



POTASSIUM

POTASSIUM IN THE SOIL

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.

Potassium in soils exist in three distinct forms: unavailable, slowly available, and readily available.

- **Unavailable Potassium:** Soil type dependant accounts for 90-98% of the of the total soil K is found in this form. Overtime the primary minerals that contains K weather, and the K is released. This process is quite slow and cannot supply the requirements if crops.
- **Slowly available Potassium:** This form of potassium is referred to as fixed K as is trapped between the layers of clay minerals. Plants cannot access much of the slowly available K during the growing season. The amount of fixed K in the slowly available forms varies with the type of clay and minerals that dominate a particular soil.
- **Readily available Potassium:** Is potassium that is dissolved in soil water and that is held on the exchange sites of clay particles (exchangeable K) is considered readily available for growth.

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, except for 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. Its primary function is maintaining the ionic balance. Plants take up anions, i.e., negatively charged ions such as nitrate (NO_3^-), phosphate ($H_2PO_4^-$ & HPO_4^{2-}) and sulphate (SO_4^{2-}), so that the total number of negative charges equals that of the positively charged cations, i.e., ammonium (NH_4^+), potassium (K^+), calcium (Ca^{2+}) and magnesium (Mg^{2+}). Nitrate (NO_3^-) is taken up in greater amounts than any other ion. It is potassium (K^+) that balances it.

Potassium 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 are 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

Incitec Pivot markets two imported granular potassium fertilisers, Muriate of Potash and Sulphate of Potash.

Muriate of Potash

Muriate of Potash (50% K) is potassium chloride (KCl). It is the most economical of the potassium fertilisers and therefore the most used. It is used in sugarcane, pastures, and many horticultural crops. Other potassium fertilisers 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 that are sensitive to chloride, or where chloride may have an adverse effect on the quality of farm produce. Muriate of Potash should not be used in foliar sprays as the chloride will burn the foliage.

Sulphate of Potash

Sulphate of Potash (41% K) is potassium sulphate (K_2SO_4). It 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.

Soluble Fine or Solution Grades of these products are used where potassium is to be applied in solution, e.g., in fertigation programs.

Nitrate of Potash

Incitec Pivot no longer markets potassium nitrate (KNO_3), also known as Nitrate of Potash and Saltpetre (13% N, 38.3% K), due to low demand on account of its higher price. 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:

1. Muriate of Potash in that it doesn't contain chloride (which will burn the foliage), and
2. Sulphate of Potash in that it has wider compatibility with other fertilisers in solution and is more soluble, allowing more concentrated fertiliser 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.

SAFETY DIRECTIONS

Refer to the Safety Data Sheet (SDS) for more detailed safety advice. Before use, read the Product Label and the SDS. Use safe work practices and avoid contact with the eyes and skin. Avoid ingestion and inhaling dust. Protective clothing, eyewear and dust masks should always be used when dealing with this product. Observe good personal hygiene, including washing hands after use. Avoid loss of fertiliser to waterways.

WARNING

This document contains information of a general nature. Before using fertiliser seek independent agronomic advice. Fertiliser programs may need to be varied depending on the plants being grown, climatic and soil conditions, application methods, irrigation, agricultural and livestock management practices, the soil's fertility, and cultural practices. ('Unforeseen Elements')

Fertiliser may burn and/or damage crop roots or foliage. Foliar burn to the leaves, fruit or other plant parts is most likely to occur when fertilisers are foliar applied at high concentrations and/or on a regular basis, different products are mixed and sprayed together at cumulatively high rates, the water is of poor quality, or the spray is applied under hot dry conditions, e.g. in the heat of the day.

Fertiliser and supplements may affect animal health. Seek independent advice before using any supplements in livestock rations.

DISCLAIMER

As Unforeseen Elements are beyond the control of Incitec Pivot Limited, in no event Incitec Pivot Limited and its related bodies corporate be liable or accept any responsibility whatsoever for any direct, indirect, punitive, incidental, special or consequential damages (including but not limited to loss of revenue, crops and livestock), in respect of the illness, injury or death of a person, damage to property (including of a third party), or any other loss whatsoever arising out of or connected with the use or misuse of this fertiliser, or its transport, storage, handling or application. Where Incitec Pivot Limited and its related bodies corporate's liability cannot be lawfully excused, it and its related bodies corporate's liability shall be limited to the replacement of, or cost of the fertiliser supplied. The buyer accepts and uses this product subject to these conditions.



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