

- Eric: We're going to move into our final chapter here, and that's our Q&A session. So first question I think is probably for Milan.
- Milan: Okay.
- Eric: What type of equipment is typically used for processing CBC?
- Milan: When you say processing, I'm assuming extraction.
- Eric: That's what I would assume.
- Milan: Yeah, so I'm going to assume extraction. So there's three steps that I like to tell everybody. You want to prepare your plant, you know, the flower if you will, but you want to prepare your plant, if you're doing a flower and leaf. And again, you can use leaf, and they actually make mulch, a red mulch, that'll actually radiate some of the good sunlight up into the leaf area, but if we're talking about your flower, you've got to make sure you get that nice... when you harvest it, keep it nice and clean, and you need to get that moisture content, again based on your extraction equipment, you want to keep that moisture content as close to 10% as you possibly can get it.
- Milan: So what you want to be able to do after you harvest that flower, you want to get that stuff dried as quickly as possible to avoid mold buildup. So the drying and then the sizing. Sizing is very important for through-put. Typically you want to size or grind something that is more chip-like than shred-like, because as you're going into these vessels, whether it's a super critical CO2 vessel or an ethanol system, you're going to want to have uniform density of material. And then it goes into the extraction system. So you have to make sure you have a moisture content as close to 10% as possible, you want size -1 inch, preferably 0.75 inch, and then after that, you want to be able to feed into your system and feed out of an inventory.
- Milan: So super critical CO2 for the most part is a little bit slower system. I've worked with both. The ethanol system has much higher through-put. There are different systems out there that change the back end of it, so whether or not you're making a distillate or an isolate, and I think of an isolate as just isolating the pure CBD portion of what you're extracting. Where a distillate will have CBD content in it, and other cannabinoids, it will have other things in it, terpenes, some lipids, some waxes. There's a whole mechanical part of this that you can get full service, but you have to know what you're doing and how to do it.
- Milan: So again, right now in the industry there appear to be two options, super critical CO2 or ethanol. Again, it's based on through-put, but regardless of which system you're using, it has to be dried, it has to be sized correctly in order to go into the machines, and the machines with a consistent square foot density will give you much better output of the product you're seeking to sell, which is the end product, the oil I'll call it generically, but either the distillate or the other products that you'll be making, which... I don't know if you're making edibles, but I don't do that. I just kind of stay at the wholesale level, so.

- Eric: All right, this one might be for Lyndon. What would be the cheapest option to look into to water a small greenhouse grow?
- Lyndon: The triple irrigation equipment that's out there is the easiest to downscale to. If you're just trying a small greenhouse size, I'd look for trickle tape at any one of the suppliers that we talked about before, or even you're local Menards store has trickle tape now and emitters, and I think the big thing is to get started and get thinking about how to scale up as we get going.
- Eric: So trickle tape, even in the greenhouse?
- Lyndon: Yep. I don't... I think that there's a white mold issue that ends up being a problem for most of the... I see it in a couple of the things here, and some of the things I've read, so we really don't want to get the plant any wetter than we have to, and we want to minimize the number of times we get the leaves wet so that we minimize the amount of disease that starts growing on them.
- Eric: I've actually had a couple of people asking this question. Is it too late in the season to plant? I will let you know, because I just planted yesterday, but Milan, what is the latest that you have planted and still gotten... I guess you could say it depends on the type of hemp, but let's just say CBD hemp for now?
- Milan: Yeah, not by design, to be honest with you, but yeah, we've planted as... again, different geographical areas. If you don't have enough grow time and you're always fighting the weather towards the end, it is... We've planted as late as after the Fourth of July. Again, more of a western environment. Think Colorado, Washington, Oregon, Midwest. It's going to be real tough to put it in. I hope Eric has good luck with it, but any later than this week, if you would, it just would be... It'd be a challenge, because part of it, you want that growth cycle because you want that flower to be able to do its thing, to get enough concentration of those active ingredients in that flower, and you need daylight, you need nutrients, you need warm weather to do all these things. So if it's a nice, warm, luxurious fall with very little moisture, sure that might work, but if it's like it's been most of this year, and then you get an early frost, then you've got to get all those plants out of the field, and then I think you've got a mess.
- Milan: So I like to look at in this area late April, early May, assuming you think frost is going to be gone, but mid-May is probably a good time to do it. Other areas of the country, it kind of varies geographically, but yeah, I would say mid-May to the end of May would be a window doing it. End of June, I guess we'll see what Eric comes up with.
- Eric: And with regards to seed and fiber, you're just going to have to ask your seed supplier. The number I've seen is right around 110 days to maturity, and so just like with all of our other crops, it's not just days to maturity if you're looking for fiber production, it's also can I get that fiber dried down, can I get it out, and the same thing with seed, am I going to be able to dry it down, or is it going to involve a lot of extra cost drying it yourself.

