

**Cliff Scholz:** Joe, one of the things that you have shared about is the importance of the relative proportions of bacteria to fungal organisms in the soil and how that affects phosphorus availability.

I'm wondering if you can share why getting the fungal proportion where it needs to be relative to bacterial, 'cause it tends to be the one that gets depressed by most of the practices that we're talking about like tilling and adding, nitrogen in soluble form and so on. Explain the phosphorus metabolism of the soil and the role of fungi in it, if you could, please.

**Joe Scrimger:** Well, and here I have to give those regenerative farmers a little credit, too. And specifically to Gabe Brown. 'Cause I was seein' pieces, but he got onto it a little faster.

And a little later, I was learnin' it over time. But those pieces weren't coming together. I had pastured-based farms that were working with some broadleaves. New broadleaves like chicory, and whatever.

Even dandelion is a decent feed, and it's a broadleaf. The broadleaf that I was workin' with that I really liked was buckwheat. But buckwheat you had to plant every year, where these other broadleaves are like a weed. They come up every year. They're perennial.

And Gabe got onto that. Where what happens in most organic farms if they get doin' the soybean thing to Japan, which most of 'em do, and then they're selling corn to the big organic chicken farm in Michigan, and they might be doin' some spelt.

But think about this: The corn takes a lotta nitrogen, whether it's manure or whatever, or clover. The soybean is a legume. It puts nitrogen back in the soil. The spelt, they're fertilizing it. It's a grass. They're fertilizin' it like corn. Just not as much nitrogen as corn.

But all those components of nitrogen in that three-year rotation, and then they may leave one year of clover to give 'em a wider rotation. But even the clover is a legume: All those things feed bacteria.

None of those really feed fungal organisms other than the mature carbon from the corn stalks or the spelt stubble or wheat stubble. But if they put

nitrogen on those crops in the way of poultry or even feather meal, but feather meal is not as bad, but any manures, and those legumes keep those bacteria established.

So we've come to the conclusion that legumes are very important in the transition. But as your soil improves, you actually want to move more to broadleaves.

And that brings that fungal balance out. That starts to have a multiplier effect on your building of organic matter, and your water moves better. And broadleaves do a better job of covering the soil than legumes do.

And they're not recharging the nitrogen. Meaning this is after you've got your nitrogen system started. You got a nitrogen cycle started. And then you lighten up on the nitrogen, but you go a year or two with broadleaves in the equation without keeping that bacterial dominated, let those fungal organisms catch up.

And some people would say that if you're gonna raise grains you gotta have a little more bacterial than you got fungal. But if you look at a woods, and I don't know if this is good or bad, but when I grew up, I did wood off some land that we turned to farmland. I mean, I went in and helped my dad cut the trees, lumbered it off, and then turned it into farmland.

And I saw how that produced. That produced tremendously, with very little inputs. And that was relatively a one-to-one bacterial to fungal balance when it comes out of the woods. And I could see the potential of that.

Now, when you're takin' a poor soil and puttin' it back, yeah, you gotta feed a little more nitrogen. But if you can get your soil back to the good state, you want more of a one-to-one balance.

And Gabe Brown he goes by diversity. And I like the diversity. I don't argue with that at all. It's just that most of the organic farmers I work with have diversity already. And the soil, the less diverse you've been in the past, the more it responds to bringin' in diversity. The more diversity you've had in the past, the less response you get to more diversity, 'cause you've already got diversity.

And that diversity comes in crops. That diversity comes in different types of fertilizers. That diversity comes in different tillage practices, and not tilling, at certain stages. That diversity comes in the variety of animals you expose the soil to.

And the type of farmers, quote, "organically and biologically" that I work with already have a lot of that diversity. Conventional agriculture, where Gabe Brown's history was, was more based on fertilizer and a couple cash crops.

And so consequently, when he puts in more diversity, he gets a bigger response. And a lotta those farms do. And I'm in favor of that. But I'm sayin' the farm shoulda had the diversity to start with. That's the point they're missing.

And so consequently, I target the cover crop to the next step we need to make in the system. If it's weed control, I would go with somethin' like rye as a cover crop because if it's broadleaves that are a problem, lambsquarters and pigweed, rye will suppress them.

If we're low in trace minerals, I'd like to use buckwheat. If we're low in phosphorus, maybe use a little buckwheat depending on time of year. If it's early or late in the season, we use oats 'cause they will bring phosphorus up.

So I wanna target where we need to go next because my job for the farm has been to be out there in the field, bein' observant, takin' my time. Trying to become in tune to what I'm with, and figuring out their next step. And how to do that, as much as we can. naturally. But I'm not against some inputs. Because we can do it without inputs, but some soils will raise a crop if you get 'em enough nitrogen. But they won't have the proper nutrient density.

I wanna establish the input as an amendment, not as a fertilizer, to fill the void in the soil so we get proper nutrient density in the crop. We gotta have nutritional density. And we've gotta get the density up and the pesticides residues down.

It's a challenge. And not understanding controlling bacteria cost me quite a

few years out there and even some of the farms transitioned because some of them had too much liquid manure and they were tryin' to compost it. But they had too much alfalfa, which most dairy farms wanna feed alfalfa.

