



## **Episode 16—Fertilizer Side-Dressing in Cotton**

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Announcer:

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

Scott Graham:

Hey everybody. Welcome in to another episode of the Alabama Crops Report Podcast. Scott Graham, Extension Entomologist, and we're going to have a little different feel today. We've got a stand-in cohost, Dr. Steve Brown's here with us. Steve, how you doing?

Steve Brown:

I'm doing well this afternoon. Good to be with you, Scott.

Scott Graham:

Yeah, we appreciate you taking time out of your busy day to come and talk a little bit with us.

Steve Brown:

I'm glad to do this. This is great to banter back and forth about information delivery to farmers. I appreciate the opportunity.

Scott Graham:

You know, sometimes you got to pull some folks off the bench and put them in the game and see how they play.  
So.

Steve Brown:

Does that mean I'm a pitch hitter?

Scott Graham:

There you go.

Steve Brown:

I can't be a regular yet?

Scott Graham:

We'll see how you do and we'll go from there.

Steve Brown:

Okay.

Scott Graham:

Now, our guest today is our resident dirt doctor, the soil scientist, Audrey Gamble. Audrey, how's it going?

Audrey Gamble:

It's going good, Scott. I'm just trying to train you not to call me dirt doctor.

Scott Graham:

We'll see. We'll see. So, we were kind of talking and before we get started, we've decided we're going to put our guests under the gun. We want you to give us one fun fact about Audrey Gamble.

Audrey Gamble:

Okay. So my fun fact is still soils related. I still think it can be fun, even if it's soils.

Scott Graham:

We'll determine whether or not it's fun.

Audrey Gamble:

So on the side, as one of my hobbies, I do a lot of pottery. So, in the evenings, I'll get my hands dirty again, make some pottery, throw it on the wheel and see how it turns out.

Scott Graham:

Now, is this a foot crank wheel or automated?

Audrey Gamble:

It's not a foot crank, but it does have a foot pedal, it's automated. Yeah.

Steve Brown:

Well, I have a related question. How did you become a soil scientist? What's your background in agriculture that got you to the place that you are today?

Audrey Gamble:

So, I have a little bit of a roundabout way that I ended up in soil science. So I grew up on a farm in Headland, Alabama, cotton and peanuts and cattle. And when I went to college, I really enjoyed chemistry. I majored in chemistry. And, I did enjoy doing my undergrad in chemistry here at Auburn, but I always had a love for agriculture and I started working for Julie Howell, who was our soil chemist at the time and she put me on a project as an undergraduate to look at iron key light products for iron deficient soy bean in the black belt region of Alabama.

Audrey Gamble:

And I thought, "Okay, this is awesome. I get to use my chemistry background and still be connected with agriculture too." And I really loved that. I was a lot more able to see the implications of my research than I was on the lab bench, in an organic chemist's lab. So I did my Masters with her, with Julie Howell, and then went on to University of Delaware to do my PhD and came back to Auburn, came back home.

Steve Brown:

Well, that's good. Yeah. So was it too cold in Delaware or?

Audrey Gamble:

It was cold. I do miss seasons. I could use a snow here and there.

Steve Brown:

Not many crops in Delaware. What was it vegetable crop?

Audrey Gamble:

Actually, there are. I always say that Southern Delaware looks a lot like Headland, Alabama, because you've got the coastal plain soil. So it's really sandy. You've got a lot of chicken houses. Now, the difference is you have a lot of corn and soybean, so not a lot of peanuts or cotton. They grow a lot of watermelons, a lot of Lima beans. So, it's a pretty heavily agriculture state towards the Southern portion. In the north, it's more urban.

Scott Graham:

That's a neat fact. That's another neat fact about you. So.

Audrey Gamble:

Go Blue Hens.

Scott Graham:

Yeah. And now we know what University of Delaware's mascot is where's learning all kinds of stuff. So, all right, Audrey, we got you on a day to talk about cotton and getting ready to for side dressing. And before we do that, Steve, do you want to give us just kind of... And it's hard to generalize where we are right now in cotton and Alabama, as we sit here late June.

