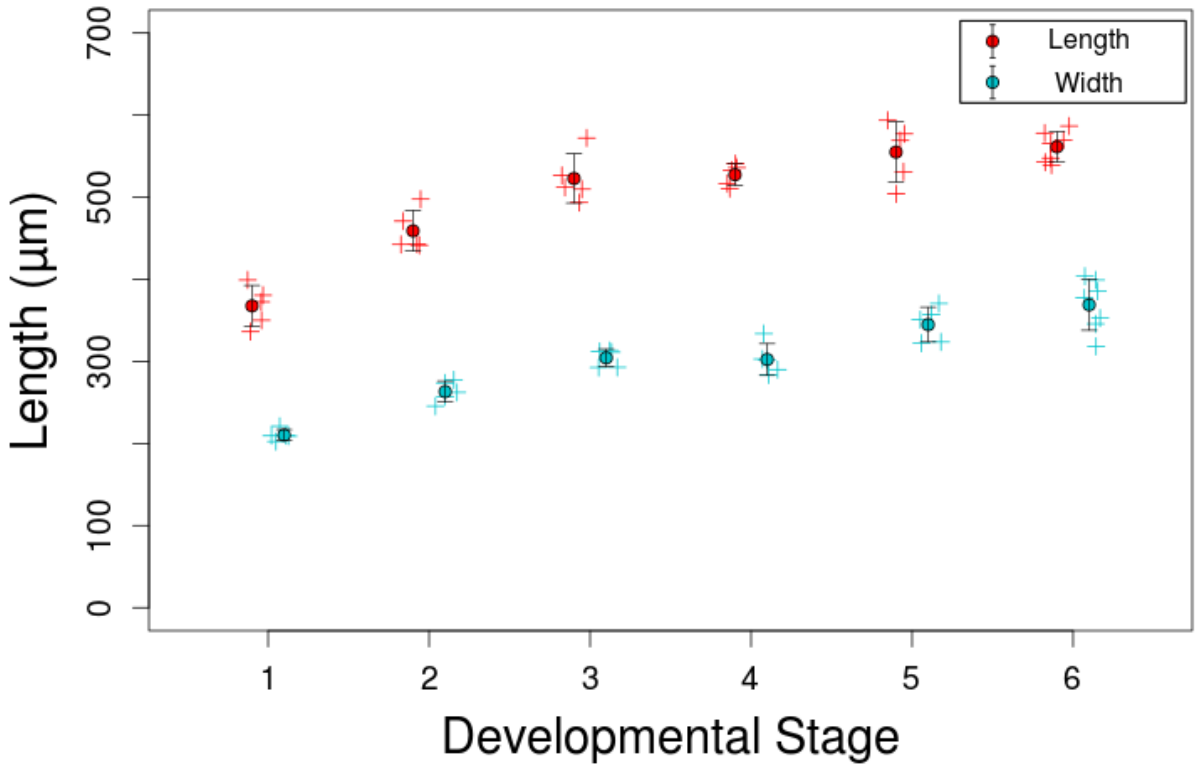
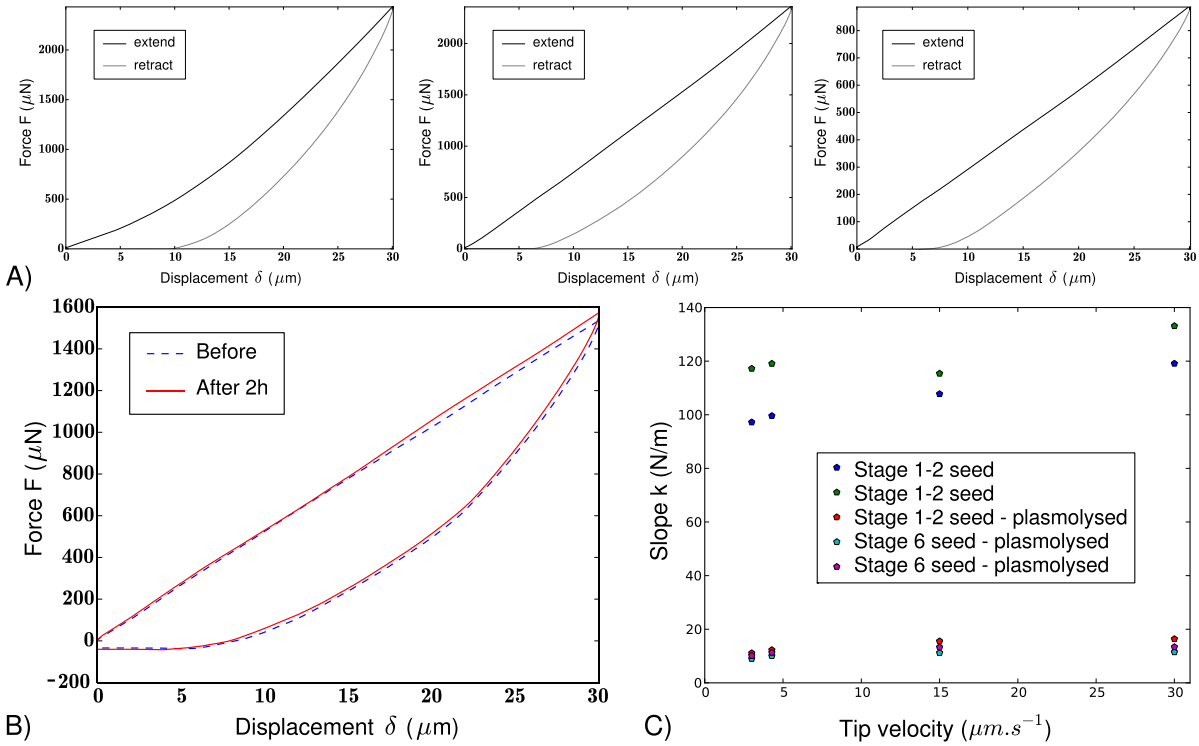
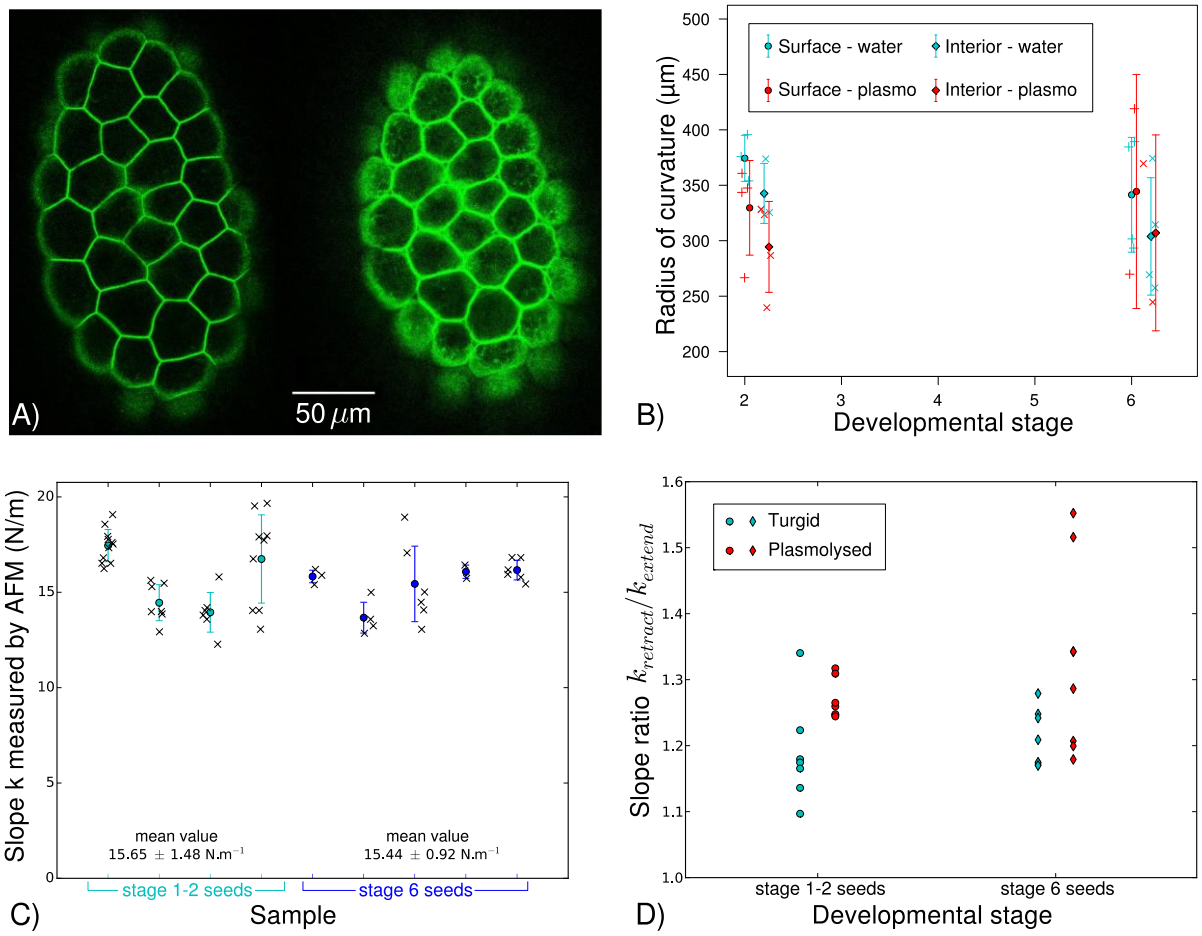


Supplementary Figure 1 – Seed length and width values at each developmental stage extracted from confocal images. Error bars indicate standard deviation around the arithmetic mean.

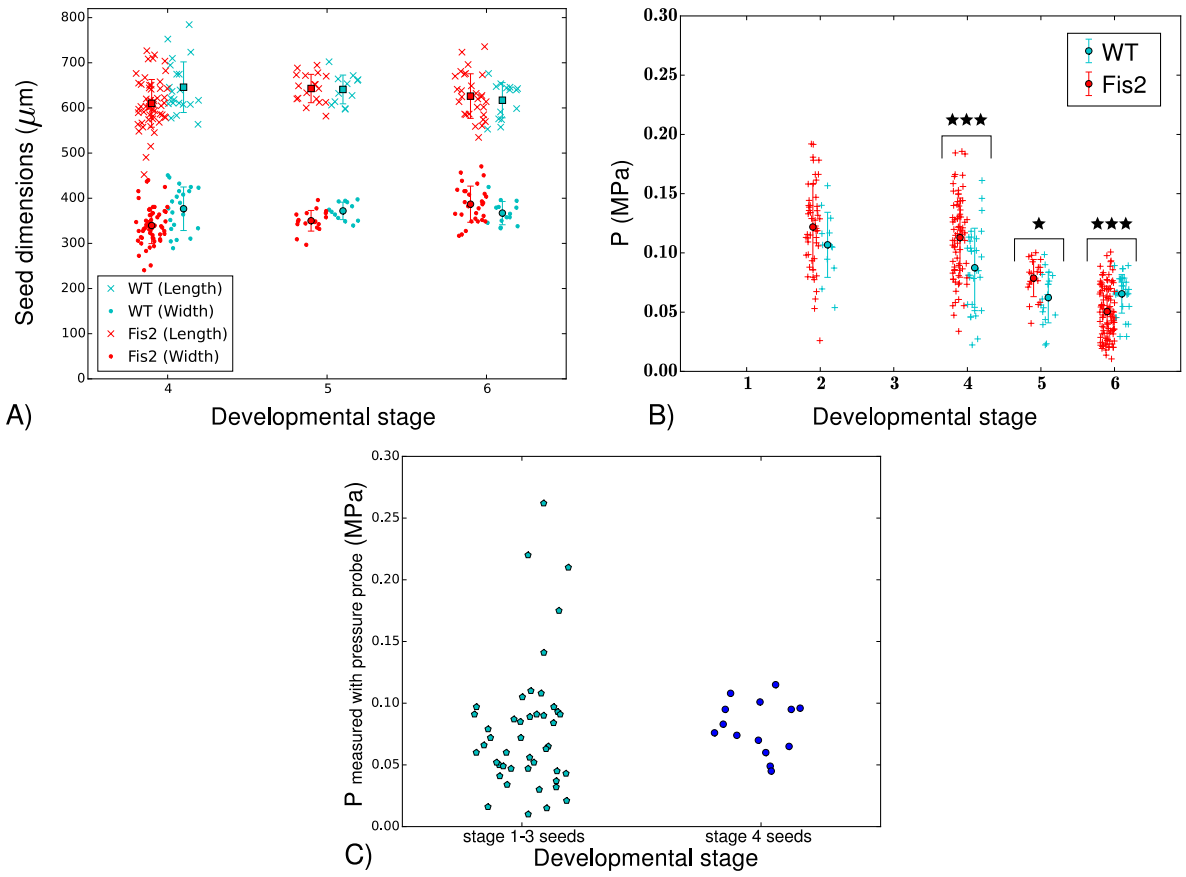


Supplementary Figure 2 – A) Further curves showing force vs displacement imposed with indenter obtained for seeds at stage 2, 3 and 6. B) Two superimposed force displacement curves for the same stage 3 seed, collected at two-hour intervals. C) Apparent stiffness of 5 different seeds at varying tip velocity. For each seed 4 different tip velocities were tested, with a two-minute interval between each indentation. The order of the velocities used for seeds 1 and 2 was v= 15, 30, 4 and then 3 µm/s. For seeds 3, 4 and 5 the order was v= 3, 30, 4 and then 15 µm/s.



