Davis Farms Virtual Field Trip
Bono, Arkansas – September 30, 2014

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Audio Transcript (36:42)

[Music]

[Blake Bennett]: Good morning. My name is Blake Bennett. And I want to welcome you to the University of Arkansas Division of Agriculture virtual field tour today.

This virtual field tour will allow you to step right into the field with us to explore a range of issues impacting soybean production in Arkansas. This educational program is being funded by the Arkansas Soybean Promotion Board through checkoff components provided by Arkansas soybean farmers.

While you're watching the program today, you may want to jot down any questions or ideas you might have. And at the end of the field presentation, you can ask your questions directly to the University of Arkansas Cooperative Extension Scientists.

So let's get out into the field. You won't even have to get your hands dirty.

[Karen Ballard]: Thanks, Blake. We appreciate that intro. I'm Karen Ballard with the University of Arkansas Division of Agriculture. Welcome to field and the farm. Joining me in the field is Shannon Davis of Davis farms from Bono, Arkansas.

We're so glad that you're joining us from all four corners of the state. This is memorable. We're stepping out here. This is reality TV Arkansas style. So expect a few bloopers. We don't have a teleprompter telling us what to say. It's the real deal, and we're so excited that you're a part of that.

I would like to jump in and let you meet the farmer. So Shannon, thank you for welcoming us to your field. And so is this just another lazy day at the field or what's going on here?

[Shannon Davis]: No. We're pretty busy this morning. We're in the process of harvesting some rice behind us there; we started yesterday evening. We got up this morning hauling some loads off to Riceland; to get the loads emptied up to bring back and start cutting the rest of the field today. We're waiting on the beans to get ready to harvest in a couple of weeks. So hopefully they'll be ready by the time we get through with our rice crop.

This particular field is my great grandfather's farm. I'm a fifth generation farmer in

this area. And this is one of the farms that he and his family have improved over the years. And I had the opportunity to take it on and rent it from my uncle whenever he retired. So I guess it's up to me now to take it forward and make it more profitable and more beneficial to agriculture.

[Karen Ballard]: Well, we just learned earlier in the program that there are 17 schools that are joining us. Over 400 students and a lot of them have never been on a soybean farm or in a field.

[Shannon Davis]: Okay.

[Karen Ballard]: So why should those 400 students care about soybean farming? Why are soybeans and soybean farming important to Arkansas?

[Shannon Davis]: Well, soybeans are just an integral part of the overall agricultural economy of the state, which is one of the major driving forces of our state. And soybeans play a big role in that through providing food sources for our livestock, poultry industries in the state, as well as the byproducts being used for things such as soy diesel or plastics and other paints, plastics and waxes and candles and different sorts of industrial items that soybeans are used for in the process.

[Karen Ballard]: So soybeans can be used for food, human food, fuel and feed?

[Shannon Davis]: Yes.

[Karen Ballard]: So it covers all the bases.

[Shannon Davis]: Yes.

[Karen Ballard]: How much money does that mean to Arkansas' economy every year?

[Shannon Davis]: I think some numbers I've seen are approximately $2 billion.

[Karen Ballard]: $2 billion. That's massive. I never would have thought it. So you know, I'm not really a farm girl. I know you couldn't tell. But reality TV would never be reality TV unless there's something a little personal that we find out about you.

[Shannon Davis]: Okay.

[Karen Ballard]: Are you ready? So tell us…

Shannon Davis]: This is that surprise question you didn't tell me about.

[Karen Ballard]: Surprise question. So tell us, Shannon, how did you get into farming? How did you decide you were going to do this as a career?

[Shannon Davis]: Well, like I said, I grew up on this farm as a little kid. I went to college and got an undergraduate degree in zoology. I thought I was going to be an eye doctor. Then I decided that wasn't really the path that I was suited for. So I looked into environmental science, trying to bridge in the gap between the environmental sciences and agriculture…working through chemical runoff and degradation studies in rice. And I just decided this is where my calling was. I just stayed with it, trying to make the most out of this opportunity I have.

