

Sustainable solutions with compostable mulch films: a conversation with Dan Martens, VP of Novamont North America

(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.

(00:01:01) Nataliya Shcherbatyuk

it is my absolute pleasure to have a chat today with Dan Martens, who is the vice president of Novamont North America. Dan, thank you so much for joining us today and let's dive into mulching.

(00:01:15) Dan Martens

Oh, thank you. I'm glad to be here. Thank you for inviting me.

(00:01:17) Nataliya Shcherbatyuk

Dan, would you like to start with sharing a little bit about yourself and how did you get to this project, or more, what brought you to this project?

(00:0:29) Dan Martens

Yes, it's really funny, I had transitioned in part of my career into the plastics industry, and I was brand new, and they wanted to do a project with a big company in Canada, and they wanted to make a compostable bag, and of course they said: "Oh, not another one of these crazy environmental projects. They'll never go anywhere. Oh, forget it". And so, they said: "Give it to the new guy". So, of course, I kind of fell in love with new materials that were really interesting, and I sort of became the green expert, and so that got me into compostables and with Novamont because we use the Novamont Mater-Bi and that product went on to win the Canadian product of the year. So, it was kind of interesting. And then when Novamont was going to open a North American office, I said: "Will you think of me"? So, several years later, I'd gone to other companies, and I was always sort of the green interest. So, they opened it and almost 15 years ago, I went to work for Novamont North America in North America and got involved in that. That and then how I got into the farming part is we really were always into composting and compostable products, but

there was a project going in the USDA on mulch film and it was University of Tennessee and Washington state. And we don't make film, we make the polymers, we make materials that the films are made out of. So, my customers making the film sort of said: "Dan, this stuff is way over my head. Do you want to get, and do you want to talk to these people"? I said: "Well, I'm not saying I know much more, but I will". And so, I went down to pay a visit to the University of Tennessee, thinking I'd talked to one person and when I got there, there was a big room full of people and they were all wanting to know about mulch films. And I said, "G", down in Europe. So, I got involved in, although the agricultural sector is a small part of my business, it's one of the real important parts and I just really enjoy working with you know, environmental projects with the soil, with farmers, and of course, all the lovely academics, the folks at Washington State, University of Tennessee, Nebraska, and others, they're really trying to do good things. So, that's sort of what keeps me in and besides, it's just fun. It's new technology, new materials, and I think we're trying to solve some problems. I love to be a part of it.

(00:03:52) Nataliya Shcherbatyuk

It is fun, and it's very important when you have this fun and it's part of your work. Because it makes your work really interesting and exciting. Can you tell more to our listeners about actually the company Novamont and its mission?

(00:04:07) Dan Martens

Yes. Novamont was really started, it goes back quickly to the story of Catia Bastioli, who's in Italy, she was a, young biochemist and working in environmental sector with chemistry in Italy, and she formed the first patent for destructuring starch, which is a component in making our bioplastics. And so, she started with that, and then, of course, part of another company and then from there, she was able to make the first compostable resins for films. And then the first compostable bag was formed after that. Novamont started growing and really found its home in the composting industry because it was a tool that could be used for collecting food scraps in the urban environment and then being used right at the composting site. So really, the compostable bag grew up with composting in Italy. Catia Bastioli, of course, is a global figure in environmental, industrial, bioplastics, and is the CEO of NovaMont now in Italy. So, she's a, if you look her up, and she's really quite a person and someone to investigate a little bit, because her impacts on the environment have really been something else. And, as Novamont just follows our orders.

(00:05:29) Nataliya Shcherbatyuk

So, do I understand it right? Is Novamont actually there is another office in Italy, or is the main office in Italy?

(00:05:38) Dan Martens

Yes, Novamont is headquartered in Novara, Italy. North American office's here, like there's one in France, and there's one in Germany, but our headquarters is in Italy, which is outside of Milan. We have six manufacturing plants, 20% of our workforce. We have about 600 employees in research. So, we're as much a research company as we are a manufacturing company as well. And of course, with all these things, building the markets, we work on environmental projects, composting, soils, marine, all these trying to create new materials that can help the environment with our continual, I'll say lovingly, addiction to plastics, which we have to work on.

(00:06:26) Nataliya Shcherbatyuk

Yeah. So, it's truly an international company with a heavy focus in Europe. It's very interesting. And since you mentioned soil, you know, it's going to bring me to the next question. So, we speak a lot about compostable mulch and what we call traditional plastic mulch. Would you mind telling more about what the difference between those mulches is, and is there any benefits of using compostable mulches, benefits to the soil health or soil fertility?

