

FERTFACTS

POTASSIUM

FACT SHEET

POTASSIUM IN SOILS

Potassium (K) is quite abundant in soils, typically ranging from 0.5 to 4.0%. Of this, only a small part is present in water-soluble and exchangeable forms, and readily available for plant uptake, usually less than 1% of the total.

Sandy soils have the lowest potassium content, clay and alluvial soils the highest. However, even clay soils can become depleted in potassium where considerable quantities are removed in farm produce, e.g. hay, silage, sugarcane.

Potassium that is dissolved in the soil solution is subject to leaching. It is more readily leached than phosphorus, less so than nitrate nitrogen.

POTASSIUM IN PLANTS

Potassium is taken up by plants from the soil as the potassium ion (K⁺). It is required in larger amounts than any other mineral element, with the exception of nitrogen. In a few crops, potassium uptake exceeds that of nitrogen, e.g. bananas, and cotton during the boll filling period.

Potassium is not a component of any organic compound in plants. It is important in various physiological processes, including photosynthesis, the metabolism of carbohydrate and protein, the activation of enzymes, and the adjustment of stomatal movement and water relations. Adequate potassium helps reduce lodging, increase winter hardiness and disease resistance, and improve yields and the quality of seed and fruit.

Optimum potassium concentrations in plant tissue are usually in the range of 1.5 to 4.5% K on a dry weight basis.

DEFICIENCY SYMPTOMS

Potassium is very mobile in plants. As it is readily transferred from older leaf and root tissue to growing points, deficiency symptoms first appear in recently matured and older leaves.

Deficiency symptoms are best described as leaf scorch. This develops from an initial yellowing of interveinal areas near the leaf margins. This is followed by tanning and browning, and finally drying of the tissue to appear as scorching. This scorching is at first confined to the leaf margins and tips but progresses inwards as the deficiency becomes more severe, until the whole leaf may be affected. Rarely does the growing point show deficiency symptoms. Leaves from potassium deficient plants have a flaccid (wilted) appearance and the tips and margins are often frayed. Plant growth is retarded and root systems are poorly developed.

Potassium balance with other nutrients, particularly the other cations (positively charged ions) such as calcium and magnesium is of importance. Too much potassium can induce deficiencies of other nutrients, while potassium deficiency may occur in soils which seem to have adequate potassium, if soil calcium and magnesium are also high.

POTASSIUM FERTILISERS

The most commonly used potassium fertilisers, and their analyses, are:

Incitec Pivot Product	Chemical Name	ANALYSIS		
		%N	%K	%S
Muriate of Potash	Potassium chloride		50	
Sulphate of Potash	Potassium sulphate		41	18
Prilled Potassium Nitrate	Potassium nitrate	13	38.3	

Sulphate of Potash or potassium sulphate (K_2SO_4) has a lower salt index than Muriate of Potash and is often preferred to the latter in crops sensitive to chloride or susceptible to fertiliser root burn. It is often used in planting mixtures for crops such as French bean and in shallow-rooted tree crops such as avocado and macadamia, where fertiliser may burn roots feeding close to the surface.

Potassium nitrate (KNO_3) is also known as Nitrate of Potash and Saltpetre. It is not widely used on account of its cost. Potassium Nitrate is often used where potassium is to be applied in solution (through irrigation systems and as a foliar spray). It has an advantage over Muriate of Potash in that it doesn't contain chloride, and over Sulphate of Potash in that it more soluble, allowing more concentrated potassium solutions to be prepared.

APPLICATION

The incidence of potassium deficiency and use of potassium fertilisers in Australia is increasing, as crop and pasture yields increase (often in response to other fertilisers) and certain soils become depleted in potassium.

Potassium is used in horticulture, sugarcane, and improved pastures in high rainfall areas. Responses to potassium have also been obtained in hay and silage, cotton and maize. In Western Australia, responses to potassium also occur in other grain crops on sandy soils.

Often, one application of potassium per annum will suffice, particularly where potassium is applied at low rates.

At higher rates, it is customary to split-apply potassium, to avoid luxury uptake and improve utilization. On sandy soils, split applications are often advocated to minimize leaching losses.

Potassium can be applied pre-plant, at planting (provided the rates are not excessive and harm young seedlings) and as a side or top-dressing. It is often applied in conjunction with other nutrients, e.g. in complete NPK fertilisers in sugarcane and horticultural crops.

FURTHER READING

For further information, a copy of the Incitec Pivot Agritopic on "Potassium" is available if more detailed information is required. These can be obtained from your Incitec Pivot Fertiliser distributor.

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