[Karen Ballard]: Okay. Thank you. I think that's a really good point. Many of you sitting in your classrooms today may think that if you're really interested in science, that medicine is your only option as a career. Sure, medicine is a great career. But agriculture needs you. So keep that in mind.

We're joined in the field also today by a scientist who works in agriculture, Dr. Terry Kirkpatrick. Dr. Kirkpatrick works for the University of Arkansas Division of Agriculture as a nematologist. And his training is in plant pathology. But those are big words, so Dr. Kirkpatrick, exactly what is a nematologist?

[Terry Kirkpatrick]: Well, Karen, thanks a lot for the introduction. And I'm glad you asked. Ologists of any kind…if you have ology behind your name, your professional title, it tells you a couple of things about that person. The first one is they study one particular area and they study it very deeply. Bacteriologists, for example, study bacteria. Zoologists study animals. Nematologists study nematodes.

Now we'll talk a lot about nematodes here in a minute. But the other thing that in my experience most ologists have in common is frankly they will bore you to death and put you to sleep in a heartbeat. And I may not be any exception in this virtual classroom. But I would like to start with you guys giving me a promise.

As we go through this, if you feel that urge to nod off and kind of slump, do it in a safe manner. Because this is our maiden voyage. And I don't want to be the one responsible for an emergency room call for anybody that fell out of their chair and got hurt.

All right. Let's talk about nematodes a little bit. Nematodes are roundworms. They are the second most numerous groups of organisms on the planet. The only group of organisms that is more numerous than nematodes are insects.

So we're talking about this giant phylum that occupies pretty much all niches. Everywhere on the face of the planet you go, including in the soil in this soybean field, you can find nematodes.

For example, nematodes are the only multi-celled animals that are found living in the hot springs in Yellowstone National Park. They are the only ones that can stand that kind of heat and survive. Nematodes are found in pineapple fields in Hawaii. They are found in oceans. Tropical rainforests are especially a place where they are found because the weather is warm. There are no winters. These guys are found in abundance.

Like I say, they occupy virtually every niche on the face of the planet, including the intestinal tracts of whales and dogs and sometimes even infecting humans, which we'll talk about in a few minutes.

Now, the world of nematodes is real broad. A particular group of nematodes within that phylum are parasitic. And I'm guessing you guys have in your biology…your basic biology…you know what a parasite is. Simply it's an organism that gets its food and lives on another organism called a host.

Nematodes are pretty much…the parasitic ones, are pretty much ubiquitous. That's a 50-cent word for everywhere. There are parasites, for example, there are insect parasites like ticks. Chiggers. Some of these things that you guys know about, you probably are real familiar with. Mistletoe in oak trees are a good parasitic plant. Leeches are parasites.

You get the picture. These guys are kind of nasty little organisms. And as we get into soybeans, we're going to find that's no exception. You may be really kind of familiar with the parasitic nematodes already and you don't know it.

If any of you have any pets, dogs as pets, and you live in Arkansas, the chances are if you value your dog's life that you regularly treat for heart worms. Heart worms are actually parasitic nematodes that are transmitted by mosquitoes from dog to dog. Left untreated they will kill the dog. They just multiply in the heart and plug the heart up. And there goes your pet. So if you value Fido, treat for heart worms.

We're lucky in the United States that we don't have many human parasitic nematodes to deal with. We have good sanitation. We have, you know, good water treatment facilities. So we really don't have to deal with the medical issues ourselves.

That's not the case, though, in a lot of the rest of the world. Many of our developing countries where water treatment and sanitation are not very good; certainly

in the tropical areas where there's no winter to knock the nematode populations down, these guys have to deal with medicinal issues. And there are a lot of medical parasitic nematodes.

Kind of the poster child just as an example is the Guinea worm. And the Guinea worm is a nematode that starts as an egg in stagnant ponds where they are not treated. A human, a person drinks the water. The egg hatches. The little microscopic nematode migrates through the body, winds up in the subcutaneous layers under the arms and legs and then grows to about the size of a piece of spaghetti. So you can imagine how nasty that might be having a piece of spaghetti crawling around under your skin.