Steve Brown:

The latter part of June, where we're looking at a crop overall, that's fairly late and therefore we need to probably manage it a little bit differently and maybe Audrey will make some comments in that regard. The rains of tropical storm or the remnants of tropical storm Claudette have probably recharged soil moisture over much of the state. So, rurally and we've recovered from early thrips injury that any that existed, which existed in a lot of places.

Steve Brown:

So, we're really poised to grow fairly aggressively. And, even the persisting prevailing forecast over the next weeks tends to be average or above average rainfall with moderate temperatures. And that's a strong combination for aggressive cotton growth. So we hope that's going to happen and it'll be a crop that we can manage. But, also mature rather quickly since it is on the late side throughout much of Alabama.

Scott Graham:

Yeah. I've seen the last week, I've seen cotton up to 13, 14 nodes, and I've seen cotton three or four true leaves.

Steve Brown:

I've seen cotton just coming out of the ground. So we've got some late cotton, but hopefully we'll have some favorable weather to consistently keep growing rather than to be stopped from a significant stress periods.

Scott Graham:

So, Audrey does that cause any major complications for farmers thinking about trying to get nitrogen and stuff out with the range of crop they have?

Audrey Gamble:

Yeah. Steve and I have talked about this a little bit. Right now throughout the state, you've got some farmers that are already getting their side dressing, maybe this week, if they can get in the field. And then you've got others who it's pretty far away at this point just for that late planted cotton. And one of the factors that comes into play when you have that late cotton is you don't want it maturing too late, obviously. And so we have a little bit of a suggestion to back off on nitrogen a little bit in that situation and really push it towards maturity.

Audrey Gamble:

But, for the cotton was planted on time which we have all seen, getting out the rate, your regular side dress rate, which it varies depending on your soil type and where you are, but that base recommendation of 90 pounds over the course of the growing season is about what we would shoot for there.

Scott Graham:

And, primarily we're recommending split applications right?

Audrey Gamble:

Our typical application would be a third at plant and then two thirds that side dress and side dress, meaning we're trying to get it out between first square and first bloom. And, I like to try to shoot for that first square time period. And that way, if the conditions just aren't favorable for a while, you still have that window to get in there and get out your nitrogen on time.

Scott Graham:

Are you talking exclusively nitrogen or some other elements that you might think about side dressing?

Audrey Gamble:

I think our number one concern is going to be nitrogen, but certainly we want to make sure we're getting our sulfur applications out by our side dress time. So, typically we're going to recommend 10 to 15 pounds of sulfur for a good cotton crop. Hear it all the time in soil fertility world, but we don't get as much sulfur from the atmosphere as we used to, we have cleaner fossil fuel emissions. We have less sulfur deposition. And, so we do have to think about sulfur fertilizer application.

Audrey Gamble:

So a lot of time that's going out with if you're putting out an ammonium fertilizer with an ammonium sulfate blended in, you're already getting it. Or if you're putting out a 28% UAN solution that has 5% sulfur, you're

getting the sulfur you need there. So just depending on what source of nitrogen you're using, you may or may not have to think about a supplement for sulfur.

Scott Graham:

What about Boron? I know it's important. We may or may not put it out with a side dress, but what's your bore on recommendation?

Audrey Gamble:

Boron recommendations in Alabama are getting out between a third to a half a pound per acre. And that can go out with your side dress applications. A lot of people are putting out foliar with a few separate applications, but we want to just make sure that we're getting out at least a third of a pound. And a lot of times we may not see a response to boron in the field, but we put it out as an insurance. And, so I always say, if you're going to put out boron do it right, and make sure you get that third of a pound out.

Audrey Gamble:

Because, a lot of products these days will have very low amounts of boron. And if you apply them at the recommended rate, it may have 10 times less. I've even seen a hundred times less are recommended amount of boron. So just making sure that you look at the percent boron in that product and get out the correct amount, I think is important.

