MEASURE AND MANAGE

Nutrient Recommendation Philosophies

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We are in a science based industry that uses technology and science to seek production efficiencies that increase profitability, reduce costs and meet compliance issues in a documented and defendable manner. Why do we then talk about recommendation philosophy, why are we not so definitive in using science to come up with a single one and only recommendation if we are so steeply science based?

Definition of Philosophy: seeking after wisdom or knowledge especially that which deals with ultimate reality or with the most general causes and principles of things and ideas and humans perception and knowledge of them. Concise Oxford Dictionary 7th Edition.

In a perfect world we would all have sandy loam soil, weekly rain, no compaction, uniform emergence, top yielding varieties, no diseases, no bugs, no leaching, no runoff, excellent drainage, uniform landscape, deep topsoil. We all plant our crops early, harvest under ideal conditions, control weeds in a single a pass and we all think the same, have the same knowledge base, and are willing to take the same risks. We all know ,we are not all perfect.

The current recommendation philosophies are Sufficiency, Crop Removal and Maintenance, and Base Saturation or Cation Balance. The reason for the existence of these philosophies is because of regional developments and research specific to the areas where the research was conducted. Researchers working in specific geographic areas in North America developed in these areas soil test methods, and calibration trials to reflect the uniqueness of these geographies and crops grown. Soil test values were calibrated to crop response and a series of charts, tables or formulae where developed so industry could interpret the results of soil tests into fertilizer recommendations for farmers.

What is some times lost in the translation is the importance of understanding how unique some of the recommendations are to the specific areas and not all research results are universally translated from one area to the next.

Sufficiency Recommendation Method of fertilizer recommendations is the current OMAF method using the Accredited Test of Sodium Bicarbonate extraction for P and Ammonium Acetate for the cations of K and Mg. Recommendations are based on calibration trials correlated to soil test results to supply sufficient nutrients to give maximum economic yield response.

Crop Removal and Soil Test Maintenance is designed to use the soil test levels to calculate the additional nutrients required to meet a specified nutrient level and or additional nutrients to cover those lost in the harvested portion removed from the field. One of the greatest impacts of man on the soil is the elevated levels of nutrients resulting from land management practices. Throughout North America an increasingly greater number of fields are testing high to very high in P and K. In Ontario the average soil test level for P has increased in the last 10 years from 26 to 38 ppm. The Nutrient Management Plans allow for the application of nutrients to high testing soils but at a rate to match crop removal. Currently the NMan software program calculates removal rates based on crop yields it also recognizes that it takes 35 pounds of P2O5 to increase the soil test 1 ppm. And 19 pounds of K2O to raise the K test 1 ppm.

Cation Balance uses the soil test results to calculate the ratios or saturations of the basic cations of K, Mg, Ca. The researchers who developed this approach observed in their data the saturation of 5, 10. 65 % of K, Mg, Ca produced the higher yields. This approach has been challenged on numerous occasions. There are many fields that do not fall inio these ratios and still produce high yields. When these fields are subjected to fertilizer applications in an effort to balance them, the result is no improvement in yield and higher cost of production. It is realized that high Cation Exchange Capacity soils with high levels of Exchangeable Calcium and Magnesium do not respond to the saturation balance method. A further spin on this method is to express the ratios Ca:Mg, Ca:K, Mg:K, and has being ideal at 6.5, 13, and 2 respectively. The ratios on world record corn fields in 1973 were 4, 23, 6 and in 1979 were 3, 18 and 5 so you can see a wide deviation from the ideal ratio and still produce world record yields. However in some soils these ratios are important especially in sandier low CEC fields. Excessive rates of potash can induce a magnesium deficiency as can an application of calcitic lime in a low magnesium soil.

Example is in the Imperial Valley of California which has high magnesium soils or Serptine Soil Types. A typical soil analysis is 70 ppm potassium, 2200 ppm Magnesium and 900 ppm Calcium. In these soils large amounts of potash fertilizer and calcium lime are needed to grow crops. What we get via the grapevine, by anecdotal evidence, and well meaning people is that we need calcium on soils which test high in Magnesium in Ontario. While we have some anecdotal evidence to support such a claim there has been no definitive research done in Ontario to confirm. Under Ontario conditions a typical soil test for a High Magnesium soil here is 180 ppm potassium, 560 ppm Magnesium and 2800 ppm Calcium. This not a Serptine soil, it is simply a clay soil with parent material high in magnesium carbonate. Care must be taken when implementing recommendations from other jurisdictions.

Another situation which developed in Ontario was for farmers to send their soil samples to out of country labs in an effort to get ***better fertilizer*** recommendations. What came back was an interpretation for fertilizer from where the lab operates. Usually these results showed the test values in pounds per acre not ppm. A soil test for Phosphorous of 24 pounds per acre would call for 50 pounds of fertilizer a soil test from OMAF at 24 PPM

called for 20 of P. In reality the 24 pound test was really 12 PPM and an OMAF recommendation at 12 ppm would recommend 50 kg or 45 pounds of P. To convert ppm to pounds multiply by 2. So in reality the units where confusing and this lead to misinformation about which set of results was better when really they where saying the same thing.

Nitrogen recommendations from Iowa where N is applied in the fall at 220 pounds actual per acre for 200 bus crop. When they spring apply their Nitrogen the rate of N is 100 pounds to achieve the same yield. There is a certain danger to surfing the web looking for fertility recommendations when one is not conversant with the local research and practices, rarely can you universally translate the practice to your conditions.