From Construction to Cultivation: Ben Weiss on Hydromulch, Sustainability, and the Future of Agriculture

[00:00:00] Nataliya Shcherbatyuk:

Hello and welcome to the Mulch Matters Podcast where we will explore the intriguing world of mulch and its impact on agriculture and the environment, as well as update you on the latest research about soil-biodegradable mulch and recycling options for plastic mulch. I am your host, Dr. Nataliya Shcherbatyuk, and I am a communications specialist for the project, “Improving end-of-life management of plastic mulch in strawberry system”. In each episode, we’ll dive into the latest research, trends, news, and insights on why mulch matters and how we can improve plastic mulch end-of-life options. We'll also branch out and discuss other plastics as well as talk to researchers, experts, and practitioners in the field who will share their insights and experiences on how to use mulch effectively in different settings.

[00:01:11] Nataliya Shcherbatyuk:

Welcome back. Happy new year you all and let's welcome our guest today, Ben Weiss, who is the graduate student at Washington State University. Hey, Ben, welcome to our podcast. How are you? I'm good,

[00:01:19] Ben Weiss:

Hi Nataliya, thank you for having me.

[00:01:21] Nataliya Shcherbatyuk:

Oh, absolutely. So, let's without any further due, go straight to our conversation and let's start by you telling us a little bit about yourself and what brought you to the graduate school at Washington State University and what is actually your current project.

[00:01:40] Ben Weiss:

So, my name is Ben Weiss. I'm originally from Philadelphia. I lived there until I was 35. I grew up in a health food co-op, so I didn't grow up around agriculture, but I grew up around food and I developed a love for food from a very early age. A lot of my childhood friends are actually cooks too, so I think that also kind of helped indoctrinate me into the world of food.

[00:02:05] Nataliya Shcherbatyuk:

Oh, did you say cooks?

[00:02:06] Ben Weiss:

Yeah, yeah. A lot of my friends.

[00:02:08] Nataliya Shcherbatyuk:

Nice. Nice.

[00:02:11] Ben Weiss:

And I grew up doing construction personally. I did construction from when I was like 15 or 16 until, I don't know, 27-ish, and during that time I started growing a tomato garden in my backyard. And I really fell in love with growing stuff in my backyard and just basic gardening stuff. And I got kind of tired of construction. Construction in Philly, you spend a lot of time in. I like the physical aspect of that kind of labor, but you spend a lot of time in like old houses and just inside and very dusty, musty environments. And I sort of discovered agriculture has a lot of you know, physical demands of construction, but they're more fun to me. I'd rather play in the dirt and move around two by fours and I really like being outside. Really into snowboarding and backpacking and stuff like that. So, I think that's really what drew me to agriculture, and then also being able to eat while I work sometimes. And, you know, that's good. I also really enjoy both about construction and agriculture that you kind of at the end of it you have this very physical thing that you did, that you can see, and I think agriculture especially provides that, especially with annual crops, because every year you get to see, like I remember these plants when they were little tiny starts or seeds, and I, you know, raised them up to be these big six feet tall tomato plants or whatever now, and I always thought that was super cool about it. I always really enjoyed, like, I get a really nice feeling of accomplishment from that. Yeah. So, that's really what drew me to agriculture. Then I went to school, I started school when I was 26 and then at 27, I went to community college for a while just to do prerequisites. And then at 27, I went to Temple University and did my bachelor's in Horticulture, and I didn't really have any plans to go to grad school when I started. I was thinking I would just do landscaping because I had sort of transitioned my little handyman construction business into landscaping, at least to some degree and then, while I was in school, I really fully transitioned to doing landscaping and started building food for us for people. As far as I know, invented a method of using Google culture to create little food forests and raise beds that people in my neighborhood really enjoyed. I would fix people's hydrology a lot. A lot of the houses where I'm from are very old. Like the street I grew up on, the basements of the houses are 10 feet below the concrete driveway, which causes really bad flooding issues. And the options for it are basically you need to put some sort of, you know, biological mass in the way to slow down the water getting to the drain. Or you need to pay a contractor a lot of money to install some pumps and to jack up your concrete. They'll actually float concrete underneath already existing concrete to raise the level of the land and it's really expensive. So, I got a lot of business doing that as well, because a lot of those people have known me since I was a child and they saw what I did at my dad's house, and they were like, how much did this cost? Oh, it's only like a couple thousand dollars.

