Video Transcript: Bird Control in Sweet Corn with Laser Scarecrows

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Chuck Bornt (moderator from Cornell Cooperative Extension): So again, my name is Chuck Bornt. I'm a Vegetable Specialist with the Eastern New York Commercial Horticulture Program over here in Eastern New York, and I've been working a little bit with the laser scarecrows with Rebecca Brown. And when I started to put this session together, it seemed like birds and sweet corn, IN sweet corn were the topics that kept coming up. And when I started to think about it, to have one speaker for, for this, probably just didn't do it justice. So we just decided to make it a whole session about lasers. And I'm going to introduce our first speaker and Jeremy, you can go ahead and hit the share button while I introduce you. Jeremy Perkins is the East Coast territory manager at Bird Control Group with 15 plus years of experience in ag sales. He specializes in B2B farm sales, farm management, communication, and networking. He specializes in agricultural bird management and is responsible for all East Coast and Canadian ag sales. Jeremy is a powerful force in the field using his positive attitude and tireless energy to solve agricultural bird management challenges. And Jeremy is inspired daily by two loving children and in his free time he enjoys traveling, boating, hiking, and skiing. So with that, Jeremy, it's yours. I'm going to turn it over to you.

Jeremy Perkins (from Bird Control Group): I like it. Can you hear me, Chuck?

Bornt: I most certainly can.

Perkins: Okay. How's everybody doing? So as you know, my name is Jeremy Perkins, I'm the East Coast Sales Manager for Bird Control Group. I've been with BCG for three years now. and I grew up in Wayne County on a fruit farm. So I know the area very well. So I've been in the Ag industry my whole life. I've, I've worked at Gripple and, and other irrigation companies. So I know a lot a lot of the community up in Sodus Bay Area, so all right. Let's get started.

Bornt: Hey Jeremy, I'm gonna butt in here one second if I can because I didn't give your title. And it's just when I put this session together, I thought it would be nice to have a little bit of perspective as to who, where did lasers come from in the idea of using them for bird control as a deterrent. And Jeremy was highly recommended to me. And so that's what he's going to just give us a little history on how lasers came to be for bird control.

Perkins: Okay, so Bird Control Group was founded out of the Netherlands in Delft. And the owner of the company was actually in college, and they were messing around lasers and shot a laser out into a pond area where there's a lot of birds. And I think they've been scaring birds with lasers for many, many years, 20 plus years. But they figured out, they said, 'Hey, if we mounted a laser, a very high-powered laser, on top of a motor that we could control where the laser would stay within a certain area.' They thought they could do something with it. So our laser is a class 3D laser. It is the most high powerful laser you can operate without a license. So that's how the company came about. I mean, it's grown ever since, a very young company, but I think they've been in operation for six or seven years now, but it's growing quite rapidly. So so as I said, Bird Control Group is based right outside of Amsterdam in the Netherlands and is hold on 1 second. Sorry about that. We are in 90 different countries. So we have a lot of lasers all around the world. In ag and in commercial industries. We do a lot of protection for birds on everything that birds need to be steered away from. So our mission at Bird Control, Bird Control Group is on a mission to provide an innovative solution to keep birds at a safe distance and to impact the world

positively. So that's our mission as a company. As I said that our mothership is over in the Netherlands and we're based right outside Portland, Oregon. This is our US headquarters. And that's where everything gets shipped out of our warehouse. So our solution today we're here to talk about our autonomic. Or autonomic laser, is a laser that you put up out in the field and program and set whatever time you want it to run at and you can walk away and it's doing its job while you don't have to do that. We also sell a lot of different things, but handheld lasers are a big thing. We're in the aerospace industry. We do airports, a lot of different golf courses. So the AVIX Connect is the app. So our laser is Bluetooth, and you can then connect to the app and you can download it on your phone to control the laser to set the programming. And after you do that, you disconnect it, and you walk away and then laser's up and running. So how it works, once the laser beam gets projected towards the birds, the birds perceive it as a physical danger and they fly away of course. So the birds see the beam. And we see like the dot in full sunlight our laser will shoot 330 yards and have the same power at one yard that it does at 330. It'll go beyond that point, but the beam starts losing its power. So the birds see that as a big solid object, like a big stick being swung at somebody. And if somebody's swinging a bat at me, I'm going to move, right? So that's what the birds perceive and that's why they move. I got a little video here just as… Hold on a second. I got something in the way. Let me start this over. So that's our Mark II autonomic. You can see the laser working through the field. And it works that easy.

