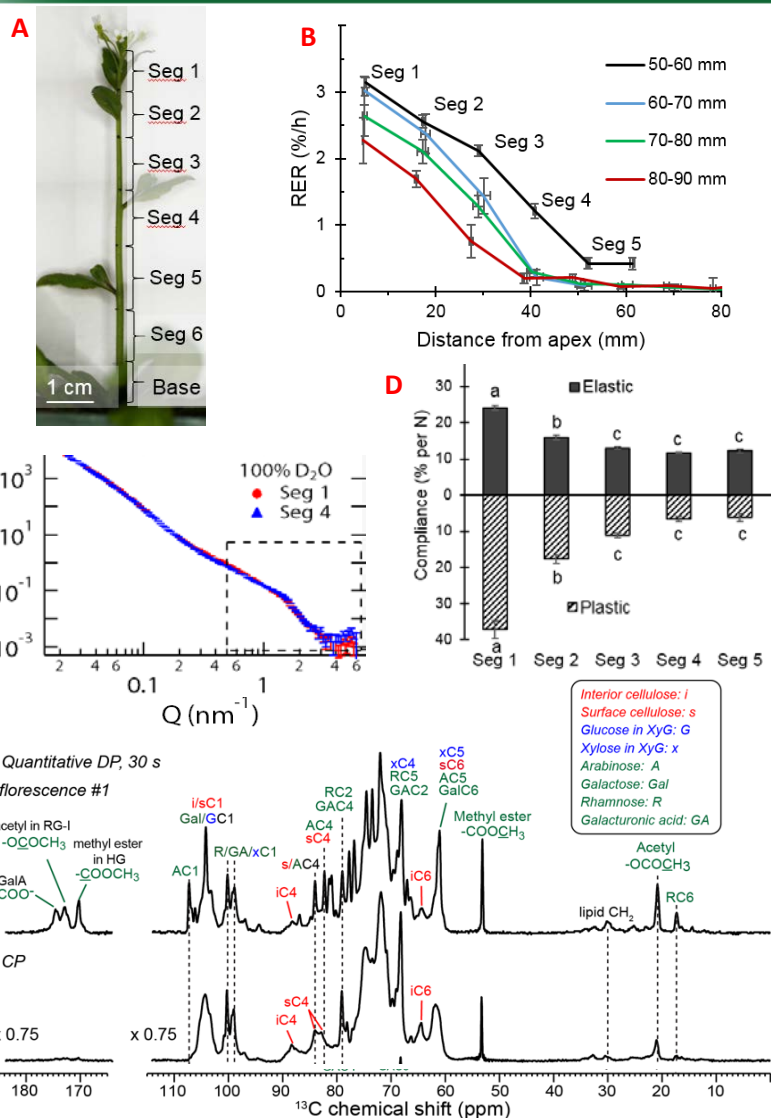


# Changes in Wall Mechanics and Polysaccharide Properties along the Growth Gradient of Arabidopsis Stems



## Scientific Achievement

Structural correlates of the spatial gradient in stem elongation rate were examined by mechanics, ssNMR and SANS. Decreases in pectin amount, branching, hydration, esterification and mobility correlated with reduced ability to grow.

## Significance and Impact

Pectin reorganization may lessen the ability of the cell wall to undergo stress relaxation and irreversible expansion (e.g. induced by expansins).

## Research Details

(A) Growing stems of Arabidopsis were marked and photographed over time to calculate (B) the relative elongation rate as a function of position along the stem. (C) SANS analysis indicates only a very subtle change in cellulose organization, despite 6X elongation of the wall. (D) Tensile compliances decreased only in the 1<sup>st</sup> half of the gradient. (E,F) ssNMR spectra of whole walls show well-resolved peaks for the polysaccharide components. As the cell ceased growth, pectin properties changed most notably (not shown).

Work was carried out at Penn State, MIT and ORNL; Phyto, P., et al. (2017). Plant Physiol 175:1593