

POTASSIUM FACTSHEET

December 2003

POTASSIUM IN SOILS

Potassium 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 and silage.

Potassium 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 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. banana and cotton during the boll filling period. It is taken up as the potassium ion (K^+).

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.



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POTASSIUM FERTILIZERS

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

| Incitec Pivot Product | Chemical Name | ANALYSIS | | |
|---------------------------|--------------------|----------|------|----|
| | | %N | %K | %S |
| Muriate of Potash | Potassium chloride | | 50 | |
| Sulfate of Potash | Potassium sulfate | | 41 | 18 |
| Prilled Potassium Nitrate | Potassium nitrate | 13 | 38.3 | |

Soluble Fine or Solution Grades of these three products are also available, i.e. Liquifert K (Muriate of Potash), Liquifert K-Spray (Sulfate of Potash) and Liquifert K-Nitrate (Potassium nitrate).

Muriate of Potash is potassium chloride (KCl). It is the most economical of the potassium fertilizers and therefore the most widely used. Other potassium fertilizers are used where the chloride in Muriate of Potash may be detrimental, e.g. in saline soils, where poor quality irrigation water is used, in crops such as tobacco which are sensitive to chloride, and where potassium is foliar-applied (where the chloride will burn the foliage).

Sulfate of Potash or potassium sulfate (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 fertilizer burn, e.g. to the crop roots. It is often used in planting mixtures for French bean, and in shallow-rooted tree crops such as avocado and macadamia.

Potassium nitrate (KNO_3) is also known as Nitrate of Potash and Saltpetre. It is not widely used on account of its cost, but finds use in crops sensitive to chloride, e.g. tobacco, and in solution (through irrigation systems and as a foliar spray). It is more soluble than potassium sulfate.

APPLICATION

The incidence of potassium deficiency, and use of potassium fertilizers in Australia is increasing, as crop and pasture yields increase (often in response to other fertilizers) and certain soils become depleted in potassium. Potassium usage in Australia is estimated to have doubled over the ten years to 1997.

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.

Application techniques are similar to nitrogen, and it is often applied in conjunction with this nutrient, e.g. in sugarcane and horticultural crops

FURTHER READING - An Agritopic on "Potassium" is available if more detailed information is required.

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