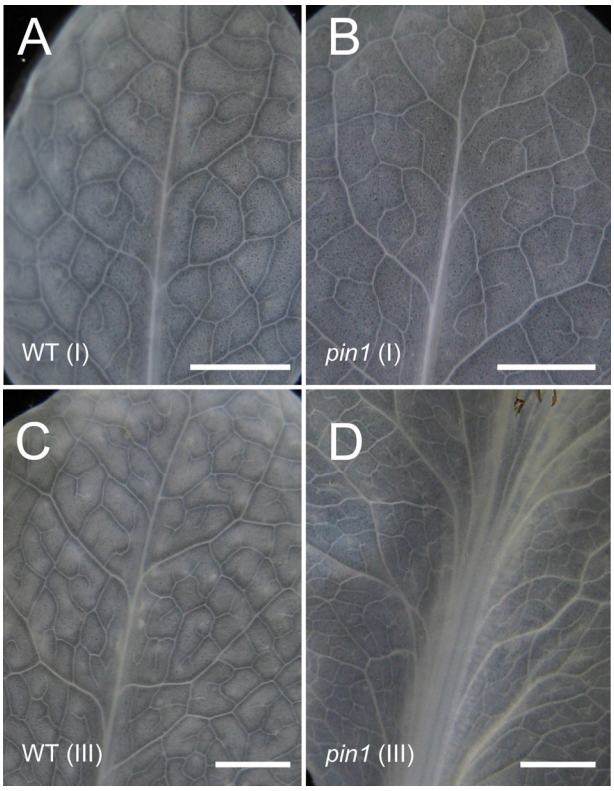
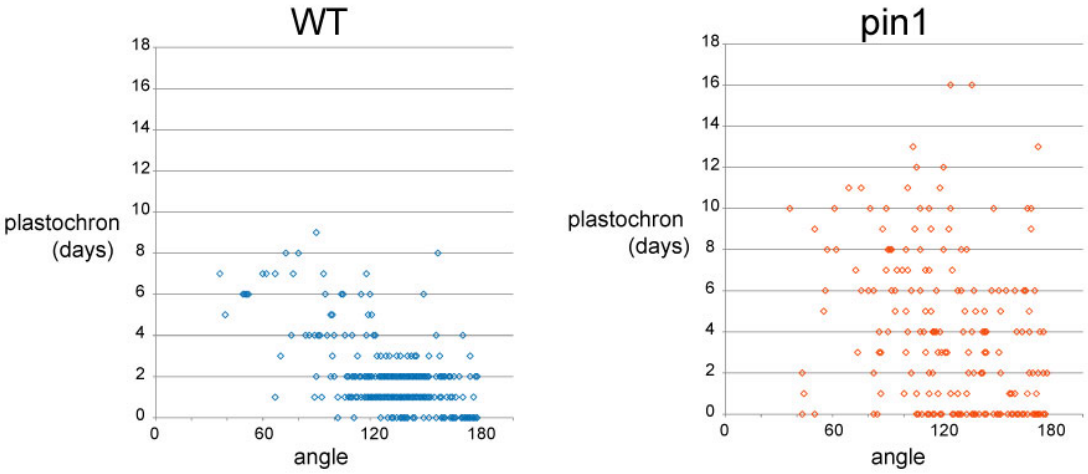
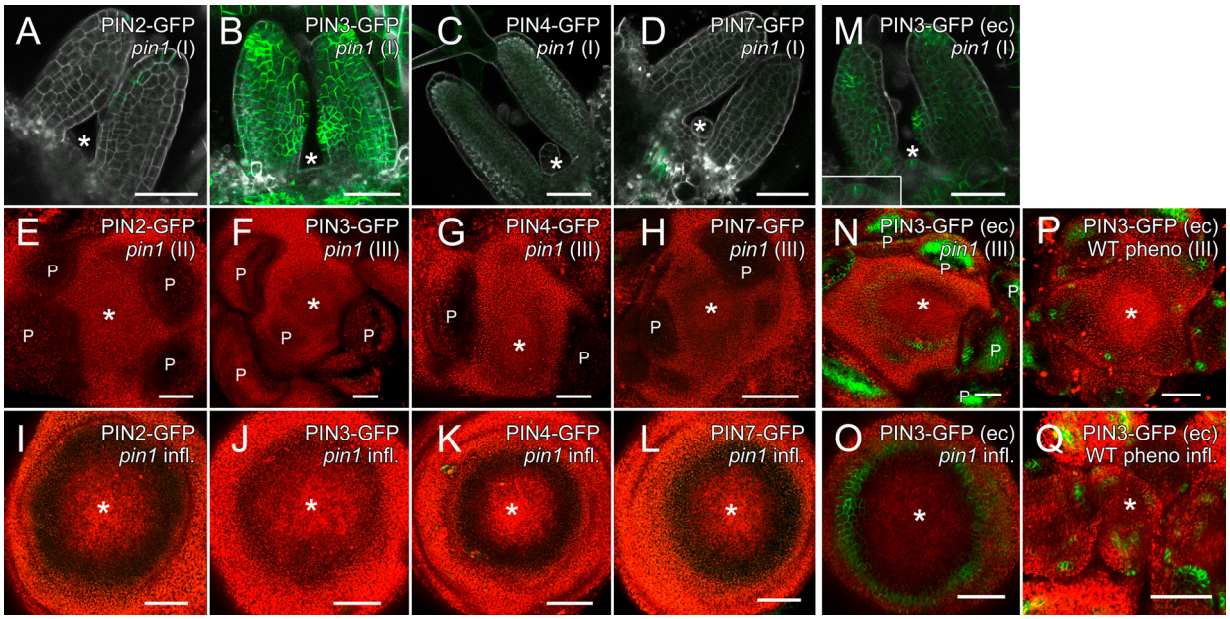