Eric: The next one is actually just a comment, and this is a question that I answered online in the Q&A, but somebody had a question about licenses, and are those annual. Tad says that they expire at the end of November, which is true, which essentially his comment is that it forces us to renew before the crop is even distributed for some folks, so we'll have to see how that plays out moving forward. And I'm not 100% sure why they chose the end of November. It could just have to do with it this year. But something to keep in mind.

Eric: Next question. Actually this is one for me. Do you have any insights on crop insurance development at this point, which is interesting, because I would say five minutes before the webinar started, I got an email from someone who does crop insurance locally, and he said that they now have hail insurance available for industrial hemp, so that could be company specific, but you might want to check with your local crop insurance provider and see what they have available. If you call around and you don't know, or you don't find anything, let me know, and I can pass you on to this person, but at least that is the last word that I've gotten.

Eric: Another question, and this one's probably for Milan. Are you seeing any processors using hydrocarbon extraction as opposed to CO2 and ethanol?

Milan: I haven't personally seen it. I talked to a couple of people. I think one was more of an investor than an actual operator, and one was a technology guy, so I haven't actually physically seen it or put my hands on any of that. That's all I could say about that.

Eric: Another question. This is again about licensing. When the license expires in November, will we have the opportunity to continue to grow indoors for those who have chosen that path, or will there be an option to apply for an extension or apply for the license next year? Harvest and processing is going to be a timely process to keep the THC below 0.3%, especially degrading. Is the process license going to expire also in November? So we covered that part.

Eric: With regards... and there was another question somebody had about the different... something about the difference between the marijuana license and the industrial hemp, and can you grow them together. So that is a separate question I answered.

Eric: But with regards to this, I think really the key question for MDARD is going to be what do I do at the end of November, in this case if I'm growing indoors in a greenhouse setting, and it's getting beyond November, what happens with that license. I had a question earlier this week about when will the 2020 licenses be available, and I had reached out to MDARD, and they're not looking at that far ahead. At this point, USDA supposedly is going to have their framework out sometime in July for public comment, and then they get 60 days typically for that, which means that they will be sending out their final version sometime in the fall, then all the states get a chance to take a look at that and make any tweaks that they need to on their own state versions. Then each state needs to submit their plan to the USDA. The USDA has 60 days to get back to each state, and then we'll be able to move forward. So the hope... that's the way I heard it put. It's not an assumption. The hope is that we will be ready to go in early 2020. So

don't expect MDARD to begin receiving applications definitely anytime before 2020, and probably, at least a month or two is my guess, into 2020.

Eric: Let's see. Are there any cost comparisons between nets from field versus greenhouse production for flower in regards to viable product and loss due to field growth? So Milan, that would probably be a question for you.

Milan: Yeah. I personally don't know of any, but I've used nets obviously in some applications, but with a greenhouse you've got a different level of infrastructure. You've got a different level of protection, though, from the weather and those kind of issues, but I don't personally know of anything that's more than anecdotal.

Eric: Lyndon, I think this one's for you. If feeding exclusively through drip with a row spacing of 6 feet, would the fertilizer amount still be the same per acre, since you would not be losing as many nutrients?

Lyndon: If your spacing is a lot wider than, like they're showing in the photos here with the mulch fabric, you want to figure the acres of actual coverage that you have. I think we'll let Milan comment, too, but I think we're talking about acres of actual plant material when we talk about 120 pounds of them.

