534 Making Drip Irrigation Work

#RealisticRegenAg | Drip irrigation holds great promise as the most efficient method for delivering water to plants with minimal losses. Unlike traditional sprinkler systems that can be affected by wind and heat, drip irrigation offers a precise way to water plants. However, one of its main challenges lies in the amount of infrastructure required for its implementation. In this episode, I'll share my insights into maximizing the effectiveness of drip irrigation, exploring innovative approaches and local research that could potentially revolutionize its use, especially as we face dwindling water supplies and prolonged droughts.

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.

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If you've been following this podcast for a while, you may recall that one of my early episodes delved into the world of drip irrigation. Inspired by a YouTube tutorial, I attempted to create a drip system using PVC pipes in my garden. What I discovered was that drip irrigation works best in flat garden beds of modest size. Even the slightest change in elevation led to uneven water distribution, and when using long sections of pipe, the pressure at the end wasn't sufficient for adequate watering.

Several years ago, I eventually abandoned drip irrigation in the annual plants section of my garden area. It continued to work reasonably well in the perennial section, thanks to plants with extensive root systems that could grow toward the drip lines over time. However, annual plants struggled when I relied solely on drip irrigation.

Before we go too far, I want to clarify that the drip system worked when I had moderate rainfall. As a supplemental watering method, it kept the garden thriving. The key was that the plants had established roots throughout the soil profile. Before the soil dried out completely, an occasional rain shower every few weeks kept everything balanced. However, during a severe drought, this approach fell short.

The critical concept to grasp with drip irrigation is that it only wets a small area of the soil. In loamy or clayey soil, water can spread further, but in sandy soil, it tends to penetrate vertically. This means that, during peak growing seasons, you might need to run the system almost daily to achieve the equivalent of an inch of water covering the entire soil surface, which would penetrate to approximately 7 inches deep. With drip irrigation, you're looking at a surface area of more like 3 to 5 inches in a 24- to 36-inch spacing between lines.

During a field tour at Lethbridge College this past summer, I had the opportunity to learn about sub-surface drip irrigation from Dr. Willemijn Appels. This system involves burying the lines below the surface to allow for regular machinery use, like tilling and seeding. Dr. Appels emphasized the importance of staying on top of irrigation scheduling. While it's possible to moisten the root zone early in the season, once the plants enter rapid growth and the heat of summer sets in, it's nearly impossible to catch up.

In an ideal scenario, a supplemental sprinkler system could help during catch-up periods and aid in germination after seeding. However, this can significantly increase costs. In such a system, effective management of the sub-surface drip becomes essential to avoid the need for supplemental watering. To enhance early-season germination, experimenting with no-till or strip-till techniques might be necessary.

During another tour this year, I came across a cost-effective system that piqued my interest. Here's the concept: attach drag lines to a pivot system that dispenses water as it moves through the soil. This setup

allows for a transition from sprinkler irrigation to drip irrigation as needed. In the midst of the growing season, occasional use of sprinklers can supplement drip irrigation when necessary. This system offers a significant advantage in windy climates, ensuring effective watering even when gusts are strong.

However, I have concerns about disease transfer with this system. There's a possibility that the lines could inadvertently spread diseases from plant to plant, particularly during high-disease-pressure years. On the other hand, relying solely on drip irrigation keeps foliage dry, making it harder for diseases to take hold. Another potential drawback is the wear and tear on pivot systems. Aftermarket modifications for pivots designed to pull equipment through the soil might work for many years, but the cumulative effects could add up over time.

Returning to my garden, I've went back to using drip irrigation. I reconfigured the pipes to minimize length and ensure that they follow a mostly downhill path for even row watering. I keep a sprinkler on standby for when the drip system lags behind, although I used it sparingly. One intriguing observation this summer was that after the vegetables had germinated, established, and weeds had been managed within the rows, the weeds in the pathways hardly grew. This meant that my plans for a living cover crop didn't pan out as expected, but the pathways remained mostly weed-free.

As my region faces impending water restrictions in the coming year, we must explore new and improved methods for efficiently delivering water to our land. Historically, flood irrigation was only about one-third effective, with two-thirds of the water wasted. Sprinklers and pivot systems doubled the efficiency, primarily saving labor. Drop tubes with lower pressures and larger droplets further cut losses in half, reaching around 85% efficiency. Achieving that last bit of improvement will require substantial investment and infrastructure. However, given the current conditions and the imperative to use water more effectively, I anticipate significant changes in the years and decades ahead.

To end off the episode I’ll give a quick update on the life of an agronomist. My week has mostly revolved around coordinating soil sampling. October is the optimal time for soil sampling, as the soil temperature falls below 5°C, halting most microbial processes. However, due to the need for potato land preparation to start immediately after harvest, usually in late September, soil sampling becomes a priority at this time. As soon as I receive the results, I'll be working on fertilization plans for any fields that require it this fall.

While fall fertilizer application is discouraged in many areas due to potential losses, our semi-arid climate allows us to safely incorporate it into the soil. With potatoes, the fertilizer is spread on the surface and immediately buried in the hills for the following year. This keeps it at a depth of 6 to 12 inches, protected by frozen soil until planting in April.

I’ve also been fielding calls from prospective clients, both locally and further away. Fall is an excellent time to start working together as it allows us to reflect on the current season and make plans for the upcoming growing season during the winter months. If you've been a longtime listener and are wondering if working with me could benefit you, please don't hesitate to get in touch. Physical distance isn't an issue; I live in Taber, Alberta, Canada, but we can easily collaborate through email, phone calls, and video conferencing.

Finally, teaching remains a significant part of my schedule. I travel to Lethbridge College to teach on Tuesday, Wednesday, and Thursday afternoons, and the preparation time keeps me busy on those days as well. It's incredibly rewarding to teach students and learn from them, keeping me sharp in the field. Thank you for listening, and I look forward to sharing more with you in next week's episode.