

# Iron (Fe)

## What is the Role of Iron (Fe) in Plants?

Iron is an essential plant nutrient required for electron transport in photosynthesis. It is an important electron acceptor in redox reactions and an activator for several enzymes. Iron deficiency may inhibit K absorption. Iron is not mobile in the plant or soil.

## Why Apply Iron (Fe) to Rice?

After the deficiencies of N, P, K, S and Zn, Fe is often the next most common nutrient limiting rice yields. Applications should be balanced to ensure a healthy and productive crop.

## How to Manage Fe?

- **Iron deficiency symptoms.** Interveinal yellowing and chlorosis of emerging leaves. Whole leaves and plants may become yellow (chlorotic). Reduced dry matter production and yield.
- **Occurrence of iron deficiency.** Iron deficiency is not common in flooded slightly acidic lowland soils, but sandy, calcareous and alkaline lowland soils may suffer from iron deficiency. Iron deficiency is more common in neutral, calcareous and alkaline upland soils.
- **How much iron to apply?** Iron deficiency is the most difficult and costly nutrient deficiency problem to correct. Soil application requires 100 to 300 kg ferrous sulfate per ha. Foliar applications of 2-3% ferrous sulfate solution or iron chelates (200 l per ha) can be used 2 to 3 times at 2-week intervals starting at tillering. The crop requires around 0.5 kg Fe ha<sup>-1</sup> (both straw and grain) per ton of grain yield, but once applied iron is not freely available to plants.
- **When to apply iron?** Apply solid ferrous sulfate ( $\text{FeSO}_4$ ) next to rice rows at the rate of 100 kg ha<sup>-1</sup>. Broadcast application will require 200 to 300 kg of ferrous sulfate ha<sup>-1</sup>. Two to three foliar applications of  $\text{FeSO}_4$  (2-3% solution) or iron chelates at 2-week intervals starting at tillering will be helpful.

## What are the Sources of Fe?

The commonly used iron fertilizers are the soluble ferrous sulfate (20-33% Fe), ferrous ammonium sulfate (14% Fe), and iron chelates (5 to 14% Fe).



Fe deficiency: Leaf interveinal yellowing.



Fe toxicity: Tiny brown spots on leaves.



Fe deficiency: Leaf yellowing in field.

## Further information

Dobermann A, Fairhurst T. 2000. Rice: Nutrient disorders and nutrient management. Singapore and Los Baños: Potash & Phosphate Institute (PPI), Potash & Phosphate Institute of Canada (PPIC), and International Rice Research Institute (IRRI). p 1-191.

- For information on site-specific nutrient management, visit <http://www.knowledgebank.irri.org/ssnm>.
- For keys to diagnose problems in the field, visit <http://www.knowledgebank.irri.org/ricedoctor>.
- For an overall view of crop management practices, visit <http://www.knowledgebank.irri.org/tropRice>.

Developed with inputs from V Balasubramanian, RJ Buresh and M Bell.

