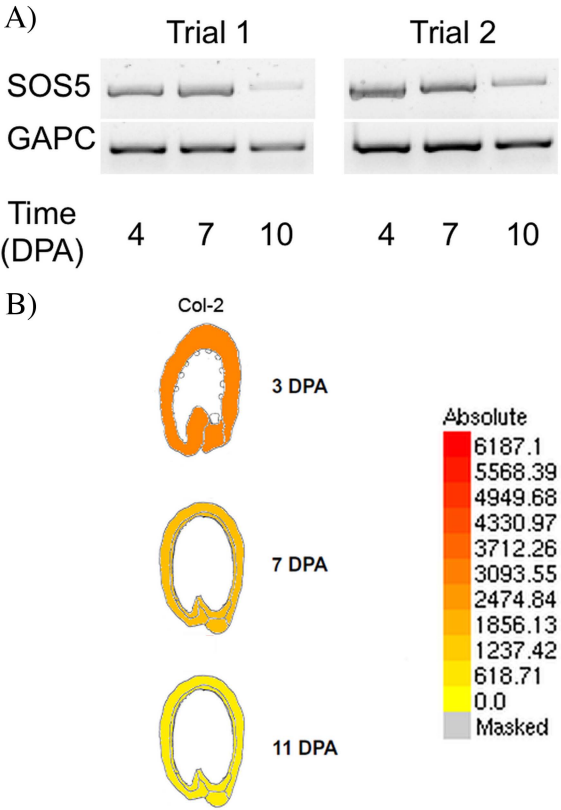
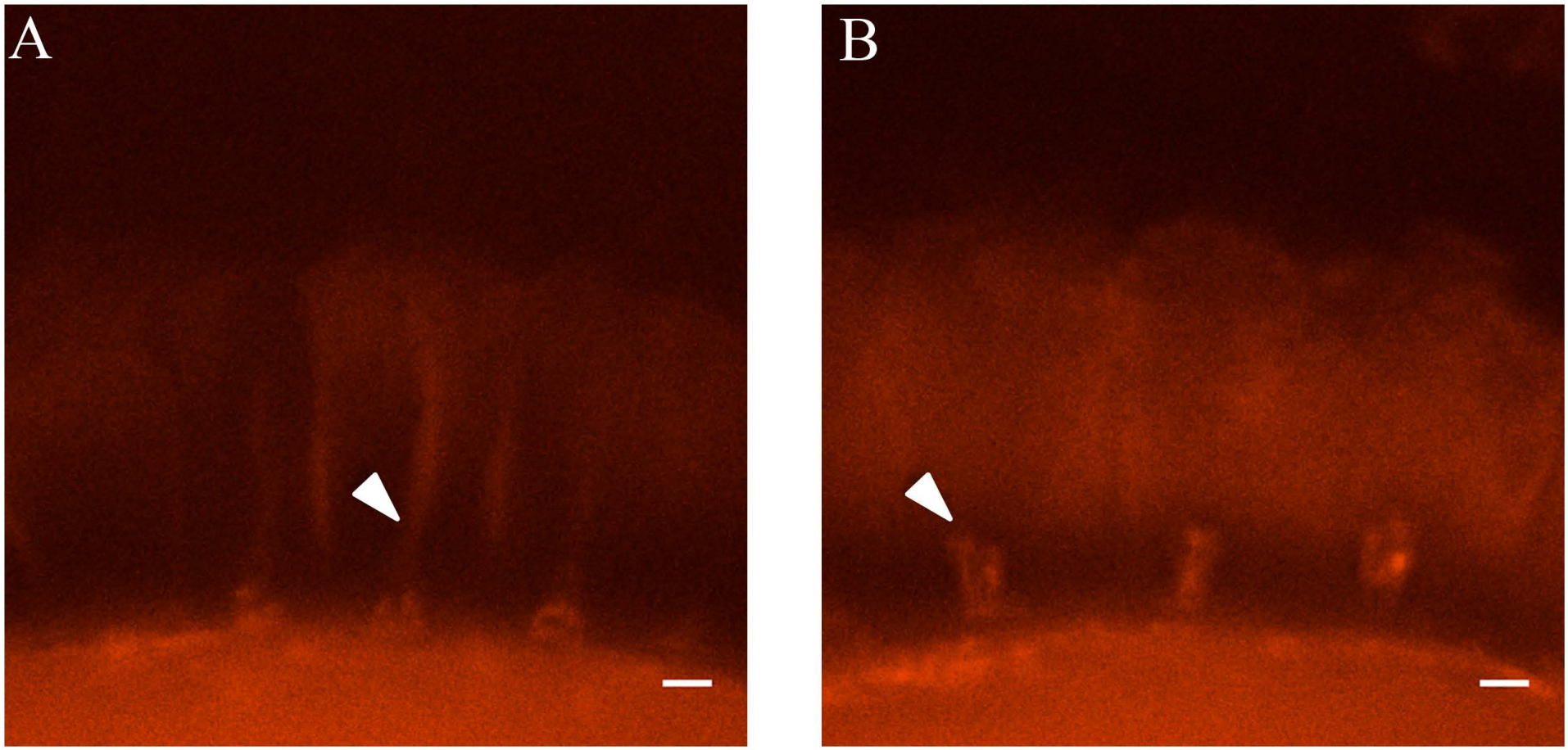
