

Spring 2013, No. 2

## **4R NUTRIENT STEWARDSHIP AN IMPORTANT ASPECT OF SUCCESSFUL FARMING, REGARDLESS OF REGULATION**

**Required plant nutrients can be most successfully applied following the 4R Nutrient Stewardship Principles.** The 4R principles are described as applying the right source of nutrient, at the right rate, at the right time, and in the right place. This applies to all nutrients that are required above what the soil can supply, and for all crops, cropping situations, and nutrient sources. Having an adequate and balanced supply of plant nutrients is essential for well yielding crops, especially as cropping practices have improved using higher yielding varieties, moisture conserving conservation tillage, and more effective pest control options. As crop yields increase there is greater demand on our soils to supply both a sufficient and balanced supply of nutrients.

**Benefits are realized from using the 4R principles in both environmentally-regulated and non-regulated situations.** In fact, effective use of 4R usually exceeds minimum guidelines for most nutrient regulations. A useful example is a farm where I helped develop a nutrient management plan. This 3,680 acre corporate mixed farm located north of Calgary, Alberta consisted of a 500 farrow-to-finish hog operation and a 100 cow dairy. Crops included barley, wheat, canola, as well as 40 acres of pasture. All manure from the hog and dairy operation was handled using a liquid manure system with an above ground steel storage lagoon that was emptied twice a year and land applied, in early spring and mid fall.

**I was asked to help the farm manager develop a nutrient management plan compliant with recent changes with the provincial Agricultural Operation Practices Act (AOPA).** This act contains regulations for manure applied to farmland in Alberta. The Act applies to any confined livestock operations greater than 500 animal units. The farm was having a challenge meeting previous county bylaws that had restricted land application of the liquid manure to only 960 acres of the total 3,680 acre farm. Application of the manure to about only one-quarter of the cropped acres was resulting in excess applications of manure. Plant available soil test N and especially P were greater than crop requirements, and soil residual levels of N were greater than that allowed under the provincial manure regulations.

**By following the 4R principles, a nutrient management plan for all of the cropped acres utilizing all the manure along with additional purchased fertilizers was possible.** This nutrient management plan complied easily with the provincial manure legislation, and made much better use of the manure by integrating use of mineral fertilizer. This resulted in higher yielding crops, and less potential for environmental harm. Additionally, it was shown that the provincial legislation took precedence over the county bylaws. Fields where previously the county thought manure should not be applied, could receive manure applications as long as setback distances from residences, permanent water bodies, and drinking water wells were complied with.

**I have yet to see a farm where use of the 4R Nutrient Stewardship Principles has not been able to exceed nutrient or manure management legislation guidelines.** This means that 4R nutrient management plans can help farmers achieve high yielding crops, effectively utilize manure if the farm has livestock, and manage adverse environmental effects. It is important to note that this can be done as long as sufficient land is available to effectively utilize available manure. I did another nutrient management plan for a 1,000 farrow to finish hog farm that only had 470 acres of cultivated farmland. In this instance I recommended that manure application agreements be made with neighboring farms to adequately utilize the nutrients from the manure and avoid excess nutrient applications. These agreements were beneficial to both the farm with the hog operation as well as neighboring farms.

**An important aspect of utilizing 4R Nutrient Management on a farm is that there is consideration for economic, social and environmental goals.** In the first farm example used above, these goals would have been achieved whether or not there had been environmental regulations in place. This shows that achieving economic, social and environmental goals are often mutually compatible.

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Abbreviations: N = nitrogen; P = phosphorus.