Milan: Correct. Yep. Yeah. If you're going to dose... You're exactly right, Lyndon. You're going to dose that based on plant material, not just the gross acreage that you're growing on, and a 6 foot... that's a lot of distance, but yeah. It's got to be based on... well, it's based on the most rows and where your plants are at, and how the spacing is between the plants.

Eric: But if we figured that the plants were a quarter of the field, of the sunlight for the field was being intercepted by the plants, we'd be looking at more like a quarter of the total per acre.

Milan: Right. 25... Yeah. 25-30%. Yeah. Again, it's... I agree with that assessment.

Eric: Milan, is that number that we've been throwing around 120 pounds per acre, does that still hold true for CBD hemp, or is it really different than compared with seed hemp?

Milan: Yeah, it's different because soil chemistry changes and where you grow it. I'm going to try to be a little bit more specific on... And actually, that was a good question. With the advent of doing drip and mulching, versus a couple of years ago it wasn't as prevalent. But I can just tell you, I was in Holland, Michigan a couple of weeks ago getting some equipment, a lot of the bed shaper, mulch layers, and those kind of things. They're looking at types of spacing. So I think that number might go down, but again, it's all based on how you're dosing it... or adding the nutrients, I should say. Again, the indoor growing comes out of me and I say dosing all the time. I think that number's going to come down a little bit. Effective irrigation of the root zone is where you want, and you could do that with less rather than more, again because there's no real good database.

- Milan: I guess that's why we're doing what we're doing, right? I mean, all these research projects will sort of coalesce different things, and then how good that data is, the quality of that data... There'll be all kinds of data in the spring of next year, and then we'll just sift through that to see what it will be. It will be interesting.
- Eric: What's the best means of supplying nutrients, through drip line or foliar spray? We're talking about only four acres in some area, so you might've touched on this already.
- Lyndon: If you're not used to using foliar sprays, I'd stay away from foliar sprays until the neighbors try it and kill their crop or you see the result. So I would stay with the trickle system as the delivery mode. And I think the other thing we need to mention is that you don't want to put 120 pounds on in one shot.
- Milan: Right.
- Lyndon: You probably want to step that out in something more like -
- Milan: Good point.
- Lyndon: - like 20 or 30 pound increments. Watch the plant growth and make sure that it's doing what you want as you go through that. The trickle has... there's so much more buffer that's available when you put it through the trickler system and let it absorb through the root system. And until somebody actually figures out the right system for doing foliar, it's terribly expensive and not as effective, and high risk compared to the other system.
- Milan: I agree 100%. Let your neighbors kill all their plants and then figure it out, but no. I just think you've got more control and you're managing risk better with the trickle irrigation.
- Eric: Milan, when you were talking about growing with mulch, I'm assuming you were talking about the plastic film -
- Milan: Yes.
- Eric: - and just used the word mulch, but somebody had a question about any specific brands or types of wood mulch that you recommend.
- Milan: Oh, I haven't used any. Yeah, when I say mulch, I'm talking about preparing the -
- Eric: The plastic.
- Milan: - it lays plastic much in one pass and creates either an 8-inch high bed, or whatever height it is. Yeah, and I'm talking about plastic mulch. I should have clarified that.
- Eric: Okay. And this one's also for you. What's the best price you've seen for feminized seeds, and what businesses can you recommend for good seeds at good prices? That one might be tricky.

Milan: You know, the pricing of seed has increased a little bit because of demand, and I think there's some less-than-honest seed providers. You know, I think it's gone up a little bit, but it's kind of stayed constant since... when did we do the workshop, a month ago?

Eric: Mm-hmm (affirmative).

Milan: I saw stuff kind of go up a little bit higher then, but if you're looking at... again, if you're growing from clones, you don't need a lot of seed. That's the point, right? So you're not buying tens of thousands of seeds, you're buying enough seed to get your mother plants started indoors or buying your clones from somebody. A couple guys in Colorado do a good job. Their seed stock is pretty good. They sell seeds and certified... they give you a certificate of authenticity on their clones as well, and maybe I could make those links available when we do whatever we do after this.

Milan: But yeah, the prices seem kind of... You're going to want good seed. The higher CBD concentration, you're going to pay a little bit more for it, but it's worth it, and you've got to have feminized seeds. There's some discussion I saw last week about why you wouldn't use feminized seeds, and my response was, why wouldn't you, because again, you get a bunch of males out there roving around, and you never know how much you're going to get.

