Compared with TAIR

Locus_name)	Gene names (primary)	Gene names (synonym)	phenotype	pubmed_id	#Original Relation	#Covered Relation
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	During cFR irradiation, mutant seedlings were almost completely unresponsive compared to WT.	7630933		
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	No other significant differences from WT were detected in mutant seedlings in response to cR, cB, or cW.	7630933		
AT1G54990	AXR4		auxin resistant; irregular rosette leaves, slightly curled around leaf axis; roots elongate on auxin-containing medium; defective root gravitropism; reduced number of lateral roots	7704045		
AT1G54990	AXR4		auxin resistant; irregular rosette leaves, slightly curled around leaf axis; roots very auxin resistant; defective root gravitropism; reduced number of lateral roots; plant appearance similar to axr1-12, but more pronounced; dwarf, bushy plants; reduced plant height; reduced fertility.	7704045		
AT1G54990	AXR4		auxin resistant; narrow, irregular rosette leaves, slightly curled around leaf axis; roots elongate on auxin-containing medium; defective root gravitropism; reduced number of lateral roots - greater reduction than for either single mutant; dwarf, bushy plants; reduced plant height; ethylene resistant; reduced fertility.	7704045		
AT1G05180			auxin resistant; irregular rosette leaves, slightly curled around leaf axis; roots very auxin resistant; defective root gravitropism; reduced number of lateral roots; plant appearance similar to axr1-12, but more pronounced; dwarf, bushy plants; reduced plant height; reduced fertility.	7704045		
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	Callus-induced roots from the mutant displayed the mutant phenotype when they grew under restrictive conditions. All the mutants responded to a gravitropic stimulus in a manner similar to wild type although the change of the direction of growth was slower than wild type.	7743935	1	0
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	When grown on soil, the mutant exhibited reduced growth and smaller leaves.	7743935	1	1
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	When grown on media containing 0.5% sucrose, the mutant had reduced root length but no apparent radial cell expansion.	7743935	1	1
AT1G58250	SAB	HPS4 SABRE	Mutation causes abnormal cell expansion of the root cortical cell. A shift in the orientation of expansion from longitudinal to radial direction was observed in the roots by confocal microscopy. Mutation was partially rescued by adding ethylene biosynthesis inhibitors. Arial part of the mutant plants had visible leaf phenotype, with short wide leaves (including cotyledons) and shorter and wider petioles, when compared to wild type.	7867930		
AT1G66340	ETR1		Ethylene insensitive. Lacks triple-response phenotype when grown in the presence of ethylene.	8211181		
AT1G05180			Decrease in SCF^{TIR1} ligase activity.	8321287		
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	The responsiveness of the mutant to increasing fluence rates of Rc was essentially identical to the wild type.	8400877		
AT1G68890	PHYLLO		Pale green plants	8717135		
AT1G31480	SGR2		Inflorescence stem failed to curve upward even after 6 h of horizontal gravistimulation. Plant size not affected in this mutation, inflorescence stem twisted as the elongated, and the lateral branches twisted downward. Reduced gravitropic response of ethyolated hypocotyls. Root gravitropism was normal.	8819871		
AT1G16540	ABA3	ABA DEFICIENT 3 ACI2 ALTERED CHLOROPLAST IMPORT 2 ATABA3 ATLOS5 LOS5 LOW OSMOTIC STRESS 5 MOLYBDENUM COFACTOR SULFURASE SIR3 SIRTINOL RESISTANT 3	abscisic acid deficient, reduced level of endogenous ABA during various stages of plant and seed development, but relatively higher ABA content than other aba mutants; impaired in ABA biosynthesis, blocking the conversion of ABA-aldehyde to ABA; increased leaf transpiration rate, but relatively low rate of water loss than other aba mutants, which leads to a slightly wilty phenotype especially under low relative humidity and water stress; wilty phenotype can be restored to normal by spraying an ABA solution to the plants; reduced seed dormancy, fresh seeds germinate at high frequency, germinate in silique on plant at high relative humidity; decreased sensitivity to the presence of GA biosynthesis inhibitors such as paclobutrazol; reduced sensitivity to salt and osmotic stress during germination.	8893542		
AT1G12360	KEU		Mutant keule embryos have large multinucleate cells with gapped or incomplete cross walls, as well as cell wall stubs that are very similar to those observed upon caffeine inhibition of cytokinesis in plants. Slower cell division. The planes of cell division are often misoriented. keule mutants die as seedlings with large polyploid cells.	9003313		
AT2G01940	SGR5	IDD15	Inflorescence stems of mutant plants showed abnormal gravitropic response, while gravitropism in hypocotyls and roots was not altered.	9210330		
AT2G01570	RGA	GRS RGA1	Early flowering compared to wild type.	9215910		
AT2G01570	RGA	GRS RGA1	No increase of germination or restoration of male fertility compared to the single ga1-3 mutant.	9215910		
AT2G01570	RGA	GRS RGA1	Partially restored stem height (59% of Ler wild type).	9215910		
AT2G01570	RGA	GRS RGA1	Rescue of the nonflowering phenotype of ga1-3.	9215910		
AT2G01570	RGA	GRS RGA1	Much reduced fertility compared to wild type Ler.	9215910		
AT2G01570	RGA	GRS RGA1	Reduced pollen levels than wild type Ler and filaments shorter than carpels.	9215910		
AT2G01570	RGA	GRS RGA1	Stems are 35% taller than that of wild type Ler.	9215910		
AT2G01570	RGA	GRS RGA1	Early flowering.	9215910		
AT2G01570	RGA	GRS RGA1	Longer carpels than those of the ga1-3 single mutant.	9215910		
AT2G01570	RGA	GRS RGA1	Stems are 32% taller than that of wild type Ler.	9215910		
AT1G34790			Early flowering compared to wild type.	9215910		
AT1G34790			The initiation of abaxial trichomes occurs marginally earlier than those of wild type Ler.	9215910		
AT1G34790			Much reduced fertility compared to wild type Ler.	9215910		
AT1G34790			Reduced pollen levels than wild type Ler and filaments shorter than carpels.	9215910		
AT1G34790			Stems are 35% taller than that of wild type Ler.	9215910		
AT1G14920	GAI	RGA2	Early flowering compared to wild type.	9215910		
AT1G14920	GAI	RGA2	The initiation of abaxial trichomes occurs marginally earlier than those of wild type Ler.	9215910		
AT1G14920	GAI	RGA2	No bolting.	9215910		
AT1G14920	GAI	RGA2	No increase of germination or restoration of male fertility compared to the single ga1-3 mutant.	9215910		
AT1G14920	GAI	RGA2	Rescue of the nonflowering phenotype of ga1-3.	9215910		
AT1G14920	GAI	RGA2	Much reduced fertility compared to wild type Ler.	9215910		
AT1G14920	GAI	RGA2	Reduced pollen levels than wild type Ler and filaments shorter than carpels.	9215910		
AT1G14920	GAI	RGA2	Stems are 35% taller than that of wild type Ler.	9215910		
AT1G14920	GAI	RGA2	Early flowering.	9215910		
AT1G14920	GAI	RGA2	Longer carpels than those of the ga1-3 single mutant.	9215910		
AT1G14920	GAI	RGA2	Stems are 32% taller than that of wild type Ler.	9215910		
AT2G02480			Trichomes have two branch points.	9367433		
AT2G02480			Partial suppression of the strong sti-EMU phenotype resulting in sta-like trichomes.	9367433		
AT2G02480			Trichomes have one branch point resting on a long stalk.	9367433		
AT2G02480			Most trichomes do not develop any branch points.	9367433		
AT2G02480			Larger but unbranched trichome cells compared to wild type.	9367433		
AT1G01510	AN	DOQ	Reduced, but still significant, number of branched trichomes.	9367433		
AT1G01510	AN	DOQ	Trichomes have only one branch point.	9367433		
AT1G48410	AGO1		Heterozygous parents and progeny are indistinguishable from wild type.	9427751	1	1
AT1G48410	AGO1		Homozygous progeny has unexpanded pointed cotyledons and very narrow rosette leaves.	9427751	1	1
AT1G48410	AGO1		The homozygous progeny is self-sterile.	9427751	1	1

AT1G02580	MEA	EMB173 EMBRYO DEFECTIVE 173 FIS1 MEDEA SDG5	In the homozygous progeny: During early stages of embryogenesis the development of mea-1 embryos is indistinguishable from wild-type siblings in cleared or sectioned specimens. Visible differences between wild-type and mea-1 embryos began at the late globular stage. Globular mea-1 embryos show excess cell proliferation and enlarge radially symmetrical. When wild-type embryos reach the mid to late heart stage, sibling mea-1 embryos are still globular and contain small vacuolated cells with curvilinear cell walls and sometimes irregular cell divisions in the ground tissue and procambium. Suspensor and hypophysis are normal, and cotyledons initiate synchronously as in the wild type. Thus, despite increased cell proliferation and occasional irregular cytokinesis, morphogenetic progression is normal. However, each stage is prolonged and includes more division cycles, and morphogenesis is delayed. As a consequence, giant heart stage mea-1 embryos are present along with late torpedo or cotyledonary stage wild-type embryos. mea-1 heart stage embryos have supernumerary cell layers. When wild-type siblings are fully differentiated, most mea-1 embryos have reached the late heart stage and are up to 10 times larger than normal. mea embryos degenerate during desiccation. These results suggest that mea controls cell proliferation during embryogenesis, allowing morphogenesis to progress normally, albeit slowly. Endosperm development in mea-1 seeds is indistinguishable from that of the wild type at early stages. When cellularization begins normally in wild-type seeds at the transition from the globular to the heart stage, no cellularization is observed in sibling mea-1 seeds. Although nuclear divisions take place more slowly in mea-1 endosperm, the distribution of endosperm nuclei is as in the wild type. Partial cellularization occurs at the micropyle when mea-1 embryos reach the late heart stage in desiccating seeds, but because fewer nuclei have been generated, most of the centra	9545225	3	3
AT1G02580	MEA	EMB173 EMBRYO DEFECTIVE 173 FIS1 MEDEA SDG5	The homozygous progeny is embryo-lethal.	9545225	1	1
AT1G02580	MEA	EMB173 EMBRYO DEFECTIVE 173 FIS1 MEDEA SDG5	Similar to non-revertant mea-1 mutant.	9545225	1	1
AT1G08550	NPQ1	ARABIDOPSIS VIOLAXANTHIN DE-EPOXIDASE 1; AVDE1; F22013.3; F22013_3; non-photochemical quenching 1; VIOLAXANTHIN DE-EPOXIDASE PRECURSOR	altered nonphotochemical quenching of chlorophyll fluorescence; unable to convert violaxanthin to zeaxanthin in excessive light via the xanthophyll cycle; affects the structural gene encoding violaxanthin deepoxidase; exhibits greatly reduced nonphotochemical quenching. demonstrating that violaxanthin deepoxidation is required for the bulk of rapidly reversible nonphotochemical qenching; altered regulation of photosynthetic energy conversion is associated with increased sensitivity to photoinhibition.	9668132	5	0
AT1G08550	NPQ1	ARABIDOPSIS VIOLAXANTHIN DE-EPOXIDASE 1; AVDE1; F22013.3; F22013_3; non-photochemical quenching 1; VIOLAXANTHIN DE-EPOXIDASE PRECURSOR	Mutants does not convert violaxanthin to antheraxanthin and zeaxanthin during exposure to high light.	9668132	1	0
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Adult plants wilt under dessicating conditions.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	After bolting, the wilty phenotype became evident in the shoot apex, cauline leaves and immature siliques of this mutant. This phenotype was partially restored by application of 10 μM ABA to rosette leaves.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Endogenous ABA levels in fresh and dehydrated tissues of the mutant were about 23% and 2.4%, respectively, of those of the wild type plants.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Endogenous levels of 12 amino acids were at least 2-fold greater in wild-type than in the mutant plants after 18 h dehydration. Amino acids that exhibited marked increases were leucine (152-fold), isoleucine (95-fold), proline (83-fold) and valine (25-fold). Aspartic acid was the only amino acid which showed a significant reduction in wild-type plants during dehydration. In dehydrated tissues of the mutant, 9 amino acids increased more than 2-fold during dehydration, however the increases in the mutant plants were less pronounced than those in wild-type plants. Glycine and alanine showed greater increases in comparison to wild type, whereas the levels of glutamic acid and aspartic acid showed a reduction in the mutant during dehydration.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Free amino acid levels in fresh tissues of the mutant plants at 30 DAI were similar to those in wild type, however the level of proline in the mutant plants was 4-fold higher than that in wild type.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Seeds have a reduced dormancy.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	The mutant embryos are morphologically normal, although mature embryos are more yellow compared to white wild-type embryos.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	The mutant has smaller rosette leaves and mature plants are not yellowish as has been reported for abal mutants.	9787459		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Under the reported growth conditions, approximately 10% of the dark germinated seedlings of the mutant produced true leaves. The dark germinated seedlings of the mutant did not show further growth even after a prolonged period of darkness.	9787459		
AT1G02090	FUS5	ATCSN7 COP15 COP9 SIGNALOSOME SUBUNIT 7 CSN7 FUSCA 5	Dark-grown mutants exhibit short hypocotyls and open, expanded cotyledons similar to light-grown mutant and wild-type seedlings, and accumulate high levels of anthocyanin. In addition, mutants develop chloroplasts in the dark, express high levels of light-inducible genes, although grown in darkness, and die after the seedling stage in light and darkness.	10330469	2	1
AT1G02090	FUS5	ATCSN7 COP15 COP9 SIGNALOSOME SUBUNIT 7 CSN7 FUSCA 5	In the homozygous progeny, dark purple seeds.	10330469	1	1
AT1G02090	FUS5	ATCSN7 COP15 COP9 SIGNALOSOME SUBUNIT 7 CSN7 FUSCA 5	Mutation is lethal in the homozygous state.	10330469	1	0
AT1G02090	FUS5	ATCSN7 COP15 COP9 SIGNALOSOME SUBUNIT 7 CSN7 FUSCA 5	In the homozygous progeny, anthocyanin accumulation (purple coloration) in the cotelydons of developing embryos.	10330469	1	1
AT1G75010	ARC3		Defective in chloroplast accumulation and division. Reduced number of chloroplasts and affected division plane in chloroplast biogenesis. Highly enlongated and multiple arrayed chloroplasts in developing green tissues. Mutant proteins do not form homodimers, as wt proteins do, and localize aberrantly inside chloroplasts.	10417716	4	3
AT1G22770	GI		Delayed flowering.	10469647	1	1
AT1G69180			Development of ectopic ovules with random distribution: 1 to 10 per gynoecium.	10535738		
AT1G69180			Grow more slowly than wild type, flower 10-14 days later, have reduced organ sizes, exhibit slight epinasty of their leaves and flowers, and display reduced apical dominance.	10535738		
AT1G69180			In double mutant carpels, two rows of primordia arise, extending along the length of the ovary, most of which subsequently develop into ovules (mostly morphologically abnormal).	10535738		
AT1G01040	DCL1	ABNORMAL SUSPENSOR 1 ASU1 ATDCL1 CAF CARPEL FACTORY DICER-LIKE 1 dicer-like 1 EMB60 EMB76 EMBRYO DEFECTIVE 60 EMBRYO DEFECTIVE 76 SHORT INTEGUMENTS 1 SIN1 SUS1 SUSPENSOR 1	indeterminate floral meristems, producing extra whorls of stamens and an indefinite number of carpels; unregulated cell division in the center of the flower with normal floral organ identity; plants also show other developmental defects including absence of axillary inflorescence meristems and abnormally shaped cotyledons, leaves, sepals, stamens and carpels	10556049		
AT2G02480			Exclusively produces unbranched trichomes.	10572032		
AT1G80350	KATNA1		Although more than 60% of the double mutant have two trichome branches, at least 30% are unbranched.	10572032		
AT1G80350	KATNA1		About 60% of the trichomes are two-branched.	10572032		
AT1G80350	KATNA1		Decreased fertility compared to wild type.	10572032		
AT1G80350	KATNA1		Reduced trichome branching	10572032		
AT1G80350	KATNA1		Predominantly produces unbranched trichomes.	10572032		
AT1G80350	KATNA1		Grows more slowly than wild type; produces abnormally short and bushy bolts at the time of flowering.	10572032		
AT1G80350	KATNA1		Double mutant has approximately the same proportion of two-branched and unbranched trichomes as the gl-3 single mutant.	10572032		
AT1G80350	KATNA1		Double mutants have more trichome branches than frc single mutant but fewer than nok single mutant.	10572032		
AT1G80350	KATNA1		Produces mostly two-branched trichomes.	10572032		
AT1G80350	KATNA1		Exclusively produces unbranched trichomes.	10572032		
AT1G80350	KATNA1		Produces less two-branched trichomes (~40%) than the frc single mutant.	10572032		
AT1G01510	AN	DOQ	Predominantly produces unbranched trichomes.	10572032		
AT1G44575			The mutant is defective specifically in the qE component of NPQ. However, it exhibites zeaxanthin synthesis in high light that is indistinguishable in extent and kinetics from that of the wild type.	10667783		

AT1G24260	SEP3	AGAMOUS-like 9; AGL9; F3I6.19; F3I6_19; SEPALLATA3; TRANSCRIPTION FACTOR AGL9	All flower organs resemble sepals. The second whorl has four green sepal-like organs (instead of four white petals) which are differentiated of interspersed stomata and the conversion of nearly all of the cells into sepal cells. Sepals replace stamens in the third whorl. The fourth whorl is a reiteration of whorls 1, 2 and 3.	10821278	1	1
AT1G02340	HFR1	FBI1 LONG HYPOCOTYL IN FAR-RED REP1 RSF1	Fluence response curves in both R and FR light confirmed that rsf1 seedlings responded normally to R light and are less sensitive to all the tested fluences of FR light. However, unlike phyA null mutants (phyA-211), they clearly responded to increasing fluences of FR light.	10982420	1	0
AT1G02340	HFR1	FBI1 LONG HYPOCOTYL IN FAR-RED REP1 RSF1	Hypocotyl elongation is less inhibited than in wild-type plants in both FR and blue light. Hypocotyl length in rsf1 seedlings was intermediate between the wild type and a photoreceptor null mutant under both light conditions.	10982420	1	0
AT1G02340	HFR1	FBI1 LONG HYPOCOTYL IN FAR-RED REP1 RSF1	In short days (SD), flowering time is unaffected. rsf1 plants were indistinguishable from wild type both in LD and SD using two criteria to measure flowering time (days until flowering and leaf number at flowering).	10982420	1	0
AT1G02340	HFR1	FBI1 LONG HYPOCOTYL IN FAR-RED REP1 RSF1	rsf1 mutants accumulated slightly, but significantly lower, levels of anthocyanins than the wild type.	10982420	1	0
AT1G48410	AGO1		The homozygous progeny has unexpanded cotyledons, narrow leaves, and a unique stem with abnormal inflorescences bearing infertile flowers.	11016954	1	1
AT1G48410	AGO1		The homozygous progeny is self-sterile.	11016954		
AT1G65620	LBD6	AS2	asymmetric and lobed rosette leaves, leaf edges curl under irregularly.	11076771		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Absence of periclinal cell divisions in the primary root meristem.	11114883	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Decreased number of vascular initials.	11114883	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Defect in cell division in the root and lower hypocotyl region soon after the embryo torpedo stage.	11114883	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Reduced cell number and exclusive xylem differentiation within the root vasculature.	11114883	2	2
AT1G09700	HYL1	ATDRB1 DRB1 DSRNA-BINDING PROTEIN 1 HYPONASTIC LEAVES 1	Altered vegetative morphology and response to hormones	11148283	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Resistant to cytokinin in root elongation assay and in callus growth and shoot formation assays.	11234017	1	0
AT1G65260	PTAC4	plastid transcriptionally active 4; T8F5.2; T8F5_2; VESICLE-INDUCING PROTEIN IN PLASTIDS 1; VIPP1	deficient in photosynthesis, thylakoid membrane system degraded.	11274447	1	0
AT1G69770	CMT1	chromomethylase 1; CHROMOMETHYLASE 1; DMT4; DNA METHYLTRANSFERASE 4; F23A5.9; F23A5_9	Wild type morphology; exhibits decreased CpXpG methylation of the Superman (SUP) gene and of other sequences throughout the genome; also show reactivated expression of endogenous retrotransposon sequences; encodes a cytosine methyltransferase homolog.	11349138	4	4
AT1G69770	CMT1	chromomethylase 1; CHROMOMETHYLASE 1; DMT4; DNA METHYLTRANSFERASE 4; F23A5.9; F23A5_9	Derepression of SUP gene silencing (induced by clk-st), leading to plants with a wildtype floral phenotype.	11349138	1	1
AT1G69770	CMT1	chromomethylase 1; CHROMOMETHYLASE 1; DMT4; DNA METHYLTRANSFERASE 4; F23A5.9; F23A5_9	Partial derepression of SUP gene silencing (induced by clk-st), leading to plants with a wildtype floral phenotype.	11349138	1	1
AT1G69770	CMT1	chromomethylase 1; CHROMOMETHYLASE 1; DMT4; DNA METHYLTRANSFERASE 4; F23A5.9; F23A5_9	Methylation pattern similar to that observed with the cmt3-7 mutant.	11349138	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Growth severely affected during reproductive growth phase: onset of flowering varies with each individual plant.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Leaf shape slightly altered: longitudinal length of blade more affected than lateral length. Impaired leaf vasculature.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Leaves expand more slowly than those of wildtype controls.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Postembryonic growth of roots (primary and lateral) severely impaired.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Reduced seedling size with small cotyledons, slightly shortened hypocotyls (65% of wildtype) and significantly reduced root length.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Addition of IAA to the medium completely inhibits root elongation, indicating normal auxin responsiveness.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No significant phenotype in shoot organs.	11479382		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Root elongation not severely inhibited by cytokinins.	11479382		
AT1G27320	AHK3	ORE12	Strong cytokinin-insensitive phenotype.	11479382		
AT1G27320	AHK3	ORE12	Growth severely affected during reproductive growth phase: onset of flowering varies with each individual plant.	11479382		
AT1G27320	AHK3	ORE12	Leaf shape slightly altered: longitudinal length of blade more affected than lateral length. Impaired leaf vasculature.	11479382		
AT1G27320	AHK3	ORE12	Leaves expand more slowly than those of wildtype controls.	11479382		
AT1G27320	AHK3	ORE12	Postembryonic growth of roots (primary and lateral) severely impaired.	11479382		
AT1G27320	AHK3	ORE12	Reduced seedling size with small cotyledons, slightly shortened hypocotyls (65% of wildtype) and significantly reduced root length.	11479382		
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	Glucose 3-phosphate level is about one-fourth of that of wild type.	11487701	1	0
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	Glucose 6-phosphate level is about one-fourth of that of wild type.	11487701	1	0
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	Slight increase in the number of short chains (DP 10 to 24) and decrease in that of longer chains (DP 31 to 46) in mutant starch.	11487701	1	0
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	starch overproducer.	11487701	1	1
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	Glucose 6-phosphate level is below detection limits.	11487701	1	0
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	Glucose 3-phosphate level is below detection limits.	11487701	1	0
AT1G10760	SEX1	GWD; GWD1; SOP; SOP1; STARCH EXCESS 1; T16B5.10; T16B5_10	Glucose 6-phosphate levels are very close to the detection limits. It can therefore not be excluded that a low residual Glc6P content is present.	11487701	1	0
AT1G74310	HSP101	ATHSP101 heaT shock proTein 101 HEAT SHOCK PROTEIN ATHSP101 HOT1	Defective in acquired thermotolerance. Plant growth and development, seed set and fertility, and germination of harvested seeds are the same as wild type in the absence of stress (normal growth conditions).	11489180	3	3
AT1G03475	CPX1	CPO HEMF HEMF1 LIN2	Plant have pale green leaves and develop lesions on the young leaves. Lesions begin as a small spot or stripe of collapsed tissue usually appearing in the middle part of the young leaves.	11489187	1	1
AT1G69180			Ectopic adaxial tissues are restricted to the medial domain of the carpels, normally occupied by the abaxial replum. Formation of external ovule-bearing placentae.	11525739		
AT1G32240	KAN2	KANADI 2	Cotyledons are narrow, cup-shaped and point upward. Leaves are narrow, dark green and develop ectopic outgrowths on their abaxial side only. Four to six stipules, rather than two, develop at the base of each leaf, surrounding its entire circumference. Stems fail to elongate upon flowering. Floral organ morphology is highly abnormal. Mature ovules have reduced outer integuments. Aberrant positioning of cell types, primarily along the adaxial/abaxial lateral organ axis.	11525739		
AT1G32990	PRPL11		Mutant plants had pale-green cotyledons and leaves.	11532164	1	1
AT1G32990	PRPL11		Relative decrease the effective quantum yield of PSII (ΦII).	11532164	1	1
AT1G32990	PRPL11		Under optimal greenhouse conditions, the size and growth rate of the mutant were reduced by up to 75% relative to wild-type. Furthermore, an average delay of about 5 days in flowering time was observed for mutant plants.	11532164	1	1

AT1G28300	LEC2		Mutant seeds were not desiccation tolerant (unlike lec1), instead, 50-80% were desiccation intolerant, those that survived and germinated had cotyledons with trichomes on the adaxial surface. Embryos had abnormal suspensors, and precociously activated shoot apical meristem.	11573014	1	6
AT2G01570	RGA	GRS RGA1	Does not produce seeds.	11717468	1	1
AT2G01570	RGA	GRS RGA1	Extreme dwarf phenotype.	11717468	1	1
AT2G01570	RGA	GRS RGA1	No bolting.	11717468	1	0
AT2G01570	RGA	GRS RGA1	Unresponsive to GA treatment in leaf expansion or stem growth.	11717468	1	1
AT2G01570	RGA	GRS RGA1	Produces seeds.	11717468	1	1
AT2G01570	RGA	GRS RGA1	Semi-dwarf phenotype.	11717468	1	1
AT1G74710	ICS1		Reduced SA accumulation in response to pathogens, reduced pathogenesis-related gene expression, and enhanced susceptibility to pathogens.	11734859	1	1
AT1G64060	RBOHF	RBOHAP108	DAB staining (H2O2 visualization) greatly reduced compared to wild-type.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Four-weeks old plants have necrotic lesions and callose deposition.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Reduced localized cell death compared to wild-type.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Smaller than wild-type.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Some plants stop growing and die before setting seeds.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Diminution of ion leakage (greater even than that of atrbohD).	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Morphologically normal but slightly smaller than wild-type.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	No change in pattern of DAB staining (H2O2 visualization) compared to wild-type.	11756663	1	1
AT1G64060	RBOHF	RBOHAP108	Same phenotype as atrbohF-F3.	11756663	1	1
AT1G43850	SEU		Defective in floral organ identity and organ number; late-arising flowers exhibited more severe phenotypes than early-arising flowers; in the late-arising flowers, the organ number in whorls 2 and 3 is reduced; on average, only 3 organs are found in whorl 2, and 5 organs in whorl 3; 7% of whorl 1 organs display partial homeotic transformation and possess sepal/petal or sepal/carpel mosaics; whorl 2 organs are most often narrow petals, but stamenoid petals were occasionally observed; alternatively, petals can be replaced by filamentous or tubular structures; whorl 3 stamens are typically reduced slightly in size; the whorl 4 gynoecium is often slightly split at the top; sometimes, horn-like protrusions are seen at the gynoecium apex. Narrow floral organs; narrow leaves; reduced plant height (semi dwarf); increased lateral branching; reduced number of seeds per silique.	11782418	6	4
AT1G43850	SEU		Enhanced flower phenotype compared with both single mutant plants, reduction in floral organ number and enhanced carpelloidy of whorl 1 organs, whorl 2 organs are completely absent. Deregulation of AG and AP3 expression in floral meristem and floral organ primordia.	11782418	2	2
AT1G64520	RPN12A		The rpn12a-1 mutant produces both the WT RPN12a protein and a RPN12a(1-186):ARP(exon2):NPTII fusion protein. The mutant form of the protein can coelute with subunits of the 26S proteasome from the regulatory and core particles and there is no increase in total steady state levels of ubiquitinated proteins in homozygous mutant seedlings. This mutant has seedling growth defects, elevated anthocyanin levels, abnormal leaf root development, delayed skotomorphogenesis, altered cytokinin responses, and reduced auxin sensitivity in their roots.	11826296	7	7
AT1G31480	SGR2		Abnormal gravitropism in inflorescence stems and hypocotyls. Some mutant seeds were shrunken and did not germinate. Although most seedlings were normal, some had abnormal shape, ofthen with one or three cotyledons.	11826297	3	2
AT1G31480	SGR2		abnormal gravitropic response	11826297	1	1
AT1G78580	TPS1		In contrast to the embryo, the endosperm of homozygous seeds developed normally up until seed maturation. During this period starch accumulated transiently in the endosperm cells of both the mutant and wild type. In desiccating homozygous seeds gaps were observed in the aleurone, a persistent layer of the endosperm. These cells appeared devoid of their endoplasm.	11851922	3	2
AT1G78580	TPS1		In the heterozygote plants, embryos from a single silique were essentially indistinguishable early in the morphogenic phase of development. However, beyond the heart stage a segregation ratio emerged as approximately 25% of the seeds began to develop more slowly. Development was progressively retarded, eventually arresting at the torpedo stage.	11851922	1	1
AT1G78580	TPS1		The homozygous progeny is embryo-lethal.	11851922	1	1
AT1G01510	AN	DOQ	Trichomes of mutant undergo primary but not secondary branching.	11889034	1	1
AT1G01510	AN	DOQ	Unbranched trichomes.	11889034	1	1
AT1G48410	AGO1		Homozygous mutants initiated flowering 7 to 12 days after the wild type and were fertile: they produced 45 to 60% of the amount of seed of the wild type.	11910010	1	0
AT1G48410	AGO1		Mutants develop rosettes with dark green and serrated leaves. Rosette size is intermediate between that of stronger alleles and wild-type plants.	11910010	2	2
AT1G48410	AGO1		Homozygous mutant develop a small rosette with dark green and serrated leaves, initiates flowering 10 to 15 days after the wild type, and is almost totally sterile, although occasionally it produces short siliques containing two to five seed.	11910010	1	1
AT1G48410	AGO1		The homozygous progeny is self-sterile.	11910010	1	1
AT1G48410	AGO1		Homozygous plants are completely deficient for post-transcriptional gene silencing.	11910010	1	1
AT1G16970	KU70		Hypersensitive to ionizing radiation and chemical mutagens	12032094	1	1
AT1G55670	PSAG		Complete loss of PSI-G in thylakoids.	12068106	1	1
AT1G55670	PSAG		Decrease in mean size.	12068106	1	1
AT1G55670	PSAG		Germination of mutant seeds was not affected and visual inspection did not reveal any drastic change in phenotype compared with WT plants, except for a slightly lighter pigmentation.	12068106	1	1
AT1G55670	PSAG		The Chl a/b ratio was slightly reduced.	12068106	1	1
AT1G55670	PSAG		The level of the xanthophyll cycle pigments (VAZ-pool) was higher than in WT plants.	12068106	1	1
AT1G55670	PSAG		The total Chl content (Chla and Chlb) was decreased by about 25% compared to wild type.	12068106	1	1
AT1G55670	PSAG		Under long-day conditions, mutant plants flowered 8 d later than wild type.	12068106	1	1
AT1G55670	PSAG		Double mutants were intermediate in mean size when compared with the corresponding single mutants.	12068106	1	1
AT1G55670	PSAG		No drop in total Chl levels.	12068106	1	1
AT1G55670	PSAG		Increase in the Chl a/b ratio.	12068106	1	1
AT1G52230	PSAH2		Double mutants were intermediate in mean size when compared with the corresponding single mutants.	12068106	1	0
AT1G52230	PSAH2		No drop in total Chl levels.	12068106	1	0
AT1G52230	PSAH2		The level of the xanthophyll cycle pigments (VAZ-pool) was higher than in WT plants.	12068106	1	0
AT1G52230	PSAH2		70% of the WT level of PSI-H is still present in mutant plants.	12068106	1	0
AT1G52230	PSAH2		Mutant plants were, in average, larger than the WT.	12068106	1	0
AT1G52230	PSAH2		Under long-day conditions, mutant plants flowered 3 d earlier than wild type.	12068106	1	0
AT1G30380			Double mutants were intermediate in mean size when compared with the corresponding single mutants.	12068106	1	0
AT1G30380			Germination of mutant seeds was not affected and visual inspection did not reveal any drastic change in phenotype compared with WT plants, except for a slightly lighter pigmentation.	12068106	1	0
AT1G30380			Increase in the Chl a/b ratio.	12068106	1	0
AT1G30380			No drop in total Chl levels.	12068106	1	0
AT1G30380			The level of the xanthophyll cycle pigments (VAZ-pool) was higher than in WT plants.	12068106	1	0
AT1G30380			Decrease in mean size.	12068106	1	0
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Unstressed leaves contain ~20 to 25% of wild type levels of ABA.	12172025	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Can germinate and perform early growth under high-salt concentration that are inhibitory for wild type seeds.	12172025	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Mutant plants are more sensitive to salt stress at later stages of development and are killed by prolonged exposure to 100 mM NaCl or 200 mM mannitol, whereas wild type plants survive.	12172025	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Seeds are more tolerant of osmotic stress at germination than wild type seedlings.	12172025	1	1

