

Accepted Manuscript

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PII: S0098-8472(18)30456-8
DOI: <https://doi.org/10.1016/j.envexpbot.2018.06.030>
Reference: EEB 3489

To appear in: *Environmental and Experimental Botany*

Received date: 28-3-2018
Revised date: 22-6-2018
Accepted date: 24-6-2018

Please cite this article as: Luna DF, Pons ABS, Bustos D, Taleisnik E, Early responses to Fe-deficiency distinguish *Sorghum bicolor* genotypes with contrasting alkalinity tolerance, *Environmental and Experimental Botany* (2018), <https://doi.org/10.1016/j.envexpbot.2018.06.030>

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Early responses to Fe-deficiency distinguish *Sorghum bicolor* genotypes with contrasting alkalinity tolerance

Running title: Alkalinity tolerance in *Sorghum*

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Highlights

- Two *Sorghum bicolor* genotypes with contrasting alkalinity tolerance were identified.
- Alkalinity and -Fe elicited similar responses, tolerance followed parallel trends.
- Both stresses caused early damage to the oxygen evolving complex in PSII.
- Upregulation of genes for phytosiderophore synthesis and transport was observed under both conditions.
- Lower expression of these genes may be related to alkalinity sensitivity.

Abstract

Soil alkalinity is a significant limitation to agricultural productivity and it is associated to several soil features, among them, Fe deficiencies. In this work, we explored the hypothesis that alkalinity tolerance in *Sorghum bicolor* is related to Fe-deficiency tolerance and its underlying mechanisms. An initial screening involving 8 sorghum genotypes identified two with contrasting growth responses to alkalinity (susceptible Minu II and more tolerant Silero INTA Pemán) that were subsequently studied under Fe-deprivation (-Fe) conditions. *Sorghum sudanense* (sudangrass) was included as control tolerant species for Fe deficiency. Growth in hydroponics and in soil indicated

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