



Soil Education Course Chapter 4 FAQ

Session #16: Tilling & Regenerative Practices

- 1. Q: Would you say the health impacts and environmental issues of using 24D would make tilling a more preferential option? When would you say using these kinds of pretty terrible herbicides ...actually make sense?**

A: My personal preference is (we'll talk about this more) actually a little bit of IPM integrated pest management -- My preference is biological first. Determine what is the problem, what is it that you're trying to solve or what you're trying to accomplish, find a biological solution, that's the first step: Building soil health and making things resilient. The next one would be mechanical or physical management of those. I'd rather see it tilled than a spraying of herbicide, chemical applications would be the last choice. It's just basic IPM practices.

- 2. Q: For the gardener, would a field fork be a recommended practice that "opens" but does not invert the soil layers?**

A: Yes, field forks are great. In fact, we're talking to somebody in Montana that has a food forest, and rather than tilling the soil to open it up and aerate it, they're going to use the field forks. If the soil is soft enough to work that way, it's a great solution.

- 3. Q: How does roller crimping actually work? By cutting just below ground?**

A: Yes, so, what happens, I guess you could say, is if you roll it, it breaks the stem then that basically kills the plant. That usually happens right above or right at the surface. I suppose it depends on the crimper that you're using.

- 4. Q: What would you consider a reasonable amount of tillage each season without knowing anything about someone's soil? Or, could you even make that statement?**

A: It's pretty impossible to say what would be the best choice. It really depends on so many factors. This is where we start getting into the complex nature of the system because it turns on the soil properties, the soil biology, the crops that you're working with, the problems you're trying to solve. What do you think tilling will fix for you? It's hard to say.

I've worked with corn down in California, where they till the soil in the spring to break it up. But they usually did it too soon, and everything was too wet, so they had these big, giant clods of clay. They'd go in and they break up those clods of clay and they harrow, and they might go in again and disk it, then furrow it, *then* they plant. Then they cultivate and till up the soil in between the rows. In the fall after harvest (of course the harvest which is pretty hard on the soil as well.) they go in and till all the residue and rake off whatever's left, so they actually remove all the organic matter, roll it flat, and then they seal it with the chemical. So all the water in this winter runs off, how exciting is that? I mean, that poor soil was literally powdered sugar. It was junk, it was so bad. And in one season, we went from that, to: "till the soil *just* enough to get the plants in the ground." Basically, we did a little furrowing, got the plants and the ground, and then left it alone, and they had a great crop. And they didn't need to do all that. So you'll learn what works best for you.

5. Q: I understand about the non disruption of the soil, but is it that the fungi is destroyed? What happens to the other organisms when soil is disrupted?

A: You lose protozoa and nematode populations, you start getting more ciliates. It disrupts the natural nutrient cycle, and can collapse the aerobic conditions, causing an increase in bacterial activity. So, not just the fungi is disrupted, but it throws off the entire system. The natural nutrient cycle progresses, but it produces undesirable nutrients in the soil.

6. Q: I have access to some highly fungal compost - made from fish and wood chips - made by KIS. Would it be useful to put some of this around some of my Rhodies or roses that are not still doing well? What about a layer of that in a new bed I am prepping for lavender?

A: That compost sounds great, I know the folks over there and they have good material.

7. Q: Should I water after I spray ReVive on the grass? Deep or light?

A: I moderate watering with or shortly after applying ReVive is just fine.

8. Q: How long after applying herbicide should I wait to apply ReVive?

A: ReVive could neutralize your herbicide (depending on what it is made of). Find out the official half-life of the product, for example, Round-Up is 13 to 17 days. Give the herbicide a chance to do it's work, then follow up with ReVive and maybe some extracts or ProVive to restore unintended biological damage.

9. Q: On the rose example, you specified Soil ReVive, but not fish... Should I add a small amount of fish also?

A: Fish, early in the growing season, can be great for the Roses. A 1/2 cup per 1000 square feet should be just fine.

10. Q: I have some biological control such as a bacillus strain for blackspot on the roses. Should I use that (or anything else) this fall to help mitigate blackspot in the spring? It says to apply it every 3-7 days to be effective, but this makes no sense to me. Maybe that is for roses that do not have a good biological environment to begin with?

