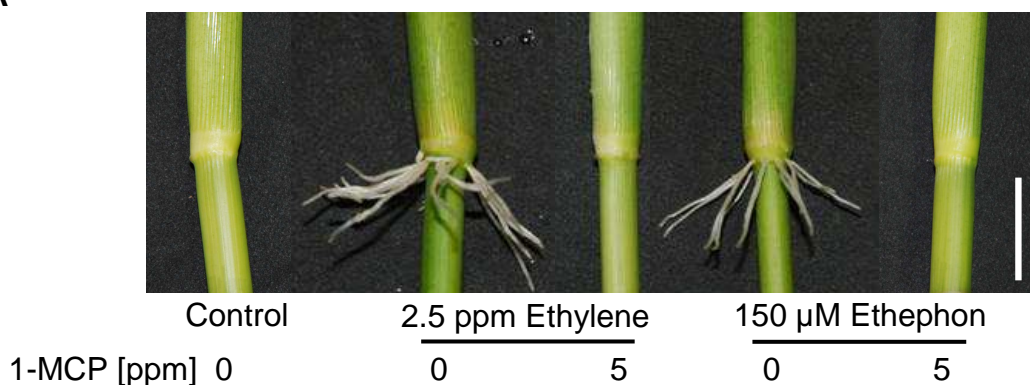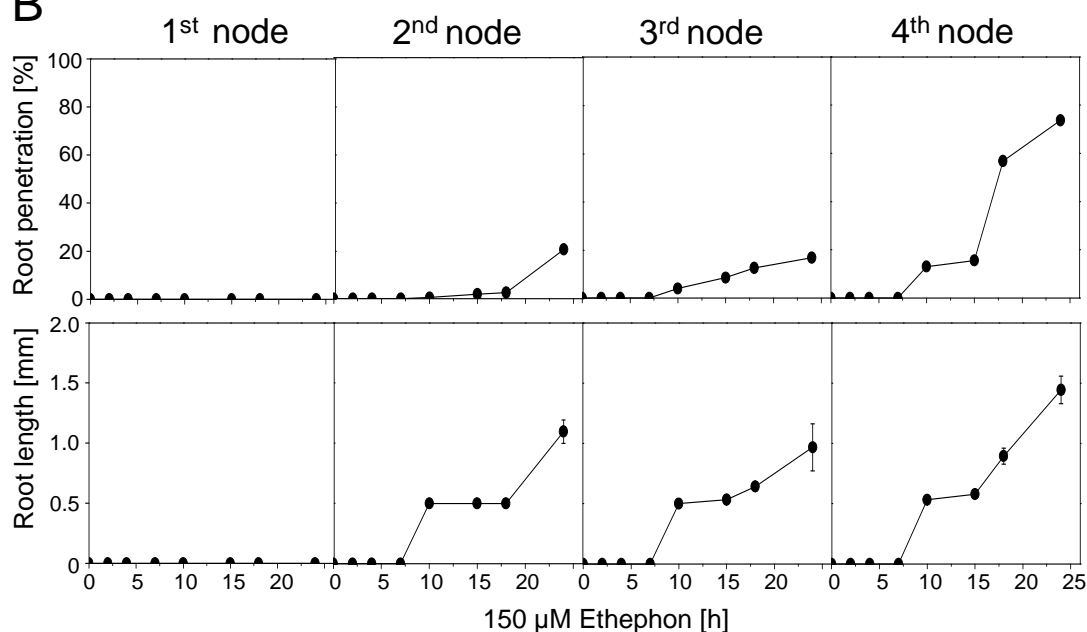**Supplemental Figure 1.** Ethylene Promotion of Adventitious Root Growth Displays a Developmental Gradient.

(A) Rice stem sections were treated for 48 h without effector as a control, with 2.5 ppm ethylene, 2.5 ppm ethylene after pre-treatment with 5 ppm of the ethylene perception inhibitor 1-MCP for 2 h, 150 µM ethephon, or 150 µM ethephon after pre-treatment with 5 ppm 1-MCP for 2 h. Bar indicates 10 mm. Ethylene and ethephon promote adventitious root growth; 1-MCP inhibits root growth.