Like, yeah, please sign me up. It's much cheaper than anyone else is going to charge to ameliorate this issue. And then while I was at Temple, Dr. Sasha Eisenman, he does a lot of ecological research. He was a really big influence on me. I really enjoyed being his student. He was my plant physiology professor. I really fell in love with plant physiology and cellular biology, and I find it super interesting, and he sort of influenced me to go into research and go to graduate school. So, when I started looking for graduate schools, I sent emails to a bunch of professors whose research I was interested in. One of them was Carol Miles. I emailed her about biodegradable mulch. I'm also pretty passionate about preserving the environment, and also Philadelphia has huge problems with litter. So, removing, like, I've been picking up litter since I was a little kid in the parks and just randomly on the street. And so, the idea of getting, you know, plastic out of agricultural supply chains was really appealing to me for that reason. So I wrote Carol Miles and she was like, well, I don't have any projects for you currently, but Lisa DeVetter does. She has one on hydromulch. So that's how I wound up at NREC and then my project is hydromulch, which is a spreadable, biodegradable, paper-based mulch technology for organic growers. And it's a technology that's very new. Most people aren't familiar with it. It comes from hydro seeding, which is, technology used in landscaping. It's sort of a full circle moment for me. I suppose. I actually saw hydro seating on the side of the highway on my way back from Prosser a couple of days ago, which was pretty exciting to me. It's the first time I've ever seen it used like in real life, at least that I remember. I probably have seen it before. I just didn't know what it was at the time. And yeah, that's about it. Oh, I guess hydromulch is also it's a technology people are really interested in, but also has a lot of hurdles that I will get into later. I'm assuming for adoption, but it works really well at suppressing dicots. And yeah, it's super interesting. I really love it. I'm really happy with my choice to come out here.

[00:07:41] Nataliya Shcherbatyuk:

Yeah, that's exciting. And, you know, I like that you said about all of those plans are being from tiny-tiny bits and then they growing up. That's really rewarding. So, tell me secretly, are you using your construction knowledge to build the garden designs and all of that?

[00:07:57] Ben Weiss:

I was in Philadelphia, where I live in Washington. I can't really garden, or I haven't figured it quite out yet because I live at the base of a mountain called Galbraith, which is a really beautiful mountain, Viking Mountain. I couldn't ask for a better place to live other than my house is surrounded by Douglas Fir trees. So, there's very little light. Like I struggled to grow spider plants inside of my apartment, which is sort of a new phenomenon to me being from Philadelphia, which has a ton of sun exposure generally. So, I haven't really been gardening much out here, but in Philadelphia I was definitely using a lot of those skills, especially when I was building like, I would build retaining like little wooden retaining walls for people or you know things like that, I've relied pretty heavily on my construction experience to do that.

[00:08:50] Nataliya Shcherbatyuk:

Yeah, that's in need for sure. Yeah, especially for gardeners. It's pretty and it's so useful. Yeah. Well, let's go back to what we, why we're here today. So, can you dive a little bit deeper into your specific project that you're doing right now? And what is the focus of your project and what is actually the significance of your research?

[00:09:11] Ben Weiss:

So, the focus of my project is creating a biodegradable mulch system for berry growers. My current research is in high bush blueberry and there was a project that was before I came to interact that was in day neutral strawberry and the significance of it is that organic farmers don't I think there's one biodegradable mulch that's we've got plus that's allowable in on certified organic farms from what I've been told, growers don't really enjoy working with it all that much. I've never actually used it myself, and really organic growers are much more limited because of national organic program rules around biodegradable mulch. So, a biodegradable mulch on a certified organic farm needs to be 100 biobased, and there's some other requirements, but that's the biggest hurdle is currently the highest biobased content in biodegradable mulch I know of is 40 percent. So, we're still a long ways off, and I think organic farmers are also especially interested in alternatives to plastic mulch because they're, you know, organic agriculture has a focus on sustainability and the amount of weed, 2. 75 million tons of plastic every year, just as mulch in agriculture. So, I think they're both especially aware of it and then also have especially, you know, limited options, so I think that's really the significance of the project. Hydromulch doesn't, in its current formulations, really suppress monocots in my experience, although our data is a little mixed on the West side. It did a little bit worse with the dicots and a little bit better with the monocots in Prosser where my current research is. It really did not suppress monocots at all, especially nutsedge. It did suppress the dicots reasonably well, though, and I think it could have some applications right now in replacing broadleaf herbicide, there's a little bit of research that showed it worked well for that by Klein in 2011.