A: Many of those kinds of pesticides/fungicides are derivatives of the biology, and not the biology itself, check the label for what is actually in the product. They are usually not too good at pre-emptive treatment, you would be better off with something like ProVide for a Fall application. Then treat in the Spring if the disease appears.

Session #17: Compost Overview

1. Q: Are the inactive F or B in a dormant state? What "wakes" them up?

A: Yes! That's usually what happens. The bacteria and fungi go into a dormant state. Moisture and other types of bio stimulants can wake them up. So adding water, putting them into the roots of a plant with the root exudates, adding the fish, kelp, humic acid, and other types of amendments can help them grow.

2. Q: Do we mix (till) compost into the soil, or leave on top of the soil?

A: Depends on you and your practices, and the timing of the application. There is really no simple answer because sometimes you want to work it into the soil, and sometimes you don't. That's really case sensitive. I recommend setting up a consultation call and we can go over your project's specific needs and timeline.

3. Q: What are we looking for with Ca:Mg? Do we want 6:1 or 8:1? What if it's off?

A: The calcium to magnesium ratio in a compost is hardly relevant. When you look at them, it's 2.3% to 1.1% calcium to magnesium. That's a pretty broad thing. But there's so much fungi here. It's all mostly about biology. What we're making sure of is that it's not too excessive. 2.3% calcium is really great. I don't think that using compost to balance calcium and magnesium is necessarily a good idea from a chemistry perspective, but that fungi can be very helpful to make that happen.

4. Q: How long does it take for compost to mature?

A: Anywhere from 6 weeks to 1-2 years. It depends on the kind of compost, materials used, the C:N ratio, and the process you use (thermal, static, etc.). We'll go over this next week.

5. Q: Is what grows on the compost truly an indicator of any sort? What kind of plants that grow on a compost pile that is curing?

A: Sometimes if you're making thermal compost, and you're not quite getting the heat up enough, the weed seeds aren't getting destroyed, you could have weeds growing. Plants shouldn't be growing from seed from a compost. That's an indicator that maybe it's not getting hot enough, or not getting mixed up enough that it destroys those weed seeds - or the plant seeds in that case. So, yes, that could be an attributed issue. We can talk about that in detail at some point.

6. Q: If you use plant/grass material that has used chemicals, does this show up in your compost?

A: Yes, some chemicals will show up. Knowing what you're working with and what your sources of material are can be really important and also watching for symptoms because

what it's showing up is some of the insecticides. So like I haven't heard of an herbicide, showing up in compost or fungicide. But I think it's called chlorperalid, which is an insecticide, that is the one thing that I know has been showing up. Some of the dewormers. So like if you're using animal manure waste, if you've got horses or cows on dewormers, those dewormers can have a negative impact on your vermicompost. So that's more of a pre-compost process. That's the nice thing about worms, we'll talk about them next week, but worms are great because they're very communicative, they will let you know when something is going wrong, pretty readily.

7. Q: If the compost goes dry, will life return with water?

A: Yes... Usually it does. If it was well made to begin with, and then dries out... and a lot of people try out their compost or even pelletize it. And once you've introduced water and in a habitat where the organisms can wake up and grow then, usually they usually come back.

8. Q: Would the rest of the compost be considered okay? Is it just the black layer that is no good?

A: In this specific case, the rest of the compost was pretty OK. They had it fairly well separated. They had an anaerobic zone that was fairly isolated because it wasn't even getting moisture. There was some real clear physical separation in the process. The rest of the material above it was in pretty good shape. But that's not always the case. It does require some paying attention and testing. We talk more about those processes when we talk about making compost.

9. Q: How about the bokashi method of composting? It is anaerobic... but folks seem to have success. Same question with KNF (Korean Natural Farming). Will we maybe cover this next week?

