

Breaking down biodegradable mulches: Insights with Dr. Carol Miles

[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.

[00:01:04] Nataliya Shcherbatyuk:

Welcome back to our Mulch Matters podcast and let's welcome our guest Dr. Carol Miles. Hi, Carol. It's so nice to have you back. How are you?

[00:01:15] Carol Miles:

Good, Nataliya. Thank you so much for inviting me, and it's a great, cloudy, rainy day here in Western Washington. So, it's a pleasure to spend a little bit of time in the office talking with you about our research work.

[00:01:28] Nataliya Shcherbatyuk:

That's fantastic. Cloudy and, you know, rainy for Eastern Washington, that would be great. We usually have a lot of sun, as you know. So, Carol, can we start by you telling us a little bit about yourself and what your current research is focused on?

[00:01:45] Carol Miles:

Yeah, I am a professor in the Department of Horticulture [Washington State University]. I'm a vegetable crop specialist. I do field research. So, we look at, I focus mostly on new crops for our area, so, these are crops that are not new. Overall, I mean, they've been grown somewhere, but they're just new to us. And so, my current program, I work on sweet potatoes and tea. So, we're looking at varieties of crops that do well here and working out production systems, spacing, just a lot of work that goes into, you know, developing overall production systems for particular crops.

[00:02:34] Nataliya Shcherbatyuk:

Oh, sweet potatoes... Do you get to taste a lot of sweet potatoes?

[00:02:36] Carol Miles:

We taste all of them. So, I do a lot of work with breeders. Um, we do advanced breeding lines. We screen them. And I personally think it's very important as a vegetable crop that it tastes good. So, oh yeah. Yeah, we taste everything.

[00:02:38] Nataliya Shcherbatyuk:

Yummy. I love sweet potato. Okay. I went a little off the topic. So let me get back. Can we dive into a background of soil biodegradable plastic mulch, which we will call BDMs, in commercial agriculture?

[00:02:55] Carol Miles:

Certainly. I've been working with soil biodegradable plastic mulches for 20 plus years now. I started, in my vegetable field research, you know, certainly weeds are a dominant issue if you're doing, organic production, which my research is a lot, a lot of my research is focused on organic production systems. And so weed management is a huge problem for us here in Western Washington because we have a 12-month weed growing season. And so, weeds are just, they're just out there all the time. And so, I started using plastic mulch very early in my career. I've been here for 30 years, and I just felt that having an alternative to a polyethylene mulch [PE], something that we, we put out every year, we pulled it up, we threw it away. It just seemed like there, there could be a better way to go. And we came across soil biodegradable mulches that were used in Europe in organic production systems. And so, I started working with companies to explore their use here in Western Washington. and I've been working on them for the last 20 years.

[00:04:04] Nataliya Shcherbatyuk:

Yeah. And you know, you said the phrase that you said it a year ago and it really caught me, it caught my attention that we "threw it away", where actually, there is no "away". And that's very important to mention, I think, because I don't think we pay too much attention on this, you know, just let's throw it away. It's not really. There is no such a place as threw it away as "away". So just to remind our listeners that plastic mulches, they have to be taken from the field at the end of the season and take it. They need to be taken somewhere else. We cannot really recycle them just yet. Is that correct?

[00:04:45] Carol Miles:

Yeah, that, that's right, Nataliya. And so, most of the farmers that we work with here in Western Washington, they're pulling up their plastic. It could be, you know, the mulch, the drip tape, just all the plastic that they use in, in their production systems. And they are indeed throwing it into the

garbage. And of course, the garbage is either a landfill in your community or it's being moved to somebody else's landfill in their community. So agricultural plastics, because they're dirty and dirty is soil contamination and plant debris and other things, they're just not suitable for recycling yet. I know there's a lot of work to try to make them recyclable, it could be the mechanical recycling that is done with household containers, you know, yogurt containers, milk jugs that they go through mostly mechanical recycling. And I know that there's interest in developing chemical recycling for plastic mulches, agricultural mulch, or agricultural plastics. But I think we're a long way away from having something that's going to be commercially available in our communities.

[00:05:52] Nataliya Shcherbatyuk:

Yeah, yeah. And I know we're working hard on figuring out the way how to recycle plastic mulch, you know, as much as we can. It's still in the process. And also, to find the alternative way for these plastic mulches and BDMs they seem to be like it's a good option for alternative ways for plastic mulch. The only thing is that currently there is no commercially available BDM product that meets the NOP requirements and NOP it's National Organic Program. So, and that's for organic production. Now, can we talk more about why and what are those NOP requirements for BDMs?

