



Tropentag, September 14-16, 2022, hybrid conference

“Can agroecological farming feed the world?
Farmers’ and academia’s views”

Effect of *Bacillus* spp. on enzyme activity and potassium uptake in lowland rice (*Oryza sativa*) under iron toxicity

TANJA WEINAND, JULIA ASCH, FOLKARD ASCH

University of Hohenheim, Inst. of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), Germany

Abstract

Plant associated bacteria can positively influence the ability of lowland rice to withstand toxic concentrations of soluble iron (FeII) in the soil. This beneficial interaction, however, is dependent on the bacteria strain × rice cultivar combination.

Iron toxicity is a major constraint for irrigated rice production in large parts of Asia, West and Central Africa, Madagascar, and Brazil. While it is known that tolerant rice cultivars deploy different adaptation strategies, the underlying mechanisms are not fully understood. Deciphering the role of both epi- and endophytic bacteria in tolerance mechanisms of local, adapted rice cultivars will be essential to incorporate plant traits mediating beneficial interaction with microorganisms under iron toxic conditions into future breeding efforts and agricultural management practices.

In the present study, three lowland rice cultivars with contrasting levels of tolerance against iron toxicity, namely IR31785-58-1-2-3-3 (sensitive), Sahel 108 (tolerant includer), and Suakoko 8 (tolerant excluder) were inoculated with three *Bacillus* isolates (*B. pumilus* and *B. megaterium*) and, after one week, exposed to excess iron (1,000 ppm) for eight days. The effects of bacteria inoculation were evaluated by leaf symptom scoring and determination of dry weight. Activities of five enzymes involved in reactive oxygen scavenging (ROS) were measured in inoculated and non-inoculated plants under normal and iron toxic growth conditions. Potassium and iron content in roots, sheaths and blades of the same plants were analysed by flame photometer and spectrophotometer, respectively. Enzyme activities and potassium uptake and distribution will be related to the effects of bacteria inoculation on leaf bronzing scores and iron distribution within the plants.

Keywords: Abiotic stress, *Bacillus* spp., iron toxicity, *Oryza sativa*