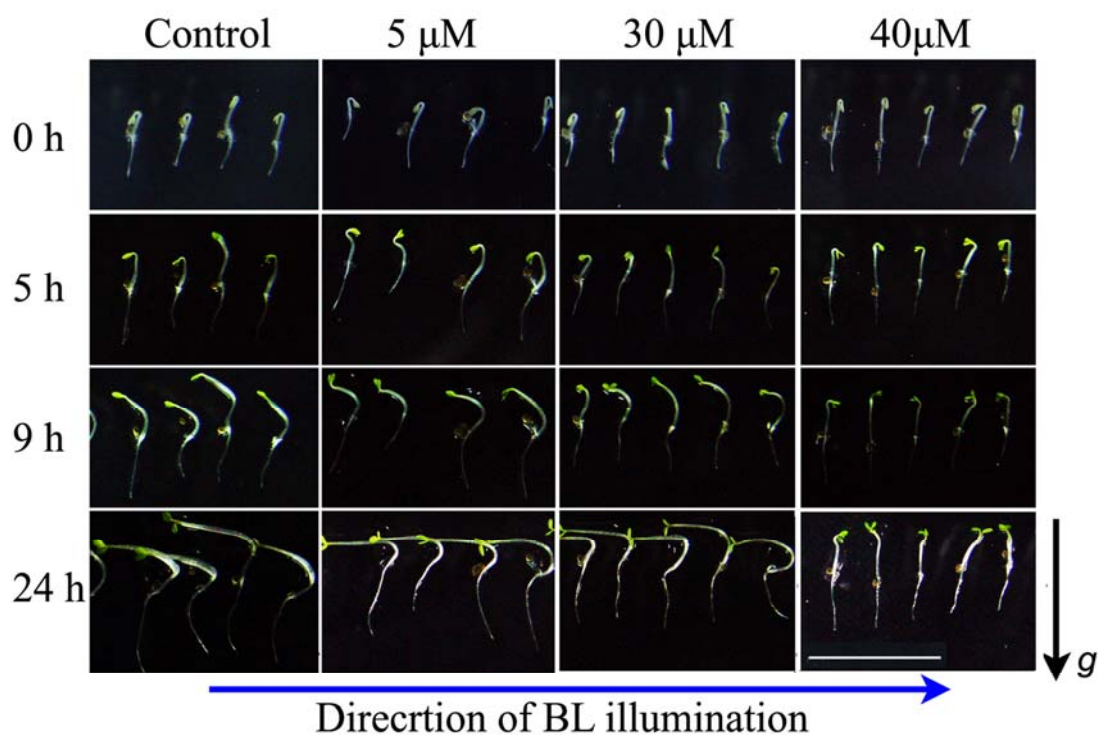**Supplemental Figure 1. BL-induced Phototropic Curvature in the *pin2* Mutant Line.**

