

Soil Media Study Through the SARE Farmer-Rancher Grant

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SPEAKERS

Speaker 3, Christa Hartsook, Joe Hannan

- C** Christa Hartsook 00:15
Hello, and welcome to the small farms podcast, a production of the small farms program at Iowa State University Extension and Outreach. Our podcast covers the opportunities and challenges associated with rural life. In this episode, I visit with Joe Hannon, a rose common berry farm, on field trials he conducted on soil media types for growing strawberries. I'm Christa Hartsook, small farms program coordinator. And we hope you enjoy the show. Joe, thanks for being back.
- J** Joe Hannan 00:45
Yeah, kind of different being on the show today as a guest farmer, not as my normal extension duty. So
- C** Christa Hartsook 00:51
exactly we were tackling a new area today.
- J** Joe Hannan 00:54
It is and you know, just a reminder to everybody if you're a farmer, and you want to be on the show, we would love to have you.
- C** Christa Hartsook 01:00
Joe let's set the stage a little bit for everybody and talk to them a little bit about your operation in itself you your growing day neutral strawberries, which is different.

J Joe Hannan 01:13

Yeah, so we grow day neutral strawberries, we treat them as an annual crop. So they get planted about the first of April to the second week of April, depending on the year. Again, they're treated as an annual and then we grow them hydroponically and vertical upright tower. So they're Clover shaped plastic buckets. That sit from roughly my knees. And I'm fairly short, so but for my knees up to about head height. And they're mounted on a piece of electrical half inch conduit. And then there's a trellis that kind of holds them in place just due to us being in a windy location. And then the tower spin and rotate around. And we get about oh let me see, about 20 strawberry plants per like three square foot of ground space. So a very high population and everything is up off the ground.

C Christa Hartsook 02:07

Sure saves a lot on the knees and wear and tear in general.

J Joe Hannan 02:10

Yeah, everything is upright. And it's just from a physical standpoint outside of mixing the soil. You're not on your hands and knees, you're using carts to harvest and truck picking and packing or bulk picking and repacking later. But yeah, nothing is bent over on the ground here. Like I said, other than prepping the soil and mixing pots and things but,

C Christa Hartsook 02:34

sure. And Joe, this is what we would call a hydroponic system.

J Joe Hannan 02:38

Yeah, it is a hydroponic system. We provide all the water and all the nutrients that the plants need. The soil media is just there to hold the roots in place, and to provide a place for water and nutrients to be stored until the plant can get on but it's a hydroponic system.

C Christa Hartsook 02:58

Sure. So Joe, you received a SARE farmer rancher grant, and maybe if that we should back up a little bit. I'm very familiar with SARE, you're very familiar with SARE. We probably should tell folks a little bit about what SARE is.

J Joe Hannan 03:11

Yeah, I think that's probably your job.

C

Christa Hartsook 03:15

It is my job. I am the I was senior coordinator. And SARE stands for Sustainable Agriculture Research and Education. Through that system we have a lot of different grant programs. One in particular is the farmer rancher grant, which is what Joe and his wife were able to access for their farm. So Joe talk, let's talk a little bit about what you were studying.

