PHOSPHORUS FERTILIZERS applied to soils can have up to 90% USE EFFICIENCY

10% to 30% of the phosphorus applied to soils in fertilizers is used by crops in the year of application. Most of the remainder becomes available for crops in subsequent years.

A wide range of factors affect the content of phosphorus in soil:
- Type of material from which the soil is derived
- Degree of weathering and erosion
- Climatic conditions
- Crop removal and fertilization

Phosphorus found in soil is classified into two broad groups: organic and inorganic.

**Organic**
- Organic phosphorus comes from plant residues, manures and microbial biomass.
- In soils that are low in organic matter only 3% of the total phosphorus content may be in the organic form, while for those that are high in organic matter, it might constitute 50% or more.
- Organic phosphorus cannot be used directly by plants. It has to be broken down (mineralized) by soil microbes into soluble inorganic forms. Approximately 1–3% of the total organic phosphorus in soils becomes available to crops each year this way.

**Inorganic**
- Inorganic forms of phosphorus found in soil consist of apatite, iron and aluminum phosphates, and phosphorus that has been adsorbed onto clay particles.

Because both organic and inorganic forms of phosphorus have extremely low solubility, only very small amounts of soil phosphorus are in solution at any one time.

By assessing reserves and using phosphorus fertilizers alongside good crop and soil management, the amount of phosphorus in solution in soils can be replaced fast enough to ensure optimal crop yields.

When plants are growing vigorously, the phosphorus in soil solution may have to be replenished at least as often as 10 times each day. A rapidly growing crop could take up the equivalent of about 2.5 kg of P2O5 per hectare daily, for example.

Soluble phosphorus, from both fertilizer or natural weathering, reacts with clay, iron and aluminum compounds in the soil, readily converting it to less available forms through phosphorus fixation.

Due to its immobility, very little soil phosphorus is lost by leaching. Fixed phosphorus instead remains in the plant root zone where it slowly becomes available to crops. Phosphorus tends to be lost by soil erosion and through crop removal.

The more contact there is between soluble phosphorus and soil particles, the greater the risk of phosphorus immobilization in soil. As a result, the most efficient way to use phosphorus fertilizer is generally to apply it shortly before planting crops.