A: Technically, those are not compost. They are VERY valuable tools, however. It makes some really interesting fungi. KNF is where they do natural composting in the ground, it is very aerobic. By definition, as long as it's aerobic, it will be compost. If it's not aerobic, then it's some other type of ferment - which is perfectly fine. I just want to separate the difference between compost and something else. If it's not aerobic and not decomposed, organic matter then in an aerobic biological state then technically it would be compost. So, and I won't go into details on these things next week but I think there's a session where we talk about a lot of other practices. I'll touch on Korean Natural Farming. I'll touch on Biodynamics, which also does a lot of ferments, and other types of preparation that are, again, these are all valuable tools, but you just have to understand that it may not be what you think it is, and there are some potential hazards. It is very easy to mess up the bokashi method, and make something horrible by accident!

10. Q: When I smell ammonia in my compost while it's most active while I'm turning it, is that problematic? The piles are highest around 150 degrees. Are you talking about finished compost here? (Yes)

A: During the composting process, it's going to go through all these different phases. We're talking about this finished, mature compost. If you think it's finished and mature and you get those smells, that's a problem. If you're smelling those things in the process of making the

pile, that's normal as it goes through its cycle, you just don't want it to get stuck there. It's also an indicator while you're going through that process that there may be some anaerobic phase going on that does happen during, especially in thermal composting early stages, it's scattered and burned through a lot of those nutrients, while those thermophilic microorganisms are processing that material.

11. Q: Can fish waste produce E. coli in your compost? Farmed fish vs. Natural?

A: That's a great question. Is there E coli in your compost? Is there E coli in the fish? If the answer to either of those questions is yes, then the answer is maybe if the answer is no, then the answer is no because you can't grow what is not there. Unless you made it yourself, commercially available fish composts/fertilizers will not have E. coli. They're homogenized, the pH is so low (they usually stabilize it to 2.5 to 3% or less pH) and that pretty much wipes out any biology.

I'll follow up really quickly on "farmed fish versus natural." That's almost as political as anything. The reality is that once you have a fish and you process it for making a fish fertilizer, it would probably be impossible to tell the difference between the two. Because of that, it doesn't get processed the same way as if we were to eat it. I can tell the difference between farmed and fresh, caught or wild caught fish, just by looking at the actual fish. But as far as like, whether it's important to have it, I don't think there's any real difference other than, if that farmed fish is raised in an organic way, or as opposed to a chemical way, there may be some differences in the protein content, and some of the nutrient density of that fish. So I don't know - it may or may not be an issue, I think that's probably more personal preference at this point.

12. Q: What happens if you apply compost that is not mature?

A: Great question, because it varies a lot. Sometimes what will happen is that because the biology isn't finished cooking, if it's still processing a high level of nitrogen, it will start sucking nitrogen out of the soil. It could steal that away from the plants so it could cause nutrient deficiencies. A common thing to happen is that the compost just steals nitrogen out of the soil. The other thing that can happen is that those toxins can get into the soil and, like alcohol for example, even as little as one part per million in the root system of the plant. It can solubilize the root and kill the plant.

Session #18: Compost Processes

1. Q: Why do oats encourage fungal growth? I use oats in my teas to encourage fungal growth but do not know why?

A: Those complex carbohydrates come from the oats and the grain, so you want whole grain. That's why we say steel cut oats-- because it has the germ. It has oils, and fungi love that! It's fungal candy, if you will. Molasses is simple sugars that feed the bacteria, the oats is a complex carbohydrate that will help feed the fungi.

It takes time though. I mean it's not something that I would recommend that you put into your teas directly. It's something that you can feed your compost. Short term, with a mature compost that's already made, you can feed the oats to it and might take a couple of weeks

for it to start breaking it down and grow. But in the case of the static compost, we're giving it a whole year, and we're giving it whole grain.

- 2. Q: I have two large garbage cans filled with yard waste accumulated over several years. The top few inches smell fine... but I expect the bottom half of the cans might be anaerobic. How do I turn the anaerobic material into something useful?**

A: Incorporate it in 10-15% and combine anaerobic material with aerobic material. It could be very toxic, so dilute it and slowly work it into the pile. So get some wood chips, get some fresh waste, and combine them together and actually go through a composting process, you should be able to recover some of that material so you can, you can start with anaerobic material and convert it, if you will. But you can't use too much of it because he could be very toxic and you want it to get diluted and only use so much of it. The other option is to dump it on a weed patch and let it kill the weeds.