Well, urban legend says the medical symbol that you guys are probably familiar with… if you go to the hospital it's over the door and in front of the sign…what is it? It's a snake around a stick. Urban legend says that's really a Guinea worm. Because in the old days the treatment was actually to find one of those worms under the skin, make an incision with a knife, reach in and pull the tail out and then wrap it out over time, just crank it out on a match stick.

There you go. Maybe that is a Guinea worm. If you guys get a chance, Google Guinea worm. It's a pretty cool lifecycle, unless you happen to be the guy that's infected.

All right. Now what about plant parasitic nematodes? That's going to be the topic of the rest of this discussion this morning. Soybeans, cotton, corn, it doesn't matter, any plant crop has a set of nematodes that can be an issue. All of the plant parasitic nematodes are microscopic and essentially, all that we're going to deal with in agriculture live in the soil.

Not all. There are a few foliar nematodes but most are subterranean. In fact I just dug up a little soil. This handful of soil right here contains thousands of nematodes. And that's the case anywhere on the face of the earth that you want to go. You dig up soil, you've got nematodes.

Now, I've talked about the bad and the ugly nematodes. And I would be remiss before we get into soybean nematodes if I didn't tell you that out of that huge phylum that we know about, only about 10-15% are really detrimental. Most -- the vast majority of nematodes are beneficial nematodes. Even those that live in the soil, most of them are beneficial. They are involved in breaking organic matter down into its elemental forms so plants can take it back up. A lot of them eat bacteria and fungi in the soil. There are some that actually are predacious and they eat other nematodes.

An area of research that's been really hot for about the last 30 years in nematology has been entomopathogenic nematodes. That's another 50-cent word for you. Entomo meaning insects. Pathogenic meaning pathogenic.

So these guys actually infect insects and there are numerous commercial products now that are available that are actually living nematodes that can be applied to soil or plants or even chicken houses for fly control. And the nematodes parasitize the insect pests providing an extremely environmentally appropriate pesticide.

Now, plant parasitic nematodes . . . All the plant parasites have one thing in common. They all feed with a stylet. Now you know from earlier they are roundworms. So that's the other thing they have in common. That's why they are in the phylum nematoda.

But they feed with a stylet. A stylet is a hollow spear. Now you all are probably familiar with stylet feeding organisms. If you've been fishing lately and the mosquitos were bad, then you know about stylets. This is the same principle. A nematode actually uses it's stylet to penetrate a root cell and then pumps in salivary secretions into that cell. In other words, they spit into the cell.

And the nematode spit contains a lot of enzymes that mush up the cellular contents of the cell. And when these guys have basically…when the cellulolytic enzymes and all of these enzymes have mushed up the cell contents into a really nice cytoplasmic smoothie, then the nematode sucks the smoothie back up and that's how it feeds. It goes into the digestive system and is used like any other food in any other organism.

Now, before we go any you further, I thought it would be really nice…all of these guys are microscopic. But because we're kind of doing techno stuff today, I wanted you to see some nematodes. So here is a video of some plant parasitic nematodes under a microscope. This magnification is about 100 X. You see these guys moving around. You see the stylet. Can you pick out the stylet in the anterior or the front end of that nematode? That's how they feed.

Now, one of the things that I want to bring out now because we're going to talk a lot about it is the specifics of soybean nematodes. And there are several types that can be very damaging to soybean crops in Arkansas. But I want to focus on the most damaging and the most widespread. And this is an organism called the root-knot nematode.

Root-knot nematodes belong to the genus *Meloidogyne.* They are also pretty much ubiquitous. There's a root-knot nematode -- there's a *Meloidogyne* species for just about every one of about 3,000 plant hosts.

So they are around. They cause galls to form. When they spit into the cell and mush up the cell contents, as they are feeding, it doesn't kill the cell. It basically makes the nuclei rapidly divide and the cell to overgrow and to cause galls or knots to form on the roots.

