Season 5 Episode 3 — Nutrient Management Part 2

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Announcer

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

Rishi Prasad

And that's why, you know, I was coming back to that initial point of, surface application or broadcast application of litter. I mean, if you have been broadcasting it for several years and if you have a pretty high salt phosphorus in the top three inches, you may consider testing your soil for phosphorus below three-inch depth. And if it falls under a low or very low category, you know, I will suggest that p application, especially injection or applying even litter in the subsurface as a strip table.

Rishi Prasad

You know using a chisel probably would be the best way to go. Meaning putting that litter three inches below will help the plants. And it will also help this buildup issue. And of course, it will create or reduce those environmental risk. So that's where we are headed. We are establishing research where we are developing an applicator where we can inject litter like three inches depth.

Rishi Prasad

And we are also investing quite a bit of time to develop a product which is very homogeneous rather than the highly heterogeneous litter. And convert that into small pellets that can be easily delivered 3 inch or 4 inch below the ground. And once you do that, you know you are enriching three inches depth. With this phosphorus and not with phosphorus, but with carbon, with micronutrient.

Rishi Prasad

I mean, so you are creating the perfect condition for your roots, and hopefully, you know, you will get the maximum benefit out of chicken litter if you are putting in a subsurface. And that will take care of all these environmental issues as well.

Simer Virk

So I guess so you figured out through research that the top three soil is very phosphorus rich and then it's low and all that, right? Yeah. So our normal soil sampling recommendation is six inch sample right. Yeah. So when the growers are taking that so if the tree is very top heavy and then, you know, the, the bottom is low when they're averaging it out across like their samples average of those that six inches.

Simer Virk

So are they seeing almost in the false results.

Rishi Prasad

Then there will be. Absolutely there will be. I mean think about if all your phosphorus in the three inch and you have nothing below three inch. So you're mixing, super rich phosphorus soil layer with a soil layer which has nothing. So, you, you you're kind of like going in a mixing effect, right?

Simer Virk

Yeah, it's averaging it out. But what are my point is, if if they, if their six inch sample is saying, hey, it's high or very high, they know I don't need to apply more or anything, but since they have a three inch very high and a bottom three inch low when it's averaging out, it's coming as a medium and like, oh, we can put some more because it's a medium.

Simer Virk

That's right. Right. So is that encouraging or is that kind of causing the application issue in a way where they they're not seeing what's the actual level?

Rishi Prasad

It is it is misleading, you know, I mean, so again, like this kind of a soil sampling will be very misleading because if your top three inches, say, for example, has extremely high phosphorus levels from a soil test B standpoint and you are mixing that STP with like a low right, you will come out in the middle somewhere, maybe medium.

Rishi Prasad

And when you reach to a medium then it will call for phosphorus application. So, under that circumstances you're just wasting your fertilizer because the soil test did not give you the right information. You mixed like a high concentration with the low concentration, and you ended up somewhere in the middle. And when it's middle, this means like the soil test will say, yeah, apply more phosphorus.

Simer Virk

Right? So what would be your recommendation for growers to maybe consider that variability. Or if it's a company helping them soil sampling or something to kind of really assess what their pay levels are.

Rishi Prasad

If I was a grower, the first thing that I would do is when I collect soil samples, I'll divide them into three inch and three inch increments to figure out, like whether I have a huge discrepancy between the top six inch or the discrepancy is less.

Scott Graham

And so with that, you're taking your probe and marking it halfway, doing a three inch, and then putting it back in that same hole, right, to get the next three.

Rishi Prasad

Or you can just push your, soil probe six inches deep and then cut it in half. Right. And when you bring it, use a tape and then just cut it at three inch and then send it to Soil testing lab.

Simer Virk

It’s way easier in some fields than the other, because sometimes it's sandy you like, especially the more you go south, yeah, it's such a loose profile.

Rishi Prasad

Right, right, right, and you can adopt the second way as well, just like what you said, you can go three inches and then next three inches, but that's the only way to figure out how much stratification issue you have on your farmland. And once you figure out that, yes, I mean, the three inch, the top three inch is pretty heavy in phosphorus.

Rishi Prasad

And the below three inch very low. Then your soil test report that you have been getting is very misleading, and you need to be thinking about that. What is the right thing to do in this case?

Simer Virk

So I know we touched on poultry litter and phosphorus bill and all that and soil sampling, I guess. Have you looked into how different tests, you know, that we send these samples and that, or are there any differences in those or.

