Episode 10—The Benefits of Broiler Litter

May 6, 2021

Announcer:

The Alabama Crops Report Podcast, your trusted information source for Alabama agriculture.

Scott Graham:

Hey everybody. Welcome into the Alabama Crops Report Podcast. I'm an Extension Entomologist, Scott Graham.

Katelyn Kesheimer:

I am Katelyn Kesheimer, also an Extension Entomologist and we're back with another episode where we meet with extension personnel from around the state and discuss the latest management recommendations for row crop production. Hey Scott, how's it going?

Scott Graham:

Pretty good. How about you?

Katelyn Kesheimer:

Good. I'm excited for our guest today. We have Dr. Rishi Prasad, who is an Assistant Professor and Extension Specialist who works in nutrient management from an environmental and agronomic perspective. So, what are we discussing today?

Rishi Prasad:

All right. We are discussing about broiler litter. We are the chicken state. Alabama is number two in broiler production, and it's important to talk about chicken poop, that's being used by the row crop farmers all over the state.

Scott Graham:

Get a lot more out of our chickens than just chicken wings, huh?

Rishi Prasad:

That's Right. We need to make sure that we get every squeeze out of it.

Scott Graham:

I've got a couple questions for you. First, kind of tell us what is broiler litter and what all nutrients are in it?

Rishi Prasad:

Right, before I talk about broiler litter. People always think about chicken, right? There are two kinds of it. One that's used for eggs, which is called layer, and there's another chicken that is used for meat purpose and that's called as broiler. There's a clear difference between a broiler litter versus a hen layer or a layer litter. In our state, in Alabama, we have more than 2,700 growers who raise a broiler litter. Sorry, broilers in the state. Broiler litter is basically a mixture of chicken feces of feed or spilled feed, the bedding material that is used to raise the chicken. In total, it's a mixture of all these three things.

Katelyn Kesheimer:

Interesting. I had no idea. We had that many broiler producers in Alabama.

Rishi Prasad:

Right.

Scott Graham:

Is there a reason... Is there something about... Do they feed them different? The reason that we use the broiler litter and not the layer litter or...

Rishi Prasad:

No, broiler is typically used for meat purposes. Of course, their feed is different from what is used for the egg purposes or the layers. Yeah. Their feed are different, and that's why the composition of the litter or the poop that comes out is very different.

Scott Graham:

That's interesting.

Rishi Prasad:

Right. Speaking about nutrients, right? Broiler litter is... It has nitrogen, phosphorus, potassium, and it also has micronutrients like zinc, boron, molybdenum, stuff like that, which are really required by the plants, even though they are in small amounts, but the plants need them. You don't want those nutrients to be limiting factor. Broiler litter has the right composition of all these different nutrients the plants need.

Katelyn Kesheimer:

With all those nutrients you just listed, are all litter created equal, or do some of them have different amounts of different nutrients?

Rishi Prasad:

You asked a really good question. From a growth perspective, I want to emphasize that not all litter are created the same. Okay. There are a lot of reasons for that. The first reason is who knows what kind of diet a chicken is being fed, right? It depends from one integrator to the other. Every integrator uses a different formula. If you're using different ingredients, the quality of litter that comes from these broiler houses will be different. The second important factor that determines the nutrient content is the age, or even the number of flocks that has been raised before that litter was clear from the broiler house. Some growers say, for example, clear the houses after one year, even six months. There are some growers who do not clean the houses at least for three years. So, imagine this huge inconsistency in clearing the house. Again, industry is moving towards where they're asking the growers to clean less frequently. Like a year or two years.

When a grower gets a litter that has been in the house for a couple of years, those litters are really good. They have high nutrient content and they're really good compared to the ones that are cleaned really frequently, six months or even four months. Again, sometimes a grower, like a chicken grower has to clean the house because of the disease. In that case, maybe after three or four flocks, there was a disease incident and the grower has to remove or clean the house.

If you apply that litter in the field, of course, it's not going to supply a lot of nutrients, but it may rob some nutrients from the soil itself because there are two processes. One is called as mineralization, and the other part is called as the immobilization. If you are putting a really fresh litter, which was clean after maybe three or four cycles, the chances are, it will be rich in bedding material, which are made up of oats or old chips or pine house or whatever it is. It can cause nutrients to immobilize rather than providing nutrients into the soils for the crops. So, you have to be careful.