AT1G21970	NFYB9	LEC1	Embryo lethal; viviparous embryos with cotyledons partially transformed into leaves; embryos sensitive to abscisic acid; embryos have reduced hypocotyl, cotyledons that remain green late in development; reduced protein and lipid bodies with starch being predominant storage product in mutant embryos. Trichomes form on cotyledons after germination; internal cells of cotyledons enlarge, vacuolate and resemble leaf mesophyll cells; intercellular spaces are prominant in cotyledons; enlarged shoot apical meristem; stomata are found on surface of cotyledons of mutant embryos; mature seeds are desiccation intolerant, however, immature seeds can be rescued before silique drying and germinated to produce seedlings. Root apex is active in viviparous seeds; immature mutant embryos germinated prior to desiccation produce plants that appear normal for other characteristics.	12244233		
AT1G28300	LEC2		Embryo lethal, embryos not viviparous, cotyledons partially transformed into leaves, complex vascular pattern observed in cotyledons. Embryos are sensitive to abscisic acid. Mutant seeds were usually desiccation tolerant at maturity, although their viability was reduced slightly after several weeks of storage. Dry seeds often germinated to produce seedlings with distorted cotyledons. This defect resulted from degeneration of cotyledon tips prior to germination. Some trichomes form on cotyledons after germination and stomata are found on surface of cotyledons of mutant embryos The cotyledon surface on seedlings produced from dry seeds lacked trichomes (likely because any trichomes initiated during embryogenesis did not survive desiccation). Mutant seeds were consequently highly pigmented at maturity and anthocyanins were especially prominent in the top half of the mutant cotyledons. Mutant embryos do not form roots during the first 48 hours of culture. The pattern of storage product accumulation was altered, the hypocotyl was filled with mature protein bodies, while the cotyledons exhibited a gradient of starch and protein accumulation. Cells in the top half of mutant cotyledons were highly vacuolated, packed with starch grains, and lacked mature protein bodies, whereas cells closer to the hypocotyl contained less starch but many protein bodies. The accumulation of lipid bodies during embryogenesis was unusual too: distribution of lipid bodies was highly abundant in the hypocotyls of the mutant plants.	12244265		
AT1G28300	LEC2		strongly impaired ability to induce somatic embryos in vitro	12244265		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	In the presence of kinetin, lateral root formation is not greatly inhibited, even at high concentrations.	12410813	1	1
AT1G64440	UGE4	REB1 RHD1	Decrease root length (54% of that of wildtype) when grown on D-galactose-free medium.	12419184		
AT1G64440	UGE4	REB1 RHD1	Decreased root length (67% of that of wildtype) when grown on D-galactose-free medium.	12419184		
AT1G77760	NIA1		ABA inhibits stomatal opening in nia1 nia2 as in the wild type, revealing that not all stomatal responses to ABA are reduced.	12446847	1	1
AT1G77760	NIA1		Nitrite fails to induce stomatal closure in epidermal peels of the double mutant.	12446847	1	0
AT1G77760	NIA1		No emission of NO (nitric oxide) under condition in which wild-type does. Wounding-induced NO production is however still observed.	12446847	1	1
AT1G77760	NIA1		Stomata are far less sensitive to ABA.	12446847	1	1
AT1G37130	NIA2		ABA inhibits stomatal opening in nia1 nia2 as in the wild type, revealing that not all stomatal responses to ABA are reduced.	12446847	1	1
AT1G37130	NIA2		Nitrite fails to induce stomatal closure in epidermal peels of the double mutant.	12446847	1	1
AT1G37130	NIA2		No emission of NO (nitric oxide) under condition in which wild-type does. Wounding-induced NO production is however still observed.	12446847	1	1
AT1G37130	NIA2		Stomata are far less sensitive to ABA.	12446847	1	1
AT1G50960	GA2OX7		In long day conditions, no significant difference in flowering behaviour between mutant and wild-type.	12509528	1	1
AT1G50960	GA2OX7		In short day conditions mutant formed fewer rosette leaves before bolting.	12509528	1	1
AT1G50960	GA2OX7		In short day conditions, mutant formed a greater number of cauline leaves.	12509528	1	1
AT1G50960	GA2OX7		Longer hypocotyl compared to wild-type when grown in medium- and low-light.	12509528	1	1
AT1G50960	GA2OX7		Dwarf (growth under long-day photoperiod).	12509528	1	1
AT2G02480			No branching of trichomes.	12586888	1	0
AT1G13870	KTI12	DRL1 ELO4	Narrow leaf lamina phenotype.	12615938	1	1
AT2G01570	RGA	GRS RGA1	Partial rescue of the sly1-10 dwarf phenotype but no significant suppression of the germination or fertility defects.	12724538	1	1
AT1G55580	SCL18	LAS	Almost complete suppression of secondary bolt formation from the axils of rosette leaves. Side shoot formation from the axils of cauline leaves of the primary bolt is not inhibited. The point of separation between lateral shoots and the main axis is often displaced acropetally. Branching from the first two or three leaves of secondary shoots is blocked. Petal abscission is delayed.	12730136	1	1
AT1G79440	ALDH5F1	SSADH1	Phenotypically dwarfed with necrotic lesions, bleached leaves, reduced leaf area, lower chlorophyll content, shorter hypocotyls and fewer flowers. Weaker phenotype compared to other ssadh alleles; inflorescences were 25-30% higher than those of ssadh-1.	12740438	3	1
AT1G79440	ALDH5F1	SSADH1	Phenotypically dwarfed with necrotic lesions, bleached leaves, reduced leaf area, lower chlorophyll content, shorter hypocotyls and fewer flowers.	12740438	1	1
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	defect in thermotolerance	12805605	1	1
AT1G30950			Mutants produce less than one petal per flower on average, although most basal flowers can have more.	12826617	1	0
AT1G30950			Weak allele specifically affecting petal development.	12826617	1	1
AT1G06520			Reduced fertility due to male sterility. Pollen collapsed and outcompeted by wild type pollen. Phenotype apparent at microspore release stage II. Tapetum differentitation is abnormal which causes a sporophytic defect on microgametogenesis.	12897259	4	2
AT1G71696	SOL1	SUPPRESSOR OF LLP1 1	same as smb-3 single mutant	12932329		
AT1G36160	ACC1	EMB22 GK PAS3	Heterozygous plants appear normal, except for the production of some severely wrinkled seeds. The altered seed phenotype is visible, during silique maturation, as white seeds amongst green ones. The dessicated wrinkled seeds are unable to germinate after imbibition (embryo lethal).	12943542	1	1
AT1G36160	ACC1	EMB22 GK PAS3	embryo lethal.	12943542	1	1
AT1G67500	REV3	ATREV3 recovery proTein 3	The root growth of mutant plants was inhibited after UV-B irradiation under both light and dark conditions. Mutant seedlings also were sensitive to gamma-rays and mitomycin C, which are known to inhibit DNA replication. Incorporation of bromodeoxyuridine after UV-B irradiation was less in rev3-1 than in the wild type.	12953110	1	1
AT1G68765	IDA		Ethylene-sensitive mutant, floral organs remain attached to the plant body after the shedding of mature seeds, even though a floral abscission zone develops. No other developmental processes were affected. When grown on the medium containing ethylene (10 ppm), mutant seedlings response was limited to lack of abscission in senescenced floral organs. Except with regard to floral abscission, seedling response to ethylene was the same as in wild type.	12972671	1	1
AT1G09530	PIF3	BHLH8 EN100 PAP3	Mutant plants contained chlorophyll amounts comparable to those of the wild-type controls.	14508006	1	1
AT1G09530	PIF3	BHLH8 EN100 PAP3	The mutant responds hypersensitively to red light but normally to far-red light for the inhibition of hypocotyl elongation.	14508006	1	1
AT1G09530	PIF3	BHLH8 EN100 PAP3	Under red and far-red light growth conditions, mutant plants have larger than normal cotyledons.	14508006	1	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	The prr7 mutant phenotype in Rc was more dramatic in the phyA-101 background, especially in the range from 0.1 to 10 μmol&#65533;m-2&#65533;s-1. However, in FRc, phyA prr7 double mutant seedlings were indistinguishable from phyA seedlings.	14563930	1	1
AT2G02950	PKS1		Under hourly R pulses, the pks mutation also had no effect in the phyA background.	14615593	1	0
AT2G02950	PKS1		Blocking of greening was enhanced in the mutant exposed to hourly pulses of FR.	14615593	1	1
AT2G02950	PKS1		In dark controls, hypocotyl growth was unaffected by the mutations and the cotyledons remained fully closed. Compared with those in the wild type, hypocotyl growth inhibition and cotyledon unfolding responses to hourly FR pulses were significantly greater in the mutant.	14615593	1	1
AT2G02950	PKS1		No differences were observed under hourly R pulses or continuous FR between wild-type and mutant plants.	14615593	1	0
AT2G02950	PKS1		No obvious root growth phenotypes.	14615593	1	1
AT2G02950	PKS1		Wild-type-like hypocotyl growth inhibition response to hourly FR pulses.	14615593	1	1
AT2G02950	PKS1		With respect to cotyledon unfolding and greening, the double mutant was indistinguishable from the wild type.	14615593	1	1
AT1G14280	PKS2		Under hourly R pulses, the pks mutation also had no effect in the phyA background.	14615593	1	0
AT1G14280	PKS2		Wild-type-like hypocotyl growth inhibition response to hourly FR pulses.	14615593	1	1
AT1G14280	PKS2		With respect to cotyledon unfolding and greening, the double mutant was indistinguishable from the wild type.	14615593	1	1

AT1G14280	PKS2		Blocking of greening was enhanced in the mutant exposed to hourly pulses of FR.	14615593	1	1
AT1G14280	PKS2		In dark controls, hypocotyl growth was unaffected by the mutations and the cotyledons remained fully closed. Compared with those in the wild type, hypocotyl growth inhibition and cotyledon unfolding responses to hourly FR pulses were significantly greater in the mutant.	14615593	1	1
AT1G14280	PKS2		No differences were observed under hourly R pulses or continuous FR between wild-type and mutant plants.	14615593	1	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	Under hourly R pulses, the pks mutation also had no effect in the phyA background.	14615593	1	0
AT1G50250	FTSH1	AAA FTSH	no visible difference in leaf morphology and variegation when grown under normal light and temperature conditions compared to wild-type.	14630971	1	1
AT1G06430	FTSH8		no visible difference in leaf morphology and variegation when grown under normal light and temperature conditions compared to wild-type.	14630971	1	0
AT1G03000	PEX6		Resistant to root elongation inhibition by IBA but responds normally to IAA. Fails to respond to the stimulatory effects of IBA on lateral root initiation but makes lateral roots in response to IAA. Specifically defective in IBA responses. Has several peroxisome-defective phenotypes: does not develop normally without exogenous sucrose, dramatic defects in hypocotyl and root elongation in the absence of sucrose. Shorter root and hypocotyl than WT. Plants grown in soil have smaller rosettes, fewer rosette leaves, and shorter primary inflorescence stems than WT. Also has shorter siliques containing fewer seeds than WT. Pale green in color.	14745029	3	3
AT1G76490			Inhibition of root elongation, dwarf, sterile, rapid senescence in mature leaves	14871314		
AT1G59940	ARR3	response reGulaTor 3	altered red light sensitivity	14973166	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Mutant leaves were small and irregular in shape compared with the wild type. Both surfaces of mutant leaves differed from the wild type. Adaxial surfaces of the wild type showed the characteristic jigsaw puzzle shape of pavement cells. In the mutant, the cells contained fewer, larger lobes. Epidermal cells on the abaxial surface of mutants were collapsed. This collapsed appearance was consistently seen in views of the abaxial leaf surface of mutant plants but was never observed on the abaxial surface of wild-type leaves or on the adaxial surfaces of either the wild-type or mutant plants.	14973169	2	2
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Mutant rosettes were slower to flower than wildtype plants (34.1 d versus 30.2 d under a 16-h photoperiod). Mutant plants produced smaller bolts, but flower morphology and fertility were normal, and siliques were similar in size to those on wild-type plants. The smaller bolts of the mutant yielded only 62 mg seed/plant compared with 177 mg seed/plant from wild-type controls. Harvested mutant seeds appeared smaller and darker than seeds from wild-type plants that had been grown alongside the mutants. Examination by light microscopy revealed that 50% of mutant seeds contained green embryos that could be distinguished through the testa. When the green and normal brown seeds from a mutant plant were germinated separately, the green seeds showed 79% germination compared with 100% germination for the brown seeds.	14973169	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Only 80.0% of mutant seedlings emerged. At 6 d, a percentage of the emerged mutant seedlings would not grow and develop into viable plants. These seedlings had white cotyledons, and they eventually died. At 19 d, 91.0% of the wild-type seeds that germinated had produced viable rosettes with four to five pairs of true leaves. For the mutants, only 72.2% of seeds that had germinated (58% of those sown) produced rosettes. At this stage, the mutant had only two to three pairs of true leaves.	14973169	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Reduced-growth phenotype.	14973169	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The cutin layer on the adaxial surface of mutant leaves was not significantly different in cross-sectional thickness from that of control wild-type leaves. However, the abaxial cutin layer on mutant leaves was substantially thinner than the wild type.	14973169	2	2
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The rate of chlorophyll leaching from mutant plants was threefold higher than the rate from wild-type controls.	14973169	1	1
AT1G68480	JAG	JAGGED	Leaves have a serrated edge. Sepals and petals are narrower and shorter than wt. Mutant sepals develop jagged tissue at the tip. Anthers are reduced with an altered shape and produce less pollen than wt.	14973282	4	4
AT1G19300	GATL1	GLZ1 PARVUS	At flowering, the mutants achieve a rosette diameter ca. 30% that of wild-type plants and an inflorescence stem height ca. 20% that of wild-type plants	15010604		
AT1G19300	GATL1	GLZ1 PARVUS	Flowers are also significantly smaller than wild-type ones and have anthers that are almost completely non-dehiscent and fail to extend above the level of the stigma in fully open flowers.	15010604		
AT1G19300	GATL1	GLZ1 PARVUS	No differences with respect to the frequency or timing of germination on soil, either in full light or in total darkness, and the rate and extent of hypocotyl elongation in dark-grown parvus seedlings are indistinguishable from that of wild-type seedlings.	15010604		
AT1G19300	GATL1	GLZ1 PARVUS	Pollen grains from mutant anthers showed less than 0.5% germination in vitro in pollen growth medium, compared with 7% germination for wild-type Ler pollen.	15010604		
AT1G19300	GATL1	GLZ1 PARVUS	Seed set is greatly reduced in parvus plants and most siliques either fail to develop or contain few (3-10) seeds.	15010604		
AT1G19300	GATL1	GLZ1 PARVUS	The phenotype of the parvus mutant is almost indistinguishable from that of wild-type plants when grown in vitro on agar. However, when grown in soil, parvus mutants are distinguished from wild-type plants after about 3 weeks due to their slightly narrower, darker green leaves.	15010604		
AT1G19300	GATL1	GLZ1 PARVUS	pavement cells, stomatal guard cells and trichomes, on the adaxial and abaxial surface of mature mutant leaves are morphologically indistinguishable from those of wild-type leaves but are smaller in the parvus mutant (ca. 60% of wild type)	15010604		
AT1G31880	BRX	BREVIS RADIX NIP3;1 NLM9	The roots of brxS seedlings are as short, both when grown in the light or in darkness. In contrast to the root system, the shoot system morphology and flowering time of brxS plants resembles the Sav-0 shoot system, which was used as the control. Cell elongation and cell production rate in the root meristematic and elongation zone were decreased in brxS seedlings, contributing approximately one-third and two-thirds, respectively, to the overall difference in root length as compared with Sav-0 seedlings.	15031265	3	3
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Wildtype roots.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Develops metaxylem as wildtype plants.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Excised hypocotyls develop small and yellowish calli indicating a strong insensitivity to kinetin, while wildtype calli are green-coloured.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Root elongation is indistinguisable from that of wildtype.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Strong cytokinin insensitivity.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Cytokinin insensitivity.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No metaxylem and no phloem differentiation.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Root elongation markedly reduced in the presence of kinetin.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	In this line the wol-1 allele appears recessive compared to cre1-3.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Same phenotype as wol-1.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Root cross-sections are identical to those of wildtype: observed re-appearance of a bipolar xylem strand and phloem tissue on each side.	15053761	1	1

AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Rapidly accumulate anthocyanins due to the loss of root functionality.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Short root phenotype.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Strong insensitivity to the hormone kinetin.	15053761	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Viability depends on the ability to develop adventitious root before plant dies.	15053761	1	0
AT2G03680	SPR1	SKU6	Defective in directional cell elongation processes; abnormal cortical microtubule function; exhibits right-handed helical growth in roots and etiolated hypocotyls; epidermal cell files of roots are twisted to form right-handed helices; on vertically oriented hard agar plates, roots grow to the right when viewed from above the agar plates; this skewed root growth is driven by the friction between agar surface and helical epidermal cell files; phenotype is enhanced under the conditions that accelerate cell elongation, under such conditions, epidermal cells undergo isotropic cell expansion, resulting in spherically shaped cells protruding from the organ surface.	15084720	6	6
AT1G66340	ETR1		The mutant exhibits a significant flg22-induced reduction in bacterial growth, indicating that the gene is most probably not required for flg22-induced bacterial resistance.	15085136		
AT1G64280	NPR1	NIM1 SAI1	The mutant exhibits a significant flg22-induced reduction in bacterial growth, indicating that the gene is most probably not required for flg22-induced bacterial resistance.	15085136	2	2
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Dwarf phenotype.	15155880	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	The leaves of the triple mutant expand more slowly than those of wildtype. At 17 days after germination, their surface area is 20% that of wildtype plants.	15155880	2	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	The rate of leaf primordial formation is slightly decreased but the phyllotaxy is normal.	15155880	2	1
AT1G27320	AHK3	ORE12	Bolting time is slightly delayed (2 to 3 days) and the inflorescence stem length is reduced. However, morphology and fertility of the flowers is relatively unaffected.	15155880	2	0
AT1G27320	AHK3	ORE12	Compact rosettes with shortened petioles and small leaf blades.	15155880	1	0
AT1G27320	AHK3	ORE12	Root elongation unaffected.	15155880	2	0
AT1G27320	AHK3	ORE12	Semi-dwarf phenotype.	15155880	1	1
AT1G27320	AHK3	ORE12	The hypocotyl length of the double mutant is slightly decreased; this effect is largely due to reduction in cell number rather than cell size.	15155880	2	0
AT1G27320	AHK3	ORE12	The leaves of the double mutant expand more slowly than those of wildtype. At 17days after germination, their surface area is 55% that of wildtype plants.	15155880	2	2
AT1G27320	AHK3	ORE12	Dwarf phenotype.	15155880	1	1
AT1G27320	AHK3	ORE12	The leaves of the triple mutant expand more slowly than those of wildtype. At 17 days after germination, their surface area is 20% that of wildtype plants.	15155880	1	1
AT1G27320	AHK3	ORE12	The rate of leaf primordial formation is slightly decreased but the phyllotaxy is normal.	15155880	1	1
AT1G27320	AHK3	ORE12	Strong cytokinin-insensitive phenotype.	15155880	1	1
AT1G27320	AHK3	ORE12	Seedlings appear normal.	15155880	1	1
AT2G01570	RGA	GRS RGA1	Partial suppression of the dwarf phenotype.	15155881	1	1
AT2G03680	SPR1	SKU6	Mutant plants exhibit altered patterns of root and organ growth as a result of defective anisotropic cell expansion. Roots, etiolated hypocotyls, and leaf petioles exhibit right-handed axial twisting, and root growth on inclined agar media is strongly right skewed. Cortical microtubules reoriented. The touch-dependent helical growth of roots is suppressed by the antimicrotubule drugs propyzamide and oryzalin, and right skewing is exacerbated by cold treatment.	15155883	4	4
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Normal or slightly reduced sensitivity to cytokinin in shoot induction assay (exogenous application of cytokinins induces wildtype shoot formation).	15166290	1	0
AT1G27320	AHK3	ORE12	Normal or slightly reduced sensitivity to cytokinin in shoot induction assay (exogenous application of cytokinins induces wildtype shoot formation).	15166290	1	1
AT2G02560	CAND1	ETA2 HVE	Similar to Atcand1-1 mutant. Resistant to sirtinol and auxin, but not to gibberellins or brassinolide. Displayed developmental phenotypes similar to those of axr1, namely, short petioles, downwardly curling leaves, shorter inflorescence. More severe inflorescence phenotype were found in this mutant compared to the atcand1-1 (ems-generated) mutation. Mutant plants were completely sterile.	15181201	4	4
AT2G02560	CAND1	ETA2 HVE	Mutants resistant to sirtinol and auxin, but not to gibberellins or brassinolide. Displayed developmental phenotypes similar to those of axr1, namely, short petioles, downwardly curling leaves, short inflorescence, and reduced fertility.	15181201	4	3
AT2G02560	CAND1	ETA2 HVE	Similar to cand1-2 and cand1-3 mutants. Rosette leaves of mutants plants were much smaller than those of wild-type plants and had a wavy morphology. Mutants flowered later than wild-type plants, with an increased number of rosette leaves indicating that the vegetative to reproductive growth transition of the primary shoot apical meristem was affected. The growth of axillary meristems is also abnormal, where a large number of smaller leaves are produced. Furthermore, the mutants have very low fertility, with less than one seed produced on average per silique. Mutant plants continued to make new flowers while wild-type plants of the same age started to senesce. Other notable phenotypes of cand1 mutants include dwarfism and loss of apical dominance. When examined closely, dwarfism largely results from reduced stem elongation. Mutant plants had a strong increase in the number of secondary inflorescences, an indication that they have lost apical dominance.	15208391	8	6
AT2G02560	CAND1	ETA2 HVE	When grown in darkness, mutant seedlings exibited mild photomorphogenic phenotypes, with short hypocotyls and opened cotyledons.	15208391	2	2
AT2G03800	GEK1	GEKO1	Ethanol hypersensitivity.	15215505		
AT2G03800	GEK1	GEKO1	When the mutant seedlings grown on normal medium were transferred to medium containing 0.03-0.1% (v/v) ethanol, their growth was reduced strongly.	15215505		
AT2G03800	GEK1	GEKO1	The germination rates of the mutant were significantly reduced by 0.003% (v/v,~0.5 mM) ethanol, whereas the wild type germinated normally in the presence of at least 0.3% (v/v) ethanol.	15215505		
AT2G03800	GEK1	GEKO1	The mutant died eventually in the presence of 0.1% ethanol.	15215505		
AT1G02120	VAD1	VASCULAR ASSOCIATED DEATH1	lesion mimic mutant; exhibits light conditional appearance of propagative HR (hypersensitive response)-like lesions along the vascular system.	15269331	2	1
AT1G01550	BPS1		Mutant roots were abnormal; primary and lateral roots were short, root hairs formed close to the root apex, and root defects were most severe when plants were grown at low temperature.	15458645		
AT1G01550	BPS1		Mutants produced two radially symmetric organs in the place of leaves; these organs were typically devoid of vascular tissue and lacked trichomes. Prolonged 16°C growth did not result in additional organs being produced, indicating that shoot meristem (SAM) activity was also lost. Mutants grown at 22°C showed a similar, albeit less severe, phenotype. The first leaf pair was slightly larger and flatter than those of 16°C-grown mutants and contained some vascular tissue, and additional radial organs were produced by the SAM. Mutants grown at 29°C showed an even less-severe phenotype; these plants produced flattened, irregularly shaped leaves with slightly lobed margins and an abnormal vein pattern.	15458645		
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	When treated with a short pulse of far-red light after seed surface sterilization, double mutant seeds germinated, while majority of wild-type seeds did not.	15486102	2	2
AT1G09530	PIF3	BHLH8 EN100 PAP3	When grown under red light, double mutants had a short hypocotyl length similar to that of the pif3 single mutant, whereas the pil5 pif3 double mutant grown under far-red light had short hypocotyl length similar to that of the pil5 single mutant. Compared with wild-type seedlings, higher percentages of double mutant seedlings grew flat in the dark, i.e., inhibition of hypocotyl negative gravitropism was observed in the dark in the double mutant (similar to pil5 single mutant).	15486102	2	2
AT2G03710	AGL3	4-Sep	Flower meristems behave like inflorescence meristems and continuously elaborate new meristems, resulting in the 'cauliflower' phenotype. Eventually flowers resembling those of ap1 single mutants eventually appear and set seeds.	15530395		
AT2G03710	AGL3	4-Sep	Inflorescences take 7-10 days longer than ap1 cal mutant to begin producing flowers.	15530395		

AT2G03710	AGL3	4-Sep	Meristem defect intermediate between that of ap1 and ap1 cal mutants. Inflorescences appear caulifower-like early after bolting but soon start producing ap1-like flowers on their periphery.	15530395		
AT2G03710	AGL3	4-Sep	Early flower mutant phenotypes are lessened in later-arising flowers which appear more normal whilst still displaying significant perturbations of organ development.	15530395		
AT2G03710	AGL3	4-Sep	Gynoecium often supported by an elongated gynophore.	15530395		
AT2G03710	AGL3	4-Sep	Many flowers display a loss of fourth whorl determinancy.	15530395		
AT2G03710	AGL3	4-Sep	Profound changes in early arising flowers. Both organ numbers and organ identity are affected in a highly variable manner.	15530395		
AT2G03710	AGL3	4-Sep	Stellate trichomes are frequently observed on carpels (never on wild-type).	15530395		
AT2G03710	AGL3	4-Sep	All flower organs are converted to leaf-like organs, most strikingly on their adaxial surface. Abaxial epidermal cells are made up of a mixture of leaf- and sepal-like characteristics. Leaf characteristics include an abundance of branched trichomes.	15530395		
AT2G03710	AGL3	4-Sep	Adaxial surface of first whorl organs are unaffected.	15530395		
AT1G69120	AP1	AGAMOUS-like 7 AGL7 APETALA1 ATAP1	Flower meristems behave like inflorescence meristems and continuously elaborate new meristems, resulting in the 'cauliflower' phenotype. Eventually flowers resembling those of ap1 single mutants eventually appear and set seeds.	15530395		
AT1G69120	AP1	AGAMOUS-like 7 AGL7 APETALA1 ATAP1	Inflorescences take 7-10 days longer than ap1 cal mutant to begin producing flowers.	15530395		
AT1G69120	AP1	AGAMOUS-like 7 AGL7 APETALA1 ATAP1	Meristem defect intermediate between that of ap1 and ap1 cal mutants. Inflorescences appear caulifower-like early after bolting but soon start producing ap1-like flowers on their periphery.	15530395		
AT1G69120	AP1	AGAMOUS-like 7 AGL7 APETALA1 ATAP1	Development of flowers in the axils of first-whorl organs.	15530395		
AT1G26310	CAL	AGL10	Flower meristems behave like inflorescence meristems and continuously elaborate new meristems, resulting in the 'cauliflower' phenotype. Eventually flowers resembling those of ap1 single mutants eventually appear and set seeds.	15530395		
AT1G26310	CAL	AGL10	Inflorescences take 7-10 days longer than ap1 cal mutant to begin producing flowers.	15530395		
AT1G24260			Early flower mutant phenotypes are lessened in later-arising flowers which appear more normal whilst still displaying significant perturbations of organ development.	15530395		
AT1G24260			Gynoecium often supported by an elongated gynophore.	15530395		
AT1G24260			Many flowers display a loss of fourth whorl determinancy.	15530395		
AT1G24260			Profound changes in early arising flowers. Both organ numbers and organ identity are affected in a highly variable manner.	15530395		
AT1G24260			Stellate trichomes are frequently observed on carpels (never on wild-type).	15530395		
AT1G24260			Adaxial epidermal cells have a slightly irregular edge, indicating a partial adoption of leaf fate.	15530395		
AT1G24260			All flower organs are converted to leaf-like organs, most strikingly on their adaxial surface. Abaxial epidermal cells are made up of a mixture of leaf- and sepal-like characteristics. Leaf characteristics include an abundance of branched trichomes.	15530395		
AT1G24260			Normal flowers apart from a reduction in the number of stamens.	15530395		
AT1G24260			Adaxial surface of first whorl organs are unaffected.	15530395		
AT1G29260	PEX7		Displays peroxisomal defects such as reduced sensitivity to exogenously applied IBA. Fewer lateral roots after IBA treatment. Not generally defective in auxin responses. Hypocotyl is not markedly shorter than WT when grown without added sucrose in the dark. PTS2-tageed proteins are not efficiently imported into the peroxisome.	15548601	5	3
AT1G04580	AAO4	AO2	The endogenous levels of ABA are significantly lower than those of the aao3 single mutant.	15574845	1	0
AT1G04580	AAO4	AO2	No significant changes in ABA levels were observed.	15574845	1	1
AT1G11130	LRR-RLK		Position of root-hair cells is scrambled. Only 66% of epidermal cells (compared with 92% in wild type) overlying two cortical cells develop as root hairs, and 21% of epidermal cells overlying one cortical cell (compared with 1% in wild type) develop as root hairs.	15618487		
AT1G55350	DEK1	ATDEK1 DEFECTIVE KERNEL 1 EMB1275 EMB80 embryo defecTive 1275 EMBRYO DEFECTIVE 80	Severity of the phenotype varied between individual mutant seed. In the most severely affected seed, no embryo development could be detected. In such seeds the endosperm develops and cellularizes but fails to differentiate a complete peripheral (aleurone-like) surface layer. In less severe mutant seed, embryos develop to the globular stage before developmental arrest. In these embryos the plane of cell division is frequently uncontrolled compared to wild-type, the embryo proper is irregular, lacking a well defined L1 cell layer. In mutant seed developing an embryo, the endosperm completes the cellularization process and differentiates an aleurone- like layer in the micropylar chamber around the embryo, but this differentiation frequently stops towards the central chamber Wild-type development occurs in about 75% of seeds of the siliques from which mutant seeds were harvested.	15647902		
AT1G26830	CUL3A	CUL3	Mutant plants flowered slightly later than wild type and had a reduced sensitivity of the inhibition of hypocotyl growth in far-red light	15659098		
AT1G59750	ARF1		no obvious auxin-related growth phenotype	15659631	1	1
AT1G35520	ARF15		no obvious auxin-related growth phenotype	15659631	1	1
AT1G35240	ARF20		no obvious auxin-related growth phenotype	15659631	1	1
AT1G34410	ARF21		no obvious auxin-related growth phenotype	15659631	1	1
AT1G34390	ARF22		no obvious auxin-related growth phenotype	15659631	1	1
AT1G34170	ARF13		no obvious auxin-related growth phenotype	15659631	1	1
AT1G30330	ARF6		nph4-1 arf19 double mutant; agravitropic response in both hypocotyls and roots; impaired phototropic response in hypocotyls; impaired lateral root formation; small plant size; small and epinastic rosette leaves; reduced auxin sensitivity	15659631	1	1
AT1G19220	ARF19		The primary roots of the mutant produce as many lateral roots as the wild type.	15659631	1	1
AT1G19220	ARF19		When seedlings are grown vertically under dark conditions, the mutant has a normal gravitropic response.	15659631	1	0
AT1G19220	ARF19		no obvious auxin-related growth phenotype, but roots show mild auxin resistance	15659631	2	2
AT1G19220	ARF19		The double mutant exhibits much stronger auxin-related phenotypes than those of the single mutants. Adult double mutant plants have thin and short inflorescence stems, and their rosette leaves are small and epinastic. In addition, it has reduced numbers of inflorescence stems, suggesting enhanced apical dominance. By contrast, its flowers appear to be normal, and they fertilize normally.	15659631	4	0
AT1G19220	ARF19		The double mutant mutant displays agravitropic responses in both hypocotyls and roots. When seedlings are grown vertically under dark conditions, the regulation of growth orientation is disrupted in both hypocotyls and roots, with the hypocotyls occasionally growing downward and the roots upward. Also, the roots and hypocotyls of the double mutant show reduced gravitropic curvatures compared with the wild type when vertically dark-grown seedlings are reoriented by 90°.	15659631	3	3
AT1G19220	ARF19		The phenotype of the double mutant is most obvious at its seedling stage, with its most prominent phenotype being severely impaired lateral root formation. Its primary roots fail to produce lateral roots in 2-week-old seedlings. However, double mutant seedlings start to generate several lateral roots after ~2 weeks of growth, and their morphological appearance is normal.	15659631	3	3
AT1G19220	ARF19		The phototropic response toward blue light in hypocotyls of double mutant seedlings is disrupted.	15659631	1	0
AT1G19220	ARF19		nph4-1 arf19 double mutant; agravitropic response in both hypocotyls and roots; impaired phototropic response in hypocotyls; impaired lateral root formation; small plant size; small and epinastic rosette leaves; reduced auxin sensitivity	15659631	1	1
AT1G74310	HSP101	ATHSP101 heaT shock proTein 101 HEAT SHOCK PROTEIN ATHSP101 HOT1	Defective thermotolerance. Plants treated at 38C are not able to acclimate to 45C temperature.	15659638	1	1
AT1G60600	ABC4		Pale green seedlings. Can only be grown on media.Chloroplasts have increased grana stacks and fewer stroma thylakoids. Decreased photosynthtic efficiency.	15686525	3	2
AT1G20980	SPL14	FBR6 SPL1R2	Mutants are resistant to fumonisin B1. In the absence of FB1, the plants have elongated petioles and enhanced leaf margin serration. Plants appear to undergo early vegetative phase change.	15703061	3	2
AT1G20330	SMT2	CVP1	Serrated petals and sepals. Fertility is 40% that of wildtype.	15737981	2	1
AT1G03310	ISA2	DBE1	Accumulates reduced amounts of starch relative to wildtype but large amounts of soluble glucan.	15743447	1	1

