

STF mediated control of leaf blade outgrowth improves biomass yield

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Leaf blades are the energy powerhouse of plants where solar energy from the sun and carbon dioxide from the atmosphere are assimilated to make sugars. Polarity patterning along the dorsoventral axis of the leaf is thought to be required for flattening of the leaf blade, but the underlying molecular mechanism of blade outgrowth is unclear. We have previously reported the identification of a key regulatory gene called STF that controls leaf blade size in *Medicago* and tobacco. STF is expressed in a developmentally regulated manner during leaf morphogenesis in a very narrow region at the junction between the adaxial and abaxial domains of the middle mesophyll and leaf margin. Our data suggests that STF directly activates cell proliferation in the middle domain by activating cell division promoters and repressing growth repressors. STF also antagonistically interacts with abaxial and adaxial factors to prevent their expression in the cell proliferation zone of the margin providing a mechanistic context for the effect of polarity on blade outgrowth. Loss-of-function of STF in *Medicago* leads to a three-fold decrease in total above ground biomass. We found that introducing this gene into the model grass *Brachypodium distachyon* by genetic transformation increases leaf blade outgrowth (leaf width) by more than 65% of the corresponding unmodified wild-type. This suggests that STF could be used to significantly improve photosynthetic efficiency and biomass yield in priority biofuel crops such as switchgrass and sorghum.

Biography

Tadege has completed his MS in Biotechnology at Wageningen Agricultural University in the Netherlands and received Ph.D. in Plant Molecular Biology from the University of Bern in Switzerland. He did postdoctoral research at CSIRO, Plant Industry in Australia and at The Samuel Roberts Noble Foundation in Oklahoma, USA. Dr. Tadege is currently an Assistant Professor at Oklahoma State University where he leads a group working on plant biomass functional genomics. His current research mainly focuses on identifying genes and genetic networks required for biomass synthesis and accumulation during development. He has published more than 30 papers in reputed journals and book chapters. He is serving as an editorial board member of the Journal of Environmental and Analytical Toxicology.

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