(A) BL-induced phototropic curvature in the *pin2* mutant line. Roots of 3-day-old *pin2* seedlings grown in darkness responded in random directions, while roots of light-grown seedlings were mostly straight before illumination (left column). Before these seedlings were laterally illuminated with 2 µmol m^{-2} s^{-1} BL, roots of dark-grown seedlings were straightened manually. Pictures in the right column were taken from the same seedlings before (red channel) and
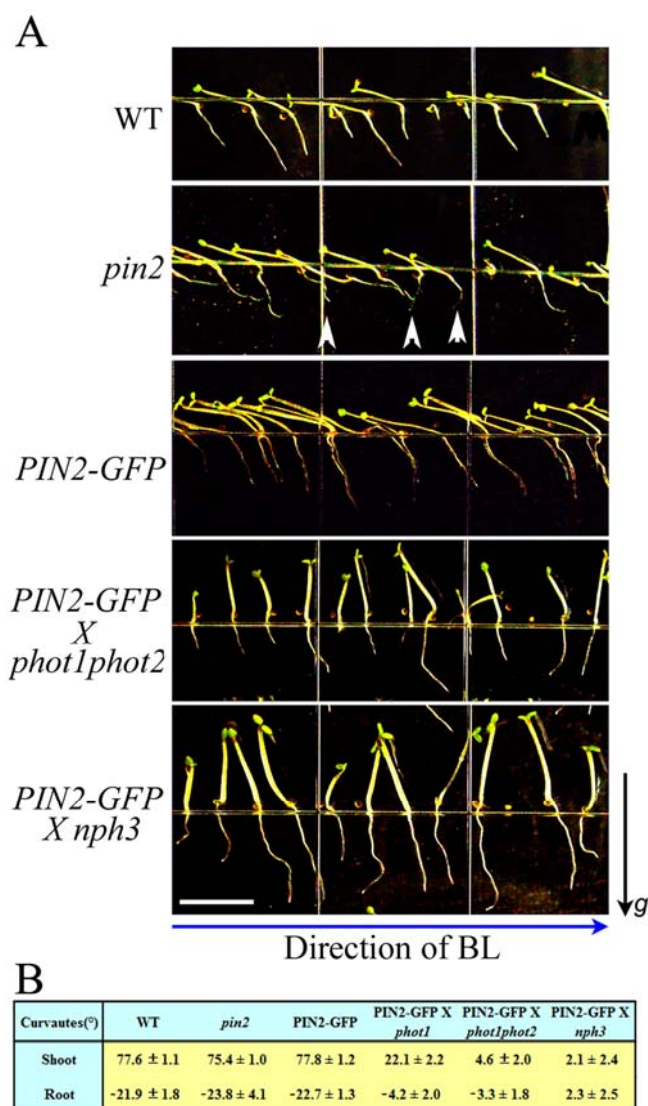
after (green channel) illumination (10 h). Images were merged to show the random curvature in *pin2* mutant root tips. (Bar = 5 mm)

(B) To compare the phototropic curvatures in both light- and dark-grown seedlings of the WT and *pin2* lines, the curvature degree was measured and the means and standard errors were calculated. A paired Student's *t*-test showed that the difference between the bending curvatures of the WT and *pin2* roots were significant (*, $P < 0.05$), while the hypocotyls did not show significant differences (–, $P > 0.05$) ($n = 24$).

Supplemental Figure 2. BL-induced Phototropic Responses of *Arabidopsis* on BFA-containing Agar Plates.

BL induced phototropic curvature in 3-day-old dark-grown WT seedlings on agar plates containing different concentrations of BFA. The mean values of phototropic curvatures are shown in the Figure 3 (Bar = 1 cm).

B

Curvautes(°)	WT	pin2	PIN2-GFP	PIN2-GFP X phot1	PIN2-GFP X phot1phot2	PIN2-GFP X nph3
Shoot	77.6 ± 1.1	75.4 ± 1.0	77.8 ± 1.2	22.1 ± 2.2	4.6 ± 2.0	2.1 ± 2.4
Root	-21.9 ± 1.8	-23.8 ± 4.1	-22.7 ± 1.3	-4.2 ± 2.0	-3.3 ± 1.8	2.3 ± 2.5

Supplemental Figure 3. BL-induced Phototropic Responses in the PIN2-GFP Expressed *Arabidopsis* Lines.

(A) Images show seedlings of the WT, *pin2*, and mutant lines expressing PIN2-GFP that were planted on the same agar plate with culture medium and grown under lateral BL illumination (2 μmol m^{-2} s^{-1}) for 4 days. Arrowheads indicate several *pin2* roots growing toward the BL source (Bar = 5 mm).

