524 The 27-Inch Precipitation Threshold: A New Rule of Thumb for Cover Crop Economics.

#RealisticRegenAg | Twenty-seven inches of precipitation is what is required to make cover crops successful. This was the conclusion of an article I came across from a post by Dr. Andrew McGuire a few months ago. I downloaded the journal article and read it. It makes so much sense to me. Join me as I discuss this important new rule of thumb for cover crops.

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In the realm of cover crops, I often hear claims that they work universally and that farmers simply need to put in more effort to integrate them into their systems. However, I have always suspected that there's more to it. In Alberta, where we have a short growing season and limited rainfall, a recent study has shed light on the crucial threshold determining when cover crops are effective and when they are not.

This study employed a meta-analysis approach, combining and standardizing data from 38 previous studies to obtain an overall perspective. By cutting through the noise, the researchers reached a definitive conclusion.

To quote directly from the article's abstract:

"On average, cover cropping reduced cash crop yield by 7%, soil water content by 18%, and soil mineral nitrogen by 25%, with significant variation across climates, soil types, and crop management conditions. Subsequent cash crop yields changed by +15, +4, −12, and −11% following cover crops in tropical, continental, dry, and temperate dryland climates, respectively."

Let's delve into these findings. Overall, cover crops led to a 7% reduction in cash crop yield, although this is an average figure that masks regional variations. To account for this, the researchers classified the studies based on tropical, continental, dry, and temperate dryland climates.

Before we proceed, let's establish what constitutes a cash crop. It refers to the crop grown by farmers for the purpose of sale or use elsewhere, either directly generating income or serving as animal feed. Even when a crop is intended for feeding livestock, it qualifies as a cash crop since the farmer avoids purchasing feed, resulting in monetary savings. In contrast, a cover crop remains on the land, either by being left on the surface or incorporated into the soil. If grazed, I still consider it a cover crop since the animals predominantly retain the nutrients on the land through their dung and urine.

In tropical climates, cover crops increased cash crop yield by 15%, providing a significant advantage to farmers who adopt this practice. However, it is crucial to evaluate whether the cost of implementing cover crops outweighs the extra income derived from higher cash crop yields, ensuring economic viability.

The underlying mechanism for this positive impact likely lies in the cover crop's ability to capture nutrients that would otherwise leach deep into the soil, thus enhancing the overall system.

In continental systems, the yield gain is slightly lower at 4%, but it remains a favorable option. The cost of cover crop implementation must be substantially lower than in tropical regions for it to be economically feasible. For instance, if investing $30 results in a mere 4 bushels of grain worth $6 per bushel, the farmer would incur a net loss. However, long-term benefits, such as improved soil structure facilitating more efficient land management, may outweigh the short-term costs, albeit quantifying these gains can be challenging.

Now, let's shift our attention to dry and dryland systems. In both cases, the losses were comparable, with a reduction of 11% for dry climates and 12% for dryland climates. Though the article did not explicitly explain the distinction between the two, it is evident that cash crop yield decreases when moisture availability becomes limiting.

