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"Global food security and food safety:
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Nutrition Sensitive Agriculture: Agronomic Biofortification for Improved Food Quality and Crop Yields – An Example from Ethiopia

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Abstract

In Ethiopia, about 38 % of children under five years of age are chronically malnourished and 57 % are anemic. The soil's nutrient status affects human nutrition through the quantity and the quality of food produced in subsistence agriculture. National-level soil sampling has shown that Ethiopia's agricultural land is deficient in a number of macro- and micro-nutrients such as zinc and iron. It is therefore not surprising that around 38% of children under five years are chronically malnourished and 57% are anemic.

Agronomic biofortification aims to increase the content of selected micronutrients, including zinc, iodine, iron and others in staple food crops. In the Ethiopian highlands, two GIZ implemented projects viz the Nutrition Sensitive Agriculture Project (NSAP) and the Integrated Soil Fertility Management Project (ISFM+) collaborate with CIMMYT to test the potential of agronomic biofortification to improve crop yields and grain micronutrient content on farmers' fields through the application of micronutrients (zinc, iron, iodine) on cereal crops. The objective being to improve crop production, quality and ultimately human nutrition.

Results from exploratory on-farm trials conducted in 2015 and 2016 indicated that the type of micronutrients and fertiliser application methods had an impact on crop yields and grain micronutrient content. Foliar zinc application was found to be effective in improving grain zinc content in wheat and teff (an annual grass native to Ethiopia and Eritrea) whereas the combination of soil plus foliar application worked better for barley. Foliar iron application resulted in significantly higher grain iron content in barley (38.1 %) and wheat (26.4 %) than their corresponding controls; however, no difference was observed in teff. Regarding foliar iodine fertiliser application, teff and barley showed significant increases in grain iodine content due to the treatment.

In conclusion, the findings suggest that:

- Responses consistently showed increases in grain micronutrient content due to treatments;
- Agronomic biofortification through the use of micronutrient containing fertilizers is a viable method for increasing grain micronutrient content, and thus potentially increasing micronutrient consumption by rural households;

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- Different crops responded to treatments in different ways, suggesting that one application type may not be ideal across crops.

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