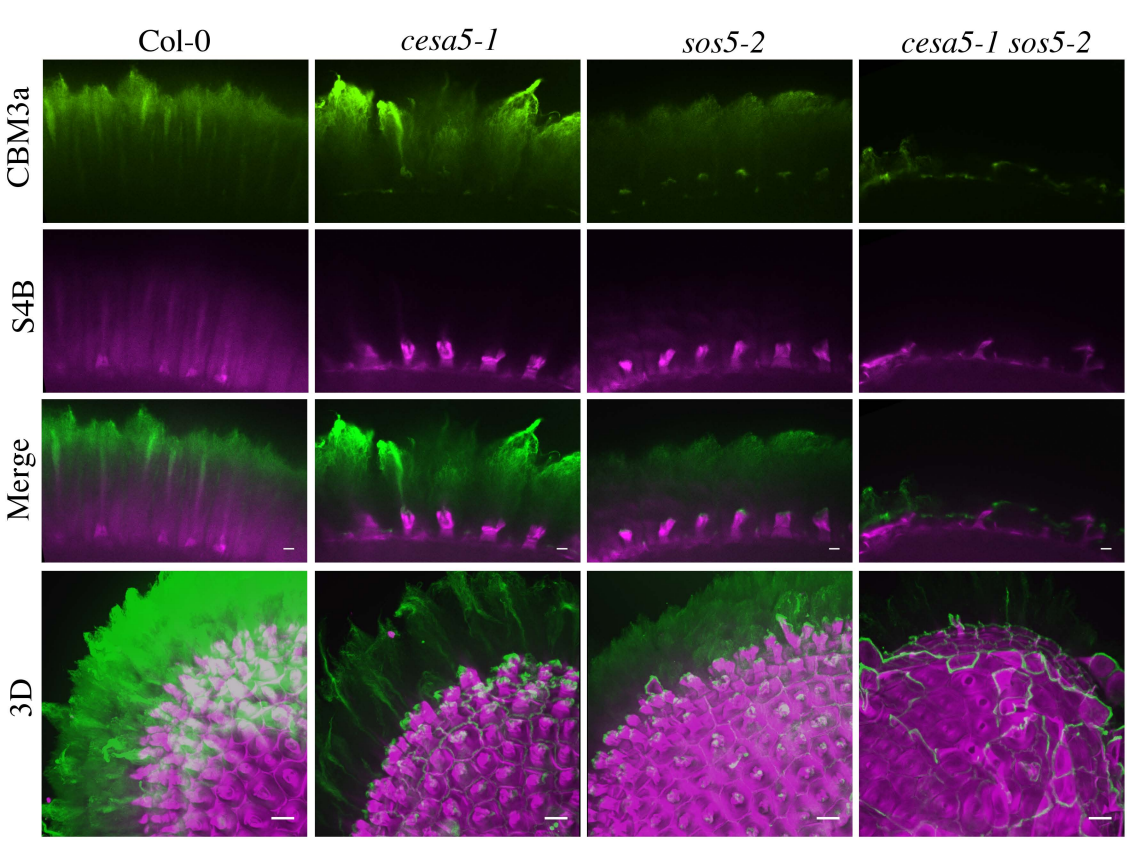