AT1G18450	ARP4		arp4-1 mutation causes partial sterility. Homozygous mutants had poorly developed siliques with a few or no seeds, compared with heterozygous mutant or wild type siliques that were fully filled with seeds. Flowers on the homozygous sterile plants were often slightly smaller and open for considerably longer periods than wild type, and a majority of them (80 to 90%) remained unfertilized. Otherwise, mutant plants revealed only mild very morphological and developmental phenotypes. The anthers from the sterile plants were often smaller, more heart shaped, and contained fewer pollen grains compared with wild type anthers, which were somewhat oblong and fully filled with pollen In addition, the mutant pollen grains were slightly larger than wild type. Because the mutant stamens often had shorter filaments than the wild type self-pollination was seldom efficient. However, upon manual pollination, pollen from the homozygous mutant plants germinated on self or wild type stigmas and produced fertile seeds, indicating that the mutant pollen grains, although larger, were viable. When homozygous mutant plant was pollinated with wild type pollen, the cross-pollination resulted in near normal development of siliques and production of seeds suggesting that the female development was not affected by the arp4-1 mutation. Sterility in the homozygous mutant plants is the result of production of fewer pollen and inefficient self-pollination. Mutant plants had a 35 to 40% reduction in the amount of AtARP4 protein compared with wild type.	15743449	1	1
AT1G06290	ACX3		Plants display decreased sensitivity to the inhibitory effect of indole-3-butyric acid (IBA) on root elongation, while remaining sensitive to inhibitory concentrations of indole-3-acetic acid. They maintain their ability to initiate lateral roots in response to IBA.	15743450	1	1
AT1G69670	CUL3B		Segregates about 17% embryo lethal. Embryos about around the transition stage.	15772280	2	2
AT1G26830	CUL3A	CUL3	Segregates about 17% embryo lethal. Embryos about around the transition stage.	15772280	2	2
AT1G17060	CYP72C1	CHI2 DLF SHK1 SOB7	Dwarf plants with short hypocotyls in light and dark. Plants have dark green leaves with rounded blades, short stems and internodes,reduced apical dominance and delayed senscence. Seeds are smaller (shorter) that non- mutant siblings. Mutants have reduced levels of endogenuos brassinosteroids.	15773850	4	1
AT1G17060	CYP72C1	CHI2 DLF SHK1 SOB7	Double mutant of BAS1 and SOB both of which are null alleles. Less responsive to light as measured by hypocotyl elongation and enhanced cotyledon expansion in red, blue and far red light meaning they are less responsive. Early flowering. Increased levels of 6-deoxotyphasterol and cataseterone, which are products of the brassiolide pathway.	15773851	2	2
AT1G26670	VTI12	VTI1B	Zip1 dominantly supresses the zigzag phenotype of the zig1 mutant. The zip1 gain of function allele results in ectopic expression of VTI12 which forms complexes with SYP22. Corrects the gravtitropism defect of zag1 homozygotes.	15797025		
AT1G29690	CAD1		Germinating cad1-1 mutant shows a dwarf phenotype with normal cotyledons but dark-brown- or black-colored cell death lesions on the true leaves. Leaf senescence with chlorophyll breakdown is accelerated in this mutant. This phenotype segregates as a recessive trait. Homozygous cad1 mutant cannot produce seeds indicating that normal plant development are also disturbed by the mutation.	15799997	3	3
AT1G22620	SAC1	FIG4 FRA7	Defective interfascicular fiber cells in inflorescnce stems. Decrease in cell wall synthesis, reduction in cell elongation, and alteration in the normal organization of the actin cytoskeleton. Global change in plant architecture.	15805481	3	3
AT1G65620	LBD6	AS2	Rosette leaves are lobed and curled downwards and have shorter petioles. Both the cauline leaves and sepals show serrations at margins.	15821980		
AT2G13680	CalS5		severely reduced silique length and seed yield	15842618	1	1
AT1G02280			Defective in POR B uptake into chlorolasts	15842619	1	1
AT1G03310	ISA2	DBE1	Modification of amylopectine structure. Strong increase of number of small chain (degree of polymerisation between 5 and 9) and decrease in number of longer chains (11-17 degree of polymerisation).	15849301	1	1
AT1G03310	ISA2	DBE1	Reduced starch in leaves	15849301	1	1
AT1G03310	ISA2	DBE1	Strong increase in water soluble polysaccharides (WSPs) content.	15849301	1	1
AT1G03310	ISA2	DBE1	Strong reduction in starch accumulation in double mutant.	15849301	1	1
AT1G10760			impaired freezing tolerance	15894744	1	1
AT1G11720	SS3	ATSS3 sTarch synThase 3 STARCH SYNTHASE III	Starch excess phenotype in leaves. Altered structure of leaf amylopectin. Increased phosphate content of starch in leaves. It is hypothesized that all of these phenomena result from the increase of activity in one or more of the other starch synthase isoforms upon loss of starch synthase III.	15908598	3	1
AT1G67500	REV3	ATREV3 recovery proTein 3	Showed high sensitivity to UV-B, gamma-rays, and DNA cross-linkers. Both REV1 and REV3 transcripts were suppressed revlrev3 double mutants.	15908599	1	1
AT1G16590	REV7	ATREV7	Mutant plants were moderately sensitive to UV-B irradiation than the wild type when mutant seedlings were irradiated with various doses of UV-B irradiation and grown in the light. Aerial tissue growth was inhibited by long-term UV-B irradiation.	15908599	1	1
AT1G27320	AHK3	ORE12	Reduced down-regulaton of phosphate starvation induced gene expression when plants are treated with cytokinins. Reduced response to exogenous cytokinins.	15923327	2	2
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	Synergistic phenotype: de-etiolated, fusca seedlings. Dark grown plants undergo photomorphogenesis; hypocotyl elongation ,cotyledon expansion, anthocyanin accumulation in cotyledons.	15923347	3	3
AT1G22920	CSN5A	AJH1 CSN5B	Synergistic phenotype: de-etiolated, fusca seedlings. Dark grown plants undergo photomorphogenesis; hypocotyl elongation ,cotyledon expansion, anthocyanin accumulation in cotyledons.	15923347	3	3
AT1G80330	GA3OX4		No remarkable phenotype in its germination and vegetative growth. Delayed starch degradation in the outer seed integument but no difference in the embryo. Starches of columnar shape disappear sooner than smaller granules in the inner layer of the outer integument. Shape of hexagonal epidermal cells is severely distorted. Thinner and more heterogeneous distribution of mucilage at periphery of seeds. These phenotypes could be complemented by exogenous application of gibberellin GA4.	15927942	1	1
AT1G65660			Segregating populations will show occasional reversion (ca. 40% in some lines)-otherwise segregates 3:1 wt:mutant. Reduced leaf venation, serrated leaves, reduced stature, narrow organs, reduced fertility. Reduced cell numbers, but cells have increased size.	15937226	3	2
AT2G06510	RPA1A	ATRPA1A ATRPA70A replicaTion proTein A 1A RPA70-KDA SUBUNIT A RPA70A	According to one report, this T-DNA insertion causes lethality and the authors could not recover homozygous mutants from a heterozygous parent.	15978034	1	1
AT1G80380			In ambient air, the growth of the homozygote plant is arrested at early cotyledon stage. The seedlings die within 2 weeks. With elevated CO2, the plant grows slowly but is viable and fertile.	15980259	1	1
AT1G09540	MYB61		Defective in regulation of stomatal pore size. Increased stomatal pore opening in light and dark.	16005292		
AT1G28300	LEC2		somatic embryogenesis ability is very limited in lec2 mutants	16034595	1	1
AT1G28300	LEC2		strongly impaired ability to induce somatic embryos in vitro	16034595	1	1
AT1G21970	NFYB9	LEC1	somatic embryogenesis ability is very limited in lecl mutants.	16034595	1	1
AT1G21970	NFYB9	LEC1	strongly impaired ability to induce somatic embryos in vitro	16034595	1	1
AT1G04950	TAF6	EMB2781 TAFI159	Embryonic lethal in homozygotes.	16039640		
AT1G04950	TAF6	EMB2781 TAFI159	Pollen tube development from mutant homozygote pollen is affected, growth rate is reduced.	16039640		
AT1G11680	CYP51G1	CYP51A2 EMB1738	Plieotrophic effects on plant development. Slow growth, defective hypocotyl elongation, abnormal flowers, reduced levels of sterols,membranes leaky.	16040657	1	1
AT1G11680	CYP51G1	CYP51A2 EMB1738	Seedling lethal, pale yellow plants die at a variety of seedling stages.	16040657	1	1
AT1G69670	CUL3B		Arrest of embryogenesis occurred predominantly at heart stage. The following abnormalities were observed: premature or abnormal division of hypophyseal cell, underdeveloped short suspensor, abnormalities in procambial cell divisions, abnormalities in protoderm formation, underdeveloped endosperm with delayed cellularization.	16045478	1	1
AT1G26830	CUL3A	CUL3	Arrest of embryogenesis occurred predominantly at heart stage. The following abnormalities were observed: premature or abnormal division of hypophyseal cell, underdeveloped short suspensor, abnormalities in procambial cell divisions, abnormalities in protoderm formation, underdeveloped endosperm with delayed cellularization.	16045478	1	1
AT1G21700	SWI3C	CHB4	Delayed development,semi-dwarf growth habit, and formation of aberrant rosettes. The rosette and cauline leaves are severely twisted along the proximodistal axis, leading to a downward curvature of the lateral edges toward the abaxial leaf surface. Cross sections of leaves showed an increased protrusion of mesophyll cell files around the vascular bundles. The root system is greatly reduced, because elongation of primary roots is inhibited. Seedlings develop several side roots and secondary root branches.	16055636	4	3
AT1G48410	AGO1		Homozygous progeny has unexpanded pointed cotyledons and very narrow rosette leaves.	16081530	1	1

AT1G28560	SRD2		temperature-sensitive mutant. srd2 seedlings grown at the permissive temperature (22C) appeared almost normal. At 28C, both hypocotyl and root explants of the srd2 mutant could not establish shoot apical meristems de novo. When primary root segments of srd2 were cultured on root-inducing medium (RIM) at 28C, abnormal lateral root primordia lacking functional apical meristems were frequently observed. except that they had fewer lateral roots than the wild-type seedlings. At the restrictive temperature (28C however, the development of true leaves and primary roots in srd2 seedlings was severely interrupted. Whereas root explants of the srd2 mutant formed calli on callus-inducing medium (CIM), at either 22Cor 28C, callus formation from srd2 hypocotyl explants was strongly inhibited at 28C	16098103	4	4
AT1G30330	ARF6		Short stamens, reduced fertility.	16107481	1	1
AT1G30330	ARF6		Twisted leaves, reduced fertility, short stamens,dwarf stature, closed flower buds (no anthesis), anthers do not dehisce, short stems.	16107481	1	1
AT1G07630	PLL5		Abnormal leaf shape- semidominant.	16112663		
AT1G42550	PMI1		mutant plants exhibit severely attenuated chloroplast movements under all tested fluence rates of light. Leaf cross sections revealed that regardless of the light condition, chloroplasts are more evenly distributed in leaf mesophyll cells in mutants than in the wild type.	16113226	1	1
AT1G42550	PMI1		severely attenuated chloroplast movement, similar phenotype to pmi1-2.	16113226	1	1
AT1G28300	LEC2		Similar to tan-1 lec1-2, embryo arrested mostly at transition or heart stage.	16113228	1	0
AT1G21970	NFYB9	LEC1	Most mutant embryos were arrested at transition or heart stage, with few reaching torpedo stage. Mutant seeds were desiccation intolerant and germinated poorly even when cultured on agar plates.	16113228	1	1
AT1G50250	FTSH1	AAA FTSH	More variegated than ftsh2.	16126834	1	1
AT1G50250	FTSH1	AAA FTSH	Completely white seedlings. Restoration of Heterozygocity of FTSH5 allows chloroplast development in the cotyledons.	16126834	1	1
AT1G06430	FTSH8		Completely white seedlings. Restoration of Heterozygocity of FTSH8 allows chloroplast development in the cotyledons.	16126834	1	1
AT1G10930	RECQL4A	RECQ4A RQL4A SGS1	no phenotype under standard growth conditions. Hypersensitive to UV light. Hypersensitive to methyl methanesulfonate (MMC), a DNA alkylating agent. Enhanced resistance to increasing concentrations of MMC as compared to wild type.	16146519	2	2
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	exhibited a decrease in total extractives, and a concomitant increase in total lignins relative to wild-type plants, more H units relative to wild-type lignins in pom1, arabinose was more abundant in the insoluble residue from pom1,	16159327	1	0
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	det3/pom1 double mutants were severely compromised with respect to plant growth and development. Many of the det3/pom1 double mutants died before bolting	16159327	1	1
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	The pom1/eli1 double mutant was compromised in growth and the rate of development was slow relative to the single mutants. The pom1/eli1 double mutants had very small rosettes, and their leaves accumulated anthocyanins.	16159327	1	1
AT1G11680	CYP51G1	CYP51A2 EMB1738	embryo lethal.	16169959	1	1
AT1G19800			reduced growth, 50% of the seeds are aborted at the embryo heart stage, the seed chloroplasts have reduced galactolipids, and that the galactolipids have reduced 18-carbon fatty acids, leaves accumulate trigalactosyldiacylglycerol, triacylglycerol and phosphatidate	16199613	3	2
AT1G15690	AVP1	ARABIDOPSIS THALIANA V-PPASE 3 ATAVP1 ATAVP3 ATVHP1;1 AVP-3 FUGU 5 FUGU5 VHP1	Shoot defects include: smaller leaves, decreased cell number in leaves, mesophyll and vascular patterning disorganized, cup-shaped cotyledons.Root defects: small cells at apex, columella cell layers reduced to 2, deformed root cap.	16210544	2	2
AT1G70210	CYCD1-1	CYCD1	During germination, the onset of cell proliferation in root tips is significantly delayed and the overall numbers of dividing cells are reduced. The delay in cell cycle activation is linked to delayed radicle emergence.	16227434	2	2
AT1G22275	ZYP1b	ZYP1	Semi-sterile, reduced fertility. Progress through prophase I , meiosisI is delayed.	16230536	1	0
AT1G22260	ZYP1a	ATZYP1a ZYP1	Semi-sterile, reduced fertility. Progress through prophase I , meiosisI is delayed.	16230536	1	0
AT1G63980			Albino plants where total clorophylls and cartenoids are less than 1% and 2%, respectively, of wildtype contents.	16231155	1	1
AT1G63980			Chloroplasts of mesophyll cells completely lack thylakoids and are filled with large vesicles.	16231155	1	1
AT1G63980			Round-shaped chloroplasts in mesophyll cells of mutant (lens-shaped in wildtype).	16231155	1	1
AT1G63970	ISPF	MCS MDS	Albino plants where total clorophylls and cartenoids are less than 1% and 2%, respectively, of wildtype contents.	16231155	1	1
AT1G63970	ISPF	MCS MDS	Chloroplasts of mesophyll cells completely lack thylakoids and are filled with large vesicles.	16231155	1	1
AT1G63970	ISPF	MCS MDS	Round-shaped chloroplasts in mesophyll cells of mutant (lens-shaped in wildtype).	16231155	1	1
AT1G08550			Lacks both zeaxanthin and tocopherols.	16258032	1	1
AT1G08550			Molecules produced during oxidative stress (MDA) accumulate in vte1 npq1 leaves after 7 d in high light, confirming the occurrence of lipid peroxidation. Also, fatty acids and chlorophylls levels decrease in npq1 vte1 leaves.	16258032	1	1
AT1G08550			PSII is strongly photoinhibited and lipid peroxidation is enhanced in the double mutant.	16258032	1	1
AT1G08550			Very sensitive to high light stress. When exposed to high light at low temperature,most of the mature leaves of npq1 vte1 bleached in contrast with wild-type, npq1, or vte1 leaves, which did not exhibit visual symptoms of oxidative stress.	16258032	1	1
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Leaves are rounder and paler than wild-type.	16258034	1	1
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Reduced fertility.	16258034	1	1
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Reduced plant size (rosette diameter of plant is ~80% of that of wild-type).	16258034	1	1
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Suppression of the late-flowering phenotype of introgressed FRI allele.	16258034	1	1
AT1G08260	TIL1	ABA OVERLY SENSITIVE 4 ABO4 EARLY IN SHORT DAYS 7 EMB142 EMB2284 EMB529 EMBRYO DEFECTIVE 142 EMBRYO DEFECTIVE 2284 EMBRYO DEFECTIVE 529 ESD7 POL2A TILTED 1	Twenty-five percent of embryos show abnormal cell divisions during embryogenesis-large cells- decreased rate of cell division. Division of the hypohyseal cell abnormal leading to abnormal placement of the root pole. Homozygotes show delayed flowering, abnormal floraly phyllotaxy and abnormal ovules.	16278345	3	3
AT1G79040			Marked reduction in steady-state of oxygen evolution. 30% reduction in mutant plants grown under standard light conditions and over 50% reduction when grown under low light.	16282331	1	1
AT1G79040			Mutant plants are not more susceptible to donor-site photoinhibition.	16282331	1	0
AT1G79040			Mutant plants exhibit over two-fold higher PSII excitation pressure compared to wildtype plants.	16282331	1	0
AT1G79040			No observable phenotype under normal (125 μmol photons/m2/s), high (450 μmol photons/m2/s) or low (15 or 50 μmol photons/m2/s) light.	16282331	1	0
AT1G79040			Similar amount of PSI and PSII centers while wildtype plants have less PSI centers.	16282331	1	0
AT1G71830	SERK1		double mutants were not able to produce seeds because of a lack of pollen development in mutant anthers. In young buds, double mutant anthers developed normally, but serk1 serk2 microsporangia produced more sporogenous cells that were unable to develop beyond meiosis. Furthermore, serk1 serk2 double mutants developed only three cell layers surrounding the sporogenous cell mass, whereas wild-type anthers developed four cell layers. Further confocal microscopic and molecular analyses showed that serk1 serk2 double mutant anthers lack development of the tapetal cell layer, which accounts for the microspore abortion and male sterility.	16284306	2	2
AT1G34210	SERK2		double mutants were not able to produce seeds because of a lack of pollen development in mutant anthers. In young buds, double mutant anthers developed normally, but serk1 serk2 microsporangia produced more sporogenous cells that were unable to develop beyond meiosis. Furthermore, serk1 serk2 double mutants developed only three cell layers surrounding the sporogenous cell mass, whereas wild-type anthers developed four cell layers. Further confocal microscopic and molecular analyses showed that serk1 serk2 double mutant anthers lack development of the tapetal cell layer, which accounts for the microspore abortion and male sterility.	16284306	2	2
AT1G16150	WAKL4		Seedlings consistently show retarded root growth when grown in full- or one-half-strength MS nutrients and are hypersensitive, as assayed by a root elongation assay, to Na+, K+, Zn2+ and Cu2+.	16286448	1	1
AT1G55600	WRKY10	MINI3	Similar to iku2-3 mutant, seed and embryo smaller in size, however the embryo cell size was comparable to control embryos. Precocious cellularization of the endosperm was observed. Expression levels of IKU2 reduced in mini3-1 background.	16293693	1	1

AT1G55600	WRKY10	MINI3	Similar to the phenotype of parental lines, mini3-1 and iku2-3. Seed size and weight comparable to single mutants lines.	16293693	1	1
AT1G69830	AMY3		Plants cold-shocked for 6h have an increased starch content compared to wildtype.	16297066	1	1
AT1G25350	OVA9	ovule aborTion 9	In heterozygous plants, 39% of ovules are aborted compared to 6% for wild type siblings.	16297076	1	1
AT1G05630	5PTASE13	AT5PTASE13	Compared to wild-type plants, cotyledon veins of At5pt13-1 were with altered numbers (4%), in incorrect vein orientation (16.3%), with additional or altered loops (1.7%), with branches (1.3%), with intersections (1.3%) and fusions (5.3%) of the distal and proximal secondary veins, or with acute angles (3.3%). In addition, the cotyledon veins of At5pt13-1 were asymmetric, with flexed secondary veins and often multiple abnormalities, such as asymmetry, abnormal caecal orientation, or flex (10.7%). Statistical analyses revealed that around 64.7% of the total cotyledons showed obvious abnormality, while the ratio of seedlings with abnormal cotyledons reaches to approximately 90%.	16299182	2	1
AT1G59940	ARR3	response reGulaTor 3	lengthens the period of the clock in all conditions	16326927	1	1
AT1G10470	ARR4	ATRR1 IBC7 INDUCED BY CYTOKININ 7 MEE7 RESPONCE REGULATOR 1 response reGulaTor 4	lengthens the period of the clock in all conditions	16326927	1	1
AT1G50240	TIO	FU	Mutant plants had binucleate mature pollen grains, contrary to tricellular pollen in the wild type, due to failure to undergo cytokinesis at pollen mitosis. Binucleate mutant pollen contained two free nuclei and remained uncellularized. Mature mutant embryo sacs showed various numbers (2 to 5) of nuclei located toward the micropylar pole without visible cellular boundaries. After fertilization, mutant embryo sacs did not develop further and remained uncellularized. At early bicellular pollen stage, approximately 1/3 of dividing microspores had incomplete callose walls, which were correctly positioned at the generative cell pole but do not persist and are degraded before mid-bicellular pollen stage. Subsequently, at mid-bicellular pollen stage, when the generative cell nucleus is highly condensed in wild-type, in approximately 1/3 of mutant pollen, the smaller generative pole nucleus remains round and relatively uncondensed and does not divide further.	16332535		
AT1G50240	TIO	FU	Mutant plants had binucleate mature pollen grains, contrary to tricellular pollen in the wild type, due to failure to undergo cytokinesis at pollen mitosis. Binucleate mutant pollen contained two free nuclei and remained uncellularized. Mature mutant embryo sacs showed various numbers (2 to 5) of nuclei located toward the micropylar pole without visible cellular boundaries. After fertilization, mutant embryo sacs did not develop further and remained uncellularized. At early bicellular pollen stage, approximately 1/2 of dividing microspores had incomplete callose walls, which were correctly positioned at the generative cell pole but do not persist and are degraded before mid-bicellular pollen stage. Subsequently, at mid-bicellular pollen stage, when the generative cell nucleus is highly condensed in wild-type, in approximately 1/2 of mutant pollen, the smaller generative pole nucleus remains round and relatively uncondensed and does not divide further.	16332535		
AT1G48380	RHL1	HYP7	Extreme dwarf in the dark and in the light. Reduced root hair number. Trichome size and branching is reduced. Ploidy defect.	16339310	4	2
AT1G24590	ESR2	DRNL ERF090 SOB2	Dramatically shorter hypocotyl compared to phyB-4 single mutant. Adult plants have curled leaves lacking petioles and irregularly shaped siliques.	16339853	2	0
AT1G31480	SGR2		showed a defect in sedimentation of amyloplasts in the petiole	16344262	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Aborted vascular system containing few protoxylem cells in the primary root. Normal adventitious root-vascular system.	16357038	2	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Adventitious roots are normal.	16357038	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Does not produce lateral roots from the primary root. However, 10 days after germination, lateral roots are formed at the upper part of the hypocotyl rather than at the root-hypocotyl junction.	16357038	2	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Normal vascular system in adventitious roots, although the hypocotyl and primary root develop aborted vascular tissues.	16357038	2	2
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Addition of IAA results in the formation of laterals from the primary root as is the case for wildtype. Both the laterals and primary root show retarded growth and reduced amounts of vascular tissue. Similar phenotypes were obtained with NAA instead of IAA.	16357038	2	2
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Reduction in primary root length (about 5-fold compared to wildtype).	16357038	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	The hypocotyl vascular system only contains xylem cells. Secondary vascular tissue develops in the upper part of the hypocotyl.	16357038	2	0
AT1G27320	AHK3	ORE12	Aborted vascular system containing few protoxylem cells in the primary root. Normal adventitious root-vascular system.	16357038	2	2
AT1G27320	AHK3	ORE12	Adventitious roots are normal.	16357038	1	1
AT1G27320	AHK3	ORE12	Does not produce lateral roots from the primary root. However, 10 days after germination, lateral roots are formed at the upper part of the hypocotyl rather than at the root-hypocotyl junction.	16357038	2	2
AT1G27320	AHK3	ORE12	Normal vascular system in adventitious roots, although the hypocotyl and primary root develop aborted vascular tissues.	16357038	2	2
AT1G55870	AHG2	ATPARN	Hypersensitive to exogenous and endogenous ABA during germination due to accumulation of high levels of ABA. The lengths of the main root, hypocotyl and stem of ahg2-1 were significantly shorter than those of the wild type. The growth rate of the main root was apparently reduced. The leaf size (length and width) in ahg2-1 was reduced to just over half , but the number of rosette leaves was not affected markedly. The reduced size of the ahg2-1 plant is due mainly to the reduced cell size, not to a reduced number of cells. Fertility was not affected. Sensitive to salicylic acid	16359390	5	5
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Almost completely infertile but can be allowed to self-fertilize under favorable temperature and light conditions.	16361392	2	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Chlorophyll content about 35% of that of wild-type.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Delay in flowering induction.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Delay in rate of leaf formation. Longer plastochrone.	16361392	2	2
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Downwards bending of cotyledons indicating differential growth in the adaxial and abaxial sides.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Early germination compared to wild-type.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Increase in trans-zeatin (16-fold) and trans-zeatin ribosides (9-fold) concentrations. 50-fold concentration increase for zeatin-O-glucoside.	16361392	3	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Increased cytokinin resistance compared to double mutant ahk2-5 ahk3-7.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Increased seed size, largely due to increased size of the embryo. Embryonic root epidermal cells increased 15% in number and 30% in size compared to wild-type.	16361392	2	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Leaf epifermal cell size is increased about three-fold compared to wild-type cells, in young as well as older leaves.	16361392	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Shorter hypocotyls than wild-type when grown in white light but increase in length when grown in darkness (~25%) and red- and far-red-light.	16361392	2	2
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Stronger reduction of shoot development compared to double mutant ahk2-5 ahk3-7.	16361392	1	0

AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Total loss of cytokinin-dependent chlorophyll retention in leaves (under dark conditions causing the so-called 'dark-induced senescence').	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Displays secondary lateral root branching (not seen in wild-type).	16361392	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	With a few exceptions, no increase in zeatin concentrations.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Resistant to cytokinin-induced hypocotyl shortening.	16361392	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Two- to three-fold increase of concentrations of all zeatin metabolites.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No difference in chlorophyll content compared to wild-type.	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No loss of cytokinin-dependent chlorophyll retention in leaves (under dark conditions causing the so-called 'dark-induced senescence').	16361392	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Shoot development indistinguishable from that of wild-type.	16361392	1	0
AT1G27320	AHK3	ORE12	Chlorophyll content further reduced compared to single mutant ahk3-7.	16361392	1	0
AT1G27320	AHK3	ORE12	Displays secondary lateral root branching (not seen in wild-type).	16361392	1	1
AT1G27320	AHK3	ORE12	Downwards bending of cotyledons indicating differential growth in the adaxial and abaxial sides.	16361392	1	1
AT1G27320	AHK3	ORE12	Early germination compared to wild-type.	16361392	1	0
AT1G27320	AHK3	ORE12	Enhancement of phenotype observed for single mutant ahk3-7: Reduced ability to respond to cytokinin by callus or shoot formation.	16361392	1	1
AT1G27320	AHK3	ORE12	Enhancement of phenotype observed in single mutant ahk3-7: Mutant seedlings grow better and form darker green leaves in the presence of elevated levels of cytokinins in medium. Increased cytokinin resistance	16361392	2	2
AT1G27320	AHK3	ORE12	Epidermal cells of fifth leaf at maturity are about double in size compared to wild-type cells. Leaves formed at later stages are similar to wild-type.	16361392	2	1
AT1G27320	AHK3	ORE12	Further reduction of rosette diameter size compared to single mutant ahk3-7.	16361392	1	1
AT1G27320	AHK3	ORE12	No alteration of flowering induction timing.	16361392	1	1
AT1G27320	AHK3	ORE12	No alteration of rate of leaf formation.	16361392	1	1
AT1G27320	AHK3	ORE12	Reduced length and width of leaves but overall form and heteroblasty is not altered.	16361392	1	0
AT1G27320	AHK3	ORE12	Resistant to cytokinin-induced hypocotyl shortening.	16361392	1	1
AT1G27320	AHK3	ORE12	Three- to tenfold higher cytokinin concentrations required to induce callus formation and growth. Shoot formation very rarely observed in double mutant explants.	16361392	2	0
AT1G27320	AHK3	ORE12	Total loss of cytokinin-dependent chlorophyll retention in leaves (under dark conditions causing the so-called 'dark-induced senescence').	16361392	1	1
AT1G27320	AHK3	ORE12	Two- to three-fold increase of concentrations of all zeatin metabolites.	16361392	1	0
AT1G27320	AHK3	ORE12	Almost completely infertile but can be allowed to self-fertilize under favorable temperature and light conditions.	16361392	2	1
AT1G27320	AHK3	ORE12	Chlorophyll content about 35% of that of wild-type.	16361392	1	0
AT1G27320	AHK3	ORE12	Delay in flowering induction.	16361392	1	1
AT1G27320	AHK3	ORE12	Delay in rate of leaf formation. Longer plastochrone.	16361392	2	1
AT1G27320	AHK3	ORE12	Increase in trans-zeatin (16-fold) and trans-zeatin ribosides (9-fold) concentrations. 50-fold concentration increase for zeatin-O-glucoside.	16361392	3	0
AT1G27320	AHK3	ORE12	Increased cytokinin resistance compared to double mutant ahk2-5 ahk3-7.	16361392	1	0
AT1G27320	AHK3	ORE12	Increased seed size, largely due to increased size of the embryo. Embryonic root epidermal cells increased 15% in number and 30% in size compared to wild-type.	16361392	2	1
AT1G27320	AHK3	ORE12	Leaf epifermal cell size is increased about three-fold compared to wild-type cells, in young as well as older leaves.	16361392	1	1
AT1G27320	AHK3	ORE12	Shorter hypocotyls than wild-type when grown in white light but increase in length when grown in darkness (~25%) and red- and far-red-light.	16361392	2	1
AT1G27320	AHK3	ORE12	Stronger reduction of shoot development compared to double mutant ahk2-5 ahk3-7.	16361392	1	0
AT1G27320	AHK3	ORE12	Chlorophyll content about 75% of that of wild-type.	16361392	1	0
AT1G27320	AHK3	ORE12	Final height of mutant plant about two-thirds of that of wild-type.	16361392	1	0
AT1G27320	AHK3	ORE12	Mutant seedlings grow better and form darker green leaves in the presence of elevated levels of cytokinins in medium.	16361392	2	1
AT1G27320	AHK3	ORE12	No loss of cytokinin-dependent chlorophyll retention in leaves (under dark conditions causing the so-called 'dark-induced senescence').	16361392	1	0
AT1G27320	AHK3	ORE12	Reduced ability to respond to cytokinin by callus or shoot formation.	16361392	1	1
AT1G27320	AHK3	ORE12	Rosette diameter reduced ~15% compared to wild-type.	16361392	1	1
AT2G03720	MRH6	morphoGenesis of rooT hair 6	Multiple straight hairs	16367956	1	0
AT1G77760	NIA1		Guard cells do not generate NO in response to H2O2 and are not significantly different to untreated controls.	16367958	2	1
AT1G77760	NIA1		Significantly impaired in NO biosynthesis in response to exogenous H2O2 compared to wild-type.	16367958	1	1
AT1G77760	NIA1		Stomatal aperture not affected by treatment with sodium nitroprusside (SNP).	16367958	1	1
AT1G64060	RBOHF	RBOHAP108	ABA fails to induce significant nitric acid (NO) production in the guard cells of this double mutant.	16367958	1	1
AT1G37130	NIA2		Guard cells do not generate NO in response to H2O2 and are not significantly different to untreated controls.	16367958	2	1
AT1G37130	NIA2		Significantly impaired in NO biosynthesis in response to exogenous H2O2 compared to wild-type.	16367958	1	1
AT1G37130	NIA2		Stomatal aperture not affected by treatment with sodium nitroprusside (SNP).	16367958	1	1
AT1G08860	BON3		Seedling lethal at 22 and 28C.	16367962	1	1
AT1G08860	BON3		Seedling lethal at 22C. Viable at 28C.	16367962	1	0
AT1G04250	IAA17		Less sensitive to brassinolide than wildtype, in terms of dark-grown hypocotyl elongation.	16367964	1	1
AT1G04250	IAA17		The mutant is less affected by brassinolide than wildtype with regard to inhibition of root elongation.	16367964	1	1
AT1G63440	HMA5		Accumulation of Cu in both roots and shoots of mutant when grown on medium containing 10 μM Cu.	16367966	1	1
AT1G63440	HMA5		During early stages of development, the seedlings are chlorotic and smaller than wild-type.	16367966	1	1
AT1G63440	HMA5		Increasingly retarded development of seedlings when grown on media containing increasing concentrations of Cu.	16367966	1	1
AT1G63440	HMA5		Seedlings germination is totally arrested (both aerial parts and roots) when grown on 50 microM Cu.	16367966	1	1
AT1G63440	HMA5		Seedlings grown on 30 μM Cu display yellow cotyledons, with completely arrested root growth.	16367966	1	1
AT1G18350	MKK7	BUD1	bud1 plants develop significantly fewer lateral roots, simpler venation patterns, and a quicker and greater curvature in the gravitropism assay. In addition, the bud1 plants have shorter hypocotyls at high temperature (29C) under light, which is a characteristic feature of defective auxin action. Determination of tritium-labeled indole-3-acetic acid transport showed that the increased expression of MKK7 in bud1 or the repressed expression in MKK7 antisense transgenic plants causes deficiency or enhancement in auxin transport, indicating that MKK7 negatively regulates polar auxin transport.	16377756	3	2
AT1G48050	KU80	ATKU80 KU80-LIKE PROTEIN	Increased susceptibility to T-DNA transformation.	16380432	1	0
AT1G80100	HP6	AHP6	increased number of vascular cell files with intervening procambial and phloem cell files; protoxylem differentiation occurred sporadically along the root	16400151	2	1
AT1G80100	HP6	AHP6	increased number of vascular cell files with intervening procambial and phloem cell files; protoxylem differentiation occurred sporadically along the root	16400151	2	1
AT1G58200	MSL3		no observable phenotype	16401419		
AT1G27320	AHK3	ORE12	delayed leaf senescence; chlorophyll content and the photochemical efficiency of photosystem II (Fv/Fm) physiological markers of leaf senescence, were maintained at higher levels in the ore12-1 mutant with age of the leaves; chlorophyll a/b-binding protein (CAB) gene and a senescenceassociated gene SAG12 were expressed at higher and lower levels, respectively; mutation greatly delayed dark-induced leaf senescence	16407152	4	4