Now, how bad can a few little microscopic nematodes be? That's a good question. Shannon is lucky because this field here is not a nematode problem field. While there are a lot of nematodes in the soil, most of them are beneficial nematodes.

But right down the road his neighbor does have a nematode problem field. We flew over it the other day and took a picture. I think you can see pretty well without anybody pointing anything out the degree of damage in this field. This is not a field that you probably want to pay the mortgage on.

We went down there and actually filmed this a couple of weeks ago when there were still leaves on the soybeans and looked at them a little bit closer. So let's go there; walk with me in this video.

[Video]: A really poor plant such as these … you can see I'm kind of in an area of the field that is shorter than normal and kind of chlorotic or yellow. The soybeans should look like this. And so you see what the nematodes do. They don't kill the plant. They prolong the agony season long. But they basically get in the farmer's pocket.

One of the reasons that we call this nematode the root-knot nematode is because it makes galls on the roots when it infects the plant. You can see this. Nutrients and water are not going to go in or up through the plant efficiently as they would in an uninfected root system.

Root-knot nematodes are real common in this state. And left untreated or uncontrolled or unmanaged, they can be pretty darn expensive.

As a final gesture in that field we were just in, I actually just randomly pulled up a plant that did not have root-knot and one adjacent to it that did. And I picked the pods off, the bean pods. And I think this pretty much tells the story right there. You can see what can happen if these nematodes are bad in a field.

Now, how do we know that Shannon does not have nematodes other than the way the crop grows of course? And how do we know if a field does have nematodes since these are microscopic guys and they are in the soil?

Well, very simply you got to get them. You got to catch them and then you got to look at them under a microscope, which means you've got to sample the field, the soil in the field. And then you've got to extract those through a nematode laboratory that specializes in nematology.

Most farmers use a piece of equipment like this. Just a simple thing called a sampling tube or a T handle sampling tube. This little device right here can…it costs probably 60 bucks…and it can save a farmer a whole lot of money.

To sample this field out here for example, we would walk through the field. We just randomly would take samples. You see we get cores, probably 20 cores out of the field. Mix those together. Send them to a nematology laboratory. The laboratory

would extract the nematodes through a pretty evolved process. Get them out in to water. Identify the nematodes. And then report back to the farmer whether they have it and really what to do about it.

Now, the Division of Agriculture in this state maintains an Arkansas nematode diagnostic laboratory. It's the place any citizen of the state can send soil to get nematode assays. It's located in Hope, Arkansas. It's my laboratory.

It's available to anybody. It doesn't matter whether you grow soybeans or whether you grow a garden in the backyard. If you want to know if you've got a nematode problem in your garden, send in a nematode sample. It's that simple.

Okay. That pretty much wraps up the discourse on nematodes. I'm hoping that you guys have been texting in questions about nematodes or soybeans or whatever you wanted to ask. I've asked a group of experts here to come together to help me answer the questions. And I'm going to let these two gentlemen right here introduce themselves. You already know Shannon.

[Ray Benson]: I'm Ray Benson. I'm a county extension agent in Mississippi County.

[Randy Chlapecka]: I'm Randy Chlapecka, a county extension agent at Jackson County, headquartered at Newport.

[Terry Kirkpatrick]: Okay. Bring on the questions.

[Haley Jernigan]: All right, Dr. Kirkpatrick, and thank you to everyone else joining him in the field to answer these great questions. We've got several for you. The first one is from Caddo Hills High School. They asked what is the percentage of Arkansas soybean crops that are damaged each year by nematodes.

[Terry Kirkpatrick]: I'll probably do that one since I'm the nematologist. Rough estimates say that about somewhere between 10 and 15% of the 3.6 million acres of soybeans we have in the state have got a severe nematode problem. So I don't have my calculator but you guys can figure how many acres that would be. Now, the yield reduction can be anywhere from 10 to 30 bushels on each acre. And soybeans are what, Shannon, $12…?

