

## Phosphorus- how do we make the most of our most universally deficient nutrient?

P release is related to:

- Total P in the soils
- Abundance of iron and aluminium oxides
- Organic carbon content
- Free lime / soluble Ca

P from Super is pretty soluble- around the same as gypsum. However, soon after diffusing out of the granule- it will precipitate as Fe or Al phosphates, or it will attach to the sides of Fe and Al oxides. Some will become organic P.

This is a good thing. If not, P would be lost with the same inefficiency as N. In most soils there is usually only a fraction of a part per million available at any given time.

As more P is applied, the "sites of reaction" are used up, and more of the P is more rapidly available. P "lock-up" is, to an extent, a myth. It is more important to determine when the rate of supply will become limiting.

Some points to note:

- Less than 5-10% of applied P may be used in yr of application.
- 95% of P uptake occurs within 0.1mm of a root hair, so young plants can struggle to access adequate P. Mycorrhiza fungi can extend the reach of roots.
- Sandy soils have been measured to lose up to 100% of applied P to leaching in first season. Certainly 50% losses are common.
- "Available P" tests don't measure available P. Rather they express an indication of the rate at which P may be extracted from the soil. This "indicator of rate" needs to be calibrated with field trials, as has been done with the "Colwell P" test.
- P has good residual value, but if not applied for 5 to 10 year, P deficiencies are likely to occur.
- High free lime is problematic (particularly over 10-20%)

**Useful tests:** Total P, Colwell P, Reactive Fe and Al, CO<sub>3</sub>%, P buffer index.



