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Evaluation of the effect of tris(3-hydroxy-4-pyridinonate) Fe(III) chelates to treat Iron Deficiency Chlorosis

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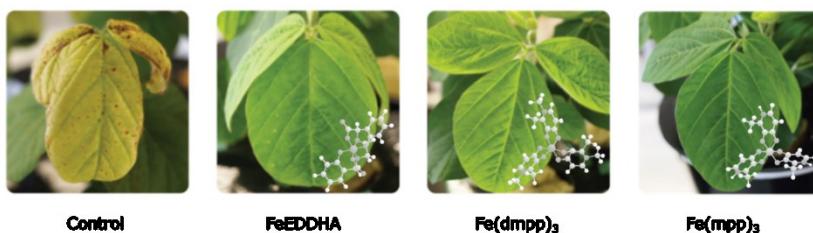
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Iron (Fe) is an essential nutrient for most organisms including plants. However, due to the existence of the element in very insoluble forms in earth crust, the uptake of Fe by plants is seriously compromised in alkaline soils, which correspond to 30% of the world's arable land. As a consequence, plants suffer from Fe deficiency chlorosis (IDC), characterized by chlorosis, yield losses, and lower concentrations of Fe in edible plant parts. Farmers rely on supplementing their crops with Fe-chelates to avoid serious growth deficiencies and Fe-EDTA and Fe-EDDHA are the available commercial products. The limited number of distinct Fe chelates that are used as fertilizers calls for the identification of new ligands capable of producing Fe-complexes with properties that allow more efficient pathways for root uptake, root to shoot translocation and maintenance of metal homeostasis.

Herein we report studies regarding the capacity of two *tris*(3-hydroxy-4-pyridinonate) Fe(III) complexes [Fe(mpp)₃] and [Fe(dmpp)₃] to amend IDC in hydroponically grown soybean (*Glycine max*) plants. The application of all complexes improved plants condition when compared to those grown with no added Fe treatment. Moreover, plants treated with [Fe(mpp)₃] exhibited the best overall results. Plants presented: (a) higher relative chlorophyll content; (b) higher biomass development and (c) higher Fe accumulation.

Plants treated with the compound [Fe(mpp)₃] were able to translocate more iron from the roots to the shoots not eliciting the expression of the Fe stress related genes. The results suggest that 3,4-HPO Fe-chelates could be economically and environmentally favourable in agricultural contexts



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