[Shannon Davis]: They were earlier in the spring. They are more around 9 right now.

[Terry Kirkpatrick]: Okay. So $10 an acre. So you figure it out. They are pretty expensive.

[Haley Jernigan}: Now in Hellstern…Hellstern Heroes Middle School asked as well as someone else, how do you get rid of those harmful nematodes? How do you get them out of your fields?

[Terry Kirkpatrick]: One of you guys want to take that one?

[Ray Benson]: Yeah, it's common to rotate to a crop that's not susceptible to nematodes. That would reduce the population. In some cases there are some chemical treatments that can be applied. But generally the most effective way is to rotate to a crop that nematodes can't survive on.

[Haley Jernigan]: Now I know Alma Airedales want to know, can the good nematodes eat the bad nematodes?

[Terry Kirkpatrick]: Yeah, they can. I mean, it's a predator-prey type of a thing. Just like any place else in nature. The only difference is they are restricted by the soil. So it's a lot harder.

Most of the nematodes, the good nematodes that eat the bad nematodes, have to more or less wait for the bad nematodes to come within… not sight obviously… because you can't see through soil. But they can smell them. And so they smell them and then they go to them and attack them.

[Haley Jernigan]: Whoa. Definitely some Hunger Games stuff going on with that. Okay. Well, what other plants can nematodes harm besides soybeans?

[Randy Chlapecka]: Well, there are numerous. As Terry mentioned in the beginning of his talk, really any crop that we have that we grow is potentially infested with nematodes. You know, soybeans and cotton are probably the No. 1 and 2 that we deal with in row crop industry. But really any row crop can get infested. Vegetables are very prone to be infested with nematodes. So really pretty much any crop we grow is potentially infested.

[Haley Jernigan]: Now those Alpena Leopards want to know what yield reduction occurs in a nematode infested field like the one you showed us?

[Shannon Davis]: Like you said, if you're looking at say a 20-30% yield reduction, if you're at 50 bushels an acre, you're going to lose 10 to 20 bushels an acre off of that. And you know, like I said, at $10 an acre that's $100 an acre. That's $100 an acre off of 1,000 acres. That's a lot. And we have 3.6 million acres in the state.

[Haley Jernigan]: Taylor High School wants to know what type of plants, if any, are not susceptible to nematodes.

[Terry Kirkpatrick]: I don't think there probably is a plant species that's not susceptible to some nematode. As far as I know, every plant species has a complement of nematode parasites. But there are some that we use in -- as mentioned a minute ago -- in rotation with soybeans that are not susceptible to the ones that go to soybeans. Grain sorghum is an excellent rotation. Because root-knot nematodes just don't do well on grain sorghum. Rice is another; because the root-knot nematodes don't do well in flooded soil. Drives the oxygen out. Kills the nematodes. So there are some that are not a host of specific nematodes. But every plant species has a nematode or two that they need -- you know, that can parasitize them.

[Ray Benson]: Can I say something about that?

[Terry Kirkpatrick]: Yes, please.

[Ray Benson]: In all of the universities' breeding programs, they have scientists that deal with development of new varieties. And a lot of their selection process is to look at plants that are a little bit more resistant or a little bit tolerant of nematodes. So they are continually trying to develop new varieties that would be less susceptible to a nematode problem.

[Terry Kirkpatrick]: Absolutely.

[Haley Jernigan]: And Pochahontas asks what is the estimated cost to rid a field? Now we talked about whether or not you can. But how much does it cost?

[Terry Kirkpatrick]: Who wants to do that? Anybody? I guess I'll do that.

[Shannon Davis]: You're the expert.

[Terry Kirkpatrick]: All right. Okay. Rid is the wrong term to use because nematodes are not like insects. They don't have legs or wings. They are not mobile. So they have evolved mechanisms to survive that are more dealing with the ability to survive all kinds of adversity and to reproduce at high levels. So once you've gotten nematodes in a field, you're always going to have nematodes in that field. And all of our management strategies now are not to try to rid them from the field.