[00:11:24] Nataliya Shcherbatyuk:

Yeah. And you mentioned several times that you're working with hydromulch, and you mentioned briefly what it is. Can you tell for listeners a little bit more and just to remind us, we had a few episodes talking about hydromulch, but this is not something that we hear on a daily basis. Can you tell how it actually works?

[00:11:41] Ben Weiss:

Oh, yeah, I'm sorry. I should have mentioned that in the beginning. So, hydromulch is water, cellulose based fiber. We're using recycled paper. Most people use paper. It has to be recycled paper for certified organic growers. That's one of the NOP requirements. And then a tackifier, which is a glue like substance that helps bond those paper fibers together. And then that material can be sprayed over tops of beds and planted through once it dries, or it can be sprayed onto the sides of beds on

already established plantings, which does sort of make it unique in that you can apply it to, you know, a five year old orchard that I mean, you can do that with other plastic mulches, but it's a lot less labor. Also, one of its big hurdles is that the, at least for orchard crops, the application technology doesn't really exist. Most of the commercial hydro seeding equipment is too wide to fit up an orchard alleyway. So, it would, you either have to redesign a modern orchard or someone would have to make an applicator, you know, special made for hydromulching that fits up those alleyways and has a really big tank on it. So those are a couple of the hurdles with actually applying it to the commercial scale, and it can be made out of other cellulosic feedstuffs. Hypothetically, I haven't really seen people doing it much, but there are some material scientists who've done work on, you know, mixing straw and paper, wood or stuff like that. Dr. Dilpreet Bajwa and Andrew Dorado have a recent paper, that's the author would be Dorado, that was looking at the mechanical properties of a bunch of different mixtures of hydromulch and they found paper with tackifier was superior to adding anything else, but it's another, you know, avenue of research that people are going to keep digging into, I think, and that is pretty interesting new, so maybe one day we could, you know, have a mixture of agricultural residues and paper or something else. So that, you know, it's a little bit cheaper. It's a little bit cleaner because then you're not using as mulch paper and, you know, recycled paper is great and all, but it can be used for a lot of other things. Whereas if you could make it out of agricultural waste that is just going to the field anyway, that would probably be more, you know, environmentally friendly.

[00:14:03] Nataliya Shcherbatyuk:

Yeah, it definitely sounds more cleaner. Yeah, and if we talk about your research that you've been doing for the past couple of years, do you have any preliminary results that you can share with us?

[00:14:15] Ben Weiss:

Yeah, so my main preliminary result is that it doesn't really suppress monocots, it definitely does suppress dicots. So, the field I'm in right now has a ton of dicots It's actually mostly dicots and each one of my plots will have. So, each plot has a one square meter data collection area, and inside that one square meter data collection area, I usually have somewhere around 40, 20 or 30 graphs is and then like three to five dicots, so it definitely does suppress dicots. Suppressing monocots is more challenging for I'm kind of curious. If there's ways to make it suppress monocots better, especially in non-organic agriculture, if you could just add some sort of grass killer to it. So, then the grass killer isn't being sprayed around quite as much. And you have a much more targeted application. And then you also get, you know, soil moisture and temperature benefits.

[00:15:15] Nataliya Shcherbatyuk:

So, you mean, what are you talking about, it's to mix in the solution of hydromulch also some sort of grass killers?

[00:15:21] Ben Weiss:

Yeah, yeah. So, for conventional agriculture, if you could add herbicide to it, and there is actually a USDA scientist, down in Prosser, who is doing some research on adding herbicide to it in hops that I'm pretty excited about, but I don't, I think his first year is next year. So, there's no results from his work yet. As far as I know, he'll be the first person to ever try that in a field. So, I think that'll be really interesting and could be, you know, a way forward for hydromulch and conventional agriculture, at least. I'm also curious about making it opaque. I have some reason to think that making it opaque would help suppress things better, but it's kind of hard to say about actually trying it.

