Season 2 Episode 10 – Plant Diagnostics Lab

August 9, 2023

Speaker 1

Welcome to the Farming Basics podcast with Olivia Fuller. We'll have sustainable farming tips from growers across the state and extension specialists at Auburn University.

Olivia Fuller

Welcome back. It's your host, Olivia Fuller, and your co-host, Jacob Kelly. We're here today with Dr. Cassie Connor. She is an extension specialist in plant pathology, and she also runs our plant diagnostics lab here on campus. Thank you so much for joining us, Kassie.

Kassie Conner

Thanks for having me.

Olivia Fuller

Tell us a little bit about the diagnostics lab you run. Are there others like it? Is this unique to Auburn?

Kassie Conner

At our lab in Alabama in particular, we have two different diagnostic labs. We have one on campus, the Auburn lab, and then we have another satellite lab in Birmingham. At the Botanical Gardens. So there's usually a Land-Grant affiliated diagnostic lab in each state. I think there's one or two states that don't have one. They have their own State Department of AG Plant Pathology lab. So at our lab, what we do is we do we accept samples for disease diagnosis, for insect identification, and for plant ID and for nematode analysis.

Olivia Fuller

So when you say disease samples, this is like people sending in plant tissue. And what types of things are you seeing the most of in your lab?

Kassie Conner

Yeah. So we usually ask for whole plants if we can get them, unless we know the disease is limited to a specific part of the plant. But yeah, we get usually a whole plant and then we identify what's causing the problem in the plant and tell the homeowner submitter how to fix it or how to prevent it.

Olivia Fuller

And you said homeowners typically is that who sending the majority of the samples?

Kassie Conner

Not really. Actually, so we do samples for commercial growers. We do them for greenhouses, grow crops producers. We do them for the State Department of AG and do them for homeowners. We do them for agricultural consultants. We even do some samples for federal government.

Olivia Fuller

And so it's basically just diseases, though, that you're looking for. And if somebody has a disease, they're going to be sending it or should be sending it to your lab.

Kassie Conner

Yes. You want to I.D. the disease that’s causing the problem so that you can figure out how to fix it or prevent it.

Jacob Kelly

Tell us a little bit about the diagnostic process. How does the lab function and what happens as soon as you get a sample in to your lab? What happens from.

Kassie Conner

There? We log all of our samples in so that we can keep track of them. And then generally I look at every plant sample and decide what I think needs to happen to it. We can send samples off if we think it's just a nutritional problem. We can send those off to the soil testing lab and get a confirmation on that. And then I look for specific pathogens to test for. And I will have one of my technicians actually run the tests and give the results back to me.

Olivia Fuller

Is that how it flows in Birmingham? As well?

Kassie Conner

Yes.

Olivia Fuller

Why is why are there two separate? Why do you have a satellite option?

Kassie Conner

So the lab in Birmingham is set up just to do the Birmingham and the Greater Birmingham area, the counties around Birmingham, just because they have such a high population.

Olivia Fuller

But there's running the same test that you're running in your lab, essentially.

Kassie Conner

Not all the same tests. We have a lot more capability in our lab, but they can do general diagnosis and insect identification.

Olivia Fuller

So if you were to send your sample and you're not in Jefferson County, you would send it to you here in Auburn.

Kassie Conner

You can, although Jim Jacoby is the diagnostician in Birmingham. And if he gets a sample that he can't process he can send it to me also.

Olivia Fuller

What is the busiest time of the year in the lab this summer?

Kassie Conner

Yeah, it's hot outside. Yeah. But we're generally we have samples coming in year-round.

Olivia Fuller

The busiest time, then the season being summer. Has there been a busier year? Is it usually the wet and rainy season?

Kassie Conner

Yeah. Usually wet and rainy years. We get a lot more diseases. But since I started in 2012, we've been receiving more samples every year. We used to only get about 1500 and now we're up above 10,000 a year. Yeah.

Jacob Kelly

Wow. Wow. And so you look at every single one of those samples?

Kassie Conner

Yes.

Jacob Kelly

And make a decision.

Kassie Conner

And I write on every single one of those forms.

Olivia Fuller

Is that just because the word's getting out now that you all exist and that's like proper steps to go through before you start spraying fungicides?

