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ISOLATION AND CHARACTERIZATION OF NEW LOW PHYTIC ACID 1(LPA) MUTATIONS IN MAIZE BY REGIONAL MUTAGENESIS BY AC TRANSPOSON

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Phytic acid (PA), myo-inositol 1,2,3,4,5,6-hexakisphosphate, is the main storage form of phosphorus in plants. It is localized in seeds, deposited as mixed salts of mineral cations in protein storage vacuoles; during germination, it is hydrolyzed by phytases. When seeds are used as food/feed, PA and the bound cations are poorly bioavailable for human and monogastric livestock due to their lack of phytase activity. Reducing the amount of PA is one strategy to solve these problems and is an objective of breeding for improving the nutritional properties of major crops. In this work, we present data on the isolation of a new maize (Zea mays L.) low phytic acid 1 (lpa1) mutant allele obtained by mutagenesis. The Lpa1 gene encodes for ZmMRP4 (accession number EF586878), a multidrug resistance-associated protein(MRP) belonging to the subfamily of ATP-binding cassette (ABC) transmembrane transporters. With the aim to isolate new lpa1 insertional mutations we crossed a line carrying an active Activator (Ac) transposon +/+ Ac (mapping on chromosome 1, bin 1.02, closely linked to lpa1) with lpa1-1/lpa1-1 homozygous line. We obtained 4787 F1 seeds that were screened by a "density assay" performed in sucrose solution (1.28 g/cm^3): putative lpa and damaged kernels having lower density compared to a wild type, were able to float. We isolated in this way 273 seeds that were sown in field and from the 27 plants that reached the maturity we obtained, by self-pollination, 16 ears. These progenies were assayed for free phosphate and PA content indicating the isolation of new lpa1 mutations. The best event (R4183-4) was selfed 4 times and after segregation of lpa1-1 mutation we isolated and characterized in homozygous status the new lpa1 mutation as confirmed by partial sequencing of the ZmMRP4 gene.