[00:06:32] Carol Miles:

Yeah, certainly, so the National Organic Program, the NOP added biodegradable mulches to their, their list of allowable synthetic products and back in 2014. So, 10 years ago, so they added them to the list, but then they created criteria for the products. And it's those criteria that prevent biodegradable plastic mulches from being used in organic systems. So, the first criteria is that the biodegradable plastic has to meet the composting specifications and there's a list of different standards that the product has to meet, and that's not a problem. Basically, all the biodegradable mulches that we work with meet those compostability standards, and they should meet those compostability standards, because that's really the first test for biodegradation. If something, if a plastic is not going to biodegrade in a compost, it's not going to biodegrade in the field. So, just understanding that that's the first level of testing for biodegradable plastic is the compostability standards. So that's criteria number one, and that's not a problem. Basically, again, all the products that we work with meet that standard. And if you have, if anybody is using a biodegradable plastic and they have a question about that, the product should include the standards on the label the product is meeting. So, it's to the benefit of the, the company to say, to tell you, the user, that. By the way, this product meets the compostability standards. And if it doesn't tell you that, I would say it's more than likely that the product does not meet those standards. And so, and you shouldn't be using it. So, compostability standard is the first criteria.

The second criteria is that the product has to reach 90% biodegradation in soil or according to another standard and there are a couple of other standards. And again, for the most part, the products we work with meet that standard. So, again, if you are buying a biodegradable plastic, and it doesn't tell you that it meets the soil biodegradability standard, it's likely that it doesn't, and you should not be

using it. So, that's criteria number 2, meeting the 90% in soil biodegradation standard. And again, the products we work with meet that standard.

So, here is where it becomes a little tricky. So, the third criteria is that the biodegradable plastic has to be produced without organisms or feedstocks derived from excluded methods, and these include genetically modified organisms. So, this is where it gets tricky. So, the feedstocks of some of the biodegradable plastics that we're working with use are they're created. The feedstocks are created through fermentation and the bacteria that do the fermentation are genetically modified. So, this is true for most commercial fermentation processes. So, let's just say, for example, if you're, doing, getting Taxol that is used in cancer treatment. It has been created through a genetically modified organism more than likely. And so genetically modified organisms are used extensively through for production of fermented products, microorganisms are the key factor. And that's because in order to get the quantity, the efficiency, the efficacy, that's needed for a commercial scale, the organisms are modified to achieve what is needed to be commercially viable. On the organic side of things, I think it's important for our listeners to understand and our inspectors and. You know, the individuals who work in organic production systems beyond just growers, but policy makers that the National Organic Program allows animal vaccines that utilize genetically modified organisms to create those vaccines. Those are allowed because it's understood the limitations of not using genetically modified organisms to create the vaccine. So, the same would apply to biodegradable plastics. It would not be commercially viable to use a non-modified organism. So, that's criteria number three. And this is where most biodegradable plastics do not meet the criteria.

Then criteria number four is really the blockage point criteria number four. And this was added really, I'm going to say, probably just off the cuff at the top level of the National Organic Program is the director who added this on was that a biodegradable plastic had to be 100% biobased. Well, there is no 100% biobased biodegradable plastic and realistically, that is more than likely not achievable, probably in our lifetime. And so, I think, I personally think that this probably came from a misconception and this misconception continues just forever. Every day I hear this question, there's a misconception that biobased equals biodegradability, and that is false. They are not the same thing. So, biobased is derived from biological organisms. So, that could be a plant, it could be a microorganism, starch, for example, is plant starch is used in a lot of biodegradable plastics. biodegradation is the breakdown of molecules in nature. So, microorganisms weathering breaks the molecules apart and that is biodegradation, and a synthesized molecule can be biodegraded in nature, just as a biobased molecule can be resistant against biodegradation. So, this 4th criteria, this requirement of 100% biobased content, in my view, has never made sense. I don't understand why the NOP included in the first place. I don't understand why the NOP holds onto it. It just, it doesn't make economic or, or scientific sense in my view.

[00:12:49] Nataliya Shcherbatyuk:

Yeah, and thank you so much for clarification and just to, you know, put another attention on this biobased versus biodegradation process that 100% biobased does not mean it's 100% biodegradable. And this is something important that it is being misunderstood at the moment.