[00:16:07] Nataliya Shcherbatyuk:

Interesting, and so, you know, you mentioned about few challenges in the application, for example, hydromulch in orchards. But if you think about the big scale, commercial scale of using hydromulch in the future or currently. What do you think are the biggest challenges to adopt this technique?

[00:16:29] Ben Weiss:

Well, I think the biggest challenge is the applicator and then to a lesser degree making it more functional and also having so someone make a purpose-built product for hydromulching. So, there are a couple of paper producers I've talked to who would be interested in doing that, but I don't think that horticultural science is really there yet for them to invest in it heavily and the applicator technology isn't there. It's also the results in our colleagues in North Dakota and their results in onion and broccoli have been a bit better than ours. And it also did those rows. You maybe could use a commercial hydro seeder to apply. I don't really know what they're spacing is off the top of my head, but I think application will be the biggest challenge. You need a really big tank when you start scaling hydromulch up. You know, like, 1 acre starts even I forget somewhere around 10, 000 gallons when I figured it out. So, you would need a really, really big tank and putting that much weight on a tractor is challenging, you know, popping wheelies and stuff. So, I think that's really the biggest hurdle other than, you know, there are some less some other horticultural hurdles, like, figuring out how to make it suppress grass and stuff, but. I think that's really the biggest hurdle, even if, you know, all of this research is super successful, and we figure out all of the horticultural aspects and it works awesome. There's still some, you know, a fair amount of mechanical engineering that's going to need to happen to make it commercially viable.

[00:18:20] Nataliya Shcherbatyuk:

Yeah, and when you said about the weight, the first thing that came to my mind was the soil compression under the tractor, even if the tires of the tractor are fine. That's a lot of weight to be driving around.

[00:18:33] Ben Weiss:

Yeah, it will add a fair amount of soil compression. There might be some ways. Like, one very kooky idea I've had is to not use a tractor at all and to figure out a way to install lines that spray hydromulch into perennial systems, so that you install it as part of, you know, the infrastructure of the field, and then once it's done, you can turn it on and turn it off, basically. But I, I've done a little bit of research into it and as far as I can tell a nozzle that would accomplish this doesn't really exist. There probably would also be some clogging issues with doing that. You'd have to figure out a way to wash out the lines without washing off the hydro mulch before it dries, and I'm sure there's other issues with that, but I think there are ways to do it. It's just, you really need engineers involved.

[00:19:21] Nataliya Shcherbatyuk:

Oh yeah, absolutely. And if it's really something that promising, I think that solution is right there.

[00:19:29] Ben Weiss:

Yeah, yeah, I'm fairly confident that if it were made to work really well from the horticultural and that paper producers and manufacturers would basically be like, oh, this is a whole new, you know, product for us that we can make and sell, like, we're very interested in this and I have gotten that response from paper producers already to a large degree is that, you know. If, if you think it works well enough currently, like we would be interested in making it, but I don't really think it works well enough currently, except for maybe, you know, applications where you're either adding herbicide or replacing herbicide as opposed to replace plastic mulch, which is a much taller order.

[00:20:12] Nataliya Shcherbatyuk:

Well, you know what? That's why you're doing your research. Yes, let's switch a little bit just slightly. So there has been pretty big concern about PFAs in different industries. So, before I jump into this question about PFAs, I would like to ask you first if you can tell what PFAs is, if you can clarify actually if this, the PFAs are used in production of biodegradable plastic mulch, which is BDMs, because we do talk a lot about BDMs.