Rishi Prasad

There is quite a bit of difference. Right now, Alabama, we use two kinds of extractions in the soil test lab. The first one is mehlich one, which is a dilute double acid. It is made up of, LCL and sulfuric acid. And the second, extraction that we use for our black billed soil is Lancaster. So.

Rishi Prasad

So right now we're recommendations B and K recommendations, based on these two, soil test extractions. So these whole test extractions work, well, when, the soil c c is low and your pH is less than six the moment your pitch is six and above. Meaning if you are going towards neutral pH. And when your soil takes more than five, you know, six.

Rishi Prasad

Mehlich one does not do a good job. And the reason is think about this. It's an acid. And if you have a soil whose pH is more than six and a half, meaning towards neutral p h, what happens when you put an acid to a neutral pH, right. So it neutralizes the effect. This means it's not going to extract the nutrients in this quantity.

Rishi Prasad

And again, you know, all of our soil test and fertility recommendations are highly empirical, right. Because in the past, people think that the if the soil test, increases soil just p value or k value increases, it is more correlated to yield. And you hit to a, you know, so you get a higher yield with a higher p test or k test.

Rishi Prasad

And once, you hit what we call this threshold, then you do not see any additional benefit of adding any more PNK, which is called as the critical level. Right.

Simer Virk

So we use mehlich one across the state, like even Auburn lab used. Yes. Yes. So is that also common? I guess across the southeast or the neighboring states uses something different?

Rishi Prasad

So the neighboring state, few of the neighboring states are using mehlich one. But right now, if you look around, is a lot of states are moving or they have already moved towards Mehlich Three, and there's quite a bit of benefit, using mehlich three as an extract and like say for example, Florida has moved to mehlich three. I mean, they moved ten years ago, more than ten years ago, actually.

Rishi Prasad

And in fact, when mehlich three was designed, it was designed for a purpose. And the purpose was because mehlich one was limiting, in a new near neutral soil or in basic soil. And that's why they said, like, you know, we need to be thinking about a build extractant, and when they designed this extractant this, mehlich three, if you look into this composition, it has EDTA and that can help extract micronutrients as well.

Rishi Prasad

Which mehlich one fails to do that. And that's one of the benefits of mehlich three. And the second benefit is it works well under acidic soils or basic or even in above basic even seven pH. And based on the research that I have conducted, we have done like evaluation throughout our soils. We have five major soil groups in the state.

Rishi Prasad

We have Coastal Plain, Piedmont Plateau, limestone, Appalachian Plateau and Black Belt. And we have seen that mehlich three does a great job of extracting nutrients. And even the, the, the extraction is kind of similar to Lancaster for black belt. So there's no point of using like Lancaster, we can use mehlich three and we are going to get the same information.

Rishi Prasad

But if we use Mehlich three or replace Mehlich three, you know, the benefits are we are going to get not only the P and K recommendations, but we can also get, micronutrient recommendation. The only caveat right now is all of our recommendations were calibrated based on Mehlich one. Right. So, if the state has to adopt Mehlich three, we have to rerun our calibrations.

Rishi Prasad

And, and maybe our fertility recommendations may change, but I think it's the time as well, because there's a lot of complain going on among several farmers or clients that to say that the varieties have changed, and all the recommendations are based on the past varieties. So, I think it's the time to, you know, start looking into or revisiting somewhat existing recommendations.

Rishi Prasad

But I will suggest that this time, why don't we use this new extractant? And because it is designed to extract micronutrients, it is designed to work on high cc soils, and it is designed to work on soils with high added aluminum content. And our soils are naturally rich in added aluminums. Right. So, I believe that this new extraction will work really, really well.

Rishi Prasad

And we need to be putting time, in fact, we will be starting some work on this area. The other thing that I would like to bring here is, what we call as phosphorus saturation ratio. Okay. What we have observed that there is a critical point or threshold we call, once you hit that threshold, you see an abrupt increase in the available phosphorus in the soil, right?

Rishi Prasad

So right now mehlich one or Mehlich three. Just by looking at those numbers, you cannot see like how much phosphorus or in what quantity the phosphorus will be available. But if we use this new tool, which we call, which we are calling as the phosphorus saturation ratio, we can tell that whether that soil is releasing phosphorus or it is acting as a sink or phosphorus, meaning it's just absorbing all that phosphorus and not re-releasing it back or even if it's releasing, it is releasing in a very poor intensity.