So we're here today, to talk about sweet corn. So I've been with BCG for three years. Upstate New York before last year, probably had five lasers in sweet corn. And it's all new, it's new technology. And we've had great success. So moving forward, you don't want, you don't want this out in your field. And there's lots of different ways of controlling with chemicals and other bird bangers and this will do the job completely. I won't say a 100 percent, but at least we claim 90 percent effective. So if you'd get 30 percent more production out of your field, you're going to do a lot better than losing all that. So these are a couple of pictures of this is a post mount out in the sweet corn are laser is a 24 volt system, so it requires 200 watt solar panels up north, because sometimes the sun doesn't shine, but we all understand that. So two 12-volt batteries is converted over and it's up and running. And it will run all day with the solar panel and the batteries up and working. These are a couple of different ways of setting it up. I know the ladder mount is in a vineyard, but I didn't have a picture of it in a cornfield. So I know that you guys plant at different times. So you're always constantly moving. This grower on the right side of the screen. built his own movable trailer. The trailer mounted laser up on top. And ideally, you want to get the laser out probably a week before the birds find the sweetness of the corn. And some time, most of my growers this year went with two lasers, because they're hopping and jumping into the next planning. But if you've got one laser and you move to the next planning, it wasn't working as well as because it takes time to get the birds to leave once they figure out that the corn is there and they're loving it. So this is another grower that mounted. He's got two poles on the laser. around the trailer. So once this corn gets high enough, you can just throw it up on the taller pole and program it and readjust it. This is one of the most unique ways to mount a laser I ran into this year. This is a grower out to the south of Buffalo and great guys. The ended up, we leased it for the first three months, and they ended up buying it. And they said they're going to buy another one next year. So it's a product that works. It takes some time to get used to it and how it how to program it. We're here BCG to help you guys. And we got technicians on staff to answer the phone calls and walk you through it. We have technicians that will come out and set that up and program that for you. So I don't know if we're having any questions now or it's going to be later, Chuck. So…

Bornt: We've got time if somebody has a quick question, but yeah, we'll have plenty of time at the end to have a lot of discussion I hope and ask a few questions.

Perkins: Okay.

Bornt: Does anybody have a question for Jeremy? So Jeremy, you know what the question I'm going to ask is because I know everybody is thinking it and nobody wants to ask it.

Perkins: Yeah.

Bornt: What is, for some of the units that you just showed, what is the going rate? And if you could explain a little bit how, you know, is it a lease, is it a purchase? How does how does it work?

Perkins: We do a try to buy it, try before you buy it. So the unit itself is at $9,950. So ten grand. If you want to convert that over to solar, you're going to add probably another $1000 to that. And that's without the batteries. We can sell you the batteries. For us to ship batteries from the West Coast to the East Coast. You know, at any auto parts dealer, you can pick up a $100 battery and it's ready to go. You're going to pay probably a $100 in shipping for the two batteries to get across. So it's going to be right around $11 thousand after we get done. If you want to purchase it, we have a three month "try it before you buy it", which is 3500 dollars for those three months, but we'll apply all that thirty-five hundred dollars towards purchase. So…

Bornt: I know you said that your laser it's good, it's as strong at 330 yards as it is one yard.

Perkins: Yep.

Bornt: So and I know this is kind of a, um, probably not the way I should pose this question, but depending on field layout and whatnot, do you have like a general acreage that one unit will cover?

Perkins: In sweet corn, I've seen success about 25 to 30 acres. So that one pole mount that I showed the screenshot of the PowerPoint that was doing about 35 acres. And they didn't want to move it, so we stuck it and it was really narrow but long. And they stuck it in the middle of the field, right on the edge. It covered everything. They did notice at the ends that they did have some bird damage. But everything inside it was good to go. So, in sweet corn, 20 to 25 acres. I'm comfortable saying it's going to do our 90 percent what we claim. So…

Bornt: And is that, you know, on a slightly rolling field or would that be absolutely flat?

