SUPPLEMENTARY DATA

FIG. S1. Root system (A–C) and inflorescences (D–G) of plants grown for 130 d and detail of the second youngest leaves from 16-d-old plants (H–J). Compared to the wild type (A), the *lrt1* root system (B) is less complex. Formation of crown root primordia from shoot-nodes in hydroponic cultivation was delayed and reduced by ~20% in *lrt1* (n = 6). Roots of *lrt1* were very fragile, with brownish zones frequently having decayed root tips (C, asterisks); seldom-formed LRs were short and many were severely curved. Scale bars = 400 mm. The homozygous *lrt1* plants were more susceptible to adverse environmental influences. In long-term hydroponics without sufficient aeration, plants were very susceptible to fungal attack of their root system, and were unable to survive deeper hypoxia of stagnant Hoagland solution supplied with 0.05% agar more than a few days (data not shown). Homozygous *lrt1* plants formed sterile inflorescences even in field conditions: (D, F) for the wild type, (E, G) for *lrt1*. In comparison with the wild type (H), mutant plants exhibited symptoms of nutrient deficiencies (I). Interestingly, such behaviour was even induced in plants of normal genotype grown in the same container with *lrt1* plants (J).

FIG. S2. Additional photographs of affected structure of *lrt1* LRP. Plants were cultivated for 16 d in aerated hydroponics. Mutant plants often developed groups of LRPs very close together (A, asterisks mark individual LRP) and with anomalously expanded cells (B, asterisks; arrow marks lignification). Fully-emerged mutant LR (C, asterisk marks LRP, arrows mark lignification), compared with the typical close root apical meristem structure in LR of the wild type (D). LRP before (E) and after (F) emergence. Scale bars = 100 µm.

