

535 Roots, Microbes, and Farmer Innovations

#RealisticRegenAg | In this month's roundup of regenerative agriculture news, I'll begin with a story about new research that delves deep into root architecture. The researchers conducted studies on intact samples of both single species and diverse mixtures of cover crops to understand how root systems behave in their natural environment.

Next, I'll discuss an article that explores the challenges of bringing microbial inoculants to the field. While these inoculants may work well in the lab, they often fail to deliver results in real-world agricultural settings. However, one team is making progress in understanding why this happens.

Following that, I'll highlight some innovative approaches by farmers who are using plants as strip tillers and employing sheep as solar panel vegetation managers. To wrap it up, I'll share a story about reimagining kochia, normally considered a weed, as animal feed that can thrive on your harshest land.

Welcome to Plants Dig Soil, a podcast about #RealisticRegenAg. I'm your host, Scott Gillespie, and I'm an agronomist from the western Canadian prairies specializing in climate-smart agriculture. I discuss scientifically proven practices that benefit the planet and, just as importantly, farmers' economic sustainability. Be sure to visit my website, www.plantsdigsoil.com, for resources and information about the services I offer.

Resources mentioned:

<https://www.plantsdigsoil.com/podcast/012-simplicity-in-cover-crop-mixes>

<https://phys.org/news/2023-09-agriculture-crops-mixtures-unexpected-results>

<https://www.producer.com/news/study-examines-how-competing-microbes-access-plants>

<https://www.agcanada.com/2023/09/getting-plants-to-do-your-tillage>

<https://www.realagriculture.com/2023/09/profitable-practices-solar-grazing-with-shady-creek-lamb-co>

<https://www.beefconsultant.com/post/including-kochia-in-cattle-rations-1>

Transcript is available:

<https://www.plantsdigsoil.com/podcast/root-microbes-farmer-innovations>

My course: Profitable From the Start: Cover Crops for the Prairies:

<https://plantsdigsoil.thinkific.com/courses/cover-crops-prairies>

My funding service offerings:

<https://www.plantsdigsoil.com/pricing/#paperwork>

SCAP overview: <https://youtu.be/0icitHJR2Ik>

SCAP program details <https://www.alberta.ca/sustainable-cap.aspx>

My consulting packages:

<https://www.plantsdigsoil.com/pricing/#consulting>

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Root Research

Have you ever heard cover croppers talk about the advantages of diverse mixtures in soil exploration? They often emphasize how diverse mixtures explore more soil and create synergistic effects below the surface. This perspective differs from research studies that often recommend single-species or simple mixtures. I've covered this before in episode 012 Simplicity in Cover Crop Mixes.

A team of researchers set out to delve deeper into this topic. Root research presents unique challenges because the only way to observe roots is to dig them up. However, this disrupts their spatial location and interactions with other roots. To overcome this, the researchers collected intact 'bricks' of soil and meticulously separated them to gain insights.

They made two fascinating discoveries. First, when you pair a shallow-rooting crop with a deep-rooting one, they tend to explore their respective soil layers effectively. For example, oilseed radish delves deep, while cereal rye thrives in the surface layers.

However, when you consider the total root mass, there's little difference between a single-species crop and a mixture. In other words, planting just cereal rye results in a dense mat of surface roots, while planting only oilseed radish yields deeper roots. In a mixture, you get half the mass of roots of each. Instead of thick roots, you end up with thinner ones.

This aligns with an energy balance perspective, as there's a limit to photosynthetic capacity above ground. When you blend two plants in equal proportions, it naturally reduces the root mass below. This insight may explain why single-species crops are preferred for specific goals, such as weed suppression.

Feel free to share your thoughts and speculations on this topic with me by sending a message or commenting on social media, or through an audio message on Spotify or my website. Also, check out the full article in the show notes for more details.

Microbial Inoculants

Moving on to microbial inoculants, here's a common scenario: a lab identifies a microbe that benefits a specific plant. It shows promising results in controlled lab environments but disappointingly fails to deliver in field trials. What's causing this discrepancy?

One research team set out to unravel this mystery. They isolated microbial strains that individually benefited plants in lab tests. When they combined these microbes in sterile lab trials, the expected results didn't materialize. It appears that the mere presence of another microbe can hinder the desired response. This helps to explain why as soon as a microbe, that individually was good for the plant, comes in contact with multiple native species, it dies, or the plant doesn't want to make a deal with it.

These findings, though disheartening for the researchers, are valuable for future research. They shed light on the challenges of translating lab findings into real-world applications. As a result, I approach new products cautiously, as promising lab results don't always translate to field success.

Farmer Innovations

Now, let's explore a farmer-led innovation that addresses a common problem in areas where cover crops overwinter. Planting a cash crop in the following spring can be challenging due to the dense cover crop. Some opt for winterkilling cover crops, but this presents its own set of challenges, especially in wet springs as they tend to hold the moisture in place and keep the ground cool.

Farmers are combining these approaches by planting cover crops in strips. Winterkilling cover crops die off, allowing planters to easily clear the residue and sow seeds. Meanwhile, overwintering cover crops continue to pump out excess moisture, provide soil stability, and suppress weeds. If it happens to be a dry spring, they could be sprayed out early. They still may impact early season growth of the cash crop by light interference, but it would be less than a plant emerging in a completely enclosed canopy.

Unconventional Farming Practices

To conclude, I'd like to highlight a couple of articles that challenge traditional farming practices. In one, a farming couple decided to use sheep as vegetation managers for a solar farm instead of taking on more debt to buy grazing land. In this case they actually get paid to graze. There are challenges: the sheep need to be concentrated so they take it all down and they need to be moved often. They also need water, but they do get shade from the solar panels. This innovative approach benefits both the energy industry and agriculture.

Finally, what do you think of when you think of kochia? A weed? An eyesore in salty areas of the field? Why not make animal feed out of it? Testing it to know the salt content and other feed parameters can allow it to be integrated into rations or grazed directly. I'm not an animal nutritionist, but Barry Yaremicio is. Check out his article and get a hold of him if you need help with crops once they turn into animal feed.

In my life as an agronomist the big thing this week seemed to be responding to funding applications. There were two programs for this past year, and one ran out of money early and one just got going. For practices that were implemented this year the invoices need to be submitted to get the money back. It's

about now that farmers are winding down from the year and getting things organized. I expect fall fertilizer to be starting next week so I'm getting those plans in place. The most amount of my time was spent preparing for and teaching my classes.

Thanks for listening and I'll talk to you again next week.