Supplemental Figure 1: *SOS5* is expressed early during seed coat development.
A) Two RT-PCR biological replicates showing *SOS5* expression during seed coat development. B) SOS5 seed expression analysis as determined by microarray analysis (http://bar.utoronto.ca/efp_seedcoat/cgi-bin/efpWeb.cgi; Dean et al., 2011).

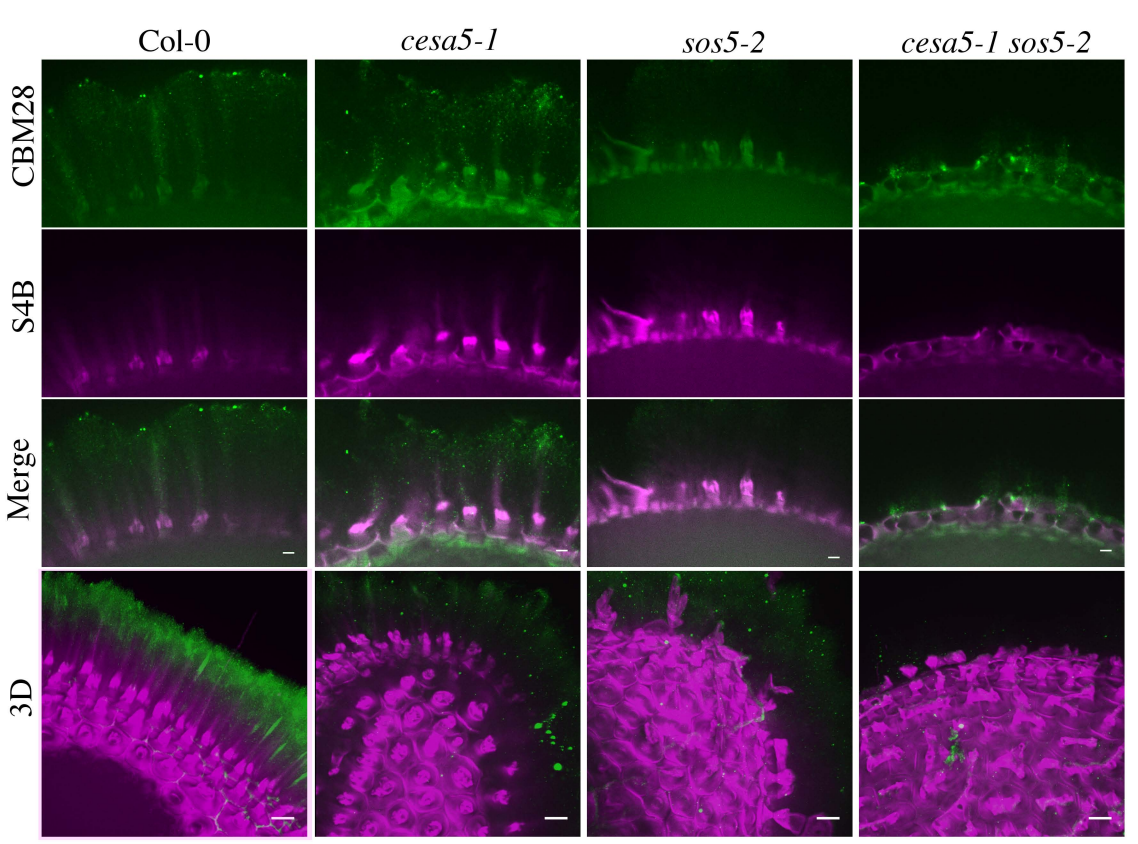


Supplemental Figure 2: *sos5-2* seeds fail to form rays immediately following hydration.

