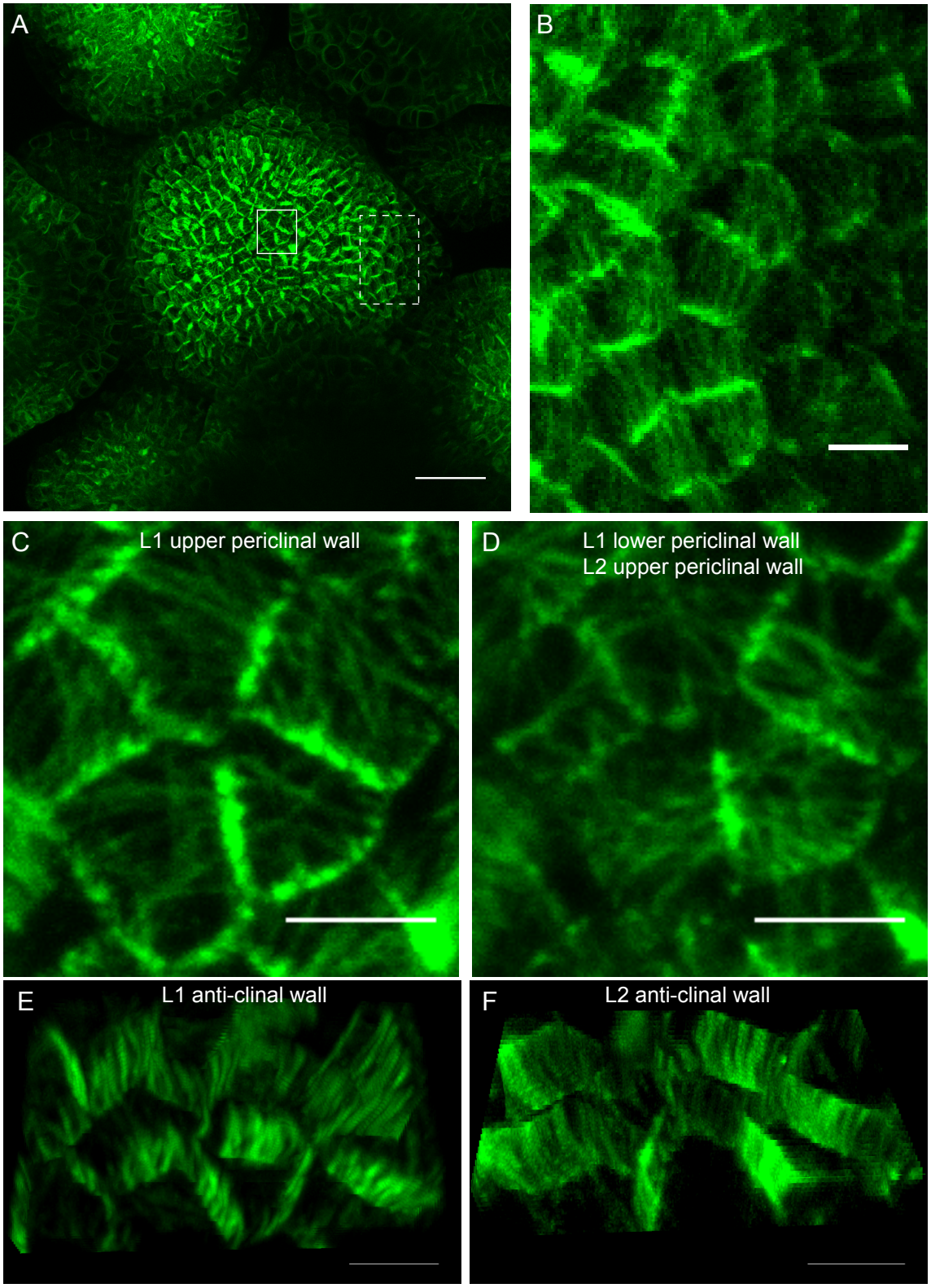

Figure S1: Microtubule organization at the shoot apical meristem
Maximum intensity projection of microtubule organization in the L1 layer of shoot apical meristem (A). Scale bar 50 μm. Aligned microtubule arrays observed on the upper periclinal face of the margin domain (insert dotted box in A) (B). Random organization of microtubules observed on the periclinal face of central domain cells (insert box in A) (C). Projection images show disorganized microtubule arrays found in the lower periclinal face of the cells in the L1 and upper periclinal face of cells in L2 layer of the central domain (D). 