AT1G78390	NCED9		No visible phenotype was observed during vegetative stage. When germinated on medium supplemented with paclobutrazol, germination rate was higher in double mutant seeds than in the single mutants or wild type, i.e., paclobutrazol resistance was enhanced in double mutant seeds. Dormancy was reduced in double mutants, and levels of ABA in the seeds were up to 18% lover than in the wild type or single mutants.	16412079	3	3
AT1G30950	UFO	AT1G30950, F17F8.16, UNUSUAL FLORAL ORGANS	Petals are usually missing in ufo-11 flowers or are sometimes replaced by filaments or petal/stamen mosaic organs. ufo-11 flowers have fewer second-whorl organs compared with rbe-3 mutants and also sometimes produce mosaic petaloid stamens in the third whorl.	16412084	3	1
AT1G30950	UFO	AT1G30950, F17F8.17, UNUSUAL FLORAL ORGANS	Double-mutant flowers have a phenotype that is similar to ufo-11 flowers.	16412084	1	0
AT1G30950	UFO	AT1G30950, F17F8.18, UNUSUAL FLORAL ORGANS	Double mutant has the same phenotype as the ufo-2 single mutant. There is no increase in the number of filaments and/or staminoid organs in the double mutant as compared with ufo-2.	16412084	1	0
AT1G74660	MIF1	mini zinc finGer 1	Constitutive overexpression of MIF1 caused dramatic developmental defects, including dwarfism, reduced apical dominance, extreme longevity, dark-green leaves, altered flower morphology, poor fertility, reduced hypocotyl length, spoon-like cotyledons, reduced root growth, and ectopic root hairs on hypocotyls and cotyledons. In addition, 35S::MIF1 seedlings underwent constitutive photomorphogenesis in the dark, with root growth similar to that in the light. Furthermore, 35S::MIF1 seedlings were demonstrated to be non-responsive to gibberellin (GA) for cell elongation, hypersensitive to the GA synthesis inhibitor paclobutrazol (PAC) and abscisic acid (ABA), and hyposensitive to auxin, brassinosteroid and cytokinin, but normally responsive to ethylene. The de-etiolation defect could not be rescued by the hormones tested.	16412086	4	2
AT1G15570	CYCA2-3	CYC3C	Homozygous mutant plants [CYCA2;3(-/-)] did not show any phenotype with morphology or growth rates obviously different from those of the wild type. However, the nuclei in trichomes of the mutant plants were larger than those of wild-type trichomes. The proportion of trichomes with four ranches was significantly higher and that of three-branch trichomes was significantly lower in the mutant than in the wild type. The mutation significantly increased the proportion of cells with a ploidy levels of 16C or higher	16415207	4	1
AT1G64670	BDG1	BODYGUARD1 CED1	Abnormal leaf shape and size, fused organs, abnormal cuticle with increased wax layers, increased wax content,reduced trichome numbers.	16415209	3	1
AT1G53700	WAG1	PK3	Similar to wild type when seedlings were grown on vertical plates.	16460509	1	1
AT1G53700	WAG1	PK3	Morphologically similar to wild type. When seedlings were grown on vertical plates, root exhibited pronounced wavy pattern.	16460509	2	2
AT1G53700	WAG1	PK3	Morphologically similar to wild type. When seedlings were grown on vertical plates, root exhibited slight wavy pattern. Overall phenotype identical to wag1-1 mutant allele.	16460509	3	3
AT1G53700	WAG1	PK3	Morphologically similar to double mutant wag1-1/wag2-1. When seedlings were grown on vertical plates, root exhibited pronounced wavy pattern. Gravitropism was not affected in mutant plants. Double mutant plants were more resistant to inhibition of root curling by auxin transport inhibitor NPA than wild type plants.	16460509	3	2
AT1G80340	GA3OX2	GA4H	30% smaller in leaf dimater and 37% shorter than single mutant ga3ox1-3.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Dwarf phenotype.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Increased levels of GA9.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Same number of leaves as wildtype but flowers seven days later.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Seeds failed to germinate in the dark and only 5% germinate in light conditions.	16460513	1	1
AT1G80340	GA3OX2	GA4H	Severe decrease in levels of bioactive GA4.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Severe defect in root length.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Root length similar to that of wildtype.	16460513	1	0
AT1G80340	GA3OX2	GA4H	Seed germination similar to wildtype in both dark and light conditions.	16460513	1	1
AT1G15550	GA3OX1	GA4	Decrease in levels of bioactive GA4.	16460513	1	1
AT1G15550	GA3OX1	GA4	Increased levels of GA9.	16460513	1	1
AT1G15550	GA3OX1	GA4	Roots shorter than that of wildtype.	16460513	1	0
AT1G15550	GA3OX1	GA4	Same number of leaves as wildtype but flowers three days later.	16460513	1	1
AT1G15550	GA3OX1	GA4	Seed germination similar to wildtype in both dark and light conditions.	16460513	1	0
AT1G15550	GA3OX1	GA4	Semi-dwarf phenotype.	16460513	1	1
AT1G15550	GA3OX1	GA4	30% smaller in leaf dimater and 37% shorter than single mutant ga3ox1-3.	16460513	1	1
AT1G15550	GA3OX1	GA4	Dwarf phenotype.	16460513	1	1
AT1G15550	GA3OX1	GA4	Same number of leaves as wildtype but flowers seven days later.	16460513	1	1
AT1G15550	GA3OX1	GA4	Seeds failed to germinate in the dark and only 5% germinate in light conditions.	16460513	1	1
AT1G15550	GA3OX1	GA4	Severe decrease in levels of bioactive GA4.	16460513	1	1
AT1G15550	GA3OX1	GA4	Severe defect in root length.	16460513	1	1
AT1G19220	ARF19		Long hypocotyl and elongated primary roots when germinated and grown on MS with sirtinol in darkness. Auxin resistant in both light and dark. Roots are less sensitive to the ethylene precursor ACC than wt roots.	16461383	3	2
AT1G19220	ARF19		Dark grown seedlings on sirtinol have both long primary roots and long hypocotyls. More resistant to 2,4-D and IAA than single mutants in both light and dark. The ethylene resistant root phenotype of arf19-101 is enhanced by arf7-201.	16461383	3	1
AT2G02810	UTR1		ER-derived vesicles obtained from atutr1 plants had a decreased uptake of UDP-glucose compared to the wild type. BiP and Calnexin are overexpressed in the mutant, suggesting that atutr1 plants have the unfolded protein response constitutively activated.	16467298	2	0
AT1G71830	SERK1		Exacerbation of phenotypes observed for single mutant bri1-6: petiole length, inward curling, inlforescence length and rosette size.	16473966	1	1
AT1G59870	PEN3		mutants allow increased penetration by inappropiate pathogens (eg barley powdery mildew Blumeria graminis f. sp hordei, Erysiphe pisi (tribe Erysipheae), and B. g. hordei (tribe Blumerieae)). pen3-1 mutants are resistant to E. cichoracearum and become chlorotic after E. cichoracearum infection.	16473969	2	2
AT1G12240	BFRUCT4	BETAFRUCT4	Significantly shorter roots. 50% reduction in vacuolar invertase (Vac-Inv) activity compared to parental line.	16481625	2	0
AT1G10270	GRP23		Mutation is lethal D608in the homozygous state.	16489121	1	1
AT1G10270	GRP23		In addition to the arrested embryo phenotype, aberrant cell divisions were also observed: These resulted in the formation of an elongated apical cell or embryo proper instead of the typical globular embryo in wild-type plants. A notable phenotype of the set09078 mutant is that ~19% of the mutant embryos displayed aberrant positioning of the division planes and asynchronous divisions. Furthermore, asynchronous divisions of the embryo proper and suspensor cells were observed.	16489121	1	1
AT1G10270	GRP23		In the homozygous mutant progeny, embryo development was arrested at the early globular stage. Although the normal embryos continued to develop, the arrested embryos subsequently became shriveled and finally degenerated. The mutant embryos never reached the heart stage but arrested by the early globular stage. Despite the aberrant embryo development phenotype, no developmental defect was observed during endosperm development in the mutant ovules.	16489121	3	3
AT1G10270	GRP23		Of the 269 mutant embryos examined, 6% were arrested at the 1-cell embryo stage, 19% were arrested at the 2- to 4-cell stage, 38% were arrested from the 6-cell to the 8-cell stage, and 18% were arrested at the 16-cell stage.	16489121	2	0
AT1G31800	CYP97A3		18% reduction in lutein and accumulates α-cryptoxanthin and α-carotene. The latter was shown to be almost exclusively localized in photosystems.	16492736	2	1
AT1G31800	CYP97A3		Decrease in β-carotene level.	16492736	1	0
AT1G31800	CYP97A3		Reduction in total β,β-carotenoids and increase in total β,ε-carotenoids.	16492736	2	1
AT1G31800	CYP97A3		Accumulates α-carotene and zeinoxanthin at levels nearly identical to lut5-1 and lut1-4 single mutants, respectively.	16492736	1	0
AT1G31800	CYP97A3		Same as lut5-1 but weaker allele.	16492736	1	0
AT1G03310	ISA2	DBE1	No reduction in maltose and matotriose production.	16495218	1	0
AT1G64440	UGE4	REB1 RHD1	Less galactose in root cell wall compared to wildtype. No difference in shoot cell wall monosaccharide composition.	16500990	2	2
AT1G64440	UGE4	REB1 RHD1	No observed effect of the structure of both rhamnogalacturonan I and II.	16500990	1	0
AT1G64440	UGE4	REB1 RHD1	Root length defect was restored when mutant was grown on 10mM galactose.	16500990	1	1
AT1G64440	UGE4	REB1 RHD1	Structural changes of xyloglucan in roots, not in shoots.	16500990	1	1
AT1G64440	UGE4	REB1 RHD1	Using the monoclonal antibody CCRC-M1, specific for α-L-fucp(1->2)-β-D-Galp side chains, swollen trichoblasts were not stained while atrichoblasts and non swollen trichoblasts were. All cell types were stained in wildtype. Staining was restored when the mutant was grown on 10mM D-galactose.	16500990	1	1

AT1G10760	SEX1		Starch content similar to that observed in the sex1-3 single mutant, and different from that of sex4-5. At the end of the light period, the starch content of the double mutant was 1.7-fold that of sex4-5, and not different from that of sex1-3. At the end of the dark period, its starch content was twice that of sex4-5, and 80% of that of sex1-3.	16513634	3	1
AT1G79840	GL2	GLABRA 2 HOMEOBOX PROTEIN GLABRA 2	No leaf trichomes. Has lower seed density and higher (8% increase) seed oil content. No difference in seed size, weight, or fatty acid composition.	16514561		
AT1G32990	RPL11		Defective in both mitochondrial and plastid gene expression.	16517761	1	1
AT1G32990	RPL11		Double mutant leaves were identical to those of the prpl11-1 single mutant in terms of thylakoid protein composition and photosynthetic performance.	16517761	1	0
AT1G32990	RPL11		No increase in H202 content in light- or dark-adapted mutant plants.	16517761	1	0
AT1G32990	RPL11		Pale-green leaves and a drastic reduction in size.	16517761	1	1
AT1G32990	RPL11		The photosynthetic performance of the double mutant is identical to that of prpl11-1 plants (Fv/Fm, 0.69 versus 0.79 in the wild type; ΦII, 0.53 versus 0.75 in the wild type; 1-qP, 0.06 versus 0.05 in the wild type).	16517761	2	1
AT1G32990	RPL11		prors1-like transcriptional response.	16517761	1	0
AT1G62750			Chloroplast differentiation was severely impaired in cotyledons but not in true leaves during early seedling growth, giving rise to the seedlings with white cotyledons. In scd1 chloroplast biosynthesis is slowed down leading to a delayed greening in cotyledons. Seed germination was delayed too in both, dark-grown seeds and light exposed seeds. Adult mutant plants had flowering time delayed for a week, while plant senescence was not affected. Mutant plants had reduced fresh weight throughout the life cycle. Seed set was affected too; mutant plants had reached only 40% of amount of seeds produced by the wild type plants.	16525888		
AT1G19250	FMO1		Loss of RPP2 resistance without effect on salicylic acid accumulation; increased susceptibility to virulent Pseudomonas syringae infection.	16531493	2	1
AT1G02910	LPA1	LOW PSII ACCUMULATION1	The leaves of the mutant are paler than those of the wild type, and growth is significantly reduced. The leaf area of the mutant is ~75% lower than that of wild-type plants 26 d after germination.	16531500	2	0
AT1G02910	LPA1	LOW PSII ACCUMULATION1	The mutants have defects in energy transfer within PSII or a partial loss of PSII capacity.	16531500	1	0
AT1G02910	LPA1	LOW PSII ACCUMULATION1	The relative amounts of the PSII core subunits CP47, CP43, D1, and D2 is greatly reduced in the mutant, especially the PSII dimer.	16531500	1	0
AT1G02910	LPA1	LOW PSII ACCUMULATION1	Wild-type chloroplasts are larger than those of the mutant and have a larger number of discs per grana stack on average. In addition, the wild-type chloroplasts display well-developed membrane systems composed of grana connected by the stroma lamellae, but the thylakoid membrane systems in mutant chloroplasts are disturbed, and the membrane spacing is not as clear.	16531500	1	0
AT1G78580	TPS1		Arrest at torpedo stage during embryo development. Can germinate after cold stratification and extended incubation. Embryos show increased deposition of cell wall material.	16553896	3	2
AT1G78580	TPS1		Enzymatic activities that typically peak during early maturation of wildtype embryos are also detected in the mutant at 12 DAF. OF these, both NAD-malic E and IDH activities then decreases significantly at 15 DAF and the expected drop in PFK activity is delayed.	16553903	2	1
AT1G78580	TPS1		G6PDH, 6PGDH, AGPase and GK activities, which typically peak at 9-12 DAF in wildtype, all show a reduction at the equivalent temporal stage in the mutant.	16553903	1	1
AT1G78580	TPS1		With the exception of ADH, all other enzymatic activities increase with the onset of maturation.	16553903	1	1
AT1G13980	GN	EMB30 GBF3 MIZ2 VAN7	Mutant embryos exhibit wildtype-like staining patterns for most of the activities analysed: G6PDH, 6PGDH, GK, PGM, PGI and ADH.	16553903	1	0
AT1G68480	JAG	JAGGED	Strong enhancement of defects in leaf, stamen and carpel development compared with jag single mutants.	16554365	1	1
AT1G13400	JGL	NUB	Strong enhancement of defects in leaf, stamen and carpel development compared with jag single mutants.	16554365	1	1
AT1G13400	JGL	NUB	no visible phenotypic effect	16554365	1	0
AT1G69940	PPME1	ARATH9	20% decrease in pectin methylesterase activity compared to wild-type.	16564517		
AT1G69940	PPME1	ARATH9	Curved, irregular morphology of pollen tubes, which are drastically stunted. This phenotype is visible early in the germination process (6h after germination). The pollen tube remains dramatically shorter as growth procedes (tested at 24h after germination).	16564517		
AT1G69940	PPME1	ARATH9	No obvious differences in the morphology of the ungerminated pollen grains.	16564517		
AT1G69940	PPME1	ARATH9	Seed production and fertility are similar to those of wild-type.	16564517		
AT1G69940	PPME1	ARATH9	The average rate of pollen tube elongation is significantly lower than that of wild-type.	16564517		
AT1G24490	ALB4	ALBINA 4 ARTEMIS	Mutant plants have altered shape of chloroplasts. Plastids somewhat larger (~20%) and more spherical in appearance compared to that of wild-type plants of the same stage and in the same tissue. The grana stacks in mesophyll cells of mutant plants are less appressed than in the wild-type chloroplasts whereas the structure of the stacks is not affected.	16595657	3	1
AT1G80840	WRKY40		sixfold reduction in the growth of the bacterial pathogen PstDC3000	16603654	1	1
AT1G80840	WRKY40		Ninefold reduction in the growth of the bacterial pathogen PstDC3000. extensive chlorosis. more susceptible to the fungal pathogen B. cinerea than the double mutants.	16603654	3	2
AT1G80840	WRKY40		little reduction in the growth of the bacterial pathogen PstDC3000	16603654	1	1
AT1G80840	WRKY40		no reduction in the growth of the bacterial pathogen PstDC3000.	16603654	1	1
AT1G22770	GI		Observed temperature-dependent effects on both period and rhythm robustness as those seen in gi-11.	16617099	1	1
AT1G22770	GI		Although at 17°C, the gi mutant and the wild type have no significant period difference (measured by the free-running periods of the leaf movement rhythms), as the temperature increased (22 and 27°C), the period of the mutant becomes significantly shorter than that of the wild type.	16617099	2	2
AT1G22770	GI		In addition to a shortening of the period, a temperature-dependent increase in the variance of period was seen for the mutant, with the variance increasing from 3.1 at 17°C to 18.0 at 27°C (F test P = 1.8x10-9). Although an increase in the variance of period with temperature was also observed for the wild type, this was not of the same magnitude (from 1.9 at 17°C to 3.8 at 27°C; F test P = 4.1x10-3).	16617099	2	2
AT1G03160	FZL	FZO-like	Similar to SALK 033745 line	16617119	1	0
AT1G03160	FZL	FZO-like	The leaves were visibly pale, and flowering was delayed by 5-7 days compared with the wild type plants. Mature mesophyll cells in mutant leaves contained fewer, larger chloroplasts than in wild type, and these were heterogeneous in size. This phenotype was more pronounced in older than in younger leaves. Mesophyll cell chloroplasts in wild type and mutant plants also differed ultrastructurally. In mutants, grana lamellae were less uniform in length and stacked in a staggered fashion, giving rise to a disorganized thylakoid array. Stroma thylakoids appeared less abundant than in wild type chloroplasts. In contrast, stroma thylakoids in mutants were similar in length to those in wild type but constituted a smaller proportion of the total thylakoid network.	16617119	5	0
AT1G74710	ICS1		Defective in phylloquinone biosynthesis.	16617180	1	1
AT1G74710	ICS1		Contains about 18% of wild-type phylloquinone content but 50-70% of wild-type PSI activity.	16617180	2	2
AT1G68890	PHYLLO		Defective in phylloquinone biosynthesis.	16617180	1	1
AT1G68890	PHYLLO		Exhibits 5-15% of wild-type D647 I (PSI) activity whereas that of photosystem II (PSII) is only reduced to about 75% of wild-type levels.	16617180	1	0
AT1G68890	PHYLLO		High chlorophyll fluorescence (hcf) phenotype associated with photosynthetic lesion.	16617180	1	1
AT1G68890	PHYLLO		Levels of chlorophyll are 41% of wild-type levels. When grown in the presence of the metabolic precursor 1,4-dihydroxy-2-naphtoate (NA), mutant plants exhibit wild-type levels of chlorophyll.	16617180	2	2
AT1G68890	PHYLLO		Mutant plants fail to quench the fluorescence efficiently upon illumination, indicating that the limiting step of the linear electron transport lies behind PSII.	16617180	1	0
AT1G68890	PHYLLO		Reduced PSI stability.	16617180	1	0
AT1G68890	PHYLLO		Seedling lethal.	16617180	1	0
AT1G18870	ICS2	ATICS2 isochorismaTe synThase 2	Defective in phylloquinone biosynthesis.	16617180	1	0
AT1G18870	ICS2	ATICS2 isochorismaTe synThase 2	Contains about 18% of wild-type phylloquinone content but 50-70% of wild-type PSI activity.	16617180	2	1
AT1G64070	RLM1		Reduced resistance to Leptosphaeria maculans, causal agent of blackleg disease.	16623885	1	1
AT1G63880		AT1G63880, T12P18.10, T12P18_10	Reduced resistance to Leptosphaeria maculans, causal agent of blackleg disease.	16623885	1	0

AT1G21270	WAK2		On pond water without sucrose, most wak2-1 seedlings arrested or slowed growth. The wak2-1 seedlings were significantly ($P < 0.001$) shorter than wild-type, with the roots being affected more than the hypocotyls. Arrest of wak2-1 on pond water was rescued by the addition of 60 mM sucrose, fructose or glucose, but not sorbitol or mannitol. When grown in the dark for 3 weeks on soil, wak2-1 plants have less hypocotyl extension than wild type. wak2-1 affects the rate of cell elongation in roots. than the wild-type	16623892	6	1
AT1G32240	KAN2	KANADI 2	Similar to kan1 kan2 double mutant. However, the ovules have a novel phenotype, forming a single amorphous structure in place of both integuments.	16623911	1	1
AT1G32240	KAN2	KANADI 2	External structures of the carpel are largely absent. Ovules arise from a surface or column of tissue at the center of the flower. The inner integuments of these ovules are normal but the asymmetrical outer integument is now a nearly symmetrical and relatively amorphous collar of tissue.	16623911	1	1
AT1G23420	INO	INNER NO OUTER	Outer integument of the ovule is absent and the inner integument is replaced by a relatively amorphous collar-like structure.	16623911	1	0
AT1G69490	NAC029	ANAC029 NAC29 NAP	Significantly delayed leaf senescence.	16640597	1	1
AT1G02580	MEA	EMB173 EMBRYO DEFECTIVE 173 FIS1 MEDEA SDG5	Mutant homozygous mea embryo sacs accumulated 45 times more maternal transcripts than wild-type before fertilization, and it persisted after fertilization (7.5 times more transcripts 4 d after pollination.	16651654	1	0
AT1G22700			Plants grown on sucrose supplemented media have reduced growth rate. Seedlings have pale yellow leaves that are thinner and more transparent than wild type. Under UV light they display high chlorophyll fluorescence. Plants lack functional photosystem I. Chloroplasts are morphologically abnormal with few lamellae and no assimilatory starch.	16679416	4	2
AT1G69120	AP1	AGAMOUS-like 7 AGL7 APETALA1 ATAP1	Unlike the agl24-2 svp-41 double mutant, where severe phenotypes similar to the lug mutant were only observed when plants were grown at 30°C, in the ap1-12 agl24-2 svp-41 triple mutant, severe lug-type phenotypes were observed under normal growing conditions (22°C).	16679456	1	1
AT1G69440	AGO7	ZIP	Downward-curled leaf margins.	16682354		
AT1G50055			No obvious leaf developmental defects.	16682354		
AT1G48410	AGO1		TAS1, TAS2, and TAS3 ta-siRNAs were below detectable levels.	16682354		
AT1G66340	ETR1		Weak ethylene-insensitivity of etr1-2 is suppressed by rte1-2. Ethylene responses are similar to those of the wild type.	16682642	1	1
AT1G08430	ALMT1		On A13+ medium, the mutant has significantly shorter roots than the Col wild type. In the absence of aluminum stress, the roots of mutant and wild type grew similarly.	16740662	1	1
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No defect in root vasculature morphology.	16753566		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Normal vascular morphology.	16753566		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Strong suppression of wol-1 mutant phenotype. Phenotype close to that of wild-type.	16753566		
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Weak suppression of wol-1 mutant phenotype. Phenotype intermediate between that of wol-1 and wild-type.	16753566		
AT1G15750	TPL	WSIP1	Embryos form cotyledons at the transition stage of embryogenesis that appear slightly stunted at later stages compared to wt embryos.	16763149	1	1
AT1G15750	TPL	WSIP1	No obvious phenotype when grown at the restrictive temperature (29 degrees C) that produces the topless phenotype in the tpl-1 mutant.	16763149	1	1
AT1G12410	CLPR2	NCLPP2	Yellow/pale-green phenotype and reduced growth. Reduced accumulation of ClpPRS complex. Reduced chloroplast size and thylakoid accumulation. Delayed plant development.	16766689	4	2
AT1G78570	RHM1	ROL1	No significant differences in the amounts of the major sugars of cell wall material, including Rha, were identified between the WT and rol1-2. However, rol1-2 and lrx1 rol1-2 showed an approx 30% reduction in the RG II-specific monosaccharides 2-O-methyl-D-xylose and 2-O-methyl-L-fucose. These methylated sugars are diagnostic components of the two large Rha-containing side chains of RG II, and their reduced abundance may reflect a defect in the synthesis of RG II.	16766693	1	1
AT1G32200	ATS1		altered fatty acid composition (strongly reduced C16 content), 25% reduction of phosphatidylglycerol content, no obvious growth defect.	16774646	1	0
AT1G73360	HDG11	HDGL2-11	More branched trichomes compared with the wild type.	16778018	1	1
AT1G73360	HDG11	HDGL2-11	Obvious enhancement of the excess branching phenotype of the hdg11-1 trichome.	16778018	1	1
AT1G73360	HDG11	HDGL2-11	The hdg11-2 mutant has increased trichome branching.	16778018	1	1
AT1G17920	HDG12		Obvious enhancement of the excess branching phenotype of the hdg11-1 trichome.	16778018	1	1
AT2G01940	SGR5	IDD15	Reduced shoot gravitropism compared with wild-type Ler.	16813575	1	1
AT2G01940	SGR5	IDD15	Inflorescence stems of mutant plants showed abnormal gravitropic response, while gravitropism in hypocotyls and roots was not altered.	16813575	1	1
AT1G33980	UPF3		late flowering in long day growth conditions; narrower and more jagged rosette leaves than both wild-type plants; aberrant flower formation.	16813578	1	1
AT1G19800	ABCI14		Compared to the wild type, mutant plants were consistently smaller and slightly pale, as was observed for the tgd1-1 mutants. Chlorophyll contents (Chlorophyll per gram of fresh weight) were reduced to a similar extent in the tgd1-1 and tgd2-1 mutants. Mutant plants had aberrant accumulation of oligogalactolipids and triacylglycerols; this was consistent with a disruption of the import of ER-derived lipids into the plastid.	16818883	3	1
AT2G02220	LRR-RLK		Compared to wildtype, mutant cells gradually lose their ability to form calluses as they age.	16829587	1	1
AT2G02220	LRR-RLK		Mutant calluses exhibit premature signs of senescence (browning within 3 weeks).	16829587	1	1
AT2G02220	LRR-RLK		Mutant leaves display premature senescence four weeks after germination and are fully senesced after six weeks.	16829587	1	1
AT2G02220	LRR-RLK		Treatment of hypocotyl segments of the mutant with auxin/cytokinin resuls in normal calluses development.	16829587	1	1
AT2G02220	LRR-RLK		When grown on B5 agar, the mutant seedlings were indistinguishable from wildtype, albeit with a slight reduction in root growth. After three weeks of culture, the mutant was morphologically identical from above-ground widltype plants.	16829587	1	0
AT2G02220	LRR-RLK		Whereas wildtype callus' growth is significantly promoted by 10mM phytosulfokine (PSK), calluses of the mutant are less sensitive to PSK.	16829587	1	0
AT1G78590	NADK3		SALK_079342 (nadk3) is hypersensitive to oxidative stress, ABA and osmotic stress.	16856986	1	1
AT2G15290	TIC21	CIA5 PIC1	Seedling lethal when grown on soil, but produced albino leaves or even inflorescent tissues on synthetic media supplemented with sucrose.	16891400	1	1
AT2G15290	TIC21	CIA5 PIC1	The youngest part of the homozygous progeny are slightly green at the center of the seedlings.	16891400	1	1
AT2G15290	TIC21	CIA5 PIC1	Albino phenotype even in the youngest part of the seedling, which often accumulates anthocyanins.	16891400	1	1
AT2G15290	TIC21	CIA5 PIC1	Seedlings grown in artificial media supplemented with sucrose are able to produce a few irregularly shaped leaves, followed by an arrest in growth. The timing of growth arrest varies from one seedling to the next leading to a variety of sizes and morphologies.	16891400	1	1
AT1G04945			Albino phenotype even in the youngest part of the seedling, which often accumulates anthocyanins.	16891400	1	0
AT1G04945			Seedlings grown in artificial media supplemented with sucrose are able to produce a few irregularly shaped leaves, followed by an arrest in growth. The timing of growth arrest varies from one seedling to the next leading to a variety of sizes and morphologies.	16891400	1	0
AT1G04940	TIC20-I		Albino phenotype even in the youngest part of the seedling, which often accumulates anthocyanins.	16891400	1	0
AT1G04940	TIC20-I		Seedlings grown in artificial media supplemented with sucrose are able to produce a few irregularly shaped leaves, followed by an arrest in growth. The timing of growth arrest varies from one seedling to the next leading to a variety of sizes and morphologies.	16891400	1	0
AT2G02950	PKS1		Under FRc conditions, the length mutant hypocotyls is decreased compared to that of wild-type plants. Under Rc conditions, the hypocotyl length is also decreased and the cotyledon area is larger.	16891401	1	1
AT1G78070			Under both FRc and Rc conditions, the length of mutant hypocotyls and cotyledon area are similar to that of wild type.	16891401	1	0
AT1G18330	RVE7	EPR1	Under both FRc and Rc conditions, the length of mutant hypocotyls and cotyledon area are similar to that of wild type.	16891401	1	0