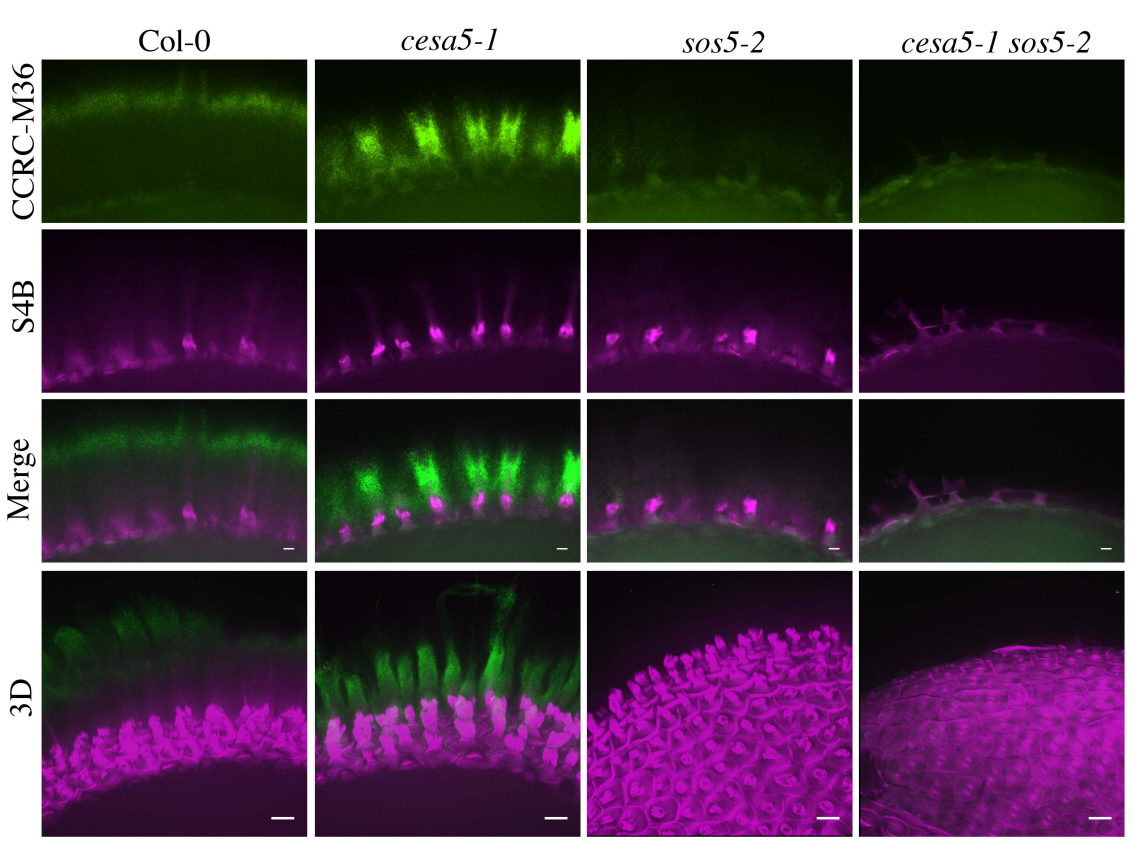
A) Wild-type and B) *sos5-2* seeds hydrated in 0.01% S4B, imaged within 30 sec of hydration. Rays located above the columella are clearly visible in wild type seeds (arrowhead), and are absent from *sos5-2* seeds (arrowhead). Bar = 10 μm.