[00:13:17] Carol Miles:

Just as 20% biobased, so most of the biodegradable plastic mulches on the market are 20% biobased. That does not mean they're only 20% biodegradable because they've met the biodegradation standard. They've met the compostability standard, which is a 100% compostable. They've met the soil biodegradability standard, which is 90% biodegraded in two years. Yes, they've already met those standards. So, to think that 20% biobased equals 20% biodegradable makes no sense whatsoever.

[00:13:48] Nataliya Shcherbatyuk:

Yes. And actually, even if we try to bring up, you know, BDMS to 100%, let's say imagining 100% biobased, it's not going to really impact the biodegradability anyway. Because it's not the same.

[00:14:05] Carol Miles:

And so, you know, in my view, the NOP is focusing on the wrong things. I think they should be focusing on biodegradation. They should be focusing on what, you know, might be outcomes of biodegradation. Because biodegradation is the goal. 100% biodegradation is the goal. And I think we should be focusing on what are the potential outcomes of that.

[00:14:31] Nataliya Shcherbatyuk:

Yeah, well, and sometimes there is confusion in terminology as well. So, you know, I really appreciate how clear you explain the difference between biobased and biodegradable, which makes a lot of sense. And if we talk about BDMs in organic production system, could you tell what would be the key benefits of using BDMs in organics?

[00:14:56] Carol Miles:

Well, the obvious, you know, key benefit is that we reduce the amount of plastic waste. So, I'm, I'm not going to give you numbers on plastic waste. You know, I don't have them on hand, but anybody, you know, you can look them up and see how much plastic is, is generated in our society today and understanding that, you know, agriculture is only responsible for, I don't know what the current percentage is, 3%, 5% of the plastic waste being generated worldwide. So, agriculture is really a very small component of the amount of plastic waste being generated. The amount of plastic waste that is generated by society, by humans, by each and every single one of us on a daily basis is significant and it is not going away. So, kind of where we started this conversation is there is no away. So, all that plastic is staying with us in those shapes and forms that we purchase and throw it in the garbage can in and that to me, which is how I started on this whole, you know, project 20 plus years

ago was that to me just seems like we need to try to do something about that. So looking for an alternative, looking for a plastic that is biodegradable, that can be broken down into the elements of carbon, hydrogen, oxygen, you know, along with the other nutrients that are in those molecules to me is something we have to be doing as a society is figuring out how we're going to live with the waste that we're generating, and we've got to reduce the amount of waste because if we continue at the same rate, it's just hard to imagine, you know, what the piles of garbage are going to look like in a generation or two.

[00:16:37] Nataliya Shcherbatyuk:

Yeah, it is scary. It is very scary. And I think that one of the challenges is that it's not, you know, we don't see it on the news or on the social media everywhere, how really the waste that's around us. I don't think the awareness is on the level that for everybody to understand. Yeah. There is a problem.

[00:17:08] Carol Miles:

Yeah. It's funny. You know, it's I think all of us are motivated by something, some small little thing. I mean, it could be a small little thing. And I think what motivates me is just the concept of plastic waste. It's just, yeah. Yeah. Keeps me up at night.

[00:17:24] Nataliya Shcherbatyuk:

Me too. Sometimes too much. Now I'm literally, I'm going to the store and I'm thinking, oh, do I want this in plastic? No, probably let me choose the glass or some other options. It's a little crazy. Yes, and you mentioned the weeds, uh, you know, 12 months, all year-round weeds, I think using BDMs in organic, that would help out with the weed control because that would reduce pesticides application as well.

[00:17:53] Carol Miles:

Well, there's that and you know, I, you know, looking at the use of plastic mulch. So again, you know, not to, um, take away from the value of plastic mulch in agricultural systems. And again, I work in vegetable crops and many vegetable crops rely on plastic mulch. So that's not something we want to get away from. We need plastic mulch in the field to achieve the yields and the quality and the, the resource conservation that we have today. So, weeds being a primary issue, certainly, you know, 20 years ago, that was the primary reason plastic mulch was used was for weed control. So, we can reduce the amount of herbicides that we're applying into the fields and that's a good thing. But today, you know, the, probably the primary use for plastic mulch is water conservation. And I think we all realize that we're entering into a world where water for agriculture can be a problem. Challenging and so as much as we can do to conserve the use of irrigation water in our, in our production fields, the better off we are, you know, as an agricultural community, but also as a society. So plastic mulch, probably the dominant use of plastic mulch today is probably for water conservation in agriculture. In

irrigation systems, and that is something again, that's very important to us. And we want to continue. So, the idea of a, an alternative plastic that is biodegradable to me again, is it's a win-win.

