Mutation of Key TF Increases Pith Cell Wall Thickness. contact R. Dixon – radixon@noble.org

- We isolated mutants of *Medicago truncatula* and *A. thaliana* with secondary cell wall thickening in pith cells leading to an ~50% increase in biomass density in stem tissue of the *Arabidopsis* mutants.

- WRKY transcription factors (encoded by MtSTP) are in part responsible for the parenchymatous nature of the pith cells in dicotyledonous plants.

- Direct binding of WRKY to the NAC gene promoter and repression of three downstream TFs that activate secondary wall synthesis were confirmed by in vitro assays and in plant transgenic experiments.

- The discovery of negative regulators of secondary wall formation in pith opens up the possibility of significantly increasing the mass of fermentable cell wall components in bioenergy crops.

Phenotypic analysis of the Mtstp-1 mutant in *Medicago*.  
(E) Light microscopy of pith cell walls in WT and mutant.  
(F) Quantification of cell wall thickness of the WT and mutant sections.  
(G and H) Detection of xylan and cellulose by immunohistochemistry using monoclonal antibodies against distinct xylan epitopes (G) and a carbohydrate-binding module that binds crystalline cellulose (H) in stem sections. Antibody and CBM names are indicated. (Scale bar: E, 20μm; G and H, 10μm.)

Mutation of WRKY transcription factors initiates pith secondary wall formation and increases stem biomass in dicotyledonous plants H Wang, U Avcib, J Nakashimaa, MG Hahn, F Chena, and RA Dixon (Noble, CCRC-UGa); *PNAS* (2010)