

## Transcript of Episode 012 of the Plants Dig Soil podcast – “Simplicity in Cover Crop Mixes”

Hello! This is Scott Gillespie and welcome to the second season of Plants Dig Soil. In this podcast, you will learn ways to transition from conventional to regenerative practices in agricultural, horticultural, and home gardening systems.

[Transition Music]

Cocktail cover crops are all the rage in cover crop discussions. Farmers and seed companies have their own special blend that is purported to have all the benefits that you need for your farm. But do they work? What do real-world farmers say about them? Does the science back them up? From the title of this podcast you should pretty well be able to figure out where I stand on this discussion but come along with me as I explore the issue.

Let's start with defining what a cocktail cover crop is. You'd most commonly hear the word cocktail applied to a set of drinks at a bar, nightclub, or social club. The Oxford Dictionary defines them as “An alcoholic drink consisting of a spirit or spirits mixed with other ingredients, such as fruit juice or cream”. Go to a browser and type cocktail into a search engine and you'll find hundreds of different mixes. In the cover cropping world cocktail cover crop blends are mixtures of different species of cover crops. Typically blends will be as low as 6 species but I have seen some get to over 15 different species.

Before going too far into this discussion you may be wondering what a cover crop is. I define a cover crops as plants that are established on your land to help defend the soil with no intention of harvesting them. The most common purpose is to hold the land in place from wind or water erosion. The second most common purpose is to help prevent weed seeds from establishing. If you want a more in-depth discussion on cover crops go back to Episode 009 Beyond Cover Crops<sup>1</sup>. In that episode I expand on the discussion into soil crops – those that not only defend the soil but start to build the soil.

Your very first question when deciding whether to plant one of these blends should be: “Can I kill all of this?” You should be thinking beyond the expected termination date. Most plants in my area will be winter-killed due to temperatures normally dropping below -25C (-13F) for at least a few weeks in the winter. What happens if some of the seeds sit dormant and don't germinate until the following year? Hairy vetch is famous for this. What happens if some of the plants set seed in a very short period? Buckwheat commonly does this.

Related to this question is “Will this cause problems for me in a succeeding crop?” Tillage radish is touted as a must-have cover crop for your land to break up hard pans. However, in my area, it could cost you a seed canola contract. Early in its growth it looks similar to seed canola and will be extremely hard to rouge out if it is not killed by the herbicides. If it manages to flower and set seed, it will contaminate the lot.

If the blend passes these two questions, there are two approaches you can take. One is to plant the diverse mix hoping that at least something will grow. The other is to break it down to the components that you think are the most beneficial to your field and plant that.

In the early stages of cover cropping the first approach may be a good way to start. This will give you an opportunity to evaluate what works on your land and what doesn't. Don't just plant it and forget it. Don't just drive by, see the green, and assume it works. Go out and look and see what has come up. Make sure you can identify the species before going out. Go to different areas of the field and see what works. Perhaps the drier sand hills have a different established mix than the wet areas at the bottom of the hills.

In my experience I've seen 1-3 species dominate the mix, no matter how many were initially planted. Even if you can find them all, do the stragglers justify their existence? How much did these species add to the cost of the mix? If the 3 species that dominate make up half the cost, why are you planting the rest?

A good next step from this is to pair down the mix to the top performers. In the following year, plant this modified mix but still try the cocktail mix in a small area to see if weather changes what thrives. Another way to test this blend is to change the ratios of the seeds. Perhaps the dominating ones were seeded too heavy and the ones that were choked out weren't at a high enough rate.

[Transition Music]

Before moving on, I'd like to take a short break to review what we've covered so far. Cover crops are simply plants that are established in the field to protect the field from harm. I like to think of them as defensive – holding the soil in place from erosion and keeping out weedy invaders.

Cocktail cover crop mixes are a term to describe diverse mixes of cover crop seeds. Rather than planting a single species – a monoculture – the idea is plant multiple species together so that you can get the multiple benefits of all species.

My caution is to ask yourself two questions before planting: Can I kill this when its purpose is complete? Will it cause me problems in following crop years? If you can answer yes to the first question and no to the second question, then you need to look at how you will approach the cocktail blend. I covered the first option already – that is to plant the mixture and observe what happens. Coming up, I'll cover the option of just picking the top performers and planting that.

[Transition Music]

When looking at cover crop options I like to follow a flow chart developed by Andy McGuire<sup>2</sup>. It is a series of 6 questions and at any point that you find yourself not being able to answer that your soil is healthy, you stop, and you address the issue.

