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Characterization of putative mutants for iron homeostasis

Little is known about the genetics of iron homeostasis in plants. A novel genetic screen was used to identify mutants with alterations in iron homeostasis. Because ferritin (Fer1) mRNA expression is upregulated by intracellular iron concentration in leaves, this gene reflects intercellular iron concentrations in leaves. To identify mutants that over- or under-accumulate leaf iron, Arabidopsis was transformed with the reporter gene green fluorescent protein (GFP) driven by the Fer1 promoter. Seed homozygous for this transgene were mutagenized with EMS. The resulting M2 seed were screened for high or low GFP fluorescence relative to transgenic controls grown on iron-sufficient medium. Six putative over-accumulators of Fe, or OAFs, were identified that expressed high levels of GFP fluorescence. Our objective was to characterize these mutants for alterations in iron homeostasis. Seed of these mutants and the non-mutagenized transgenic control were germinated and grown on iron-sufficient media for 11 days before transferring to fresh iron-sufficient or –deficient media for three days, at which point Fer1 and GFP mRNA expression were determined by Northern blotting and the activity of ferric chelate reductase (an enzyme whose activity increases during iron deficiency) was assayed. One mutant, OAF102, showed uncoupled GFP and Fer1 expression between iron-sufficient or –deficient media. Further characterization of this mutant is being performed.