Table S1. Origins of marker lines

Marker	Ecotype	References and sources
ET1335	L*er*	Sundaresan et al., 1995; Cold Spring Harbor Laboratory
GT5211*	L*er*	Sundaresan et al., 1995; Cold Spring Harbor Laboratory
553-643**	C24	Goddijn et al., 1993; van den Berg et al., 1995; Mattsson et al., 1999
Athb8-GUS	Col-0	Baima et al., 1995
AtP5K1-GUS	C24	Elge et al., 2001
DR5-GUS	Col-0	Ulmasov et al., 1997
ET3845	L*er*	Sundaresan et al., 1995; ABRC stock centre (accession number CS25530)
GT525	L*er*	Sundaresan et al., 1995; ABRC stock centre (accession number CS25632)
GT2845	L*er*	Sundaresan et al., 1995; ABRC stock centre (accession number CS25649)
GT5978	L*er*	Sundaresan et al., 1995; ABRC stock centre (accession number CS25697)
GT6224	L*er*	Sundaresan et al., 1995; ABRC stock centre (accession number CS25725)
GT6644	L*er*	Sundaresan et al., 1995; ABRC stock centre (accession number CS25817)

*Line GT5211 was isolated in a large-scale gene trap insertional mutagenesis (Sundaresan et al., 1995). The insertion is presumed to disrupt the coding sequence of GATA transcription factor 5 (accession number At5g66320) (Jeong and Shih, 2003) (http://genetrap.cshl.org/Home.html), but we have not observed anatomical abnormalities in homozygous individuals.

**Line 553-643 has previously been reported to be expressed in the root vascular cylinder, including the most distal region of the prostele, as well as in the phloem of mature vascular strands (van den Berg et al., 1995; Mattsson et al., 1999).

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Table S2. Leaf development under different growth conditions

DAG	Leaf stage	Leaf shape	Leaf size ($\times 10^3 \mu m^2$)	Procambial status	Mesophyll differentiation	
					1st IA	2nd IA
Condition A						
2	0 DAI	semispherical (48/50)	0.61±0.01 (13)	none (50/50)	na	na
3	1 DAI	cylindrical (49/50)	3.00±0.21 (17)	1st order (46/50)	na	na
4	2 DAI	oval (42/50)	8.86±0.65 (14)	1st order (44/50)	na	na
5	3 DAI	oval (50/50)	17.94±1.00 (12)	2nd order 1st loop (41/50)	0/70	na
6	4 DAI	oval (50/50)	63.22±5.85 (10)	2nd order 2nd loop (36/50)	0/70	0/70
7	5 DAI	round (30/50)	349.99±26.55 (17)	2nd order 2nd loop (32/50)	66/70	0/70
8	6 DAI	round (38/50)	978.11±97.41 (14)	2nd order 3rd loop (34/50)	70/70	55/70
Condition B						
2	0 DAI	semispherical (50/50)	0.80±0.00 (10)	none (50/50)	na	na
3	1 DAI	cylindrical (50/50)	3.67±0.12 (16)	1st order (48/50)	na	na
4	2 DAI	oval (37/50)	8.52±0.78 (14)	1st order (40/50)	na	na
5	3 DAI	oval (46/50)	19.34±2.38 (12)	2nd order 1st loop (50/50)	0/70	na
6	4 DAI	oval (50/50)	96.65± 7.09 (15)	2nd order 2nd loop (35/50)	66/70	4/70
7	5 DAI	round (36/50)	308.63±35.20 (16)	2nd order 2nd loop (27/50)	70/70	62/70
8	6 DAI	round (42/50)	978.11±107.93 (14)	2nd order 3rd loop (42/50)	70/70	70/70
Condition C						
2	na	na	na	na	na	na
3	0 DAI	semispherical (44/50)	0.98±0.01 (18)	none (50/50)	na	na
4	1 DAI	cylindrical (50/50)	2.65±0.01 (20)	primary (47/50)	na	na
5	2 DAI	oval (42/50)	9.32±0.67 (12)	primary (33/50)	na	na
6	3 DAI	oval (50/50)	18.63±1.07 (14)	secondary 1st loop (39/50)	21/70	na
7	4 DAI	oval (40/50)	56.86±3.09 (14)	secondary 2nd loop (35/50)	68/70	33/70
8	5 DAI	round (42/50)	147.84±12.60 (12)	secondary 2nd loop (38/50)	70/70	70/70

Growth condition-dependent morphology of leaves evaluated by shape (defining DAI relative to DAG), size (determined from digital images using Image J 1.30 software), procambial status (referring to formation of particular procambial strands) and mesophyll differentiation (referring to the presence of mesophyll in particular IAs). Leaf size values as mean±s.e.m; number of samples is in parentheses. Other values in parentheses refer to the fraction of primordia displaying a particular feature. All observations are based on whole-mount preparations of Athb8-GUS-stained first leaves grown under the indicated conditions. Note that except for mesophyll differentiation, leaf development proceeds very similarly under all conditions between 0 DAI and 4 DAI, the phase critical for procambium formation. na, not applicable.