

MULCH MATTERS EP. 20

From Washington to China: Lessons in Strawberry Production and Sustainable Ag 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 systems*". 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:

Hi, Carol. This is so nice to have you back here. How are you?

[00:01:26] Carol Miles:

I'm doing well, thank you. It's... I have to say it's a beautiful day here in Northwest Washington and been doing a lot of field work and it just feels good, so thank you. Good to be back.

[00:01:36] Nataliya Shcherbatyuk:

Oh, thank you. It's also very nice here on the East side. Well, but it's getting hot. So, Carol, not too long ago, you've been traveling to China and this is something I wanted to talk to you today. Could you please tell us what inspired you to attend the conference in China?

[00:01:59] Carol Miles:

Yeah. Well, I had been to an international conference before, so we attended myself, Markus Flury and Lisa DeVetter from our biodegradable mulch team, our SCRI project, attended an International Society for Horticultural Sciences Symposium in China. That was back in March of this year, of 2025, and I had attended an ISHS conference before an International Society Science Conference before for watermelon grafting, which was a project I was working on, you know, 15 years ago. And it was just such a, um, eye-opening experience to see the level of watermelon production in China, which is, you know, China's the number one producer. Um, so when this opportunity came to go to China to attend the International Strawberry Symposium, um, and our project team is working on strawberries with biodegradable mulches, I very much wanted to attend to see, you know, okay, so what does strawberry production look like in China? And it was pretty amazing.

[00:03:03] Nataliya Shcherbatyuk:

And when you've been going to China, you probably had some sort of, you know, expectation of what to look for. So how did the experience that you have with strawberry and mulch actually can be compared to your expectations when you already got there?

[00:03:20] Carol Miles:

Well, I have to say that China has come a very long way in the period, you know, since I was there the first time, and again, thinking back, it's like I was there 12-15 years ago is when I was there the first time, and this time, I mean, the technology in China, it's just leaped ahead by generations, was my thought, is what I saw, and so as a country, as a society, they have just leaped ahead in terms of, you know, where they are living with technology, it's just, it's incredible.

[00:04:00] Nataliya Shcherbatyuk:

Interesting. And there is anything that stand out for you speaking about technology when you think about strawberry production in greenhouses.

[00:04:09] Carol Miles:

Well, that was kind of the interesting thing is, and so the symposium that we attended we were funneled, I'm gonna say, you know, very closely into facilities that I think my understanding from our Chinese colleagues are really, the facilities were really just there for outreach and public relations. They weren't facilities that, you know, strawberries are produced on a commercial level.

[00:04:39] Nataliya Shcherbatyuk:

Okay. So, so it's more like a showcase.

[00:04:40] Carol Miles:

Very much a showcase. That's what my Chinese colleagues told me. It's like, this is nice, but this is not how strawberries are really grown in China. So, for the symposium, what we saw was very high tech. It was very proper, very clean, very well maintained. Just, you know, very high end, I'm gonna say. And then when I was out and about later after the symposium, then we got to see strawberry production at, you know, the local scale. Pretty different.

[00:05:12] Nataliya Shcherbatyuk:

Well, would you mention a few differences that you could notice between them and the production strawberries here in United States?

[00:05:21] Carol Miles:

Yeah, so what we saw: everywhere that I saw strawberry production, it was all under plastic. Well, the symposium was under glass, so they were the glass greenhouses. I think they're the Dutch system. I'm not really sure, but I'm gonna say that the Dutch style greenhouses very tall. Basically acres under glass, you know, connected these greenhouses, connected all very well maintained, really highly high technology managed,

and the strawberries there were being produced in tabletop systems. So, I'm not sure if you know you or your listeners are familiar with the tabletop system, but they're basically, gutters that are placed waist high, and the strawberries are grown there, and so that picking is done standing up versus, you know, when strawberries are grown in the soil. Very, very different. And so, there's just a huge difference in ergonomics, labor efficiencies, but of course the costs are very high going into these systems, they're essentially hydroponic, the water has to be filtered and recirculated. There's, you know, the pest management, the fertilizer, everything is injected. It's a very high cost, high capital-intensive system. But it's also the system that's used in Europe, again, to the best of my understanding, and I'm starting to see it a little bit here in North America, but, if you go to California, which is, you know, the number one strawberry producer in the United States, it's all in the soil. So, it's very, very different systems here.

