



Figure 1. Laser ablation tomography can be used to quickly and accurately phenotype MCS. Lines with MCS have smaller and thicker outer cortical cells. The red bar indicates the MCS region in the cross-section. These thickened cortical cells are stained red with phloroglucinol-HCl due to their high lignin content. Cryo-scanning electron microscopy images show detailed images of the smaller cells with thick cell walls in the outer cortex. All images are of a fourth node root. Genotype with MCS (IBM14) and a genotype with no MCS (IBM178) are shown. Scale bar represents 100  $\mu\text{m}$ . Violin plot showing median, interquartile range, 95% confidence intervals, and frequency of cell wall:lumen area ratio for MCS (n=27) and non-MCS (n=26) root samples. Letters denote significant differences as determined by Welch's Two Sample T-test at a confidence level of  $\alpha \leq 0.05$ .