

MAGNESIUM FACTSHEET

December 2003

MAGNESIUM IN SOILS

Most of the magnesium in the soil exists in forms that are not directly available to plants. About 5% of the total is present in exchangeable forms. This consists of magnesium held on clay and organic particles in the soil, and any magnesium in water-soluble forms.

Exchangeable magnesium levels are likely to be lower on well drained sandy soils in areas of high rainfall, where magnesium and other cations, e.g. calcium, have been leached from the topsoil. Soils that are low in calcium and magnesium tend to be acid, i.e. they have a low pH.

Magnesium also has an influence on the structure of clay soils. Once the magnesium percentage of exchangeable cations exceeds 20%, the soil will become increasingly difficult to work, as magnesium causes clay particles to disperse.

Magnesium concentrations often increase with depth. If magnesium is low in the top-soil but high in the sub-soil, magnesium deficiency is less likely to occur, or may be temporary.

MAGNESIUM IN PLANTS

Magnesium is taken up by plants as magnesium ions (Mg^{2+}). It plays a key role in the photosynthetic process, being an important constituent of chlorophyll, the green pigment in leaves and stems.

The presence of other positively charged ions (cations) in the soil, or their application in fertilizers, may depress plant uptake of magnesium (Mg^{2+}), e.g. calcium (Ca^{2+}), potassium (K^+), sodium (Na^+) and ammonium (NH_4^+). For example, the application of high rates of potassium (K) at planting on light sandy soil can induce magnesium deficiency (orange freckle) in sugarcane. In pasture, the use of potassium fertilizer may increase the incidence of grass tetany (magnesium deficiency) in grazing animals. Such effects are more pronounced at low soil pH, and in fast growing short season horticultural crops.

Once absorbed, magnesium is quite mobile within the plant, i.e. it is readily relocated from old to young plant tissue.

DEFICIENCY SYMPTOMS

As magnesium is mobile in plants, deficiency begins in the older leaves and moves to the younger leaves. Deficiency symptoms generally appear during the latter part of the growing season. However, it may be induced earlier, e.g. following the application of potassium at planting.

Early symptoms of magnesium deficiency include the loss of healthy green colour between veins. This is usually followed by yellowing (chlorosis), which starts at the leaf tips and margins and progresses inward until the entire leaf is chlorotic, curling of the leaf margins, death of these areas and premature defoliation. Brilliant colours develop in some plants, e.g. bright orange, red and purple tints in strawberries.

MAGNESIUM FERTILIZERS

Dolomite is calcium magnesium carbonate [$CaMg(CO_3)_2$]. In its pure form it contains 20.8% Ca and 12.5% Mg. Commercial grades of dolomite typically contains from 8 - 12.5% Mg. Dolomite, and related products, are used to supply calcium and magnesium, and raise the soil pH. Liming materials such as dolomite are insoluble, and are slow to react in the soil. To be effective, they must be finely ground, i.e. have a fine particle size. In annual crops, they should be applied several months before planting, and be incorporated into the soil.

Granomag AL7 (magnesium oxide) is the most concentrated magnesium fertilizer available, containing 54% Mg. Like the carbonates (magnesite and dolomite), magnesium oxide is insoluble and slow to react in



Because the land is your life.

the soil. It should not be used where a quick response to magnesium is required. In annual crops, it is best applied pre-plant.

Potassium magnesium sulfate contains around 18% K, 22% S and 10.5% Mg. As the magnesium is present in the soluble sulfate form, it can be used where a quick response to magnesium is required, e.g. at planting on soils low on magnesium. Potassium magnesium sulfate is only suited to dry application to the soil, i.e. it dissolves too slowly to be applied in solution.

Liquifert Mag [Magnesium sulfate or Epsom salts ($MgSO_4 \cdot 7H_2O$)], contains 9.6% Mg and 13% S. It is used where there is a need to apply magnesium in solution, e.g. through fertigation systems, or as a foliar spray. Liquifert Mag is a fine crystalline product, and absorbs moisture readily. It should not be blended with other fertilizers for dry application to the soil, e.g. for use as a planting mixture.

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

COPYRIGHT - Copyright, 2003 - All rights reserved. Copying or reproduction in whole, or in part, by any means, or transmission into a machine language without the written permission of Incitec Pivot Limited, is strictly prohibited.

Incitec Pivot Limited 70 Southbank Bvd, Melbourne 3006
ABN 42 004 080 264 Freecall 1800 333 197 www.incitecpivot.com.au



Because the land is your life.