3D lateral view of longitudinally aligned microtubules in L1 (E) and L2 (F) layers along the anticlinal face of cells in the central domain. Scale bars 5 μm

Development • Supplementary information

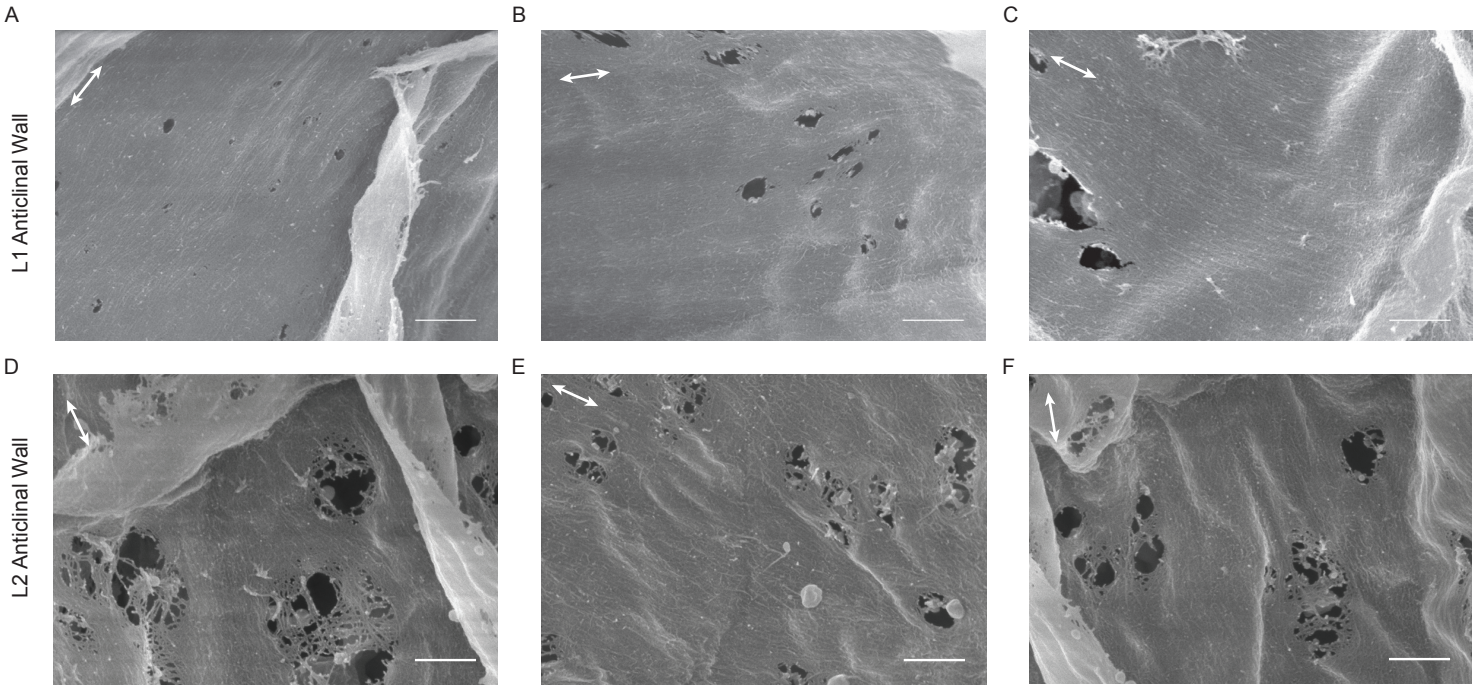

Figure S2: Cellulose microfibril orientation at the anticlinal walls
Longitudinal sections of cells in the central domain of shoot apical meristem. Representative images of cellulose microfibril orientations along the anticlinal wall in L1 (A-C) and L2 (D-F) cells. White lines with double arrows indicates cells longitudinal axis. Scale bars 500 nm.

