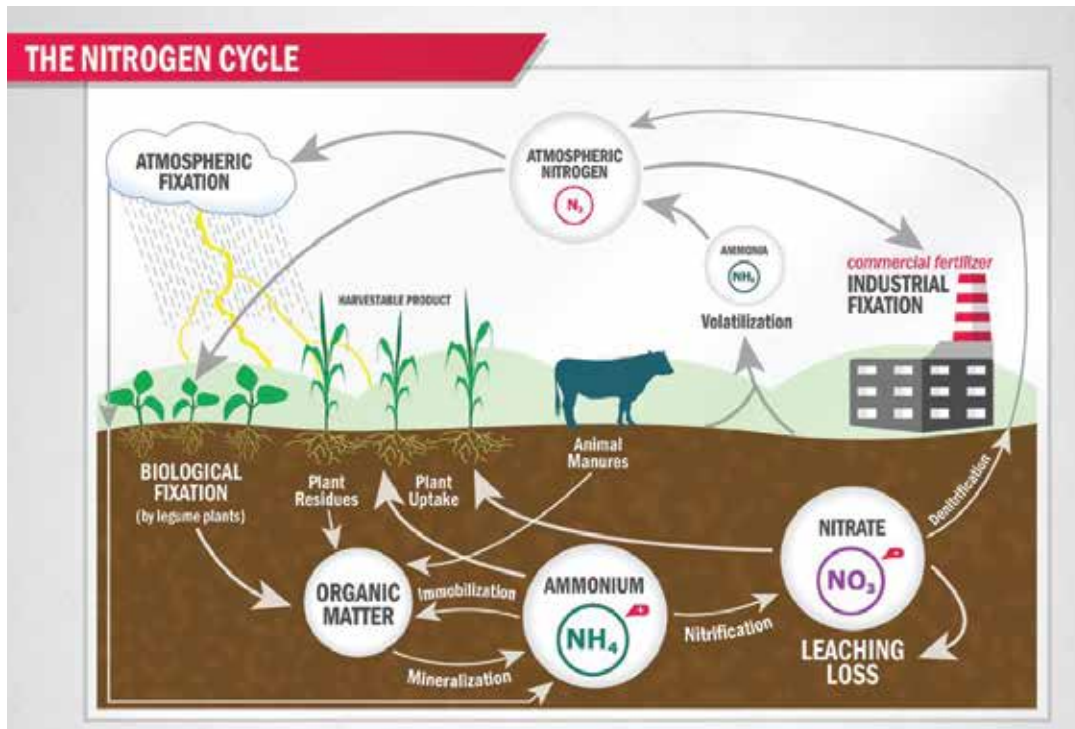


4Rs of Nutrient Stewardship, Soil Sampling & Precision Ag



Mineralization
Bacteria digest organic material and release ammonium.

Nitrification
Bacteria convert ammonium to nitrite, other bacteria then convert nitrite to nitrate.

Leaching
Rain or other infiltrating water moves nitrite away from root zone in the soil and into fresh water.

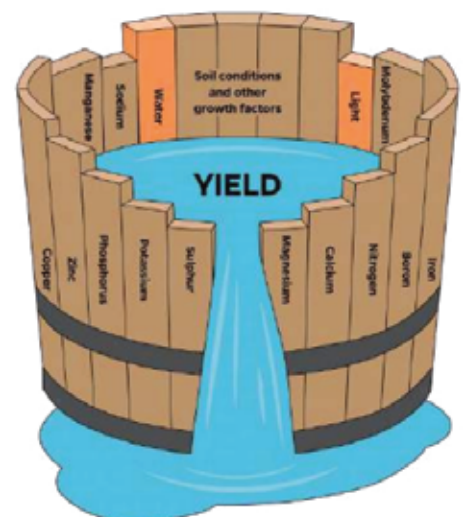
Denitrification
Bacteria can convert nitrate in warm, moist soil to gaseous forms that can be lost to the air.

Volatilization
Urease enzymes break urea molecules into ammonia gas near soil surface which is lost to the air.



Liebig's Law of the Minimum

You can only be as good as your least limiting factor. The goal is to never be limiting. The Law of the minimum states that crop yields will only grow to the most limiting factor, and when the factor is supplemented, another factor will become the limiting factor to hold back yield. Represented by the barrel, the limiting factor is the lowest stave and the barrel can be with anymore water until that stave is raised. The barrel is as full as it can get. By regular soil and tissue test, like NutriCropRx, growers can potentiall identify their limiting factor and provide a solution to increase yield.



Crop Removal Rates for Corn

Year	Ontario Yield	P ₂ O ₅	K ₂ O
1990	113 bu/ac	47 lbs/ac	33 lbs/ac
2005	145 bu/ac	61 lbs/ac	42 lbs/ac
2022	166 bu/ac	70 lbs/ac	48 lbs/ac

Grain Corn:
 P2O5 0.42 lb/bu
 K2O 0.29 lb/bu

Corn Silage:
 P2O5 9.3-13.6 lb/ton
 K2O 16.6-30.4 lb/ton

Soil Test!

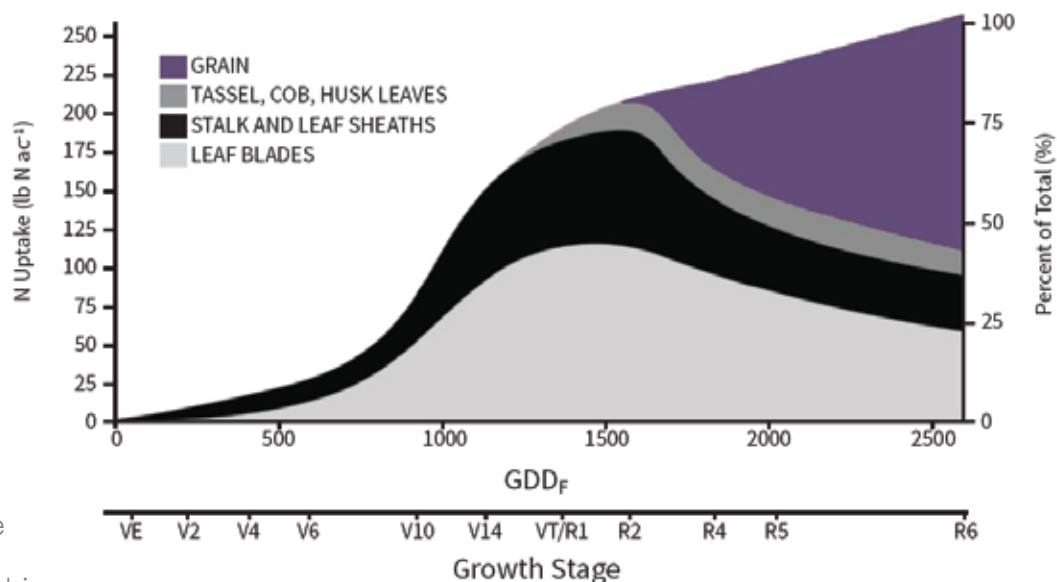
Soil Sampling

- Soil test will drop 1 ppm P for approximately each 35 lbs P2O5 removed
- Soil test will drop 1 ppm K for approximately each 17 lbs K2O removed

Nitrogen Uptake Curve in Corn



Read The
 Nutrient
 Stewardship
 4R Pocket
 Guide



Bendera, RR, Haegele, JW, Ruffo, ML, Below, FE, Nutrient Uptake, Partitioning, and Remobilization in Modern Transgenic Insect-Protected Maize Hybrids. *Agronomy Journal* 2012; 105 (1): 161-160.