[00:19:16] Nataliya Shcherbatyuk:

Yeah, and I like that you brought up the point that, you know, going away from plastic mulch because we are not as we mentioned the beginning of this podcast episode that plastic mulch at the moment the way it's being done. We take it to the field, we use it, in the end of the season and be taken away from the field so, the main goal is to figure out the how to manage this end-of-life plastic mulch, you know action. What do we do? How to recycle and there are a team that's working on that, and while teams are working on the recycling options they are also working on alternative options, which we're talking today about, and that's BDMs. And talking about BDMs, to continue about BDMs, let's talk a little bit more about this biodegradation process. How does the degradation process of BDMs work and what factors actually influence it?

[00:20:13] Carol Miles:

Yeah. So, biodegradation starts, you know, in the field while the mulch is on the soil surface. So, what we, you know, when we lay the mulch, we do a covered bed and immediately that mulch is starting to get exposed to sunlight, to water, to weathering, wind action, you know, wind blows soil particles, which are very abrasive and so that's all a part of the weathering process and that weathering process. So, for the time that that mulch is on the bed, and I work in vegetable production systems and so we've got a mulch on the bed for four months there abouts from May through August. Let's just say maybe five months. And so, for that four or five month at the mulches on the bed surface, it's being exposed to all those weathering factors, including temperature. So, temperature, you know, high temperatures in the summertime, and light the sunlight. So, all of these factors combined start to break down the molecules. So, what you'll see is in the field. In about two to three months after you've laid them, the biodegradable mulch, you'll start to see it develop rips and tears and holes as it starts to break apart. And so, the biodegradation starts with the weathering factors and temperature is certainly a main factor there and then your soil type. Whether or not your soil is microbial active, and if you have a lot of microbial activity, then the microbes are going to be more, um, starting to play a role with the mulch comes into surface with the soil. So that's where biodegradation starts and then we mechanically till the mulch into the field. So, what we do is we pull out our drip tape. So, we just use a tractor to, to pull the drip tape out from the bed. So, the drip tape is laid under the mulch at the time of bed shaping. So, at the end of the season, we pull the drip tape out and then we just run our disc over the field, and we disc the mulch or rototill it into the soil. And so, we physically break it apart into essentially fragments at that point. And they're incorporated into the soil. So now we've got much smaller pieces of mulch in the soil. You've got a large edge effect there where the microbes can start to, you know, feed on the malt start to break it apart and again, the weathering action in the soil. You've got the water again temperature, and that's where you see most of the biodegradation is going to happen in the soil with biological activity. So probably we lose a few

percentages, maybe 10% of the mulch while it's on the surface of the bed, but we lose the remainder of it after it's been soil incorporated. And that's where temperature becomes effective. So high temperatures equal higher biological activity, higher biological activity is going to give you a faster rate of biodegradation.

[00:23:10] Nataliya Shcherbatyuk:

Great. Great. And you mentioned you, you've been working with many, many vegetables, which is great because my next question would be what are, or if there are any specific crops, you know, or any farming conditions where BDMs perform better and why would that be?

[00:23:49] Carol Miles:

