Field Validation of a Quick Screening Method for Iron Toxicity in Lowland Rice

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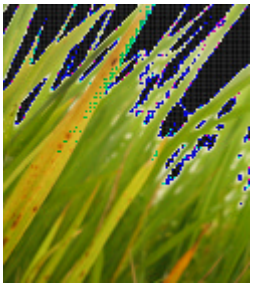
Introduction

Iron toxicity is one of the most important abiotic stresses in lowland rice and responsible for yield losses up to 90%. In flooded soils, high concentrations of reduced iron lead to excessive Fe(II) uptake and the typical symptom, a copper colouring of the leaves, called leaf bronzing. To avoid yield losses resistant genotypes need to be selected and targeted to the specific growing environment. Earlier greenhouse studies have shown that both includer and excluder strategies can be identified. In this study, 13 genotypes were tested in the field for their mechanisms of Fe toxicity tolerance and to validate the greenhouse screening tool for its transferability to field conditions.

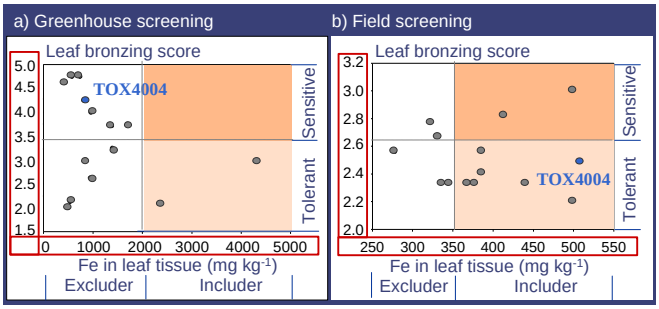
Aims :

- **Validate hydroponic screening tool**
- **Screen for resistant genotypes**
- **Differentiate between includer/excluder strategies**



Conclusion

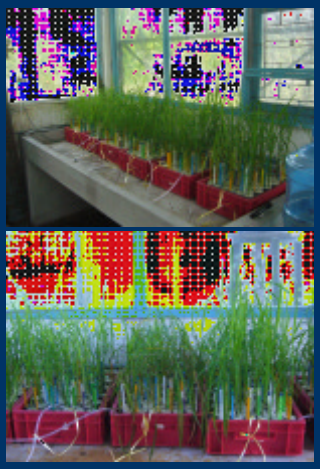
- Lower toxicity levels in the field than in the greenhouse lead to different results
- Greenhouse screening is more precise because of more variability in stress response
- Check cultivars proofed to be tolerant in both cultivation methods
- No reliable conclusion can be drawn about the other cultivars tested in the field
- Greenhouse screening appear to be the method of choice



Material & Methods

Two field sites with different levels of iron toxicity in the Mekong delta/Vietnam were chosen. Thirteen local Vietnamese genotypes and one check cultivar were grown on both sites until late vegetative stage. Leaf symptom scoring and visual assessment were conducted followed by destructive sampling and analysis of Fe content in the leaves. Results were compared to those obtained in a standardized greenhouse screening for iron toxicity.

a) Greenhouse set-up

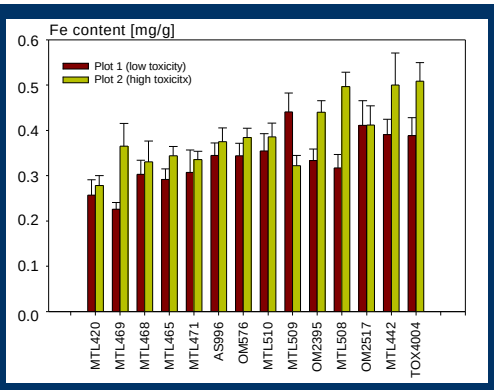


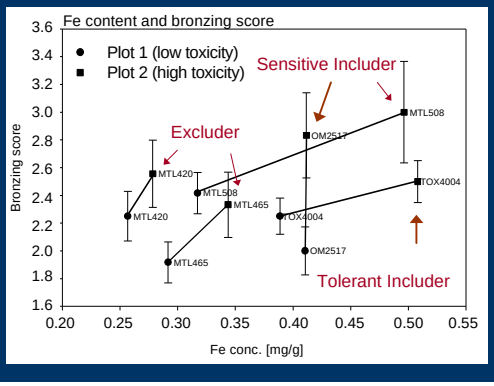
b) Field experiment

Tools :

- **2 field sites with different levels of iron toxicity**
- **13 local genotypes and 1 tolerant check variety**
- **Leaf bronzing scoring and analysis of Fe contents in the leaves**
- **Comparison to results obtained in greenhouse screening**

Results





- **More symptoms and higher Fe content at the more toxic site**
- **Differentiation between includer / excluder strategies possible**
- **Sensitive / tolerant genotypes differ in their stress responses**
- **Comparison to results obtained from the greenhouse screening shows much lower symptom scores and Fe contents in the field**