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Tissue accumulation and quantification of Zn in biofortified *Triticum aestivum* grains – Interactions with Mn, Fe, Cu, Ca, K, P and S

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Abstract: Zinc has a fundamental role at the regulatory, functional and structural levels, yet its deficiency leads to loss of brain function, changes in growth and weakening of the immune system. In this context, biofortification, which is a process in which there is an enrichment of both content and the bioavailability of micronutrients in edible tissues of staple foods, may be used to overcome Zn deficiency. Considering that *Triticum aestivum* L. is a staple food largely used for flour production, an itinerary for Zn biofortification was implemented in two cvs (Roxo and Paiva), produced in an experimental cereal field production located in Alentejo, Portugal. These cvs were submitted to three different treatments (control – without foliar spraying, 6.3 and 12.6 kg ha $^{-1}$ of Zn-EDTA pulverization), being applied three zinc foliar application at booting, heading and grain milk stages. The accumulation of Zn, Mn, Fe, Cu, Ca, K, P and S in bread wheat was investigated, being found that, in general, maximum contents occurred in the embryo and vascular bundle. Besides, although Zn increased in the wheat grain, specially the higher concentration, did not markably affected the other minerals concentration. It was concluded that whole wheat flour biofortified in Zn is a more suitable option for a healthier diet, rich in minerals and leading to the creation of an added value product useful to decrease micronutrient deficiency.

Keywords: Grain minerals location; Minerals quantification; *Triticum aestivum*; Zn biofortification.

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Results and Discussion

In overall, the macroelements P, S, K and Ca, as well as the microelements Mn, Fe, Cu and Zn are preferably located in the embryo and in the vascular bundle. Besides, for all mineral mentioned, both varieties tended to present similar values. There was a gradual rise of Zn levels with increasing concentration of Zn-EDTA in all the grain zones, with Paiva displaying slightly higher values than Roxo.

Conclusions

Through Zn-EDTA foliar spraying, in general, accumulation of Zn, Mn, Fe, Cu, Ca, K, P and S in bread wheat prevails in the embryo and vascular bundle. Through the applied biofortification itinerary of both cvs, Zn increased in the wheat grain, specially the higher concentration, but did not affected markably the other minerals concentration in the grain, which suggests that the whole wheat flour biofortified in Zn is a more suitable option for a healthier diet rich in minerals and leading to the creation of an added value product useful to decrease micronutrient deficiency.

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