Kassie Conner

So a lot of it is research based samples. We have a lot more capabilities than other labs do. So we can offer more services.

Olivia Fuller

Can you give us an example of what one of those might be.

Kassie Conner

So we can do molecular tests to ID plant pathogens, which a lot of diagnostic labs don't have capability to do, which helps out when you're doing surveys looking for a specific pathogen.

Jacob Kelly

I get this question a lot and I had to learn how to do it myself, but how do we properly collect a sample and then send it in? Because this can be messed up pretty easily. And if you get a bad sample, you can't do anything with it, right?

Kassie Conner

Especially by you. Yeah. Yeah, I know. So it depends on what type, what symptoms you're having and what part of the plan it is. So if you obviously have leaf spots, you can just collect about 20 leaves and put them in a bag and send them in. But if it's something like branch dieback, we have to have the whole branch. If it's a wilting of a plant, we have to have the whole plant because a lot of the times you see symptoms on the top part of the plant, and it's actually the roots that are having a problem. So a couple of things about sending samples in is to never put a wet paper towel or dry a paper towel in with your sample because that just creates right when it's in transit.

Jacob Kelly

Totally done that.

Kassie Conner

Yeah. And then you just put it into a sturdy container so that it doesn't get beat up in the mail. If you do have soil with your sample, you need to keep that contained somehow because if your box gets tumbled, you don't want the soil getting spread all over the plant.

Olivia Fuller

What about the freshness? How many days after taking the sample? Does it need to get to you?

Kassie Conner

I would prefer everybody to overnight everything to me. But that doesn't usually happen. Some things can dry down a little bit and you can still see them. But if it's in a state of decay where it's going to start rotting Once the whole plant rots, you're not going to be able to find the pathogens. So as quickly as possible.

Olivia Fuller [sponsor segment]

Olivia Fuller

What about like tissue analysis about if you were getting the nutrients? Are you specifically looking at diseases?

Kassie Conner

We specifically look at the diseases but if we suspect that there is a nutritional problem, we will send the sample over to the soil testing lab and have them do a nutrient analysis. But there's also different guidelines for collecting nutrient analysis samples. So they prefer that soil never touched the leaf tissue because that can contaminate the samples and it depends on what crop it is.

Kassie Conner

Sometimes you have to collect your samples from a different area on the plant, like the newest growth versus the oldest.

Olivia Fuller

And they can take dried samples too, right?

Kassie Conner

Well, they have to dry down all their samples anyway.

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Olivia Fuller

So.

Kassie Conner

Okay, so it doesn't matter if it gets dry for them.

Jacob Kelly

So a plant, I think it has a disease. I put it in a ziploc bag, close it up and send it your way. Do I need to close it or leave it open? Does it need air?

Kassie Conner

You need to close it so it doesn't get out in the mouth.

Jacob Kelly

Okay. All right. So you don't want it to explode inside of the box…

Kassie Conner

Nope.

Jacob Kelly

… and go everywhere.

Kassie Conner

Nope.

Jacob Kelly

… because you don't want to have plant confetti everywhere when you open the box.

Kassie Conner

Exactly.

Jacob Kelly

Okay.

Kassie Conner

But you can also take your samples to your regional extension agent and they can take a look at them first.

Jacob Kelly

That's right.

Kassie Conner

And then they can send them on to us if they don't know what's wrong with it.

Jacob Kelly

All of us took a couple of disease classes, and so we might be able, you know, and we all see a bunch of diseases all the time. So, you know, when you start seeing these things every year or every other year, you kind of pick up on a few things and we can nail some stuff down and save you a little bit of time for the big stuff.

Kassie Conner

All right.

Olivia Fuller

So speaking on the diseases, can you explain the disease triangle to us?

Kassie Conner

Sure. So you have the different points of the disease triangle are a conducive environment for disease, a susceptible plant and a viable pathogen. And so if you put like a little circle around each of those, only the very center of that is going to all touch and that's kind of like the area where you get disease if you have all the right elements. So the reason we think about the disease triangle is to think about how to control diseases So if you can alter one of those points on the triangle, you can stop the cycle of the disease either by having a resistant plant or eliminating the pathogen or manipulating the environment so that it's not favorable for the pathogen.