We were tryin' to switch 'em to grass. We were tryin' to use the liquid manure to make the grass grow. And we were keepin' the system too bacterial dominated, even on some organic farms. The whole thing wasn't working.

Again, the broadleaves, Gabe got onto that and he expresses it fairly well, because I'm one of those stubborn farmers too, that's maybe hard of hearing at certain times. But he got through to me.

And when I took that back and started lookin' at the history, and started to looking how broadleaves are used, the light come on for me. But that was more recently, actually, that those last pieces come together.

And then, I was onto the thing in the Lake Erie basin, 'cause I've traveled Ohio since I was a kid, watching those changes. But Gabe's process will change that, too. But I'm also sayin' we not only gotta change the water, we've gotta make people healthier.

And we've gotta decrease this outbreak of degenerative disease that we're dealing with. And it's actually a little bit epic, and it's a little bit epidemic, in degenerative disease. And that relates back to the nutritional density. And I work off the principle that most all degenerative disease is mineral deficiency.

**Cliff Scholz:** From what I'm hearing you say, in order to get the phosphorus working in the soil, you just covered the piece about adding broadleaf crops and/or cover crops into your rotation. We heard about reducing nitrogen inputs from fertilizers and plant sources, even.

There's the piece about adding higher-carbon compost sources and higher-carbon manure sources, which would be more on the cattle side, for example, than the poultry side. Is there anything that I missed there? Did I hit the main points for raising the organic matter / fungal component to bring the phosphorus in again and raise that nutritional density?

**Joe Scrimger:** I think you're hitting the right points. In the phosphorus cycle... we all know about a nitrogen cycle. The nitrogen cycle makes growth, and we have to have that for a certain percentage of that protein. But part of that protein is supposed to be made with the phosphorus system working.

And the phosphorus system actually mobilizes other minerals into that plant. It's used and reused. But you have to have a certain amount of that, especially in the colder climates of Michigan. Especially to start in early spring.

You don't have to overdo it. But you've gotta have it addressed, otherwise we end up relyin' on nitrogen. And too many farmers are doing that across some of the organic deal and across some of the regenerative. And it's real. And in the short term, it's a crutch we do.

I admit I would recommend extra nitrogen on the start to get the farm goin' and then wean it down. And then don't work on the phosphorus first because you'll stall the soil out. If you try to build fungal first, you won't have enough bacteria to do the base digestion.

So you gotta get those bacteria up. And when I make that statement about minerals, some people will say, "Well, that's not the problem, digestion is." And I've made this statement about digestion. It's just that if you have a digestion problem, you're not metabolizing the minerals properly.

So it ends up bein' a mineral problem. It's sorta like we got this phosphorus problem, and yes there's a phosphorus problem, but it's because we're mismanaging nitrogen. But really, the soil has a digestion problem.

The U.S. public, what's the number one drug by weight, volume, dollars, et cetera, used in our United States, what's sold by drug stores? What is it?

**Cliff Scholz:** Tums. Is it antacids? Or is it—

**Joe Scrimger:** Yeah--

**Cliff Scholz:** Laxatives? It's gotta be one of those two.

**Joe Scrimger:** Yeah. Well, it's antacids.

**Cliff Scholz:** Uh-huh. Figures...

**Joe Scrimger:** There's more money spent on antacids than there is on heart medicine.

**Cliff Scholz:** Uh-huh. Yeah, that totally makes sense—

**Joe Scrimger:** So the problem is digestion in the farms and in humans. And you end up with a mineral problem. You end up with a mineral shortage. But that problem started because the minerals are goofed up. You see what I'm sayin'? You gotta go back to when that problem started. So that's why we have—

**Cliff Scholz:** You know, hardly anybody's gonna talk about soil digestion and its parallels with human digestion, and the fact that you end up with parallel problems in both those systems. Or very few people that you're going to talk with in any world.

Because the medical world isn't lookin' at this and the agricultural world is trained not to look at it this way, too.

**Joe Scrimger:** I see what you just said. And the medical people, the soil scientists, I appreciate them. I get quite a few pieces from them. Just they don't understand the whole thing. So right now it's very key, the things you're workin' on, and others, and those biodynamic farmers.

We need better leaders. And one of the things they discussed in the Michigan AgriBusiness program the other day was leaders. And, a leader has to be able to deal with a volatile situation, figure it out, come through it, and be able to share it.

And I'm only getting part of that process right. I sorta have a lot of it figured out. How to share it is a challenge yet. But, I'm gonna continue to work on it. And I know I'm ahead of other people that... I'm not begrudgin' their degree.

I appreciate it. But some of 'em are just too specialized to connect all the dots. I had Eliot Coleman come into Michigan State to speak way back in the late '70s the first time we had him in.

And he made that statement. He says, "Well, the problem here is that the only thing that connects the departments at most ag colleges is the septic system," you know? They are not connected above, you know, on a human basis.

They're competing for dollars. They don't share things. And so I was never in that world. I don't have to fight for grants. I had to fight to survive. But I figured that out quite a few years ago. And I don't have to wait until I get another grant to do this.

And I don't have to delay the process for 15 years. I'm not the only one that's ready to do this. I'm very capable of having other professional contact, and good associations with other professional people that we work together with. And we're gonna lead ahead of a lot of the other system. It's our job.

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