[00:20:47] Ben Weiss:

Yeah, sure. So, as far as we know, they're not used in the production of BDMs. The only way a BDM could really become contaminated with a biodegradable mulch or with PFAs, excuse me, is if the same manufacturing lines were used to make something with PFAs in it, which I don't really know why they would be, but I've talked to a couple of the material scientists on the our biodegradable mulch project or Lisa's biodegradable mulch project, and that was really the only way they could think of, they could become contaminated. Their PFAs are generally added to paper products, not plastic products. They are added to plastic products sometimes, but they're mostly used in paper, their main use in paper is making them water and greaseproof. So, they're a big problem in takeout food containers. Basically, any paper product that has been made water or greaseproof has a decent

chance of having PFAs in it. And then PFAs are polyfluoroalkyl substances, they're also generally termed “forever chemicals”, that's usually what the, you know, media calls them. So, if you see a news report about forever chemicals, it's the same thing. And there, there are a class of compounds of fluorinated compounds that are very sticky. So, they're very good at sticking to biological tissues. And they're also very hard to pull apart or destroy on a molecular level, because they have a whole bunch of fluorine molecules, which are the most electronegative molecule, and they're shaped in such a way that they're all pulling against each other in the molecule. So, finding something that could pull, you know, that structure apart is really challenging just because fluorine is the most electronegative, you know, atom on the periodic table. So, there isn't really anything that can easily pull it apart,

[00:22:51] Nataliya Shcherbatyuk:

So, if not from BDMs, then do you know what's the actually major source of PFAs in agriculture?

[00:23:00] Ben Weiss:

It's the paper industry. So, the one of the other things about PFAs that's concerning is their water soluble. So, especially the farm is near a paper manufacturer. Other contamination sources are airplane or airports because they use firefighting foams have a lot of PFAs in them. That's specifically the ones used to put out plane fires. That's actually the reason I became aware of PFAs about 10 years ago is that there's a military base in Philadelphia that contaminated the groundwater and their surrounding area with firefighting foams, and that was one of the 1st times we were if it was either one of the 1st times, if not the 1st time that the EPA really realized, oh, this compound is getting into drinking water and probably isn't good for you to be consuming, so, yeah, they move around in water. That's why they're able to get into plant tissues pretty easily, because if it's in your irrigation water and your water, they'll get in there. Another source is if you're near enough to a paper plant or a manufacturer using PFAS, they also get into the air and they can go into plants through their stomata. Um, although that's a pretty preliminary finding, um, so like they know that they're capable of doing it, but what the concentration that's actually, you know, the plants are actually. Getting into their tissues from air versus water. We don't really know yet. And, um, it's a really interesting topic. There'll be a lot more research on it coming out in the coming years. I expect because the EPA is taking a really hard look at them. And I would also expect more regulations around them to be coming out from EPA and various other government organizations as that research comes out. So. It's an interesting and scary, field.

[00:24:50] Nataliya Shcherbatyuk:

Yeah. I mean, you mentioned if it can, if it seems like it can come through storm aids, then, you know, probably can come to our lungs as well.

[00:24:59] Ben Weiss:

Yeah. Yeah. That's a good point. I never actually thought of that, but it totally could. And it also could be in our drinking water and off to move.

[00:25:08] Nataliya Shcherbatyuk:

Yeah. Yeah. So do you, about the back to the fires, do you know if they use the same, uh, bomb for their, let's say wildfires?

[00:25:18] Ben Weiss:

I don't know. I mean, that's never occurred to me to look into. I wouldn't think they did because I think the reason, they're using PFAS on airports. specifically, is because they need something that can put out jet fuel, which is, you know, really, really combustible and oil and a wood fire or, you know, a forest fire would be, you know, I mean, it's going to be a very high temperature of course, but it's not going to have this, it's going to have different properties. Um, I'm not really that familiar with the firefighting foam aspect of it. Um, So I don't really know, but I would kind of assume not just 'cause I've never heard anything about it. I would also kind of think that the forestry service would, you know, I, I would guess that they're more hesitant to spray certain compounds on the forest just because of, you know, down the line ramifications after they put out the fire. Um, I don't really know though. That's a really good question.

[00:26:19] Nataliya Shcherbatyuk:

Something to look at into for sure. Yeah, it's interesting. Yeah,

[00:26:23] Ben Weiss:

I'll, I never thought about that, so I'm glad we brought it up

[00:26:23] Nataliya Shcherbatyuk:

Okay, let's talk again a little bit about BDMs. So again, what do you think for further research and advancement? Um, what needs to be done and what needs to be improved in respect to adaptation and effectiveness of biodegradable mulches in commercial agriculture?