Scott Graham:

Okay. Back to nitrogen since that's really your most important thing you're doing when you're, when you're talking about side dress application, but tropical storm Claudette dropped anywhere from probably six or eight inches to maybe down to two inches over much of the state. Does that have any impact on how farmers should think about his side dress application and his total nitrogen approach this year?

Audrey Gamble:

Yeah. It depends on where the cotton was when they're getting these significant rainfalls. I mean, if they have not side dressed yet, I would not necessarily increase it that much, just because like you said, we have a late planted crop and everything. In sandy soils, we will probably get some leaching loss and we might get some denitrification loss to the atmosphere. So, but a lot of that is still going to be hanging around in the subsoil layer. So, if we got a heavy rain at a time after we'd put out side dress applications, I might say add another 10 pounds or something along those lines. Is that about what you would consider too?

Scott Graham:

Yeah. Yeah. Would there be a difference with the type of nitrogen they put out?

Audrey Gamble:

In that case, no. But, there are some different considerations for different nitrogen sources and the biggest one is going to be urea. And, that it's going to be if we're looking at a dry spell. So with urea, we can get 20 to 30% volatilization or nitrogen loss in the worst case scenario. So, if we've got good soil moisture, but it's dry and windy and hot outside, we can lose significant amount of nitrogen.

Audrey Gamble:

So, if we're not going to get a rain for an extended period of time, then we would put something like a urease inhibitor, NBPT Agravate on that urea to make sure it stays in place. But, once it's in the soil most of our nitrogen that's applied, it's going to be converted to nitrate anyway. So, we put out ammonium forms and then within a couple of weeks, most of that nitrogen is going to be in the nitrate form anyway. And, that's what susceptible to leaching. So, regardless of what source you're putting out, if you just have significant rainfall after putting out side dress applications, then you might consider supplementing a little bit.

Scott Graham:

So, somebody would have put some out two weeks ago, a week ago, and then we just had this Claudette, was that it's name?

Steve Brown:

Yeah.

Scott Graham:

Tropical storm Claudette, wouldn't matter. Now you wouldn't say one form of nitrogen? I don't know what... I'm just a bug man. I don't know exactly how to say it, but one type of nitrogen wouldn't be better in that situation than the other?

Audrey Gamble:

Not really.

Scott Graham:

That might not be the way to say it.

Audrey Gamble:

Not in a sandy soil. No.

Scott Graham:

What's the most common form of nitrogen put out in our side dress applications?

Audrey Gamble:

I would say there's a lot of UAN going out. So that's a urea ammonium nitrate [crosstalk 00:11:24].

Scott Graham:

Is that a liquid or a solid?

Audrey Gamble:

That's a liquid.

Scott Graham:

Is that 28005?

Audrey Gamble:

Mm-hmm (affirmative). 28005 or 30. 32%. And, then urea and then a 3400. But like I said, eventually in the soil, that's all going to get converted into nitrate by soil microorganisms.

Steve Brown:

So, are we using less and less ammonium nitrate because of concerns, I guess?

Audrey Gamble:

I mean, we're definitely still using it. A lot of times it's being blended with either ammonium sulfate or... I can't just go into a store and buy a 3400 because of the fear of making bombs. Can we say that on a podcast?

Scott Graham:

Sure. You can.

Steve Brown:

What about for the farmer that's put out two tons of chicken litter up front. What's your side dress approach in that situation?

Audrey Gamble:

So if I'm a farmer and I put out about two tons of chicken litter prior to planting, I'm going to estimate that I have about 30 to 60 pounds of it available during the cotton growing season. Because, the amount of chicken litter available, it's going to be highly dependent on the soil moisture, the temperature when you put it out in relation to planting. And so, I'm going to want to get to that 90 pounds as my base rate for nitrogen, for cotton.

And so, putting a side dressing between 30 to 60 pounds is probably the range that I'm going to be in if I've put out two tons of chicken litter already.