AT1G01060	LHY	LATE ELONGATED HYPOCOTYL LATE ELONGATED HYPOCOTYL 1 LHY1	The mutant plants are hypersensitive to both FRc and Rc light treatments in hypocotyl elongation and exhibits a small reciprocal enlargement in cotyledon area, albeit not statistically significant.	16891401	1	0
AT1G60440	PANK1	ATCOAA ATPANK1 panToThenaTe kinase 1	The mutant siliques contained a percentage of shriveled seed remnants, which manifested as gaps in the developing line of green seeds.	16897480		
AT1G60440	PANK1	ATCOAA ATPANK1 panToThenaTe kinase 1	embryo lethal.	16897480		
AT1G59640	BPE	BHLH31 EN88 ZCW32	Larger petal size as a result of increased petal cell size.	16902407	1	1
AT1G10170	NFXL1	ATNFXL1 NF-X-like 1	Reduced growth (decreased biomass) when grown under conditions with salt or osmotic stress. Reduced levels of H2O2.	16905136	1	0
AT2G02560	CAND1	ETA2 HVE	Cotyledon areoles (regions of the lamina completely bordered by veins) were often incompletely closed, while in the wild type, the cotyledons contained three or four complete areoles. The reduction in vein numbers was also apparent in the first two rosette leaves, which had fewer secondary veins than the wild type. No quaternary veins and only a few tertiary veins, which ended blindly within the areoles, were present in mutant leaves, the intramarginal vein of which was occasionally interrupted.	16943276	1	1
AT2G02560	CAND1	ETA2 HVE	Similar to Atcand1-1 mutant. Resistant to sirtinol and auxin, but not to gibberellins or brassinolide. Displayed developmental phenotypes similar to those of axr1, namely, short petioles, downwardly curling leaves, shorter inflorescence. More severe inflorescence phenotype were found in this mutant compared to the atcand1-1 (ems-generated) mutation. Mutant plants were completely sterile.	16943276	1	0
AT1G73590	PIN1		Altered leaf venation pattern. Compared to the wild type, vascular density of the first leaf in mutants was increased (Fig 7, in Alonso-Peral et al, 2006).	16943276	1	1
AT1G05470	IP5P6	CVP2	cvp2-1 mutants have defective foliar vascular patterning due to a reduced recruitment of cells into vascular tissue. cvp2-1 cotyledons have an aberrant open reticulum, an increased number of free vein endings, and vascular islands. cvp2-1 leaves have abnormal secondary, tertiary, and quarternary venation patterns. IP3 levels are increased in cvp2-1 seedlings and these mutants are hypersensitive to ABA in a seed germination assay.	16943276	1	0
AT1G04020	BARD1	ATBARD1 ROW1	Sensitive to mitomycin C. Intrachromosomal homologous recombination is reduced in the mutant plants and less inducible by genotoxic stress.	16957774	1	1
AT1G74710	ICS1		In control experiments, multiplication of the bacterial cor mutant (in Col and Ler) at the surface of leaves was greatly reduced compared whereas it multiplied efficiently when infiltrated directly into the apoplast (and caused typical disease symptoms incluring necrosis and chlorosis). In the surface-inoculated mutant, the bacterial cor mutant multiplied efficiently.	16959575		
AT1G74710	ICS1		Stomatal closure in response to bacteria and lipopolysaccharide (LPS) is compromised in the mutant.	16959575		
AT1G16540	ABA3	ABA DEFICIENT 3 ACI2 ALTERED CHLOROPLAST IMPORT 2 ATABA3 ATLOS5 LOS5 LOW OSMOTIC STRESS 5 MOLYBDENUM COFACTOR SULFURASE SIR3 SIRTINOL RESISTANT 3	In control experiments, multiplication of the bacterial cor mutant (in Col and Ler) at the surface of leaves was greatly reduced compared whereas it multiplied efficiently when infiltrated directly into the apoplast (and caused typical disease symptoms incluring necrosis and chlorosis). In the surface-inoculated mutant, the bacterial cor mutant multiplied efficiently.	16959575		
AT1G16540	ABA3	ABA DEFICIENT 3 ACI2 ALTERED CHLOROPLAST IMPORT 2 ATABA3 ATLOS5 LOS5 LOW OSMOTIC STRESS 5 MOLYBDENUM COFACTOR SULFURASE SIR3 SIRTINOL RESISTANT 3	Stomata of the mutant are greatly compromised in their ability to respond to either Pst DC3000 or Pst DC300/avrRpt2, suggesting that ABA biosynthesis is required for stomatal closure in response to these bacteria.	16959575		
AT1G16540	ABA3	ABA DEFICIENT 3 ACI2 ALTERED CHLOROPLAST IMPORT 2 ATABA3 ATLOS5 LOS5 LOW OSMOTIC STRESS 5 MOLYBDENUM COFACTOR SULFURASE SIR3 SIRTINOL RESISTANT 3	Stomatal closure could not be induced by the bacterial PAMP (pathogen-associated molecular pattern) molecules flg2 (a biologically active peptide derived from flagellin) or LPS (lipopolysaccharide).	16959575		
AT1G05180	AXR1		Leaf phenotypes are enhanced with respect to either single mutant, with deeply lobed margins and ectopic stipules present in the sinus of each lobe.	16971475	1	0
AT1G05180	AXR1		Ectopic stipules observed in cauline leaves of as1;axr1 plants are not found. Leaves have an as1-like morphology.	16971475	1	0
AT1G73840	ESP1	ENHANCED SILENCING PHENOTYPE 1	Early flowering, normal stature and leaf morphology.	17008405	1	1
AT1G73840	ESP1	ENHANCED SILENCING PHENOTYPE 1	Two- to three-fold fewer of the endogenous PDS mRNA than in the wild-type plants and 10- to 50-fold higher levels of PDS siRNA.	17008405	1	1
AT1G32490	ESP3	EMB2733 EMBRYO DEFECTIVE 2733 ENHANCED SILENCING PHENOTYPE 3	Reduced stature, early flowering, and altered leaf morphology.	17008405	1	1
AT1G32490	ESP3	EMB2733 EMBRYO DEFECTIVE 2733 ENHANCED SILENCING PHENOTYPE 3	Two- to three-fold fewer of the endogenous PDS mRNA than in the wild-type plants and 10- to 50-fold higher levels of PDS siRNA.	17008405	1	0
AT1G78390	NCED9		Seed germination in the dark after far red light treatment was almost completely suppressed as in the case of wild type.	17010113	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Approximately 40% of mutant seeds germinate after far red/red light treatment, whereas wild type germination was suppressed almost entirely.	17010113	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Germination of the mutant seeds after irradiation with far red light is inhibited by paclobutrazol, an inhibitor of GA biosynthesis.	17010113	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Several GA biosynthesis genes are upregulated in the mutant compared to wild type during seed development.	17010113	1	1
AT1G65470	FAS1	FASCIATA 1 FUGU 2 FUGU2 NFB2 NUCLEOSOME	smaller than wild type and develop fasciation.	17021044	1	0
AT1G03310	ISA2	DBE1	Strong reduction in maltose accumulation compared to the be2-1 be3-2 double mutant.	17028209	1	1
AT1G03310	ISA2	DBE1	Displays the same profile of polymerization (DP) as the corresponding be2 or be3 mutant.	17028209	1	1
AT1G03310	ISA2	DBE1	Increased starch phosphorylase activity compared to wild type.	17028209	1	1
AT1G03310	ISA2	DBE1	No starch branching enzyme activity detected.	17028209	1	1
AT1G03310	ISA2	DBE1	DP 6-7 and DP 5-9 chains are slightly decreased, whereas DP 10-16 chains are slightly increased (DP, degree of polymerization).	17028209	1	1
AT1G03310	ISA2	DBE1	Starch granules are slightly larger than those of wild type.	17028209	1	1
AT1G03310	ISA2	DBE1	Absence of starch and accumulation of very high levels of water-soluble glucans.	17028209	1	1
AT1G03310	ISA2	DBE1	Contains 90% of α-maltose and 10% of β-maltose.	17028209	1	0
AT1G03310	ISA2	DBE1	Low growth and flowering rates.	17028209	1	1
AT1G03310	ISA2	DBE1	Pale colour.	17028209	1	0
AT1G03310	ISA2	DBE1	Reduced size of the mature plant. Thirty days after seed germination, the fresh weight of this mutant is one-fifth of that of wild type.	17028209	1	0
AT1G03310	ISA2	DBE1	The levels of sucrose, fructose, glucose 6-phosphate and glucose 1-phosphate are not significantly deviating from those of wild type or the single mutants.	17028209	1	0
AT1G03310	ISA2	DBE1	The maltose accumulates mostly in the cytosol (~80%).	17028209	1	0
AT1G03310	ISA2	DBE1	The mutant is still able to produce siliques and viable seeds.	17028209	1	0
AT1G03310	ISA2	DBE1	Water-soluble glycans are composed of very short malto-oligosaccharides made of 80% maltose, 14% maltotriose and 6% glucose.	17028209	1	0
AT1G03310	ISA2	DBE1	Wilting of the inflorescence.	17028209	1	1
AT1G53330			30-40% T3 seeds are embryo lethal, the rest had delayed germination. Among the germinated plants, they displayed a range of phenotypic expression: 1) seedling lethal, 2) normal cotyledons later became elongated and fragile, slightly narrower and curved rosette leaves, reduced shoot apical dominancy, elongated internode, shorter primary roots and long lateral roots, shorter siliques, 3) very subtle changes	17028967		
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Mutant showed a similar sensitivity to 25 mM trehalose as wild type (inhibition of root growth).	17031512	1	1
AT1G71100	RPI1	RSW10	After 4 days at 31&#65533;C, root hairs emerge in the region that would formerly have been the meristem.	17059404	1	1
AT1G71100	RPI1	RSW10	Bulging of epidermal cells is observed in roots but not in the hypocotyl.	17059404	1	1
AT1G71100	RPI1	RSW10	Flowers, leaves and trichomes are normal.	17059404	1	0
AT1G71100	RPI1	RSW10	Hypocotyl phenotype is modest in mature, aerial parts of the plant.	17059404	1	1
AT1G71100	RPI1	RSW10	In mutant seedlings, hypocotyl swelling is constitutively observed both at 21&#65533;C and 31&#65533;C (although slightly more important in the latter case).	17059404	1	1
AT1G71100	RPI1	RSW10	Phenotype pronounced in seedlings, in particular after the transfer of plants initially grown at 21&#65533;C to the elevated temperature of 31&#65533;C, but is not obvious in mature plants.	17059404	1	1
AT1G71100	RPI1	RSW10	Reduction in cellulosic glucose. The non-cellulosic matrix polysaccharides showed a reduction in fucose, increase in arabinose and to a lesser extent xylose. No significant changes in the levels of rhamnose, mannose and galactose are observed.	17059404	1	0
AT1G71100	RPI1	RSW10	Roots of the mutants are similar to those of wild type when grown at 21&#65533;C. After transfer to 31&#65533;C, their roots progressively increase in diameter between day s 5 and 9. Extended treatment at this temperature leads to the drastic reduction in root elongation and of the elongation zone itself.	17059404	1	1
AT1G71100	RPI1	RSW10	Significant reduction in cellulose.	17059404	1	1

AT1G71100	RPI1	RSW10	Stem regrowth is reduced.	17059404	1	1
AT1G68460	IPT1		Decreased levels of isopentenyladenosine riboside (iPR) and isopentenyladenosine monophosphate (iPRMP) compared to wild type.	17062755	1	0
AT1G68460	IPT1		Increased levels of cis-zeatin riboside (cZR) and cis-zeatin riboside monophosphate (cZRMP) compared to wild type.	17062755	1	0
AT1G68460	IPT1		Decreases in free-base iP and tZ are moderate compared to those of the riboside and ribotide forms.	17062755	1	0
AT1G68460	IPT1		External application of trans-zeatin partially rescues the growth of aerial parts of the mutant, and reduced its lateral root elongation.	17062755	1	0
AT1G68460	IPT1		Fewer rosette leaves than wild type indicating a prolonged plastochron.	17062755	1	1
AT1G68460	IPT1		Flowering time is delayed when grown on vermiculite but not on nutrient agar.	17062755	1	0
AT1G68460	IPT1		Indistinguishable from wild type in the early stages of development. Phenotypic differences become evident as the plant age.	17062755	1	1
AT1G68460	IPT1		Levels of iPRMP, iPR, tZRMP, tZR. tZ-7-glucoside, tZ-9-glucoside and tZ-O-glucoside are all reduced to less than 20% of those of wild type.	17062755	1	0
AT1G68460	IPT1		Rduced shoot apical meristem size and thin inflorescence stems.	17062755	1	1
AT1G68460	IPT1		Relative to wild type, both the number of lateral roots (longer than 1cm) and the total length of the lateral roots are increased.	17062755	1	1
AT1G68460	IPT1		Short and thin aerial parts.	17062755	1	1
AT1G68460	IPT1		Some seeds are aborted but surviving ones are larger than those of wild type.	17062755	1	1
AT1G68460	IPT1		Thin, small plants.	17062755	1	1
AT1G25410	IPT6		Fewer rosette leaves than wild type indicating a prolonged plastochron.	17062755	1	1
AT1G25410	IPT6		Flowering time is delayed when grown on vermiculite but not on nutrient agar.	17062755	1	0
AT1G25410	IPT6		Indistinguishable from wild type in the early stages of development. Phenotypic differences become evident as the plant age.	17062755	1	0
AT1G25410	IPT6		Rduced shoot apical meristem size and thin inflorescence stems.	17062755	1	0
AT1G25410	IPT6		Short and thin aerial parts.	17062755	1	0
AT1G25410	IPT6		Some seeds are aborted but surviving ones are larger than those of wild type.	17062755	1	0
AT1G25410	IPT6		Thin, small plants.	17062755	1	0
AT1G23400			homozygous are embryo lethal, arrested at the globular stage and do not undergo transition to heart stage	17071648	1	0
AT1G23400			small, pale green	17071648	1	0
AT1G30970	SUF4	suppressor of FRIGIDA4	Suppress the FRI late flowering phenotype. Reduced H3K4 trimethylation at FLC locus.	17079264	1	1
AT1G76030	VHA-B1	AT57	Insensitive to high-glucose repression of cotyledon expansion, chlorophyll accumulation, true-leaf development and root elongation. The response is specific to glucose but not to osmotic changes.	17081979		
AT1G09110			Insensitive to high-glucose repression of cotyledon expansion, chlorophyll accumulation, true-leaf development and root elongation. The response is specific to glucose but not to osmotic changes.	17081979		
AT1G09100	RPT5B	TBP1	Insensitive to high-glucose repression of cotyledon expansion, chlorophyll accumulation, true-leaf development and root elongation. The response is specific to glucose but not to osmotic changes.	17081979		
AT2G02480			The mutant showed cluster-like trichomes lacking additional branches.	17090720	1	0
AT1G73730	EIL3	ATEIL3 ATSLIM ETHYLENE-INSENSITIVE3-like 3 SLIM1 SULFUR LIMITATION 1	reduced plant growth under sulfate starvation condition. reduced sulfate uptake.	17114350	1	1
AT1G15820			No change in the chlorophyll a/b ratio and no change in the content of various xanthophylls compared to wild type. Moreover, there was no difference in the extent light-induced deepoxidation of the xanthophyll cycle pigments.	17114352	1	0
AT1G15820			Reduction in growth rate of the mutant plants compared with the wild type: the rate of increase in rosette diameter was slower, the average time for flowering increased by several days, and the fresh weight was lower.	17114352	1	1
AT1G15820			The kinetics of NPQ formation were altered in the mutant plants compared with the wild type; in the latter, the rapid rise in NPQ was followed by a slower phase, whereas in the mutant, the slower phase was almost completely absent. The reduction in qE in the CP24-depleted plants was observed at all light intensities, with a maximum reduction of ~60% in the mutants.	17114352	1	0
AT1G15820			When the FR light is turned off in State I, the induction of State II occurs rapidly and is complete within 3 min. By contrast, in the wild type, this takes at least 10 min.	17114352	1	0
AT1G74560	NRP1	NFA6	mutants did not show any phenotype under in vitro culture and greenhouse growth conditions.	17122067	1	0
AT1G74560	NRP1	NFA6	Double mutant plants showed a short-root phenotype: roots grew like the wild-type roots until 6 d after germination (DAG). However, after 7 DAG, the elongation of the double mutant roots was dramatically reduced compared with the wild-type roots. The aerial organs (leaves, rosettes, inflorescences, flowers, fruits, and embryos) developed normally in the double mutant plants.	17122067	1	0
AT1G18800	NRP2	NFA5	mutants did not show any phenotype under in vitro culture and greenhouse growth conditions.	17122067	1	1
AT1G18800	NRP2	NFA5	Double mutant plants showed a short-root phenotype: roots grew like the wild-type roots until 6 d after germination (DAG). However, after 7 DAG, the elongation of the double mutant roots was dramatically reduced compared with the wild-type roots. The aerial organs (leaves, rosettes, inflorescences, flowers, fruits, and embryos) developed normally in the double mutant plants.	17122067	1	1
AT1G76420	NAC031	CUC3 NAC368	High frequency production of cup-shaped cotyledons in seedlings, most form a primary shoot.	17122068	1	1
AT1G76420	NAC031	CUC3 NAC368	Production of the first pair of leaf primordia is significantly delayed compared to the wild type. This likely reflects a defect in embryonic shoot meristem initiation.	17122068	1	1
AT1G76420	NAC031	CUC3 NAC368	High frequency of production of cup-shaped cotyledons in seedlings, more than half fail to produce primary shoots.	17122068	1	1
AT1G76420	NAC031	CUC3 NAC368	12% of seedlings have cotyledons partially fused along one side (heart-shaped cotyledons).	17122068	1	1
AT1G65480	FT	FLOWERING LOCUS T REDUCED STEM BRANCHING 8 RSB8	Increased delay in flowering time compared to both parental single mutants.	17138694	1	0
AT1G30970	SUF4	suppressor of FRIGIDA4	Similar delays in flowering in short days and similar acceleration of flowering by vernalization as Col.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Early flowering almost identical to Col, which is a fri null, and did not display any other morphological alterations.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Slight increase in delay in flowering under LD conditions compared to co-1 single mutant.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Shorter delay in flowering time under LD conditions compared to single mutant fca-9.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Flowering time similar to that of the flc-3 single mutant in both LD and SD conditions.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Increased delay in flowering time compared to both parental single mutants.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Intermediate delay in flowering time compared to both single mutants.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Delay in flowering intermediate between that observed in the two parental single mutants.	17138694	1	1
AT1G30970	SUF4	suppressor of FRIGIDA4	Slight increase in delay in flowering under LD conditions compared to soc1-2 single mutant.	17138694	1	1
AT1G49820	MTK		etiolated seedlings of both wild type and mtk mutants have very low emission of ethylene. The eto3 mutant on the other hand has much higher emission of ethylene. The mtk/eto3 double mutant has a intermediate level of ethylene emission. Since mtk is involved in methionine recycle, the double mutant phenotype indicated that methionine recycle is required to sustain high rates of ethylene synthesis.	17144895	1	1
AT1G79000	HAC1	ARABIDOPSIS THALIANA P300 ATHAC1 ATHPCAT2 P300 PCAT2 YUP8H12R.38 YUP8H12R_38	Late flowering in long day (16 h light/8 h dark) as well as short day (8 h light/16 h dark).	17144897	1	1
AT1G20840	MSSP1	MT1	No variation in sucrose content of leaves placed under both normal temperature or cold treatment (24h) compared to wild type leaves.	17158605	1	1
AT1G20840	MSSP1	MT1	Slight reduction (~30%) of glucose and fructose contents in leaves, whereas sucrose content is similar to that of wild type under normal growth conditions.	17158605	1	0
AT1G20840	MSSP1	MT1	The vacuoles of this mutant exhibit a substantially reduced capacity to import glucose.	17158605	1	1
AT1G20840	MSSP1	MT1	Although no variation in sucrose content of leaves placed under normal temperature conditions compared to wild type leaves, a substantial decrease in sucrose content was observed when the plants were placed under cold treatment (24h).	17158605	1	0
AT1G20840	MSSP1	MT1	Under cold treatment (24h), the decrease in glucose and fructose content in leaves is more drastically reduced compared to that of wild type and even that of the tmt1 single mutants.	17158605	1	1

AT1G20840	MSSP1	MT1	Under normal growth temperature conditions, the double mutant leaves' content in glucose and fructose is slightly reduced (~30%) in a similar fashion to that observed with the tmt1 single mutants.	17158605	1	1
AT1G20840	MSSP1	MT1	Under normal temperature conditions, a substantial reduction in glucose and fructose contents in leaves is observed compared to wild type, and even the single tmt1 and double tmt1/tmt2 mutants.	17158605	1	1
AT1G64280	NPR1	NIM1 SAI1	dwarf. Increased salicyclic acid level.	17163880	1	1
AT1G08630	THA1	Threonine aldolase 1	has a large increase of seed threonine content and a small decrease of most other seed amino acids. glycine content is significantly lower in seedlings.	17172352	1	1
AT1G80840	WRKY40		Mutant is almost fully resistant to the virulent powdery mildew Golovinomyces orontii.	17185563	1	0
AT1G80840	WRKY40		Susceptibility to the virulent powdery mildew Golovinomyces orontii remains unchanged compared to wild type.	17185563	1	1
AT1G18500	IPMS1	MAML-4	IPMS1 mutants grew somewhat slower and had undulated leaves that tended to be slightly chlorotic. Showed an increase in the content of the aliphatic amino acid Val.	17189332	1	0
AT1G47720	OSB1		Retarted root growth, variegated and distorted leaves, distorted flowers, partial sterile, and unviable seeds. Increased number but decreased size of mitochondria.	17189341	1	1
AT2G01570	RGA	GRS RGA1	Partial suppression of the gidla-1 gidlb-1 gidlc-1 triple mutant phenotype.	17194763	1	1
AT1G02970	WEE1		significant decreased root elongation rates, densely clustered hairs at the root tip and outgrowth of lateral roots	17209125	1	1
AT1G68725	AGP19		Both the size and number of the epidermal cells were found to be decreased in the mutant. However, stomata cells appeared normal in terms of morphology and fraction of total epidermal cells.	17217456	1	1
AT1G68725	AGP19		Leaves, stems and sepals were lighter green than WT plants throughout the life cycle. Pigment content analyses demonstrated that mutant rosette leaves contained less chlorophyll and anthocyanin compared to WT.	17217456	1	1
AT1G68725	AGP19		Mutant had fewer rosette leaves compared to WT plants at the same age. Moreover, mutant rosette leaves were smaller and more round and had shorter petioles than WT.	17217456	1	1
AT1G68725	AGP19		Mutant hypocotyls were 75% of the length of WT hypocotyls when grown under long-day conditions, which corresponded to a reduction in hypocotyl cell length but not cell number. However, hypocotyl length was not compromised when mutant seedlings were grown in the dark.	17217456	1	1
AT1G68725	AGP19		The mutant had shorter, more slender inflorescence stems with fewer auxillary branches and side bolts. Mutant produced fewer flowers than WT and had fewer and shorter siliques, fewer seeds per silique and a higher percentage of sterile siliques, resulting in less seed production. More than half of the mutant flowers were fertile, and although they were smaller than WT flowers, they opened normally and had normal arrangements and numbers of floral organs. Some sterile flowers were open, while others remained closed. One reason for sterility was the failure of the stamens to elongate beyond the pistil at floral stage 14, whereas, in WT, the stamens were longer than the pistil and brushed against the stigma to allow pollination and fertilization.	17217456	1	1
AT1G68725	AGP19		Whereas, as plants matured, WT rosette leaves curled down, mutant leaves remained flat.	17217456	1	1
AT1G16540	ABA3	ABA DEFICIENT 3 ACI2 ALTERED CHLOROPLAST IMPORT 2 ATABA3 ATLOS5 LOS5 LOW OSMOTIC STRESS 5 MOLYBDENUM COFACTOR SULFURASE SIR3 SIRTINOL RESISTANT 3	Double mutants were indistinguishable from bps1 single mutants.	17217459	1	1
AT1G01550	BPS1		Growth of bps1-2 mutants on CPTA-supplemented medium resulted in partial rescue of both leaf and root defects. bps1-2 mutants grown on control growth medium have small radialized leaves with very little vascular tissue, and very short misshapen knotted-looking roots. By contrast, bps1-2 mutants grown on CPTA-supplemented medium produced larger flattened leaves that contained primary and secondary veins, and smooth elongated roots.	17217459	1	1
AT1G01550	BPS1		Under high light conditions (approximately 200 μE.m-2.sec-1), CPTA-treated seedlings were completely photobleached and mutants showed rescue of both leaf and root development. Under moderate (approximately 100 μE.m-2.sec-1) and low (30 μE.m-2.sec-1) light intensities, seedlings are incompletely photobleached, but leaf and root development continue to show partial rescue.	17217459	1	1
AT1G01550	BPS1		In double mutant seedlings grown on CPTA, a partial rescue of the bps1 phenotype was observed.	17217459	1	1
AT1G66340	ETR1		In blue light, the mutant has a shorter hypocotyl than in wild type, but shows a clear sensitivity to cytokinins.	17217468	1	1
AT1G66340	ETR1		In darkness, the mutant is resistant to cytokinins (only small decrease in hypocotyl length).	17217468	1	1
AT1G04400	CRY2	PHH1 SEL20	In contrast to wild type, blue light does not inhibit hypocotyl elongation in the double mutant.	17217468	1	1
AT1G04400	CRY2	PHH1 SEL20	Unlike wild type, mutant seedlings in higher light conditions (12 μmol.m-2.sec-1) respond to increasing concerntrations of benzylaminopurine (BAP). At lower light intensities or in darkness, cytokinins caused identical growth inhibition in both wild-type and double mutant seedlings.	17217468	1	1
AT1G35580	CINV1	A alkaline cyTosolic inverTase 1 N-InvG neuTral inverTase G	Concentration of sucrose in the mutant roots are lower than in wild type. The concentration of myo-inositol is increased, as are those of glucose and fructose.	17220200	1	1
AT1G35580	CINV1	A alkaline cyTosolic inverTase 1 N-InvG neuTral inverTase G	Light green leaves.	17220200	1	1
AT1G35580	CINV1	A alkaline cyTosolic inverTase 1 N-InvG neuTral inverTase G	Seedlings are more tolerant to high concentrations of glucose and sucrose compared to wild-type seedlings.	17220200	1	1
AT1G35580	CINV1	A alkaline cyTosolic inverTase 1 N-InvG neuTral inverTase G	Shortened roots.	17220200	1	1
AT1G34120	IP5PI	AT5P1 AT5PTASE1 ATIP5PI	Increased length of hypocotyls in dark grown seedlings. Seeds that have been stratified at 4C for 3 days germinate faster. Increased sensitivity to ABA.	17237190	3	3
AT1G32770	NAC012	NST3 SND1	Under short-day conditions, the nst1-1 nst3-1 plants were no longer able to remain upright when they reached >15cmin height neither lignin nor cellulose, which constitute secondary walls, was produced in inflorescence stems of nst1-1 nst3-1 plants,	17237351	3	2
AT1G21760	FBP7	ATFBP7 F-BOX PROTEIN 7 F-box proTein 7	Although the yeast homolog of AtFBP7 is reported to bind to eEF-2, the steady state levels of eEF-2 are not altered in fbp7 mutants under normal temperature conditions, or in response to heat or cold stress.	17240087		
AT1G66050	ORTH5	VIM2	No centromere repeat hypomethylation phenotype.	17242155	1	0
AT1G57820	ORTH2	VIM1	Increased HpaII cleavage of the 180-bp centromere repeats. This reflects hypomethylation of the centromere. Centromere repeats in interphase nuclei are decondensed relative to wild type.	17242155	1	0
AT1G03980	PCS2	ATPCS2 phyTochelaTin synThase 2	Exposure of seedlings to 50 μM Cd2+ for 2 days does not induce phytochelatin biosynthesis.	17253989	1	1
AT1G03980	PCS2	ATPCS2 phyTochelaTin synThase 2	Exposure of seedlings to 50 μM Cd2+ for 2 days does phytochelatin biosynthesis as it does in wild type.	17253989	1	1
AT1G64670	BDG1	BODYGUARD1 CED1	Cuticular defects. Resistant to Botrytis cinerea.	17257167	2	1
AT1G73370	SUS6	ATSUS6 sucrose synThase 6	The amounts of glucose, fructose, sucrose, cellulose (roots) and starch in the mutant were not statistically significantly different from those of the equivalent wild-type lines grown under the same conditions at the same time.	17257168	1	1
AT1G73370	SUS6	ATSUS6 sucrose synThase 6	When grown in soil or hydroponically, the double mutant line was not obviously different from wild-type controls.	17257168	1	1
AT1G14660	NHX8	ATNHX8 H+ exchanGer 8 Na+ SODIUM HYDROGEN EXCHANGER 8	Li+ hypersensitive. Under low Li+ concentrations, germination of mutant seeds and elongation of roots were significantly reduced.	17270011	2	2
AT1G69190	CyTHPPK/DHPS		no visible phenotype. Mutant seeds displayed reduced germination rates. A modest but significant decrease of 5-CH3-PteGlu(n) and 5-CHO-PteGlu(n) (by 11 and 33%, respectively) was observed in dry seeds of the mutant as compared with the wild-type, resulting in a decrease in total folate content by 11%	17289662	2	1
AT1G44446	CH1	ATCAO CAO CHLORINA 1 CHLOROPHYLL A OXYGENASE CHLOROPHYLL B SYNTHASE	Chlorophyll contents decreased by approximately 40% compared to the parental line (ch1-1/GFP-CAO).	17291312	1	0
AT1G44446	CH1	ATCAO CAO CHLORINA 1 CHLOROPHYLL A OXYGENASE CHLOROPHYLL B SYNTHASE	Significant increase in the expression of the GFP-CAO transgene.	17291312	1	0
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	Double null homozygous mutant progeny invariably die at the seedling stage, do not express detectable CSN5 proteins, and are virtually identical to the null alleles of the cop/det/fus mutants.	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	During the first two to three DAG, the double homozygous mutant progeny display the typical photomorphogenic phenotype of the fusca mutants.	17307927	1	1

AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	In double homozygous progeny, significant reduction of CSN1, CSN6, CSN7, and CSN8 and in a very slight reduction of CSN4. In the case of CSN3, the complete loss of function of CSN5 results in the accumulation of a larger and possibly modified CSN3 form, whereas the normal (smaller) CSN3 form is present predominantly in wild type.	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	In the homozygous progeny, anthocyanin accumulation (purple coloration) in the cotelydons of developing embryos.	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	Mutation is lethal in the homozygous state.	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	A residual derubylation activity can be observed in the double mutant seedlings.	17307927	1	0
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	At 6 to 7 DAG, the double mutants uniformly start to form the first pair of true leaves and eventually develop into impaired small plantlets, with dark red cotyledons and asymmetrical leaves.	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	None of the double mutants arrest at the seedling stage, and even though severely compromised, mutant plantlets survive to a mature stage.	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	Mutants are virtually indistinguishable from wild-type plants at all developmental stages (germination, vegetative and reproductive).	17307927	1	1
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	No detectable changes in the cellular pools of COP9 signalosome complex subunits.	17307927	1	0
AT1G71230	CSN5B	AJH2 COP9-siGnalosome 5B CSN5	Mutants are virtually indistinguishable from wild-type siblings in the dark and in all light conditions, both at seedling and mature stages.	17307927	1	1
AT1G69670	CUL3B		Mutants are virtually indistinguishable from wild-type siblings in the dark and in all light conditions, both at seedling and mature stages.	17307927	1	1
AT1G69670	CUL3B		Significant increase (five- to sixfold) in the total amount of CSN5 with respect to the CSN5 level observed in the csn5a-2 single mutant.	17307927	1	0
AT1G26830	CUL3A	CUL3	Mutants are virtually indistinguishable from wild-type siblings in the dark and in all light conditions, both at seedling and mature stages.	17307927	1	1
AT1G26830	CUL3A	CUL3	Significant increase (five- to sixfold) in the total amount of CSN5 with respect to the CSN5 level observed in the csn5a-2 single mutant.	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	At the reproductive stage, the mutants exhibit severe developmental defects that result in dwarf stature and the loss of apical dominance (52 DAG).	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	At the vegetative stage, the csn5a plantlets are characterized by small, light green, and curly rosettes (12 and 14DAG), which are almost completely depleted of trichomes, in contrast with wild-type.	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	Mutants are not lethal at the seedling stage, and, at a few DAG, the purple cotyledons turn light green before the production of true leaves.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	Seedlings have purple cotyledons.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	Shorter hypocotyls in the dark, shorter roots, smaller flowers, a decreased number of root hairs in response to jasmonic acid treatment, and altered light and auxin responses.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	The cellular pools of the COP9 signalosome complex subunits: CSN1, CSN3, CSN5, CSN6, CSN7, and CSN8, are reduced drastically compared with those in wild type.	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	csn5a-1 and csn5a-2 are virtually indistinguishable from each other in the initial few DAG, starting from 8 DAG and throughout the vegetative stage, the phenotype of csn5a-2 is less severe than that of csn5a-1, in terms of both rosette size and trichome density. This difference becomes particularly evident at the reproductive phase (52 DAG).	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	Double null homozygous mutant progeny invariably die at the seedling stage, do not express detectable CSN5 proteins, and are virtually identical to the null alleles of the cop/det/fus mutants.	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	During the first two to three DAG, the double homozygous mutant progeny display the typical photomorphogenic phenotype of the fusca mutants.	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	In double homozygous progeny, significant reduction of CSN1, CSN6, CSN7, and CSN8 and in a very slight reduction of CSN4. In the case of CSN3, the complete loss of function of CSN5 results in the accumulation of a larger and possibly modified CSN3 form, whereas the normal (smaller) CSN3 form is present predominantly in wild type.	17307927	1	0
AT1G22920	CSN5A	AJH1 CSN5B	In the homozygous progeny, anthocyanin accumulation (purple coloration) in the cotelydons of developing embryos.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	Mutation is lethal in the homozygous state.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	A residual derubylation activity can be observed in the double mutant seedlings.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	At 6 to 7 DAG, the double mutants uniformly start to form the first pair of true leaves and eventually develop into impaired small plantlets, with dark red cotyledons and asymmetrical leaves.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	None of the double mutants arrest at the seedling stage, and even though severely compromised, mutant plantlets survive to a mature stage.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	Mutants are virtually indistinguishable from wild-type siblings in the dark and in all light conditions, both at seedling and mature stages.	17307927	1	1
AT1G22920	CSN5A	AJH1 CSN5B	Significant increase (five- to sixfold) in the total amount of CSN5 with respect to the CSN5 level observed in the csn5a-2 single mutant.	17307927	1	0
AT1G02090	FUS5	ATCSN7 COP15 COP9 SIGNALOSOME SUBUNIT 7 CSN7 FUSCA 5	In the homozygous progeny, anthocyanin accumulation (purple coloration) in the cotelydons of developing embryos.	17307927	1	1
AT1G02090	FUS5	ATCSN7 COP15 COP9 SIGNALOSOME SUBUNIT 7 CSN7 FUSCA 5	In the homozygous progeny, the mutation leads to CSN1, CSN3, CSN4, CSN6, and CSN8 instability, accompanied by a mild reduction of CSN5.	17307927	1	0
AT1G23310	GGAT1	AOAT1 GGT1	ABA-regulated seed germination was unaffected under the experimental conditions used.	17318317	1	1
AT1G23310	GGAT1	AOAT1 GGT1	Although ggt1-1 did not affect cold tolerance of plants kept in the dark, mutant plants subjected to cold and light treatment exhibited severe leaf chlorosis. This light sensitivity of ggt1-1 could be alleviated either by reduced light intensity or by growth on media containing sucrose.	17318317	1	0
AT1G23310	GGAT1	AOAT1 GGT1	In the absence of ABA treatment, root elongation of ggt1-1 was reduced nearly 50% compared to wild-type.	17318317	1	1
AT1G23310	GGAT1	AOAT1 GGT1	Mutant leaves were stained with NBT or DAB: the results indicated an increased level of H2O2 but little difference in O2- . This difference in H2O2 was further investigated by quantitative determination of seedling H2O2 using an Amplex Red assay. Light grown ggt1-1 seedlings, but not dark grown seedlings, had increased levels of H2O2 relative to wild-type.	17318317	1	1
AT1G23310	GGAT1	AOAT1 GGT1	Mutant plants had a pale green color and grew more slowly than wild-type.	17318317	1	1
AT1G23310	GGAT1	AOAT1 GGT1	Proline accumulation was higher in untreated ggt1-1 seedlings and also increased to a higher than wild-type level upon ABA treatment.	17318317	1	1
AT1G23310	GGAT1	AOAT1 GGT1	The mutant shows a reduction in ABA-responsive RD29A expression. In ggt1-1, expression of RD29A:LUC was approximately one-third of the wild-type level at 3 h after application of 100 μM ABA.	17318317	1	0
AT1G23310	GGAT1	AOAT1 GGT1	Same phenotype as ggt1-1.	17318317	1	1
AT1G17290	no gene was found		plants appear normal under normal growth conditions. When grown on low-nitrogen medium with alanine supplementation, the mutant plants showed reduced growth.	17319845		
AT1G09530	PIF3	BHLH8 EN100 PAP3	When grown under constant red light, the mutant had shorter hypocotyls compared with wild type plants.	17319847	1	1
AT1G09530	PIF3	BHLH8 EN100 PAP3	Under constant red-light conditions, the hypocotyl length of the double mutant was intermediate to that of the parental single mutants.	17319847	1	1
AT1G45145	TRX5	LIV1	Insensitive to victorin 1, microbial toxin produced by the fungus Cochliobolus victoriae.	17322408	1	0
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	The chlorophyll content index of the double mutant did not differ from the single mutants, and the germination percentage of freshly harvested seeds was slightly higher than that of the single mutants.	17329563	1	1
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	Same phenotypes as the single mutants.	17329563	1	1
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	Reduced seed dormancy phenotype.	17329563	1	1
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	Mutant plants were smaller, with pale green laminas and irregular blade surface, and their inflorescence stems were thinner than those of the Col stems.	17329565	1	1
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	Reduction in the rosette biomass to 43 and 42% of fresh and dry weight of Col, respectively , and weak but significant ($P < 0.001$) inhibition of the root growth when the kinetic slopes of hub2-1 and Col were compared.	17329565	1	1
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	No new leaf and flower phenotypes were observed compared to the single mutant parents, and the biomass of the double mutant lines fell statistically in the same group as that of both single parents.	17329565	1	1
AT1G14670	TMN2	EMP8	No increased tolerance to arsenic compared to wild type.	17335514	1	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	Arsenic accumulation appeared slightly decreased in the mutants, but it did not differ significantly from that of wild type.	17335514	1	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	Mutant showed no light dependence of arsenic tolerance, whereas wild-type seedlings showed an increased arsenate tolerance when grown in the dark compared with WT seedlings grown in the light.	17335514	1	1

AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	When grown under constant light, mutant seeds showed a significantly higher rate of survival than WT seeds in the presence of arsenate.	17335514	1	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	Less inhibition of thiol synthesis was observed in the mutant.	17335514	1	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	No clear differences in arsenic speciation (arsenate or arsenite) in the mutant compared to wild type.	17335514	1	0
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	After 5 days growth under far-red light, the double mutant showed the same elongated hypocotyl phenotype as the loss-of-function allele phyA-211.	17335514	1	1
AT1G09560	GLP4	GLP5	No increased tolerance to arsenic compared to wild type.	17335514	1	1
AT2G15290	TIC21	CIA5 PIC1	Cotyledons in young homozygous progeny were red, most likely because chlorophyll was low or absent, and anthocyanin pigments accumulated.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	Dwarfed and chlorotic mutant plants.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	In the mutant's homozygous progeny, mature rosette leaves were retarded in growth. Secondary and tertiary veins in mutant leaves were thicker than in the wild type, and their diameter was commensurate with that of the primary vein. The organization of leaf mesophyll into palisade and spongy parenchyma cells was lost, and the leaf surface was extremely curled. This deformation in the mutant leaf was already visible in cotyledons. In addition, leaf cross sections revealed that mesophyll cells, in contrast with wild-type plants, do not contain fully differentiated chloroplasts.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	Plastids of cotyledons, leaves, and shoot apices in the mutant plants were characterized by the presence of electron-dense phytoferritin aggregates. Those clusters were not found in any chloroplasts of wild-type plants.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	Roots were smaller than in wild-type plants. However, no significant phenotype in roots of mutants maintained on sucrose-supplemented medium was observed.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	The majority of the slowly growing homozygous mutant progeny produced almost transparent rosette leaves; however, in approximately one-third of the plants, the leaves appeared white. This subpopulation of mutants was even smaller and did not produce inflorescences.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	The shoot apex and the very young emerging leaves of homozygous progeny were pale green and their leaves turned chlorotic while growing. After 6 weeks on sucrose-containing agar, surviving mutant plants were able to produce an inflorescence; again, the young sepals of the flower were pale green and became white subsequently.	17337631	1	1
AT2G15290	TIC21	CIA5 PIC1	The style and developing silique of the flower of the homozygous progeny were pale green, whereas leaves and stem accumulated anthocyanin pigments.	17337631	1	1
AT1G52930	BRIX1-2		Absence of ABA-induced inhibition of seed germination.	17347412	1	1
AT1G52930	BRIX1-2		Mutant plants exhibit all known major ABA defects (seed dormancy, stomatal opening, growth inhibition).	17347412	1	1
AT1G52930	BRIX1-2		Reduced seed dormancy phenotype.	17347412	1	1
AT1G52930	BRIX1-2		Seedling growth inhibition by ABA was substantially reduced in the mutant compared with that of the wild type. In the absence of ABA, the mutant seedlings developed normally and were indistinguishable from the wild-type seedlings.	17347412	1	1
AT1G52930	BRIX1-2		The defect exhibited by the double mutant in ABA-induced stomatal closure was similar to that exhibited by both single mutants.	17347412	1	1
AT1G52920	GCR2	GPCR	Absence of ABA-induced inhibition of seed germination.	17347412	1	1
AT1G52920	GCR2	GPCR	Mutant plants exhibit all known major ABA defects (seed dormancy, stomatal opening, growth inhibition).	17347412	1	1
AT1G52920	GCR2	GPCR	Reduced seed dormancy phenotype.	17347412	1	1
AT1G52920	GCR2	GPCR	Seedling growth inhibition by ABA was substantially reduced in the mutant compared with that of the wild type. In the absence of ABA, the mutant seedlings developed normally and were indistinguishable from the wild-type seedlings.	17347412	1	1
AT1G52920	GCR2	GPCR	The defect exhibited by the double mutant in ABA-induced stomatal closure was similar to that exhibited by both single mutants.	17347412	1	1
AT1G67080	ABA4		Neoxanthin was absent in the mutant genotype, while an increase in Violaxanthin content was recorded. aba4-1 leaf discs were clearly more sensitive to light stress than the wild type (90% of chlorophyll was bleached in aba4-1 versus 35% in the wild type) aba4-1 has a reduced steady state ABA content (45% of wild-type content)	17351115	1	1
AT1G67080	ABA4		aba4-1 npq1 underwent a significant reduction in leaf chlorophyll content and a strong accumulation of the antioxidant molecule tocopherol with respect to npq1 aba4-1 npq1 was photoinhibited further and had only recovered to similar levels as the other genotypes after 6 d decrease of the chlorophyll/carotenoid ratio and an increase in tocopherol content	17351115	1	1
AT1G08550	NPQ1		aba4-1 npq1 underwent a significant reduction in leaf chlorophyll content and a strong accumulation of the antioxidant molecule tocopherol with respect to npq1 aba4-1 npq1 was photoinhibited further and had only recovered to similar levels as the other genotypes after 6 d decrease of the chlorophyll/carotenoid ratio and an increase in tocopherol content	17351115	1	1
AT1G62360	STM		30 from a total of 40 seedlings (75%) developed at least one leaf 8 days after germination and all double mutant progeny developed leaves by day 20. In 19 stm-1 trn2-23010 double mutant seedlings, leaves initiated from the base of the cotyledons, which were always fused due to lack of early STM activity. In the remaining 21 double mutant progeny single leaves or side shoots arose laterally, from the outside of the fused base of the petioles instead of being initiated from the shoot apex and thus resembled stm-1 mutant side shoots which are initiated after a long delay.	17351828	1	1
AT1G62360	STM		The double mutant progeny does not develop flowers.	17351828	1	1
AT1G62360	STM		About 51% of stm-5 trn2-23010 double mutant seedlings produced leaves by 8 days after germination, compared to only 3% in the stm-5 single mutant. In contrast to combination with stm-1, leaves of stm-5 trn2-23010 double mutants never initiated from outside the base of the cotyledon petioles but emerged internally to the cotyledons where the SAM normally resides in wild type.	17351828	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	In contrast to wild type, anthocyanin accumulation did not occur in the senescing mutant rosette leaves.	17355433	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	Mutants failed to adapt to the conditions of nitrogen limitation and started senescence much earlier and more rapidly than did wild-type plants supplied with 3 mM nitrate: mutant plants supplied with 10 mM nitrate had a similar pattern of growth and development to wild type. When the nitrate concentration was reduced to 3 mM, the mutant plants started senescence in the fifth rosette leaf at 24 DAG, and after this point senescence progressed rapidly with all rosette leaves showing senescence symptoms at 26 DAG, and the whole rosette dying at 32 DAG. In contrast, wild-type plants displayed no senescence symptoms in the fifth rosette leaf until 32 DAG. In wild-type plants, the process of senescence proceeded slowly and gradually from the fifth to the youngest rosette leaves, and it took at least 2 weeks for all rosette leaves to show the senescence symptoms.	17355433	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	The cauline leaves in the mutant plants started senescence at 28 DAG, at least 10 days earlier than those in the wild-type plants. Further, the developing mutant siliques initiated senescence in their tips at 32 DAG, while the wild-type siliques showed no senescence symptoms throughout their development but accumulated abundant anthocyanin which was not observed in the mutant siliques.	17355433	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	The early senescence process was arrested when nitrate was added after depletion.	17355433	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	The occurrence (at 24 DAG) and progression (at 28 DAG) of senescence in mutant rosette leaves were not accompanied by a significant reduction in the amounts of nitrogen-containing compounds: nitrate, total amino acids, soluble proteins, and total nitrogen. By contrast, they were largely reduced in the wild-type plants.	17355433	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	With the reduction of the nitrate concentration to 1 mM, the occurrence of the senescence phenotype in the rosette leaves of mutant plants was accelerated to 20 DAG, and severe senescence in the developing mutant siliques resulted in their death around 30 DAG without producing viable seeds. Under the same growth condition (1 mM nitrate), wild-type plants did not start senescence in their rosette leaves until 26 DAG, and produced fecund siliques.	17355433	1	1

AT1G15500	ATNTT2	T16N11.1; T16N11_1	Necrotic leaf lesions in short day conditions at low light. Light-induced accumulation of H(2)0(2) and constitutive expression of genes for copper/zinc superoxide dismutase 2 and ascorbate peroxidase 1.	17355434	1	1
AT1G59870	PEN3	ABCG36; ARABIDOPSIS PLEIOTROPIC DRUG RESISTANCE 8; Arabidopsis thaliana ATP-binding cassette G36; ARABIDOPSIS THALIANA ATP-BINDING CASSETTE G36; ATABCG36; ATP-binding cassette G36; ATP-BINDING CASSETTE G36; ATPDR8; F23H11.19; F23H11_19; PDR8; PENETRATION 3; PLEIOTROPIC DRUG RESISTANCE 8	shoot FW, root length and chlorophyll contents of ko-2 plants are significantly lower than those of wild-type plants	17355438	1	1
AT1G74960	FAB1	ARABIDOPSIS BETA-KETOACYL-ACP SYNTHETASE 2; ATKAS2; BETA-KETOACYL-ACP SYNTHETASE 2; F25A4.7; F25A4_7; fatty acid biosynthesis 1; KAS2	embryo lethal.	17360594	1	1
AT1G27320	AHK3	ORE12	The meristem of the mutants did not stop growing at 5 dpg and kept increasing in size. Furthermore, the growth rate of mutant roots was higher than the wild-type, resulting in longer roots.	17363254		
AT1G27320	AHK3	ORE12	The root-meristem size of the double mutant was indistinguishable from that of the ahk3 mutant.	17363254		
AT1G17170	GSTU24		As for the root growth assay, the root elongation of both the mutant and the wild-type was inhibited at lower concentrations of TNT than 2,6-DNT. In addition, there was no statistically significant difference of the root elongation between the gst mutant and the wild-type exposed to different concentrations of 2,6-DNT and TNT from t-test.	17368510		
AT1G17170	GSTU24		The plants took up TNT faster than 2,6-DNT. Over 99% of the initial concentration of TNT was removed by the plants after 1 d whereas 30% was removed for 2,6-DNT at the same period of time.	17368510		
AT1G09700	HYL1	ATDRB1 DRB1 DSRNA-BINDING PROTEIN 1 HYPONASTIC LEAVES 1	Increased abundance of miRNA precursors.	17369351		
AT1G01040	DCL1	ABNORMAL SUSPENSOR 1 ASU1 ATDCL1 CAF CARPEL FACTORY DICER-LIKE 1 dicer-like 1 EMB60 EMB76 EMBRYO DEFECTIVE 60 EMBRYO DEFECTIVE 76 SHORT INTEGUMENTS 1 SIN1 SUS1 SUSPENSOR 1	Increased abundance of miRNA precursors.	17369351		
AT1G55020	LOX1		developed more emergent (stage VIII) and lateral roots at 10 d. has a moderate increase in the length of the primary root.	17369372	1	1
AT1G48920	NUC-L1	ATNUC-L1; F27K7.6; F27K7_6; NUC1; nucleolin 1; nucleolin like 1; PARALLEL 1; PARL1	parl1-1 mutants, initially identified based on their aberrant parallel venation pattern in juvenile leaves, exhibit several other developmental defects. They have abnormal venation patterns in their cotyledons, adult leaves, petals, and sepals. In addition, they are shorter, have abnormal leaf shapes, and have reduced apical dominance, rosette size, fertility, and root length compared to wild type plants. The normal adaxial/abaxial arrangement of xylem and phloem is maintained in parl1-1 mutant leaves, but, they have a reduced palisade mesophyll layer in the leaf. There are aberrant expression patterns for the DR5:GUS reporter and the Athb8:GUS reporter in the parl1-1 mutants.	17369435	3	2
AT1G48920	NUC-L1	ATNUC-L1; F27K7.6; F27K7_6; NUC1; nucleolin 1; nucleolin like 1; PARALLEL 1; PARL1	parl-2 mutants have defects in leaf venation patterns, as well as several other developmental defects including reduced stature, reduced apical dominance, and reduced fertility relative to wild type plants. They accumulate pre-rRNA transcripts that have not been spliced at the A0 site.	17369435	1	1
AT1G30490	ATHB-9	HB9 PHV	Defects in embryonic cell patterning in essentially all double mutants. Pleotropic cotyledon phenotypes. Large increase in phenotypic penetrance.	17376809	1	0
AT1G24590	ESR2	DRNL ERF090 SOB2	Defects in embryonic cell patterning in essentially all double mutants. Pleotropic cotyledon phenotypes. Large increase in phenotypic penetrance.	17376809	1	0
AT1G24590	ESR2	DRNL ERF090 SOB2	A quarter of drn-1 drnl-2/DRNL-2 progeny, genotyped as double-homozygous mutants had pin-like embryos, with complete absence of cotyledons. They directly initiated leaves from a functional shoot apical meristem.	17376809	1	0
AT1G24590	ESR2	DRNL ERF090 SOB2	sterile	17376809	1	1
AT1G24590	ESR2	DRNL ERF090 SOB2	Defective cotyledon development phenotypes at incomplete penetrance, including monocotyledonous seedlings, seedlings with partially fused cotyledons, tricots or various tricot fusion combinations. The inappropriate cotyledon development leads to alterations of leaf phyllotaxy.	17376809	1	1
AT1G24590	ESR2	DRNL ERF090 SOB2	No embryo development defects.	17376809	1	1
AT1G12980	ESR1	DRN ERF089	Abnormal cell division observable from the globular embryo stage onwards. Approximately half of homozygous drn-1 embryos show abnormal development in the hypophysis region, or no obvious distinction between embryo proper and suspensor.	17376809	1	1
AT1G12980	ESR1	DRN ERF089	Defective cotyledon development phenotypes at incomplete penetrance, including monocotyledonous seedlings, seedlings with partially fused cotyledons, tricots or various tricot fusion combinations. The inappropriate cotyledon development leads to alterations of leaf phyllotaxy.	17376809	1	1
AT1G12980	ESR1	DRN ERF089	Defects in embryonic cell patterning in essentially all double mutants. Pleotropic cotyledon phenotypes. Large increase in phenotypic penetrance.	17376809	1	1
AT1G12980	ESR1	DRN ERF089	A quarter of drn-1 drnl-2/DRNL-2 progeny, genotyped as double-homozygous mutants had pin-like embryos, with complete absence of cotyledons. They directly initiated leaves from a functional shoot apical meristem.	17376809	1	1
AT1G12980	ESR1	DRN ERF089	sterile	17376809	1	0
AT1G04080	PRP39		Mutant plants are indistinguishable from WT, except for a delay in time to flowering measured as the number of days to bolting and the total leaf numbers at flowering. On average, the mutant plants flower 10 days and 44 days later than WT plants under long day and short day growth conditions, respectively.	17380304	1	1
AT1G04080	PRP39		The mutant is responsive to a vernalization treatment, the treated mutant plants flowering earlier than mutant plants not subjected to the vernalizaiton treatment.	17380304	1	1
AT1G04080	PRP39		The mutant plants treated with GA flowered earlier than the at prp39-1-1 plants without GA treatment and at similar times as wild-type plants without GA treatment.	17380304	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Increased cuticle permeability compared with WT.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Strongly resistant to infection with Botrytis cinerea strain: infection sites on mutant leaves remained usually symptom free, in contrast to those on Col leaves.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	A number of ester-bound monomers were reduced in the mutant.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Increased resistance to Botrytis infection: the visual phenotypes of the leaves 3 days after inoculation show that the lesions larger than the original infection site represent only 5% of lesions compared to 75% in WT plants.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	Similar phenotype to that described for lacs2-2.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The distinct osmium-dense cuticular membrane representing insoluble lipid-derived polymers such as cutin, visible at the epidermal outer extracellular matrix of WT plants, could not be seen at the leaf epidermis of the mutant. The remaining outer epidermal extracellular matrix sometimes had a distinct laminated structure.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The mutant showed severe damage at a lower concentration of BASTA compared with WT Col-0 plants.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The rate of water loss from the mutant is significantly higher than that of Col-0 plants.	17396154	1	1
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The total amount of omega-hydroxylated fatty acids and their derivatives was reduced 4- to 5-fold in the mutant compared with Col-0. The impact of mutation on the amount of dicarboxylic acids, characteristic of Arabidopsis cutin, was particularly strong, and the amount was reduced to 15-20% of WT amount.	17396154	1	1
AT1G13230	PII-2		Defect in symbiotic interaction with the endophytic fungus Piriformospora indica.	17397506	1	1
AT1G78290	SRK2C	OSKL4 SNRK2.8	The activity of glyI in wild type and snrk2.8-1 knockout plants under control conditions and salt stress was tested. Salt treatment stimulated the activity of the enzyme in the wild type plant, but less stimulation was observed in the snrk2.8-1. glyI activity was lower after salt treatment in the snrk2.8-1, but salt stress still increased the protein activity.	17404219	1	0
AT1G17220	FUG1	F20D23.8; F20D23_8; fu-gaeri1	Double mutant suppresses leaf variegation due to var2 loss of function. First leaves are smaller with reduced cell size.	17416734	1	1
AT1G17220	FUG1	F20D23.8; F20D23_8; fu-gaeri1	Segregates for embryo lethal (3wt:1emb). Homozygotes are not viable.	17416734	1	1
AT1G17220	FUG1	F20D23.8; F20D23_8; fu-gaeri1	Double mutant suppresses leaf variegation due to var2 loss of function. First leaves are smaller with reduced cell size.	17416734	1	1
AT1G58360	AAP1	NAT2	no obvious phenotype, endurance to toxic concentration of phenylalanine (2 mM) which did not influence development of roots and leaves of the mutant nor did a high level of phenylalanine (10 mM) arrested germination as observed in the wildtyp	17419840	1	1

AT1G78240	QUA2	OSU1 TSD2	short, darkgrown hypocotyls, reduced cell adhesion and a dwarfed mature plant. 50% reduction in HG (homogalacturonan) content	17425712	1	1
AT1G78240	QUA2	OSU1 TSD2	short, darkgrown hypocotyls, reduced cell adhesion and a dwarfed mature plant	17425712	1	1
AT1G58440	SQE1	DRY2 XF1	Dark grown seedlings have shorter hypocotyls characteristic of de-etiolated seedlings. Roots are highly branched. Plants have short stature and are sterile. Seeds abort.	17426032	4	3
AT1G58440	SQE1	DRY2 XF1	Small plants, seedling lethal.	17426032	2	2
AT1G16720	HCF173		High chlorophyll fluorescence. Not able to grow photoautotrophically on soil but could be maintained on sucrose-supplemented medium (did not develop any fertile flowers). Impaired photosystem II.	17435084	3	2
AT1G47056	VFB1		Defects in lateral root formation, delayed root elongation and delayed plant growth. Reduced cell size.	17435085	2	2
AT2G01570	RGA	GRS RGA1	The double mutant germinated much better in response to increasing red light fluences. At 0 μmol.m-2 red light fluence, the double mutant germinated ~15%, whereas the wildtype and single mutant seeds did not germinate under this light condition. At 5 μmol.m-2, the double mutant germinated ~60%, whereas the wild type and the two single mutants germinated only ~5%. At a higher red light fluence (65 μmol.m-2), all seeds germinated ~100%.	17449805	1	1
AT2G01570	RGA	GRS RGA1	Normal germination compared to wild-type plants in response to varying red light fluences.	17449805	1	1
AT1G14920	GAI	RGA2	Normal germination compared to wild-type plants in response to varying red light fluences.	17449805	1	1
AT1G14920	GAI	RGA2	The double mutant germinated much better in response to increasing red light fluences. At 0 μmol.m-2 red light fluence, the double mutant germinated ~15%, whereas the wildtype and single mutant seeds did not germinate under this light condition. At 5 μmol.m-2, the double mutant germinated ~60%, whereas the wild type and the two single mutants germinated only ~5%. At a higher red light fluence (65 μmol.m-2), all seeds germinated ~100%.	17449805	1	1
AT1G69390	MINE1	ARC12	Fewer but enlarged plastids. Contain short FtsZ filaments within a single oversized plastid.	17451550	1	0
AT1G78240	QUA2	OSU1 TSD2	Increased activity of axial meristems, reduced root growth and enhanced de-etiolation.	17461780	3	3
AT1G68740	PHO1;H1		Strong reduction in growth and in the capacity to transfer phosphate (Pi) from the root to shoot compared with pho1.	17461783	1	1
AT1G68740	PHO1;H1		T-DNA knock-out mutants of PHO1;H1 neither showed growth defects nor alteration in phosphate (Pi) transport dynamics, or Pi content, compared with wild type.	17461783	1	1
AT1G68740	PHO1;H1		Vegetative growth of the mutant appears to be comparable with wild type for plants grown in soil, although the mutant has flowers with smaller petals and reduced fertility. The abnormal flower phenotype has been reported to occur in a fraction of the transgenic plants derived from the Madison collection, and is thought to be linked to the presence of an AP1 sequence in the T-DNA.	17461783	2	2
AT1G18570	MYB51	HIG1	compromised in indolic glucosinolate biosynthesis.	17461791	1	1
AT1G08370	DCP1	ATDCP1; decapping 1	The homozygous progeny does not form flower buds.	17485080	1	0
AT1G08370	DCP1	ATDCP1; decapping 1	The homozygous progeny is seedling lethal, showed arrested postembryonic development including cotyledon expansion, development of vascular networks, root elongation, and shoot development.	17485080	5	1
AT1G01140	CIPK9	PKS6 SnRK3.12	hypersensitive to low potassium media	17486125	1	1
AT1G01280	CYP703A2	DEX2	Slightly longer inflorescences, an extended period of blooming, a reduced number of elongated siliques, and overall reduced seed set. About a third of the siliques failed to develop. Pollen was not developed (lower and middle part of the inflorescence) or reduced (apical flowers).	17496121	4	4
AT1G23010	LPR1		Long primary root when grown on low Pi.	17496893	1	1
AT1G79280	NUA	TPR	Accumulate nuclear poly(A+) RNA.	17513499	1	1
AT1G79280	NUA	TPR	Decreased mRNA levels of the floral repressors FLC and MAF4 and increased mRNA levels of the floral activators FT and SOC1.	17513499	1	1
AT1G79280	NUA	TPR	Extreme early-flowering, stunted in growth, phyllotaxy defects in the inflorescence.	17513499	1	1
AT1G79280	NUA	TPR	Increase in SUMO conjugates and decrease in free SUMO.	17513499	1	0
AT1G79280	NUA	TPR	Similar to nua-1 and esd4-2 single mutants. Have even shorter stamens and reduced fertility than the single mutants.	17513499	2	1
AT1G74710	ICS1		Following Pythium irregulare infection, the increase in JA levels was comparable in wild-type and sid2-1 plants.	17513501	1	1
AT1G74710	ICS1		Significantly increased susceptibility to the oomycete Pythium irregulare.	17513501	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	In contrast to wild type, ABA levels did not increased rapidly after infection with the oomycete Pythium irregulare.	17513501	1	1
AT1G52340	ABA2	GIN1 ISI4 SAN3 SDR1 SIS4 SRE1	Increased susceptibility to P. irregulare compared with the wild type.	17513501	1	1
AT1G60490	VPS34	ATVPS34; F8A5.4; F8A5_4; PHOSPATIDYLINOSITOL 3-KINASE; PHOSPHATIDYLINOSITOL 3-KINASE; PI3K; vacuolar protein sorting 34	Mutants showed reduced endocytosis and little ROS production upon exposure to salt stress. Bleaching became visible in the mutant plants after 4–5 days and most plants were dead after 7 days after mutants were transferred to plates containing 150 mM NaCl.	17521408	2	2
AT1G17440	TAF12B	CKH1 EER4	Roots are extremely curled. Dark-grown seedlings are hypersensitive to ethylene. Extreme hypocotyl shortening is observed when grown on 100ul /L ethylene.	17526916	3	3
AT1G17440	TAF12B	CKH1 EER4	Extreme hypocotyl shortening when grown in the dark. Much smaller than either of the single mutants. Plants die at or near the time at which they flower.	17526916	3	3
AT1G17440	TAF12B	CKH1 EER4	eer4 partially restores the ethylene responsiveness to the ein3-1 mutant. Exposure of the eer4;ein3-1 mutant to saturating levels of ethylene results in moderate hypocotyl inhibition along with the generation of a pronounced apical hook.	17526916	1	1
AT1G17440	TAF12B	CKH1 EER4	Identical to the ein2-5 single mutant.There is no noticeable effect on hypocotyl length of dark grown plants supplemented with ethylene.	17526916	1	1
AT1G66340	ETR1		The mutant was the most sensitive to high salt (NaCl) and osmotic (mannitol) stress in both germination rate and percentage of germinating seedlings turning green.	17533512	2	2
AT1G34370	STOP1	ATSTOP1	Reduced root growth at pH 4.7. Hypersensitive to proton (H+) and aluminum (Al3+) rhizotoxicity. No expression of the AtALMT1 gene (encoding a malate transporter) and malate excretion after Al treatment.	17535918	3	3
AT1G34370	STOP1	ATSTOP1	No root growth at pH 4.3.	17535918	1	1
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	The greenhouse-grown mutant was slightly dwarfed.	17540573		
AT1G05850	CTL1	ARM ELP1 ERH2 HOT2 POM1	Partial reversion of the hypocotyl-elongation defect of pom1-2.	17540573		
AT1G27510	EX2	EXECUTER 2	Once they were transferred to the long day conditions (after being grown in constant light until they reached the rosette leaf stage and were ready to bolt), the mutant plants continued to grow similarly to wild type except that their growth was slightly reduced and their final height was ~80% of that of wild type.	17540731	1	1
AT1G27510	EX2	EXECUTER 2	Under continuous light the mutant plants grew equally well compared to wild type and finally reached the same height.	17540731	1	1
AT1G27510	EX2	EXECUTER 2	When mature plants grown under continuous light were shifted to the dark for 8 h free protochlorophyllide accumulated in the mutant to similar levels in rosette leaves and were 3- to 4-fold higher than in wild-type controls.	17540731	1	0
AT1G27510	EX2	EXECUTER 2	Once they were transferred to the long day conditions (after being grown in constant light until they reached the rosette leaf stage and were ready to bolt), the mutant plants stopped growing.	17540731	1	1
AT1G65650	UCH2	EXECUTER 2	Accumulated less chlorophyll than wild-type. Smaller and more compact rosettes than wild-type. More lanceolate cauline leaves. Less fertile. Under short day conditions, the double mutant develops a less branched primary inflorescence.	17559514	2	1
AT1G09570	PHYA	ELONGATED HYPOCOTYL 8 FAR RED ELONGATED 1 FAR RED ELONGATED HYPOCOTYL 2 FHY2 FRE1 HY8 phyTochrome A	Whereas, in WT seeds, germination could be promoted by a single red or far-red pulse given after 48 h but not after 3 h (matching the time of highest phyA abundance), the germination was no longer promoted in the mutant in either treatment.	17566111	1	1
AT1G15020	QSOX1	QSO2	Displays more sensitivity to toxic cations than control plants, both as seedlings grown in vitro, and as plants grown in soil.	17568770	1	1
AT1G15020	QSOX1	QSO2	Whereas the initial rate of uptake (less than 20 min) was not significantly affected by the mutation, both the uptake at longer times (1 h) and the accumulation after 2 days of both toxic cations correlated inversely with QSO2 function. With K+ and Rb+ uptake, the initial rate of uptake was not affected by QSO2 but, opposite to the results with toxic cations, both the uptake at long times and the accumulation of K+ were directly correlated with QSO2 function.	17568770	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	The triple mutant had an approximately additive phenotype. They were bushy and displayed the reduced fertility of axr1-12 plants.	17586653	1	1

AT1G62180	APR2	3'-PHOSPHOADENOSINE-5'-PHOSPHOSULFATE (PAPS) REDUCTASE HOMOLOG 43; 5'adenylylphosphosulfate reductase 2; ADENOSINE-5'-PHOSPHOSULFATE REDUCTASE; APS REDUCTASE; APSR; ATAPR2; F19K23.11; F19K23_11; PRH; PRH43	mutant accumulated 2.5 times more sulfate than the wild type	17589509	1	1
AT1G70510	KNAT2	ARABIDOPSIS THALIANA KN 1 ATK1	Fruits produced by bp-1, knat2 and bp-1 knat2 plants showed a wild-type aspect, both in replum and valves.	17592013	1	1
AT1G65620	LBD6	AS2	The mutant fruits displayed the same phenotype as seen in those of as1-1.	17592013	1	1
AT1G28320	DEG15	GPP	Immunoblot with α-gMDH antibodies showed that processing of pre-gMDH to gMDH no longer occurred in the homozygous mutant plant.	17592111	1	0
AT1G65620	LBD6	AS2	Mutant leaf petioles displayed clusters of densely cytoplasmic, undifferentiated cells on the adaxial side, coincident with the development of ectopic outgrowths.	17601823	2	2
AT1G65620	LBD6	AS2	The rosette leaf petioles of the triple mutant plants showed extensive ectopic outgrowth formation in the marginal region, and some outgrowths exhibited a strongly radialized character.	17601823	1	1
AT1G65620	LBD6	AS2	The vascular patterning defects in the triple mutant leaf petioles were greatly enhanced compared with those of the parental plants.	17601823	1	1
AT1G32240	KAN2	KANADI 2	About nine-tenths of the mutants exhibited abaxialized vasculature. The exclusively adaxialized vasculature observed in kan1 kan2 petioles was not detected in bop1 bop2 kan1 kan2 petioles. The radialized portion of bop1 bop2 kan1 kan2 leaves showed various kinds of organ polarity defects. The vascular bundles of nearly half of the leaves (44.0%) consisted of phloem surrounded by xylem, while one-third (36.0%) displayed xylem surrounded by phloem, and a small percentage (16.0%) had a mixture of both types of vasculature.	17601823	1	1
AT1G32240	KAN2	KANADI 2	Quadruple mutant plants developed narrow leaves with ectopic blade outgrowth along the petioles, like bop1 bop2 leaves, as well as ectopic outgrowths on their abaxial lamina, like kan1 kan2 leaves. However, all of the bop1 bop2 kan1 kan2 leaves also showed extended, radialized petiole development that was not observed in either parental genotype.	17601823	1	1
AT1G32240	KAN2	KANADI 2	bop1 bop2 kan1 kan2 stems had a decreased ratio of adaxialized vascular phenotypes compared with kan1 kan2 stems. Similar to what was observed in petioles, 6.7% of bop1 bop2 kan1 kan2 stems exhibited an abaxialized phenotype of xylem surrounded by phloem, while others (13.3%) had both types of vasculature in a single stem.	17601823	1	1
AT1G32240	KAN2	KANADI 2	All kan1 kan2 stem vascular bundles displayed phloem surrounded by xylem, indicating adaxialized polarity.	17601823	1	1
AT1G32240	KAN2	KANADI 2	Double mutant plants have narrow leaves and developed ectopic outgrowths on their abaxial lamina.	17601823	1	1
AT1G32240	KAN2	KANADI 2	The vasculature in more than half (55.9%) of kan1 kan2 leaf petioles exhibited a pattern of phloem surrounded by xylem, representing an adaxialized phenotype. However, very surprisingly, 17.6% of kan1 kan2 leaf petioles had abaxialized vasculature or a mixture of adaxialized and abaxialized vasculature.	17601823	1	1
AT1G70070	ISE2	EMB25 PDE317	Embryo-defective phenotypes and lack of plasmodesmata aperture/size-exclusion limit downregulation after the torpedo stage.	17601829	1	0
AT1G70070	ISE2	EMB25 PDE317	Similar frequency of branched plasmodesmata as in ise2-1.	17601829	1	0
AT1G70070	ISE2	EMB25 PDE317	Homozygous embryos have proportionally thicker hypocotyls and smaller cotyledons. However, the general organization of the tissues in the embryonic axis, such as procambial strands, ground tissue, and protodermis, was indistinguishable from that of wild-type embryos described in the literature.	17601829	1	1
AT1G70070	ISE2	EMB25 PDE317	Homozygous embryos produce very low levels of chlorophyll.	17601829	1	1
AT1G70070	ISE2	EMB25 PDE317	Homozygous embryos were reduced in size compared with wild-type embryos, and their cotyledons were smaller, with irregular borders, pointed tips, and uneven sizes.	17601829	1	1
AT1G70070	ISE2	EMB25 PDE317	Homozygous mutant embryos develop more slowly compared with wild-type embryos during the later stages of development. Abnormal morphology starts to be evident only after the heart stage.	17601829	1	1
AT1G70070	ISE2	EMB25 PDE317	Homozygous mutant seeds can germinate in vitro on agar plates containing Murashige and Skoog (MS) salt plus 1% sucrose, although the growth/developmental rate of the homozygous seedlings was slower compared with that of wild-type seedlings. Whereas wild-type seedlings displayed fully expanded green cotyledons, true leaves and a well-developed root system by 14 d after germination, homozygous seedlings were much smaller and white or pale green in color. Underdeveloped cotyledons emerged from the homozygous seeds but expanded very slowly and sometimes showed bumpy irregular surfaces and occasional anthocyanin expression. Partial greening was observed in ise2 seedlings only after culture for several weeks. Most of the homozygous seedlings developed leaf-like structures that were translucent and contained trichomes. The aerial portions of the homozygous seedlings generally were stunted and thicker and frequently exhibited callus-like structures after extended periods of culture. Mutant seedlings often form stunted inflorescence shoot- and flower-like organs but normal-looking roots and root hairs. Frequently, multiple short shoots originate from the apical dome of a single original seedling, forming a broccoli-like structure. Homozygous seedlings grown in culture with 1% sucrose are sterile and perish immediately after germinating in soil or on MS medium without sucrose.	17601829	1	1
AT1G70070	ISE2	EMB25 PDE317	In all homozygous embryos from late-heart to late-torpedo stages, 15% of their plasmodesmata (PD) exhibited branched morphology, in contrast with the single simple PD observed in wild-type embryos. Branched PD were randomly distributed throughout the whole body of embryos, and no variation in their frequency was observed among late-heart, early-torpedo, and late-torpedo stages.	17601829	1	0
AT1G70070	ISE2	EMB25 PDE317	Mutation is lethal in the homozygous state.	17601829	1	0
AT1G70070	ISE2	EMB25 PDE317	Radicle and the shoot apical meristem (SAM) appeared normal in the homozygous seedlings but were often larger.	17601829	1	1
AT1G70070	ISE2	EMB25 PDE317	Wild-type and ISE2/ise2 heterozygous embryos remain green as their organs, such as hypocotyls and cotyledons, develop. The corresponding ise2 embryos (from the same silique) were white by light microscopy and never turned green even at later stages.	17601829	1	1
AT1G06040	STO	B-box domain proTein 24 BBX24 SALT TOLERANCE	shorter hypocotyl under Rc, FRc, Bc, and larger cotyledon area than wt/increased anthocyanin accumulation under FRc and Bc.	17605755	1	1
AT1G02880	TPK1	Thiamin pyrophosphokinase1	The AtTPK1-KO single mutant does not have any obvious aberrant phenotypes, but, the AtTPK1-KO /AtTPK2-KO double mutant demonstrates that these enzymes are required to produce thiamine pyrophosphate from thiamine.	17611796	1	0
AT1G02880	TPK1	Thiamin pyrophosphokinase1	These double knock-out mutants are thiamine auxotrophs that have a seedling lethal phenotype unless they are supplied with exogenous thiamine pyrophosphate (TPP) through a spray-based application. In addition, these mutants have 2-fold higher levels of thiamine and 32-fold lower levels of TPP than wild type plants.	17611796	1	1
AT1G09340	CRB	CHLOROPLAST RNA BINDING chloroplasT RNA bindinG CRUCIFERIN B CSP41B HIP1.3	Smaller and paler than wild-type plants. Reduction in both chlorophyll a and chlorophyll b. Impaired photosynthesis.	17617174	3	3
AT1G09330	ECH	ECHIDNA	Smaller and paler than wild-type plants. Reduction in both chlorophyll a and chlorophyll b. Impaired photosynthesis.	17617174	3	3
AT2G05210	POT1A	POT1	Telomeres in wild-type siblings appeared as a homogeneous smear of products ranging from 1.6 to 4.5 kb. Telomere tracts in pot1-1 were much shorter than in wild-type and showed a more discrete banding pattern.	17627276	1	1
AT2G05210	POT1A	POT1	The fate of telomeres in pot1 mutants was followed for several plant generations and it was found that telomere length in pot1-1 decreased progressively with each generation. The ever-shorter-telomere phenotype and sharp TRF banding profile were strikingly similar to the phenotype associated with tert mutants, which lose 200-500 bp of telomeric DNA per plant generation.	17627276	1	1
AT2G05210	POT1A	POT1	The mutants failed to elongate their telomeres, and exhibited a heterogeneous profile of TRF products similar to that seen in ku70 tert.	17627276	1	1
AT2G05210	POT1A	POT1	Same degree of telomere shortening as in the pot1 ku70 and ku70 tert double mutants.	17627276	1	1
AT2G05210	POT1A	POT1	Telomeres in the double mutants shortened at the same rate as in either single mutant.	17627276	1	1
AT2G05210	POT1A	POT1	Telomeres of the same length and sharp banding profile were found in the double mutant, as in their tert and pot1-1 siblings.	17627276	1	1
AT2G05210	POT1A	POT1	Telomeres in wild-type siblings appeared as a homogeneous smear of products ranging from 1.6 to 4.5 kb. Telomeres were significantly shorter in pot1-2 than in wild-type, or even pot1-1.	17627276	1	1