(00:06:57) Dan Martens

Yes, it really goes to the polymers. It gets back to the materials, and that's what got me hooked with bioplastics and composites in the beginning, it's a really different material, and it gets into chemistry. So, biodegradable mulches are actually made from polymers that are, can act as food for microbes. They're recognized even if they're synthetic. So, they're recognizing that it could be eaten by microbes. And then, of course, returned back to the soil through biodegradation. So, the mulch films that are traditional plasticulture, were designed to be against nature, to hold up against nature, to last for a long time, and not be swayed by what the planet would throw at it. However, compostable, or BDMs, are designed to work with nature. So, what they'll do is break down in a process that's not so difficult, but, you know, hydrolysis and then biodegradation and fragmentation, and then digested by microbes, which are in the soil already, and then will return to the soil. So, they can be tilled into the ground as opposed to being pulled up. So, when they can be tilled into the ground, it adds some very interesting financial gains because you don't have all that labor. It also has an impact on microplastics, you know, and on soil health. All the while, it still acts like regular plastic mulch as far as protecting the seeds, heating the soil, protecting the moisture with a couple other interesting attributes that, you know, compostable has that others don't and some differences as well.

(00:05:29) Nataliya Shcherbatyuk

That's great when you mention about some contributs [contributions] that compostables have and the others don't and that actually leads me to the next question that I had for you in mind. When we speak about compostable mulches, are there any specific crops or any growing conditions where actually those compostable mulch films are particularly beneficial or particularly effective?

(00:09:14) Dan Martens

Yes, and you know what they found, which is kind of, was not the original mission of these films, but they found that, that they can also be used as production aids and crops where you never could before. And one of my favorites in Italy are commercial tomatoes. And maybe that's my love of pasta and sauces. I'm not sure. Well, it's there. Whatever it is, it's there. What's interesting in commercial tomatoes, the way they, they pick them is with machines. They actually run over them and using, of course, a mulch film, you can control moisture and weeds and it helps them grow and all this stuff, but you can't use plastic because it ties up the machine and causes problems. So, the Tomato Farmers Institute in Italy found that by using the compostable mulches, they break up and they fragment by the time the machines are picking the tomatoes, they are, you know, just get kicked out like the green matter, just like the leaves and stuff, they are kicked out. So, they found that actually they gained 25% more production at the beginning of the harvest and also at the end, which are the two parts where actually you get paid more during the middle where there's plenty of tomatoes. So that's interesting, I just love watching the machine or some videos, you know, on the way it works. But I also like for sweet corn: sweet corn, which they grow a lot in Canada, they use a clear mulch film, and really all it has to do is heat the soil. So, it's clear, or clearer, you know, and it heats the soil and within a month or two it's gone and as the corn comes up and the canopy covers, it's okay. But it's really something where our materials are really suited very well for that, and then I also like, I guess the other one is something for vines and berries. We're finding some work in California with vineyards and with raspberries Washington State, of course, is doing some great work with raspberries. And the idea is that, you know, when the vines come up, you want them there at the beginning, but as they get big, you want to take them off, but you can't, because as you tug them, you'll pull the vines. So, this just lets them break apart into the soil and get incorporated into the soil. So those are just three, but there's others as well. But you know, those are three where I think actually the material is doing something that regular mulch could not do, you know, which I think is kind of cool.

(00:11:48) Nataliya Shcherbatyuk

Yeah. And that's a good point because if you think about biodegradable mulches, they are, per se good for a few months, it might be just perfect for specific crops. Because if you don't need to worry about crop all over the season as a perennial. So, by the time you harvest, mulch is already shredded per se into

pieces. So that's fantastic. And then you don't need to worry about, like you say, pulling the films, breaking the machines.

(00:12:18) Dan Martens

Exactly. And, you know, the environmental impacts of, you know, plastic mulch it's been highlighted, it's been, you know, a couple numbers, but new things have come out with the use of plastic mulches, and of course, people say: Oh, of course, it's, you know, potential for microplastics for leakage or things like that. But another thing that's just being recognized now is the removal of soil, because when they pull up these mulches. The plastic, about 67% of the weight that they pull up is soil. So, that's being removed from the fields, and I think in EU they have an average that it's like 160,000 tons of soil is removed annually with mulch film. So that's a lot of soil, especially when, if you like to study soils, which is minerals from rocks and organic matter, it takes a long time to make any soil.

(00:13:24) Nataliya Shcherbatyuk

Yeah. And you also think about nutrition. I mean, you probably pull-out tons of nutrients with that soil as well.

