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Analysis of polysaccharide composition during sorghum grain development

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Sorghum (*Sorghum bicolor* (L.) is the fifth most important grain produced in the world. Native to Africa, sorghum is now cultivated all over the world. In a context of climate change, its cultivation is increasing in Europe due to its low input and water requirements. The attractiveness of sorghum grain is also explained by its nutritional qualities, in particular its gluten-free and relatively high content of polysaccharides and proteins.

In sorghum grains, polysaccharides are of two types: storage and parietal polysaccharides. Storage polysaccharides are composed of starch (60-75% of grain) accumulated in the endosperm. Cell wall polysaccharides, representing 2 to 7 % of grain weight, are mainly arabinoxylans and mixed β-glucans. Beside their structural role, cell wall polysaccharides impact the nutritional and technological qualities of grains as they represent the vast majority of dietary fibers.

While the composition of cell walls in mature grains has been well studied, less is known about the polysaccharide deposition during grain development and the mechanisms that drive their assembly within the cell wall, even though they are key factors in determining the physico-chemical properties of cell walls and the end use of grain.

In this purpose, polysaccharides in the endosperm and outer layers of grains were analyzed at different stages of grain development. Mixed β-glucan and starch contents were also determined. By specific stainings and immunolabellings, polysaccharides were monitored in the different tissue layers. To go further, transcriptomic analyses were carried out after laser microdissection of grains to separate endosperm from outer layers. This analysis led to the determination of genes involved in the biosynthesis and remodelling of cell wall polysaccharides.

These overall results provide new knowledges on polysaccharide assembly during the development of sorghum grain.

Table of contents