(B) Data represent the separation angle from the vertical position in hypocotyls and roots (mean ± SE, *n* = 24).
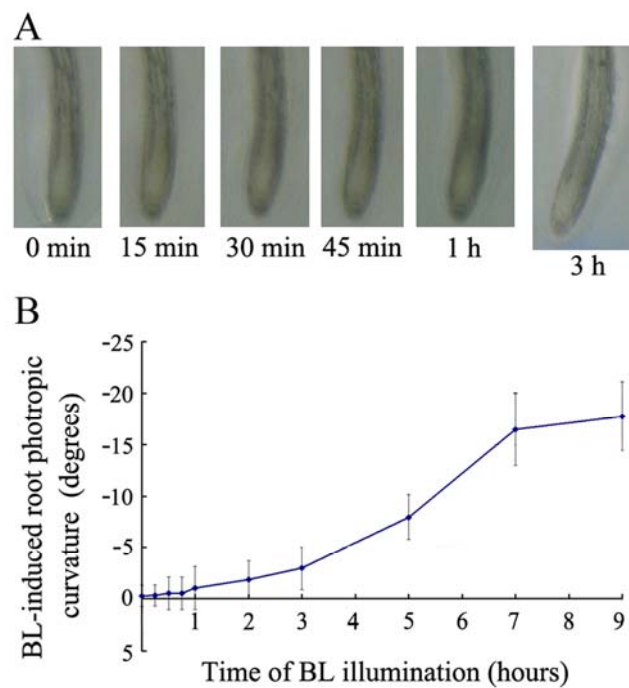
Supplemental Figure 4. **BL-induced Phototropic Response of a Dark-Grown WT *Arabidopsis* Root.**

(A) Images show the bending reaction of a single root tip after 0, 15, 30, 45, 60, and 180 min of continuous weak BL illumination (2 µmol m^{-2} s^{-1}) from the right.

(B) Bending curvature of BL-induced negative root phototropism (mean ± SE, *n* = 12).
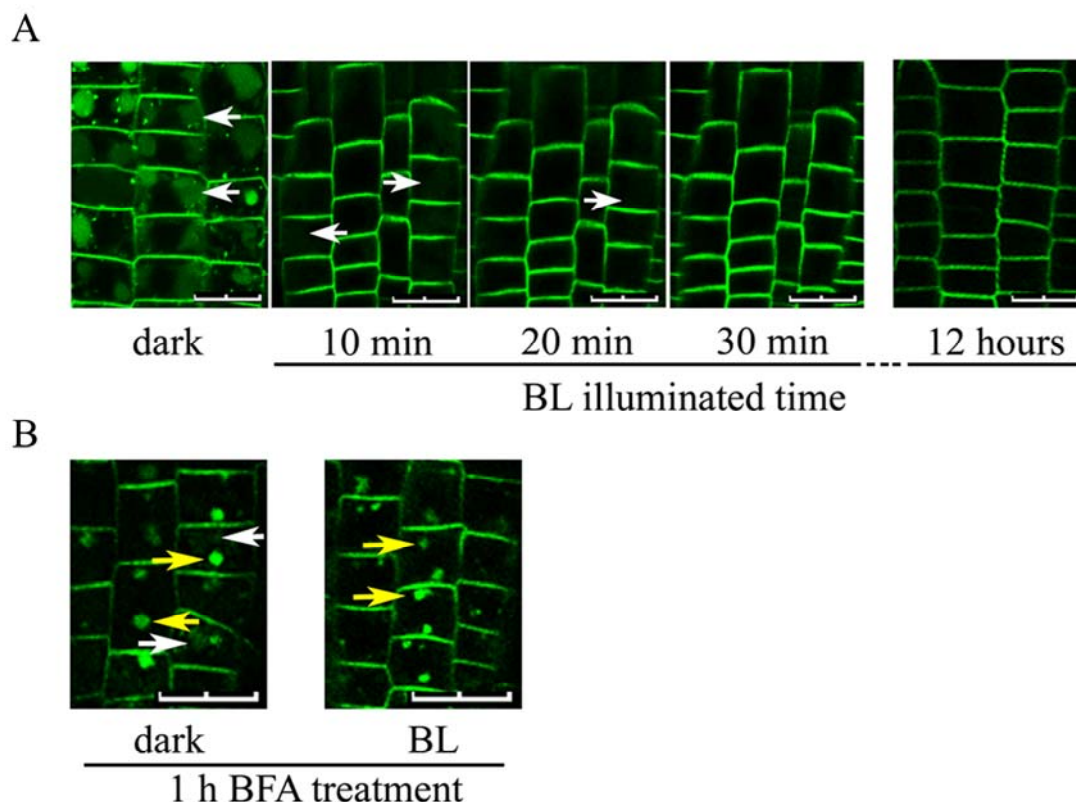
Supplemental Figure 5. The Wild-Type (WT) PIN2 Does Not Affect the BL-induced and BFA-induced Behavior of PIN2-GFP.