Jacob Kelly

Right. Some of these pathogen genes are here. They're ubiquitous. They're here all the time, everywhere. Yep. And so we have to do things to mitigate their survival. And using that disease triangle example, we can maybe remove the host or change the host to resistant variety.

Olivia Fuller

Do you like to point to one of those in particular as opposed to the other?

Kassie Conner

I would say probably the environment is the easiest to manipulate. I'll give you an example. So we have Isaac, Toni, Insulin. I was a soul born fungus so ubiquitous in all soils. It usually only causes a problem when the environment is favorable for the pathogen and not the plant. So if you're planting your crops out early and the soil still cold and wet, it's going to inhibit growth of the plant. But the fungus is really going to like that. So planting later to avoid that environmental condition will help keep the plants.

Olivia Fuller

Healthier and then just other small things, too. I mean, that's very helpful. I'm thinking of things like not walking in the field when it's been raining. Yeah, all the small little things that really make a big difference.

Kassie Conner

Yeah. Especially if, you know, you have a disease and it's been raining. Usually fungi are about 80% of the diseases, and fungi produce spores that typically sit on the outside of the plant. So as you walk through the crop, you'll pick them up on your clothing and you'll spread them throughout the entire planting.

Jacob Kelly

Yeah. People like to blame extension agents for spreading diseases around.

Kassie Conner

People like to blame diagnostic [?] for introducing diseases.

Jacob Kelly

It's your fault you found it. That's funny. So there's a lot of tactics growers can use, and it's a little things like not going through the field when it's been pouring down rain and you know, you have a disease because it's likely going to stick to something your clothes or your tractor or whatever. I mean, you've already got to deal with wild animals going through there. Hopefully not. But probably so they're going to help spread it. So we want to try to do our part and minimizing that spread.

Kassie Conner

Critters as small as caterpillars or birds can spread pathogens around in a field.

Jacob Kelly

Those jerks…

Kassie Conner

Yeah.

Olivia Fuller

What's the most fun disease you've found lately?

Kassie Conner

Probably the neo personality. Opposites in the strawberries.

Olivia Fuller

You really nailed down the pronunciation, too.

Kassie Conner

Just rolls off the tongue.

Olivia Fuller

It does. Have they found any treatments for that yet?

Kassie Conner

Not yet.

Jacob Kelly

Don’t get them.

Kassie Conner

Yeah, don't get it. What are you buying from? I have seen some research where they are working with the actual industry itself. The people that are producing the plugs and up in Canada, and they're trying to get them to adopt these chambers that have steam sterilization in them to sterilize their plants before they send them out. Because once they start producing them, they only test them for systemic pathogens. Once or twice in the lifecycle of the plant. And then they plant them out into the field and still call them disease certified free. Right. So they're trying to push the whole industry to change the way that they are producing the plants.

Olivia Fuller

So you also offer nematode testing?

Kassie Conner

Yes, we do. We have a new metallurgy lab. They will usually process around 2000 to 2500 samples a year. Again, for the same people that we process, plant samples for diagnosis for and there's not really a whole lot you can do about nematodes, but we can give preventative control recommendations for growers to use in the field.

Olivia Fuller

I mean, they're there and I guess it is just learning how to live with them.

Kassie Conner

Nematodes are the most abundant life form on earth. They are all associated with specific things. They're not just there for the good of being there. So you would be able to identify where plants were. If everything was taken off of the surface of the earth.

Jacob Kelly

You get 2000 nematode samples, right? So what percentage of those actually have nematodes?

Kassie Conner

Usually almost all samples have nematodes of some sort. Okay. And usually I'll have plant parasitic nematodes. We don't identify the ones that are not plant parasitic because there's just too many nematodes out there. But sometimes we'll get some from nurseries that don't have anything in them. That's the only time they don't have anything in them. We only run those samples for phytosanitary certificate purposes. So if there's a quarantine, you know, somewhere out west for cyst nematode, we have to certify that it doesn't have cyst nematode in it.

Jacob Kelly

Right. Okay. Okay. That makes sense.

Olivia Fuller

We learned a lot. Thanks for coming on, Kassie.

Kassie Conner
You're welcome.

Speaker 1

This has been a production of Alabama Extension at Auburn University.