Rishi Prasad

So intensity is extremely important, right? Even if like say for example, like, even if your soil is releasing phosphorus, but if the phosphorus is not releasing the amount that is needed by the plant, we say that the intensity is low. And this tool, the phosphorus saturation ratio, can tell very clearly, like how intensely your soil is releasing phosphorus.

Rishi Prasad

To the in the soil solution that will be taken by the plant. So we are working on this, tool and you know, once it is released, I feel like we may need to even think about calibrating our, P recommendation based on this new tool as well as we move forward and think about adopting mehlich three in future.

Rishi Prasad

So there's a lot of potential, a lot of potential.

Simer Virk

You think so what will be the process look like for adopting that. Like is our is it the labs need to buy new equipment, need to run method. Is it a huge infrastructure kind of thing to that...

Rishi Prasad

It is not. In fact, it will be much simpler and easier than the current one. So right now we use mehlich. You know, you just add five grams of soil, 25 mls of mehlich one and then shake it and then that extractant is filtered. And then you measure it, in ICP, you need to do the same thing.

Rishi Prasad

You don't have to change anything. You know, the only thing that's going to change is the extractant. Okay. So you move from mehlich one to mehlich three. The rest is is less, even, Like the extraction time is way less than mehlich One. So I feel like, there is nothing to lose, but there's a lot of win win situation if we start using mehlich Three.

Simer Virk

So if if it's that convenient in a way or easy relatively, why not offer both? Or is that makes the process complicated or complex at some point, to be able to juggle between one, and three.

Rishi Prasad

So we can offer both? I mean, during the transit period, I mean, remember, like, you know, our, fertility recommendations are calibrated to mehlich one, if we have to move to mehlich three, we have to recalibrate it. But one thing for sure is like if we get mehlich three we can also extract iron. We can extract aluminum.

Rishi Prasad

It’s efficiency is much better than mehlich one. And now you will be able to account your added aluminum that is present in the soil that binds phosphorus. Right. So mehlich three would help you get a better picture of your soil that whether it is releasing phosphorus or it is absorbing or it's acting as a sink for phosphorus.

Rishi Prasad

So yeah, it's it's very promising to.

Scott Graham

Yeah, it's very interesting. I didn't yeah. Didn't know about that stuff. So, we talked about I don't know Simer if it's in this one or the, the podcast before, but we talked about the kind of doing like three-inch, three-inch soil testing.

Rishi Prasad

Yes.

Scott Graham

That is specifically for phosphorus not nitrogen or other ?

Rishi Prasad

Not. But you can do the same thing for potassium.

Scott Graham

So you can oh yeah. And so would would you're obviously that's going to take a lot of time right. You're doubling the amount of soil bags that you need when you're sampling.

Simer Virk

Cost.

Scott Graham

Cost. Yeah. Probably whoever is pulling your sample is probably not going to like it. So is your recommendation there. Hey, if you feel like your yields have been off the last couple of years and you've done everything right, maybe try that in a couple of fields just to look at it. Don't go whole hog on it. But.

Rishi Prasad

That's true.

Scott Graham

But just just do it somewhere just to see.

Rishi Prasad

Yeah I mean that's a one time investment. I see like say for example, if your soil in the top is extremely high, it's going to read extremely high. You Know regardless. But if you are investing one time to know what is below range. Right. And if you know that if that soil is low in phosphorus, that low in phosphorus or potassium, you cannot change in like a year or two years, right?

Rishi Prasad

It takes a lot of time to change that fertility level. So I think it's a good one time investment to know what is in the top three inch and what is below three inch. This way you will know whether pulling soil samples, like using a six inch probe is a better approach, and basing your fertility recommendation on that six inches is a better approach.

Rishi Prasad

Or I should be thinking about pulling two separate depths and then making my, P and K recommendations or applications based on those soil test results.

Simer Virk

So let's say somebody did it. And what you just said. There is a difference between the top and bottom. How would a grower approach a recommendation for something like that.

Rishi Prasad

So the only say for example.

Simer Virk

Because we don't have we talked about the subsurface bending, but we don't have any commercial application or anything.

Scott Graham

Yeah you have to knife it down.

Rishi Prasad

You have to knife it down using liquid liquid for that...

Simer Virk

That’s what I was getting it. So, they the only option at that point. Yeah. Because we don't have a way to inject litter or broad Subsurface litter yet.

Rishi Prasad

Yeah, Yeah, Well the option is to apply knife in a liquid fertilizer below three inch.

