

University of Minnesota Nutrient Management Podcast Episode “Phosphorus and potassium application in a late spring”

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Paul McDivitt: Welcome back to University of Minnesota Extension's nutrient management podcast. I'm your host, Paul McDivitt, communication specialist here at U of M Extension. Today on the podcast, we're talking about phosphorus and potassium application in a late spring. We have four members of Extension's Nutrient Management team, Dan Kaiser, Melissa Wilson, Lindsay Pease, and Jeff Vetsch, to cover the basics and beyond.

Paul McDivitt: Welcome. Why don't you each give us a quick introduction?

Jeff Vetsch: Hi, I'm Jeff Vetsch. I'm a researcher and [inaudible 00:00:32] scientist at the Southern Research and Outreach Center in Waseca, and I primarily focus my research on nitrogen management, but I also work with P and K.

Dan Kaiser: I'm Dan Kaiser. I'm a nutrient management specialist with the U of M Extension. I'm located on the St. Paul campus.

Melissa Wilson: I'm Melissa Wilson. I work with Manure Management and I'm an extension specialist here in the St. Paul campus.

Lindsay Pease: I'm Lindsay Pease. I am a nutrient and water management specialist at the Northwest Research Outreach Center in Crookston, Minnesota.

Paul McDivitt: All right, first question. Should growers be concerned when applying phosphorus and potassium if soils are wet or soil conditions are less than desirable at the time of application?

Dan Kaiser: I think the thing here is looking at situations where loss potential might be higher. With P and K, typically we don't have the downward movement potential that we'd have with nitrogen, so there's always the question particularly with these nutrients, of how well they react with the soil. That's really the main thing. We know that most fertilizers are water soluble, but it does still take some time for that fertilizer to react, so particularly with phosphorous, you look at runoff concerns. There could be some implications for that. We know well a week or more after application, typically, I think you start to see some reaction pretty quickly with the soil, but there's still a risk, so runoff

losses. Lindsay, before you came here in Ohio, look at some of that in terms of loss potential. But also soluble movement, phosphorus movement into the soil, becomes an issue. I think that the main thing is you look at applicators and the size of the applicators and compaction issues, really what concerned me more in wet conditions and getting across fields when there may not be very desirable to do so. That's where you sometimes get some erring towards going onto frozen ground to apply, and that has its risks as well.

Dan Kaiser: There's some things, I think, to consider at that point, really just with the whole dynamics different than we do with some of the other nutrients.

Lindsay Pease: Yeah, and with phosphorus application in particular, some of my work in Ohio with the USDA showed that really in that first five days after phosphorus application when you get a rainfall, that's when you're at the most risk for runoff losses. If you're applying phosphorus and then you happen to get a big rainfall, there's a chance that that phosphorus is not gonna taken up by the soil. It's just gonna wash away with the water.

Dan Kaiser: One of the simple agronomic things to think about, is if you have a field that's marginal, and there's rain in the pretty immediate forecast, and it's unlikely you're gonna get out there to incorporate that P and K application with tillage, because of the current soil conditions and the rain in the forecast, maybe it's better off to hold back on that application until that field is fit to get that incorporation with tillage.

Melissa Wilson: For manure, we know that there's a little bit of a difference, in that it's not all necessarily water soluble for the phosphorus initially. Something like 50 to 60% is usually in the inorganic form right away, so that would be water soluble, versus some of it's gonna be kept up in that organic portion of the manure, so it's a little bit of a different beast than the commercial fertilizers are. But anytime you're applying in wet conditions, you do have to worry about runoff and things like that with manure as well.

Jeff Vetsch: So, the main thing ... you've gotta make the decision at the key point whether or not it's worth it. Sometimes with P and K, you see a lot of growers, particularly have been farming for awhile. You see the value of it just because of what it's done. Particularly if you started in a situation where they're low testing. There gets to be then a lot of emphasis that we have to apply, we have to apply. But you get into years where it's less than desirable. It's a good time, really, at this point in time where we're sitting here waiting for things to break in the field, to look at where your soil tests are at this point in time, because if your soil tests are high enough, there's other options, I think, out there, instead of trying to get out there at less than desirable times. The main issue is if you pre-booked, I think, how do you deal with that when you've already paid for it and you wanna take advantage of it?