- 3. Q: Any tips or recommendations for shredding plant material/weeds, straw, and cardboard in a small backyard compost pile? Lawn mower, small chipper?**

A: Machete! Chop it up by hand, wood chipper! Anything that you can use. You can use anything to chop that stuff up. I don't have any specific recommendations. There are so many tools out there. Just be careful, obviously.

- 4. Q: How can you tell if commercial composts are any good before you purchase it?**

A: I'd recommend watching last week's session. Go by smell, sight, and feel to determine if it is good. Use the squeeze test: implement field testing! Obviously, you can't tell if it has E. coli from those methods. But if it fails most of those tests, chances are greater that it'll have a disease.

- 5. Q: Is it common to add any minerals while composting? calcium, azomite, basalt, granite dust?**

A: I don't subscribe to that at all. It is organic matter that we are really looking to add. Once the compost is finished, and you know that your compost is lacking a certain mineral, you can add it in and let your biology eat it. Slowly integrate it into the pile and then apply the compost. That can be fairly efficient if you have the means, but only do it in small doses.

- 6. Q: If you put non-organically grown material in your compost, but compost organically (no more synthetics), can you call it organic? (Such as material grown with fertilizers)**

A: You'd have to define the non-organic material you're adding to your compost. But yes, conventionally grown material can be converted into an organic material. Conventionally input materials processed properly can be considered organic at the end of the process. There's only a few chemicals that don't make it through that. That's another reason why I think that the organic standard is a little short because they don't test for those types of chemicals.

Session #19: Compost Tea & Extracts

1. Q: Are there any nutrients in the compost teas or brews?

A: Oh, yeah. So, whatever soluble nutrients might be in those teas and in the compost you can get some soluble nutrients, but it's gonna be really light. So, think about dilution of nutrients. If you take half a pound of compost into five gallons of water, how many nutrients are you really going to get? It's going to be really nominal. There's a little write up on water extracted from humic acid so there's a prevailing commentary out there that if you just run water through compost, you can get humic acid, and there is no reason to buy it. There is no scientific evidence that shows that running water through compost makes humic acid. I found an article where they extracted the humic acid content from compost using the standard methods and it ranged anywhere from half a percent to 4 or 5% using chemical extraction processes. So, you don't get a lot out of compost in that fashion. So, yes. There's some soluble nutrients you might get a little bit of nitrogen and some other soluble things, but it's pretty nominal as a fertilizer. I don't recommend it. It's not really its intent, it's supposed to be introducing biology.

2. Q: How much dilution, if any? Can the tea be diluted for application?

A: Let's use ProVide as an example here. If you need 10 gallons per acre, and your equipment sprays out 12 gallons per acre, then add two gallons of water. Water can be used as a carrier. It won't hurt anything, it comes down to getting the biology in the system. The amount of water you use to do that is not really important. That it's helpful when you're doing larger scales too, because you have to pivot. Some of those pivots are putting out tens of thousands of gallons of water over the course of 36 to 48 hours and you've got a thousand gallon holding tank... so you'll need a lot of dilution.

3. Q: I was reading about compost teas and it was mentioned that one should not use molasses for a compost tea?

A: Molasses is simple sugar and if you want a lot, **a lot of** bacteria, you can use molasses. The researcher (and some of the research) that said that, said the molasses caused E. coli -- that was the research. And so, you don't want to use molasses because it'll grow E. coli. Well, it turns out their molasses was contaminated, so of course it'll grow. And if you put molasses in with a compost that has E. coli then for sure it'll grow. I almost never recommend molasses, or simple sugars of any type. Most people don't need more bacteria. That's really the last thing you need. So, don't encourage it and there's no need to expand upon it. So, it's not that you can't use molasses, it's just that you need to be conscientious about it, think it through, and ask: "do I really need a lot of bacteria?" If the answer is yes, then use a tiny amount and it's probably going to be fine.