Development • Supplementary information

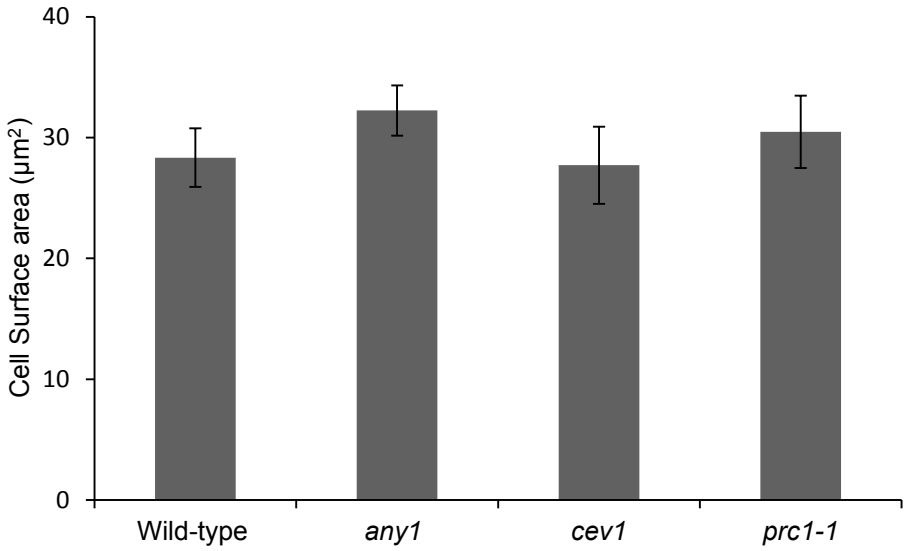

Figure S3: Cell size is unaffected in cellulose synthase mutants
Average cell size in the central zone cells of the different cellulose synthase mutants (N= Cells/shoot apical meristems, Wild-type=253/3, *any1*=199/3, *cev1*=145/4 and *prc1-1*=118/3)

Development • Supplementary information

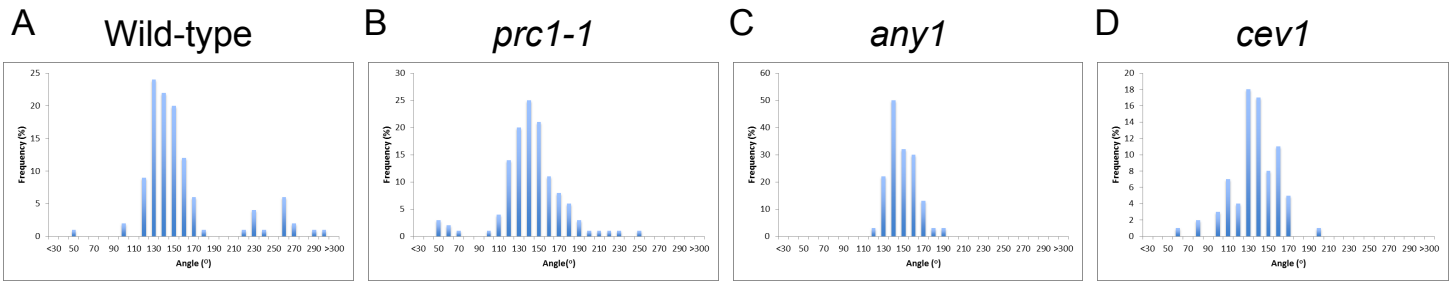

Figure S4: Post meristematic phyllotactic patterning in cellulose synthase mutants
Distribution of frequencies of divergence angles between successive siliques (A) in wild-type (n=113, 9 plants), (B) *prc1-1* (n=124, 8 plants), (C) *any1* (n=156, 8 plants) and (D) *cev1* (n=77, 7 plants).