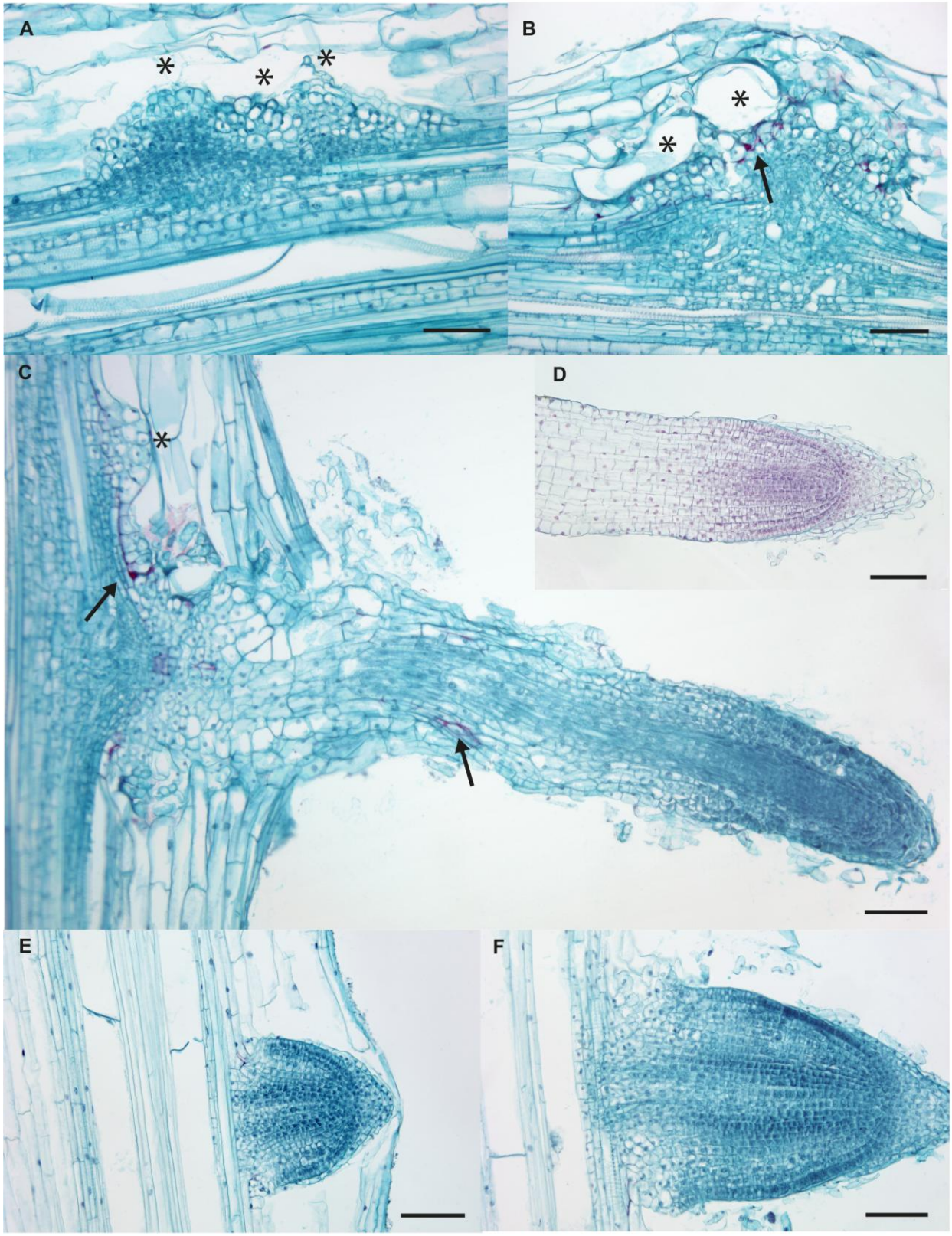

FIG. S3. Quantification of lignin using thioglycolic acid, followed by alkaline hydrolysis in adult plants from long-term hydroponic cultivation. Results are expressed as absorbance per dry weight of purified cell walls (g^{-1}). Older fully-differentiated parts of plants were sampled. Leaves, nodes, and internodes from the basal first quarter of the shoot length; adventitious nodal roots (ANR) were sampled from the first node above water level. LRs under the water level were divided into two groups - first order LRs (LR I.) and higher orders LRs (other LR). No significant differences were identified between *lrt1* and the wild type. Two-sample *t*-test, mean values ± s.e., $n = 4$.