Supplemental Figure 1. Venation patterns are aberrant in *pin1* stage III, but not stage I. A and B, Venation in stage I leaves. Secondary veins branching off from the primary vein, as well as a network of higher order veins, can clearly be distinguished in both wild type (A) and *pin1* (B). C and D, Venation in stage III leaves. Wild type leaves (C) still show a clear hierarchy and branching patterns, while *pin1* leaves (D) have fused veins and deviant patterning. Scale bars : 2 mm.

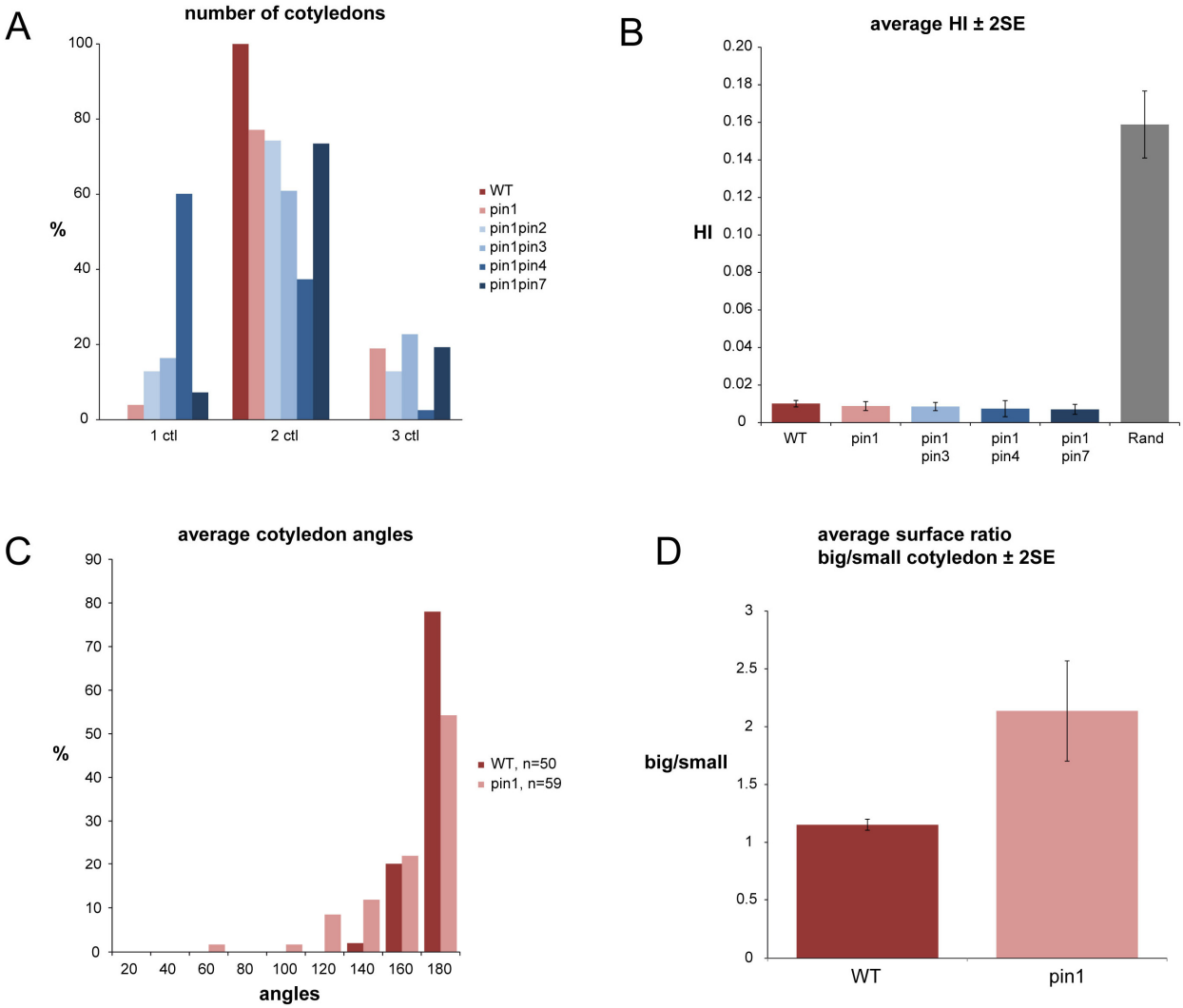


Supplememental Figure 2. There is no correlation between plastochron length and divergence angle in stage I wild type (n=461) or *pin1* (n=211) plants.



Supplemental Figure 3. PIN proteins are not upregulated in the *pin1* background.

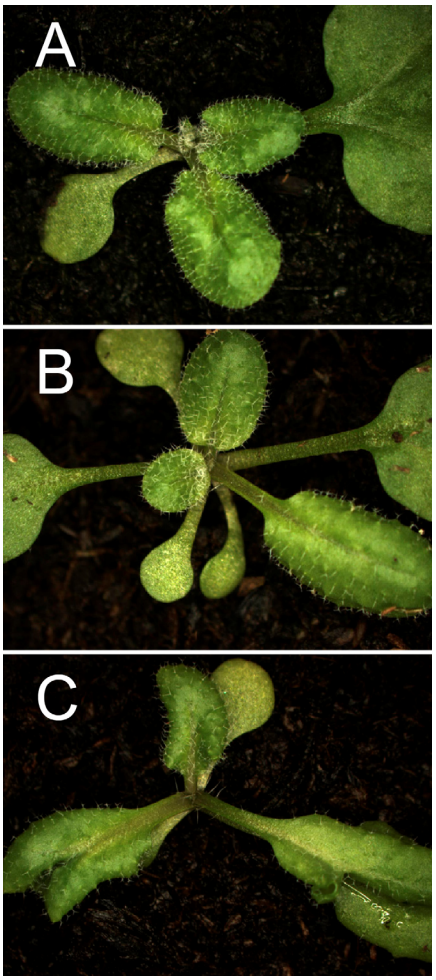
A to D, Expression patterns of PIN2-GFP (A), PIN3-GFP (B), PIN4-GFP (C), and PIN7-GFP (D) in stage I seedlings segregating for *pin1* did not differ from wild type. E to H, No expression of PIN2-GFP (E), PIN3-GFP (F), PIN4-GFP (G), and PIN7-GFP (H) was found in stage III *pin1* meristems. I to L, PIN2-GFP (I), PIN3-GFP (J), PIN4-GFP (K), and PIN7-GFP (L) were not found in *pin1* inflorescence meristems. M to O, PIN3-GFP*pin1* line showing ectopic expression of PIN3-GFP. In such lines, PIN3-GFP signal was sometimes found in stage I meristems (M, inset), as well an in the epidermis and vasculature of primordia of stage III meristems. Signal was also observed in a ring-shaped domain of mutant inflorescence