Scott Graham

So and again my brain, I did not do very good in soils or soil fertility in undergrad. So it is tied up in the top three inches. You've we've established that well in our theoretical field here. Right.

Rishi Prasad

It's more available in the top three inch.

Scott Graham

It’s higher there's more valibility is that slowly slowly leaching down. And where I'm getting that is if I do have really high numbers in the top three and low in the bottom three, can I just skip out on phosphorus for a couple of years. And it's it's going to keep slowly going down. Or is that it.

Scott Graham

Are you getting enough from...well I'm starting to confuse myself. But in my normal application, am I getting enough down below those top three that it's worth it?

Rishi Prasad

So if, say for example, you have enough in the top three inch, there is no point of adding any more, right? Because there's no benefit out of it. The only benefit that you will get eventually if you're really hung up on on the hey, I need to build my soil. If you are in that philosophy where you really want to build your soil phosphorus is the best route to take would be to inject three inches below, because that's an investment and that's a protected investment.

Rishi Prasad

You're not going to lose it anywhere. And then you build subsurface B application.

Scott Graham

But but so let's say I just want to make sure I'm not alluding to something somebody is going to pick up with. And boy that was wrong. So I say I'm going into 25. Prices are where they are. And I do a two-tiered approach and I've got way more than I need in the top three. Not enough in the bottom.

Scott Graham

Should I just not apply phosphorus this year?

Rishi Prasad

So, this is a very tricky question to answer because remember like plants take phosphorus to the water route right. So, what happens is if if it's raining of course the top phosphorus will dissolve in water and then plants can take it. But if you are in a drought or an extended drought, we have you have no water for a month under that circumstances.

Rishi Prasad

You know, the plant is not taking any phosphorus from the surface because the topsoil is pretty dry, right? So then the phosphorus would come from the one that is at the bottom right. Sometimes you, you know, even in an extended drought, even though the top 3 inch or 4 inch of the soil looks pretty dry, but the bottom four or below four inches, you still have some water, right?

Rishi Prasad

And that's why plants are sending roots below four inch or six instead. So if you have enough in the surface and the soil, just say like, do not put any more. I will not put any more in the surface. Instead, I will start building my phosphorus level below four inch depth or three inch depth because that will it will help you on the drought situation.

Rishi Prasad

And again, nobody knows what the weather will look like right? I mean, if we can say for sure that it's going to rain the next 30 days or it's going to be drought for the next 30 days, I mean, it's difficult, right?

Simer Virk

So I guess, one main rule thing, which there's a lot of things in farming that, you know, because again, like Scott said, prices and everything, especially if a growers got litter on his own farm or he's got chicken houses, all that, he's got all this phosphorus sitting, but we're telling him, no, you need to invest in the injection and all that, at which adds more cost and extra other stuff, right?

Simer Virk

That's something even with us sometimes, personally, it's hard to kind of right justify, especially when they're very thin margins. Right. Right. Right, right. So I think that's what it I guess the main question would be how do you kind of break that mental thing in a way?

Scott Graham

Because when there's kind of like cover crops, right? The first couple of years there was no benefit for long term. Yeah. It's it's even the knifing is still a long term approach.

Rishi Prasad

It is a long, long term approach.

Scott Graham

So this this year may not be the year to start that right. Just depends on your situation. Who owns the farm? Who owns the farm. Right. Are you leasing it and building it for somebody else, or, you know, those types of things? Yeah, that that's what I was wondering. Hey, if there is a lot up top your dry land.

Scott Graham

So you're dependent on rain to leach it down anyway, maybe if that top three is really high, let's just don't put any out this year.

Rishi Prasad

That's true. I mean, if it's high, there's no point of putting anything.

Scott Graham

If it's going to leach down when it does. right. Yeah.

Rishi Prasad

So that would be level. It will be at level with the rain. But if you really want to build up your phosphorus. So let's say for example, you own a land and you think that you're going to farm for the next ten, 15 or 20 years. Yeah, I mean, I would definitely build my phosphorus or put my phosphorus below for staff and not risk all the investment by putting it on the surface.

Rishi Prasad

And at the same time, you know, like, there are a lot of environmental, things that are tied up with. Right? I mean, typically any regulatory agencies or any, agency will tell you that if your soil test levels are pretty high in the top six inch, you know, you should not be putting any more phosphorus.

