



# Humus - improving soil phosphate availability

## Improving soil phosphate availability with humates

Soil fertility is dependent on a combination of factors like concentration of elements in the soil, the amount of applied fertilizers, the type of fertilizers (liquid or solids) and the availability of these nutrients when the plants require it. In soil fertility, it is not good enough to know that a soil contains a range of elements. More importantly, we need to know how available these elements are to the plants.

Similarly, it is not sufficient to know what amounts of fertilizers are being applied. It is equally important to know how much of the applied fertilizers are available to the plants during the growing season.

It is therefore necessary in soil analysis to know the total amounts of the elements in the soil and the proportion which is “available” to the plants.

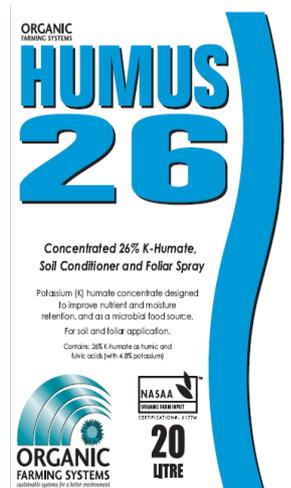
## Fixation of Phosphate Fertilisers

Phosphates are very prone to “fixation” in the soil very soon after application. Once this happens, the phosphates become unavailable to the plants. Phosphate fixation commonly occurs where there are high levels of iron, calcium, aluminium and clays.

Scientific studies have shown that up to 80% of the applied phosphates are quickly locked up in the soil. A large portion is either lost through leaching or in run-off.

- Plant Uptake 15 – 30%
- Fixed or Bound in soil 50 – 80%
- Loss from Leaching or Run-off 10 – 25%

Take the example of a soil analysis which shows “Olsen P” levels of 20 ppm (mg/litre or mg/kg) and 1,500 ppm of “Total P”.



In a one-hectare block of land in a farm, there would be an equivalent of 1,200 tonnes of topsoil in a 10cm depth. This amount of topsoil would contain an equivalent of 24kg of Olsen-P and 1,800kg of Total-P. In P terms, this is equivalent to approximately 260kg and 19,800kg of applied super phosphate.

Knowing both the "available P" and "Total P" tells us how much is locked up in the soil and how much of it is available to the plants for uptake/growth. The above information therefore tells us that there is a large amount of P locked up in the soil which can be freed-up and made available to the plants.

## Improving Phosphates Availability

Applications of 5 litres/ha of humates and 15 litre/ha of liquid 9-5-6 formulation have been shown to improve phosphate availability in the form of higher Olsen-P levels in the soil within a period of 1 to 2 years. It is remarkable that this increase in Olsen-P in the soil was achieved without further application of any super phosphates.

Humates increase the availability of the phosphates by solubilising some of the fixed phosphates. Additional fixed phosphates are also solubilised by the increased soil microbial activity brought about by the application of humates.

## Field Program Procedure

How can one tell if a soil has a potential for phosphate fixation? This needs to be confirmed by soil analysis for Olsen-P and Total -P. However, the following properties give a general indication of high phosphate fixation. Soils which are high in:

- Iron (red coloured soils)
- Aluminium (grey coloured soils, commonly acidic)
- Total calcium (calcareous soils or soils with a history of high rates of applications of agricultural lime).
- Clayey (soils rich in allophane, "sticky soils), and
- pH (above 6.5, alkaline soils)

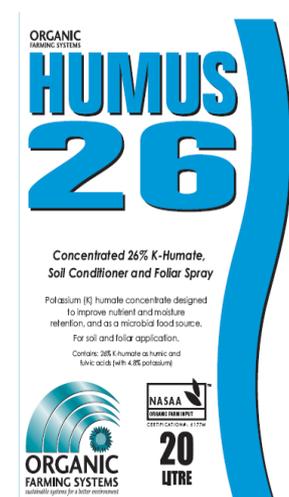
usually have a likelihood of high levels of phosphate fixation. These soils should offer great opportunities for applications of humate products.

It is essential to conduct a soil analysis to determine the existing nutrient levels. The analysis should include determinations for Olsen-P and Total-P levels in the soil. If high levels of Total-P are encountered (well above 1000 ppm or mg/litre), and Olsen-P levels are within acceptable limits (20-30 ppm or mg/litre), then it is reasonable to reduce the amount of super phosphates to be applied. While recent studies

have shown that further applications of super phosphates can be stopped completely when humates and liquid 9-5-6 formulation are applied as a soil drench, it would be more prudent to reduce super phosphate applications by 50% in the first year of the program, followed by further reductions in subsequent years. It is recommended that the farmer commits to at least a 3-year program with humate products, if possible.

## Situations where OFS Humus 26 will be beneficial:

Soils high in clays, iron	Frees up bound phosphates, calcium or calcium content and iron; opens up clay over the longer term.
Sandy soils	Improves nutrient retention and water holding ability; Use with OFS Fish Emulsion and Fish Plus to stimulate biological activity.
Sodic, high pH soils	Improves availability of nutrients, particularly phosphates and trace elements.
Organic soils	Stimulates biological activity, leading to greater mineralization of organic matter and release of nutrients; use with OFS Fish Emulsion and Fish Plus to stimulate biological activity
Hard, compact soils	Improves moisture penetration, reduces surface crusting and opens up soil structures
Acidic soils	Improves nutrient retention and availability to plants, and immobilizes aluminium.



This information is of a general nature - seek specific advice for your situation.