Development • Supplementary information

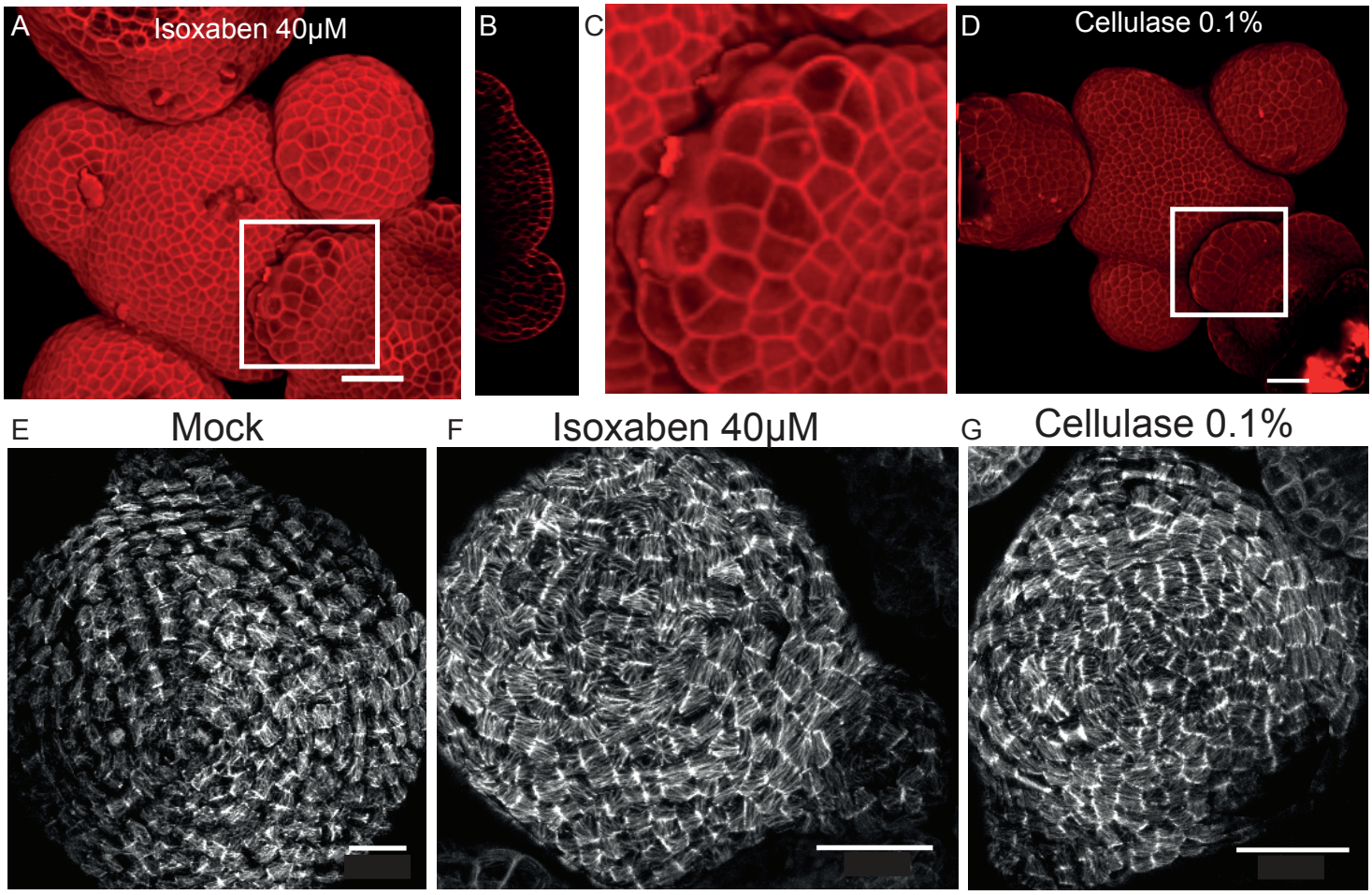

Figure S5: Pharmacological and enzymatic disruption of cellulose:
75 hrs treatment of wild-type shoot apical meristem with 40 μM isoxaben (A) Orthogonal view along the center of the shoot apical meristem (B) Enlarged image showing swelling of young sepal primordia insert (white box) in A (C) and 0.1% cellulase (D) treated shoot apical meristem for a period of 75 hrs. Swelling of young sepal primordia insert (white box). Microtubule organization in the L1 layer of MBD GFP lines expressing shoot apical meristem treated for 24 hrs with DMSO control (E) 40μM isoxaben (F) and 0.1% cellulase (G). Scale bars 25 μm.