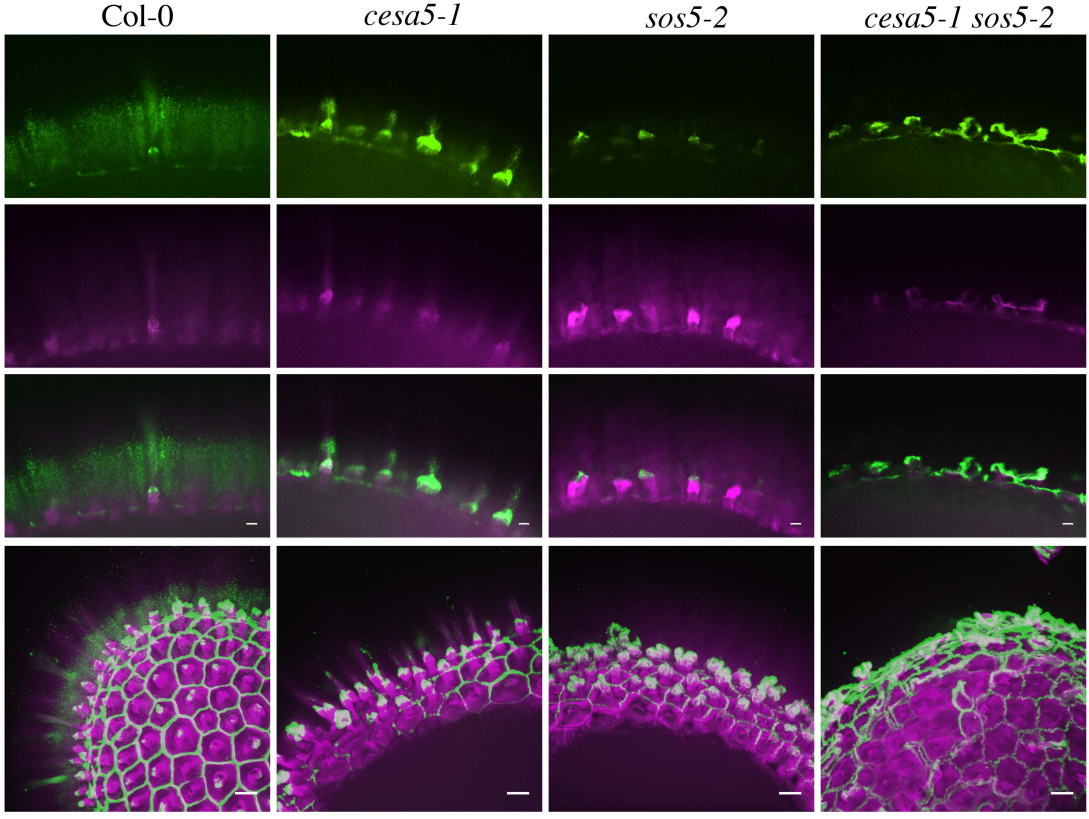
Supplemental Figure 3: CBM3a immunolabeling (Green) and S4B (Magenta) stained wild-type, *cesa5-1*, *sos5-2* and *cesa5-1 sos5-2* double mutant seeds showing individual light channels and three-dimensional recontructions of multiple optical stacks. Top three rows, bar = 10 μm. Bottom row, bar = 25 μm.



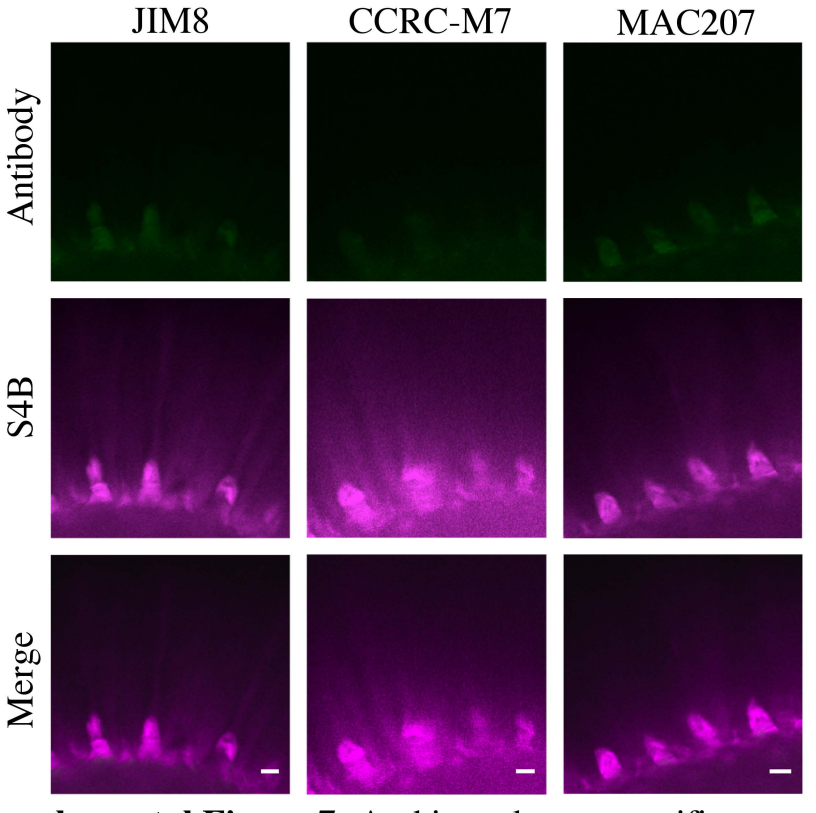
Supplemental Figure 4: CBM28 immunolabeling (Green) and S4B (Magenta) stained wild-type, *cesa5-1*, *sos5-2* and *cesa5-1 sos5-2* double mutant seeds showing individual light channels and three-dimensional recontructions of multiple optical stacks. Top three rows, bar = 10 μm. Bottom row, bar = 25 μm.