AT1G16970	KU70		In contrast to the ku70 mutant, which undergo telomerase-dependent expansion to more than twice the normal length in a single generation, the ku70 tert double mutant displays accelerated telomere shortening and a precocious onset of genome stability.	17627276	1	1
AT1G16970	KU70		The mutants failed to elongate their telomeres, and exhibited a heterogeneous profile of TRF products similar to that seen in ku70 tert.	17627276	1	1
AT1G16970	KU70		Same degree of telomere shortening as in the pot1 ku70 and ku70 tert double mutants.	17627276	1	1
AT1G73180	AT1G73180	T18K17.15; T18K17 15	The bns-2 mutant has defects in inflorescence development.	17627280	1	1
AT1G73177	BNS	anaphase-promoTinG complex 13 APC13 BONSAI	The bns-2 mutant has defects in inflorescence development.	17627280	1	1
AT1G26810	GALT1	B3GALT15	In contrast with wild-type plants, no Lea-containing peaks were found in extracts of the mutant.	17630273	1	1
AT1G26810	GALT1	B3GALT15	Mutant lines did not display a detectable signal with JIM84 (a monoclonal antibody specifically binding to Lea structures on plant N-glycans), whereas, in wild-type plants, a strong staining was visible.	17630273	1	1
AT1G77110	PIN6	PIN-FORMED 6	shorter visible lateral roots at 9 days after germination. The proximal region of each lateral root in the mutant is significantly swollen and often bent. Growth and morphology of the primary root of the puchi mutant is normal.	17630277	3	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12_21	Homozygous axr1-12 plants that are heterozygous for axl-1 display severe growth defects. These seedlings developed short, slow growing roots compared with wild-type roots, and were arrested at the late seedling stage.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12_21	Plants with the genotype AXL/axl-1 axr1-12/axr1-12 had a slight but consistent reduction in RUB-CUL1 levels.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	The axr1-12/axr1-12 AXL/axl-1 line are nearly completely resistant to auxin, a much more severe phenotype than for axr1-12 alone.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12_21	The columella of AXL/axl-1 axr1-12/axr1-12 root tips is highly disorganized during early seedling root growth, and is completely disrupted at the time when root growth ceases.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12_21	Reduced RUB modification of CUL1.	17655650	1	0
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	Slight decrease in the number of columella columns in axr1-12 seedlings compared with wild type.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	The mutant is resistant to auxin.	17655650	1	0
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	Double homozygous mutant seedlings are completely deficient in RUB-modified CUL1.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12_21	Double homozygous progeny has severe growth and developmental defects. The phenotype of these plants resembled the bdl/iaa12 and mp/arf5 mutants. These seedlings did not segregate at the expected 1/16 ratio. Instead, we identified three double mutant seedlings in 176 F2 plants, suggesting the homozygous double mutants are arrested during embryogenesis.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	In the double mutant progeny, great reduction in vascular development.	17655650	1	0
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	The AXR1/axr1-12, axl-1/axl-1 plants were similar to wild type with respect to overall morphology and fertility.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	The double homozygous progeny is seedling lethal.	17655650	1	1
AT1G05180	AXR1	AUXIN RESISTANT 1; AUXIN RESISTANT PROTEIN 1; YUP8H12.21; YUP8H12 21	Very strong embryo defects were observed in homozygous axl-1 plants segregating the axr1-12 mutation.	17655650	1	1
AT1G64780	AMT1-2		The amt1;2-1 mutant appears to grow normally on media with different levels of ammonium or ammonium nitrate, but, seems slightly more resistant to methylammonium that wild type seedlings. High affinity ammonium uptake is reduced in the roots of amt1;2-2 mutants. There is no change in the level of AMT1;1, AMT1;3, or AMT2;1 transcripts for these mutants relative to wild type in low or high nitrogen conditions.	17693533	1	1
AT1G64780	AMT1-2		The amt1;2-2 mutant appears to grow normally on media with different levels of ammonium or ammonium nitrate, but, seems slightly more resistant to methylammonium that wild type seedlings. High affinity ammonium uptake is reduced in the roots of amt1;2-2 mutants. There is no change in the level of AMT1;1, AMT1;3, or AMT2;1 transcripts for these mutants relative to wild type in low or high nitrogen conditions.	17693533	1	1
AT1G50030	TOR	TarGeT of rapamycin	larger plants, more resistant to stress	17721441	1	1
AT1G67370	ASY1	ASYNAPTIC 1; ATASY1; F1N21.19	The chromosome fragmentation phenotype of the asy1/ Atrad51 double mutant is indistinguishable from that of the Atrad51 mutant.	17785529	1	1
AT1G67370	ASY1	ASYNAPTIC 1; ATASY1; F1N21.19	Mutant lines showed identical asynaptic and chiasma frequency phenotypes.	17785529	1	1
AT1G67230	CRWN1	KAKU2 LINC1	Nuclei are significantly smaller than wild-type nuclei.	17873096	1	1
AT1G67230	CRWN1	KAKU2 LINC1	Epidermal cells are approximately one-fourth the size of wild-type epidermal cells. Whole plant is dwarfed with respect to wild-type and single mutant siblings in segregating F2 family. Spindle-shaped nuclei are almost entirely absent. Number of chromocenters in double mutant nuclei is half that of wild type nuclei. Nuclear DNA packaging density is increased with respect to wild type.	17873096	1	1
AT1G13220	LINC2	CROWDED NUCLEI 2 CRWN2 LITTLE NUCLEI2	Nuclei are significantly smaller than wild-type nuclei.	17873096	1	1
AT1G13220	LINC2	CROWDED NUCLEI 2 CRWN2 LITTLE NUCLEI2	Epidermal cells are approximately one-fourth the size of wild-type epidermal cells. Whole plant is dwarfed with respect to wild-type and single mutant siblings in segregating F2 family. Spindle-shaped nuclei are almost entirely absent. Number of chromocenters in double mutant nuclei is half that of wild type nuclei. Nuclear DNA packaging density is increased with respect to wild type.	17873096	1	1
AT1G08430	ALMT1		The mutant exhibits very low levels of root growth and malate release in the presence of Al (0.2 nmol plant-1 24 h-1).	17885092	1	1
AT1G76490			The hmg1 mutant has reduced levels of sterols compared to wild-type plants, but, its sterol composition is normal. It also has about a 65% drop in triterpenoid levels compared to wild-type plants.	17917299		
AT1G62830	LDL1	SWP1	Late flowering. Flowers later than flc3 single mutant but earlier than ldl1/ldl2 double mutant.	17921315	1	1
AT1G30270	CIPK23	ATCIPK23 LKS1 LOW-K+-SENSITIVE 1 PKS17 SnRK3.23 SOS2-like proTein kinase 17	Enhanced drought tolerance. Hypersensitive to ABA inhibition of light-induced stomatal opening. Loss of function of CIPK23 alters the ABA responsiveness of guard cells during their opening and closure, leading to reduced water loss under drought conditions. When grown on media containing low levels of KCl (micromolar range), cipk23 mutants displayed drastically reduced stature compared to the wild-type. In particular, the roots of mutant plants were significantly shorter than those of wildtype plants.	17922773	2	1
AT2G04240	XERICO		Resistant to exogenous ABA. Seeds contained lower amounts of endogenous ABA than wildtype.	17933900	1	1
AT1G51190	PLT2	AIL4	Rootless.Embryonic root differentiates 3 days after germination. Adventitious roots arrest 6 days after germination.	17960244	1	1
AT1G74900	OTP43	F25A4.13; F25A4_13; organelle transcript processing defect 43	Segregates 25% embryo lethal. Leaves abnormally shaped (serrated).	17965268	1	0
AT1G63990	SPO11-2	sporulaTion 11-2	The first meiotic division of pollen mother cells because the homologs neither pair nor form SCs due to the lack of initial DSB formation	17965269	1	1
AT1G63990	SPO11-2	sporulaTion 11-2	Anthers were shorter and aged earlier. Chromosome segregation is severely disturbed.	17965269	2	2
AT1G20900	AHL27	ESC ORE7	Delayed leaf senescence, slightly shorter petioles, round and enlarged leaves, an increased number of inflorescences, a late flowering phenotype and increased biomass.	17971039	5	1
AT1G64520	RPN12A		The rpn12a-1 mutant has defects in ubiquitin-mediated proteolysis via the 26S proteasome, rendering it more sensitive to misfolded proteins that are degraded in a 26S-proteasome / Ub-dependent manner. However, it has increased levels of the 20S core particle of the proteasome, and exhibits reduced sensitivity to oxidative stress, presumably since oxidatively damaged proteins can be degraded in a 20S proteasome-dependent, but 26S proteasome /Ub-independent manner.	17971041	2	1
AT1G01610	GPAT4		This double knock-out mutant has a 60-70% overall decrease in cutin monomer content in leaf and stem. The plant grew slowly. The water loss rate for rosettes was 4-fold greater than wild type. The mutant has an increased sensitivity to fungal pathogen. Defects in stomata structure.	17991776	2	0
AT1G10930	RECQL4A	RECQ4A RQL4A SGS1	sensitive to methylmethanesulfonate and cis-platin and showed an enhanced homologous recombination level	18000056	2	0

AT1G10130	ECA3	ARABIDOPSIS THALIANA ER-TYPE CA2+-ATPASE 3; ATECA3; endoplasmic reticulum-type calcium-transporting ATPase 3; T27I1.16; T27I1_16	Shoot and root growth is strongly retarded when plants are grown in the absence of Mn. Also shows delayed growth when grown in the absence of Ca.	18024560	2	2
AT1G10920			Reduced sensitivity to victorin.	18052878		
AT1G17580	XI-1	MYA1	There are no obvious defects in the aerial tissues, roots, or root hairs of xi-1 mutant plants grown under normal conditions. There are also no obvious defects in organelle trafficking, except for a slight effect on peroxisome movement. Double mutant analysis reveals a greater role for XI-1 in organelle movement and plant development (see xik-2/xi-1).	18178669	1	1
AT1G04160	XIB	ATXIB MYOSIN XI B myosin XI B MYOSIN XI-8 XI-8 XI-B	There are no obvious defects in the aerial tissues, roots, or root hairs of xi-b mutant plants grown under normal conditions. There are also no obvious defects in organelle trafficking. Double mutant analysis reveals a role for xi-b in root hair elongation (see xi-2/xi-b).	18178669	1	1
AT1G04160	XIB	ATXIB MYOSIN XI B myosin XI B MYOSIN XI-8 XI-8 XI-B	There are no obvious defects in the aerial tissues, roots, or root hairs of xi-b mutant plants grown under normal conditions. There are also no obvious defects in organelle trafficking. Double mutant analysis reveals a role for xi-b in root hair elongation (see xi-2/xi-b)	18178669	1	1
AT1G20090	ROP2	Arabidopsis RAC-like 4; ARAC4; ATRAC4; ATROP2; GTP-BINDING PROTEIN ARAC4; RHO-related protein from plants 2; T20H2.12; T20H2_12	stomata open faster and the extent of aperture increase is larger in response to light	18178769	1	1
AT1G01220	FKGP	ATFKGP GDP-L-fucose pyrophosphorylase L-fucokinase	fkgp-1 mutants have about 40 times more L-fucose than wild type Arabidopsis plants, but the levels of other monosaccharides do not appear to differ significantly in the mutants. No obvious phenotypic abnormalities were observed in the fkgp-1 mutants, nor were any differences in the sugar composition of cell wall polysaccharides detected.	18199744	1	0
AT1G04520	CRRSP3		The movement of GFP between cells is increased in this double mutant.	18215111	1	1
AT2G13560	NAD-ME1		The nad-me1.1 mutants appear to grow and develop normally and display normal photosynthetic behavior, however, the plants have a significant reduction in NAD-dependent malic enzyme activity.	18223148		
AT2G13560	NAD-ME1		The nad-me1.1 / nad-me2.1 double mutant has no detectable NAD-dependent malic enzyme activity. However, it appears to grow and develop normally and to have normal photosynthetic parameters. However, the levels of several metabolites, including fructose, galactose, sucrose, 2-oxoglutarate, succinate, fumarate, citrate, and several amino acids are altered in these double mutants relative to wild type plants. The metabolites affected differ depending on whether the analyses are done at the end of the day or end of the night.	18223148		
AT1G73660	SIS8	AT6	Increased tolerance of salt stress. Seedlings germinate in the presence of high concentrations of NaCl.	18299802	1	1
AT1G80330	GA3OX4		Dwarf phenotype, early flowers are sterile while late flowers are fertile. Reduced silique length.	18310462	1	1
AT1G80325			Dwarf phenotype, early flowers are sterile while late flowers are fertile. Reduced silique length.	18310462	1	1
AT1G15550	GA3OX1	GA4	Dwarf phenotype, early flowers are sterile while late flowers are fertile. Reduced silique length.	18310462	1	1
AT2G14560	LURP1		Compromised in RPP4-mediated resistance. Mutants allow increased growth of Hyaloperonospora parasitica hyphae frequently surrounded by a trail of necrotic plant cells.	18346188	1	0
AT1G65360	AGL23	AT1G65360, AGAMOUS-like 23, T8F5.14, T8F5_14	arrest in embryo sac development; albino due to absence of chloroplast	18346189	1	1
AT1G66340	ETR1		Increased number of lateral roots. Reduced acropetal auxin transport.	18363780	1	1
AT1G69935	SHW1		Dark grown seedlings have shorter hypocotyls and reduced apical hook curvature. In white light, mutants have shorter hypocotyls indicating an enhanced inhibition of hypocotyl elongation. Late flowering in long days. Reduced chlorophyll accumulation.	18375596	4	4
AT1G15820	LHCB6	AT1G05207	retarded growth, reduced NPQ amplitude, limited electron transport rate	18381925	1	1
AT1G05560	UGT75B1	UDP-GLUCOSE TRANSFERASE 1 UDP-GLUCOSYLTRANSFERASE UDP-GlucosylTransferase 75B1 UGT1	Extracts from mutant leaves, flowers, and siliques show a 95% reduction in p-acylglucosyltransferase activity relative to wild type extracts, and p-ABA-glucose formation is severely diminished when assayed in a radiotracer feeding experiment using mutant and wild type leaves. Though the ratio of glucosylated to non-glucosylated pABA is much lower in mutant plants, they have comparable levels of total pABA.	18385129	1	0
AT1G70510	KNAT2	ARABIDOPSIS THALIANA KN 1 ATK1	pny phenotype	18390591	1	1
AT1G70510	KNAT2	ARABIDOPSIS THALIANA KN 1 ATK1	Similar to bp single mutants.	18390591	1	1
AT1G70510	KNAT2	ARABIDOPSIS THALIANA KN 1 ATK1	Similar to bp;pny double mutant.	18390591	1	1
AT1G70510	KNAT2	ARABIDOPSIS THALIANA KN 1 ATK1	Fully rescues downward orientation of siliques characteristic of bp single mutants. Shorter than WT. Rescuse partial loss of apical dominance characteristic of single bp mutants. Partial rescue of primary inflorescence internode length characteristic of bp single mutants.	18390591	1	1
AT1G70510	KNAT2	ARABIDOPSIS THALIANA KN 1 ATK1	Similar to knat6;bp;pny except htat shows greater suppression on bp pny silique orientation defects.	18390591	1	1
AT1G23380	KNAT6		Partially rescues the downward orientation of siliques characteristic of bp single mutants. Rescue of partial loss of apical dominance phenotype characteristic of bp mutants. Short plants, although taller than bp single mutants. Partial rescue of primary inflorescence stem internode length characteristic of bp single mutants.	18390591	4	4
AT1G23380	KNAT6		Partially suppresses pny;bp phenotypes such as dwarfism, loss of apical dominance and silique orientation.	18390591	1	1
AT1G23380	KNAT6		Fully rescues downward orientation of siliques characteristic of bp single mutants. Shorter than WT. Rescuse partial loss of apical dominance characteristic of single bp mutants. Partial rescue of primary inflorescence internode length characteristic of bp single mutants.	18390591	3	3
AT1G23380	KNAT6		Similar to knat6;bp;pny except htat shows greater suppression on bp pny silique orientation defects.	18390591	1	1
AT1G23380	KNAT6		WT	18390591	1	1
AT1G72330	ALAAT2	AOAT3	slightly retarded. Leaves contained undegraded starch at the end of night.	18390594	1	1
AT1G43850	SEU		Resembles seu-1 single mutant with reduced stamen number.	18390806	1	1
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	These mutants have shorter hypocotyls than wild-type plants when grown in low R:FR ratio light. sav3-1 mutants are shorter and have reduced leaf hyponasty compared to wild type plants when both are subjected to supplementary far red light. Shade-induced expression of IAA19 and IAA29 is reduced in this mutant compared to wild-type plants.	18394996	3	3
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	These mutants have shorter hypocotyls, shorter petioles, and more leaf area than wild-type plants when grown in low R:FR ratio light. They mutants have 60% of the free auxin normally found in wild-type mutants with a marked reduction in IAA synthesis rate under shade conditions. Microarray experiments indicate that following shade treatment, the sav3-2 mutant has 66 genes that are expressed at a lower level than in WT plants. Shade-induced expression of IAA19 and IAA29 is reduced in this mutant compared to wild-type plants, but the wild-type expression level can be restored with 1 uM IAA.	18394996	4	4
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	These mutants have shorter hypocotyls than wild-type plants when grown in low R:FR ratio light. Shade-induced expression of IAA19 and IAA29 is reduced in this mutant compared to wild-type plants.	18394996	2	2
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	The hypocotyl of this mutant responds normally to ACC when grown in the dark, but, its roots are moderately less sensitive to ACC than wild type seedlings grown under the same conditions. This difference in sensitivity can be eliminated when the mutants are treated with ACC and low levels of IAA. wei8-1 and wild type hypocotyls and roots respond similarly to IAA in the absence of ACC. The roots of wei8-1 mutant seedlings do not display proper gravitropism. High-temperature mediated hypocotyl elongation is reduced by ~25% in these mutants compared to wild-type seedlings.	18394997		
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	These triple mutants do not make a primary root, they have an extremely reduced hypocotyl, and they lack discernible vasculature in their cotyledons. These mutants have a higher propensity to develop a single cotyledon than wild-type embryos.	18394997		

AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	The roots of this mutant show almost no sensitivity to the ethylene precursor ACC, but sensitivity is largely restored by the addition of low levels of IAA (but not tryptophan). ACC-triggered dark-grown apical hook formation is also compromised in this mutant, and it is not restored by the addition of IAA. Root gravitropism is more disrupted in this double mutant than in either single mutant. The mutant plants are shorter than wild type, have reduced venation in their leaves, exhibit reduced apical dominance, and produce abnormal flowers. DR5:GUS expression is also diminished in these double mutants, consistent with a ~50% reduction in IAA levels in these mutants. Root meristematic cells differentiate in this mutant, leading to a loss of the stem cell niche and the cessation of root growth.	18394997		
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	ACC-triggered dark-grown apical hook formation is compromised in this mutant. Root meristematic cells differentiate in this mutant, leading to a loss of the stem cell niche and the cessation of root growth. This mutant also lacks valves in the gynoecia.	18394997		
AT1G70560	TAA1	CKRC1 SAV3 TIR2 WEI8	The hypocotyl of this mutant responds normally to ACC when grown in the dark, but, its roots are moderately less sensitive to ACC than wild type seedlings grown under the same conditions. This difference in sensitivity can be eliminated when the mutants are treated with ACC and low levels of IAA. wei8-2 and wild type hypocotyls and roots respond similarly to IAA in the absence of ACC.	18394997		
AT1G23320	TAR1		This mutant does not have any obvious morphological defects and it responds normally to ACC and IAA in hypocotyl and root elongation assays.	18394997		
AT1G23320	TAR1		These triple mutants do not make a primary root, they have an extremely reduced hypocotyl, and they lack discernible vasculature in their cotyledons. These mutants have a higher propensity to develop a single cotyledon than wild-type embryos.	18394997		
AT1G61120	GES	LIS TPS04	These mutants fail to accumulate (E,E)-geranyllinalool and 4,8,12-trimethyltrideca-1,3,7,11-tetraene (TMTT) in response to a treatment with the octadecanoid mimic coronalon.	18398052	1	1
AT1G09340	CRB	CHLOROPLAST RNA BINDING chloroplasT RNA bindinG CRUCIFERIN B CSP41B HIP1.3	Pale green seedlings, short shoots, short siliques and reduced seed set. Mutants do not accumulate CSP41b protein and CSP41a protein levels are reduced.	18398686	1	1
AT1G60490	VPS34		Similar to wild type siblings. Normal root hair length. Segregates 1:1 for wt:het offspring as mutation affects the male gametophyte and is not transmitted.	18408046	1	1
AT1G69180	CRC		Short siliques. Indeterminate floral mersitem - carpels enclose extra floral organs.	18441215	1	1
AT1G73360	HDG11	HDGL2-11	edt1 mutant plants show enhanced drought tolerance due to overexpression of the HDG11 protein. edt1 mutants have a longer primary root with more lateral roots, and have a higher root biomass. They have larger epidermal cells and larger stomata, but a lower stomatal density. Nevertheless, they have higher levels of photosynthesis than WT seedlings. Mutant seedlings accumulate higher levels of ABA following PEG treatment, and show constitutively higher levels of Pro. Superoxide dismutase activity is also higher in edt1 mutants. Overexpression of HDG11 in tobacco also causes improved drought tolerance.	18451323	6	6
AT1G73360	HDG11	HDGL2-11	Although ectopic overexpression of HDG11 confers increased drought tolerance, hdg11-2 mutants do not appear to be less drought tolerant than wild type plants.	18451323	1	1
AT1G73360	HDG11	HDGL2-11	Although ectopic overexpression of HDG11 causes increased drought tolerance, there is no evidence for reduced drought tolerance in hdg11-2 hdg12 double mutants. The mutants have a wild type appearance, with the exception of having increased trichome branching.	18451323	2	2
AT1G17920	HDG12		Although ectopic overexpression of HDG11 causes increased drought tolerance, there is no evidence for reduced drought tolerance in hdg11-2 hdg12 double mutants. The mutants have a wild type appearance, with the exception of having increased trichome branching.	18451323	2	2
AT1G67140	SWEETIE		Dwarfed. Small, asymmetric, lancet-shaped leaves (cotyledons unaffected). Early senescence of leaves, petals and sepals. Large stigma. Infertile. Over-accumulates starch and trehalose.	18452589	3	3
AT1G06160	ERF094	ORA59	No accumulation of ORA59 transcripts upon JA or ethephon treatment. Increased susceptibility to B.cinera infection.	18467450	2	0
AT1G19270	DA1	SOD1	WT phenotype under normal growth conditions	18483219	1	1
AT1G19270	DA1	SOD1	Increased seed and organ size. Seed mass increased to 132% of WT. Increased seed and ovule volume. Increased cotyledon area. Increased embryo size. Increased total seed yield per plant. Increased integument size. Large flowers with extra petals and carpels. Enlarged, somewhat flattened siliques. Round, large leaves. Thick stems. All organs have more cells than WT, but cell size is the same as WT. Longer lifespan than WT.	18483219	13	6
AT1G13740	AFP2		Hypersensitive to salt, glucose and osmotic stress. Hyperdormant. Slightly sensitive to ABA.	18484180	2	2
AT1G17110	UBP15	UBIQUITIN-SPECIFIC PROTEASE 15 ubiquiTin-specific proTease 15	ubp15-1 mutants exhibit several anatomical defects related to leaf, root, flower, stem, and silique development. Notably, rosette leaves are narrow and serrated. An examination of ubp15-1 leaf cross-sections reveals a reduction in the number of adaxial epidermal and palisade cells spanning the width of the leaf. ubp15-1 mutant leaves also have fewer spongy cell layers than wild type leaves. The aberrant phenotype of this mutant is exacerbated when it is crossed with ubp16-1.	18485060	4	2
AT1G78610	MSL6		Abolished stretch-activate mechanosensitive channel activity	18485707		
AT1G53470	MSL4		Abolished stretch-activate mechanosensitive channel activity	18485707		
AT1G03790	SOM		Wild-type seeds germinate when PHYB is activated by red light but not when PHYB is inactivated by far-red light. som mutant seeds germinate at rates of almost 100% irrespective of light conditions.	18487351	2	2
AT1G60950	FD2	PETF PETF1	retarded growth, with thin leaves of a lighter yellowish-green color, and more roundly shape	18494733	1	0
AT1G67490	GCS1	KNF MUC RSW	Increased number of root hairs and increased stomatal density in siliques.	18503769	1	0
AT1G60490	VPS34		Adult plant morphologically normal. Reduced transmission through male gametophyte. More than half of pollen grains are defective having abnormal vacuolar development. Pollen germination and pollen tube growth is also affected.	18515640	3	3
AT2G04270	rne	G G-like RNAse E RNase E RNE RNEE	Segregates 3:1 WT:hoomozygous mutant. Homozygotes are white and arrest after the cotyledon stage. The phenotype is rescued by growth on sucrose.	18515828	1	1
AT2G04270	rne	G G-like RNAse E RNase E RNE RNEE	White seedlings that arrest at the cotyledon stage. Phenotype rescued by providing sucrose. On sucrose, mutant plants have small chloroplasts with fewer thylakoids and shorter granal stacks than WT. Fully developed chloroplasts are not observed.	18515828	1	1
AT1G18730	PnsB4	NDF6 NDH dependenT flow 6	Impaired NAD(P)H dehydrogenase activity	18535009		
AT1G06770	DRIP1	DREB2A-inTeracTinG proTein 1	There are no obvious morphological defects in the drip1-1 mutant, but the drip1-1 drip 2-1 double mutant has altered gene expression levels and dehydration tolerance. In addition, higher levels of GFP-DREB2A protein are observed in drip1-1 mutants than in wild type seedlings transformed with the same construct.	18552202	2	2
AT1G06770	DRIP1	DREB2A-inTeracTinG proTein 1	drip1-1 drip1-2 double mutants are developmentally delayed and bolt, flower, and set seed later than wild type plants. However, their overall size can exceed that of wild type plants if they receive adequate water. The transcript profile of these mutants differs from wild type under normal conditions, and in response to dehydration stress. Levels of numerous stress-inducible transcripts are increased in the double mutant. In addition, the double mutants appear to be more tolerant to dehydration stress than wild type plants, based on ion leakage assays and recovery after dehydration stress experiments.	18552202	1	1
AT1G78570	RHM1	ROL1	A detailed analysis of the rol1-2 mutants show aberrant cotyledon development with an uneven surface and hyponastic growth, aberrant pavement cell and stomatal morphology in cotyledons, and defective trichome formation. Further the typical jigsaw puzzle-like cell shape of pavement cells was absent in rol1-2 mutants.	18567791	2	1
AT1G42990	BZIP60		The levels of several ER-stress-responsive protein disulfide isomerases (PDI1,5,6,9,10,11) are reduced in this mutant, when ER stress is replied. However, the level of transcripts for the non-ER-stress-responsive PDI2 and PDI8 is slightly increased under these conditions in the atbzip60 mutant relative to WT plants.	18574595	2	0
AT1G50500	HIT1	ATVPS53 HEAT-INTOLERANT 1 VPS53	Reduced transmission of allele through pollen. Homozygotes cannot be recovered. Suspected embryo lethality of homozygotes because reduced seed set is observed in siliques of plants segregating homozygotes. Mature pollen grains appear WT, suggesting that defect occurs at a later stage. Vegetative development appears normal.	18583349	2	2
AT1G04030			Mutant meristems develop abnormally. The meristem is enlarged shortly after germination and appears disorganized. Primordia are irregular and lateral organs produced include tubular and finger-like structures. Also affects the development of roots. Primary root growth is inhibited. The root apical meristems are enlarged and lack distinct columella cells or starch granules.	18591352	5	2

