just go into the forest and, we identify the species of interest. Down there it was eucalyptus, radiata pine, and there's a tree, which only grows in Chilies. So they had an interest in that, 'cause that was a medicinal plant.

It was the local people that told us what plants. We talked to local landowners.

We talk to their foresters, Chilean forester that works for us in Chile, he takes care of all that. Anyway, it's one of the other things we wanna do is sort of expand.

We have the inoculants registered with the Canadian government for Boreal Species Pines and Spruces in the Boreal. We have some agricultural cultures that we have registered, and reclamation cultures for grasslands on mine sites and things. So we have all those registered. We have the ones down in Chile that we've collected and registered with the Chilean government down there.

To have that whole process where we could go into a site, and if someone has a different tree that they want to develop the inoculum for different species in a different geographic area, where we could go to that site. Collect the roots. Take them back to the lab and you culture, the fungi from the roots of the tree.

That's how we collect it. They call that the isolation process. And then once we get the spores and the fungi growing, in our Petri plates and growth nutrients, then we just ramp that up into our biotech facility.

Amberly: I'm curious like, what's missing?

How is this not. Is it just that we need more time to study it? We need to tell more people about it.

Mark: There are lots of people studying this worldwide.

There are big groups in Australia. You know, they obviously have different plant species growing there. There's a big group out in BC, Dr Suzanne Simard, I don't know if you read any of her work, she's taking the DNA aspect of it, mapping of the microbes in the soil, which is a whole different complexity.

And she's developed all those techniques to study it. They were looking at different ways of doing the mycorrhiza. We were doing it old school. We would just collect the roots, and we would grow it out, and identify what it was. We didn't necessarily know what it was at the time. Now all these DNA assessment techniques have really advanced in the last 10, 15 years or so.

So now you could just take a soil sample, and you could tell what mycorrhiza is down there. You could tell what all kinds of fungi are down there, or bacteria. So it's really sped up the research, so there's more work on it. And I know Dr Simard coined the term the mother tree. It's a very interesting work she's done. She's been working on it since the eighties, which is when we started, but more from a research component.

At one time, they thought the conifers had a certain mycorrhiza and then the broadleaf had a certain one, and there was no interconnection, like the roots aren't connected. She proved that you could put nitrogen on the conifer tree and it would show up on the broadleaf tree, and vice versa.

She proved that there was a physical connection through the mycorrhizal hyphae.

Amberly: Wow.

Mark: So one tree could transfer nutrients to the other and vice versa.

Amberly: And they do that.

Mark: And they do. So she would put nitrogen gas on the needles of one tree and it would show up that special nitrogen gas would show up again on the broadleaf proving the connection between the two.

And then she could take the DNA from each one, and they were the same. There are all kinds of research papers on that and, and lots of other groups now doing similar things in other areas. Her area of focus when she started was on the BC, the coastal areas.

Now it's repeated worldwide.

Amberly: Wow. Thank you so much, for sharing your story and giving us hope about what's coming.

Randi Russell: Thank you for listening to the RAD Story Lodge. We hoped you enjoyed today's episode. Stay tuned for a follow-up episode where we'll hear more about this exciting collaboration from the team at Wahkohtowin. This episode was produced by Arina Isaeva from Wolf Eye Productions and introduced by Randi Russell. The conversations took place at the 2025 Indigenous Land Symposium, which was hosted by Wahkohtowin Development in Bawaating, Sault Ste. Marie, Robinson Huron Treaty. We'd like to extend a huge thank you to award-winning duo Raven and Shashana of Digging Roots, for the incredible music featured in this episode and to all the RAD Team members who have helped to make the podcast happen. RAD Story Lodge is made possible by funding support from Liz Dykman's team at Environment and Climate Change Canada.

Mark: I don't wanna talk too much, but you got me going, right? I can't stop.