Perkins: Yeah, that was pretty flat. There was there is no hills at all. So everything depends on your layout out and the rolls of the land.

Bornt: And I'm looking at, all those different units that are out there. It looked like, you know, all the heights were different. But do you have a standard height or minimum height that you'd like to see those units mounted at?

Perkins: You know, ideally…And this is not my…I have heard from the growers, because they've played with it more than I have on sweet corn. Shooting straight through the tassels at a, I mean, so you have to remember that this thing will, will go when it's dusk or cloud cover, it'll go a mile to two miles. At night, it'll go five miles. It'll keep on going because there's nothing to hold it back. So shooting through the tassels ideally is the best way to do it, is what I've heard from the growers that have had success. But

saying that, you gotta know where that beam is going. You don't want to be shooting through into anybody's houses. It is a class 3B laser. It will hurt the human eye. But saying that it's always, constantly moving. To hurt the human eye, it's got a set in for three or four seconds. But it's constantly moving. I've I've been grazed in the eye with it when I was programming it. But it's just a graze. I have a little bright spot, but in five minutes it's gone. What else?

Bornt: That's great. Thank you.

Perkins: All right. You're welcome.

Bornt: Alright, So stop, stop sharing your screen and just stick around. As I said, we'll have a nice little panel discussion here towards the end. All right, and then, and I'll start introducing our next speaker.

So our next speaker is Dr. Rebecca Brown. And Dr. Brown is a professor of Plant Sciences at the University of Rhode Island, where she leads the vegetable program. Her research is focused on solving problems for peri- urban vegetable producers and supporting vegetable production in southern New England. Dr. Brown, is a generalist, in addition to work on bird control in sweet corn and other crops. Her research areas include cover crops, soil health and development of new crops and production methods for peri-urban vegetable systems. And this, this next talk, it's going to be split between Dr. Brown, who has developed slightly less expensive laser scarecrow unit, and she's been playing with these units for a couple of years now. And we were fortunate enough here to get one a couple of years ago to look at. But we just thought we'd give her a little bit of time to explain her unit and the results that she's had over in Rhode Island and neighboring New England states. And I first saw Dr. Brown talk about this at the New England meeting a few years ago.

Dr. Rebecca Brown (from University of Rhode Island): So I'm going to be talking today as Chuck said, about the laser scarecrow that we developed at the University of Rhode Island.

So as Jeremy told us, it's pretty well established that moving laser beams, scare birds, handheld units, like the ones Bird Control Group sells have been around since the 1990s. And there's actually been quite a bit of research done with them. But one of the things they found is that when you stop moving the laser around, the birds come back. And so this means that you have to have the birds, you have to have the laser constantly being moved. And human operators, of course, costs too much. So the solution to that is to automate the laser. Now, when you're looking at a laser, an automated laser scarecrow, there are really only a few essential components. Obviously, you need to have the laser module. You need to have motors to move your laser beam. You need to have some sort of a weatherproof enclosure, a power supply. And then the rest of these are actually more or less optional. And this is a picture here of a commercial unit that's no longer on the market. That's basically just our top four components plus safety switches. And the thing about switches, the reason I've got the hash mark there, is that if you're actually selling the laser, you're required by law to have certain types of switches on your unit. If you're just building it for yourself, then technically you don't actually need any switches because you can turn it on and off at the power supply. But commercial ones all have to have switches then if you want to be able to control the motion of your laser rather than just have it covering a full circle, at a fixed angle. That's where you need a computer in the system. You need some sort of a system that senses things and can communicate with the computer to control the area impacted by the laser beam. And one of the things about the Bird Control Group unit is that it has an extremely sophisticated system to control the

area that's impacted by the beam. Then you also want some sort of a system to control the speed and range of motion of your beam.

