PROGRESS AND PROSPECTS FOR POTATO BIOFORTIFICATION: DIVERSITY, RETENTION, BREEDING AND DELIVERY

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With HarvestPlus, CIP has undertaken biofortification of potato as a food-based strategy to combat micronutrient malnutrition, targeting Fe, Zn and ascorbic acid, as a promoter of mineral bioavailability.

Ample genetic diversity for the Fe and Zn concentration exist and can be exploited in breeding programs seeking to increase the levels of these minerals in the human diet. Significant variation for mineral concentration due to environment and genotype x environment interaction has been found,

Boiling does not affect the Fe and Zn concentration of potatoes. However the ascorbic acid concentration varies significantly depending on the preparation method.

The bioavailability of Fe in potato can be greater than in cereals and legumes due to the presence of high levels of ascorbic acid and low levels of phytic acid. Caco-2 assays of showed that the Fe from yellow fleshed potato varieties is of higher bioavailability than the one of pink and purple fleshed varieties,

Following first realization of genetic gains in a diploid base population, 4x-2x crossing is in progress toward new breeding goals of higher bioavailable Fe and Zn concentrations in advanced tetraploid populations with disease resistance and tolerance to abiotic stress. NIRS calibrations provide new, more rapid and economical means to estimate micronutrient concentrations for timely decision-making in the course of population improvement.

Participatory selection with farmers, NGOs, universities and schools among other stakeholders builds on end-user perceptions, preferences and demand for distinctiveness. Recent experiences in the central and southern Andes have shown that although farmers select candidate varieties for decentralized official release they often maintain multi-clone portfolios to satisfy demand for diversity and confront environmental variability.