Rishi Prasad

And with manure application, you know, we have, a lot of, like, other tools tied up. One is called the speed index. That determines, like, when you need to stop applying any manure on your land. So, you know, that mindset that you're talking about, that you know, hey, I have this much of litter sitting on the ground.

Rishi Prasad

And I have been applying this. I guess if if you continue to do that, you will create, a lot of issues, especially environmental issues. And in case if there's a major disaster that happens, like, say, for example, you are near like a lake or a dam and the dam starts turning green, you know, and the EPA or any regulatory agency audits it, you know, they will figure out where that phosphorus is coming from.

Rishi Prasad

And that's where all the regulations and scrutinization will kick in and it will become very difficult to farm. So I guess, like, you know, we need to be proactive. We need to be thinking ahead of time and taking the right decisions. You know, I understand that there is limitation. But hey, if you have already built up quite a bit in the surface, it's not a good idea.

Scott Graham

You know, I don't know how chicken litter contracts work, right? But there's 2 million tons you said every year.

Rishi Prasad

Two Million tons is generated. But you do not know how much would that is being, plus how much is cleaned out from the broiler houses are applied.

Scott Graham

But the eater houses.

Simer Virk

Eater Houses...

Scott Graham

But but where I'm going there is. That sounds like an infinite amount, right? 10 million tons sounds like 2 million tons, but I don't know if there's any how the if those are contracts or if it's just what I've been buying. You know, my my litter from such and such for 20 years with I want to sit out a couple of years.

Scott Graham

Am I able to get it again, because they gotta do something with it, right. They're not just going to. Yeah, just just keep it at the back of the barn. So, you know, I don't know how that works. And maybe you can get into where you're rotating fields every couple of years, because I would guess if you have a good source and it's litter, that's been good, you probably want to keep that.

Scott Graham

You don't want to lose it.

Rishi Prasad

Yeah yeah yeah yeah. I was estimating the market value of the litter and, you know, I guess if we are generating 2 million, I'm sorry, 2 million tons of litter every year, that litter is worth $90 million. I mean, think about $90 million of nutrients tied up in the litter. It's a huge amount of money. So, if, say, for example, you have you are a poultry grower and you produce like several thousand tons of litter every year, and you also have agricultural land, the best bet would be to sell that litter and buy the nutrient that you need.

Rishi Prasad

And most of the nutrient that any person or any farmer would need is the nitrogen or potassium. Right? So you can sell that litter and use that money to buy a commercial fertilizer to meet your nitrogen or potassium demands.

Simer Virk

Are most of our, chicken houses up in north Alabama, I would guess?

Rishi Prasad

North and southeast. We have two belts.

Simer Virk

Yeah, because I was thinking it would be great in a way. And now I'm kind of looking into, if we have a spatial. Map of these across the state. And I think in other day in your meeting, you mentioned that litter is only economical if you, transport it within 80 miles. That's true of it, right?

Rishi Prasad

Right.

Simer Virk

Yeah. Yeah. Well, so you draw these circles around those spatial locations that these are the areas you do a soil sampling in those fields and those areas versus outside kind of see how much over application or how does the pea, you know, because it's almost like these recommendations and all these other considerations you're finding then could be a lot more targeted in those areas.

Rishi Prasad

That’s true.

Simer Virk

That's just fields. Then be a very broad across the state, because there could be some growers maybe applying that every 30 or 40, and they may be fine. Yeah, yeah, yeah. But it's happening so much closer to the later houses. Yeah, yeah that this could be a targeted kind of strategy.

Rishi Prasad

Strategy in those areas.

Simer Virk

Right. Yeah. Okay.

Scott Graham

Well Rishi this has been good. This has been a good episode, Simer and I have enjoyed this. I think our, recording device is about to die, and I'm going to have to go pick up my daughter from school in a couple minutes to,

Simer Virk

Yeah. No, I think that we learned a lot. It's not just the growers. I'm always, you know, one thing I enjoy about, you know, like our guests coming and sharing some of the stuff that we don't. We don't even know.

Scott Graham

Yeah. That's right. Yeah. I learned, probably relearned what a broiler chicken was.

Simer Virk

I learn every episode about some new stuff, and it. I guess it kind of makes us better scientists in a way. You know?

Scott Graham

That’s right. So, Rishi, we appreciate it. Your time today. And, as always, if anybody has any ideas or topics that that we should discuss, please let us know. And of course, if any of us at Alabama Extension can help in any way, please don't hesitate to reach out.

Announcer

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