So when I first started doing research on laser scarecrows in sweet corn back in 2016, Bird Control Group was really just getting started in the US market. And there weren't really any commercial units that were suited to peri- urban agriculture where we have smaller fields and were needing to move this unit around a lot as well as there weren't any out there that I could afford for research purposes. So I decided to design and build my own. Now, our unit uses the same 532 nanometer wavelength laser as the Bird Control Group units. But our laser is much smaller. It's only 50 milliwatts instead of 500. And that does mean it has a much shorter range. We found it to be effective in sweet corn for at least 300 feet. But it's not going to cover 20 acres. Flip side of that is that if your field is only 10 acres or less, then this is a much more scale appropriate unit. We use two motors in ours, a direct drive stepper motor that allows for bidirectional horizontal rotation. It can go both forwards and backwards. And then a servo motor, which you can see down here. To adjust the vertical tilt on our unit. Our weather proof enclosure is a five-gallon bucket and our power supply is a 12 volt battery because we have a much smaller laser, we need a lot less power, so we only need a single battery. And a 20 watt solar panel is enough to keep that battery charged rather than needing the 200 watt panels. This of course makes the unit much smaller and easier to move around. We have three different switches on ours, a daylight sensor that automatically turns the unit on at dawn and off at dusk. And then a key switch because that's required by law. And a tilt switch so that if the unit blows over or gets knocked over, it will automatically shut itself off. The computer control in ours is a SparkFun Pro Micro Arduino controller. These are the same controllers that are widely used by hobbyists for all kinds of wearables and remote control devices and other electronics. And then we have a printed circuit board that provides all of the circuitry and the speed and direction of horizontal rotation is semi random. We also have an innovative system to control where the beam goes, which is very simple to use. You basically block off areas where you don't want the beam shining using tape. And we have an infrared sensor that detects that tape and turns the beam off. And then we have knobs that let you control the speed, the vertical angle, and the vertical range of motion on the laser. And you can get a lot more details about the whole thing and designs for building it at our website.

So these are just a few more pictures of it. This is what I mean by the tape. So on this unit we had it set up to only do a 180 degrees, and so we blocked off half of the bucket with tape. The laser would actually shut off as it passed that side.

And then this is just the internal workings of our unit.

And this is what it looks like out in the field up on a pole.

So I'm going to go really quickly through this because I don't have a lot of time. But we did some field research with ours being researchers with three years of trials here in Rhode Island. And basically what we would do is split fields and protect half the field with the laser and leave the other half unprotected as a control. And then we would go through and count the number of damaged ears in the field.

And these are our results. As you can see, we were able to consistently reduce the number of damaged ears in the protected halves of the field compared to the unprotected. And this difference was statistically significant. Now our damage levels, particularly in 2019, were a lot higher than optimal even in the protected field. This is partly because there was nothing to keep the birds from flying through the

corn canopy. From the unprotected side of the field to the protected side of the field. And then the other thing is that we were doing these in commercial fields and sometimes we weren't able to get the laser into the field far enough before the corn became sweet and the birds found it because of issues communicating with the farmers. We were relying on them to tell us when the unit needed to go into the field and that didn't always happen.

But our conclusion, similar to what Jeremy said, are that laser scarecrows do significantly reduce bird damage relative to unprotected fields. And it's most effective if you protect the entire field and you begin operating your laser scarecrow before the corn ripens. We have had a number of farmers, here in southern New England, test our lasers and they are reporting less than 5% damage when nearby unprotected fields have more than 80 percent damage. And the other thing that's particularly important is that neighbors don't notice the laser as long as it gets shut off at night. And so this is a good solution when you've got neighbors who are already upset or alienated about propane cannons.

So with that, I'm just going to leave up the acknowledgment screen. Chuck. I don't know if we have time for questions or we'll leave it to later.

Bornt: I would say we have time for one question. If anybody has one, let me check my chat on the bottom here. *(pause)*

So Rebecca, the one thing that I know you didn't mention was the cost of your particular units. And then I know they've gone through several modifications over the years. But where would you say price point you are at this particular time?

Brown: So our units, of course, unlike the Bird Control units, are not truly commercially available. We have a limited number of kits available for $600 a piece for growers who want to partner with us, including with Chuck in research. And we also are putting the designs up on the website and lists of parts and everything, and you can buy all of the parts for less than the $600. We're basically selling them at our cost and that includes some pre-assembly. So there's some labor in there as well.

Bornt: Okay. And Jeremy was just wondering what the size of the of the laser beam is that you're using.

