

Organization, mechanism of action and regulation of the chloroplast iron uptake system

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Chloroplasts contain 80-90% of the iron (Fe) in the mesophyll cells. Although Fe is essential for the function of the photosynthetic apparatus, the Fe homeostasis of the chloroplast is not well-understood. Oilseed rape plants grown under optimal, Fe deficient and Fe excess conditions were studied. Fe deficiency decreased the *in vivo* Fe content whereas Fe excess did not alter it. Chloroplasts preferred to take up Fe from Fe^(III):citrate 1:1 complexes, over other complexes such as Fe^(III):nicotianamine 1:1.1. Moreover, a competition was found between the Fe and Cu uptake. Fe nutrition also altered both the Fe uptake and the ferric-chelate reductase activity: both the lack and the excess of Fe led to their decrease. Fe metabolism stays under age-control: Fe content of chloroplasts increased until the leaves reached their maturity but decreased during their aging except under Fe excess. Changes in the transcript level of *BnFro7*, *BnPic1* and *BnNico* together with the amount of BnPIC1 and BnNiCo proteins showed similar tendencies, indicating a transcriptional level regulation. Thus, the Fe uptake of the chloroplasts that uses ferric-citrate complexes as substrates stays under the control of the Fe nutrition status and the age of the leaves.

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