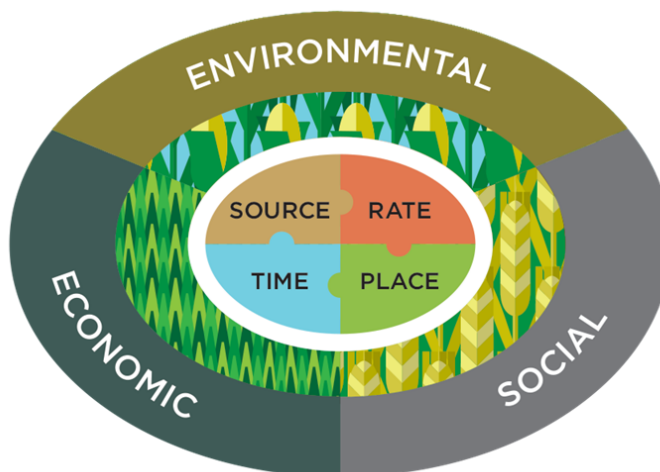


4R Nutrient Planning – where to start?



If you aren't already aware of the 4R Nutrient Stewardship program and how it ties into the Federal Government's target of reducing Nitrous Oxide emissions in agriculture by 30% below 2020 levels, you have either been living under a rock since harvest, or have made the wise decision to uncouple from the internet for a while. So, I am going to assume that most of you are aware that funding is currently available from the Canola Council of Canada encouraging producers to start down the road of using evidence based agronomy to increase fertilizer use efficiency. The idea is to implement those management practices that will allow your crop to get more of the nutrients you apply, and for the groundwater and atmosphere to get less.

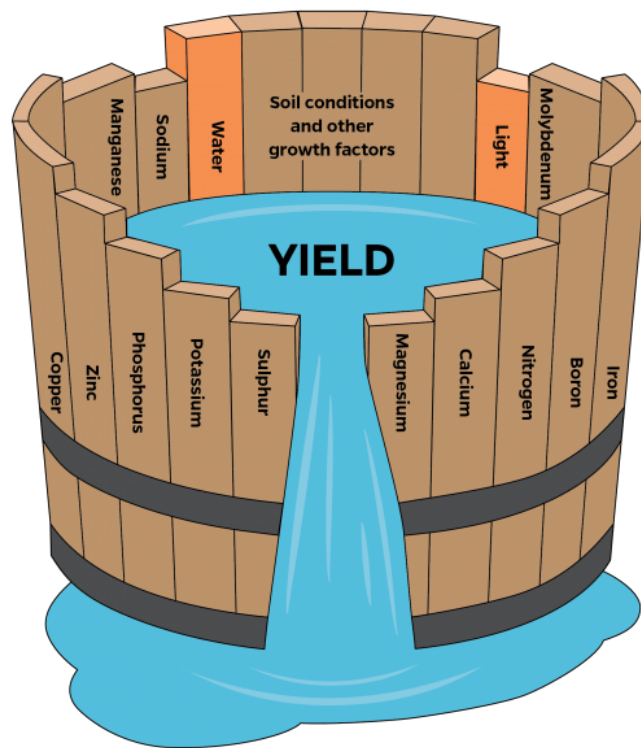
Whatever our opinions on climate change or Federal Government policies in general, I think we can all agree that getting a bigger bang for our fertilizer dollar is a goal worth pursuing. A 4R Nutrient Stewardship plan provides a template to help implement and monitor any change in production practices that can help us get there. In a nutshell, the program requires you to set goals, review your present production methods, formulate a plan that improves on those methods, implement and then monitor that plan. Based on the measurable results you get, you would fine tune your new management practice, then rinse and repeat. The idea is to set up a cycle of continuous improvement based on a combination of available information on best practices and your own experiences.

However, before embarking on this journey, it's helpful to have a clear idea of where you want this path to lead you in terms of soil nutrient levels and productivity. What do you envision for your farm ten years from now? Twenty years from now? Or when you pass it on to the next generation? How you view land usage on any particular field can best be seen by how you look at a soil test report, interpret the results, and formulate a nutrient plan. A big part of 4R planning will be soil testing and managing each field as a separate entity, rather

than having broad acre applications of a set fertilizer blend, so it's likely a good idea to give some thought to what your soil test "philosophy" is.