Steve Brown:

Okay. You said a couple of times you've used a number of 90 pounds, which I think your research has confirmed that's a good target for us. Talk about when you tweak down and reduce that slightly, or maybe you might bump that up. Just what situations would be "Hey, let's reduce it a little bit." Or "Let's be a little more aggressive."

Audrey Gamble:

Yeah. It's a little bit of an art because there's so many factors affecting nitrogen availability and soils. It's different from phosphorus and it's different from potassium because you have so many different loss pathways. So, here's some of the situations in which I would tweak it down. So if I've had a good, healthy legume cover crop that I've terminated before plant, that would be a situation where I may back off a little. Now, Kit Baulkham at USDA ARS lab here in Auburn, his research has shown basically a benefit about 50 to 60% of the time from that legume cover crop over a significant number of years.

Audrey Gamble:

And so it can be variable, but with a good, healthy legume crop, I think we can back off a little bit. If we've seen excessive growth in previous years, we've had issues with disease and insect pressure, even though it makes Scott happy to see those extra insects, it doesn't make everyone happy.

Scott Graham:

[inaudible 00:14:16].

Audrey Gamble:

So, I might back off a little bit in that case.

Scott Graham:

Only in the research plot.

Audrey Gamble:

And, then let's see, so in some cases where I might bump up, I mean, if we're in a really high yield potential scenario and I've seen inadequate growth in the past, I might bump that rate up a little, but I don't want to go higher than one 20. Is that what you? What's your limit, Steve?

Steve Brown:

I remember you and I, the first year I was here, I did a study and I could have drawn it up in my office. The 90 was right on top of the number. And it's hard to argue with that. And, I think if we do anything because we've made some really good yields in places and we made two bales and we made two and a half. We made three bales and we made three and a half and I'm going for bigger. And, so people in some places are more aggressive with nitrogen. And I think they're creating some problems, particularly where they got really good water or rainfall or irrigation capabilities. They may be overdoing it and creating some disease problems and bowl rock, hard luck problems with [inaudible 00:15:23]. So, I think if there's one element I'm tending to be more conservative than being more lavish.

Audrey Gamble:

I think we both kind of err on the conservative end. And I think overall in production, people tend to err towards the over application and I think-

Steve Brown:

Everybody thinks they can hit a grand slam every time and that doesn't happen.

Audrey Gamble:

Right.

Steve Brown:

And, I'm not sure that for the farmer, let's say he's making 12 or 1300 pounds in a good... I don't know that the inputs are really different from 12 or 1300 pounds versus 1600 pounds. I think it's minimal insect pressure and favorable harvest conditions. I think those things, we can make the cotton, but we don't always pick the cotton.

Audrey Gamble:

Right. I mean, in some of our research plots, we've been over three bales with 90 pounds of cotton.

Steve Brown:

For sure.

Audrey Gamble:

I mean with 90 pounds of nitrogen.

Steve Brown:

For sure.

Steve Brown:

One other, I know we've had some issues with potassium. Should we consider that as a side dress element?

Audrey Gamble:

Ideally you've taken care of potassium applications prior to plant and you've soil tested. You've gotten it up to the level that it needs to be. That's not always going to be the case. I think some people, I just think it makes them feel better to put some extra potassium out. I don't expect a yield benefit from that if we've already taken care of our soil test potassium, but I don't think we're going to lose it. It's going to be there, unless we're in a deep sandy soil, it's in our bank for next year. So, again, ideally we've already taken care of it and we're taking care of other issues that could limit potassium deficiency, like compaction.

Scott Graham:

I know you've had some cerebral site, years of research on potassium [inaudible 00:17:18]. How many times did you see a response?

Audrey Gamble:

We've done some with foliar applications and very rarely do we see a response. I personally have not done any research where I've put out pow potash at side-dress, but I know Glenn Harris over at Georgia has done a lot of that and just not seen a response. So, if you're in a situation where you're seeing potassium deficiency, then certainly go ahead and put it out and try to correct that deficiency. But again, ideally we've already taken care of that by the time we're doing side dress applications.

