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SCREENING COMMON BEAN (*PHASEOLUS VULGARIS* L.) GERMPLASM FOR FE AND ZN BIOFORTIFICATION

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Among Plant Genetic Resources for Agriculture, landraces are excellent genetic materials for developing new varieties. Due to their genetic diversity, these populations have maintained potentially useful alleles for increasing valuable traits in crops.

A diet mostly relying on pulses as source of proteins could not guarantee a proper intake of mineral such as iron (Fe) and zinc (Zn). Fe and Zn deficiency can lead to serious medical conditions, especially in developing countries. Biofortification is regarded as a sustainable and an effective approach to cope with such a form of malnutrition. Common bean, the most widely used pulse in the world, shows varying concentrations of Fe and Zn, but also of anti-nutritional compounds such as phytates (phytic acid, InsP6, and its derivatives, InsP5 and InsP4), which reduce absorption of Fe and Zn. Exploring the variability for these compounds is the first step towards biofortification of common bean.

The aims of our work were: (i) to explore the diversity of a group of landraces for Fe, Zn and phytate content to identify donor accessions for biofortification traits; (ii) to identify genome regions and alleles for high Fe and Zn bioavailability.

In 2017, a collection of 192 pure lines –developed at the University of Perugia, using a Single-Seed Descent approach and starting from 179 landraces and 13 cultivars – was grown in isolation, using a randomized partially replicated design and a standard compost. A total of 222 seed samples were harvested and analysed for Fe, Zn and phytates. For each sample, fine flour was obtained using zirconium oxide grinding balls and Teflon capsules. Fe and Zn quantification was carried out using X-Ray Fluorescence while phytates were extracted, purified by ion-exchange chromatography and quantified using spectrophotometry.

According to our results, the collection showed high level of diversity for these traits. The concentration of Fe ranged between 38.4 and 93.7 mg/kg (average CV 0,9%), while Zn was between 18.9 and 53.4 mg/kg (average CV 2,3%). Phytate concentrations ranged from 4.8 to 19.9 mg/g, with an average of 12.0 mg/kg. The average coefficient of variation between duplicates was 2.7%, demonstrating a high reproducibility. DNA extracted from each line phenotyped in 2017 will be genotyped for subsequent association studies.