Brown: So the diameter of ours is 14 millimeters, so it is smaller than the Bird Control Group unit.

Bornt: Great. Thank you, Rebecca. I appreciate it.

Brown: Sure!

(edited out content per speaker's request)

Bornt: *(talking about Nick Stanton of Stanton's Feura Farm)*…acres 600 of which is hay, but about a 100 acres of mixed vegetables and fruit, including about 60 acres of sweet corn, a 10 acre apple orchard, and seven acres of mixed small fruit including strawberries, blueberries, and raspberries. And Nick is really responsible for just a ton of the day-to-day operations at the farm and has been extremely instrumental in helping me work on the lasers. And really, one of the great things about Nick is what I like to call tinkerer, like many of us are, but, you know, we noted a few things that we did not like about the URI lasers that we bought from Rebecca and I know she doesn't take any offense to that. So we Nick, the last couple of years has really been kinda tearing that thing a part and make a lot of revamps to it. But I really wanted him to share his experience and then some of the things that he's done with those lasers.

So with that, Nick, I'm going to turn it over to you. Looks like you got everything up and running and go right ahead. It's all yours.

Nick Stanton (from Stanton's Feura Farm): Alright, so why we are a family farm a little south of Albany, very diverse, as Chuck mentioned, some stuff. We're always trying to come up with innovative ways to solve problems. And obviously for a lot of sweet corn growers, bird control is becoming a bigger and bigger issue. And that is definitely the case on our farm. So I'm just kinda gonna go over what we've been doing the last few years.

So what I have here, basically things that we've tried or are using. And obviously you see the blow-up scarecrow type of thing. And I remember that being the first thing we tried on poles and we've steered completely away from that. It just, it didn't seem to be effective enough for what we were doing and the amount of them that we'd have to put out in the field and constantly move. We then started out with just a simple non-rotating single shot propane canon. And it worked. But as you see with a lot of things with these birds is that they got used to it. And so we ended up buying a couple of these we see in the center of the screen multi-bang bird cannons. And they really change. If you're going to go with the canon, it's more erratic and it rotates and it changes how many times it fires, et cetera. So much more effective. And then I think anyone who is doing propane cannons is basically reinforcing that with shooting them. It kind of puts a little punch behind the sound and definitely makes it a little more effective. So that's kind of what we were using leading up to trying laser scarecrows.

So in 2018, we were fortunate enough to have Chuck and the University of Rhode Island supply us with one of Rebecca's units. And we put it out and we definitely had some good results. Good results. We were excited about what we saw. We did have issues with keeping the unit going at times, which is understandable with anything that's new technology. 2019, with the issues we had in 2018, I kind of took it upon myself to make it a little more reliable, in terms of it functioning consistently for us and not breaking down as much. And we had found that, in the first year, that not having a direct drive was just an issue. There's a lot more moving components than we felt necessary. So, I did make it direct drive, and I also made a, which I'll show pictures of later, a slightly different approach to using Rebecca's board and, basically essentially the same unit, but basically flipping it upside down on the pole. And we had great results. I mean, 2019, we didn't use, as I wrote here, we didn't use propane cannons until the beginning of August. I mean it, I was super-excited with the results that year running those two units. And one thing to mention with it that I should have mentioned before, but what we're having a big issue with, we don't have like big developments real close to us on our farm, but we do have houses close enough and we're getting pressure by neighbors about cannons going off. So we're really excited to try to find a way to get rid of the cannons, and that's kinda what's pushing all this. So yeah, 2019 was very good. 2020, so this past growing season, we did not have as good of results. Unfortunately, our first field of corn, which is literally right behind our house, I put the lasers out and it just seemed like we were getting damage. And one day I was out actually putting out a propane cannon to hopefully change the situation and reinforce things, and I physically, in-person watched a flock of blackbirds literally land, literally underneath the laser and around it as it was going and they really didn't care. So that was a little bit discouraging and the whole thing. But we continued to use it and kinda monitor its results. And that's pretty much the three years, kind of a summary of them.