J

Joe Hannan 03:37

Yeah, so we got the SARE farmer rancher grant, which, again, it's for anybody that's wanting to do an actual research project on their farm or with a group of farmers. It's a the best plan or the best grant program. I think that's available for doing some on farm work. It's really in your hands and your control to set up and do the study. And it was super easy like Marilee and I put together our proposal. I don't know it took us a couple hours to write it and it took us Christmas vacation to kind of mull over how we're going to do it. So it was it was pretty easy. Yeah, so our research project so in the vertical towers typically use a mixture of core peat and perlite as your planting media for going in the in the planting arena. Buckets or the containers for the strawberries, the core peat and perlite. It's not a perfect soil media, I guess I'm putting I can put it that way. It's pretty cheap overall in comparison to some of the other media mixes that we use, but it is really labor intensive to prepare and mix and get into the pot. So the core peat blocks are in a nine by nine by three inch dry compacted block and you have to hydrate those and that takes quite a while to get them to hydrate and then you've got to take the perlite which is just as dry dusty powder and you got to mask up although we're all used to wearing a mask at this point. And then you got to mix the two at about a one to one mix. And that is hard physical labor to get this wet core peat mixed in with this dry perlite material and then get it into pots, especially at the scale that Marilee and I are at because we're small, we can't afford the hydrating and mixing equipment, I don't have 10 or 15 grand to put put towards that for, you know, a couple of 1000 pots every year. So that's really labor intensive to prepare the soil. Then, with all these towers, it's a struggle to get the water to move down through the tower and be uniform from the top bucket to the bottom bucket and across the bucket. So you need to put the water in the middle, you want that water to move out to the edges, but also the move all the way down the tower and do the same, same thing. So you want a good uniform distribution. With the core peat and the perlite. It's not in great media for getting good water distribution. And what I find often is that I have difficulty of getting the right hydration levels from the top of the tower to the bottom of the tower often with the core peat perlite, you'll end up with either the top being too wet in order to get the bottom one dry, or vice versa. And so if the bottom one is dry, now you've got short, stunted plants and you're not going to have the yield that you want. If the top one is too wet, you're leaching out nutrients during that process. And when you leach nutrients out, it dries up the pH of that media and causes iron deficiency it causes boron deficiency and it causes basically a very poor, poor, marketable quality fruit. And so that's been the challenge with the peat and perlite. And then, you know, if I'm treating this as an annual, I need to be able to do something with this at the end of the season, I want to be able to compost it and use it as fertilizer and one of my other high tunnels because I have all that fertilizer and material there. I want to reuse that somewhere else on the farm. And so that that I don't want to be putting perlite out into my high tunnels in my field. So I'm looking for something that is also completely biodegradable, renewable mix.

C

Christa Hartsook 07:15

Yeah, no, it makes sense. So in the end, Joe, you are really looking for easier mixing, good water nutrient distribution through that thing. What else did you find? Or what else did you try then?

J

Joe Hannan 07:28

Actually, we tried quite a few things. So in 2018 and 2019, we had a media mix that was kind of a fibrous core material. And that worked great under wet conditions. And I should preface that our strawberries are all outdoors, they're not in a high tunnel or anything like that. But we have this ground up, not even ground up. It's just a fibrous material. And it was really nice under wet conditions because it would shed a lot of excess water you never have plants sitting in too wet of soil. That said that media would also leach out some extra nutrients. So we'd have to split out and do some foliar feeding every couple of days or at least a day or two after getting a rainfall which we got into the habit Oh, we got to rainfall, I'm just gonna go foliar feed today, whatever, no big deal, I've got a little backpack sprayer for doing it. So it's not that big of an issue, but it doesn't have great water distribution. And then of course, going into this trial for 2020. They took the product off the market and I couldn't find it. Of course right. So some of the other medium mixes that we used, we wanted to stick with that core peat based material because core works really well with strawberries. It's got good drainage characteristics that you want because you don't want your strawberries to be in wet saturated soil. And then what we found was a core chips and fiber materials a dry compact block. But rather than being ground up core peat, they leave it into chunks. So it's a little quarter to half inch diameter chunks and then it also has some of that fibrous material that we'd like from stuff that's no longer on the market. And so what we did is we took one block of core peat and one block of that chips and fiber and hydrated them and mix them up as one of our media types. So that's one that we use out in the field out in trial. Then just on a complete random whim, I took that material and ran it through a wood chipper

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Christa Hartsook 09:31

A wood chipper?

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Joe Hannan 09:33

Yeah, ran it through the wood chipper and low and behold I created the material that was no longer on the market that fibrous material with just a little bit of heat in it that I really liked was basically just the ground up chips and fiber blocks. And I'm like, I I literally just got dropped on the floor come running into my house like Marilee Marilee, Marilee, you're not gonna believe what happened. And like we just created the material that we could no longer get So we did that we use that in two different media mixes out in our trial one that has the core peat plus the chips and fiber mix that we used and the other one and ran it through the wood chipper and then we just used a regular core chips and fiber and ran those to the wood chipper because it gave me a pretty distinct media next was the one with the extra peat was a lot heavier and a lot more water and had a lot more water distribution then just the fiber alone but we didn't want to get too wet because in the past that's where the issues have been if the ground is too