The first question is: Does your soil blow or flow away? In other words, if you don't do anything, is wind or water erosion a real concern? Anyone who grows potatoes, carrots, sugar beets, or any other vegetable crop that must be dug from the soil will stop here, at least in the year of production. Goal #1 is holding onto your soil.

Potatoes are planted early but don't often emerge for 3-5 weeks. For early season protection you may need to be planting something in the prior year so that you have residue built into the hills as they sit there waiting for the potatoes to emerge.<sup>3</sup>

They are often dug later in the fall and leave almost no residue on the surface. In this case you can't be seeding slow to establish plants, plants that can't handle uneven seeding depths, or ones that can't handle cold temperatures or frost.

After potato harvest, cereal rye (also known as fall rye) is likely going to be the only option once you've passed your typical frost date. It establishes fast, it can germinate from near the surface to 3" deep, and it can handle the cold. It's often seen growing underneath the snow as it melts. Cereal rye has a very dense and fibrous root system near the surface of the soil. In terms of soil defenders there's nothing like it. It also produces its own herbicide to inhibit other plants from growing nearby it (also called allelopathy), making it a great defender against weeds. If you want to explore this further, I encourage you to go back to Season 1 and listen to episodes 003<sup>4</sup> and 004<sup>5</sup> on potato production and soil health.

The next question relates to the first: Does your soil allow water to soak in rapidly? This assumes that you are holding your soil in place. Water isn't flowing off the field, but it means it's ponding. The hilltops stay dry and low spots get the water the hilltops were supposed to get. And when too much water comes at once it sits in the low areas taking a long time to infiltrate.

If we are just focusing on the surface, this means that all we need is something that slows the water down and gives it a chance to move into the soil. Nearly any plant will work here – living or dead. You don't need a diverse mix of plants. You just need the least expensive seed you can find. If you have something that will establish fast and consistently, use it.

The third question looks a little deeper: Does your soil drain? Now that your soil stays in place, and the water moves in where it should, does the water go deep enough? A hard pan that is deeper than the tillage equipment can run will be best broken up with a plant that has a tough root system. This is where the much-touted tillage radish can have a place. Given a long enough growing season it can get large enough and grow deep enough that it can make a real change in the soil. When killed (by frost or by herbicide) it rapidly decomposes and leaves channels through the soil.

After the rains are done, the fourth question looks at the surface again: Does your soil crust? This can indicate a lack of soil organic matter, too much tillage, or too little surface cover. The best fix is to limit tillage but in cases of root vegetables where tillage is inevitable the solution must focus on organic matter. We don't need to be worrying about trying to create long-term organic matter that is stable for centuries. Just focus on super charging the system leading up to the soil disturbing crop.<sup>6</sup>

This could mean applying compost or manure. It could mean being sure every crop in the rotation also has a cover crop or soil crop. It could mean spending the entire year prior to potatoes growing a soil crop as a green manure. This organic matter that is added won't last long

but it doesn't need to – it just needs to protect and enhance the soil until the potatoes emerge and can hold it in place.<sup>7</sup>

The fifth question covers nutrient flow: Does your crop recover most of the nutrients you apply? This could mean synthetic nutrients, it could mean nutrients from composts or manures, or it could mean nutrients assimilated or mined by soil crops. This is where a diverse mix may pay more than a monoculture. Cereal rye will take up a lot of nutrients that are left over from your cash crop, but it may not release them fast enough to the next crop. Tillage radish picks up nutrients very efficiently, but as soon as it's dead it can release them too fast and they can leach away in the new root channels they have created.

The final question covers disease and insect pests: Are there areas where plants die or grow poorly? In the example of the full season soil crop grown ahead of potatoes, mustard is typically grown for its biofumigant properties. It could be considered a bio-hack – lush, green growth is chopped into small pieces and immediately (within minutes) disced into the soil. The chemical it releases is toxic to most life below but seems to kill potato disease organisms more than the beneficial ones and thus benefits the potato crop in the coming year.<sup>8</sup>

[Transition Music]

So, should you plant cocktail cover crop mixes? If you can go through the six questions and determine that your soil is healthy, then, by all means, try to move your soil to the next level by increasing the diversity. Just make sure you have thought through the potential problems you could bring onto your farm in terms cover crops turned bad – weeds – and detriments to your coming crops.

