



Knowledge grows



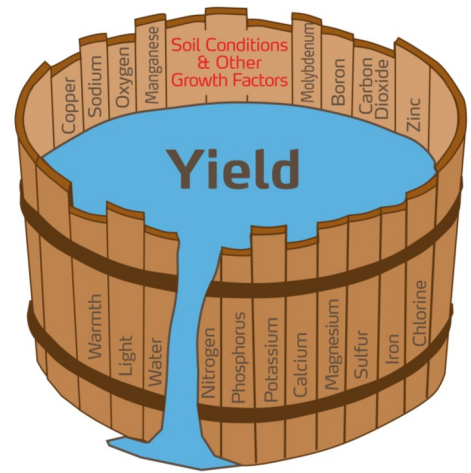
Yara Analytical Services
Technical Bulletin

Understanding Soil Nutrient Interactions

Plant Nutrient Requirement

All plants require a sufficient supply of essential major, secondary and micronutrients to reach their potential. However, no nutrient should be seen as secondary in importance as they all have a part to play in increasing yield or improving quality. Justus von Liebig demonstrated this principal with his **Law of Minimum** which states that a deficiency of any single nutrient is enough to limit yield.

However, plants also require this supply of nutrients to be balanced. When the supply is imbalanced, interactions that occur in the soil can affect nutrient uptake causing plant growth or animal health to suffer, affecting yield, quality and productivity.



JUSTUS VON LIEBIG 1803 - 187:

Nutrient interactions

There are many interactions that can influence availability. These need to be considered when high levels of particular nutrients in the soil interfere with, and have a negative effect on, the uptake of other nutrients into a growing plant. Those nutrients which behave in this way are said to be antagonistic. As well as occurring in the soil naturally, or as result of historic fertiliser practice, nutrient interactions can be the result of imbalances caused by the over application of a nutrient. Some common nutrient imbalances are shown in the table to the right.

Excess	Imbalance	Effect
K	Mg & Ca	Poor Yield/Quality – Grass Tetany in livestock
Ca & Mg	K	Poor Yield/Quality
P	Zn or Fe	Poor Yield/Quality
N	S or Cu	Poor Yield – High Nitrogen also softens fruit
S	Se	Selenium deficiency in livestock
Mo	Cu	Copper deficiencies in grass and livestock

Some nutrients behave as stimulants. Stimulation occurs when a high level of a nutrient increases plant demand for another nutrient. For example, nitrogen uptake creates a demand for magnesium.

As with an antagonism, the result is an imbalanced nutrient supply causing deficiencies in the growing crop. Mulder's Chart (left) demonstrates just how complex these soil nutrient interactions can be, and how a comprehensive soil analysis has the greatest potential to reveal hidden nutrient issues.