Specific farming conditions. I would say that I don't know that there's, because most of the crops I work with are annual crops or they're single season. And I think when you start to, when you look at those crops, again my cropping cycle is four to five months. And for the most part, most BDM's work pretty well there. There are differences in color. I know we worked with some transparent film with the idea that, um, we would get more heat under the transparent film. But in fact, what we ended up with was a lot of weeds. And so, in our climate here, and I don't use an herbicide under the bed. So, I think that in answer to your question, understanding the, your production system, if you're going to be using an herbicide, then you can use the colored mulches and the clear mulch, biodegradable mulches, where the weeds would otherwise germinate under the mulch. If you don't use an herbicide, the weeds will germinate under, they'll push that mulch up, they'll rip it apart, and you'll get, it'll start to fall apart just much, much earlier because of the weed growth underneath it. So, I think that's a big consideration is whether or not you're using an herbicide you're using a colored mulch, a transparent mulch, or if you go with a very thin mulch, so mulches come in different thicknesses. We use for the most part, a 0.6 mm to a 1 mm and for vegetable production systems, excuse me, vegetable production systems that are one season. So, for me, it's just the summer that is durable enough. But if you're doing, let's just say strawberries, for example, and you have an overwintering cycle, then that mulch is going to start to deteriorate during the wintertime. And you're going to, by the time you get through the winter, and you come into the spring, it's not going to be there any longer. So, there you would need a much thicker mulch to sustain all the weathering that happens during the wintertime. Other thing that we've encountered in terms of mulch is the weight of the crop on the mulch. So, for example, we did pumpkin research with biodegradable mulches and where the pumpkin sat on the mulch when you lifted that pumpkin up, the mulch was actually stuck to the bottom of the pumpkins. So, we found here in western Washington, we have a heavy do in the morning. So, what we found is if we harvested the pumpkins in the morning, we could just simply wipe off the mulch with a cloth or a towel or your hand. And that wasn't a problem, but if you harvested the pumpkins in the afternoon when it was dry, that mulch was stuck onto the pumpkins, and you couldn't wipe it off. So, that was a consideration that, you know, for our growers here in Western Washington to make. If you're in a dry

climate and it's dry morning and night, then with a mulch that's stuck to the bottom of your fruit or your crop, that could become problematic, I think.

[00:26:40] Nataliya Shcherbatyuk:

Yeah, yeah, logistically can be probably organized. Like you say, you would just do it in the morning. Yeah, but that's good knowledge to know. So, you know, farmers can plan on it. And speaking about cost efficiency, um, if to compare BDMs with traditional plastic mulch, is there any difference, are there any economic factors the farmer should consider?

[00:27:05] Carol Miles:

Yeah, certainly, um, if you just look at the purchase price and unfortunately, I think too many people stop at the purchase price. If you just look at the purchase price, the biodegradable mulch is going to cost anywhere from. Well, let's just say twice as much as a polyethylene mulch, and there's some variability there. You know, I've seen numbers of 1, 1.5 times to 3 times as much. So, it depends on your product. It depends on how much you're buying. It depends on whether or not you have to ship it in versus pick it up. So, there are a lot of variables there that, that determine what the actual cost to you is, but let's just say it's two times the cost of your, your polyethylene mulch. That's your purchase price. So, what you have to consider, however, is the costs that come after the growing season. So, for a biodegradable mulch, for us, there's no additional cost after we lay it. What we do, as I mentioned earlier, is we pull our drip tape out, which we would be doing anyway. And then we cultivate our field, which we would be doing anyway. And the mulch is incorporated into the soil and there's no additional cost to us. If you have a polyethylene mulch, what you're going to have to do is you're going to have to pay for a crew to remove that mulch and either they're doing it by hand or they're doing it mechanically, but either way, there's a cost to that. Then you have to pay to transport it to wherever you're getting it to, and if you're taking it to the landfill, then you're paying a dump fee. And so, there's a cost to the end of the cycle with the plastic mulch where there is no cost to the end of the cycle for the biodegradable mulch. So, the economics, um, question, you need to look beyond just the purchase price. And I think, unfortunately, too many people just look at the purchase price.

[00:28:46] Nataliya Shcherbatyuk:

Right. Yeah. Yeah. It's a bigger picture question. It's not just the one point at the beginning. Yeah. And also, you know, you say, you mentioned the end of the cycle, but if you think about plastic mulch, the end of the cycle is not really, it's not really there, unless it's, I don't even know, because they are end up on the landfills, you know.

[00:29:09] Carol Miles:

Certainly, and you know, if you're looking at plastic mulch in the landfill, and I think what everybody needs to understand is we have no studies that really track the longevity of waste of plastic waste, because it's anywhere from 300 to 1000 years or potentially more. Well, we haven't been doing

the science for 300 years to know, you know, how long does it really take? We don't know that. So, all of that, those numbers that you see in the literature and that are quoted to you, they're all theories based on hypotheses, based on what we think we understand about the system. And I think it's important to know that the biodegradation rates that we're seeing for biodegradable plastics are actually based on fact and research. So, right, research has followed biodegradable plastics. We can track the amount of time it takes. We know it takes two years or three years or four years depending on the cropping system. Those are known tested values, science based. The amount of time for plastic to, to degrade. Is completely theoretical and all we know is it probably right now the majority of it is all still there exactly where we put it.