- Jeff Vetsch: That's the main thing, I think, on that. When you start talking about it, those that have already bought it and have to get it applied, because it's already been purchased, what do you do? And do you risk things in terms of getting out in less than optimal times?
- Paul McDivitt: Is it better to delay planting and get fertilizer applied?
- Dan Kaiser: I think this is a good question. We'll see what happens this spring, 'cause you never really know. Last year, I didn't think we'd get a snowfall in the middle of April like we did and push things back like it did. When I break this down, I look a lot at the soil test data that we have and look at a lot of the probability data we have. If you look at ... as you increase your soil tests, we know that what that typically means in the high and very high categories, that those soils have a high or very high probability that they can supply all the given nutrients.
- Dan Kaiser: If you look at it in terms of the standpoint, in terms of risk of yield loss, I think you're much more susceptible to seeing a yield loss from doing planting out too far, trying to get the fertilizer applied, versus not applying that given year. That's the main thing. Looking at it, I think we know that there's some optimal windows, in terms of planting, and really we wanna hit those, because if we don't, we're really gonna see some potential yield loss. I think particularly for Jeff, we start seeing more of your season hybrids being grown here in Minnesota. That's the thing that concerns me, is really you're investing a lot of money in these high yield potential varieties and then you're purposely ... if you purposely plant them later, just because you're trying to get the fertilizer applied, doesn't make a lot of sense to me if you're looking at risking some yield loss.
- Jeff Vetsch: Especially when you've got probably very high or high P and K testing soils, anyway.
- Dan Kaiser: Yeah, the issue would be ... I know Lindsay, up in your area, where you've got a lot of high PH, maybe low P soils, I think there's some definite advantage there, although there's a lot of phosphorus there in those soils; it just isn't necessarily available. I think it's really prioritizing fields that would have lower soil testing areas that you know that you're gonna get greater return on investment, are really going to be the thing.
- Dan Kaiser: I think the same thing, you can say mineral applications, although there's fewer options. I know, Melissa, in terms of post planting options, with manure at this given point in time, and with P and K, we'd like to get it at least incorporated to get it so it's down near the roots. But overall, as Jeff was saying, you get high, very high situations. Really, the chance of that it's gonna be short in those situations is really low.

Dan Kaiser: So, we look at high and very high. The data is ... especially with phosphorus, I'm usually within about one percent of max yield, if I have any yield loss itself. There's some risk there, but overall, we're looking at maybe less than 10% of the time, we see some sort of yield increase. I think a lot of that's maybe due to starter effects that we see in some of the soils that are a little cool and wet too long, which could use some phosphorus early in the growing season.

Paul McDivitt: Are there options to apply P and K post planting?

Jeff Vetsch: I think your best option to apply P and K at planting is to, if you don't think you're gonna get that broadcast application on because of timing, is to look at your starter options and maybe up that starter rate of phosphorus, and use that as your phosphorus application and skip that broadcast application if it just can't be applied.

Dan Kaiser: Yeah, we were talking about this before. Really, the post planting options really aren't necessarily ideal, because again, you're still susceptible to situations where you may have runoff losses. You have to be somewhat careful. If it doesn't look like it's gonna rain a substantial amount, although we can't really ever predict that, where you get a runoff event. That's really gonna be the greatest risk at that point. And from the point at which if you think you have to get it on, you've already planted, you really aren't gonna take much advantage to that. Now, if you've got high testing soils again, we go back to it's probably not gonna be needed, so you're applying that more for replacing what the soil is supplying anyway.

Dan Kaiser: Options, I think what Jeff was saying, that the starter options are out there. I know we still have a few growers that have two by two options, which give you much more flexibility, particularly dealing with the dry fertilizer. I remember that growing up and it wasn't enjoyable. Unless you've got a large tiner or something you can pull behind the planter, it's a lot of filling and it's not a lot of fun. There are some options out there for that. Looking at years where you may have a spring where you wanna get planted and you're not using currently in-furrow, but you have the option to use it. It may be a good idea to maybe look and go back to it.

Dan Kaiser: You can do a lot based on our data, what we've seen. Even medium testing soils, Jeff, with five gallons of 10340 seems to be a good option with phosphorus. Then with potassium, it really boils down to with these in-furrow options, how much you're applying. Because really, most of these products are applying such a small amount, where that one is where it becomes tougher. If you're in a little situation, you still might need to look at something. I don't think side dressing any liquids ... we've really not looked at that that much, but just from what I've seen of it, it hasn't provided to be the most ideal option to go back in and side dress, just because of cost.

Jeff Vetsch: Yeah. And as far as potassium goes, you could broadcast on the surface of the soil after planting, because it really doesn't have an environmental risk. But at the same time, how effective is that gonna be as a nutrient supplying methodology after planting? That would be questionable. It would be better on a very low testing site than doing nothing, but if you're on a high or very high testing soil, it probably isn't gonna have much advantage.

Lindsay Pease: Right, because yeah, you're gonna have a surface application and you're not gonna be able to incorporate it. That nutrient's really not gonna be able to make it down to the roots when it needs it, not necessarily. So, if you're broadcasting it and just leaving it on the surface, it's building up that top layer that probably doesn't need it anyway. That's definitely ... sometimes ending up in a situation where you're over-applying or not gonna get the return on that.