[00:06:59] Nataliya Shcherbatyuk:

Also, while you've been there and you've been talking to the colleagues, did you observe or heard about any challenges that growers in China are currently facing?

[00:07:09] Carol Miles:

Well, yeah, so strawberry, looking at strawberry production, and this is I think probably true for most crop production in China, a lot of it is produced domestically and sold domestically. And so, the challenge is, you know, with strawberries are, you know, are you striving for a 12 month market and a 12 month production to hit a 12 month market because there's not a lot of import overall, and that, and a lot of that has to do with cost. I mean, China is still a low earning country. So if you look at, you know, the annual income, China is very low on that scale, and so for your customer, your general consumer to be able to purchase strawberries, the cost has to be pretty low. And anything getting imported, you know, is coming from higher cost countries and so the affordability just isn't there.

So that's probably one of the big challenges, I think, but they're addressing that through this protected production system. These, you know, greenhouses and plastic tunnels is, you know, how to get a product on the market for a longer period of time that's affordable to your common Chinese customer.

[00:08:22] Nataliya Shcherbatyuk:

And let's talk a little bit about plastic mulch. So, what did you notice? What role does actually this plastic technology plays in the systems?

[00:08:32] Carol Miles:

Well, in the strawberry systems that we saw, there essentially was no plastic mulch. So, the system is, the greenhouse floors are all covered in what we would call weed mat, which is a weed barrier.

It's a, you know, heavy Okay. Woven, um, barrier. So it's not a, a mulch fabric, it's, it's a long lasting mm-hmm. Plastic, um, weed barrier. Mm-hmm. So the floors of the, the greenhouses, um, are covered with that. And then they use. Probably what would, I would think of as a greenhouse grade plastic. So UV light protected to go over the benches, you know, if they're trying to do any humidity control or anything that's, you know, within the greenhouses with plastic, it's a clear plastic, which is likely greenhouse grade, which is UV protected, so it doesn't break down. So, in the system that we saw for the symposium didn't see plastic mulch there.

[00:09:25] Nataliya Shcherbatyuk:

Okay, but did you see plastic mulch somewhere else?

[00:09:30] Carol Miles:

Yeah. So then when we looked at local production, so local production is in high tunnels and at least at the time of year I was there. So, we were there in March. So, understanding that in March, you know, weather is pretty cold. And so, a lot of the production that we saw that was harvesting, that was being harvested and being sold on the market was in high tunnels. And so there you've got the plastic, you know, over the tunnels, and I saw tunnels that had two to three layers of plastic. So, there'd be the outside tunnel, and then there would be a tunnel inside of that. And then there'd be a cover over the crop. So, it'd be three layers of greenhouse, plastic, greenhouse, great plastic. So again, UV light protected, clear plastic, and you know, so just, and its purpose was to get that heat level up right to push the crop forward by accumulating heat during the day, and then the soil surface in some cases was covered with plastic mulch, but in some cases was not. So that was the local production system that I saw, you know, when we moved, when we left the conference and went to look at, you know, where crops were being grown commercially.

[00:10:41] Nataliya Shcherbatyuk:

Did you get to talk to anybody about overall ag plastic management? How do they manage that? How are they recycling? Like what did you see from that perspective?