4. Q: Is fulvic acid a "food" for the compost tea?

A: My understanding is that Fulvic Acid is just a lower grade version of humic acid, so the carbon chains (and we'll get into this a little more in a couple other sessions) But, humic acid is a really complex carbon chain. Fulvic Acid is a more simple version of that, and one of the definitions is soluble at all pHs. So it can be a good component in the process, especially if

you're combining it with nutrients because there's a lot of building evidence that fulvic acid along with some fertilizer applications has a really compounding effect. Something to think about. But as far as a food, I've never really used fulvic acid as a direct food source. Although we know it's in some of the things that we work with more focused on the humic acid component.

5. Q: Best food for fungi?

A: The best food for fungi is Soil ReVive. ReVive is the combination of a lot of the foods that we talk about. This includes humic acid, kelp, complex carbohydrates, amino acids, things like that are working together to help feed the fungi. Fish hydrolysate can also feed fungi. It can be a very good fungal food, but it also feeds bacteria and sometimes it feeds the bacteria a little better than the fungi, and you have some issues, competition. In compost, you can feed the compost oats, but that takes a couple of weeks, (a week to two weeks) for it to grow out like that. So you want something nice and soluble that is readily available. That's the reason I created ReVive -- we needed something that was easy and consistent to use for feeding the fungi and the protozoa. So a lot of our work shows that it also feeds the protozoa. There's a lot of variations on all of that.

6. Q: I am a corn, soybean, milo farmer/rancher in Nebraska just beginning to work with biologicals. What is a good way to get started? What should I expect to see with the use of compost tea or ProVide/ReVive?

A: Our hope is that the education in this series allows you to learn what the best way for you is to get started. Testing tells us where you're at, we add and start building up the biology and you get the benefits of improved nutrient cycling, reduce disease pressure, opening up the soil, and water holding capacity. All of these are benefits of using these kinds of products, these are tools to help rebuild your soil and build it up, get the biology working. So all of those benefits are possible whether you decide to do it yourself, or whether you use products that are already out there. And again, we will talk about these in a little bit more detail. So, the goal is based on what you're trying to accomplish, what you want to see happen. Some people want to just reduce their fertilizer inputs, or they want to be able to reduce the amount of herbicides and pesticides they use. Or, they just want a better, healthier soil and water holding capacity.

So the last official session, or second to last official session is actually going through a process of -- kinda going through a worksheet to address that. Like how do you transition, what are your goals, what are your objectives? And then we'll work with you to help figure out what kind of testing and what kind of products make the most sense.

7. Q: Without testing, is there a way to tell if your tea is bad?

A: It will smell bad! It can't televise smell if it's really good. smell is probably the best way. There's no other real way to tell. You can't touch it, you can't look at it. If you have your own microscope, and I know a lot of you do, if you've taken those online classes, and stuff. Look for ciliates. That's probably the biggest indication -- if you see a lot of the ciliates running around. And those are the ones with the hairs all the way around them, and they move really fast. If there's a lot of those, it's probably not a very good tea. It's gone anaerobic.

- 8. Q: In most conventional store-bought humic acid products I know that it is extracted from leonardite via strong bases... Do you possibly have any insight into this? I've heard a lot of arguments on the "not possible" side but virtually no answers on the other side.**

A: While it is true that compost contains some components of humic substances (humic and fulvic acids), it is a very low fraction. Even using "normal" chemical extraction methods you can only expect to get 0.5 to 5% humic acid. I have not found any scientific literature supporting the idea that using water is an effective method to remove humic acid into solution from compost.

Now, this is not to say that there are no benefits of doing this. Fulvic acid tends to be much more soluble than humic acid, also the soluble nutrients and of course the microorganisms. These can provide great benefits to the health of the soil and to the plants. For some additional thoughts and references this article may be of interest to you:

<https://www.biocycle.net/compost-and-humic-substances/>

- 9. Q: To improve fungal ratios, do you add Revive at the start of the brew or when it's finished?**

A: If you want it really fungal then pre-treat the compost with ReVive, then add the ReVive into the brew as well, at the beginning.

- 10. Q: How much ReVive should we use (per 5 gal brew or per cup of compost)? And, how long is the pre-treatment process?**

A: For every 1 pound of compost you wish to pretreat, add in 2 ounces of Revive, let sit for 2-4 days, until you see good growth on the surface. For tea brewing we recommend 2 ounces of Revive for every 1 pound of compost, added at the beginning of the brew cycle.