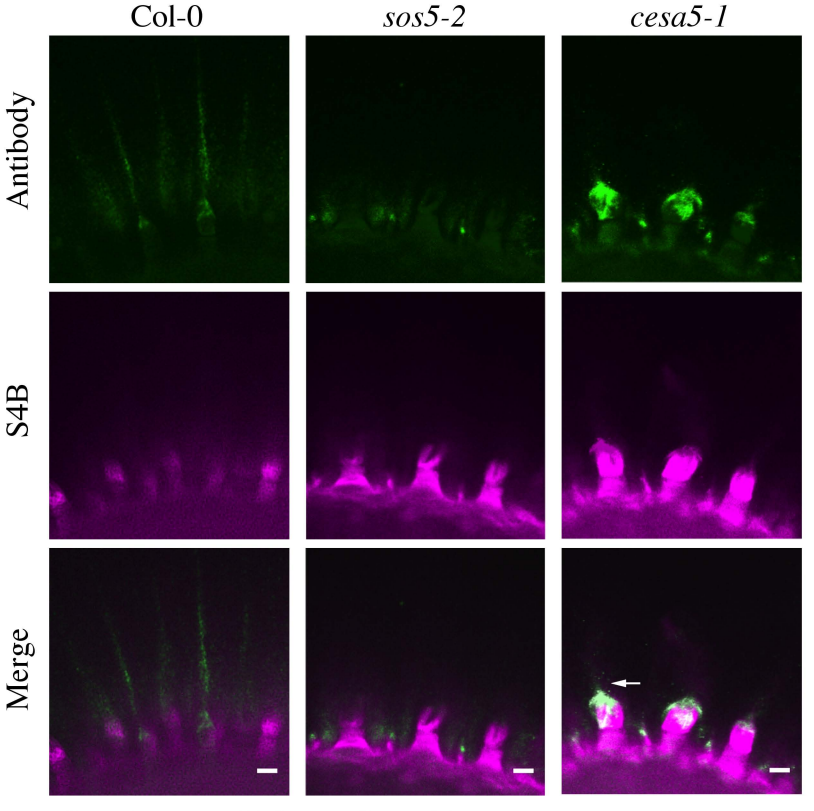
Supplemental Figure 5: CCRC-M36 immunolabeling (Green) and S4B (Magenta) stained wild-type, *cesa5-1*, *sos5-2* and *cesa5-1 sos5-2* double mutant seeds showing individual light channels and three-dimensional recontructions of multiple optical stacks. Top three rows, bar = 10 μm. Bottom row, bar = 25 μm.