Before I end, I want to highlight a report and an article that came out recently that can shed some light on the question of simplicity or complexity in cover crops. The United States Annual National Cover Crop Survey<sup>9</sup> indicates that very few farmers plant cocktail mixes. In 2019 70% of farmers used a simple mix of 2-5 species. Just over 20% of farmers grew six or more species in a mix – a cocktail mix – and just under 10% grew a single species cover crop.

Keeping it simple is backed up by a scientific review of cover crop mixtures vs monocultures<sup>10</sup>. In 9 out of every 10 studies there was no difference between the monoculture and the mixture. In other words, in the vast majority of cases, it didn't matter what was planted or whether it was a mixture or monoculture, the plants did the job they needed to do. Just pick what works for your area and fits your budget. In only 1 out of every 10 studies there was a significant effect when comparing monocultures to mixtures. Of these studies where there was an effect the monoculture was better 83% of the time and the diverse mixture only came out on top 17% of the time.

[Transition Music]

Remember to get local advice before acting upon this information. If you don't know who to talk to, get a hold of me and I'll help you find someone. If you're in my local area and are in need of help, contact me. It's always free to chat. If we get to the point that the scope broadens to consulting work, we can work out a plan that fits your budget.

Would you like to keep up with me through a free monthly newsletter? Go to [www.plantsdigsoil.com/contact](http://www.plantsdigsoil.com/contact) and select the newsletter option. If you haven't subscribed to the podcast yet please make sure you do that in your favourite app. If you're a long-time listener – will you consider leaving me a review? This helps others discover the podcast. If you know of someone that would enjoy this, please be sure to share it with them directly or through your social networks.

If you're still listening, you're probably like me and like to know what the catch is. Why am I putting out this information for free? The reason is that I love to learn, and I love to share the information. My knowledge has been built up from experiences in my own garden, advising farmers and agronomists in my consulting business, and from reading the latest books and articles on agronomy and regenerative agriculture.

I have a B.Sc. (Agr.) with an agronomy focus and a M.Sc. with a focus on Plant Science. Beyond my formal education, I have attained, and maintained, my Certified Crop Advisor designation and am a member in good standing with the Alberta Institute of Agrologists.

Nearly everything I talk about is from free resources posted to university and research organization websites. Books that used to be hard to track down are available to buy or borrow for nearly anyone with an ereader. The information is out there – sifting through it all is what takes the time.

I make my living entirely from consulting. I don't sell any products, software, or systems. I strive to be as independent and as unbiased as possible so I can provide the best advice to my clients and help as many people as possible move from conventional to regenerative agriculture.

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<sup>1</sup> Scott Gillespie. 2020. 009 Beyond Cover Crops.  
<https://www.plantsdigsoil.com/podcast/009-beyond-cover-crops>

<sup>2</sup> Andrew McGuire. 2019. Soil (health) evaluation begins by asking “What’s the problem with my soil?”  
<http://csanr.wsu.edu/whats-the-problem-with-my-soil/>

<sup>3</sup> Andrew McGuire. 2018. Green Manures, The Other GM crops.  
<http://csanr.wsu.edu/green-manures-the-other-gm-crops/>

<sup>4</sup> Scott Gillespie. 2020. 003 Re-Thinking Potato Production for Soil Health.  
<https://www.plantsdigsoil.com/podcast/003-re-thinking-potato-production-for-soil-health>

<sup>5</sup> Scott Gillespie. 2020. 004 Soil Health Leading up to Potato Production.  
<https://www.plantsdigsoil.com/podcast/004-soil-health-leading-up-to-potato-production>

<sup>6</sup> Andrew McGuire. 2020. Just-In-Time Soil Health.  
<http://csanr.wsu.edu/just-in-time-soil-health/>

<sup>7</sup> Andrew McGuire. 2018. Green Manures, The Other GM crops.  
<http://csanr.wsu.edu/green-manures-the-other-gm-crops/>

<sup>8</sup> Andrew McGuire. 2018. Green Manures, The Other GM crops.

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<http://csanr.wsu.edu/green-manures-the-other-gm-crops/>

<sup>9</sup> SARE. 2020. National Cover Crop Survey.  
<https://www.sare.org/news/2020-cover-crop-survey-report/>

<sup>10</sup> Andrew McGuire. 2020. Contrary Science; Cover Crop Mixtures, Monocultures, and Mechanisms.  
<http://csanr.wsu.edu/contrary-science-cover-crop-mixtures-monocultures-and-mechanisms/>