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CHASING DROUGHT STRESS IN LPA1-1 MAIZE MUTANT: A COMPARISON BETWEEN THE ROOT SYSTEM ARCHITECTURE AND THE EPIGEAL PART OF THE PLANT

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Phytic acid (PA) is the main storage form of phosphorus (P) in plants. It is localized in the seeds and is accumulated as phytate salts with different cations, reducing their bioavailability. Only ruminants can degrade PA due to the presence of phytases in the digestive tract, while monogastric animals assimilate only 10% of phytate in feed and 90% is excreted, contributing to P pollution and water eutrophication. In underdeveloped countries, the lack of important cations (such as iron and zinc) in the diet represents a problem for human health, while in rich countries the problem is related to feed: farmers must supply mineral phosphorus to the feed of monogastrics, thus implying an economic problem. In recent decades, many low phytic acid (*lpa*) mutants have been isolated: in maize, *lpa1-1* is characterized by a 66% reduction in PA, followed by a proportional increase in inorganic P. Unfortunately, PA decrease is followed by a series of negative pleiotropic effects on the seed and on plant performance. One of these agronomic defects observed on *lpa1-1* is a greater susceptibility to drought stress, which could be caused by an alteration in the Root System Architecture (RSA).

With the aim to assess the effect of drought stress on the mutant, we have compared the RSA of *lpa1-1* to a wild phenotype using different approaches, spanning from the greenhouse to the field. In this work we present the results obtained, which clearly show that a variety of morphological changes occurred in the epigeal part of the mutant plant rather than in the root system. Data show that drought stress in mutant plants seems to be

caused by reduced photosynthetic efficiency and lower stomatal conductance and not by a shallower root system.

Studying and overcoming the pleiotropic effects affecting *lpa* mutants would determine several potential benefits for the nutritional quality of food and feed and for the environmental P sustainability in agriculture.