

The roles, uptake and partitioning of micronutrients in wheat

Rola, pobieranie i dystrybucja mikroelementów w pszenicy

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Cereals such as wheat serve as the staple food for a large proportion of the world's population. Whilst being a reliable source of carbohydrate and protein, they contain relatively low concentrations of essential dietary micronutrients such as Zn and Fe in their edible tissues. This is a major issue for human nutrition and food security. Additionally, plant mineral deficiencies can have a negative impact on crop health and yield.

Remedial application of fertilizer is one solution to alleviate crop mineral deficiencies, however enhancing efficiency of uptake from the soil and/or partitioning of the minerals to specific tissues following uptake by genetic mean involving the selection and breeding of appropriate germplasm is a cost effective and potentially sustainable solution.

Factors involved in efficient uptake may relate to root characteristics, root architecture, or activity of transport systems or mechanisms involved in accessing soil pools via for example, exudates. Alternatively, the capacity for uptake may relate to sink tissues and the capacity to store mineral nutrients and partition and/or remobilize them to different tissue during growth and development. Finally, uptake may be influenced by competing ions, as illustrated by the interaction between S and Se, or be a function of growth limitations determined by other mineral nutrient availabilities.

One approach to crop improvement is the screening of diverse germplasm, identification of characteristics of interest, isolation of the underpinning genes and subsequent crop breeding. This a long and complex process limited by the available genetic diversity including ancestral or distant relatives of modern varieties. Example data sets will be discussed in this presentation.

Fertilizer inputs, particularly nitrogen, drive crop growth and increase demands for other mineral nutrients including micronutrients. Increased growth also provides a sink for storage. However excess growth can also be associated with a dilution of specific nutrients, leading to a lower dietary quality. These tradeoffs need to be balanced in the management of crop systems and in the selection of nutrient efficient germplasm. Interactions between nitrogen-supply and micronutrient uptake are currently under investigation and preliminary data will be presented.

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