Steve Brown:

All right. And I'd like to backup way back to the beginning. I've dealt with some farmers who put it out, put it all out at planting their total nitrogen approach. What do you think about that?

Audrey Gamble:

I think a lot of times you're not going to see a difference in yield between putting it out all at plant versus putting it out as a split application. But, to me it's more risky. Because, let's say you did put all 90 pounds out at plant and then you do have significant periods of heavy rainfall. And, you've got a big chance for loss through leaching and denitrification, I would prefer, I know we can be more efficient if we split it. So, I would always prefer to see it split, but it's just a little more risky that way.

Steve Brown:

Just this morning, I have two graduate students and we walked the colors rotation. And it's a fabulous place to look at nutrient deficiencies and on the three different crops that are there. And, I know you have responsibility for managing that site. Talk about that because it's a great learning laboratory that's been there, what almost 115 years? Something like that?

Audrey Gamble:

Right, it was started in 1911. So, 110 years-

Steve Brown:

Okay.

Audrey Gamble:

Of the color's rotation. And, it was established by George Atkinson and like you mentioned, it's a study where we have different fertility treatments that have been in place for 110 years now. So, we use it a lot for teaching students, what nutrient deficiency symptoms look like and we're always happy to have guests out there. If anyone wants a tour, feel free to contact me. We're doing one for the Alpha Ag Expo this year, they're going to come out and do a tour. So yeah, it's just a great place to see nutrient deficiencies on cotton, soybean and corn. We have all three out there growing each summer. You can see potash deficiency, nitrogen deficiency, phosphorus deficiency, sulfur deficiency, all those good things. It's a really fun place to look around.

Scott Graham:

And, the experiment was instituted to really explore the question of what they call cotton rust and explain that.

Audrey Gamble:

Yeah so cotton rust, it's not a true rust disease, but it's the appearance of a rust, a bronzing of the leaves. So, back then in the early 1900s, there were a lot of questions about what was causing that bronzing appearance. And that's where it was first discovered that that was potash deficiency. So, potash deficiency, it causes the yellowing of the outer margins of the leaf, but it also allows a lot of disease pressure to come in.

Audrey Gamble:

Potassium is just really important for overall plant health. And so that was the place where it was discovered. And we actually have a historical marker out there out of the colors rotation to document that.

Steve Brown:

It's a great learning place. And it's also, we tend to walk it on a weekly basis almost. And we see the progression of symptoms. Most things can start off looking fairly normal and then with added growth and plant size, you see a separation by treatment. It's a fabulous learning site.

Audrey Gamble:

Right. I think early in the season, you've got plots that have had one one-third soil test recommended potassium in two thirds. And early in the season, you can't tell too much different. The foliage is there, but once it's

harvest, there's almost no lint on those one third potash plants. And, yeah, there's something different every time of the year.

Scott Graham:

You can pick out some different things. That tells you right there. It's pretty, pretty obvious, pretty stark.

Steve Brown:

At that side this year, we also have a unique experiment going on with one of your cohorts, Dr. Elana Jacobs. I'm looking at the interaction with nutrient deficiencies and the cotton leaf [inaudible 00:21:37] dwarf virus. It's fascinating to look at the growth inside those cages and even the differences there. So it's a great learning site.

Audrey Gamble:

Yeah. I'm curious to see, are there any nutrient deficiencies that will make CLRDV worsen?

Steve Brown:

Yeah.

Scott Graham:

So, have to tune into another episode to find out.

Audrey Gamble:

Sounds good.

Scott Graham:

Audrey, this was great. We appreciate your time. Steve, thank you for helping fill in today. I feel like we got a lot discussed and I know I learned a lot.

Steve Brown:

[crosstalk 00:22:06].

Scott Graham:

So hopefully a lot of people did.

Steve Brown:

Yes.

Audrey Gamble:

Thanks for having me, that was fun.

Scott Graham:

All right, we appreciate you all listening to today's episode as always, if any of us can ever be of any help here at Extension, please don't hesitate to reach out and let us know.

Announcer:

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