A conclusion at this point, I will say that we are still learning about this and learning. I would say that some of the previous speakers have said, trying to get the laser out before the corn is ready. I cannot say

that I have stuck to that timeline every time. So as farming goes, it gets a little hectic at times and sometimes the timing of things aren't as you'd want them to be. So I mean, I think that's something that I'm going to try to maybe address and get lasers out earlier and see if some results change.

But our conclusion at this point is they're not consistently effective. As you saw through the different years of what I've put as results. And I will say that on our farm we saw less bird pressure in 2019, than 2020. So some of our results differing that year to year might very well be related to how many birds were around. By themselves, they're not, I would say at this point, are not a complete solution to bird damage in sweet corn. We like to use them in conjunction with the cannons. And it allows us to spread the cannons farther, use less cannons, and then like in-between cannons put a laser and we're having pretty good results that way. We kind of plant, do like a two-acre plan, and will have I would say like up to 20-acre field of corn. And we have two-acre plantings staggered a week apart. So we're kinda constantly moving them into where the most ripe corn is, which I think from what I'm understanding from previous speakers, as we're moving out of old corn might be drawing the birds in. Even though it's not stuff we're trying to protect because we're going to pick it, it might be drawing birds in and not helping the situation. As with other methods of bird control that we've seen at this point, I believe that the birds do get used to the laser scarecrows, like other things, might also be part of the difference year to year, maybe either getting used to them more than they were at the beginning. Again, just normal observation from a lot of different we're just trying to keep birds out. It seems, from my opinion, the more erratic, the more change you have in your unit or any type of bird control, the better. They just, and I think that hints towards them getting used to whatever control you're using.

Kind of a little side note that we're talking about sweet corn, but we've had really good luck. We plant rye in the fall and when it's in its young stage, we have Canadian geese come in and they land in the field. And some cases its fields where we had corn. So there's something they can eat, corn we've disked up, and they just annihilate the rye. So what we've actually had really good luck putting these scarecrow units out in the rye fields and keep in the geese out.

So I'm going to show you a few videos now. So this is basically the original setup of Rebecca's unit and it has the direct drive on it. And this will kind of give you an idea of what it's doing. And I would say when it when I go away from the unit with the camera, look at the bottom section of the garage door. And you'll kind of see the erratic side to side motion. All of the laser. Unfortunately, all my videos, the servo motor that controls the tipping up and down of the laser. It's not functioning. And that has been one of the biggest hurdles to try and get this thing to consistently work is that servo motor. So here goes the video. Let's see. So you can get it. You can see the laser there. It'll come back and you'll see that the back-and-forth motion. And then you can kind of visual in your mind visualize if that was also moving up and down at the same time. So you're getting a lot of different angles. And it allows you to cover different terrain and, and different parts of the field get hit a different time. Then I'll zoom in on it and you'll kinda see it close up in motion. *(pause while showing the video)* All right. So there's that one.

And then again, I think it's basically saw similar with Rebecca taken some pictures of what's going on. But again, you got inside the bucket on the left. Just a stepper motor direct drive down and then you got the control board. I did eliminate the tilt switch because we were having a lot of troubles with it. And we haven't found a use for the sensor to shut off certain areas in the rotation of the field. We just let it go round and round. Most of our fields are set up where it's not a problem. So, I kinda eliminated those two things, making it a little simpler, but some situations you might need those things. So this is a

second unit I made. And basically what I did was, my thought behind this was kind of to eliminate the pole shadowing a short, a small section of the field as it rotated. The laser being so close the pole. If you picture as you go out farther and farther, that kinda shadow gets bigger. So my thought was to one do that. And you'll see later on, I kinda moved the control down where you don't have to take it off the pole to either adjust speeds or yeah, basically adjust speeds or the tip of the laser. It's hard to see the laser in this, but there is a slot in the bucket that the laser shines out of. So yeah, there's that.

And then alright, so this is kind of it without the bucket. This is my second unit without the bucket on. This is when I first put it together and you'll see I basically just took what was underneath the bucket and the first model and put it on top so that it just rotates with the bucket. And you kind of see it going around here. The blue thing there is what they call a slip ring. So that allows the power to go through a rotating shaft. And that, honestly, is the most expensive part in the whole setup at this point. And then you can see that the box is remote so that you don't have to pull that bucket down off the pole if you want to adjust some of the control knobs or diagnose some things that are involved with the control board. And again, it's just a simple 12-volt battery. We were kinda seeing, I wouldn't say that I focused on it specifically, but you get a pretty good runtime off a single battery with this unit. I would say a week and a half to two weeks, I think is a fair statement. And we are not running slower panels or just simply with that amount of time we're moving the laser before the battery runs out, so we'll just swap a battery.