[00:26:48] Ben Weiss:

Well, I think, um, I think to the effectiveness there, like they work, they work about as well as polyethylene mulches. I think it's really, they need to be made in a way that growers are more okay with using. So, I know like there's a strawberry grower in California. I heard talk about it and his main concern is that he has, um, lettuce growers coming in two weeks after him. And they're very concerned about pieces of plastic getting into the, you know, getting onto the lettuce because it's a crop. It's so close to the ground and because a piece of plastic and a piece of lettuce are pretty similar. It's pretty similar that they wouldn't wash out in the wash pack, um, which is something that I actually have worked on a leafy green farm before in a micro green farm before. And I've ran a

commercial Washer before and I would imagine that a biodegradable mulch would act about the same as a leaf and that it would just come out as a much cleaner piece of biodegradable mulch in, you know, your lettuce. So, I'm pretty sensitive to that concern. I do think it's a thing that maybe could be overcome by, I don't know, spraying something on it that helps it degrade or something like that.

[00:28:05] Nataliya Shcherbatyuk:

Or maybe rotations. Maybe, I mean, if biodegradable mulch is expected to biodegrade in, let's say, two, three years, then it might be rotation between the plants.

[00:28:17] Ben Weiss:

Well, I think the issue for this grower was that in this area of California, Salinas Valley, they're going like strawberry and then they're going straight into lettuce and they're not really doing rotation or letting, um, there's no break in their cropping cycle. And then if you go further south, they're just doing strawberries, like on top of strawberries, like repeatedly. I see, yeah, that would be an option, but I don't think that's an option for the really big industrial folks, just because they're, you know, You know, they're rotating between lettuce and strawberry pretty exclusively for economic reasons, and I don't think they want to change, right? Yeah, maybe if there was some sort of incentive to change it like some sort of, you know, if the state of California was like, we'll make up the day like the money you lose with a subsidy or something, maybe that would help. I also think some sort of consumer research should be done to see how organic consumers feel about biodegradable mulches.

[00:29:23] Nataliya:

Oh, that's a good point. Yeah.

[00:29:26] Ben Weiss:

I was raised in a health food store. And my dad's the purchasing manager of the health food store. And I talked to him about it and I've talked to some other people who I know are organic growers and this is organic purchasers. This is very anecdotal and specific to Philadelphia. Um, but all of them were very like, we don't really care about a hundred percent bio based mandate. Like as long, we would prefer to you have less plastic and less microplastic in the soil. Um, so. I don't really, I think that could be an avenue to help more growers adopt it because I do think a lot of organic growers would adopt it if they could, and I think that market would be more amenable, um, to it just because of the focus on environmentalism in organic agriculture. And that that's a lot of the reason people buy organic, like to take it back to Temple, that Professor Sasha Eisenman, the reason he buys organic is because he's concerned about the environment, and he thinks environmental or organic production is more environmentally friendly. So, I think that could be a really beneficial, like, avenue of sociological research is to look at what consumers actually care about. And then having. Consumer opinion informed the National Organic Program more because something I've really realized from being at NREC is that I think there's and from delving into National Organic Program rules, is that I think there's

sort of a disconnect between what the consumers care about and what the purchasing managers care about and what the NOP rules say. Um, so I think that I think that could be a really beneficial avenue to get more folks using BDNs. Just getting it into organic agriculture and 1 way or another, letting consumer preference sort of dictate another idea. I had, although it's probably sort of controversial because it would put pressure on growers is some sort of like, um. Low plastic or no plastic certification that could be put on products like a 3rd party certification, not a government 1 sort of similar to Rainforest Alliance certified. Um, um, um, um, um, um, um, so some sort of like advertising thing that, you know, like that this food was grown with biodegradable plastic and with growers who are trying to use less plastic. And then even minimized.

[00:31:50] Nataliya Shcherbatyuk:

Yeah, and that's a good point. Even if you put minimized or lesson. Yeah. And you know, you, you speak, you said a few times about bio based and then we spoke about biodegradability, and I just wanted to again, remind that 100 percent biobased, it does not mean 100 percent is biodegradable. So, which is quite important thing to remember. Just because even if it happens that BDMs will become 100 percent biobased, it's not necessary, will be equal to 100 percent biodegradable. So that those things are not the same. And if we want to have less plastic in the field, it doesn't necessarily mean it has to be more plant based.