[00:10:52] Carol Miles:

Well, so the people I talked to with, the people who were, you know, running the greenhouses, and, and it wasn't actually strawberries, I didn't talk to anybody doing strawberries. We actually ended up talking to the blueberry group, just because that's how it worked out, that that was the group that I could visit and. I would say that everybody I talk to there, you know, in management, in production, you know, working with the crop, basically when that plastic is removed, they indicated they have no idea where it goes.

[00:11:24] Nataliya Shcherbatyuk:

Interesting.

[00:11:26] Carol Miles:

It's, it just, it goes somewhere, and they don't know, they make assumptions, but who knows if that's the case or not.

[00:11:36] Nataliya Shcherbatyuk:

It's, you know, it's hard to make assumption. I don't think also it's fair if you didn't really see, I didn't see, so as a human, we can assume a lot of things, but is it really, you know, the case, right?

[00:11:47] Carol Miles:

And so, you know, I think some of them were assuming that it was getting handled well, you know, kinda like what we would call in the United States "wish cycling", right? When everybody puts everything possible in the

recycling bin, but most of it isn't recyclable. So, I think everybody was, the individuals I talked to who again, were, you know, the production people on the ground and in marketing, they assumed the plastic was being managed in a certain way, but nobody really knew.

[00:12:21] Nataliya Shcherbatyuk:

And have you seen any alternatives, materials that they might be testing using instead of PE?

[00:12:29] Carol Miles:

No, I did not. So, when we were at the symposium, you know, I was told by a colleague that China had a biodegradable plastics standard, and so I went to look that up. I found it; it was published. I think it was released, it came into circulation in 2022, I believe it is. So, you know, three years from, from this point in time, three years ago, and everybody that I talked to at the symposium and beyond had no idea about biodegradable plastics or, you know, plastic rules or regulations regarding plastic, plastic, um, management post use.

[00:13:09] Nataliya Shcherbatyuk:

Interesting. I wonder why, maybe it's financial side from their or maybe PE works well for them and they're not interested. Interesting.

[00:13:20] Carol Miles:

I think a lot of it comes down to the cost and so, China, like many other places, you know, it's, it's all about purchase cost and biodegradable plastics are certainly gonna cost more. And until, or unless there's a government program that really incentivizes it, I don't see it moving forward. So, for example, on the PE side, if, if the, you know, the costs of managing PE post use, if that was to come down to the growers, then probably they would look at alternatives. But until that were to happen, you know, they're just looking at their costs and their costs are much lower to use PE.

[00:14:00] Nataliya Shcherbatyuk:

Yeah. Well, and you know, it kind of makes sense because the land sizes that they use is much smaller to what we have here. So, they need to think about on the long term, cost wise, what's going to be the most beneficial for them to use the little piece of land over and over again.

[00:14:17] Carol Miles:

Well, and you're absolutely right about that. I think that was one of the other things that surprised me. I just, I, you know, again, I didn't really know about agricultural production in China, the scale of it. And so, while total production is enormous, yeah, the size of local holdings, as you just said, is very small.

And so, there are companies that lease land. They have, you know, agreements with farmers and they can, you know, they lease hundreds or, you know X number of hectares. But the farmer themselves, the ownership is, you know, in some cases, you know, half a hectare or less.

[00:14:55] Nataliya Shcherbatyuk:

Yeah. That's definitely much smaller to what we used to see here in United States.

[00:15:02] Carol Miles:

Tiny compared to what we have here. Individual holdings, right? But together, you know. Together, they form a large area.

[00:15:13] Nataliya Shcherbatyuk:

Yeah, definitely. Are there any lessons that you would like to share that you got from China and you would like to bring here to our growers in United States?