To test the effect of WT PIN2 on the cellular behavior of PIN2-GFP, we crossed the *PIN2_{PRO}:PIN2-GFP* transformed line (♂) onto the WT (Col 0, ♀) to obtain heterozygous F_1 plants.

(A) The WT PIN2 did not affect BL-induced disappearance of VLC-localized PIN2-GFP; compare with Figure 5.

(B) The WT PIN2 did not affect the re-localization of PIN2-GFP after 1 h BFA (30 μM) treatment with or without BL illumination; compare with Figure 6.

(A) and **(B)** Yellow arrows indicate BFA compartments with higher intensities and densities, whereas white arrows show the lower intensity VLCs. Intensity of BL illumination was 2 μmol m^{-2} s^{-1} (Bars = 20 μm).
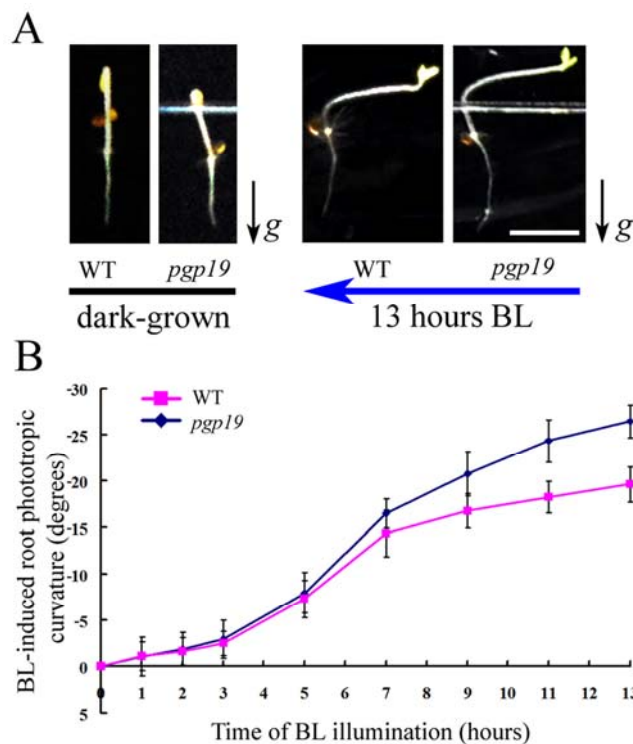
Supplemental Figure 6. BL-induced Phototropic Response of a Dark-Grown Wild-Type (WT) and *pgp19 Arabidopsis* Root.

(A) BL-induced phototropic curvature in 3-day-old dark-grown WT (Col 0) and *pgp19* mutant line. Left: before illumination, right: after 13 h unilateral BL illumination (Bar = 5 mm).