Scott Graham:

Is it pretty readily available to the grower or the buyer of the litter, how old it is? Do I need to test it to see what the levels are?

Katelyn Kesheimer:

Like a nutritional content panel?

Scott Graham:

Does it have a label?

Rishi Prasad:

Right. Typically, it's always advised to test, do not guess, but test. Right? That's the common philosophy and that should be practiced by the growers. They should take samples and send to a lab and look at what the nitrogen phosphorus and potassium content are before they should apply it. It's really important.

Scott Graham:

They send it... Can they send it to Auburn, with the soil testing lab or is that a different lab?

Rishi Prasad:

Definitely, we can send to Auburn Soil Testing Lab, but also there are some other commercial labs that do test the broiler litter or the animal mineral on a regular basis. There are several options.

Katelyn Kesheimer:

Say we have a source of litter, we get it tested, it has the right nutrients. When do we put it out relative to the crop?

Rishi Prasad:

That's a really, really good question. I'm glad that you have asked that. Many growers do not realize that litter... When they apply it to their land, there is a certain window when they release the nutrients. I have seen several growers apply litter six months in advance. If somebody is doing that, probably that is not the right practice for several reasons. The research that I have done and what I have found, or what my team has found is 15 to 20 days before you plant that's the best time when most of the nutrients from the litter at a level for the plants to take. If you apply three months in advance, probably you will lose a lot of the nitrogen value and potassium value, but phosphorus, yes, that will be present. You're going to lose all the nitrogen, and most of the potassium, if there's a big rainfall event after you applied and before you have planted your crop.

Scott Graham:

You said 15 to 20 days...

Rishi Prasad:

...Before planting.

Scott Graham:

...Before planting.

Rishi Prasad:

That's the right window. [crosstalk 00:08:18] If you get maximum benefit from the broiler litter application.

Scott Graham:

Does that vary by crop at all?

Rishi Prasad:

No, it doesn't vary. The deciding factors are, basically, your weather conditions. Say for example, you applied the litter today and it rained for next three days, right? So, in that case, you'll lose some of the nutrients that are in there through leeching or volatilization or denitrification, whatever the route is. The other part that also changes the way litter releases nutrients is the soil types. Say, for example, you apply litter in Tennessee valley, those take heavy clay soils. In those places, the nutrient release is faster and it stays in the soil for the plants to take. If you're applying litter in, for example, coastal plain soils or coarse textured soils, the nutrient release is not really high. They are very subjected or prone to loss. It's through a leeching route when there's a rain fall event.

Katelyn Kesheimer:

How much litter is typically applied to a field prior to planting in that 15 to 20 day window? How much of those nutrients, you mentioned, can we get? How much nitrogen, phosphorus and potassium are we getting?

Rishi Prasad:

Right. Most growers in the state, they apply typically two tons of litter. From a general nutrient analysis standpoint, what we have seen is, typically, a broiler litter has a fertilizer grade of 332, meaning, every one ton of litter has 60 pounds of nitrogen, 60 pounds of phosphorus, and 40 pounds of potassium. That's the total. Not all of that is available to the crop immediately. I just mentioned that the rate of nutrient release depends upon the soil type. And, the research that I have done, what we have seen it is... For example, nitrogen... In Tennessee Valley, heavier soils... We see a nitrogen release of almost 36% compared to a coastal plain soil where we see only 20% of nitrogen that is present when the litter is released. You'll see quite a bit of difference between the soil types and weather conditions as well.

Potassium, we have seen that 80% of potassium is released quickly. It's very water soluble. If you apply litter, 80% of potassium that is presented in the litter quickly dissolves in water and is immediately available to the plant. Now, when it comes to phosphorus, almost 50% of phosphorus that is present in broiler litter, is water soluble. Meaning, when you apply litter, we can take 50% of the total phosphorus that is present in litter to be available for plant use. Again, these numbers change based on the soul type, based on the weather conditions. All these factors really play an important role of how much total nutrient will be released for crop uptake.

Scott Graham:

If I needed twice that much, could I just double my litter? You talked about percentage of nitrogen that's released, is that relative to the soil or relative to the amount of chicken litter that's been like laid?

