***Mixed-Linked Glucan Synthesis Explorations Refine Biosynthetic Model***

Up to 20% of the cell wall in grasses is composed of mixed-linked glucan (MLG). The MLG carbohydrate is an important plant-based energy source for human consumption and potentially a readily accessible carbon source for biofuel production. MLG synthesis depends on two cellulose-synthase-like gene families (CSLH & CSLF). Although importance of CSLF family in the grasses during MLG synthesis has been reported, relatively little is known about how and where CSLF proteins produce MLG in the cell. GLBRC Researchers investigated the topology of CSLF6 by expressing a CSLF gene found in the model grass Brachypodium (BdCSLF6) in both tobacco epidermal cells and the yeast *Pichia*. Using a combination of live cell imaging, immuno-electron microscopy, and protease protection assays, the catalytic domain BdCSLF6 was mapped in the cytoplasmic face of Golgi membranes, demonstrating that a Golgi localization is sufficient for MLG biosynthesis. In addition, researchers determined that the BdCSLF56 protein is capable of producing both chemical linkages found in the glucan chain of MLG. The evidence acquired in this study enables the proposal of a model for the steps in MLG biosynthesis: BdCSLF6 uses the cytosolic pool of UDP-glucose to synthesize and extend the MLG chain towards the lumen of the Golgi for secretion. Once incorporated in the cell wall, the MLG is a readily available source of carbon for biofuels production. Understanding the biosynthetic processes associated with MLG synthesis make it easier to exploit this carbohydrate for biofuel production. Future analyses are likely to offer important insights into the complex machinery that enable the biosynthesis of other important cell wall components.

**Reference: Kim S-J, Zemelis S, Keegstra K, Brandizzi F** (2015) The cytoplasmic localization of the catalytic site of CSLF6 supports a channeling model for the biosynthesis of mixed-linkage glucan. The Plant Journal **Accepted Article:** doi: 10.1111/tpj.12748

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