It doesn't really matter whether you get rid of them or not. What matters is that you keep that population density in that field below an economic level, which means low enough that it doesn't cost you any yield when you harvest the crop. And so all of our strategies go to that rather than getting rid of it. And as simple as just rotating to another crop or going to a resistant variety, it may cost very little. It's just a matter of changing what you do.

[Haley Jernigan]: And what percentage of crops are destroyed by nematodes?

[Terry Kirkpatrick]: It's hard to estimate. Nematodes don't always destroy the crop. They just debilitate it. And a lot is going undocumented right now. So that's really a hard question. You get the prize for that one. I don't know the answer to it.

Ray Benson]: I would say almost every field is at least affected some way. Maybe not enough that it would cost yield. But every field, almost 100% have some issues… some problem maybe even just in a little bitty spot.

[Haley Jernigan]: Why are nematodes there if they are not beneficial?

[Terry Kirkpatrick]: It kind of is what it is. I mean, they are there because they can't go anywhere else. So they are surviving there. And the soil is…Okay, here is a definition. Dirt is under your fingernails. Soil is the biological medium that plants grow in and all of the microorganisms that are there exist there.

And it exists not in a vacuum. It exists as an interrelationship of organisms. Good ones, bad ones, and in between.

One of the reasons the bad ones predominate in the soybean field is because there's no diversity there. We plow it up and we plant only soybeans, and so it favors those that are parasitic on soybeans so they kind of rise to the top.

So it's just kind of standard ecology that's going on here in this soil.

[Haley Jernigan]: Alma asked…we're going to combine a couple of questions here. So with the Davis farm being close in proximity to the infected farm, are his soybeans at risk from that infected farm? And to combine that, can agricultural practices spread the infection?

[Randy Chlapecka]: As Dr. Kirkpatrick said earlier, nematodes don't move a lot so they kind of stay where they are at, but farmers move equipment from field to field. So soil can get on a tractor tire or any piece of equipment and may move from field to field

that way. So that would probably be the predominant way they would easily move from one field to another because again they don't move very readily on their own.

[Terry Kirkpatrick]: Yeah, Shannon, what precautions do you take not only against that field but just sanitation on your farm; just kind of trying to keep unwanted things out anyway?

[Shannon Davis]: Well a lot of times, like with rice, we may have a field that has some red rice; which is a type of our natural occurring rice that has a red grain as opposed to the white grain that we plant. You get a deduction on your loads that you haul in that has this red grain. A lot of times we will combine our efforts to harvest those fields before we go into another field that may not have that plant present to keep that problem from being translocated to a clean field. And it's similar to what you're talking about with nematodes.

[Terry Kirkpatrick]: With nematodes…don't move them through soil.

[Shannon Davis]: If you've got a piece of equipment that's working in a field that does have a problem, you wouldn't want to go to a clean field. That would in turn inoculate that field with the nematodes that you're trying to work against.

[Terry Kirkpatrick]: Absolutely. Sanitation is the key.

[Shannon Davis]: Right.

[Haley Jernigan]: How does weather affect nematodes and about what is the life span of nematodes?

[Terry Kirkpatrick]: Okay. I can do that. Weather impacts nematodes because all of them have an optimum temperature range. So if it's really cold, it shuts them down. If it freezes them in the soil, it kills them because it denatures the cells.

The life span of a nematode is more or less about 30 days. So every 30 days during the course of the growing season when the temperatures are up, you got a new cycle coming on. And each one of them produces 1,000 offspring. So you can figure that one, too; the log scale kind of goes sky high pretty quick.

[Haley Jernigan]: Alpena asks another question. How many seasons of rice or grain sorghum are necessary to kill a nematode infestation?

[Ray Benson]: Well, usually one year rotation will lower -- if you rotate to a crop that's not susceptible to nematodes -- that one year will lower the numbers enough that you can probably rotate back to a crop and not have many problems. I would think that two years pretty well zeros out the number.