(B) Rice stem sections were treated with 150 µM ethephon for up to 24 h. Root penetration and average lengths of the adventitious roots that had emerged at the first, second, third and fourth node were measured after 2 h, 4 h, 7 h 10 h, 15 h, 18 h and 24 h of treatment. Data are mean, n = 12 to 40.
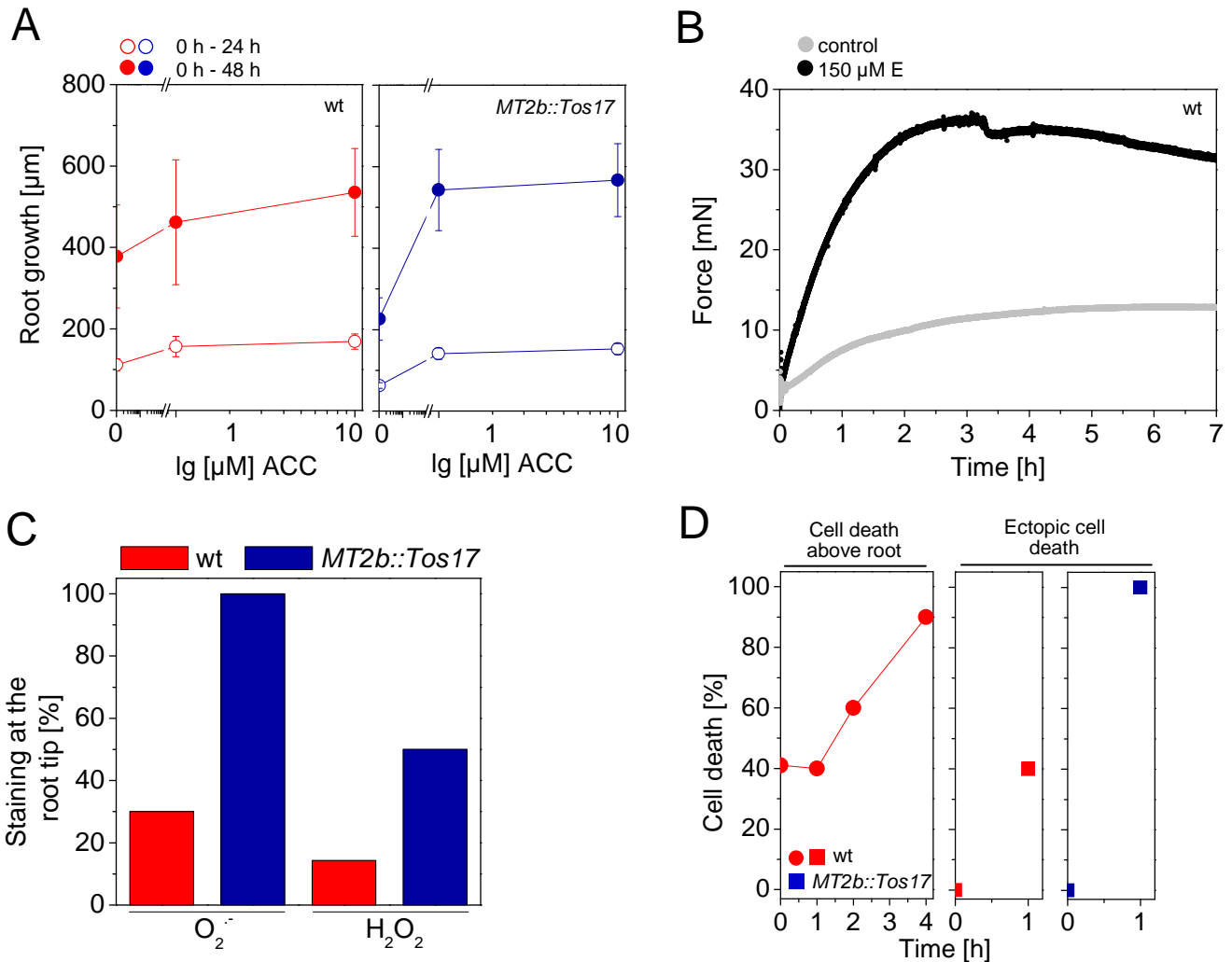
Supplemental Figure 2. Repression of *MT2b* Enhances Pressure-induced Cell Death.

(A) Growth of isolated adventitious roots of cv Nipponbare wt and *MT2b::Tos17* ± 1 µM or 10 µM ACC after 24 h or 48 h. Data are mean ± SE (n = 27 to 36). There are no statistical differences between wt and *MT2b::Tos17* (P < 0.001, ANOVA).

(B) Time-force curves from root primordia of wt cv Nipponbare ± 150 µM ethephon. Data presented as mean (n = 4 to 9).

