

October 2021



Soil Testing

As harvest wraps up, attention turns to preparing for the 2022 growing season. We are coming out of a year where many growers have had below average yields exacerbated by record setting heat and a lack of timely rains. This leaves many people wondering where their fields stand with regards to residual, unused nutrients from the 2021 crop. The answer to this question will be different for every grower, as rainfall and yields varied wildly throughout east central Alberta. If there was ever a year to invest in some fall soil testing, I believe this is the one. With unknown levels of carry over nutrients, a volatile fertilizer market and generally below average subsoil moisture levels, it's never been more important to get a handle on what is going on in the soil.

While the ideal time to soil test would be as close to seeding as possible, that just isn't practical in many cases. Alternatively, soil testing often happens in the fall, as this can give you a reasonably accurate snapshot of the soil nutrient conditions. This also allows for fertility planning and fertilizer purchases prior to spring. So when would be the best time to start soil testing this fall? When testing for phosphorus and potassium, timing is generally not an issue; they remain at relatively stable levels regardless of soil temperature. However nitrogen levels can be greatly impacted by this. Soil temperature in the fall has the largest impact on the populations of soil microbes that use and then release nitrogen back into the soil, so it's best to wait until the temperatures are low enough that nitrogen using microbes are winding down for the year. That usually starts to happen once temperatures drop below 7 C or 45 F.

Another thing to consider is the impact that soil moisture has on the nitrogen cycle. When we go through a hot dry period, soil microorganisms tend to go dormant. A rainfall event will cause them to start up their biological processes again all at once. Generally there is an equilibrium between microorganisms that are actively taking up N to use in their biological processes and those that are dying; thereby releasing their N back into the soil. When you get drought followed by significant rain, that changes; the vast majority of the soil microorganisms will be going through their lifecycle in lockstep. So you get an initial tie up of N as the exploding microorganism populations compete for available supplies, followed by a general release as that generation dies. So if you sample in the week following the rain, your N readings would be artificially low and if you were to go out and sample 14 to 18 days after the rain when a lot of N is being released back into the soil, you may get a misleading idea of how much carry over N you have.

The Battle River Training Field gives us a good example of what I mean. By August 21st, the field had hit permanent wilting point in the top 10 cm where most of the soil biology will occur. As you can see by the graph, conditions were dry enough down to 20 cm that for all intents and purposes, the soil microorganisms had stopped all biological processes.



Soil Moisture to 20 cm as of Aug 21. (Crop Intelligence Data)

On Aug 22nd and 23rd, the field received about 40 mm of rainfall, leading to much improved soil moisture conditions in the top 20 cm as shown by this graph of conditions on September 13th.



Soil Moisture to 20 cm as of Sept 13. (Crop Intelligence Data)

This reactivated all the microorganisms, leading to a sudden decline in soil available N followed by a spike in the levels. It usually takes about 3 weeks to go through this tie up and release cycle, so any soil testing done in this period may give you a misleading idea about your soil N levels.

In summary, while I believe soil testing this fall is a great management decision; I also think timing it properly is important to getting the most accurate information. If your 2022 crop plan is being based on existing soil nutrition data, it's worth waiting for the right soil temperatures and a stable moisture level to ensure you have the best possible information to make your decisions for the next growing season.

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Supplement to the October report



2022 Planning the best bang for your fertilizer dollar

The fertilizer markets are unusually volatile this fall, with skyrocketing prices and supply chain shortages looking like they are going to be a major factor in the 2022 cropping season. This being the case, I thought it would make sense to do a small addition to the October newsletter to talk about this a little. The current economic situation will mean that many growers will be weighing their options with regards to cutting back on inputs next year and it's important to have an understanding of how cuts in fertilizer rates may impact the yield.

First off, it goes without saying that not all soils are created equal. Soils with higher organic matter that can mineralize more nitrogen throughout the growing season may be less impacted by cutting a few pounds of nitrogen from the fertilizer program than a low organic matter soil, which can run out of available mineralized nitrogen in a hurry. It also stands to reason that cutting phosphate rates on a field with a high soil test level of around 20 ppm will have much less impact than cutting the same amount on a field with test levels below 15 ppm.

But regardless what "starting position" your fields' nutrient supplying power gives you, the crops you are producing on them will require a set number of pounds of nutrients per acre to produce each bushel of grain, so it's easy enough to get a rough idea on what the impact will be if you decide that you need to cut back on your fertilizer program next year. Below is a chart based on work done by Westco Fertilizers in the 1990's which shows nutrient uptake of several of the major crops grown in east central Alberta. The information is a bit dated, but it's still a great starting point.

POUNDS OF NUTRIENT REQUIRED TO PRODUCE A BUSHEL OF GRAIN					
CROP	% PROTEIN	N	P205	K20	S
HRS Wheat	13.5	1.82	0.75	1.86	0.20
Feed Barley	11.7	1.14	0.53	1.25	0.19
Malt Barley	11.0	1.08	0.53	1.25	0.19
Oats	11.5	0.85	0.40	0.30	0.10
Canola	-	2.80	1.27	2.25	0.52
Flax	-	2.30	0.82	1.68	0.49

While the numbers shown here are still reasonably accurate for crop such as flax, oats and barley, the numbers they show for canola and wheat no longer reflect the nutrient requirements of our modern varieties, especially in terms of the amount of nitrogen needed. Since this work was compiled, hybrid canola has taken over the vast majority of the oilseed acres and new varieties of wheat yield considerably more than the varieties Westco was dealing with in their plot work. Estimates on the N usage in new canola varieties range from 3 to 3.5 lbs per bushel depending on the source you look at. The best estimate I have found for new wheat varieties is based off of a four year study on high production wheat done by Dr. Don Flaten from the University of Manitoba. His team estimated the N usage of Brandon wheat at 2 lbs per bushel over the course of this extensive field scale trial.

Hopefully this information will be helpful to those of you who are already tackling your 2022 cropping plan and trying to work out how to get the best bang for your fertilizer dollar next year.



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