[00:15:26] Carol Miles:

Well, it's not really a lesson so much as, again, just, you know, building on what we just discussed about land holdings, you know, in the number of farmers, I think, you know, what I saw was because there is the size of a farm is so small, but the profitability is actually quite good for a family. So, and a family being a husband and wife and you know, maybe the children, but maybe not. Probably some employees, they can make a living off of a hectare, you know? And so what you see is you see a very large farming population because all that land, you know, again, if you think that there are whatever thousands of hectares there are being farmed in China, and each farm is a hectare in size, you've got thousands of farmers. Making a good living. It's a good living. And so that was the other thing I saw is, you know, as we went into the agricultural areas and, and we went pretty far, the housing is really good because these farmers are, you know, they're investing in their villages. They're investing in their homes. It's they've got nice houses; they've got nice transportation. The transportation systems are all there. I will share with you another thing that I learned about China is, you know, their marketing, their, their delivery within 24 hours across the entire country. Is phenomenal.

The idea that you can pick up something in one, one spot of China and deliver it, you know, within hours. As far as you can go, their transportation system, their marketing system is incredible.

[00:17:11] Nataliya Shcherbatyuk:

So, it's like transportation communication basically, because I'm pretty sure it has to change branches several times before it gets from, you know, point A to point B.

[00:17:19] Carol Miles:

Yeah, and you can just imagine, I mean, China's a big country, right? China's almost the size of the United States, I think in, you know, in a square kilometers or square miles, however you wanna look at it. And so, it's a big country. And so that's one of the things that I learned there was, you know, we went to the market, we went to the wholesale market, and we looked at, you know, all the product coming in. We were in Shanghai. Looked at all the product coming in, where it was coming in from, the fact that it arrived, you know, within a few hours or overnight. And then it was gonna go out again all over the country and it was gonna be there that day.

[00:17:56] Nataliya Shcherbatyuk:

Fascinating. For sure. Pretty incredible.

[00:18:00] Carol Miles:

So just looking at the trains, you know, the train system, you know, the trains are moving at 200 miles an hour, excuse me, 200 kilometers an hour. it's pretty fast. I mean, trains are moving much faster than the road system. And there moving every day, several times a day all through the country. It's pretty incredible.

[00:18:24] Nataliya Shcherbatyuk:

This is something that I got used to when I, well as you know, I'm from Ukraine, and we have the train system is extremely strong as well. So, there's something that I used to hear about train system, you can rely actually on train quite a bit. So that's, that's interesting. So, was there anything else that surprised you?

[00:18:48] Carol Miles:

Well, again, I just have to come back to the, you know, the speed of social change in China is incredible. So, you know, an individual that is 30 years old there, grew up in a village with no running water, no septic systems, no roads, no trains, nothing. You know? They grew up hand weeding and hand, you know, doing everything by hand. And today they are in this one of the most advanced technologies in the world. And to see that happen in a period of 20 years is incredible.

[00:19:31] Nataliya Shcherbatyuk:

That's impressive. That's, yeah, definitely impressive.

[00:19:34] Carol Miles:

Yeah. And they've really, you know, China as a country seems to have really put an effort into. Bringing up, you know, the, the villages at the village level, it's not just the cities. It's, and the cities have grown at an incredible pace. And again, you know, apartment buildings, you know, 30 floors high. Just hundreds of them in these major cities with millions of people. But you go out to the rural areas, and we were out probably as rural as you can go. And the housing is all there, infrastructure is all there, they've just made a huge effort to invest in, you know, in the farthest reaches in the smallest villages.

[00:20:16] Nataliya Shcherbatyuk:

Yeah. It seems like they value those, you know, outside corners that they, the village that if I would say the village potentially feeds cities, so there is a value to it.

[00:20:29] Carol Miles:

Absolutely. I think you're absolutely right and maybe that's another thing I'll, I'll say is that they have such a tight tie to food production. Everywhere. So, we were in a major city. A major city with millions of people and every plot of land, it's not a park, it's a farm, you know, it's, it's, there's canola growing for oil. You know, oil seed, canola is like everywhere. Everybody has a plot of oil seed, canola, there's wheat, you know, 'cause. Wheat is used for noodles, you know, it's just you don't have parks. You have little plots of farmland.

