

# RESEARCH WITH IMPACT



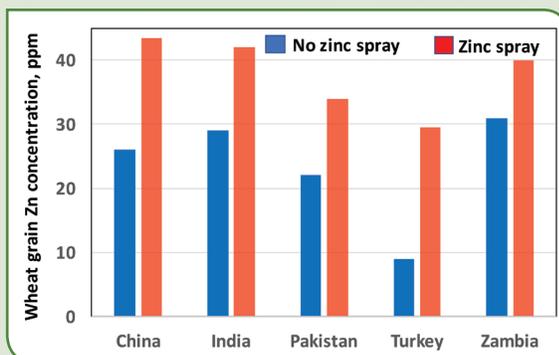
## THE CHALLENGE:

Zinc (Zn) deficiency in human diets causes people to have many health complications, including impaired brain development, weakened immune systems, and stunted growth. Zinc deficiency is responsible for the deaths of 450,000 children annually. Low Zn intake is clearly a major issue, especially among women, children, and the elderly living in the developing world.

Most of the dietary calories in the developing world come from cereal-based foods with low Zn concentrations. This on-going international collaborative project examines practical techniques to boost the Zn content of common cereal grains to improve human nutrition.

## Overcoming Human Zinc Deficiencies with Proper Fertilization

Zn-containing solution was sprayed onto the leaves of the crop through a foliar application. The Zn concentrations in grains, such as wheat, can be increased by proper fertilizer application and selecting the appropriate crop varieties with the ability to acquire Zn from the soil.



**Figure 1.** Application of a foliar spray a Zn-containing solution onto the leaves of wheat plants boosted the Zn concentration of grain in five countries.

## THE RESULTS:

The HarvestZinc program has demonstrated that a spray of Zn-containing solution onto plant leaves is the most effective at boosting the Zn concentration of cereal grains. Wheat was the most promising cereal crop as foliar fertilization was most able to increase Zn concentrations within its harvested grain (Figure 1). Proper timing of the foliar application is important. A foliar application

of Zn later in growing season is more effective than an early season application.

Although soil applications of Zn are somewhat less effective, an application of Zn fertilizer in some soils produces Zn-rich grain while boosting yield—up to 22% in India, Pakistan, and Turkey.

Adequate nitrogen (N) nutrition is also important for the enrichment of cereal grains with both Zn and iron. Increased soil N supply to growing cereal crops positively affected the uptake, translocation, and grain accumulation of Zn. The interaction between N and Zn uptake is under further investigation. An extensive training program is underway to help local farmers adopt this simple solution for the prevention of malnutrition due to insufficient Zn in the diet.

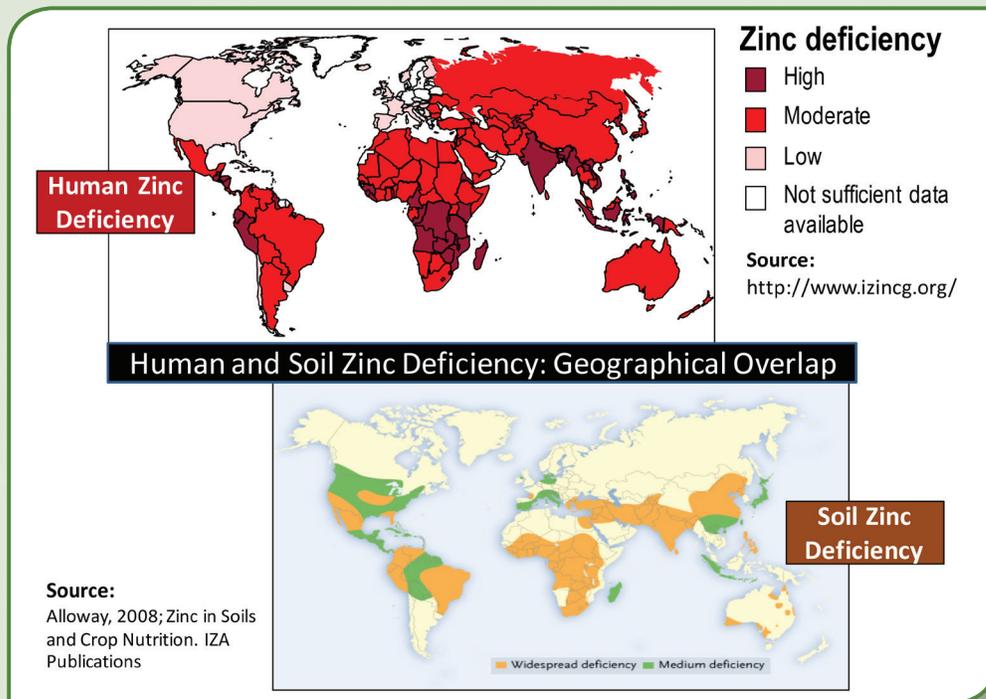
The HarvestPlus Zinc Program is coordinated by Dr. Ismail Cakmak, Sabanci University, Istanbul, Turkey.

## FURTHER READING:

Cakmak, I. 2012 HarvestPlus Zinc Fertilizer Project: HarvestZinc. Better Crops 96 (2):17-19.

## THE RESEARCH SOLUTION:

A broad coalition of organizations, companies, government agencies, and academic institutions partnered to form the HarvestZinc Fertilizer Project (harvestzinc.org), developed under the HarvestPlus Program. The project explores practical options to improve the Zn concentration of various staple food crops. A multi-country research program was launched where solid Zn fertilizer was applied directly to soil or a



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