FACT SHEET

March 2022

PHOSPHORUS

PHOSPHORUS IN SOILS

Australian soils are characteristically low in phosphorus (P) in their native state, with the exception of a few soils of basaltic origin and some alluvial soils. This reflects the geological age of the continent and its soils. Agriculture can further deplete soil fertility, even in soils that initially are high in phosphorus, due to the removal of nutrients in farm produce.

Most of the phosphorus in soils is associated with organic matter. Even in mineral soils between 20% and 80% of the total phosphorus will be present in organic forms.

Phosphorus is most available for uptake by plants in the pH range 6.5 - 7.5. At pH below 5.5, slowly soluble oxides of iron, aluminium and manganese form, reducing phosphorus availability, while at pH above 7.0, slowly soluble calcium phosphate is formed.

Phosphorus in the soil is relatively immobile. Phosphorus applied as fertiliser does not usually move far rarely without some form of physical mixing, e.g. cultivation. The distance that the phosphorus front moves in the soil from fertiliser granules is rarely much more than 4 - 5 cm.

PHOSPHORUS IN PLANTS

Phosphorus is one of the primary nutrients, along with nitrogen (N) and potassium (K). It is required in large quantities by plants. Most plants take up the bulk of their phosphorus requirement early in their life, in the seedling stage of annuals and early regrowth of perennials. While phosphorus is not mobile in soils, it is one of the more mobile nutrients in plants. It is readily moved within the plant from old to young tissue.

Phosphorus is required for cell division at growing points, and is particularly important in stimulating root development. Consequently, the best responses to phosphorus fertiliser are obtained if it is applied early, e.g. banded with or near the seed at planting in annual crops, and at the start of the main growing season in perennial crops and pastures.

Plant uptake of immobile nutrients such as phosphorus (and zinc) is enhanced by AMF (Arbuscular mycorrhiza fungi), a beneficial fungus which grows in association with plant roots.

DEFICIENCY SYMPTOMS

Symptoms of phosphorus deficiency include:

- Poor legume growth and loss of the legume component in mixed pastures.
- Slow emergence and growth of annual crops. Plants look stunted and spindly, cereals tiller poorly.
- Off-green (often dark, not light green or yellowish) foliage with purplish veins and purplish petioles.

- Low yields.

PHOSPHORUS FERTILISERS

The phosphorus fertilisers marketed by Incitec Pivot Fertilisers are listed in the following table.

Incitec Pivot Product	Common Name	Analysis			
		%N	%P	%S	%Ca
SuPerfect	Single Superphosphate (SSP)	-	8.8	11	19
MAP	Monoammonium Phosphate	10.0	21.9	1.5	-
DAP	Diammonium Phosphate	17.7	20.0	1.6	-

SuPerfect

Single Superphosphate (SSP) is manufactured by treating phosphate rock with sulfuric acid at Geelong (Victoria). It is particularly suited to grass legume pastures where both phosphorus and sulfur (S) are required. It is also used in legume grain crops. Molybdenum (Mo) fortified grades are also available. Molybdenum plays an important role in legume nodulation.

Triple Superphosphate (TSP) is no longer being manufactured or imported into Australia by Incitec Pivot.

Ammonium Phosphates

MAP (monoammonium phosphate) and DAP (diammonium phosphate) are manufactured by reacting ammonia with phosphoric acid. They are made at Phosphate Hill in north-west Queensland and are also imported:

MAP

MAP is popular as a planting fertiliser in grain and cotton crops on neutral to alkaline soil types. It is used to supply all the phosphorus the crop requires plus some starter nitrogen. MAP is usually preferred to DAP as a planting fertiliser in these situations as it is less likely to harm germinating seeds and emerging seedlings on account of its lower nitrogen content. It is also more suitable for storage in silos that DAP, as it is less hygroscopic, i.e. it is less likely to absorb atmospheric moisture and set in storage.

DAP

DAP is the most commonly traded phosphorus fertiliser on world markets. Its high analysis (both N and P) makes it economical to freight, store and apply. In Australia, DAP is used in cropping and on grass pastures, both on its own and in blends, e.g. for sugarcane and horticulture.

The granulated phosphorus fertilisers marketed by Incitec Pivot Fertilisers are not suitable for application in solution, e.g. in fertigation programs, not should they be used as phosphorus supplements for livestock.

Solution Grades of MAP are normally used where phosphorus is applied in solution, while dicalcium phosphate (DCP) is commonly used as a mineral supplement for livestock.

APPLICATION

Because phosphorus is required for root development and is mobile in plants it is best applied early. In annual crops, it should be applied at planting, banded with or near the seed or transplants. This ensures early access (phosphorus does not move far in the soil) and reduces fixation.

In pastures and tree crops, phosphorus is normally applied at the start of the main growing season. For pastures in southern Australia, phosphorus is commonly applied in the autumn, but can also be applied in the spring.

Because phosphorus does not leach readily, there is usually no need to apply it more frequently than each time a crop is planted, or once per year in perennial tree crops and pastures.

WARNING

The information contained in this publication is for use as a guide only. The use of fertilisers is not the only factor involved in producing a top yielding pasture or crop. Local soil, climatic and other conditions should also be taken into account, as these could affect pasture or crop responses to applied fertiliser.

Before using fertiliser seek appropriate agronomic advice. Fertiliser may burn and/or damage plant roots or foliage.

Foliar burn to the leaves, fruit or other plant parts is most likely to occur when different products are mixed and sprayed together, the water is of poor quality, or the spray is applied under hot dry conditions, eg. in the heat of the day.

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