(B) Mean values of BL-induced negative phototropic bending calculated on the basis of root apices of 12 *Arabidopsis* seedlings in each line. A paired Student's *t*-test indicated that the difference of the bending curvatures after 13 h of unilateral BL illumination between the WT and *pgp19* roots was significant ($P < 0.05$).
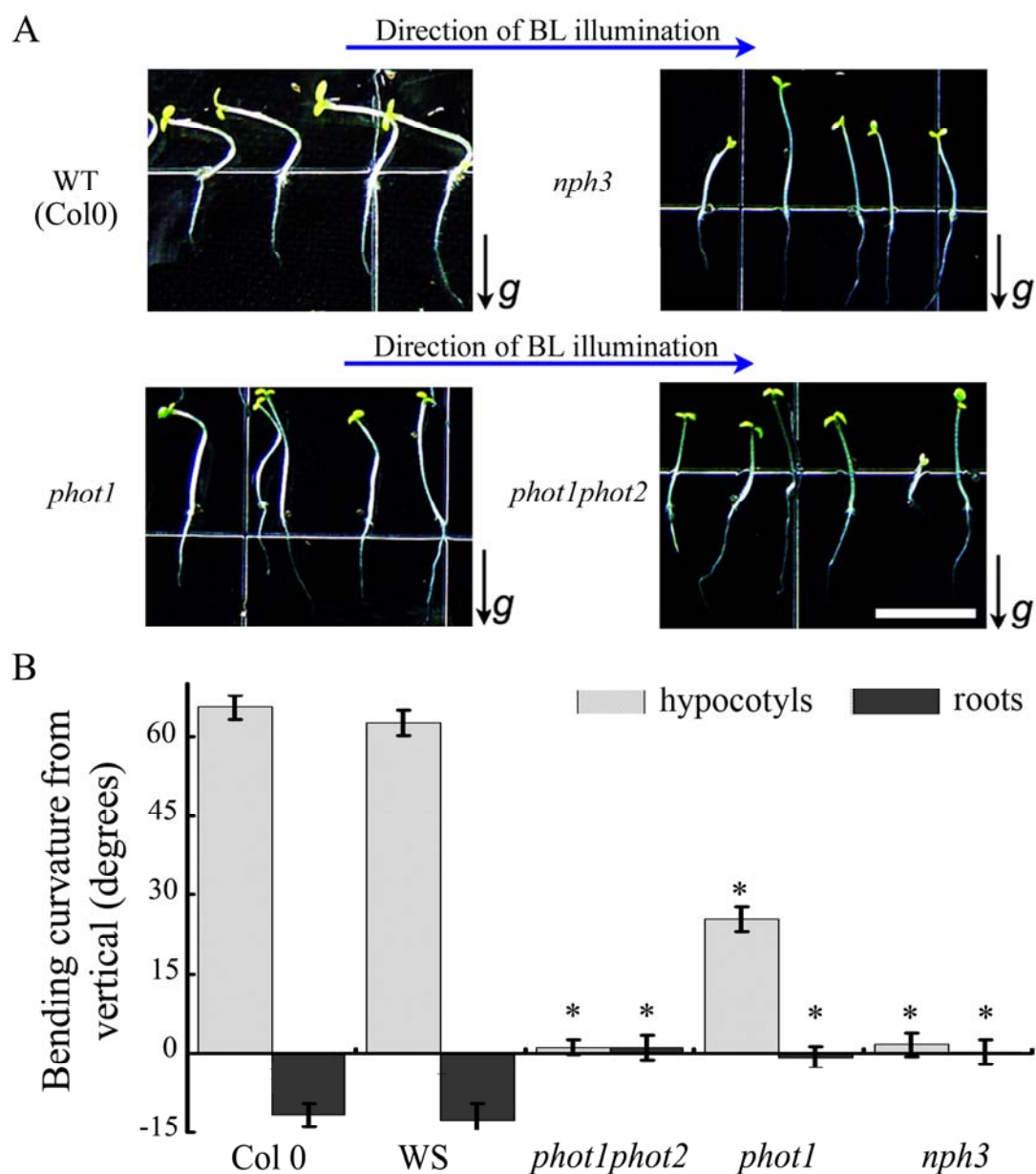
Supplemental Figure 7. BL-induced Phototropic Response in a Dark-Grown Wild-Type (WT) and *phot1phot2, phot1,* and *nph3 Arabidopsis* seedlings.

(A) Three-day-old dark-grown seedlings of the WT (Col 0 and WS), *phot1phot2, phot1,* and *nph3* were illuminated with BL (2 μmol m^{-2} s^{-1}) laterally for 24 h. (Bar = 5 mm).

(B) To compare the phototropic curvature in WT (Col0 and WS phenotype) and mutant seedlings, the curvature degree was measured and the means and

standard errors were calculated. Seedlings of the *nph3*, and *phot1phot2* mutants show non-phototropic response in both roots and hypocotyls, while *phot1* has a decreased positive bending curvature in hypocotyls and no bending curvature in roots. A paired Student's *t*-test showed that the differences in the bending curvature between the mutant lines and the WT lines are significant (*, $P < 0.05$) ($n = 24$).

