Proceedings of the Joint Meeting AGI-SIBV-SIGA
Assisi, Italy – 19/22 September, 2011
ISBN **978-88-904570-2-9**

Poster Communication Abstract – 8.17

LOW PHYTIC ACID 1 MUTATION IN MAIZE, NOT ONLY A PHOSPHOROUS ISSUE

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Maize, phytic acid, starch, ions, proteins

Phytic acid, myo-inositol 1,2,3,4,5,6-hexakisphosphate (IP6), is the major storage form of phosphorous in plants and it is mainly accumulated in seeds (up to 4-5% of dry weight) and pollen. In maize kernel the 80% of phytic acid is localized in the scutellum while the remaining 20% is in the aleuronic layer. Phytic acid is deposited as mixed salts of mineral cations in protein storage vacuoles and during germination it is idrolized by phytases. Phytic acid and the cations that it is able to bind are poorly bio-available for monogastric animals due to their lack of phytase activity, for this reason phytic acid P is mainly excreted in wastes, furthermore the nutritional value of the seeds decreases due to the low bio disponibility of micronutrients which are important feed/food components. The undigested phosphorous contained in excreted phytic acid can also contribute to water pollution.

One strategy to solve this problem is the isolation of *low phytic acid* (*lpa*) mutants able to accumulate low level of phytic P and high level of free phosphate in the seeds while the total content of seed P is not modified. Among cultivated plants maize is one of most important, it is used for many purposes, in several countries as staple food, as feed for animals and in industrial activity. Three *low phytic acid* maize mutants have been isolated: *lpa1*, *lpa2* and *lpa3*; *lpa*1 exhibited the most relevant reduction of phytic acid in the seed.

The *lpa* mutations influence not only the phosphorous accumulation in the seed but also the plant development and its productivity due to negative pleiotropic effects. This can reflect the involvement of inositol phosphates such as phytic acid in fundamental biological process.

Here we present genetic, physiological and hystological data regarding *lpa1-7*, a *low phytic acid 1* mutant allele, obtained by chemical mutagenesis. We further investigate the effect of the *lpa1* class of mutations on several aspects of grain quality, such as storage proteins, ions accumulation and nutritional value. We also highlight differences in starch content, structure and functional properties.