Milan: I think Wisconsin's coming up with sort of a program as well, I think. I've been talking to them a lot lately, but I'll see if I can get a couple of links, at least for people that I've used in the past. Again, not recommending them, but they have good documentation, and documentation is key. The Amazon example that you used, Eric, was a good one. No matter how many likes you have... boy, don't buy seeds on the internet.

Eric: The next one I'm assuming is going to be probably best served by Milan as well. When can you start first spotting the male plants? Or distinguishing the two, I guess.

Milan: Yeah, well I mean, you'll see them at the flowering stage. They come out and they have the sacs. You have to know what you're looking for, but they'll come out, and when everything is flowering, you have to... yeah, you've got to cruise that field, you've got to know what you're looking for, and you've just got to yank those suckers out of there. I mean that was -

Eric: And it's pretty easy to distinguish between male and female?

Milan: I think it is, yeah. Maybe a picture next time, now that I think about it, a picture between... when I say no males allowed, I'm not trying to be funny... but maybe a picture between what a male plant looks like when it's flowered and a female plant. At least, I think I could easily tell the difference. Yeah, you could see them, and you've got to get them out quickly because they'll take over and grow rather rapidly.

Eric: So when you say quickly, what kind of time window are you talking about? So once floral initiation starts and you distinguish that's male, how long do you have before you have a risk of colon -

Milan: Days.

Eric: Okay.

Milan: Days. I mean, yeah. Get out there and yank them out of there. And even if you don't get them all... You know, the problem is there's no CBD, right, in the male plant, and it's going to then drastically reduce what's going to happen in your female plant. But yeah, it's like all hands on deck kind of thing. You try to manage that risk by buying a good seed that has a good COA, a certificate of authenticity, but if you're going to grow from seed and you've done that. If you buy clones, same thing. You're going to get mostly femi... you're going to get I would say 995 feminized clones if you are buying by clones. Again, a little bit more money to do it that way, but a lot more certainty.

Milan: At the end of the day, if you're heading into end of October, early November and you're harvesting and... because all that testing that you do is to verify that you've done all the things you can do to get a good quality plant to whoever you're selling it to. And I said this in the workshop before is, whoever you're selling it to, they're going to have specifications, and they're going to want a certain concentration, and if it doesn't meet those specifications, then you've just spent a lot of money growing all year for no revenue. Because it won't be a little bit of revenue. If it's bad... I mean, there's a warehouse in Kentucky with hundreds of thousands of pounds of hemp with various data on it from last year. So I don't know what that deal was there, but yeah, you've got to be very diligent. Develop a success strategy, and males are not part of that success strategy.

Eric: This is probably just a quick question. Do you know of any tool to perform in-field THC level testing?

Milan: Yeah, but you're better just getting an expedited turnaround time and get the analysis done quickly. The problem is those in-field tools are getting better, and it's a guide. It's not what you could use to legally declare that you have it. But I mean tissue analysis obviously tells you a lot. It tells you a lot for a lot of reasons when you're growing. But I don't know if there's anything out there that I would say yes, go buy this brand or do this. Yeah. But again, turnaround time in a lab is what you're limited to. It's unbelievable.

Milan: Having worked in a lab decades ago, early in my career, even with computerization and how accurate the machines are, everyone's doing the same thing. They're looking at testing, and the testing's important because if you're over 0.3% then you've got zero revenue, and if you're close to 0.3% and you're still growing, how do you make sure that you're not going to be over that. And I'm not sure how Michigan's program is, but some of the other states that I've worked in, you get to retest one time, but yeah, that's kind of risky business. So sort of be really diligent on getting that stuff done.

Milan: In some states actually, you can't test, send in the analysis until so much time before the grow is completed, and then it has to be accepted, and then once it's accepted, they tell you yes, you can harvest. Oregon I think is that way... one state that comes to mind.