[00:30:24] Nataliya Shcherbatyuk:

Yeah, yeah, well, and, you know, it's good that you start speaking about the research because I wanted to ask you if you can share any research findings, any case studies that you've been working on, or you've met. That actually highlight the effectiveness of biodegradable mulches. potentials, and I would like to speak about organic production systems.

[00:30:50] Carol Miles:

Well, yeah, so let me, let me separate those two questions, if you will. So, the studies that we've done with soil biodegradable mulch in field situations, that's, that's our work that we've been doing here at Washington State University. And we've, that work is being replicated at other universities as well. So, University of Tennessee, and now currently, um, the new project, new research that's going on is California, Nebraska, Florida, in addition to Washington State, so if I look at the field research that we've done, we have incorporated biodegradable mulches into our field site here, starting about 10 years ago. And we've been able to follow that biodegradation in our fields in our site here. We actually had three sites at the time. We were, we started this project 10 years ago, so we had, Washington State University. We in western Washington, here in Mount Vernon where I am. We had a field site at the University of Tennessee in Knoxville, and we had a field site at Texas University of Texas, excuse me, Texas A&M in Lubbock. And so, we had three field sites. And what we were able to do is to follow the biodegradation rate of the mulches after we soil incorporated them at those three different sites. And what we found was that the biodegradation occurred much faster in Texas where temperatures were higher than the next higher rate was in Tennessee where temperatures were moderately high, and then the lower rate was here in Washington where we have relatively mild temperatures, but within four years here in Mount Vernon, we were still getting, you know, Approaching that 90% biodegradation rate of our mulches in our field soils, whereas Texas they had reached the 90 % and Tennessee as well after the four year period. So, we have those research studies, um, and now we're into our next project with our next, um, treatments of, you know, the currently available biodegradable mulches and, and this is being done in four or five different locations. Uh, so we have those kinds of data available to us. Your question about organic systems, however, we're not able to do any of this research in organic systems because biodegradable

mulches are not allowed in organic systems. So, we could not certify our field organically because we're using biodegradable mulches. So that research cannot take place here in the United States in a certified organic field.

[00:33:15] Nataliya Shcherbatyuk:

I see, so it's more like you do research that potentially you can imagine it's organic, but you cannot certify it as organic.

[00:33:26] Carol Miles:

Yeah, you're not allowed to because we're using a prohibited substance. So, I mean, it's certainly a research study could set up a field that was. Everything organic, except certification, and you could do these studies, but you could never you couldn't call it certified organic research because the products not allowed.

[00:33:47] Nataliya Shcherbatyuk:

Well, you know, speaking about next 5 to 10 years, what future development or innovations do you see in the field of biodegradable mulches? And what do you think, how might they further benefit organic agriculture?

[00:34:04] Carol Miles:

Well, I think that the first obvious one that comes to my mind, I think this is where the industry is going, is to try to increase that, that rate of bio-based content in, in the biodegradable plastic. So currently it's about 20%. I think there's a general interest in trying to increase that rate. So, getting it up to, I'm going to say 40 to 50% is, I think, likely achievable. So, I think that's one area that I see things changing and, um, the product changing, and then just really, I'm going to say to me, the most critical point is, is really educating the customer, the person that's buying the biodegradable plastic to look, to make sure that that product is actually biodegradable. And the only way you know, that is if the product tells you that it meets these biodegradation standards. So. As we started this talk with, you know, the first one is that compostability standard. So, making sure the products tell you, yes, we are tested, and we meet the standards. So, there's the compostability standard, and then there's the soil biodegradation standard. And to me, that would be the. The biggest step that we could take is to get products out of the market that are, frankly, misrepresenting themselves to customers by saying that they're biodegradable when they're not.

[00:35:29] Nataliya Shcherbatyuk:

Yes, that's important to not only read the label title, but also what we call it small print with the details on, it's like, you know, it's like a food label. You gotta read instructions, you gotta read ingredients.

[00:35:42] Carol Miles:

Right. And unfortunately, I think that oftentimes what it comes down to is policies. Create the change because industries aren't willing to do so themselves. Um, and we see this, you know, in many different avenues of life. And that's why we have policies is because we ask people to be honest and, you know, to, um, to verify them themselves. And, and, and there's always going to be constituents out there that don't do that. And so, policies protect the customer, the consumer. And I think it's likely that policies are going to come down that, that require testing and labeling. And I think that's a good thing for the customer and the consumer, because otherwise we will continue to get misrepresentation in the marketplace. Yeah,

[00:36:30] Nataliya Shcherbatyuk:

I have to agree with you. It's a good thing to, you know, to show the truth on the package of what's in the package. There is no reason for customer to be buying something that it's not really in it.

