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Zinc, its sources, functions and threats to the environment and biological life: A review*

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Abstract

Zinc is one of the most widespread elements on our planet. Zinc can be found in the environment in many forms, including different isotopic forms, organic and inorganic forms. In soil and water, zinc can be of both natural and anthropogenic origin. In soils, both the content and availability of zinc depend on many variables, and its presence is a multifaceted issue. Due to its unique structure and properties, zinc is an extremely valuable element for physiological processes. Zinc occurs in more than 200 enzymes, involved in fundamental processes such as the synthesis of proteins, nucleic acids and hormones. Zinc-dependent reactions include energy transfer reactions, protein synthesis or nitrogen metabolism. International trends indicate an insufficient content/availability of this micronutrient on more than 40% of agriculturally used land. This translates into the reduced efficiency of agricultural production and sub-optimal zinc levels in plant tissues, which in turn results in an insufficient zinc content in plant-derived food. Optimal zinc content in plant nutrition is crucial for both plant physiology and plant production efficiency. Both under- and over-nutrition of zinc will have a negative effect on the plant growth, development and performance. A possible solution to the problem of zinc deficiency in plant tissues is the use of biofortification. Ensuring optimal nutrition with this micronutrient is crucial for human health or animal production efficiency. Inadequate zinc nutrition results in the disruption of essential metabolic processes, reduced immunity and impaired reproduction as well as progeny development. The purpose of this article is to review the literature and provide a comprehensive overview of the knowledge concerning the sources and functions of zinc and risks of zinc deficiency or excess in the environment.

Keywords: zinc, metabolic reactions, malnourishment, micronutrient

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