SOUTH AFRICAN SUGARCANE RESEARCH INSTITUTE

7. NUTRITION

7.11 Soil acidification

Causes of soil acidification

Although much attention has been devoted to the identification and amelioration of aluminium toxicity, it is now recognised that there is an apparent increase in soil acidity throughout the rainfed part of the sugar industry. Accelerated acidification of soils under cultivation is most often the result of:

- increased mineralisation of organic matter
- oxidation of ammoniacal fertilisers and the leaching of nitrate from the soil profile
- removal of base cations during harvesting
- not following lime recommendations.

These processes occur whenever soils are continuously cropped and often cause gradual increases in soil acidity, particularly with sandy soils. The accelerated acidification recently noted in the industry is possibly associated with the leaching of nitrates not taken up by cane during the drought years.

Effects of soil acidification

Apart from the presence of toxic aluminium associated with acid soils, a number of other adverse conditions are linked to acidifying conditions:

- decreasing macro-nutrient availability
- decreasing nutrient uptake by plants
- increasing P fixation
- decreasing N mineralisation
- decreasing soil microbial and faunal activity.

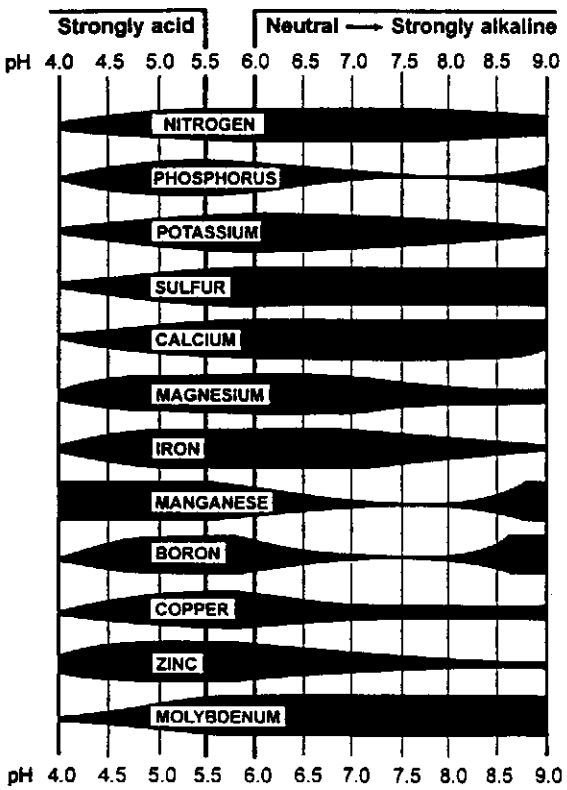
Recommendations

The trend of increasing acidity does NOT mean that lime should be routinely applied to all fields. Applying lime where it is not needed is expensive and may result in trace element deficiencies in some circumstances. Variety N12 also appears to be negatively affected by over-liming. Apply lime only when:

- soil calcium and/or magnesium deficiencies occur
- soil aluminium saturation index (ASI) value is above 20% for all varieties other than N12
- ASI value is above 40% for variety N12.

The above can only be identified with regular soil sampling. See also Information Sheet 7.5, *Recommendations for lime and gypsum.*

The diagram shows the influence of pH on the availability of plant nutrients, with the widest parts of the shaded areas indicating maximum availability.



After Lucas and Davis, 1961