[00:36:43] Carol Miles:

I was going to say, if you think about it, I mean, this is why we have all of our food safety laws. As you go back a hundred plus years ago, you know, companies were putting products on the shelf, selling it to customers that were, that killed people because they weren't safe. And so, and because of that, you know, we, the United States and other, other countries as well, develop food safety laws to protect us.

[00:37:09] Nataliya Shcherbatyuk:

Yeah. Well, and you know, from the perspective of the grower, if they want to put more finances into biodegradation, into biodegradable mulch options, they want the product that they're really expecting to be in the package. So, it's just fair for our farmers to, you know, to buy what they want to buy. So, wow. Those are, you know, those are pretty tough questions. Tough thinking, I would say. It's a big picture. It's not. One of those happy episodes, you know what I mean,

[00:37:45] Carol Miles:

I, you know, so I don't see it that way. I think that, you know, it's, um, these are all good things. I think that as I look at it again, I'm a vegetable production research scientist. That's what I do. I work in vegetable production systems as I look out at my fields. They're all covered in plastic mulch. And what I want is I want to be able to use a biodegradable plastic mulch. I would love to be able to use it in my organic fields. I use it in my conventional fields without a problem. And you know, I just, I feel like organic growers are, are being prohibited from using something that I think is Better than the plastic that they're allowed to use the non-biodegradable plastic. They're allowed to use, so plastic is here to stay with us, as you know, as society, as humanity as we know it and probably the foreseeable future for many good reasons. We just need to make a better product. We need to as you know, we need to support the development the testing the verification and just get behind what's you know recognizing

where we have problems and figuring out, you know, how can we really create solutions that are workable for, for all of us.

[00:38:57] Nataliya Shcherbatyuk:

Yeah. Yeah. And the way I see it, it's like two main streams. Basically, we need to figure out how to recycle what we have from the plastic perspective and what other options we can use for those who want not to use plastic options.

[00:39:12] Carol Miles:

Yeah, absolutely. And it's, you know, like everything in life, it's not one or the other. It's we want choices. Yeah. Absolutely.

[00:39:19] Nataliya Shcherbatyuk:

So, Carol, tell us what inspires you and what motivates you to do what you're doing.

[00:39:27] Carol Miles:

I would say the overriding motivation I have is I like vegetable crops. I'm, you know, I'm a vegetable production scientist. That's what I, I love to do. It's, it's where my heart is. And, and every time we, you know, we start investigating a new crop. So, as I mentioned, you know, currently we're working on sweet potatoes in order for me to grow sweet potatoes here in Western Washington, I need to use plastic mulch. And so, the two things come together in this case is, you know, we need plastic mulch to elevate the soil temperature and we get a fantastic crop of sweet potatoes. Um, in that farming system that, that we're using here. So, what motivates me honestly is working with the crops I work with, working with the farmers I work with, looking at opportunities, market opportunities. I love working with new crops. So, the opportunity to say, you know, this is new to our market and maybe working with things that are culturally relevant in some areas, they're new to us. So, for example, on sweet potatoes, you know, we're looking at, we're starting to look at purple varieties, um. You know, which are very popular in Asia with Asian communities, and there's a wonderful opportunity for us to be growing more purple sweet potatoes and then looking at the quality of those potatoes, the eating quality, you know, what we all, what's the texture, what's the flavor that we all like and working with the breeders to target those.

[00:40:49] Nataliya Shcherbatyuk:

Now you've hit in my hobby, what I'm really into it. It's the plant-based nutrition and, you know, you mentioned the purple sweet potato and those are extremely nutritious crops. Those are fantastic to have them around as a local, you know, local farmers.

[00:41:04] Carol Miles:

Absolutely. And yeah, so working with crops like, you know, these new crops that I work with in my career, it's just been a great pleasure to me to, you know, every, five years or so, you know, we start to look at a new crop for us. And I just, I greatly enjoy it. It's, it's a never-ending learning process.

[00:41:23] Nataliya Shcherbatyuk:

Yeah, that's, that's really good. Well, Carol, thank you so much for being our guest today. It was a great discussion.

[00:41:30] Carol Miles:

Thank you so much for having me. Appreciate it.

[00:41:33] Nataliya Shcherbatyuk:

Thank you. 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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