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**Characterization of rice wild relative species for iron toxicity tolerance
at the vegetative growth stage**



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ABSTRACT

*Iron toxicity is a widespread nutritional disorder of rice in wetlands characterized by large concentrations of reduced iron (Fe) in the soil solution. It is associated with poor water control, resulting in reducing soil conditions that promote the accumulation of soluble ferrous iron in the soil solution. Genetic improvement is considered the most promising strategy to counteract negative effects of iron toxicity on rice. Within the genus *Oryza*, only accessions of the species *Oryza sativa* and *O. glaberrima* have so far been assessed for their tolerance to elevated concentrations of iron in solution. However, the genus *Oryza* comprises 23 species that may contain genes of interest and represent a so far completely untapped potential for future rice breeding research. We hypothesize that rice wild relatives might have evolved adaptive mechanisms to abiotic stresses including iron toxicity, thus enlarging the gene pool for future rice breeding work for iron stress tolerance.*

*The present research aimed at characterizing selected domesticated *O. sativa* and *O. glaberrima* as well as 62 accessions belonging to the other species of *Oryza* (wild relatives) at the vegetative growth stage for their response to elevated Fe(II) in soil solution. A total of 75 genotypes belonging to 21 different species of *Oryza* were comparatively assessed in a greenhouse experiment. Twelve-day-old seedling were transplanted into polders that were enriched with reduced iron either to represent a constant moderate iron concentration in the soil (chronic stress) or a short-term high iron pulse (acute stress). Toxicity symptoms were assessed as Leaf Bronzing Scores (LBS) on a scale from 0 to 10.*

*Genotypes responded differently to the two types of Fe stress. Early formation of LBS and subsequent recovery was observed with acute Fe stress while more constant but also less severe symptoms occurred with chronic stress. Genotypes belonging to the species *O. nivara* showed the lowest LBS under acute stress, while *O. sativa* genotype FL483 expressed the lowest LBS under chronic Fe stress. Based on the relationship of leaf iron concentration and LBS some accessions of the species *O. rufipogon* and *O. nivara* could be classified as tolerant includer types (tolerating high tissue concentrations of iron), while other accessions of *O. nivara* and most accessions of *O. barthii* could be classified as excluder types (limiting the uptake of iron by the roots). Based on this preliminary assessment we conclude that some wild relatives of rice have potential and may be of interest for future rice breeding strategies for tolerance to conditions of iron toxicity.*