Supplementary Figure 3- A) Confocal image showing the outer testa of a turgid Lti6B:GFP-expressing seed (stage 2), and of the same seed after 90 minutes of osmotic treatment (0.7M mannitol-plasmo). B) Longitudinal radius of curvature for turgid seeds, and the same seeds after osmotic treatment (90 minutes in 0.7M mannitol). Values were extracted from confocal stacks using ImageJ. For each seed the radius of curvature of both the outer cell wall, and the cell wall between the inner and outer integuments (« interior ») was measured. C) Apparent stiffness of the outer testa cell wall obtained using Atomic Force Microscopy (AFM). Values of k were extracted from the slopes of AFM extend force curves using a linear fit of the region spanning 75 to 100% of the maximum applied force. We used a Catalyst AFM (Bruker, Santa Barbara, CA) and a cantilever with spring constant 42 N/m and spherical tip 0.8µm in diameter (SD-Sphere-NCH-S-10; Nanosensors, Neuchatel, Switzerland). Seeds

were prepared as for indentation measurements. We probed a few cells (2-11) on the surface of each of 9 seeds (each black cross corresponds to one cell and is the average of measurements over 3 locations in the cell with 3 repetitions per location). Mean values of each seed and their associated standard deviations are represented by colored circles and bars, respectively. For B and C error bars indicate standard deviation around the arithmetic mean. D) Ratio of retract slope to extend slope obtained with indenter.



Supplementary Figure 4- A) Seed sizes extracted from light microscopy images of indented *FIS2/FIS2* and *FIS2/fis2-5* populations. B) Pressure values calculated for populations of seeds from *FIS2/FIS2* and *FIS2/fis2-5* plants at different developmental stages. *Differences between populations were evaluated statistically using a Wilcoxon rank-sum test. *=p<0.05, **=p<0.01, ***=p<0.001. Error bars indicate standard deviation around the arithmetic mean.* C) Pressure values obtained for developing seeds using a pressure probe apparatus. Pulled glass micropipettes were bevelled to an external diameter of 10-20µm, filled with silicone oil and mounted into a pressure probe. Seeds were laid onto a humidified filter paper, and impaled with the pipette until a meniscus formed between the oil and the cell/endosperm sap. Pressure was then increased so that sap was almost entirely pushed back into the seed. Successive rises and decreases in pressure were then applied to the pipette in order to ensure a perfect hydraulic connection between the pipette and the seed. The meniscus was then stabilized and the pressure value (i.e. the turgor pressure) read from the pressure sensor.