wet and heavy so we aimed more toward and use a fair bit of material not just in the trial but in some of our other fields just the ground up chips and and fiber. So we bought a wood chipper The reason we bought the wood chipper because was because we were actually going to try to grind up corn stock bales. So corn stock bales are dirt cheap. You know I can get them locally here for \$3 to \$5 a bale for just you know, a seven at town square bale. If you can pull that apart and get that broken up and ground up. That gives you a ton of volume for next to no cost. One bale goes a long way the problem is a wood chipper not a good solution for grinding up corn stock bales. But you know, I've got livestock, farming neighbors around me, but you know, they're using that equipment and bale handling equipment, you know, their tractor and loaders the same one that feeds cattle that cleans up the poop out of their feedlot that hauls manure out to the pasture. Like I was not cross contaminating myself in that so. So I think corn stock bales could be a good option. It's just we ended up not being able to use it because I didn't have the right tools to deal with it. I know that there was some work done in Nebraska that looked at using corn stalks for hydroponic media, and they didn't like it because it chewed up a lot of extra nitrogen. But in the grand scheme of things and the cost difference of a little bit extra nitrogen for using corn stock bales that are basically free in the grand scheme. And I mean they're, they're so cheap, they're they're not even a blip on the cost radar, versus using blocks of peat, core peat and chips and fiber are really expensive. That adds up quickly. So a little bit extra nitrogen to toss on. I don't think it's that big of a deal. I'd love to play around with that a little bit more, just like I said, I didn't have the right tools to have to deal with it.

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Christa Hartsook 12:19

sure that makes sense. So let's talk a little bit about each of these different trials. And Joe, what did you like about each of the different media types you tried? And what did you not like?

J

Joe Hannan 12:31

Okay, so I'll start with the core oat and the core chips and fiber all mixed up. What I really liked there is that it does well under dry conditions and had pretty good water holding capacity that had decent water, movement and distribution down through the towers. It also was not prone to getting blown around and by the wind in the springtime so that the core peat and perlite when it dries out in the springtime and you don't have plant cover and roots holding that stuff in place. It dries out and it blows and so you're out there, like this past year was 80 degrees when we planted a couple days after I mean we planted on early April, we had four inches of snow a couple of days later, it's 80 degrees for a week. And we were out there a couple times a day trying to water it down just top your asset and keep it wet and in place. The core peat and core chips and fiber mix did not blow around, it was not like we had to be out there really watching it very carefully. I think it would be tolerant of material handling. So running it through an auger or a conveyor in order to prep it, move it use it to load up pots, we're doing everything by hand, but I think this material would hold it well enough together that you could use equipment to do it a little bit of concern though, if the equipment jostles too much, you can kind of get some separation of materials, you don't want to handle a lot, but you can handle some what I did not like about it. If those chips dry out in the field, they're really really hard to rehydrate, you almost need a rainfall to get them to properly rehydrate. Yeah, there's just a little bit of a challenge with them if the dry out. Second, you got to really watch what kind of core peat you're getting. So 2019 We had just a couple of towers of this just kind of we knew we're gonna apply for this grant project. So we were testing out a few things ahead

of time. And the core peat that we had was a much finer grain material, whereas I bought from a different supplier this year, and it was a much larger gritty, core peat material. So I didn't quite have my mix ratios, right. I think from one era, you know, they weren't consistent in 2019 to provide me what I want it in 2020 because I had a slightly different material. So that said, I think we had started to look at for Fall mix and some fall plantings of doing a one to one mix with the core peat that we had and the chips and fiber. And that was actually outperforming the peat and perlite mix, both from a plant production standpoint, a water holding standpoint and water distribution, like as blown out of my mind and four weeks that we had it kind of sitting there and getting it up and going. So, okay, the other one that kind of caught me off guard was the core peat plus the core chips and fiber mix. I think that soil stayed cooler. So we didn't talk about this earlier. But we had let me see we plan it in early April, we had were warm for a week. And then we had four weeks of cold, wet rainy weather like rain all day, every day for four weeks. And we lost about half of our plants. Okay. And I think that Knicks took a very hard hit. And it took longer to recover because it didn't warm up as much. So I think that one that mix definitely is worth looking at a little bit more on especially adjusting some of the ratios here because if you get into that typical July August time period, if you're able to keep that temperature down a little bit more so than some of the other medium mixes, you're going to see increased plant production and plant fruit quality by being able to keep the strawberry plants just a little bit cooler, both from strawberries or say if you're gone leafy greens, you'd get the same benefit there.

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Christa Hartsook 16:21

yeah, yeah, that makes sense.