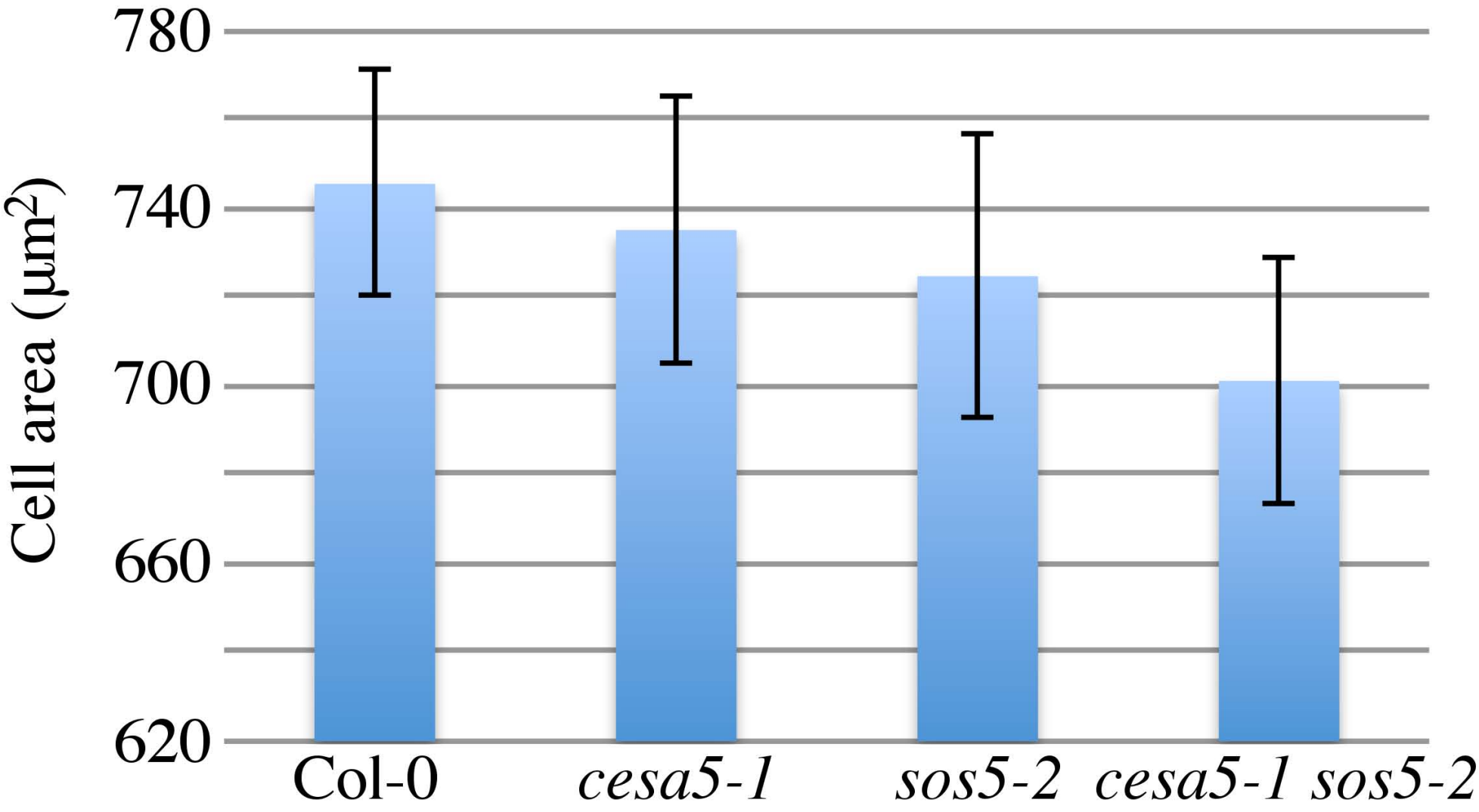
Supplemental Figure 6: JIM5 immunolabeling (Green) and S4B (Magenta) stained wild-type, *cesa5-1*, *sos5-2* and *cesa5-1 sos5-2* double mutant seeds showing individual light channels and three-dimensional recontructions of multiple optical stacks. Top three rows, bar = 10 μm. Bottom row, bar = 25 μm.



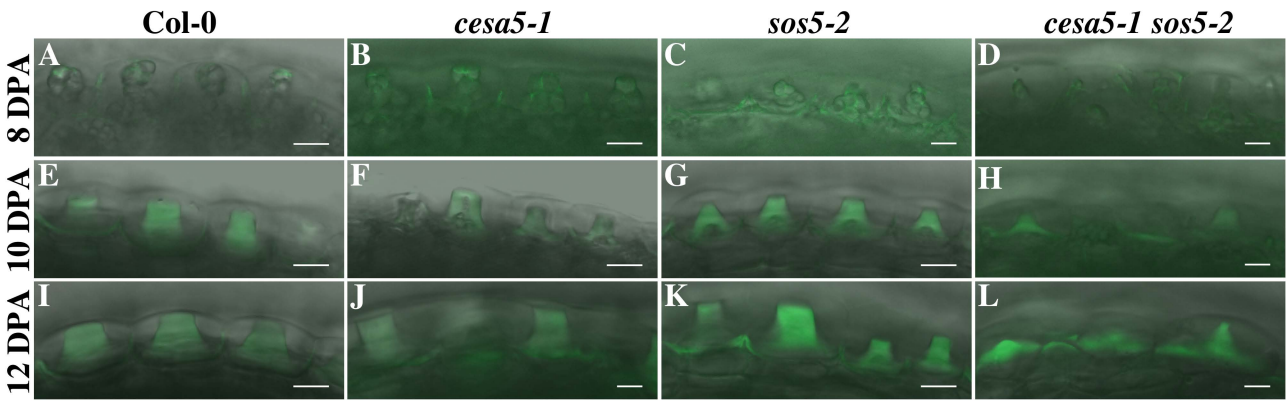
Supplemental Figure 7: Arabinogalactan specific antibodies JIM8 (AG), CCRC-M7 (RG I, AGP) and MAC207 (AGP) fail to significantly label wild-type adherent mucilage. Bar = 10 μm.