The first time I heard the term "soil test philosophy" it was being used by Dr. Dan Heaney, whose Fertilizer Canada course on 4R Nutrient Stewardship is the basis for this article. I admit I raised an eyebrow at the term. Since when does soil testing merit its own philosophy? Well, it turns out this is a real thing, and the management decisions people make when looking at soil test results are greatly influenced by their philosophy, or long term nutrient goals. Even the recommendation you get from a lab is influenced by their own philosophy on nutrient management, so it's best to have an understanding of the 4 major approaches used to develop nutrient plans. I will start with the least useful ones for us here on the Prairies and end with the 2 that will most likely define you decisions.

- 1. Replacement.** This is simply matching inputs to crop removal, which makes very little sense on a number of levels. It does not recognize that soil is a dynamic system, nor does it allow for the improvement of the soil if there is an existing nutrient deficiency. Also it makes no economic sense to spend money on a nutrient that may already be in excess in your soil, simply because your crop removed some of it.
- 2. Ideal Soil (Base Cation Saturation Ratio).** According to the BCSR concept, maximum plant growth will be achieved only when the soil's exchangeable Ca, Mg, and K concentrations are approximately 65% Ca, 10% Mg, and 5% K – the so called "Ideal Soil". Rather than spend time on why many agronomists don't think this is an appropriate approach on our geologically immature prairie soils, I will just refer you to this 2007 literature review that has very definite views on the practice.
<https://access.onlinelibrary.wiley.com/doi/abs/10.2136/sssaj2006.0186>
- 3. Sufficiency.** This works off of Liebig's Law of the Minimum that tells us that the least available nutrient will always be a crop's yield limiting factor. In a sufficiency system, nutrients are only added to the level required to meet the yield goals that have been set for that year. If the soil already has enough of a particular nutrient to meet this year's goal, no more will be added. The goal of this system is to minimize fertilizer costs and maximize returns in a given year. Sufficiency works well for nutrients that are readily available in the soil or micronutrients that are needed in very small amounts. It does not work well with macronutrients that are not readily soil available. This strategy is most often pursued in years of high input costs or on rented land.
- 4. Build and Maintain.** This philosophy works on the concept of adding enough of a nutrient to hit the anticipated yield goal and then adding more beyond that to help build a surplus in the soil. After a couple of cycles through the crop rotation there should be enough of the nutrient built up to switch to "maintenance" where your only goal is to keep the nutrient level above a set baseline. This approach will ultimately allow more flexibility in deciding on placement or timing of nutrient applications. For example high soil test P205 means you don't have to seed place your phosphate. You may also decide to skip applications in a year of high cost inputs. While this approach can work quite well with P, K and some micronutrients, it has obvious drawbacks with products like Nitrogen and Sulfur that can gas off or leach out of the rooting zone. Plus you have an additional input cost during the build phase that is not offset by added yield.



So which approach is best? Well that's for you to decide! It really depends on a lot of factors, starting with the nutrient being assessed. For example, you could very well use a sufficiency plan for nitrogen, which is easily lost from the cropping system and a build and maintain plan for phosphate, which tends to be tied up in the soil easily and release back into the soil solution slowly. Your approach may also vary based on the soil type and topography you work with, the land ownership and the environmental goals you are trying to achieve. My only purpose today is to encourage you to consider what you want to ultimately achieve with your nutrient management plan, not just on your whole farm, but on each field you manage. Hopefully, having that goal firmly in mind makes the next step of deciding how to improve on your present practices an easier exercise.

For more information on 4R Nutrient Stewardship please visit Fertilizer Canada at

<https://fertilizercanada.ca/our-focus/advocacy/whats-in-it-4r-me/>

And for information on accessing the On-farm Climate Action Fund please use this link to the Canola Council of Canada for an overview of the Canola 4R Advantage program they are offering.

<https://www.canolacouncil.org/4R-advantage/>

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