J

Joe Hannan 16:23

So we looked at some other things. Okay, so the, the core chips and fiber, we ground that up, that works really well wet years would never use it inside a greenhouse material because you do need some rainfall. I mean, it's it's my rainfall. Flood mix is kind of what I call it, not susceptible to wind blowing, super easy to plant into. And actually, it was one of the easiest to prepare for planting in the pot, because you prep the core chips and fiber blocks, they only take like 15 minutes to hydrate, and then you can take them out and dump them right through the wood chipper and put the material into the pots and start planting. Like one person could prep the material for planting, while two or three people are just trying to keep up with filling pots and planting like it was so easy to prepare. But again, not a drought year material, no material handling, it's not going to go through an auger conveyor, it's going to separate way too much and just not give you a uniform product on the on the downstream side of that if you're using it outside just plan on irrigating twice a day rather than once a day with it but if you're set up for a timer it's not a big deal it's not that we're using any more water with that media it's just that we're you're getting twice a day at half rates. So and that seem to work fine. And you know, you're gonna lose a little bit of nutrients and things like that when it rains. So just you're gonna have to plan on doing some foliar feeding. And actually even like this year with us getting so wet and then we want to so dry we probably needed to be doing some foliar feedings when it was dry as well because we were having trouble getting water down through the towers and distributed, like on a drought year like this we probably should have just said ignore the bottom two or three pots because we just can't get watered. So with that with that particular media anyway so so then we did a core peat plus we mix that with a courtship and fibers so that that

one block core peat, three blocks core chips and fiber and Marilee through the wood chipper as well. That one honestly don't waste your time with it. There's too many extra steps there. If you want a heavier mix material, just go at a higher rate of peat and core chips and fiber and just not grind it and you're gonna get the same response. So no difference in costs a little bit less than labor.

C Christa Hartsook 18:39

So sure, sure. Did you go in then Joe and kind of break all of that down in terms of the cost of the media itself, your time the water usage and then your eventual yield?

J Joe Hannan 18:50

Yeah, we did. So we'll come to yield stuff here in a little bit because that's a sore sore subject but so we did we looked at what the material cost was what the labor cost was and what the total cost was. And this is per tower and a tower is five pots of four plant seeds. So 20 pots, and so when we looked at the chips plus peat our material was \$4.48 per tower. Our labor was \$2.75 per tower so you've got \$7.25 just getting planted the ground chips and Pete That was about \$7.50 to \$7.60 total per hour for material and labor perlite was by far the cheapest because your material cost was so low. So you got like material cost about \$2.75 Because perlite is just dirt cheap. And this is really why I wanted to look at using corn stalks because you could really keep that material cost way way down possibly even lower than the perlite costs because you can get that locally. Look at the labor costs. The labor for peat perlite was actually the highest at \$3.15 Because it was such a bear to hydrate and mix, it was a lot of hand mixing to get it up and going. But your total cost is still under \$6 A tower because the material costs are so low, and then the ground chips that one had by far the cheapest labor cost because it was 15 minutes to hydrate a block and you can hydrate 15-20 of them at a time and just go down the row as you get them hydrated. And then running them through the woodchipper. It's just like nothing. So what we did is, at the end of each day, from when we're wood chipping, or running the ground chips to the wood chipper, we just open it up, cleaned it up, sharpen the knives, and we'd be good to go the next day. But yeah, so the cost is anywhere from just about \$6 to a little over \$7 depending on on the mixes, which that's not cheap. It takes a lot of strawberries to offset that cost.

C Christa Hartsook 20:52

Sure, sure. It's a huge consideration for sure.

J Joe Hannan 20:56

Yeah. And that's really why I find that that material itself that it's just cheap is so important. But again, I wanted something that was going to compost and break down and stuff too. So I wanted to be able to use it elsewhere, which I use some of my stuff from 2019, in one of my tunnels and things just as fertilizer in it. So I mentioned in from mid April to mid May, we had rain all day, every day like it was just sloppy saturated. Man, I didn't run the irrigation system on my hydroponic towers for four plus weeks. That's ridiculous when you're looking at supposed