(C) Percentage of $O_2^{.-}$ and H_2O_2 staining at the root tip of cv Nipponbare wt and *MT2b::Tos17*. Data are mean (n = 7 to 10). **(D)** Application of 40 mM force promotes cell death above primorida (●) and ectopically (wt ■, *MT2b::Tos17* ■). Repression of *MT2b::Tos17* significantly enhances ectopic cell death (t-test, P < 0.005). Data are mean (n = 10).
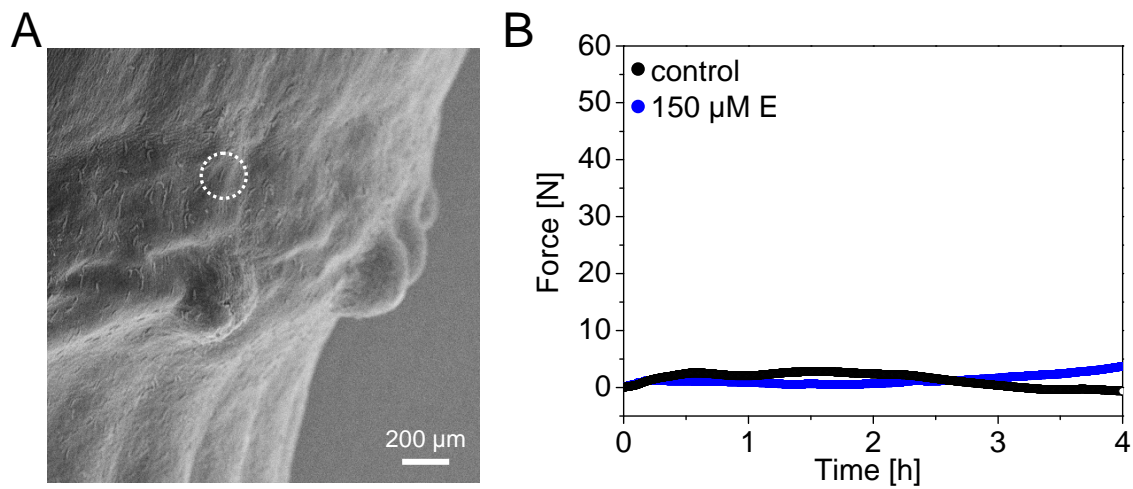
Supplemental Figure 3. Ethylene Signaling Does Not Induce a Mechanical Force Ectopically.

(A) Scanning electron micrograph of a third node with bulging epidermis above primordia. For force measurements the root dummy was placed above epidermis cells not overlaying an adventitious root primoridum (indicated by a dashed circle).

(B) Force from nodal epidermis cells not overlaying an adventitious root primoridum ± 150 µM ethephon (E).
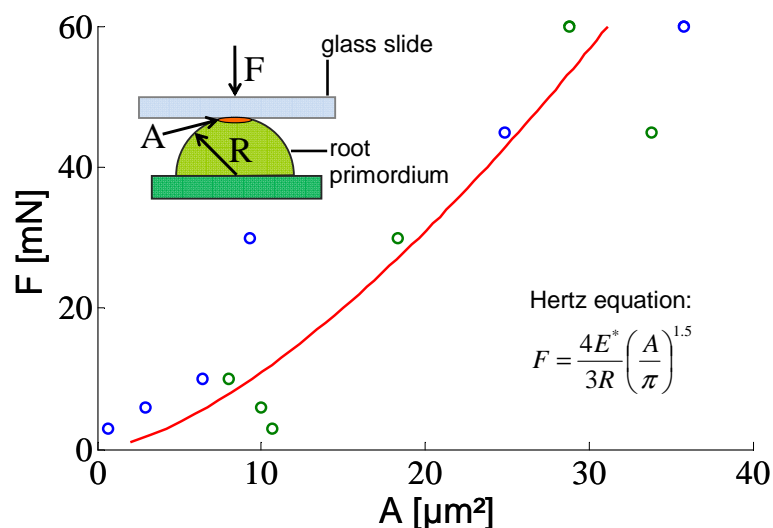
Supplemental Figure 4. Calculation of the Pressure at Each Force Applied.
Single root primordia were used to determine the average pressure.
The root and epidermis deformations were considered to follow simple Hertz theory. The Young elasticity modulus of the root was found from the fit of the indentation curves of two roots (7.39 MPa).
The maximum pressure on the top of the root could be found from the following expression:

$$p_0 = \frac{1}{\pi}\left(\frac{6E^{*2}F}{R^2}\right)^{1/3}$$

where E^* is Young modulus, R is a root tip radius, F is an applied force. The average pressure equals to the force divided by the contact area (A) or 2/3 of the maximum pressure. The average pressure, produced by the 8 mN and 33 mN force applied to the root tip with 162 µm radius, is corresponding to 0.98 MPa and 1.58 MPa. Assuming, that the epidermis has the same elastic modulus as the root, and taking into account, that the root dummy radius was 100 µm, the 2.94 mN and 58.88 mN applied forces correspond to 0.97 MPa and 2.64 MPa average pressure, respectively.

Supplemental Table 1. Dose-response Curve of Ethephon-induced Epidermal Cell Death in cv Zhonghua 11.

Stem sections of rice cv Zhonghua 11 were treated with ethephon at concentrations indicated for 22 h or 48 h respectively. Dead epidermal cells were visualized at the third node using Evans Blue. Results are averages (± SE) from at least two independent experiments and nine stem sections analyzed per treatment.

Ethephon [µM]	Cell death (%) after 22 h	Cell death (%) after 48 h
0	1.0 (± 1.9)	10.9 (± 2.4)
15	8.0 (± 3.4)	19.0 (± 6.6)
50	16.7 (± 4.1)	54.1 (± 9.0)
150	36.3 (± 5.2)	56.9 (± 4.0)