[00:32:40] Ben Weiss:

Yeah, yeah, it's a very important point. Thanks for adding that. Um, I think it also 100 percent bio based. If you did make it 100 percent bio based, then you might run into other issues in NOP. Anyway, like, would it still degrade 90 percent within two years? And what if there's these other hurdles? Do you have to do it? Jump over too to actually make that work, which I don't really know if a hundred percent bio-based would be able to do. So, I, I do think it's something NOP needs to look at again, and I am fairly certain they are. I know there was a memo written like a year or so ago about it to them, um, or from NOP to NOSB, I think actually. Um, so I think it is a thing people are at least sort of reviewing. At the regulatory level.

[00:33:30] Nataliya Shcherbatyuk:

Yeah, well, we'll see how everything develops, but I'm sure that, you know, everybody has a goal and that's the goal to be more ecofriendly. So, they all are working towards that. So that's great. And Hey, Ben to wrap things up. So, I have a question for you. If you could use hydro mulch plant any crop in the world. Tell me what would that be and why?

[00:33:53] Ben Weiss:

Oh, I would repeat client's research in apples. I would go and compare it to glyphosate in Washington for apple production and see if we got similar results because what clients found was that the vigor for the apple trees under hydro mulch is greater. And that it had similar weed suppression.

Um, his hypothesis was that the vigor was greater because the glyphosate was causing a little bit of phytotoxicity. And then also the hydro mulch, you get soil temperature and moisture modulation that you don't get with glyphosate. And I think especially as water becomes a bigger issue, you know, I know in Washington, we got. Like a third of the snow that we were supposed to last year for folks who don't know a lot of Washington's water that we use for agriculture comes from our snowpack. And if we keep getting less snowpack as climate change progresses, it would become a really big problem. Water conservation is becoming a bigger and bigger issue in the state. And I think as that occurs more and more that technologies like hydro mulch would make more and more sense as a, you know, cost of using water goes up that conserving that water by having a mulch layer makes more and more sense. Um, not that hydro mulch is quite as good as plastic is doing that, but it's about as good. And then I think also, um. You know, like, conventional growers are kind of used to spraying things. So, I think that's sort of an advantage it has over them switching to plastic, too. So, I would, I really want to either myself or see someone, um, look at it in apples and other tree fruits, not as a replacement for plastic mulch, but as a replacement for, uh, broadleaf herbicides. And I'm also really excited by, uh, the work that, uh, Is being done at USDA and processor with hops by adding, uh. herbicide to it. I think that's a really interesting avenue as well, both because it'll make the herbicide, well, hypothetically, it'll make the herbicide treatment more targeted, so you're not getting it on pollinators and beneficial insects as much, and not, you know, broadcasting it as much, but really just getting it where it needs to be to kill the weeds. And I also think it's interesting because, again, you're adding that mulch layer that provides moisture conservation, so you kind of be getting the best of both worlds, maybe, hypothetically, anyway.

[00:36:18] Nataliya Shcherbatyuk:

Yeah. That's pretty interesting. And hey, you're doing your master's, right? So, you know, there's can be potentially PhD, just do what you described.

[00:36:29] Ben Weiss:

Yeah. Maybe I've thought about that before.

[00:36:33] Nataliya Shcherbatyuk:

Well, you never know. Well, that was great. I think pretty educationally informative. There's anything else you would like to add about hydromulch or PFAS or BDMs to our listeners?

[00:36:47] Ben Weiss:

Thanks for listening to us, check out the Small Fruit Labs social media that I'm sure Nataliya will put links to wherever she posts this.

[00:36:57] Nataliya Shcherbatyuk:

Yeah, definitely. Yeah. Well, thank you so much, Ben. It was really nice talking to you.

[00:37:02] Ben Weiss:

Thanks for having me. I really appreciate it.

[00:37:03] Nataliya Shcherbatyuk:

That's it for today and until the next episode. You can find more information by following us on Instagram and LinkedIn by @mulch_matters and going to our websites www.smallfruits.wsu.edu and choose *Mulch Technologies*. This work is supported by Specialty Crops Research Initiative Award 2022-51181-38325 from the USDA National Institute of Food and Agriculture. Any opinions, findings, conclusions, or recommendations expressed on this podcast are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

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