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Profiling of Nutrients and trace elements in Sorghum bicolor mutants

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Abstract content
 (Max 300 words)

One of biology's greatest challenges in the postgenomic era lies in the establishment of functional connections between genes, proteins, and mineral ions. We describe here the use of PIXE (proton induced x-ray emission) for the spatial profiling of the distribution of major elements within sorghum seed tissue. Amino acid and protein content were determined by HPLC and the Dumas method respectively. In addition, SEM (scanning electron microscopy) analysis of the endosperm was used to determine the biological significance between endosperm microstructure and its elemental profile. Using a nuclear microprobe, we mapped and quantified 9 elements, including essential macro- and micronutrients and various nonessential elements, in the seeds of 5 stable mutants of sorghum. All 5 mutants had an altered Fe elemental profile. In one mutant with increased protein content the spatial distribution of K₊ was altered, from its original location in the scutellum to its deposition in the aleurone layer. The SEM revealed major changes in starch granule morphology and protein content. Based on the frequency of elemental profile mutations, we estimate a significant portion of the S. bicolor proteome is involved in regulating the plant's nutrient and trace element content.

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