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ELEMENT DISTRIBUTION IN COMMON BEAN *lpa1* SEEDS SHOWS A CALCIUM REDISTRIBUTION THAT MAY EXPLAIN THE HARD-TO-COOK (HTC) DEFECT AND THE UNEXPECTED PHA-L LECTIN THERMAL STABILITY OF THE *lpa1* MUTANT

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Iron deficiency affects most of the world population both in developed and developing countries, especially people who consume high amount of phytate-containing food. Phytic acid (PA), the main form used by seeds to store phosphorus, is an antinutritional factor for its ability to chelate minerals important for human nutrition.

We previously isolated and characterized a *lpa1* (low phytic acid) mutant in common bean with 90% reduction of PA. The *lpa1* beans have been shown to improve iron status in human trials, but some adverse gastrointestinal effects have been reported and linked to the stability upon cooking of a bean lectin, the PHA-L, contained in these seeds (Petry et al., 2016).

Here we will present data on the distribution of globoids and of minerals, by µPIXE analysis, in wt and *lpa1* seeds. We have also studied the influence of the *lpa1* mutation and of the cooking temperature on the thermal hydrolysis of bean PHAs by analysing beans, both wt and *lpa1*, carrying different PHA alleles (PHA-E, PHA-L and PHA-E,L), cooked at sub-optimal (95°C) or normal temperature (100°C). Our results show that the *lpa1* mutation strongly influences the stability of the PHA-L, but not that of the PHA-E. We show that the mechanism by which the *lpa1* mutation affects PHA-L stability involves an excess of free cations (most likely Ca^{2+}) generated by the low levels of PA and we also show a redistribution of Ca^{2+} ions that in the *lpa1* mutant are more concentrated in the cell wall middle lamella area of the parenchyma cells, in accordance with the proposed theory for the development of the HTC defect (Kruger et al., 2015).

Petry et al. (2016). Journal of Nutrition 146, 970-975
Kruger et al. (2005). Food Chemistry 174, 365-371