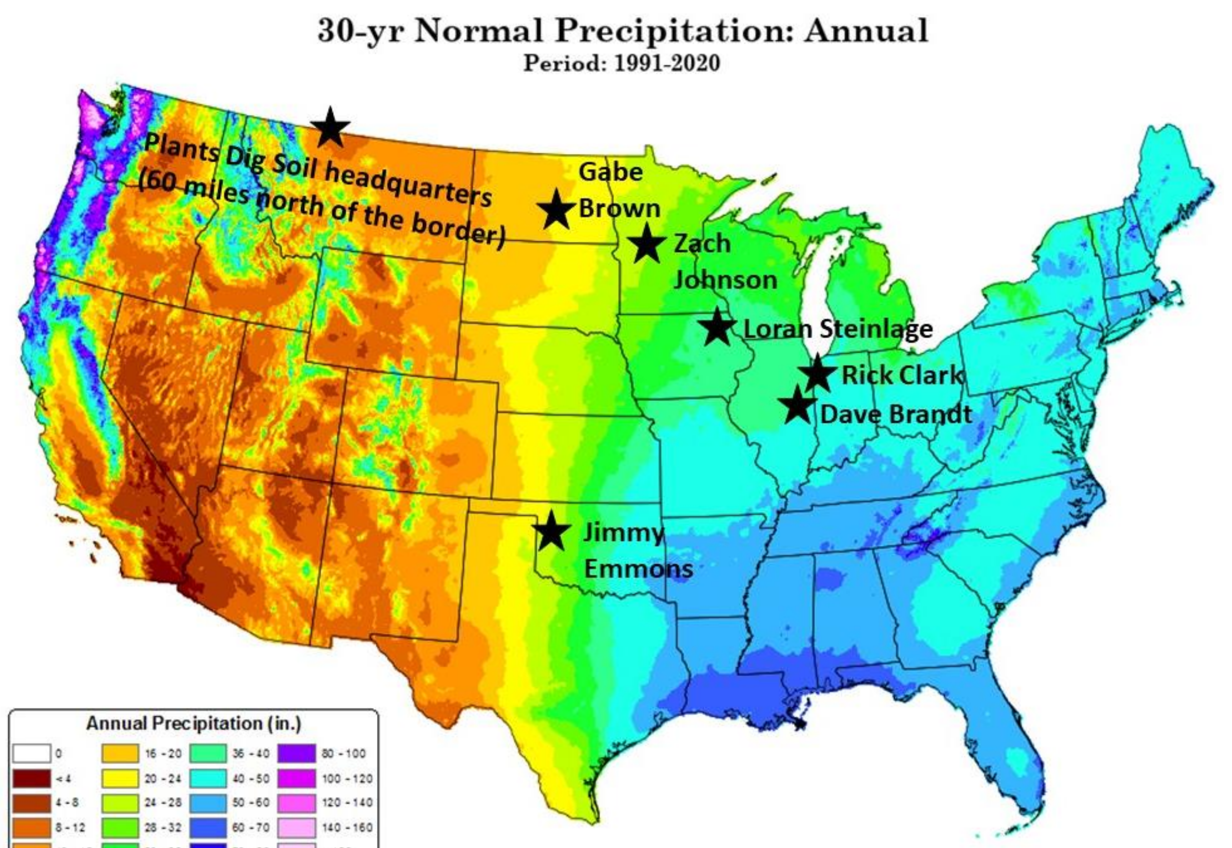
Consequently, farmers who invest in cover crops not only incur additional expenses but also suffer financial setbacks in subsequent cash crops. Such a scenario lacks economic sense, unless the long-term benefits to the land are substantial. Spending $30 to lose $20 in crop revenue seems like a lose-lose situation.

The most enlightening aspect of this study was the author’s attempt to quantify the findings by determining the necessary precipitation threshold. Rather than classifying climates as tropical, continental, or dryland, they established that approximately 27 inches (700mm) of precipitation is required. In my region of southern Alberta, just north of the Montana border, we receive this amount of precipitation on average every two years, and with current trends, it may take three to four years to reach that level.

For dryland farmers in my area, this means adopting a cash crop and fallow rotation approach. Planting a cash crop one year and a cover crop the next allows the cover crop to suppress weeds, contribute nitrogen, and nourish the soil's microbial life. When the soil is left bare, the microbes utilize the organic matter in the soil as a food source. However, for this system to be effective, the moisture required for growing the cover crop must not exceed or surpass the typical amount lost to evaporation. Alternatively, if more moisture is utilized, the cover crop must trap additional snow moisture.

In reality, this approach does not consistently yield satisfactory results. I discussed this issue in detail in a previous episode titled "Cover Crops in a Drought." Additionally, the system's drawback lies in the fact that farmers receive income every other year, posing challenges with regard to crop insurance since attempting a crop annually is usually required. Consequently, structural changes must be implemented to make this approach viable.

Turning to irrigated land in my area, the newfound information regarding the 27-inch precipitation cutoff makes perfect sense. Typically, irrigated crops receive around 12-15 inches of water annually, with 3-5 inches originating from rainfall. Although there may be an opportunity to grow cover crops when additional water is available, we are still teetering on the threshold. For example, if 18 inches are allocated to the cash crop and another 9 inches come from rain or snow, an opportunity may exist. However, we remain closely aligned with the 27-inch cutoff.



To conclude, let's consider the implications of this new information within the context of celebrity farmers—the individuals often highlighted in the media for their successful cover crop practices. I discovered an excellent map created by the PRISM Climate Group at Oregon State

University, where I marked the celebrities I could recall, such as Gabe Brown, Jimmy Emmons, Zach Johnson, Loran Steinlage, Rick Clark, and Dave Brandt.

Gabe, with an annual precipitation of 20 inches, has managed to make cover crops work under conditions akin to our irrigated land. Moreover, since he primarily raises cattle, the dynamics of his operations significantly influence the feasibility of cover crop implementation. Zach and Jimmy, hovering around the 28-inch threshold, have a higher likelihood of successful cover crop integration. As for Loran, Rick, and Dave, they experience precipitation exceeding 36 inches annually, providing ample resources to support their practices.

I invite you to share the names and locations of any individuals I may have missed, as I would love to expand the map with additional stars and continue sharing updated versions on social media. Stay tuned for next week's episode.