[Terry Kirkpatrick]: Yeah. It doesn't get rid of them but it gets them low enough that it will take them a long time to come back.

[Haley Jernigan]: Can infected farms use their soybeans for industrial purposes so it's not a total loss?

[Randy Chlapecka]: Yeah. There's really no problem as far as the soybean itself, if it makes a soybean. A lot of times that crop is going to be damaged and you may not produce a good soybean crop. Or you might have small seeds, things like that. But I mean, any viable seed that is produced can be used for normal soybean purposes.

[Shannon Davis]: Yeah, it's not something that's going to be transmitted through the seed. It stays with the soil.

[Haley Jernigan]: And last question, what are some job opportunities in agricultural science related to nematodes that these students might want to get involved in the future?

[Terry Kirkpatrick]: Well, the gamut is pretty broad. Certainly on the one end is farming in general and agricultural agribusiness deals with nematodes every day in producing a crop So you know, the professional agriculturalist is one. There's a whole industry on helping growers do a better job and a more profitable job. There are companies that develop resistant varieties for farmers to use, as Ray said a minute ago, that are less susceptible, hence, more profitable.

There's a lot of research now going on in actually using nematodes as sentinel species as indicators of things like polluted environments and places like that.

There are entomopathogenic nematodes that are being developed and released.

Certainly the science of nematology. You can be an ologist like me if anybody is still awake and wants to pursue it. So you know, it's a broad area.

[Haley Jernigan]: And is there anything in particular they would want to look into studying in college or in school to be able to do that?

[Terry Kirkpatrick]: Biology. You know, take the hard courses. Don't get out of Chemistry I and Chemistry II and organic and all of those. Take them. If you're

interested in science, science works on these principles. So get a good fundamental science undergraduate education.

[Haley Jernigan]: Excellent. Well, thank you so much, Dr. Kirkpatrick and all of your soybean crew. I'm going to turn it back over to Karen in the field.

[Karen Ballard]: I just want to say that we're so excited that you've joined us from around the state. You should have learned by now a lot about soybeans, a little bit about nematodes, how to take a soil sample, and that you may have a future in agricultural science and in Arkansas agriculture.

Like Shannon talked about earlier, his interest was in environmental science. So all of these sciences go together to make sure that Arkansas agriculture is a sustainable natural resource.

Blake is going to share with us how you can continue to be involved in this beyond our virtual field day. You can be involved by taking the online course, the Soybean Science Challenge course. We have a course for teachers and for students. And also to participate in the science fairs, the ISEF regional and state science fairs. The Arkansas Soybean Promotion Board sponsors cash prizes for the best project that supports Arkansas soybean production at all of the regional science fairs. And a $500 prize to the student at the state science fair. That's real money, folks.

So in any of those disciplines like Terry was talking about, any of the disciplines can support agriculture, whether it's food science, agronomy, chemistry, engineering. There are all kinds of engineering applications that are necessary and important to support Arkansas agriculture.

So check out the Soybean Science Challenge. There's lots of ways for you to be involved. And I'm going to pitch it back to Blake who is going to tell you about those opportunities.

[Music]

[Blake Bennett Video]: Hi, I'm Blake Bennett. I'm a fourth generation farmer from Pocahontas, Arkansas. I would like to personally invite you to learn more about the improvements to soybean production in the Arkansas economy and the potential opportunities in science-based careers available to Arkansas students. The Soybean Science Challenge is a program for 9th through 12th grade students and teachers that includes online education and cash awards for student research at Arkansas ISEF affiliated regional and state science groups. We refer to soybeans as the miracle

bean because there are many uses for human food, renewable fuel, and animal feed. But there's still a lot to learn.

And that's where you come in. Each year the Soybean Science Challenge provides cash awards to researchers. If you love science, then you'll want to check out the Soybean Science Challenge.

[Music].

Paid for by Arkansas soybean producers and their checkoff.

For more information, visit TheMiracleBean.com.

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