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Effects of humidity and amino acids on the translocation of manganese and zinc applied to the leaves soybean (glycine max) crop.

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Amino acids are part of the primary structure of proteins. Additionally, they are precursors of several chemicals and, in plants, they are able to mitigate the deleterious effects of stress. In Brazil, several companies have been trading commercial products based on amino acids as stimulants of plant metabolism. They also claim that the amino acids contribute to the absorption and transport of micronutrients sprayed on leaves. However, scientific studies supporting those arguments are scarce. Hence, we decided to employ in vivo analysis X-ray fluorescence spectroscopy strategy to determine the translocation rate of Mn and Zn complexed with histidine. For this, 0.3 ml in a ratio of 2:1:1 M of histidine, manganese and zinc, respectively, was sprayed on the leaves of soybean. Measurements were performed on the petiole and evaluated during one week under high (80-90%) and low humidity (30-45%).

The analysis carried out on the petiole showed that the application of Mn and Zn with and without histidine were similar in high humidity, i.e, the amino acid had no influence on the translocation of micronutrients. Differently, in low humidity conditions, the amino acid increased the combined uptake+transport of Zn. One should also highlight that the metal-amino acid complexes presente little phytotoxic effects on the leaves compared to sulfate based metals. In the next phase of the project, cross sections of the treated leaves will be mapped under sub-micron lateral resolution at the Carnauba beamline of the LNLS. There, we expect to determine how much of the absorbed nutrient remains in the apoplast, in the cell wall, and how much enters in the simplast, i.e. in the citosol. Then, we will be able to verify weather metal-amino acid complexes induce, or facilitate, the entrance of metals in the cell. The same procedures will be carried out for the coffee culture.

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