



Information Sheet

7.11 Copper management



Sugarcane requirements for copper (Cu) are very low with the crop removing only about 1 to 2 grams per ton of cane harvested (a typical 100 t/ha sugarcane crop removes about 0.1 to 0.2 kg Cu/ha). Copper is important for the production of chlorophyll and for photosynthesis. It is also involved in protein and carbohydrate processes in the plant. Copper is taken up by the plant as the Cu^{2+} cation or as organic chelates. Due to the very low crop requirement, deficiencies are rarely reported as most soils have sufficient supply.

Deficiencies symptoms

- Generally appears younger leaves first.
- Small dark green patches may appear on leaves along with some interveinal yellowing (chlorosis).
- Plants develop characteristic “droopy top”.
- In extreme case leaves become fully chlorotic and bleached.
- Tillering vigour declines and internode length are reduced.



Copper deficiency symptoms. ►

Impact of excess copper

Copper toxicity has not been reported in South African sugarcane and is not a commonly encountered problem. However, like boron (B), applying excessive amount of Cu can induce toxicity.

Factors affecting copper availability

The main drivers of concern affecting Cu availability in the soil are pH, texture and organic matter content. Copper will often accumulate in soil surface horizons due to low mobility in the soil and strong binding to clay and organic matter. High pH also reduce availability. Interference by other elements can also lead to apparent deficiency symptoms.

Copper application guidelines

Soil treatments

- In plant cane, a soil test is usually undertaken to assess soil sufficiency levels.
- When the soil test level is below 0.8 mg/L, **10 kg of Cu/ha**, should be applied in the planting furrow. This is usually adequate for several ratoon cycles.
- Leaf sampling is advised to confirm adequate supply and uptake by the crop.
- Generally, copper sulphate (mono or penta-hydrate, 25-35% Cu) or a suitable copper fortified fertiliser mixture is advised.
- Cu-chelates are costly, but perform well over a range of soil conditions. In general they are better suited to situations where Cu lock-up may be a problem (alkaline soils and high organic matter levels).

Foliar spray

Foliar application is reported to give very quick responses where Cu deficiency is identified. Due to potential toxicity, leaf testing should be used to confirm deficiency (<3 ppm) before treatment. The following strategies are advised:

- Young cane, up to six months old, should receive a foliar application of 0.5-1% copper sulphate (or chelate equivalent) and a suitable wetter, using a knapsack spray rate of 300-400 L/ha.
- The effect of a spray application of copper is usually visible within three weeks, though it will only be beneficial within that growing season.

Notes and precautions

- Excess Cu can be toxic – caution not to over supply is important.
- Where excess has been soil applied, liming can be used to decrease availability.

Available copper fertiliser formulations

Source/product	Cu%	Solubility	Notes
Copper sulphate pentahydrate (bluestone)	25	High	Soil or foliar application.
Copper sulphate monohydrate	34.5	High	Soil or foliar application.
Copper oxide	14-20	Low, dissolves in acidic soil	Soil application.
Copper chelate	10-14	High	Typically foliar application, but can use in soil.

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