Again, this is with the bucket on, you'll see the bucket is painted and it's got some like DOT reflective tape. Just I had the idea of trying to since a bucket was turning to give a little different look for the birds, maybe some sun coming off the reflective tape. Just to kind of add some different looks into along with the laser. And in this video as well, you'll see it just happened to be the shop was dark enough where the laser wouldn't run without light. And you'll see the bottom of the screen using a flashlight to make it go and then I'll take the light away and it shuts off. Which one of the nicest things about these is when they do function properly, you can literally leave them out there and that light sensors shuts it off before dark and turns it on the morning, so you don't have to go back and forth and turn it on. So. And you can kinda see again back and forth. And unfortunately again, the Servo is not functioning so normally that laser would also be tipping up and down at the same time, which I think is for a single laser setup is very important, especially if you're not on a flat fields.

And at the end here. So one of the biggest issues that we've had with the original unit is any of the plastic components. They just didn't hold up; kept breaking them. If you were moving the unit and you happened to nudge something, it would snap and then you'd be down for the day. So along with making a direct drive, I've really tried to make it more robust, not as fragile. And I've basically gone to metal components. But one of the biggest issues with going to metal components is they're heavier. And I think I'm kinda reaching the max of what this type of stepper motor can handle to stop the rotation and then start the other direction properly. And you'll kind of see. So this is a stepper motor, and that's actually a much bigger stepper motor than what was originally used. And I put that on, and unfortunately, the control board, this unit, the way it's set up in these pictures, it's just too much amperage for the control board. So at this point I'm kinda limited by the control board as well. So that's something that I'll have to look into or try to go a different route with something less amperage. But we're finding with the Servo's is they have either a little, the original ones we're using have little plastic ears in them. And the constant back-to-back, back and forth movement, the gears end up chipping off and often they, they don't function. And then, so I found an aluminum geared one, and that one as well

just did not hold up. So, um, and as you can see, just you're seeing just a simple metal plate and everything. I'm just trying to go all metal again for durability reasons and yeah, I think that's pretty much it. And that as you can see, that the pole just mounts basically underneath. Basically, we're, at this point, we've just been using a one inch conduit and cut to the height you want. And using a three-quarter inch piece of rebar pounded in the ground. And you slip the one inch conduit over the rebar and then you just, this happens to be a three quarter inch bolt welded on the bottom my bracket here, and that slips in and they just put a clip in through it and you're good to go. But again, the idea with this unit was to have no poles in the way to shadow the laser as it went around. And that's pretty much it, I believe. Yep.

Bornt: Fantastic. Thanks, Nick. I appreciate it.

Stanton: You're welcome.

Bornt: So with that, if you have a question, go ahead and unmute yourself, but try to police yourselves a little bit with one person speaking at a time. That would be great. Now I do know that…

Okay, so we have one question on the bottom that just came in. Says, "Hi Nick. Since you have mentioned you have different bird population on 2019 and 2020, do you think lasers work better with an intermediate bird pressure? Or does the population size a factor to help with these units?"

Stanton: I think that the population size affects that. I think it affects the overall success of the unit. And I think that runs along with, I mean, I would say that about our, about our bird cannons as well. When the pressure gets high it just man, I see them. I feel like at times when there's just a lot of them that I mean, it's just very hard to stop them. They are on a mission to find your corn. So I would definitely say that it, it affects it.

Brown: If I can jump in there, Chuck, and add to that.

Bornt: I was just going to put the word out for Jeremy and Rebecca and Ali to happily add to that.