meristems (O). P to R PIN3-GFP*pin1* lines with ectopic expression also showed signal in young primordia of stage III (P) and inflorescence (Q) meristems of plants with wild type phenotype. P, primordium; asterisk, meristem center. Scale bars: 50 µm.



Supplemental Figure 4. Multiple mutant phenotypes.

A, Number of cotyledons in wild type and mutant combinations. Seedlings with single cotyledons are more frequent in *pin1pin4*. *Pin1*: n = 153, *pin1pin2*: n = 70, *pin1pin3*: n = 110, *pin1pin4*: n = 198, *pin1pin7*: n = 83, WT: n = 60. B, Hofmeister indices of wild type and mutant combinations. All measured wild type and mutant plants have a similar mean HI (twofold standard error overlap, $p > 0.05$), but are clearly different from the random control (twofold standard error overlap, $p < 0.05$). C, average angles between cotyledons in wild type seedlings and dicotyledonous *pin1* seedlings. In average, mutants have smaller divergence angles between their

cotyledons (wild type average: 168°, 2xSE=3°; *pin1* average: 154°, 2xSE=7°). D, surface ratio of biggest to smallest cotyledon in wild type and dicotyledonous *pin1* seedlings. Mutants seedlings had a higher size difference than wild type (wild type average: 1.15, 2xSE 0.05; *pin1* average: 2.14, 2xSE 0.43).



Supplemental Figure 5. *pin1aux1lax1* mutants produce leaves.
A, *pin1-7* mutant 20 days after germination. B, *pin1-7aux1-21* double mutant 20 days after germination. C, *pin1-7aux1-21lax1* triple mutant 23 days after germination.