Development • Supplementary information

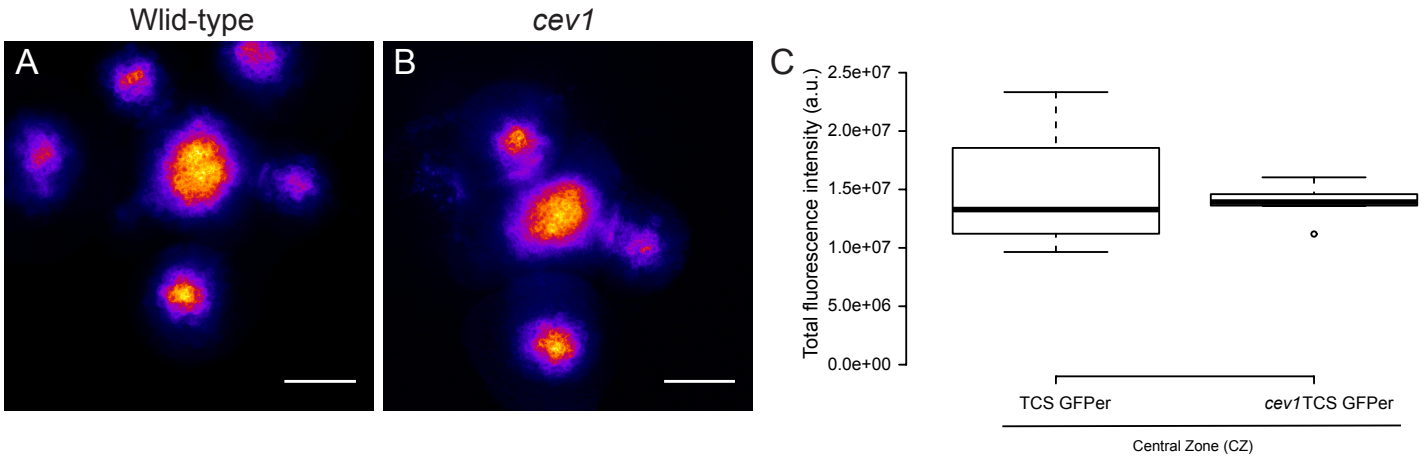

Figure S6: Cytokinin status in wild-type and *cev1* mutant meristem
Sum intensity projection of *pTCS:GFPer* wild-type (A) and *cev1* (B). Box plots of total fluorescence intensity obtained from cells of the central zone (enclosure 25 µm radius). (Wild-type N=5, *cev1* N=4 shoot apical meristems) (C). Scale bars 50 µm. Center lines in box plots show the medians; box limits indicate the 25th and 75th percentiles as determined by R software; whiskers extend 1.5 times the interquartile range from the 25th and 75th percentiles, outliers are represented by dots.

Development • Supplementary information