Eric: So conversations that I've had with MDARD for this year, unless I heard wrong, and I don't think I did, the burden is going to be on the growers to get that tissue sampling done. So this year you are going to be the one to go out and sample your field and send those tissues in to get them tested. The locations for the businesses that are doing the testing, my understanding is that MDARD is working to get their own facility up and running to do their testing, but they didn't suspect that that was going to be up and running for 2019, so they were trying to figure out how to utilize the LARA-specified labs that they would use for marijuana, that they could get those labs to also do the testing for the CBD for this year, but it will be up to the grower to do that. But they did say, if you do, like I mentioned before... you want to test every week or every other week so that you know where you're at, they're going to recommend that growers send those results in to MDARD as well, probably not for regulatory purposes, but just so that they can also learn along with the rest of us.

Eric: Next question, this is probably for Milan again. What role does soil fertility play in maximizing CBD production compared with genetics?

Milan: Well, they're both important. I hate to cop out on that, but they're both important. Genetics are going to be important because of the strain of how it was derived. I mean, these strains didn't happen and sort of like in the other part of the business, the LARA-regulated stuff, but you want to have... the genetics of the plant really matter, and you want to make sure that... So chemistry's also important because the genetics are important for making sure your target... you have a certain target in mind and there's a certain price point to get that 10, 12%, or 8%, whatever you're going to get, and that's going to be based on genetics, the cell chemistry, and if you don't give the cell everything it needs to... or the plant, you give it everything it needs to thrive, and less stress, all those things, it's going to affect the concentration and the floral component of that hemp grown for CBD production.

Milan: Yeah, they're almost equally as important. If you've got bad genetics, I don't care what you do in the soil. Yeah, you're not going to get something that's going to get you close to 10% CBD, and you're stuck with something that's around 3 or 4, and that affects your economics drastically.

Eric: The next question, I'm going to read it, and then I'm going to I guess interpret it. It says, should stems not stalks be included with leaves and flowers for the drying and sizing process? So by stems, maybe this person is meaning the petiole. I don't know if you've heard that distinction between stems and stalks, but are you including that with the leaves and the flowers?

Milan: Well, if you're drying it the old fashioned way... I shouldn't say old fashioned way. If you're doing a nonmechanical drying, you're going to hang the plant, and so you're going to want... and one of the reasons you're hanging the plant is as the plant dries, your concentration as the moisture wicks out of that... and you know, airflow is important, humidity, all those things when you're hanging them, you don't want mold to formulate. And when you're also coming out of the field, it's real important that you don't take the green plants and mix them with plants that've already been drying for

five or six days because they're going to rehydrate, and then it just continues the problematic nature of drying it.

Milan: But if you're going to hang the plants, the airflow's important. You're going to hang them on the stalk, but you're going to get rid of the flower and you're going to take off the leaf, and you're going to be left with the residual biomass, which I don't really do a lot with. I get a buy... there's a couple of folks that actually buy it, so there's no disposal cost, but I just don't do a lot with it. So if you're going to dry them all together, hanging you can do that with. Mechanical drying, take the time to get the parts separated, or the pieces separated if you will. Again, mechanical drying is a low BTU affair, 85-90 degrees. Residence time is pretty minimal. You want some turbulent flow in there, and you can do it rather quickly.

Milan: I'm working on a drying system that does just that. It's not built yet, but it's hopefully going to be ready late 2019. I would kind of isolate flower leaves.

Eric: And that kind of goes along with another question here. The term biomass, does that include flower, or flowers, leaves and stems, and the term biomass is everything that the plant is producing. So you could separate that out, and you could say I'm taking the flower or the flower and the leaf portion, but biomass, when you hear people use the term biomass, that's the whole plant.

Milan: Right, and again, some of the stuff that I've done in my... in the pulp and paper business, biomass is biomass. It's the tree. It's the whole tree.

Eric: Mm-hmm (affirmative).

Milan: Here I probably need to be more specific on that, but yeah. I consider biomass the what's left over in this particular part of CBD production, or growing for CBD production.

Eric: So I'm looking at the time, but I'm also looking at the remaining questions, and it seems like all of the questions, they're not specifically about irrigation, they're about different aspects of growing. So what I think we're going to do is we're going to end the live session. So thanks for joining, everyone. Milan and Lyndon, thank you very much for all your inputs. Appreciate it.

Lyndon: Thanks for having us.

Milan: Yeah, same here.