(00:13:30) Dan Martens

Yes. And then of course, it's a really difficult thing. It really can't be recycled. You say you can, but not easily because it's contaminated and so there's more studies in the EU about it, but you know, there's still a lot of people burning, you know, mulch films and in Florida they burn, which is not good, or they're burying them on site. And it's sort of, the more they put legislation in that you have to landfill these or something, it's more expensive, the more people find a way to go around the rules and to do something that's not best. So, we definitely need alternatives or new technologies.

(00:14:17) Nataliya Shcherbatyuk

Yeah, and are there any changes regarding biodegradable mulches when we speak about for the past several years? So, is anything trending currently?

(00:14:29) Dan Martens

Yeah, I'll tell you what's kind of cool. Like even 10 years ago, I remember going and speaking to the organics boards and things like that. And we had 20 years of experience, Novamont really put the first mulch films out there like 20 years ago. They were very primitive and the sun would hit them and they, you

know, in a day, they shrink into a little ball or something, but now five or six generations later, the technology is much better. But I think there's a couple of things just quickly to touch on. One is just legislation, like, we had these conversations before there was no legislation and now there's a European standard for soil biodegradable mulch film specifically. And it's a 17033, which was good because it sets some standards, which people always say, well, how do we know, how do we know it's not something 10 years ago, we find out that it was terrible. But it measures how long it biodegrades, it measures for toxic elements, it measures for heavy metals, things like that. And then just last year, or even I think this year, there was an ISO standard 23517, which basically mirrors the European standard. But what this does is it's not just a European standard, but an international standard for the soil biodegradation of compostable mulch films. So, I think that's huge because nobody now can say that there's no certification in California, Washington state, and even in the Farm Bill, which has the "Compost Act" in it, there's labeling for compostables and they actually have a designation for biodegradable mulch film. So that word is not allowed to be used biodegradable in most labeling because it doesn't have a meaning anymore. But for agricultural mulch films, you can use that word. So that's something that's going to be even federally legislated, but it's in California. So that's kind of interesting. And then I think the other thing to do is that there's been a kind of a real push for using plant-based feedstocks. Yeah, and, you know, right now the technology in Italy, they require for organic like 60% plant-based chemistry. Now, all the chemical, everything is biodegradable, it's compostable by standard, but the technology just does not exist to make every monomer, as we say, from, but Novamont has a mission to be 100% plant-based chemistry, and we'll probably get there hopefully sooner than later, but right now that's something that's becoming real has been legislated in Germany. They require plant-based compostables at 50%. France does not, but they don't allow the oxo-degradables. They're being banned, which are plastics. And the EU, 2024 will also, at a European level, be banning the OXOs, which are not compostable BDMs, those are plastics that break down and fragment. So that's kind of interesting. and then what I hear a lot now is all this conversation about PFAS and microplastics. Now, PFAS has not been something that is in our world, but it's a topic that comes up and you have to be able to defend it. So, of course, a lot of screenings talk about that, but it's not our material. But persistent microplastics, there was a good report that came out a year, a year and a half ago. It was the UN assessment of agricultural plastics, and you can find it online. It's FAO, I think, but they talk about mulch films, and they talk about, you know, using alternatives or finding BDMs to use. So that's, we didn't talk about that stuff, you know, five years ago at this level. And there's a study coming out right now from the European Commission, I'm sorry, I'm not that good, but it's going to be published and basically, they said that they thought that the best use of compostable materials was in agriculture for most films, basically because you've got stuff in contact with the soil, with food, and the fear of microplastics, which is still an evolving science. What are they? What do they do? How do they end up in our bloodstream? So anyway, a lot of kinds of movement, all been positive. So, people say, Oh, this is all brand new like this, but this has been going on for 20 years. Oh, and then, of course, I have to tip my hat to the programs that Washington State and all the research UConn and Tennessee and Nebraska now all doing studying these materials on a farm level, on a chemical level, on

a financial level, on a social level, because as the, we get academia to quantify and I should say not support, but validate some of this stuff, it takes away some of these myths, and fears, and concerns, which I think, you know, that's, I don't know, maybe in the last, maybe a little more than five years, but so important. And I just love those guys anyway, so I'm happy to shout out whenever possible.

(00:20:06) Nataliya Shcherbatyuk

Oh, thank you. Yeah, that's, it's very interesting. It's very important. And it's really very trending now more and more. You can see it. Especially plastic, biodegradable mulches and all of that. And can you tell us more about some new applications for crops where actually that biodegradable mulch fits beyond the benefits of traditional mulch applications?