Dan Kaiser: I always think there's a lot of talk about banking P and K and just putting it back in after what you've removed. Really, when I look at it, if your options aren't great, you've gotta look at it from a cost standpoint. Because if you're spending money on something, even if you're trying to bank it, and if something happens where there's a little chance of it being there, was it really worth spending the money on it? Because you look at fertilizer, I mean, even where it seems like it isn't as high of a cost, it gets pretty expensive when you start adding it all up. Particularly for growers that are wanting to apply close to exact removal, which I don't necessarily agree with, because we've seen there's a lot of flexibility in there. We can be within 20, 30 pounds of removal and still not see the soil test even change.

Dan Kaiser: Really, with that, looking at just the options that are out there, and maybe delaying if you're really banking, I mean, there's no reason why you couldn't put that on at a later time. Just increase the rate the next time you apply if you really think you needed that application.

Lindsay Pease: If you are using your soil as a bank and you run out of time to apply phosphorus, maybe that's a good time to use your savings.

Dan Kaiser: Yeah, that's really what we try to say, but a lot of people, particularly with phosphorus, it gets to be a ... we've seen the value of it. We've got soils that started really low and they get that a lot. Talking to my dad when he started farming, a lot of his stuff was low, and he was trying to build it up to get to a point where the yield is higher. We've seen that consistently, that you're probably not gonna make enough consistently with fertilizing high testing soil, where it really matters if you don't get it on one year.

Dan Kaiser: Then manure, I have no ... usually manure, we're looking at options probably more related to nitrogen. Those fields are pretty high themselves.

Melissa Wilson: Yeah, there's a lot of evidence that in systems where you're constantly applying the manure to the surface, maybe in new till systems, that there will be a lot of phosphorus buildup in the first inch or so. Again, that gets back to then that's more likely to run off, especially the soluble forms of phosphorus in large runoff events, versus trying to get it incorporated better, is better off for getting it distributed more in the soil, rooting depth, at least.

Melissa Wilson: For post planting, we have had some success with side dressing liquid swine manure, but we were using it as more of a nitrogen source rather than a P and K source. How available the phosphorus and potassium would be that first year, I'm not sure. We always assume about 80 to 90% the first year in all the kind of manures we use in Minnesota. So, I'd assume that much would be available even at the side dressing as well.

Paul McDivitt: What should farmers do if planting is delayed by weather and they haven't applied fertilizer?

Dan Kaiser: I think right now, the good thing to do would be start looking at your soil test [inaudible 00:13:27], if you have it, recent reports, and just seeing what fields may need to be prioritized if it should happen. We don't know. The spring is, who knows? You never know if you're gonna get a three inch rainfall that's gonna set you back for awhile, or even a 10 inch snow. We had that, I think, in early May, I remember that snow on the planters down around the Waseca area. So, it just depends. I would just start looking at fields and just start seeing, you know, do I need it in these fields or not? Then you gotta talk to the retailer and just see what's feasible, in terms of getting out to the fields. If you've got other options, it's a time to look at them. Because again, looking at delaying the application, even if you could delay it to fall, if you already are dealing with high testing situations and add what you're gonna put on the spring for the replacement, it'd be better doing it to a point where you can get it at least incorporated so you can at least get it to hold a little bit better than just laying it on the surface and risking loss.

Jeff Vetsch: Yeah, and to add to what Dan said, I would think about if you're gonna look at these fields and identify, say, you've got two or three fields that have 80 or 90% or more, the field is very high or high testing soils in P and K. Your probability of getting a response to that application is very small. Those are the fields you could just go ahead, work up and plant, and skip the application. If you've got other fields that maybe need that broadcast application because the potential for return on investment is a lot greater, those are the ones that you hold off to plant 'til a little later, and see if you can get that window of opportunity to get the fertilizer on, incorporate it, and plant it.

Dan Kaiser: One thing, being here in Minnesota ... I've been here for about 10 years and it's taught me you really never know. You get to situations, I think, like 2000 ... I think it was 2012, where we started to get a really warm March, then it started

to get wet again. Then we were looking at planting in I think in early May in some of the fields. Some people I know got planted early, but you just never know what's gonna happen. Just trying to plan for that, it's hard, so having some options and discussing those while you may not be in the field, maybe have the planter ready to go and everything ready to go for spring, then start looking at what some of those alternative options, it's a good time, really, to do it.

Paul McDivitt:

All right, that about does it for the podcast this week. We'd like to thank the Minnesota Agricultural Fertilizer Research and Education Council, AFREC, for supporting this podcast. For the latest information on nutrient management, you can follow us on Facebook and Twitter at U-M-N Nutrient M-G-M-T, where you can also send us your questions for future podcast episodes. Thanks for listening.

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