



Fighting malnutrition with iron and zinc biofortified potatoes

For more than 10 years, the International Potato Center (CIP) has been working on potato biofortification to increase the concentration and bioavailability of iron and zinc in this crop. This work is being done with a view to helping reduce the levels of malnutrition in poor communities with high potato consumption.

Potato and nutrition

CIP's scientists are focusing their efforts on increasing the nutritional value of crops through genetic improvement or biofortification, as an option for improving health in poor communities where people cannot access commercially fortified foods or vitamin supplements. It is thought that the bioavailability of iron in potato may be higher than that in cereals and legumes due to the presence of high levels of vitamin C - which facilitates iron absorption in the human body - and low levels of phytic acid, an inhibitor of iron absorption. CIP and its partners have recently shown that the bioaccessibility of iron in potato is high compared to that in other basic crops such as wheat and beans. From 63 to 79% of the potato iron is released from the food matrix after gastrointestinal digestion *in vitro*, and therefore must be available for absorption at the intestinal level.

Efforts are focused on the identification and development of varieties rich in iron and zinc concentration and bioavailability. The potato is recognized as a staple food, but its potential to combat malnutrition is not well known. In the Andean highlands, where there is little access to meat, potatoes are an

important source of iron in the diet. For example, in Huancavelica, in the Peruvian highlands, women and children consume on average 800 and 200 grams, respectively, of potato per day. Similarly, in parts of Rwanda and other African countries, women consume an average of 400 grams of potatoes per day. Therefore, increasing the iron and zinc concentrations in potatoes consumed by people in these areas.



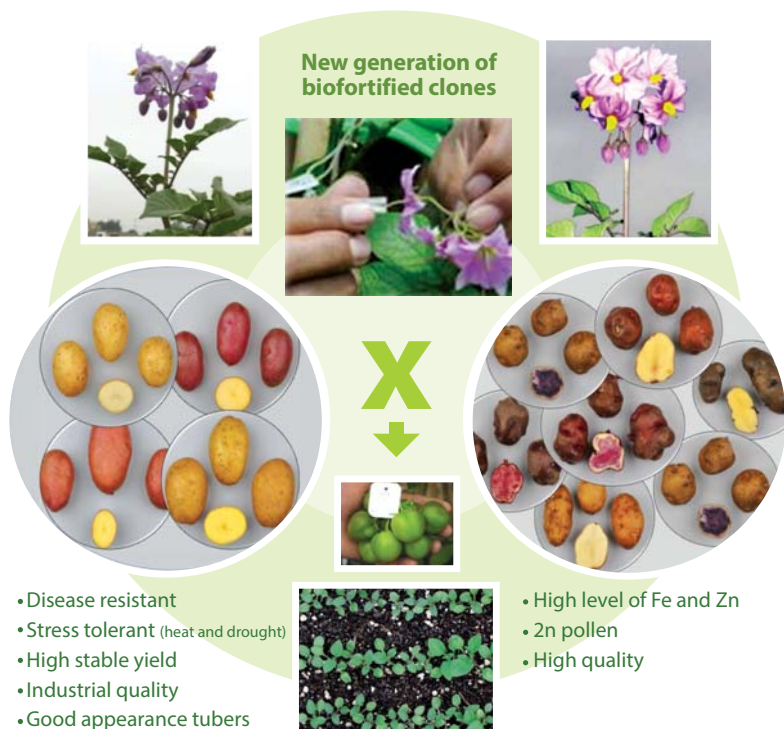


Iron deficiency is the most common nutritional disorder in the world. Similarly, zinc deficiency affects a large part of the population in developing countries. A deficiency in these minerals has serious effects on human health, including problems of physical and cognitive development, and an increased risk of contracting diseases in children and in women of childbearing age, as well as a reduction in work capacity.

Breeding

CIP's potato biofortification program started from a baseline with iron levels of 19 mg/kg and zinc levels of 14 mg/kg expressed as dry weight (DW) basis. After three cycles of breeding and selection, concentrations were increased to 25-35 mg/kg DW iron and 18-32 mg/kg DW. Considering the high consumption of potatoes by our target populations, the consumption of biofortified potatoes could cover between 20 and 45% of the estimated daily average requirement of iron and zinc for children and for women of childbearing age.

At present, CIP is combining the first products of its biofortification program with advanced breeding lines to develop new hybrids that will be able to withstand major potato pests and diseases, global warming and drought, high yields, and acceptance by farmers and consumers. The first generation of biofortified potatoes with high yields and resistance to potato diseases comprises more than 50 genotypes with iron concentrations higher than 30 mg/kg DW and zinc higher than 35 mg/kg, DW.



Participatory selection

Participatory selection among new biofortified potatoes in Peru, Nepal, Bhutan, Rwanda and Ethiopia will identify the varieties most preferred by farmers and consumers, increasing prospects for adoption and impact on the nutritional status of women and children at risk of malnutrition.



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