(00:20:30) Dan Martens

Yeah, there's some interesting research going on, and one, which I really love, which I've seen in Italy, it's not really commercial yet, but it's for rice production and you know how rice production in Italy, they, you know, this is why risotto is Italian. They grow the good stuff, the good rice. But basically, with rice, you use a lot of water and you spread seeds, but what they found out is that if they can use compostable mulch, they can lay it down and they can sow through the mulch. So, you actually have a more structured sowing of the seeds. And also, it holds the moisture in, so theoretically, you can use less water. And especially when you think, you know, water conservation, you think of things like California, which is a big water State, you know, or other place where they can conserve water. It's actually pretty big, you know, so I think that's, there's some things there. Now, the other interesting thing is a company in Ireland invented a rice sowing machine to use with compostable mulches. Also, for the hemp industry, the hemp industry, where they grow outdoors, the same problem with that they want to remove the mulch at the end without damaging the plants. So, and the hemp farmers are interesting because most of them, at least this is pre-COVID when I used to work, I haven't talked to them since then, but they're usually younger farmers. They're usually new farmers, who haven't had a bias with vegetables or something, they take over land that kind of has been discarded by the farmers because "grow your cannabis", and it's usually an industry that kind of before COVID had money. So, they kind of would pay for the better materials and kind of proud about it, kind of touted. You know, "we're not using plastic", things like that. So, I thought that was interesting, and then something else, an old, old crop, which you don't think of, which is kind of phasing out, but tobacco. Tobacco has always been something that is still grown, but you could never really use mulch on it because of the way it's cultured. But it's the same thing with compostable mulches. They can be used and then when they harvest, they don't tangle up machines, and things like that. So that's kind of a new, one of the old crops that's kind of a new technology. So, anyway, I guess we have to maybe say all the smokers are really foreign technology. I guess, I don't know, I don't know if that's good or bad. I'm not going to judge.

(00:23:15) Nataliya Shcherbatyuk

What is interesting is from perspective of growing plants, it's interesting.

(00:23:19) Dan Martens

Yes, and of course, the project we're talking about is strawberries, you know, strawberry farmers, I love this project because it was brought not by industry, not by academia, but by the farmers. And in Italy, I presented 10 years ago, Italian studies on strawberries and cultivation using compostable mulch films and some very interesting results. So, I'm hoping that we have the same, you know, with this project strawberries, because who doesn't love strawberries?

(00:23:54) Nataliya Shcherbatyuk

I don't know.

(00:23:58) Dan Martens

I don't know who it could be. Maybe the blueberry blinders. Maybe they, maybe we'll see. I don't know.

(00:24:04) Nataliya Shcherbatyuk

And when you talk to those farmers who want to transition or transitioning from plastic mulch to compostable mulches, what the main consideration you would talk to them about? What would be your tips?

(00:24:18) Dan Martens

Well, I think the main thing to say is you really have to say it's a different animal. It's a different, it's a different tool with and it has to be kind of it has some of the same attributes, but as I said it's like comparing a goat and a cow. They're both kind of like four legged animals that eat grass, but they're really different animals. So, when you are working with compostable mulch films you have to sort of recognize that they're not going to look the same, now, especially we see this a lot in Japan. In Japan, they love beautiful, manicured rows of mulch film and it's black and shiny and looks like patent leather shoes. They love it. Well, our material will start oxidizing and biodegrading and we'll start getting holes in it when the canopy comes out, you know, so you don't need it. And that's part of it, but commercial farmers really want it to be plastic, but they want it not to be plastic. They want it to be plastic, but then, in the end they want it to melt away. And it's really a different animal. So, you have to be aware that it's going to look and act differently. It will