Supplemental Figure 8: Wild-type, *sos5-2* and *cesa5-1* seeds immunolabeled with JIM13. Arrow in lower right panel indicates weak labeling in *cesa5-1* seeds at the base of the ray that is absent in *sos5-2* seeds. Bar = 10 μm.

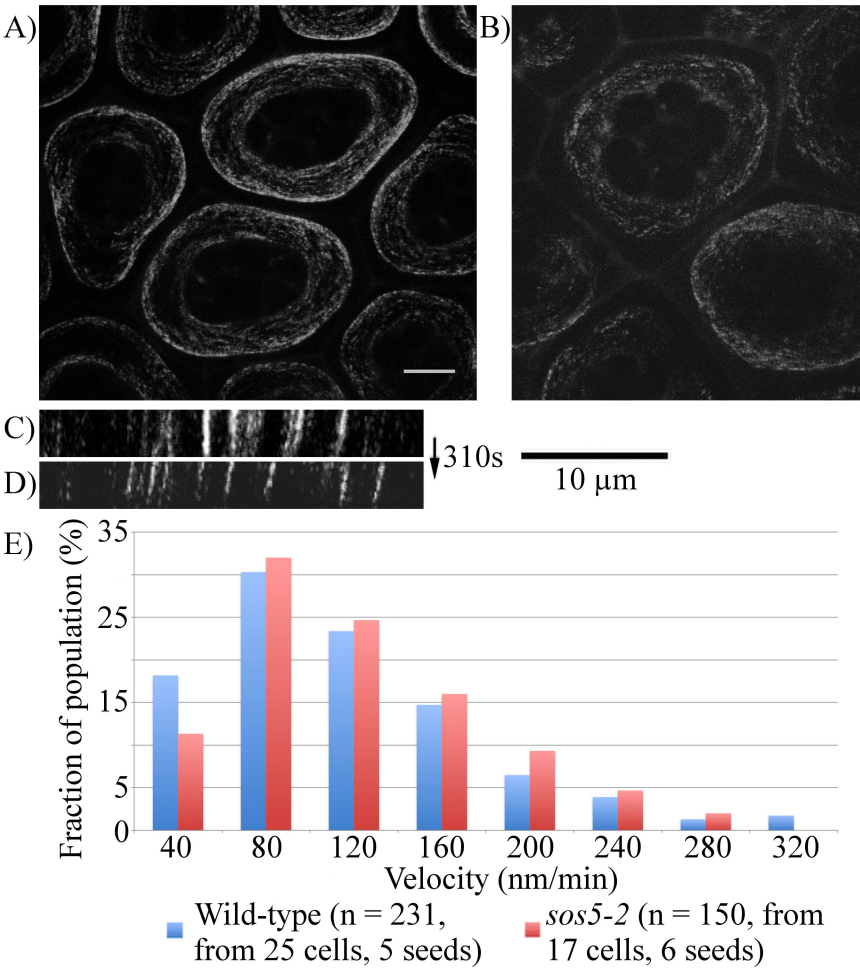


Supplemental Figure 9: Surface cell area is not significantly different in *cesa5-1 sos5-2* epidermal cells. Error bars represent SE from 80 cell area measurements.



Supplemental Figure 10: Live-cell imaging of columella development.

Confocal images of seed coat epidermal cells stained with Propidium Iodide (Green) overlayed with transmitted light images at 8, 10, and 12 DPA. Bar = 10 μm.



Supplemental Figure 11: SOS5 does not affect GFP-CESA5 direction of movement or velocity. A, B) Time-lapse image of GFP-CESA5 in wild-type or *sos5-2* backgrounds (respectively). Scale = 10 µm. C) Kymograph of GFP-CESA5. D) Kymograph of GFP-CESA5 in the *sos5-2* background. Scale for C) and D) for time (Vertical) and distance (Horizontal) shown on the right. E) Distribution of particle velocities for GFP-CESA5 in wild-type and *sos5-2* backgrounds.