Brown: Okay. Yeah. So I know someone asked earlier about whether the birds get used to it or not. We haven't had a chance yet to run the actual tests that will determine that. Those have to be done using captive birds so that you can make sure you're using the same individuals. And that's something actually that Brian's going to be doing down in Florida as part of our grant. But it's been delayed by the whole pandemic. So we don't know year-to-year whether we actually are dealing with the same individuals. We have found at URI that when we deploy the laser in the same field for a five-week period, that we don't really have any drop off in efficacy. So if the birds are getting used to it, it's not happening super quickly. And we also saw really decreased efficacy last summer, so 2020. And I think part of that may have been just the year that with the drought, there was just a lot less alternate food for the birds. And basically, it's like any other sort of wildlife control. If they're hungry enough, it doesn't matter what you're doing. If you've got the only food source around, they're going to ignore whether it's lasers or cannons or guns or repellent spray. Their hunger is going to let them overcome that. And you're going to have problems.

Bornt: So yeah, I'm going to go ahead…

Perkins: *(interrupting Bornt)* Sorry. I'm sorry. I definitely saw that this year because it was so dry. Birds will do what they need to, to survive. So I was down in New Jersey, birds were eating grapes that were

pea size. The growers never saw that before. It was so dry. They're going to, they're going to go and do what they need to do.

Bornt: So I'll ask the group too, are there certain species of birds that this, these lasers seem to work better on than others that you've kind of noticed?

Stanton: I would say we're mainly seeing blackbirds. That's where a lot of our damage comes from. And I, that's really all we've been using it on. So blackbirds is basically the only tests we've had.

Brown: I've been using the lasers in addition to blackbirds on starlings and Canada geese. And then robins, we've done some work in blueberries where we were going after robins, in addition to starlings. I have found that house sparrows are not bothered by the laser and pigeons don't seem to be particularly bothered by it. I also had a report from a farmer out on Martha's Vineyard who had no success using it on geese. And we think that may have been because it was a resident flock. And there are no goose predators on the vineyard. So those geese basically weren't scared of anything.

Perkins: I would agree with that. The resident geese are very hard to get to move.

Bornt: Okay. I know. So there was another question. Has there had been any other crops that these lasers have been used in? And Rebecca, you and I know that there's some stuff going on. I think it's in South Dakota with sunflowers. I know Jeremy showed a couple of pictures. I know these things are being deployed in grapes as well. My technician, Natasha, who's actually on the webinar, also built her own unit to use in a blueberry planting. So they're, yes there are other crops that these units are being used in. Any other experiences?

Brown: I had a grower use them in strawberries is the other crop.

Bornt: Jeremy?

Perkins: I have growers using them in cabbage. I mean, anything that they can protect. Out in California birds are eating everything. They're putting them up for anything and everything out there.

Bornt: Jeremy, question for you is anyone using lasers where they're having issues with birds, with seeding, you know birds pulling seeds out of the ground. Anybody doing any of that?

Perkins: Some. Seedlings are an issue. Early, I mean, even in sweet corn and I can't remember what state it was. I had a unit go out for seedlings. So it's an issue because the birds will come out and pull them all out. I know. And what's the other? *(Pause…mumbling)* I sold a unit. I can't remember the crop though. Hemp is an issue with seedlings. So…

Bornt: And any efficacy on like crows that you know? Or is crows one of those that doesn't seem to be bothered by the lasers. Anybody?

Perkins: We've had success on crows. I think the only birds right now that we haven't seen success on is like pelicans, a lot of the big water birds. The Southern birds, we've had success on swans. Just sold one to a cranberry farmer down in New Jersey and their issue is swans. So pelicans, any, any predator bird doesn't have an effect on. So they, they're birds out there that are harder to get rid of, but eventually they will leave. So I think it's the power of the laser that determines what's going to scare them and you know, what's not.

Bornt: All right. Any other questions for our panel? Any other final thoughts from our panel before we close out here this afternoon? *(pause)*

All right. With that, Gemma, do you want to go ahead and launch the exiting poll? There it is. So if you are looking for DEC credits, please make sure you go to the link that was just posted in the chat box and make sure you sign out.

I want to thank everyone for joining us today. I especially want to thank our speakers for joining us and sharing their experiences with the lasers. Hopefully, 2021 will be able to get a few more of these units out in the field and get a little more data on them. That's, that's our goal and our hope. And again, thank you for joining us. And I hope everyone has a great 2021.

(end of video)