Supplemental Table 1

Distance from the root apex (mm)	WT (Col 0) Dark value (fmoles cm^{-2} s^{-1})	WT (Col 0) + BL value (fmoles cm^{-2} s^{-1})	WT (WS) Dark value (fmoles cm^{-2} s^{-1})	WT (WS) + BL value (fmoles cm^{-2} s^{-1})
0.01	12.6 ± 1.3	18.9 ± 1.5	11.5 ± 1.5	20.4 ± 2.6
0.052	44.7 ± 3.6	58.9 ± 3.5	40.6 ± 3.5	48.2 ± 5.4
0.102	33.4 ± 3.9	68 ± 3.8	41.3 ± 3.4	66.5 ± 7.8
0.152	127.4 ± 13.6	167 ± 10.2	135 ± 14.2	171 ± 19.9
0.202	198 ± 16.9	256.9 ± 18.6	189 ± 19.5	242.2 ± 20.5
0.252	144 ± 15.3	158.6 ± 11.1	150 ± 18.2	170.2 ± 15.2
0.302	63 ± 5.9	68.2 ± 5.4	71 ± 8.3	70.7 ± 6.5
0.352	35 ± 3.6	45 ± 3.6	32 ± 3.8	50.2 ± 4.1
0.402	28 ± 2.5	38.6 ± 3.5	29 ± 3.5	35.9 ± 3.8
0.452	24 ± 2.4	28.6 ± 2.2	25 ± 2.6	31.2 ± 3.2
0.502	17.4 ± 1.6	26.6 ± 2.5	24 ± 2.8	28.9 ± 2.1
0.552	22.5 ± 2.4	32.5 ± 2.8	23 ± 3.4	28.4 ± 2.5
0.602	19.5 ± 2.3	28.1 ± 2.4	18.5 ± 2.9	31 ± 2.2
0.652	16.4 ± 2.1	21.2 ± 3.1	16 ± 3.3	26.5 ± 2.6
0.702	13.5 ± 1.6	15.6 ± 1.6	16.5 ± 1.6	23.3 ± 2.2
0.752	20.5 ± 1.9	22.6 ± 1.5	16.4 ± 1.9	25.5 ± 2.8
0.802	21.4 ± 1.8	28.5 ± 2.1	18.2 ± 2.5	28.4 ± 2.7
0.852	22.4 ± 1.5	23.4 ± 2.1	20.6 ± 2.4	22.1 ± 2.5
0.902	26.4 ± 1.6	21.5 ± 1.4	20.5 ± 2.0	25.9 ± 2.5
0.952	26.3 ± 2.3	26.6 ± 2.5	21.5 ± 2.5	20.1 ± 2.4

Distance from the root apex (mm)	*eir1-4* Dark value (fmoles cm^{-2} $s^{-1)}$	*eir1-4* +BL value (fmoles cm^{-2} $s^{-1)}$	*nph3-1* Dark value (fmoles cm^{-2} $s^{-1)}$	n*ph3-1* + BL value (fmoles cm^{-2} $s^{-1)}$
0.01	10.5 ± 2.5	11.2 ± 1.5	23.5 ± 2.5	25.9 ± 1.6
0.052	35.2 ± 3.8	36.8 ± 2.5	48.8 ± 3.2	58.6 ± 2.6
0.102	48.9 ± 5.6	58.6 ± 6.5	65.2 ± 3.5	69.8 ± 5.8
0.152	111.3 ± 15.6	125.6 ± 11.2	142.3 ± 12.5	132.1 ± 15.6
0.202	173.9 ± 20.1	196.2 ± 18.6	175.6 ± 12.8	169.8 ± 16.5
0.252	159.6 ± 18.5	158.3 ± 18.2	188.6 ± 13.5	156.2 ± 18.9
0.302	72.2 ± 8.5	75.3 ± 8.6	89.5 ± 9.6	75.7 ± 8.5
0.352	42.6 ± 4.8	48.9 ± 5.8	65.4 ± 8.5	58.8 ± 5.2
0.402	32.5 ± 5.6	33.2 ± 3.2	45.8 ± 6.5	52.3 ± 4.4
0.452	20.5 ± 3.5	25.3 ± 2.6	23.5 ± 3.5	36.5 ± 3.4
0.502	18.5 ± 2.5	19.8 ± 2.8	23.3 ± 2.1	28.6 ± 2.8
0.552	19.6 ± 2.9	20.5 ± 2.2	21.5 ± 3.2	23.6 ± 1.6
0.602	21.3 ± 2.5	20.6 ± 1.8	20.3 ± 2.4	19.8 ± 1.8
0.652	20.5 ± 3.4	22.1 ± 1.6	20.8 ± 1.9	16.8 ± 2

