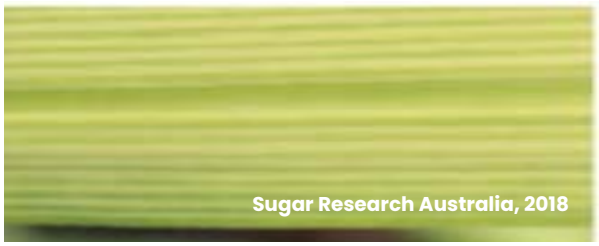
Information Sheet

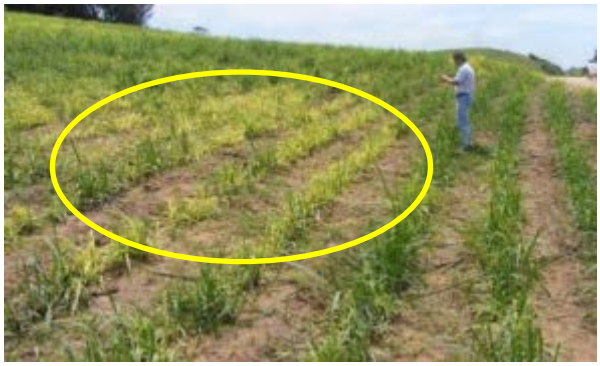
7.9 Iron management

Iron (Fe) is required in the highest amount of all the micronutrients. Sugarcane requires about 5o grams Fe per ton of sugarcane harvested (a typical 100 t/ha sugarcane crop removes about 5 kg Fe/ha). Iron is mainly used in the production of chlorophyll and is thus important for photosynthesis. Iron is one of the most common elements in the soil, with very few soils having low amounts. Iron availability is largely controlled by soil chemistry (aeration status and pH).

Defciencies symptoms

- Pale yellow interveinal stripes develop along the leaf blades.
- Younger or new leaves are affected first.
- In extreme cases the entire leaf blade becomes chlorotic pale yellow or white.
- May often appear as patches in fields and appearance may be temporary (due to temporary plant unavailability rather then inadequate soil supply).
- Root development is poor on young stubble shoots.





Deficiency often presents as yellow interveinal stripes on leaf (above). Field with a patch of Fe-deficient soil (below). ▶

Impact of excess iron

Iron availability can increase under waterlogged (poorly aerated) or acid conditions, but these conditions tend to result in other crop problems manifesting before Fe uptake is excessive. Toxicity, *per* se, is seldom observed.

◀ The red colour of many soils is due to iron oxide indicating a well drained and aerated soil. Yellow and blue- grey mottling indicated reduced iron due to waterlogging.

Factors affecting iron availability

Iron is very common in most soils and is responsible for many of the reds/oranges/yellows in aerated soil and the blue/grey colours of waterlogged soils. In almost all soils, Fe is present in large amounts, mostly as soil minerals. Of greater importance to Fe availability is the soil chemistry. The main factors affecting availability are soil pH and soil aeration status. Other factors that can play a role are competitive interaction with other elements such as P or Ca, thought these are strongly linked to the chemistry of the soil. Dry soils are also reported to increase likelihood of Fe deficiency.

Maximum Fe availability occurs at **low pH (<4)**, though root and crop health is often severely compromised at such low pH values. Despite this, under very acid conditions a condition known as "acid chlorosis" may develop (caused by excess uptake of Mn). It has been occasionally observed in acidic Midlands soil under cool, wet growing conditions. Liming is usually an adequate remedy.

At **pH values >7.5**, Fe availability decreases sharply due to formation of insoluble compounds. Deficiency caused by excess alkalinity is referred to as "alkaline or lime chlorosis". The effect is frequently noticeable in young ratoons and the term "ratoon chlorosis" is used. The effect is temporary, and the plant will outgrow the condition (though yields may be compromised).

Iron and phosphorus interactions

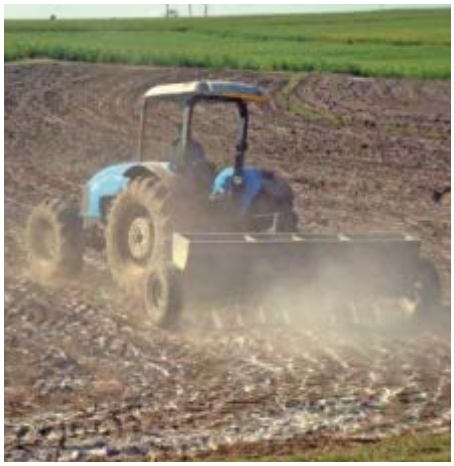
In acid soils, phosphorus can be strongly held by iron minerals lowering plant-available P. Many acidic Midlands soils have high amounts of these minerals and their P-capturing capacity increases as the soil becomes more acidic. This P is usually not readily released, though liming has been shown to improve P availability.

Iron application guidelines

Soil treatment

Soil treatment for Fe deficiency is generally regarded as ineffective and usually not advised.

In acid soils, liming may improve availability, though be cautious not to over-lime. Avoid liming to pH greater than 6.5 (preferred is between 4.5 and 5.5). In alkaline or over-limed soils, some alleviation may be achieved through localised acidification around the root zone. The use of acidifying fertilisers (e.g. ammonium sulphate) applied in the furrow or banded over the stool has been reported to improve Fe availability and reduce deficiency symptoms. For more persistent benefits on very alkaline or calcareous soils, elemental sulphur can be furrow applied at planting to increase soil acidity in the rooting zone.



▲ Liming application.

Foliar spray

Foliar application is the preferred treatment where deficiency is detected. The following guidelines apply (plant or ratoon):

- Apply a foliar application of 1 to 1.5% ferrous sulphate (or 0.1 to 0.5 % Fe-chelate solution) and a suitable wetter, using a knapsack spray rate of 300 to 400 L/ha. Consult the product label for specific application guidelines.
- This can be applied as soon as there is suficient leaf material (5 to 6 leaf stage) and preferably during warmer spells to promote uptake.
- If deficiency symptoms do not disappear with in about 3 weeks of treatment, a second application may be required. In severe cases several repeat applications may be required.

Notes and precautions

Where Fe compounds are applied through irrigation systems or knapsack sprayers, ensure there is compatibility with other compounds to be added and ensure water is not alkaline. Iron will readily complex and precipitate to form scales, blocking nozzles and pipes. Acid or oxidant flushing may be necessary to remove these build-ups.

Available iron fertiliser formulations

Source/product	Fe%	Solubility	Notes
Iron sulphate heptahydrate	20	High	Foliar application is best, soil treatment ineffective.
Iron sulphate monohydrate	30	High	
Iron chelate	13	High	Foliar application is best, soil treatment may be partially effective.

Louis Titshall (Senior Soil Scientist)

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