

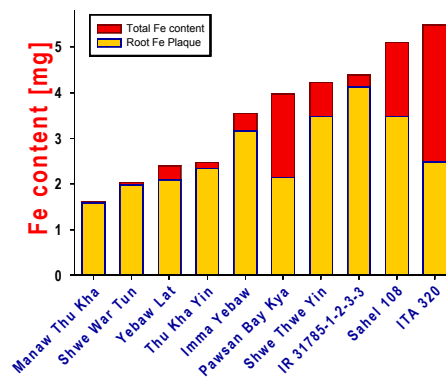
Introduction

Iron toxicity is one of the most important abiotic stresses limiting rice production in lowland systems. The most efficient way to address Fe toxicity is via resistant genotypes. To date screening tools for Fe-toxicity tolerance in rice are based on leaf symptoms and yield, but not on resistance mechanisms such as exclusion or tolerance. Recently we developed a mechanistic early screening method that allows the investigation of actual tolerance mechanisms. However, the rice roots were not accessible in that screening method and it was not possible to identify the Fe exclusion potential or retention power of rice roots. The aim of this research was to adapt this screening tool in a controlled growing environment allowing accessing the rice roots.

Conclusions

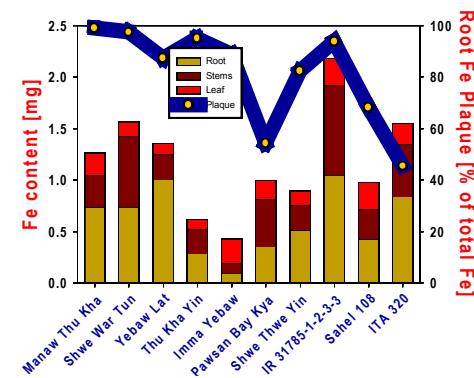
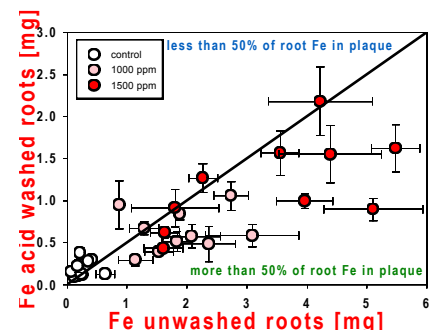
- ~ Genotypes differ widely in the amount of Fe sequestered to root Fe plaque
- ~ The major share of Fe in the plant is found in the root Fe plaque
- ~ The amount of Fe in root plaque is not related to the amount of Fe taken up to the shoot.
- ~ Toxicity symptom expression is not related to root Fe plaque

Results - Summary



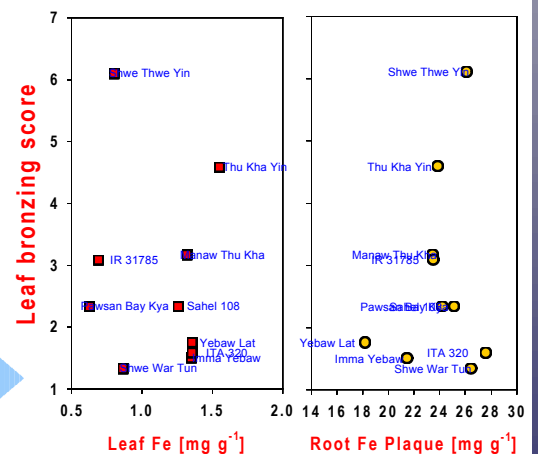
Between 40 and 95% of the total Fe in the plant is located in the root plaque

In most cases more than 50% of the root Fe content is at the roots and not in the roots



The percentage share of root iron plaque in total plant Fe is not related to shoot Fe uptake

Leaf bronzing score is not correlated to root iron plaque and only weakly correlated with leaf Fe concentration.



Notes on Materials and Methods



- ~ 10 genotypes were selected including three check varieties ITA 320 (tolerant), Sahel 108 (tolerant) and IR 31785-58-1-2-3-3 (sensitive) and 7 Myanmar cultivars
- ~ Rice seedlings were hydroponically grown in PVC boxes for 4 weeks – see images on the left.
- ~ and then subjected to three Fe treatments (0, 1000 and 1500 mg L⁻¹ Fe(II) applied as FeSO₄).
- ~ Nitrogen gas was infiltrated to the cultural solution through porous stones to provide anoxic conditions.
- ~ After 3 days stress exposure the rice seedlings were scored for iron toxicity symptoms
- ~ Root Fe plaque was washed of the root for 5 min using 0.5 M HCl
- ~ Fe concentrations were measured by AAS.