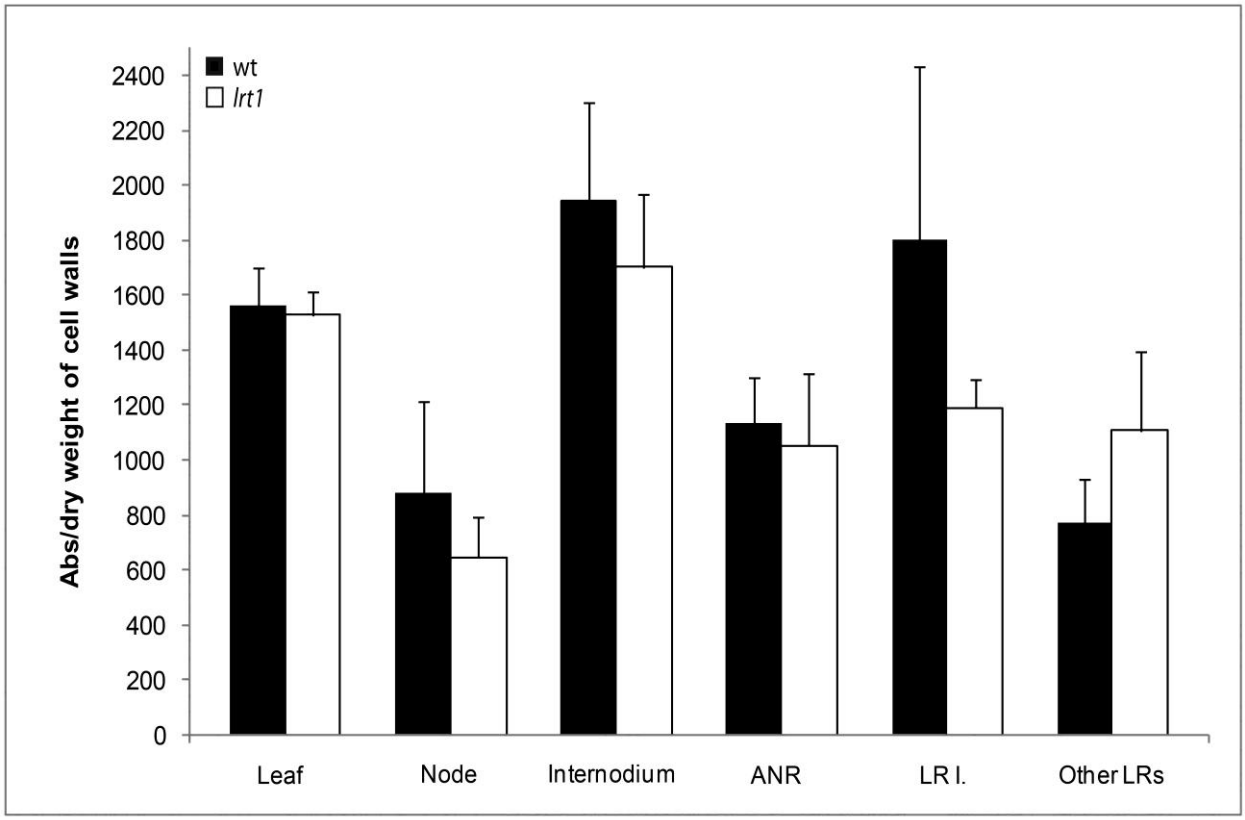

TABLE S1. Number of cortex layers, diameter of primary cortex and central cylinder (in mm ± s.e.) in the middle of the primary root of 16-d-old wild type and *lrt1*, under different cultivation conditions

		Number of cortex layers		Diameter of primary cortex		Diameter of central cylinder	
Moist paper	**wt**	6.3± *0.1*	-	98.8±*1.8*	*	160.0± *1.9*	-
	lrt1	6.6± *0.2*	-	106.4±*3.1*	*	161.9± *1.9*	-
Non-aerated hydroponics	**wt**	7.0± *0.1*	-	99.8±*1.6*	*	170.3± *2.1*	-
	lrt1	7.0± *0.2*	-	111.3±*3.9*	*	172.0± *1.7*	-
Aerated hydroponics	**wt**	5.8± *0.8*	*	76.4±*1.3*	**	161.6± *2.1*	**
	lrt1	6.3±*0.5*	*	114.9±*1.6*	**	177.6±*1.8*	**

two-sample t-test, * $P < 0.05$, ** $P < 0.01$; $n = 5$ (3 sections and 3 measurements per 1 root)

TABLE S2. Thickness of cell walls of metaxylem vessels, pericycle and pith (in mm ± s.s.). Samples were taken from a first- and third-quarter of primary root length of 16-d-old wild type and *lrt1* seedlings in hydroponics. Cell walls of metaxylem vessels, pericycle and pith were significantly thicker in *lrt1* roots, compared to the wild type. Thickness was measured on permanent sections. Three sections, with three measurements on every section, in every area

			Metaxylem vessels		Pericycle		Pith	
Non-aerated hydroponics[x]	¼	**wt**	0.82±*0.04*	**	1.09±*0.04*	**	0.81±*0.01*	**
		lrt1	1.42±*0.06*	**	1.50±*0.06*	**	1.67±*0.18*	**
	¾	**wt**	1.66±*0.09*	**	1.45±*0.05*	-	1.08±*0.22*	-
		lrt1	2.73±*0.09*	**	1.52±*0.06*	-	1.31±*0.23*	-
Aerated hydroponics[y]	¼	**wt**	1.26±*0.05*	**	1.25±*0.05*	**	1.83±*0.07*	**
		lrt1	3.28±*0.11*	**	2.07±*0.08*	**	2.71±*0.17*	**
	¾	**wt**	2.85±*0.07*	**	1.35±*0.05*	**	1.46±*0.25*	*
		lrt1	4.26±*0.09*	**	2.04±*0.07*	**	2.11±*0.16*	*

two-sample t-test, * $P < 0.05$, ** $P < 0.01$

[x] $n = 6$, [y] $n = 8$