to be what you're supposed to irrigate daily. Yeah, so we track the number of plants that we lost within each of our towers, and whether it was the chips and peat, the ground tips and peat the peat and the perlite the ground chips, we figure we lost about three plants, like just three completely dead plants across every single tower. So it was about 25% loss. But then we didn't really count separately, plants that just looked absolutely terrible. And were on the verge dead, we just kind of ones our dead dead. So then we wanted to look at things finally started recover. So we looked at plant population in August. And what we did there, because we just we could not have that much loss on the plant population. So we actually used runners from the day neutrals in order to set and fill in some of those blank spots. And we went and got to a point where we were less than one plant missing per tower. So we were almost able to get back up to 100% plant population. Which was pretty impressive. And honestly, I think we probably could have been done that done a little bit better and got them back into production a little bit faster. But we were unsure whether we were going to set runners or not refilling because everything everybody says don't use runners because runners are going to take away from the rest of your crop. So that'll say maybe infield production. But when you're in hydroponic production, boy, you can push a lot of vegetative production very, very quickly. I mean, we're putting on a leaf every four or five days. And I usually look at a leaf a week from a production standpoint. So we're gonna make up pretty quickly and got to a point where you cannot tell which was a runner plant what wasn't and it was pulling off the same same size fruit and things like that. So I would definitely do that again. But I would just do it right from the get go. We we lollygag around too long on on that. Sure. Sure. So, but the chips and Remember when I said it was colder? Yep. And it showed when it came down to plant population restoration. We actually were just a little bit over one plant per tower missing. Were all the others were significantly less than that. Yeah. And I think we could change up that chip in fiber and peat mix and do a little bit better next year.

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Christa Hartsook 23:58

Yeah. Oh, overall water usage. Joe, where were you at there

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Joe Hannan 24:02

should have figured out what the actual water usage per tower was. Basically, there was no difference in water usage across any of the treatment. So it's all about the same. Okay, trying to think we had 800 and some towers, and we used roughly actually would have been just a little over a gallon per tower is what we're using per day. I think we probably could have pulled that down just a little bit. But because we were so dry, we struggled to get water out there. I mean, we went 17 weeks without water, except for the day that you were here to take video. Yeah, and the deracho and the deracho. We didn't actually get that much out of it. So yeah, we went 17 weeks about water and then continued on after that without water. But so yeah, so you asked about yield. So that's the kicker 17 weeks without water. You're using 130,000 gallons of water over that summer. We ended up with a very dry well, that could not produce any more water come August 20. So deracho was what August 10. Yeah, so it wasn't quite the 20th it was a week later. Anyway, so August 10. A week later that next Saturday after spending all week getting the plants put back in shape and stuff like that our well ran dry. I wouldn't, I was not going to haul 1000 gallons of water in to the farmer day because that's a good way to destroy a truck and I can't turn a profit on. Right. So, yeah, yield wise yield was absolute trash for us this year. It's super frustrating. I will say when you look at yield, the peat and perlite

actually did the best this year, both on fruit size on fruit quality and actual just total total yield. And I'm not 100% Sure, well, I got some ideas on why that happened. But so that one did the best, the chips plus peat was a pretty short second. So even though we did have a recovery rate, it still did pretty good on giving us yield. But I think it would have eventually caught up to the peat perlite. And the reason I say that as the is because the peat and perlite actually we started to get root bound. And we were actually having starting to have production problems with that Nick's as it got late into the season, because we could not get the water to infiltrate because it had gotten so plain, just you could not get the water to move down things. So they were drying out quite a bit. Okay. Whereas the chips and fiber and peat mix, we were not having that issue. And so those were starting to come up and produce a little bit better than the peat, perlite there where we had seconds and things. So we had a lot of seconds out of those. And that was more a management issue was trying to get them irrigation water amount just right on those. So it was a little harder than the peat perlite mix to get the irrigation just right. So we ended up either underwater and over watering kind of consistently on those. So we struggled there, the ground ships had terrible yield, because we just didn't have rainfall they need that mix needs rainfall in order to be productive. Previous Year on the ground chips, we tracked some data actually tracked data to previous years because we've had that in 18 and 19. And we were at a pound a plant or better on the on that mix so and that's really where you should be. Yeah. At and then the ground chips plus, plus peat it did about the same as the peat perlite and the chips and peat but again, that's not when I would jump on a recommend is just no value adding that extra step of grinding that mix.

