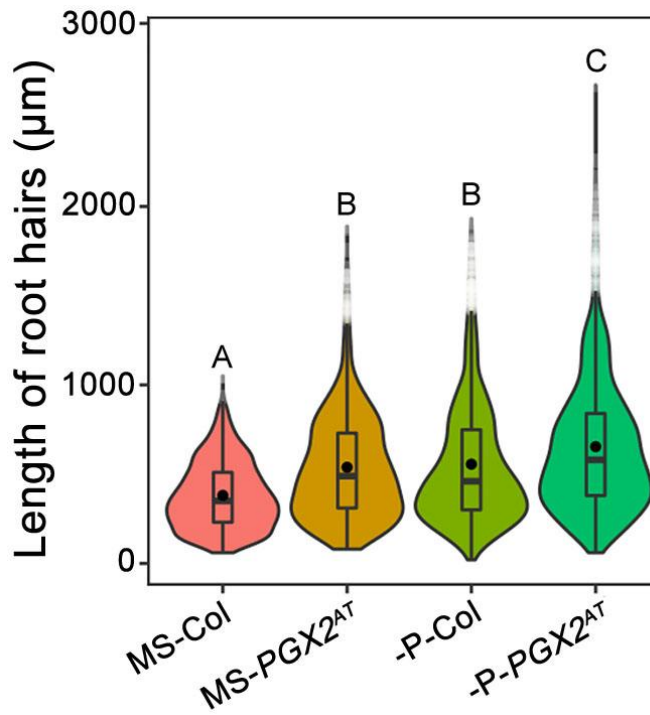
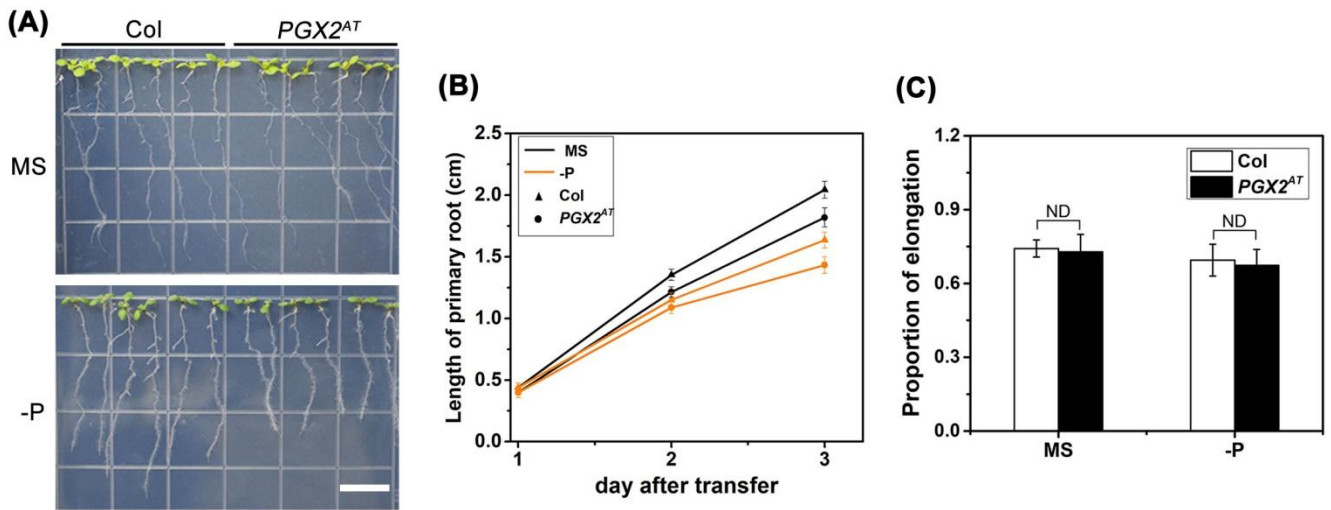


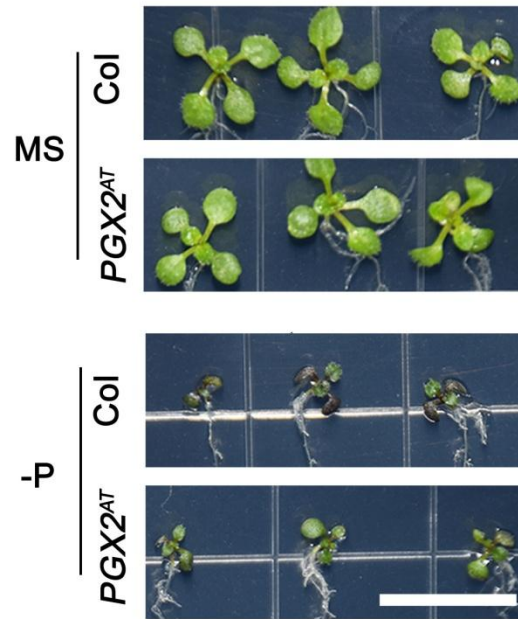
Supplementary Figure 1. Gene expression detection and root hairs of Col and PG-related mutants grown under phosphate deficient conditions. **(A-D)** Gene expression detection by qPCR from the roots and seedlings of seven-day-old light-grown Col, *PGX1^{OE1}*, *PGX3^{OE}*, *PGX2^{AT}* plants (n = 3 technical replicates, *t*-test, **P < 0.001). **(E)** Primary roots with root hair region of Col, *PGX1^{OE1}*, *PGX1^{OE48}*, *pgx1-1*, *pgx1-2*, *PGX3^{OE}*, *pgx3* and *pgx2* seedlings grown in normal (MS, 480 μ M) and phosphate deficient (-P, 10 μ M) conditions. Images focusing on root hair regions were taken after 3-day-old seedlings were transferred onto normal MS or phosphate deficient medium plates for another four days. Bars = 100 μ m.



