Effects of *At*FRO2 expression in the nutritional enhancement of soybean (*Glycine max*. L)

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Soybean, whose earliest evidence of cultivation dates back to 1000 BC, remains one of the key plant sources of nutrients worldwide. Iron (Fe) is one of the most important micronutrients in human and plant nutrition, and adequate iron nutrition in plants is central in providing adequate concentrations of this important mineral in harvested plant products for human food and animal feed. The first step in the absorption of iron by many plant species is the reduction of Fe(III) to Fe(II). This is an obligatory step for iron uptake by all dycotiledonous plants. Most studies of this process focus on the root reduction of iron, and not on the role of leaf iron reduction in seed loading of iron and other nutrients. Soybean [*Glycine max* (L.) Merr.] constitutively expressing the FRO2 iron reductase gene from *Arabidopsis thaliana* was analyzed for leaf reductase activity, and the effect on seed nutrient concentrations was assessed. It was found that protoplasts isolated from the transgenic leaves had three (3)-fold higher reductase activity, and that the seed iron levels also were increased by 10%. However, leaf and pod wall iron concentrations increased as much as 500% in the transgenic plants, suggesting that other factors are limiting the translocation of the excess iron into the seeds. It was found that *ferritin* expression levels were higher in the transgenic leaves than in the control. This suggests that the excess iron maybe stored as *ferritin* in the leaves and therefore unavailable for phloem loading. Finally, concentrations of Mn, K, P and Zn had significantly higher concentrations in the leaves, pod walls, root and xylem sap of the transgenic plants, and that Zn concentrations also were higher in the transgenic seeds. This suggests a more ubiquitous role of the iron reductase in plant mineral dynamics.

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