[00:21:11] Nataliya Shcherbatyuk:

That's pretty cool. You know, I never thought about that 'cause we used to parks, but you know, why not having park in the field, the field in the park.

[00:21:20] Carol Miles:

That's kinda interesting. And so, you know, if land hasn't been developed 'cause land is developing pretty quickly, but here's a, a block of land that hasn't gone under the, you know, under the tractor yet, under, you know? The construction zone, it's still farmland, they're still farming it, and it could be completely surrounded by these 30 floor tall buildings, but it's, it's a farm, which is what it used to be, you know, 20 years ago, the whole area. So, I think that's the other thing is, again, very, very tight tide of food. You know, food is just so important, so intrinsic to social value. At least that was my experience. But, you know, I was with people who are involved in agriculture.

[00:22:02] Nataliya Shcherbatyuk:

And were any collaborations, and knowledge exchange opportunities that stood out for you?

[00:22:13] Carol Miles:

Well, what I saw was a lot of international companies, a lot of foreign companies are in China, producing in China for China, that's what I saw. And so, a and a lot of those are European, so European companies, you know, from Spain all the way up into. The Netherlands over, you know, all the way over to Germany, kind of, you know, France, Italy, they're all in China, working in China, Australia, New Zealand, they're in China and so again, the opportunity to produce in China and sell the market opportunity within China is big enough that you, they can be there, they can be in production, and they can make a profit, you know, having everything within the country. So, there were a lot of collaborations that I saw and, you know, talked with people who are, you know, working within the country and they're from other countries in agriculture, I just, you know, I just looked at, you know, some ag production.

[00:23:19] Nataliya Shcherbatyuk:

Yeah. And I have one more question for you. If you had one takeaway to share with fellow researchers here in United States, what would that be?

[00:23:33] Carol Miles:

Well, it's hard to have just one. I'm gonna say the two things that really struck me was, um, that small farms in China can be highly profitable and here in the United States and certainly where I am in northwest Washington, we have a lot of small farms here as well. And you know, they're selling into, you know, the more urban zones, and I think they can make money. But I think that what I saw from in China was that they were far more profitable, smaller farms being far more profitable, and the model works for them. And I think in the United States and other countries, I think we just keep thinking that we have to, you know, get bigger and bigger and bigger. And the bigger we go here in the United States, the more mechanized we go, the fewer people it involves. And it just there are just so fewer people working the land. And in China there are thousands of people working the land. They're all intrinsically connected to it. And I think for me that was a, it was a nice thing to see that there

are all these people who really cared about their land and what was what they were producing. And they lived there.

[00:24:50] Nataliya Shcherbatyuk:

I was just gonna say that it seems like it's like a family business. It's theirs, it's their baby.

[00:24:58] Carol Miles:

Yeah. And most of these operations that I saw were husband and wife, you know, and they were young. They, you know, and so, you know, and you had the generations, again, it's like you had the, the older generations that, you know, were. Kind of retiring out, but they all lived there together. And then you had the younger families coming in, the younger couples coming in, you know, 20-30 years old and for the most part they were, you know, husband-wife operations. And then again, they would, you know, the kids would work. Between school hours and understanding that school is extremely important in China. You know, everybody, everybody goes to school, goodness, from 7:00 AM to, you know, 9:00 PM every day, so, kids are not really working the ground, you know, it's, it's other, it's adults working in the, the fields and the kids are out being educated. So, I think that was probably the big thing I saw was just, you know, the, the closeness that individuals had with the land. They lived there, it was their farm, and they could make a really good living from it.

[00:26:04] Nataliya Shcherbatyuk:

That's pretty nice.

[00:26:06] Carol Miles:

Yeah.

[00:26:06] Nataliya Shcherbatyuk:

Well, thank you Carol. I think it was fantastic brief tour into Chinese ag production. Thank you so much.

[00:26:17] Carol Miles:

Yeah, thank you. Appreciate you asking.

[00:26:27] 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 website (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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