0.702	18.5 ± 3	25.6 ± 2.4	20.2 ± 2.2	19.9 ± 2.2
0.752	18.4 ± 3	29.2 ± 1.9	20 ± 2.5	25.6 ± 1.8
0.802	19.2 ± 2.8	24.5 ± 2.6	21.5 ± 2.1	24.8 ± 1.9
0.852	19.6 ± 2.1	18.5 ± 1	24.7 ± 1.8	26.8 ± 1.6
0.902	20.5 ± 1.9	17.6 ± 1.5	18.5 ± 1.7	26.6 ± 1.6
0.952	21.5 ± 1.8	18 ± 1.3	19.7 ± 1.8	21.1 ± 1.6

Distance from the root apex (mm)	*phot1-5* Dark value (fmoles cm^{-2} $s^{-1)}$	p*hot1-5* + BL value (fmoles cm^{-2} $s^{-1)}$	*phot1/phot2* dark value (fmoles cm^{-2} $s^{-1)}$	*phot1/phot2* + BL value (fmoles cm^{-2} $s^{-1)}$
0.01	22.2 ± 1.8	22.6 ± 1.2	18.5 ± 1.2	19.5 ± 1.4
0.052	63.2 ± 4.8	45.3 ± 3.5	42.6 ± 1.6	36.8 ± 2.5
0.102	71 ± 6.3	63 ± 5.1	71.5 ± 5.6	63.2 ± 5.6
0.152	112.1 ± 10.2	167.2 ± 15	156 ± 13.5	140.8 ± 12.5
0.202	196.5 ± 18.6	215.5 ± 19.8	178 ± 12.5	181.2 ± 13.4
0.252	184.2 ± 13.6	144.3 ± 16.8	185 ± 16.9	178.6 ± 16.2
0.302	96.5 ± 8.7	98.6 ± 10.5	89.6 ± 10.2	95.6 ± 10.2
0.352	42.6 ± 3.6	56.4 ± 5.9	65.2 ± 8.5	89.5 ± 7.5
0.402	38.9 ± 3.4	42.6 ± 3.6	35.6 ± 2.6	56.8 ± 5.4
0.452	25.4 ± 2.9	32.5 ± 3.4	29.8 ± 2.5	36.5 ± 3.2
0.502	20.5 ± 2.8	21.8 ± 2.8	28.5 ± 2.8	21.5 ± 2.6
0.552	20.1 ± 2.4	20.8 ± 1.8	23.1 ± 2.4	26.2 ± 2.4
0.602	20.8 ± 3.1	25.6 ± 2.5	18.5 ± 2	23.6 ± 2.1
0.652	20.6 ± 2	27.3 ± 2	16.5 ± 2.1	19.9 ± 2.8
0.702	20.9 ± 1.6	26.5 ± 2.4	18.9 ± 1.5	19.5 ± 2.2
0.752	19.5 ± 1.9	21.4 ± 2.2	17.4 ± 1.9	20.6 ± 2.6
0.802	18.9 ± 1.7	20.3 ± 2.6	17.6 ± 2.1	20 ± 2.2
0.852	15.6 ± 2.5	20 ± 2.5	19.9 ± 2.5	23.5 ± 1.4
0.902	17.8 ± 2.2	19.5 ± 2.6	16.8 ± 1.8	23.2 ± 1.1
0.952	19.3 ± 2.4	20.1 ± 2	17.1 ± 1.9	21.1 ± 1.8

Supplemental Table 1. Mean Values of Auxin Influx Flow in Arabidopsis Root Apex.

Data show the mean ± SE (n = 12) of auxin flux values in the intact root apex region of 4-day-old dark-grown Arabidopsis seedlings. Profiles are shown in Figures 2A and 2B.