Rishi Prasad:

Many people think that if I apply rather than five tons... If we apply too much, typical rate is two tons, right? If a grower say, "No, I'm going to double the amount five tons." What we have seen, it really slows down the release rate of nutrients. If you start doubling the amount of litter that you put in the field. Think about this, the release of nutrients from litter is a microbial process. The microbes have to chew on it and break it, and then that's how they release it. Now, if you put too much of litter.. Of course, that's too much food for the microbes, they're not going to chew all of them at one time. the release rate changes. If you put five tons, the release rate drops down significantly compared to a two ton chicken litter. Two ton chicken litter will release nutrients much faster than a five 10 rate.

Scott Graham:

They all thought if some is good, more is better, it doesn't necessarily...

Rishi Prasad:

Absolutely.

Scott Graham:

That doesn't fly for them.

Katelyn Kesheimer:

I was thinking about ice cream for that. So, thank you for that analogy too much ice cream, bad. That's what I was just thinking.

Scott Graham:

I haven't found that limit yet.

Katelyn Kesheimer:

So, we're talking about applying chicken poop to the land as fertilizer. Can you talk about some potential environmental issues with this?

Rishi Prasad:

Yes. Again, if somebody is really doing a good job of managing the litter and applying the litter in the correct rate and the correct timing, we will not run into any of the environmental issues. The environmental issues kick in

when a grower or a producer is applying a really high amount of litter. And, he is applying repeatedly year after, year after year. If somebody does that, what happens is the phosphorus level in the soul starts building up pretty quickly. All the water quality issues related to eutrophication... You might have heard about the golfs and the dead zones and the algal bloom... Those are no related to nutrients, such as phosphorous and nitrate. It depends upon whether we are in fresh water or sea water, which is the limiting nutrients in freshwater is mostly the phosphorus.

If the soils are high in phosphorus because of this practice of repeated application of poultry litter, and when it rains, it's going to dissolve that phosphorus and it's going to take it to the creek. Then, eventually to the water body and that particular water body will become your trophic. It accelerates the rate of trophism in the lake and the lake will start showing these algal blooms or some weeds that will grow in the lake. That causes a whole bunch of problems, which are related to water quality. Especially, the drinking water quality. Most of these allergies release toxins, and it can be a problem. Excess of anything is really bad, but if you are doing it in the right way, putting the right amount at the right time and maintaining all those buffers in the distances that are recommended by NRCS and other government agencies. If you are doing and following all those guidelines you'd become a good steward for managing the litter, and also a good steward of the environment and the land as well.

Scott Graham:

I would think on top of all the negative things you said, if you're putting out too much, then every time the wind changes direction, you got another neighbor calling and complaining too.

Rishi Prasad:

Absolutely, that's the worst call to take.

Scott Graham:

All right, we appreciate your time. Can you give us just real briefly, some updates from some of the car research you all are doing to try to help.

Rishi Prasad:

We are doing a couple of some important work related to broiler litter application in the state. One thing that producers have asked for is, if they are using broiler litter in their fertility program, they should cut some of the fertilizers back. The question is by how much, so we are conducting some litter and fertilizer rate studies where we apply litter as any growers will apply in a couple of months in advance. Then we are looking into applying different rates of nitrogen, and see where do we hit the maximum, because that can become a recommendation as how much credit you can take from litter application. It doesn't matter whether it's nitrogen, or phosphorous, or potassium. The other important research that we are looking into that aspect of this repeated application of litter will lead to phosphorous saturation in the soils.

If you keep applying litter, your soil will be saturated. We are trying to understand the phosphorous storage capacities of Alabama soils, so that we can provide or recommend to grower... When to stop further application, and avoid any environmental consequences. We are heading into those arenas and trying to explore different things by looking into the soils, different functional capacity to the soil to store phosphorous. And, those are the things that's going to help us to formulate some of the laws and regulations that are associated with the rates and applications of litter in the state.

Katelyn Kesheimer:

Fantastic. Well, thanks for joining us today, Rishi. I had a really good time, and learned way more about broiler than I ever knew before.

Scott Graham:

Absolutely. Yeah.

Rishi Prasad:

Thank you very much for hosting me.

Scott Graham:

We appreciate your time today. I thank you all for joining in with us. As always, if we can ever be of any help, please let us know.

Announcer:

The Alabama Crops Report Podcast is a production of the Alabama Cooperative Extension System, and is sponsored by Alabama Ag Credit.