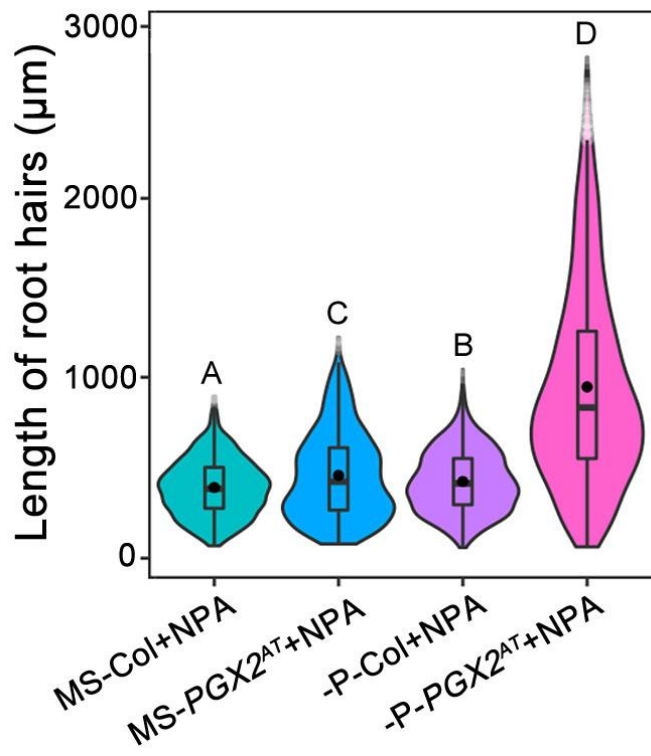
Supplementary Figure 2. *PGX2^{AT}* seedlings have longer root hairs under normal and phosphate deficient conditions. Violin plot of root hair length of seven-day-old Col and *PGX2^{AT}* seedlings under normal and low P conditions ($n \geq 800$ root hairs from at least 10 seedlings). Uppercase letters indicate significantly different groups as determined by one-way ANOVA with post-hoc Duncan's test ($P < 0.01$).



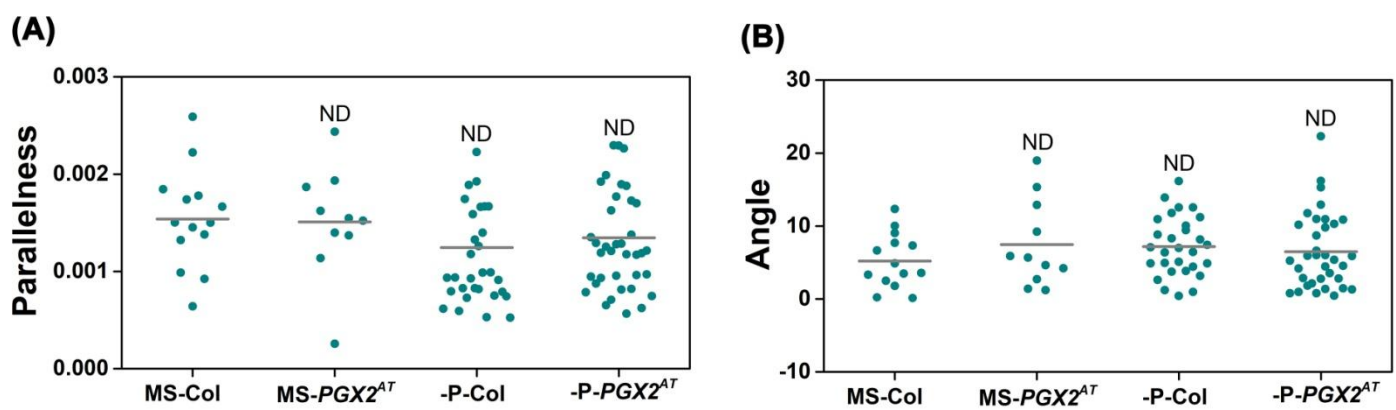
Supplementary Figure 3. Primary root length of Col and *PGX2^{AT}* seedlings. **(A)** Col and *PGX2^{AT}* seedlings grown for three days in normal conditions were transferred onto normal MS or phosphate deficient (-P) MS medium plates for another four days. Bar = 1 cm. **(B)** Primary root lengths of Col and *PGX2^{AT}* seedlings after seedlings were transferred to normal MS and -P conditions. **(C)** Proportion of root elongation to total length of Col and *PGX2^{AT}* seedlings (n = 35 seedlings per each genotype). Error bars represent SD. ND, no statistical difference.



Supplementary Figure 4. Anthocyanin accumulation in leaves of Col and *PGX2^{AT}* seedlings under low phosphate conditions. *PGX2^{AT}* seedlings display less anthocyanin accumulation compared to Col controls against low phosphate treatment. Images were taken in the 10th day after seedling transfer. Bar = 1 cm.



Supplementary Figure 5. NPA application promotes root hair elongation of *PGX2^{AT}* seedlings in phosphate deficient conditions. Violin plot of root hair length of seven-day-old Col and *PGX2^{AT}* seedlings with NPA treatment under normal and low P conditions ($n \geq 800$ root hairs from at least 10 seedlings). Uppercase letters indicate significantly different groups as determined by one-way ANOVA with post-hoc Duncan's test ($P < 0.01$).



Supplementary Figure 6. Actin filament orientation in *Lifeact-GFP* Col and *Lifeact-GFP* *PGX2^{AT}* transgenic seedlings under normal MS and phosphate deficient conditions. **(A, B)** Parallelness and angle of actin filaments relative to cell elongation axis ($n \geq 11$ cells). ND, no statistical difference.