accomplish the same thing with heating the soil, and with stopping weeds, and with moisture, although it also has a breathable effect. It's breathable. So, what it will do is balance out the air and the soil. They studied this also in Europe, so that you don't get these peaks and deficits. So, the soil can kind of breathe through it. With that said, a downside is being, you can't really use it with fumigation. This will be a new technology that I hope we'll be able to use fumigants because the fumigants, some of them that are really pretty strong will "eat" the material, or at least, you know, won't hold the fume and get down into the soil as it breathes. So, that's something, so that's already like California and Florida, you have to be careful. And then of course, when you put the material down, you can use the same equipment, except you have to put it on very loose and then what happens is it stretches and it kind of shrinks onto the bed and comes nice and tight. And then you have to plant within a day or two of putting it down or at the same time. So, there's a few little things, but luckily, we have a few good distributors, farm distributors, and they try to give all these little tips and things. And so, my advice to any farmer who wants to try some of these materials is to go very slow because it's a different animal and you have to learn this, how this animal lives, just like anything else. Buy one roll, put one roll down, then do one row the next year. Before we've had some farmers in Florida who say: "Oh, I want to do this" and they'll buy 400 acres and put it down, and then make a tropical rainstorm in the morning and a hundred degrees in the afternoon, and it basically makes like a steam chest in the sandy soil, breaks down the material very quickly because you're basically steaming it. So, that's a very rare thing, but I say go slow and learn the material. Our best results are usually with the smaller farmers in the U. S. Now in Italy and Spain, you actually have commercial farmers who say: "I would never go back" and they have financials to show that it's really good. But here in the U. S. and parts of Canada, it's really the smaller farmers, who would love not using plastic. They're proud of it and they accept it as it is, and they would never change. So, I would say go slow. I know it looks like plastic, but it's really a different animal and learn, learn, learn your soil and your plants.

(00:28:16) Nataliya Shcherbatyuk

Yeah, those are good tips. Definitely. And I have a fun question for you. Well, at least it's fun for me to ask you the question. What is your favorite and the most challenging crop to work with and why?

(00:28:33) Dan Martens

Oh, well, I would have to probably defer this a little bit, I think I spilled the beans a little bit, literally. With tomatoes, I love the fact what most farms do. But I love the new technologies. I just love new technologies. And I love the idea of sweet corn, where you can put down a clear, very kind of basic material. And have it be gone, you know, in like two months, so, it just kind of looks really fun, you know, because the corn comes up through the mulch film and breaks it up and all that. But I think that on the commercial side, I love the tomato story. I love the sweet corn story. I'm very excited about the cannabis and that story because I think that's an emerging market. But I think, you know, when I hear bad stories from, it's usually

some pharmacist- oh I tried that, it didn't work. They gave it one shot and he said it was more expensive, and this, and that. And really it was just, you know, you need to learn, learn how the material works with the plant, the soil. So, we are doing some, you know, like I said, there's actually some wine companies in South Africa who have vineyards in California, and they're actually making some very interesting work with most films with the vines, with the vineyards. And which we're doing in South Africa and now it's out in California. And I think that's really cool because that's another industry where, you know, they have money to spend, to actually try new technology. And that's been very interesting. I don't know if we'll study, they studied it in France. There are actually some studies about vineyards and wine production and mulch films.

(00:30:23) Nataliya Shcherbatyuk

Interesting, that's very interesting, I feel I'm going to be Googling a little bit after we're done.

(00:30:29) Dan Martens

Well, when we did the first SCRI project, we had a big tour in Italy and Spain and all the academics came and Novamont hosted, we call it the International Symposium. And for a day at the Novamont headquarters in Navarra, we had the Washington state folks and the Tennessee folks, and we brought the academics from all over Europe. So, we had from France, we had the woman who wrote the papers on the vineyards, and we had new technologies. And it was really interesting, and I would hope that maybe with this project so, you know, five or six years later, we can maybe go back and say, what's new. Because there's so much more to talk about.

(00:31:12) Nataliya Shcherbatyuk

Yeah, definitely. Dan, if our listeners would like to learn more about the company and what you do, where can they find you?

(00:31:23) Dan Martens

Well, we have of course, we have our website, Novamont.com, and there it goes by product group. So, if you're interested in the mulch films, you can actually go and watch videos. We have a Novamont channel on YouTube, but if you one of the brands that we have in the U. S. is called Bio360. It's one of my customers brands, which is pretty much a main brand here. But Novamont has some great videos, some European experiences, you can see the tomato harvesting, you can hear some farmers talk about their experiences. So, I think that's the best way and then of course, there's a lot of papers. I think Washington State has a great website, great resource pages on BDMs with a lot of the work they've done. University of Tennessee also has a good resource page and UConn as well and some of the experts that were there at

UConn now. So, you can kind of look around and find a lot of these documents and papers. And of course, you can always ask me too. I'm happy to talk as you can tell. I'll be happy.

(00:32:33) Nataliya Shcherbatyuk

That's a good educational lesson today. Well, thank you so much, Dan. It was such a great and actually full of knowledge discussion. Thank you so much. And I hope we'll talk soon again.

(00:32:50) Dan Martens

Oh, well, thank you so much and thank you for all you're doing. This is great to, to spread the word and, and the information. And I'm so flattered that you took the time to reach out and I'm so glad. If I can help in any other way, just let me know. So, thanks the best to you all.

(00:33:06) 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 the 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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