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***Bacillus*-mediated Changes in Iron Partitioning and Sequestration in Lowland Rice under Iron Toxic Conditions**

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Abstract

Iron toxicity is the result of large concentrations of reduced iron (Fe II) in the soil solution, which occurs in flooded (arable) soils. It constitutes a severe stress in lowland rice cultivation and can lead to significant economic losses. Despite the widespread occurrence of iron toxicity in many rice producing areas, little is known about the impact of rhizobacteria on rice genotypic responses.

Rice cultivars tolerant to iron toxicity have been shown to employ different tolerance strategies and we hypothesise that the extent of iron toxicity symptom mitigation or aggravation upon *Bacillus* spp. inoculation is partly dependent on the genotypic adaptation mechanism. This study investigates *Bacillus*-mediated changes in iron sequestration in lowland rice and their impact on the expression of iron toxicity symptoms.

Six rice (*Oryza sativa*) cultivars (IR75866-17-B-12-WAB1, Suakoko 8, Nipponbare, IR31785-58-1-2-3-3, TOX 4004-8-1-2-3, Sahel 108), differing in their tolerance to iron toxicity were subjected to inoculation with three different *Bacillus* isolates (*B. pumilus* and *B. megaterium*) and subsequently exposed to 1000 ppm Fe (II) over the course of one week. The effects of bacteria treatment were evaluated by symptom scoring, dry weight determination and measurement of plant iron content.

Screening of leaf scores showed that the impact of *Bacillus* isolates on iron toxicity symptoms significantly differs between rice cultivars. Further, iron uptake and shoot iron concentration do not always correlate with severity of leaf symptoms.

Iron partitioning in rice tissues will be further analysed. Varietal differences in symptom expression changes following bacteria treatment will be related to altered iron concentrations in leaf blades, leaf sheaths and roots. Further, a possible impact of *Bacillus* inoculation on iron sequestration within the plant cell will be investigated.

Keywords: *Bacillus* spp, iron toxicity, *Oryza sativa*