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Christa Hartsook 27:28

Yeah. So Joe overall, what's next, you know, how are you going to proceed,

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Joe Hannan 27:32

peat and perlite will definitely be on the farm again, in some way, shape, or form. And I'll be going with a one to one mix of the chips and fiber plus peat mix rather than a one to three mix, like so we had started to set a trial up inside our high tunnel for some fall production. And those plants are just going gangbusters Marilee, I were both watching that water distribution on those and it was just by far better than the peat perlite. So while it's a lot more expensive, if I can solve some issues by going that route, I will sure. So that'll I guarantee you that it'll be in the mixes next. Other things as next, eventually I'll try to look at corn stocks and finding a mix for that. But I'm not going to tackle that one anytime soon. Because that's going to take quite a bit of playing to figure out that you're grinding to mix ratio. And then honestly, we're going to look at less towers and more other rate options. Okay, the towers are nice, you can jam a lot of plants in but they're also we're not seeing the labor savings that we had wanted to but go into that system. Sure, though, water management, irrigation system management on that as a lot more, there's a lot more cost with the irrigation setup. Whereas if I can just bring up and do beds, trough systems that are at waist height or chest height or something like that and run it with a drip irrigation or drip tape down through it by far and away. I think I can come out just as well that route and have have less plants, but also have significantly less labor and cost tied up. Sure. Sure that makes sense. Right up there. So I'll definitely be looking at some different options for that here in the future too.

C Christa Hartsook 29:18

Yeah. Joe, anything else you want to share about farmer rancher grant process or your trial itself?

J Joe Hannan 29:25

Yeah, so the farmer rancher grant process, have a good idea talk to you talk to there's quite a few other folks in the state that have gotten them but it is a research project and then there's an extension component and so we did we have this podcast, we have a video that you got your team actually came out and recorded it for us and then I've got another video that's going to be kind of like this podcast material, but it's gonna have more pictures and things like that to kind of go with it that I'll be getting recorded here. The process is pretty easy. The paperwork and the writing of it is really easy. What I would definitely suggest is going back in and looking at previous projects and looking at what others have done and how your project is different. I spent quite a bit of time looking at other people's projects, and I gleaned quite a bit of information that we ended up kind of incorporating into our into our project as we were going to take some time to look at other projects and include that. And I don't have a lot to say cause it was just such an easy process versus other grants I'm involved with on my day job. So

C Christa Hartsook 30:28

yeah, right. And for those interested, the SARE farmer, rancher grants typically are kind of announced as open in August, and then they have an early December deadline. So it gives you plenty of time to write as Joe indicated, it was not a very difficult application at all, everything is done online. And you do have easy access to that entire library of previously funded projects. SARE doesn't like to fund projects that have already been done before. So it's really very helpful and beneficial to your overall application to go through that library.

J Joe Hannan 31:05

Yeah, I kind of mentioned a little bit earlier that you can have a project that is just your farm, or you can have a project that has multiple farms or multiple farms plus like a nonprofit involved. And when you have multiple entities, I think your funding amounts can be a little bit higher.

C Christa Hartsook 31:22

Yes, yes, that's very true for an individual farm, you are maxed out at \$9,000 was was last year's application anyway, I'm anticipating that that will be roughly the same this year. So the more people you involve in the project, the more that funding source can go up, to so.

J Joe Hannan 31:38

Yep. Just be realistic about how you're spending your funds. But definitely don't sell yourself cheap, either. Yep. I mean, grants are a lot of work. And if you think something's going to take you a half hour, it's actually probably gonna take you an hour or so account for that.

C Christa Hartsook 31:54

Yes. Also a good point. Joe thanks for being on and being willing to share about your farm side versus your extension site today. I really appreciate it.

J Joe Hannan 32:04

Yeah, thanks for having me on here and allowing me to talk about our project. And and thanks to SARE for funding us this year, they provided a lot of help, as we're trying to really figure out what soil media mixes are we're going to use and how they respond and different types of systems. And I'm honestly getting Facebook messages and calls from all over the country and all over the world here. It's been kind of kind of crazy.

C Christa Hartsook 32:30

That's awesome. That's it's great to see that outreach is really hitting out there. For those interested in the SARE farmer rancher grant, there is a lot more information on that North Central SARE website, which is just north central SARE dot ORG so you can find more information about the farmer rancher grant process there. And that would connect you right to me, too, if you wanted to bounce any ideas off. So Joe thanks for being on. We appreciate it.

J Joe Hannan 32:58

And can we put the link for the video that you guys created in the show notes as well? Please

C Christa Hartsook 33:02

raise your hand. Yep, absolutely. And then folks can get a visual of what your operation looks like.

J Joe Hannan 33:07

Awesome, much appreciate it.

C Christa Hartsook 33:09

All right. Thanks, Joe.

J Joe Hannan 33:11

Bye, Krista.



Speaker 3 33:12

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