AT1G04020	BARD1	ATBARD1 ROW1	Mutant meristems develop abnormally. The meristem is enlarged shortly after germination and appears disorganized. Primordia are irregular and lateral organs produced include tubular and finger-like structures. Also affects the development of roots. Primary root growth is inhibited. The root apical meristems are enlarged and lack distinct columella cells or starch granules.	18591352	5	2
AT1G11755	LEW1		homozygote lethal.	18612099	1	0
AT1G69640	SBH1		Dwarf plants with reduced vigor, dies before expansion of the true leaves, necrotic lesions on cotyledons. When grew on agar plates, the double mutants displayed extended viability and developed into compact and epinastic rosette with small curled leaves and short petioles, however no bolting. Short roots on agar plate.	18612100	3	1
AT1G14290	SBH2	ATSBH2 sphinGoid base hydroxylase 2	Dwarf plants with reduced vigor, dies before expansion of the true leaves, necrotic lesions on cotyledons. When grew on agar plates, the double mutants displayed extended viability and developed into compact and epinastic rosette with small curled leaves and short petioles, however no bolting. Short roots on agar plate.	18612100	3	1
AT1G64360	AT1G64360		early flowering in short days	18614705	1	1
AT1G50290	AT1G50290		early flowering in short days	18614705	1	1
AT1G56510	ADR2	WRR4	Homozygotes are susceptible to infection by Acem2, Ac2 and Ac7 innoculations of A. candida white rust pathogens. Blisters and chlorotic patches form on leaves of susceptible plants.	18624640		
AT1G26630	ELF5A-2	FBR12	Increased resistance to Pseudomonas syringae pv tomato DC3000 colonization. 72hrs post-innoculation, CFU/leaf disc values were >94% lower tahn WT. Inhibition of infection is correlated with curtailed chlorosis and there fore programmed cell death. Morphologically indistinguishable to WT.	18633122		
AT1G26630	ELF5A-2	FBR12	Increased leaf chlorosis in response to Pseudomonas syringae pv tomato DC3000 innoculation. Severely stunted growth. Many plants do not produce seed. Stunted plants have yellow, curled leaves, purple cotyledons and abnormal flower morphology. Severity of phenotype is directly correlated with level of overexpression.	18633122		
AT1G13930	F7A19.2		Increased sensitivity to salt stress.	18643972	1	1
AT1G13290	WIP6	DOT5	dot5-1 mutants have a misaligned venation defect in their leaves and cotyledons. Their phenotypes may vary somewhat, but dot5-1 mutants often have shorter roots and delayed leaf initiation compared to wild-type seedlings. They also have an abnormal petiole length and phyllotaxy. Apical dominance is reduced in dot5-1 mutants, and they appear to be hypersensitive to an application of the polar auxin transport inhibitor NPA.	18643975	4	1
AT1G13290	WIP6	DOT5	This mutant is reported to have an embryo lethal phenotype in the homozygous state.	18643975	1	0
AT1G50960	GA2OX7		Longer roots when plants are grown under salt stress (50-100nM NaCl).	18643985	1	1
AT1G12610	DREB1F	DDF2 ERF033	Longer roots when plants are grown under salt stress (50-100 nM NaCl).	18643985	1	1
AT1G32770	NAC012	NST3 SND1	Plants are indehiscent because siliques lack secondary walls except in vascular vessels.	18657234	1	1
AT1G54160	NFYA5		Hypersensitive to drought stress.	18682547	1	1
AT1G14320	RPL10A	SAC52	Double mutant shows increase in growth of 68% relative to acl5-1 single mutant. Also restores normal liginification.	18694459	1	1
AT1G14320	RPL10A	SAC52	Defective female gametophytes.	18694459	1	1
AT1G66970	SVL2	GDPDL1 SHV3-like 2	same as smb-3 single mutant	18718934	1	0
AT1G79940	ATERDJ2A		Reduced transmission through pollen. Pollen grains are viable, but pollen germination is aberrant. Homozygotes cannot be recovered.	18718935	1	1
AT1G65520	ECI1		Although the gene that is mutated in this plant encodes a protein that is 49% identical to the IBR10 protein implicated in indole-3-butyric acid (IBA) responses, this mutant displays a normal wild-type IBA response.	18725356	1	1
AT2G06925	PLA2-ALPHA	ATSPLA2-ALPHA PHOSPHOLIPASE A2-ALPHA	WT phenotype. Also, no effect on light-induced stomatal opening.	18725378	1	1
AT1G02860	NLA	BAH1 BENZOIC ACID HYPERSENSITIVE 1 niTroGen limiTaTion adapTaTion	Exhibits spontaneous cell death in leaves after bolting and increased salicylic acid levels and localized cell death after inoculation with Pst DC3000.	18753285	1	1
AT1G54115	CCX4	CAX10	same as smb-3 single mutant	18775974	1	1
AT1G54115	CCX4	CAX10	Heterozygotes and homozygotes have a WT phenotype	18775974	1	1
AT1G75820	LRR-RLK		Triple mutant enhances the floral meristem defects of clv1-11 single mutant. Novel phenotypes include the existence of an enlarged indeterminate meristem in the center of each flower. Leaves are smaller and number of rosette leaves is increased.	18780746	3	0
AT1G65380	CLV2	RLP10	Number of carpels not statistically significant form that of clv2-1 alone.	18780746	1	1
AT1G32450	NPF7.3	NRT1.5	Defective in xylem transport of nitrate from root to shoot. Morphologically WT when grown on soil. When grown on plates, roots were shorter than WT	18780802	1	0
AT2G14120	DRP3B	ADL2B dynamin relaTed proTein	Plants are slower growing than single mutants or non-mutant siblings. Pale mutant color due to decreased number of mitochondria and peroxisomes.	18785999	2	2
AT1G04220	KCS2	DAISY KCS17	significantly reduced root growth	18786002	1	1
AT1G03770	RING1B	ARABIDOPSIS THALIANA RING 1B ATRING1B RING 1B	Plants are extremely small with a reduced number of leaves, leaves are sessile and the inflorescences are completely arrested. Enhanced de-repression of KNOX gene expression.	18799658	2	1
AT2G11810	MGDC	ATMGD3 MGD3	No visible or biochemically determinable mutant phenotype observed under nutrient-sufficient conditions.	18808455	1	1
AT2G11810	MGDC	ATMGD3 MGD3	Under Pi starved conditions, reduced DGDG content is observed, the proportion of phosphatidylethanolamine and phosphatidylcholine increased approximately two-fold in shoot and large differences in fatty acid compositions of galactolipids are seen in shoots and particularly roots. Under these conditions, the fresh weight of shoots and roots was reduced.	18808455	2	2
AT1G53140	DRP5A		Grow normally when seeds were germinated under conventional conditions (21°C), mutant seedlings grow more slowly than those of the wild type at a lower temperature (16°C). In both conditions, the chloroplast size and number per cell in the drp5A mutants. Mutant root tips display perturbation of the cell array and formation of incomplete or twisted cell plates, similar to other A. thaliana mutants of cytokinetic proteins.	18809930	3	2
AT1G62830	LDL1	SWP1	Roots are longer than WT.	18835563	1	1
AT1G09270	IMPA4		Decreased susceptibility to Agrobacterium-mediated transformation.	18836040	1	1
AT2G02760	UBC2		The flowering of ubc1/2 double mutants is accelerated compared to wild type plants under long days and short days. Histone2B ubiquitination is lost in ubc1/2 mutants and FLC expression is repressed. There are gene-specific changes in the patterns of histone ubiquitination and methylation in this mutant.	18849490	3	2
AT2G02760	UBC2		This mutant flowers at the same time as wild type plants, but, a ubc1 ubc2 double mutant has accelerated flowering.	18849490	4	3
AT1G55250	HUB2	hisTone mono-ubiquiTinaTion 2	The flowering of hub2-2 mutants is accelerated compared to wild type plants under long days and short days. In addition, the plants are small and have pale green leaves. Histone2B ubiquitination is lost in hub2-2 mutants.	18849490	3	3
AT1G14400	UBC1		This mutant flowers at the same time as wild type plants, but, a ubc1 ubc2 double mutant has accelerated flowering.	18849490	1	1
AT1G14400	UBC1		The flowering of ubc1/2 double mutants is accelerated compared to wild type plants under long days and short days. Histone2B ubiquitination is lost in ubc1/2 mutants and FLC expression is repressed. There are gene-specific changes in the patterns of histone ubiquitination and methylation in this mutant.	18849490	3	2
AT1G60220	ULP1D	OTS1	ots1-1 mutants flower at the same time as wild-type plants when grown under long day conditions and appear phenotypically normal. However, there are abnormal phenotypes associated with the ots1-1 ots1-2 double mutant.	18849491	2	2
AT1G60220	ULP1D	OTS1	The ots1-1 ots2-1 double mutant plants flower earlier than wild type plants under long days and short days. They do not differ notably from wild type plants with respect to their overall growth rate, inflorescence structure, or seedling primary root elongation rate. But, they are hypersensitive to salt based on root elongation assays. They also have a higher level of SUMOylated proteins than wild type seedlings exposed to salt stress.	18849491	4	4
AT1G10570	OTS2	OVERLY TOLERANT TO SALT 2 UB-LIKE PROTEASE 1C ULP1C	The ots1-1 ots2-1 double mutant plants flower earlier than wild type plants under long days and short days. They do not differ notably from wild type plants with respect to their overall growth rate, inflorescence structure, or seedling primary root elongation rate. But, they are hypersensitive to salt based on root elongation assays. They also have a higher level of SUMOylated proteins than wild type seedlings exposed to salt stress.	18849491	4	3
AT1G10570	OTS2	OVERLY TOLERANT TO SALT 2 UB-LIKE PROTEASE 1C ULP1C	ots2-1 mutants flower at the same time as wild-type plants when grown under long day conditions and appear phenotypically normal. However, there are abnormal phenotypes associated with the ots1-1 ots1-2 double mutant.	18849491	2	1
AT1G20700	WOX14	ATWOX14 WUSCHEL RELATED HOMEOBOX 14 WUSCHEL relaTed homeobox 14	Reduced fertility, short siliques and aborted seeds. Late flowering. Reduced number of lateral roots. Short stamens.	18950478	4	2

AT1G80760	NIP6-1		Under conditions of low boron, nip6;1-2 mutants have smaller, darker green, and more irregularly shaped young rosette leaves than wild type plants. These leaves have smaller cells and lack intercellular air spaces. Lower boron levels accumulate in these young rosette leaves and in stems with shoot apicies when nip6;1-2 mutants are grown under low boron conditions, but, wild type levels of boron accumulate when these plants are grown with sufficient boron. Even under low boron conditions, there are no significant differences in boron levels between wild type and mutant plants in mature leaves. In addition, under normal boron conditions, the leaves of nip6;1-2 mutants grow normally and accumulate wild type levels of boron.	18952773	5	1
AT1G80760	NIP6-1		Under conditions of low boron, nip6;1-3 mutants have smaller, darker green, and more irregularly shaped young rosette leaves than wild type plants.	18952773	1	1
AT1G07530	SCL14		The levels of transcripts for several genes, such as At3g28740 (CYP81D11) and At5g16980 (NADP-dependent oxidoreductase) are altered in scl14 mutant plants. Some of these genes have as-1-like elements in their promoters.	18984675	2	0
AT1G26260	CIB5		cib1 or cib5 single mutant shows no obvious phenotype, and cib1cib5 double mutant showed a mild but statistically significant delay of flowering under a photoperiodic inductive condition (plants were grown in short-day photoperiod (9h light/15h dark) for 20 days and transfered to long-day photoperiod (16h light/ 8h dark) for 4 days, and removed back to short-day to continue grow until flowering.	18988809		
AT2G01950	LRR-RLK		Abnormal leaf venation. Reduced number of leaf veins.	19000166	2	2
AT1G14000			Abnormal leaf venation. Increased number of veins end freely rather than in loops.	19000166		
AT2G04550	IBR5	SKIP33	A higher proportion of the MPK12 protein isolated from ibr5-3 mutants is dually phosphorylated. The MPK12 protein isolated from ibr5-3 mutants also has higher activity than the MPK12 protein isolated from wild type plants.	19000167	2	0
AT1G29990	PFD6	prefoldin 6	Seedlings exhibit root swelling when grown in the presence of 100 nM oryzalin and have a 25% reduction in hypocotyl length. Reduced cell size is due to defects in the microtubules. Microtubules in the root elongation zone remain disorganized. Also affects epidermal cells which have abnormal division planes.	19004800	2	1
AT1G31880	BRX	BREVIS RADIX NIP3;1 NLM9	lateral root formation in the mutant is insensitive to exogenous cytokinin; altered auxin response in lateral root primordium in the presence of exogenous cytokinin.	19037657	2	2
AT1G34355	PS1	ATPS1 PARALLEL SPINDLE 1	diploid pollen grains	19043546	1	1
AT1G55320	AAE18		Resistant to 2,4-dichlorophenoxybutyric acid (2,4 DB), a compound that is metabolized to active auxin. When grown in the presence of pro-auxins, roots are shorter than normal.	19043666	2	2
AT1G27320	AHK3	ORE12	Reduced levels of cytokinin inducible gene expression, specifically AAR5-7.	19048287	1	0
AT1G05690	BT3		Reduced seed set and shortened siliques. Phenotype is identical to bt2-3/+;bt3-1/+	19054356	2	0
AT1G05690	BT3		Embryo lethal - not recovered.	19054356	1	0
AT1G05690	BT3		same as smb-3 single mutant	19054356	1	0
AT1G05690	BT3		Double homozygotes are embryo lethal. Double heterozygotes have short siliques and a reduced seed set.	19054356	2	0
AT1G17580	XI-1	MYA1	The xi-k / xi-1 double mutant plants are shorter and have smaller rosettes than wild type plants. Their reduced leaf size results from decreased cell size and decreased cell number. These double mutants produce fewer seeds per silique than wild type plants. In the leaf epidermis, Golgi stacks, peroxisomes, and mitochondria move more slowly in these mutant cells than in wild-type cells. Root hair length is reduced to ~35% of the wild type root hair length in these double mutants, but their root hair density is very similar to the wild type density.	19060218	5	4
AT1G04160	XIB	ATXIB MYOSIN XI B myosin XI B MYOSIN XI-8 XI-8 XI-B	The overall growth of the xi-2 / xi-b double mutant is normal. In the leaf epidermis, Golgi stacks and peroxisomes move more slowly in these mutant cells than in wild-type cells. The rate of mitochondrial movement is also slightly reduced. Root hair length is reduced to ~15% of the wild type root hair length in these double mutants, but their root hair density is very similar to the wild type density.	19060218	5	2
AT1G07130	STN1		Plants exhibit loss of apical dominance, fasciation, abberrant phyllotaxy, and reduced leaf size. Over generations, the germination rate also decreases to below 20%.	19064932	2	0
AT1G07128			Plants exhibit loss of apical dominance, fasciation, abberrant phyllotaxy, and reduced leaf size. Over generations, the germination rate also decreases to below 20%.	19064932		
AT1G48050	KU80	ATKU80 KU80-LIKE PROTEIN	Delayed growth during later stages of development.	19070688		
AT1G68460	IPT1		Reduced cambial activity and reduced secondary growth in both shoots and roots.	19074290	1	1
AT1G79580	SMB	NAC033	Additional columella root cap and lateral root cap cell layers in the mature embryo and postembryonic root development. Root meristem length and cell number is similar to WT. Extra layer of small, stem-cell-like cells, below the columella and lateral root cap stem cells.	19081078		
AT1G26870	FEZ	NAC009	Homozygotes have a reduced number of columella root cap (COL) and lateral root cap (LRC) cell layers. Meristem length, meristem cell number and root length are comparable to WT. Periclinal division rates in the COL and LRC stem cells are reduced.	19081078		
AT1G76100	PETE1	plasTocyanin 1	Delayed bolting. Reduced copper accumulation. Reduced iron accumulation.	19084994	3	1
AT1G20340	DRT112		Lower biomass than WT. Delayed bolting. Reduced copper accumulation.	19084994	3	3
AT1G03770	RING1B	ARABIDOPSIS THALIANA RING 1B ATRING1B RING 1B	Plieotrophic defects. Leaves may be lobed, downward curving or make ectopic meristems. The SAM is enlarged and phyllotaxy is abnormal and the shoot apex may terminate in a cluster of flowers with extra floral organs.Occasional homeotic conversion of petals to stamens.	19097900		
AT1G03770	RING1B	ARABIDOPSIS THALIANA RING 1B ATRING1B RING 1B	lants are extremely small with a reduced number of leaves, leaves are sessile and the inflorescences are completely arrested. Cotyledons are relatively well expanded.Enhanced de-repression of KNOX gene expression.	19097900		
AT1G20830	MCD1		defective in chloroplast division	19135368		
AT1G20820			defective in chloroplast division	19135368		
AT1G64990	GTG1		gtg1-1 mutant plants do not show any obvious phenotypic abnormalities and are indistinguishable from wild-type plants.	19135895		
AT1G64990	GTG1		These double mutants are hyposensitive to ABA in seed germination, post-germination development, root elongation, ABA-induced gene expression, and ABA-induced stomatal closure assays. However, they have a normal response to ABA in inhibition of stomatal opening assays. These mutants are smaller than wild-type plants and flower earlier. They have normal endogenous levels of ABA. No differences in the transcript levels of CHLH, FCA, or GCR2 are observed in these mutants compared to wild-type plants.	19135895		
AT1G14720	XTH28		The developing flowers of atxth28 mutant showed has characteristic phenotypes a significantly lower elongation ratio of the stamen at the pollination stage, an increased angle between the stamen and pistil, and an aberrant orientation of anther dehiscence.As a result the capability for automatic self-pollination was decreased in the mutant.	19139039	4	1
AT1G79250	AGC1-7	AGC1.7	Double mutant displays defects in pollen tubes. Tubes are wider and bulge out indicating a defect in polarity maintenance. Pollen tubes are also shorter.	19144004	3	3
AT1G53940	GLIP2		has increased number of lateral roots, hypocotyls have impaired gravitropic curvature	19146828		
AT2G06510	RPA1A	ATRPA1A ATRPA70A replicaTion proTein A 1A RPA70-KDA SUBUNIT A RPA70A	This double mutant has a lower chiasma frequency than either single mutant, but more chiasma than Atrpa1a/Atmsh4 or Atmsh4.	19153602	2	0
AT2G06510	RPA1A	ATRPA1A ATRPA70A replicaTion proTein A 1A RPA70-KDA SUBUNIT A RPA70A	This double mutant has even lower fertility and shorter siliques than atrpa1 mutants. These mutants have a residual chiasmata frequency and distribution comparable to msh4 mutants.	19153602	2	0
AT2G06510	RPA1A	ATRPA1A ATRPA70A replicaTion proTein A 1A RPA70-KDA SUBUNIT A RPA70A	Meiosis in pollen mother cells proceeds normally from early prophase I to the pachytene stage where full synapsis is observed, in the mutants. However, a reduced number of chiasmatas are detected in the mutants during chromosome condensation in late diplotene/diakinesis.Univalent chromosomes present at metaphase I cause mis-segregation at meiosis I and therefore, aneuploid tetrads are observed following meiosis II. There is no evidence of chromosome fragmentation in these mutants, suggesting that RPA1a is not required per se for the repair of double strand breaks during meiosis.	19153602	3	0

AT2G06510	RPA1A	ATRPA1A ATRPA70A replicaTion proTein A 1A RPA70-KDA SUBUNIT A RPA70A	The rpala mutant has normal vegetative growth, but lower levels of fertility. Siliques are shorter in rpala mutants than in wild type plants, and their mean seed set per silique is reduced by ~68%. Pollen viability is also reduced in the mutants. Meiosis in pollen mother cells proceeds normally from early prophase I to the pachytene stage where full synapsis is observed, in the mutants. However, a reduced number of chiasmatas are detected in the mutants during chromosome condensation in late diplotene/diakinesis.Univalent chromosomes present at metaphase I cause mis-segregation at meiosis I and therefore, aneuploid tetrads are observed following meiosis II. There is no evidence of chromosome fragmentation in these mutants, suggesting that RPA1a is not required per se for the repair of double strand breaks during meiosis. There are no major defects in axis formation or synaptonemal complex formation in these mutants, nor are the number of MSH4 foci altered. However, there is a reduced number of MLH1 and MLH3 foci, suggesting that more recombination intermediates are repaired as non-cross-overs	19153602	3	1
AT1G54060	ASIL1		Small seedlings, with slightly darker green, orbicular leaf blades and shorter leaf petioles than WT. Adult plants are 17% shorter than WT. Short siliques, small seeds, lower seed weight than WT. Delayed flowering in long days.	19155348	3	0
AT2G03120	SPP		no homozygotes were recovered from the heterozygous mutant, mutant pollen appeared normal by Alexander stain but failed to germinate, the organization of the male germ unit (MGU) is disrupted, the vegetative nuclei were malformed with displacement of the two sperm cells, or the entire MGU were mislocalized to the pollen periphery.	19168645	1	1
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Reduced levels of lutein.	19174535	1	1
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Lutien levels reduced by 30-70%.Increased shoot branching (2-3X more branches), early flowering and reduced fertility.	19174535	2	2
AT1G62360	STM		Double mutant enhances the SAM phenotype. 80% of double mutants show shoot termination after germination and production of the first two sets of leaves. Shoots regenerate at a low frequency.	19175771	3	3
AT1G31880	BRX	BREVIS RADIX NIP3;1 NLM9	enhanced response to ABA-mediated inhibition of root growth	19201913	1	1
AT1G27760	SAT32	ATSAT32 SALT-TOLERANCE 32	Reduced fertility. Increased root length (longer roots). Hypersensitive to salt stress.	19210750	3	3
AT1G77980	AGL66		Reduced seed set.	19211705	1	1
AT1G77980	AGL66		Reduced seed set. Pollen tubes are delayed in germination/growth.	19211705	2	2
AT1G22130	AGL104		Reduced seed set.	19211705	1	1
AT1G22130	AGL104		Reduced seed set. Pollen tubes are delayed in germination/growth.	19211705	2	2
AT1G68640	PAN		Double mutant displays pentamerous flowers typical of PAN mutants but also displays defects in later stages of petal development.	19218396	2	1
AT1G62940	4CLL1	ACOS5	pollen development arrested after released from tetrads, free microspores were devoid of exine layer, completely absence of pollen grains at anther maturity, completely male sterile	19218397	1	1
AT1G74030	ENO1		Trichomes are less turgescent and are distorted with respect to the wild type. Plants also have fewer root hairs with respect to wild type.	19223001	2	0
AT1G09110		TRNA-GLU-1	double mutants are both male and female gametophyte lethal	19223514	1	1
AT1G09100	RPT5B	TBP1	double mutants are both male and female gametophyte lethal	19223514	1	1
AT1G72970	HTH		Pollen development defective.	19237690	1	1
AT1G16300	GAPCP2		weaker induction of HSP70A following AZC treatment of the hsfA2 mutant line when compared with wild-type	19244141	1	0
AT1G53130	GRI		increased ROS-induced cell death (ROS: reactive oxygen species); decreased seed content; more resistant to bacterial pathogen Pseudomonas syringae	19279211	3	2
AT1G04580	AAO4	AO2	Reduced Levels of Total BA and of Benzoylated Glucosinolates	19297586	1	0
AT1G49240	ACT8		Lacks root hairs.Root hairs initiate but do not develop further.	19304937	2	1
AT1G49240	ACT8		Short root hairs. 50% reduction in root hair length compared to wild type.	19304937	1	1
AT1G49240	ACT8		Plants are dwarf. Leaves are smaller and contain fewer cells and fewer lobes than wild type. Reduced number of trichome branches. Petals are narrow. Roots are more severely affected and produce short root hairs. Cell files are irregular and the elongation zone is much reduced.	19304937	4	3
AT1G58440	SQE1	DRY2 XF1	Plants are hypersensitive to drought. Mutants have decreased stomatal conductance when grown in low relative humidity. Root architecture is affected: roots are 60% shorter than wild type and produce more lateral roots. Lateral roots are shortr and branched.Plants are shorter and leaves are yellow green. Chemically, the mutants have decreased sterols in the roots, decreased chlorophyll levels and increased levels of proline.	19309460	5	4
AT1G03060	SPI	SPIRRIG	Trichome cells have shorter branches, reduced stalk length and width. Epidermal pavement cells are less complex, with less lobing. Root hairs are shorter and root hair vacuoles are fragmented.	19392685	3	0
AT1G49430	LACS2	LATERAL ROOT DEVELOPMENT 2 LRD2	The lacs1-1 lacs2-3 double mutants had a synergistic phenotype, compared to either of the single mutants, with drastically reduced stem wax and cutin contents, increased cuticle permeability, and severe male sterile in low humidity.	19392700	1	1
AT1G58360	AAP1	NAT2	reduced total N and carbon content and increased amino acid levels in mature and desiccated mutant seeds; elevated amino acid level in the seed coat/endosperm; increased number of protein bodies in the endosperm; decreased storage protein levels.	19392706	3	3
AT1G34245	EPF2		stomatal development abnormal	19398336		
AT2G14540	SRP2		When exposed to MMS, mutants grew consistently more vigorously than wild-type. Reduced induction of DNA repair- and cell cycle-related genes.	19426562	2	0
AT1G64030	SRP3		When exposed to MMS, mutants grew consistently more vigorously than wild-type. Reduced induction of DNA repair- and cell cycle-related genes.	19426562	2	0
AT1G15510	PCMP-H73	ECB2 VAC1	early chloroplast biogenesis mutant; lacks an organized thylakoid membrane; albino cotyledons; seedling lethal.	19500301	4	3
AT1G12010	AT1G12010		The aco mutant appears to have only ~85% of the ethylene of wild type plants.	19513806	1	1
AT1G69560	MYB105	ATMYB105 LATERAL ORGAN FUSION 2 LOF2 MYB DOMAIN PROTEIN 105 myb domain proTein 105	defects in organ separation as a result of abnormal cell division and expansion during early boundary formation	19542355	1	1
AT1G26780	MYB117	CTF LOF1	defects in organ separation as a result of abnormal cell division and expansion during early boundary formation	19542355	1	1
AT1G64690	BLT	BRANCHLESS TRICHOME BRANCHLESS TRICHOMES	branchless trichomes with blunt tips	19626137	1	1
AT1G04510	MAC3A	F19P19.2; F19P19_2; MOS4-associated complex 3A; MOS4-associated complex 3A	defective in R protein-mediated defense response	19629177	1	1
AT1G08030	TPST		Seedlings of tpst-1 had stunted roots and smaller cotyledons compared with the WT. tpst-1 has an abnormally shaped root apical meristem due to disorganized cell division and expansion. At 15 days after germination, the leaves of the tpst-1 plants are small and pale green, the number of higher order veins is reduced, and the secondary veins often do not close. At the flowering stage, tpst-1 has smaller rosettes, tiny leaves showing early senescence, shorter inflorescence, and a reduced number of flowers and siliques. The fertility and seed set of tpst-1 are normal.	19666544	5	4
AT1G25540	MED25	MED25 1 PFT1	susceptible to leaf infecting nectrophic pathogens	19671879	1	1
AT1G08450	CRT3	A. Thaliana calreTiculin 3 ATCRT3 CALRETICULIN 3 calreTiculin 3 EBS2 PRIORITY IN SWEET LIFE 1 PSL1	compromised in EFR but not FLS2 signaling.	19717464	1	1
AT1G33240	GTL1	AT-GTL1 AT-GTL2 ATGTL1 GT-2-like 1 GT2-LIKE 1 GT2-LIKE 2	increased trichome cell size and nuclear DNA content without affecting the number of trichome branches	19717615	1	1
AT1G69870	NPF2.13	NRT1.7	mutant plants accumulate a higher amount of nitrate in older leaves; defective in remobilizing nitrate from older leaves to younger leaves.	19734434	2	2
AT2G01290	RPI2		Low chlorophyll content. Chloroplast were smaller and accumulated fewer and smaller starch granules than wild-type. Under short-day conditions, the flowering times of the mutant plants were significantly delayed. Premature cell death.	19744161	4	4
AT1G09090	RBOHB	ATRBOHB ATRBOHB-BETA	Mutants fail to after-ripen and show reduced protein oxidation.	19761445	1	1
AT1G67370	ASY1	ASYNAPTIC 1; ATASY1; F1N21.19	Defective in meiotic double strand break formation. Fewer chiasmata formed per cell compared to the wild type cells.	19763177	2	1
AT1G14750	SDS	SOLO DANCERS	Defective in meiotic double strand break formation. Fewer chiasmata formed per cell compared to the wild type cells.	19763177	2	1
AT1G13330	HOP2	AHP2	Defective in meiotic double strand break formation. Fewer chiasmata formed per cell compared to the wild type cells.	19763177	2	1
AT1G01690	PRD3	ATPRD3	Defective in meiotic double strand break formation. Fewer chiasmata formed per cell compared to the wild type cells.	19763177	2	1
AT1G03300	DUF1		same as smb-3 single mutant	19795213		

AT1G12770	RH47	EMB1586 ISE1	mutants typically arrest before the mid-torpedo stage	19805190	1	0
AT1G27370	SPL10		Wider lamina in the third cauline leaf than the respective single mutants. Increased number of trichomes on sepals than the respective single mutants.	19880401	1	1
AT1G27370	SPL10		Cauline leaves and sepal trichomes show morphological defects. Specifically, leaf lamina is wider than WT in the third cauline leaf. These phenotypes indicate a delayed vegetative - to reproductive phase change.	19880401	2	2
AT1G27360	SPL11		Cauline leaves and sepal trichomes show morphological defects. Specifically, leaf lamina is wider than WT in the third cauline leaf. These phenotypes indicate a delayed vegetative - to reproductive phase change.	19880401	2	2
AT1G27360	SPL11		Wider lamina in the third cauline leaf than the respective single mutants.	19880401	1	1
AT1G56590	ZIP4	adaptor protein-3 mu-adaptin; AP3M; F25P12.96; F25P12_96; ZIG SUPPRESSOR 4	Partially suppressed the abnormality of zig-1 in both gravitropism and stem morphology.	19884248	2	2
AT1G10310	AT1G10310	F14N23.19; F14N23_19	Mutants have reduced seed 18:1 delta nine fatty acids. An analogous change in fatty acids is seen in the leaf, but it is more subtle than in seed.	19906890	1	1
AT1G08260	TIL1	ABA OVERLY SENSITIVE 4 ABO4 EARLY IN SHORT DAYS 7 EMB142 EMB2284 EMB529 EMBRYO DEFECTIVE 142 EMBRYO DEFECTIVE 2284 EMBRYO DEFECTIVE 529 ESD7 POL2A TILTED 1	Early flowering.	19947980	1	1
AT1G71800	CSTF64	ESP1	Decreased organ size and fertility.	19965720	1	1
AT1G17760	CSTF77		female gametophyte lethal	19965720	1	0
AT2G03620	MRS2-5	MGT3	Homozygote has a WT phenotype, even under conditions of Mg+ stress.	19966073	1	1
AT1G80900	MRS2-10	MGT1	Homozygote has a WT phenotype, even under conditions of Mg+ stress.	19966073	1	1
AT1G16010	MRS2-1	MGT2	Homozygote has a WT phenotype, even under conditions of Mg+ stress.	19966073	1	1
AT1G55325	GCT	CCT CENTER CITY GRAND CENTRAL MAB2 MACCHI-BOU 2	Uncoupling of growth and pattern formation in early embryogenesis. Patterning is delayed by several days, after which radial patterning beings in a remarkably normal manner.	20023166	2	1
AT1G80080	TMM	RLP17	Mutants produce stomata on the hypocotyl and also produce small groups of hypocotyl cells in an arrangement that resembles braided 'challah' bread.	20056678	1	1
AT1G65420	NPQ7	NONPHOTOCHEMICAL QUENCHING 7; T8F5.20; T8F5_20	Homozygotes exhibit a low nonphotochemical quenching phenotype. Also, chlorophyll a+b content is higher than WT, whereas the chlorophyll a/b ratio was smaller than WT. Morphologically WT under normal growth conditions. Fv/Fm is almost identical to WT, as is the xanthophyll cycle pigment pool size.	20087601	1	0
AT1G65420	NPQ7	NONPHOTOCHEMICAL QUENCHING 7; T8F5.20; T8F5_20	Nonphotochemical quenching measurements were lower than either of the single mutants.	20087601	1	0
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Small SAM and limited root growth.	20110319	1	1
AT1G27320	AHK3	ORE12	Small SAM and limited root growth.	20110319	1	1
AT1G51450	TRO	ASH2R	embryo lethal	20118203	1	1
AT1G15520	ABCG40	ATABCG40 ATP-bindinG casseTTe G40 ATPDR12 PDR12 PLEIOTROPIC DRUG RESISTANCE 12 pleioTropic druG resisTance 12	Increased sensitivity to drought stress.	20133880	1	1
AT1G77390	CYCA1-2	TAM	Meiocytes produce unreduced gametes by undergoing meiosis I but skipping meiosis II.	20143347		
AT1G79580	SMB	NAC033	Delayed maturation and shedding of lateral root cap cells. The root cap extends into the differentiation zone.	20197506	1	1
AT1G79580	SMB	NAC033	same as smb-3 single mutant	20197506	1	1
AT1G79580	SMB	NAC033	Root cap cells appear as a mass lacking uniform morphology. Cells can be highly elongated and twisted. Cells fail to stop elongation and to adopt the rigid, rectangular morphology of COL cells. When compared with smb-3, the triple mutant has thesame number of complete LRC layers, and the appearance of the cells in those layers closely resembles that in smb-3. However, partial remains of older LRC layers remain attached to the meristem in the triple mutant, giving it a messy appearance. Remains of old LRC cap layers can be found still attached to the root along its whole length.	20197506	1	1
AT1G79580	SMB	NAC033	Same as smb-3 single mutant phenotype	20197506	1	1
AT1G33290	AT1G33290	T1609.17; T1609_17	WT phenotype	20197506	1	1
AT1G33290	AT1G33290	T1609.17; T1609_17	Columella root cap cells fail to detach.	20197506	1	1
AT1G33290	AT1G33290	T1609.17; T1609_17	same as smb-3 single mutant	20197506	1	1
AT1G33290	AT1G33290	T1609.17; T1609_17	Root cap cells appear as a mass lacking uniform morphology. Cells can be highly elongated and twisted. Cells fail to stop elongation and to adopt the rigid, rectangular morphology of COL cells. When compared with smb-3, the triple mutant has thesame number of complete LRC layers, and the appearance of the cells in those layers closely resembles that in smb-3. However, partial remains of older LRC layers remain attached to the meristem in the triple mutant, giving it a messy appearance. Remains of old LRC cap layers can be found still attached to the root along its whole length.	20197506	1	0
AT1G33280	BRN1	NAC015	WT phenotype	20197506	1	1
AT1G33280	BRN1	NAC015	Columella root cap cells fail to detach.	20197506	1	0
AT1G33280	BRN1	NAC015	same as smb-3 single mutant	20197506	1	1
AT1G33280	BRN1	NAC015	Root cap cells appear as a mass lacking uniform morphology. Cells can be highly elongated and twisted. Cells fail to stop elongation and to adopt the rigid, rectangular morphology of COL cells. When compared with smb-3, the triple mutant has thesame number of complete LRC layers, and the appearance of the cells in those layers closely resembles that in smb-3. However, partial remains of older LRC layers remain attached to the meristem in the triple mutant, giving it a messy appearance. Remains of old LRC cap layers can be found still attached to the root along its whole length.	20197506	3	0
AT1G54960	ANP2		Delayed growth, short roots, multiply branched root hairs. Radially expanded root and hypocotyl cells. Aberrant microtuble organization and resistance to oryzalin.	20215588	3	1
AT1G46768	RAP2.1	relaTed To AP2 1	The mutant plants showed an improved tolerance to the drought and cold.	20230648	1	1
AT1G64790	ILA	ILITHYIA	Mutant plants are much smaller in size than Col-0 wild type and they have serrated leaves that are yellow to light green in color. Homozygous mutants are sterile and must be propagated as heterozygotes.	20360018	3	3
AT1G64790	ILA	ILITHYIA	Mutant plants are much smaller in size than Col-0 wild type and they have serrated leaves that are yellow to light green in color. Homozygous mutants are sterile and must be propagated as heterozygotes.	20360018	3	3
AT1G16540	ABA3	ABA DEFICIENT 3 ACI2 ALTERED CHLOROPLAST IMPORT 2 ATABA3 ATLOS5 LOS5 LOW OSMOTIC STRESS 5 MOLYBDENUM COFACTOR SULFURASE SIR3 SIRTINOL RESISTANT 3	Defective chloroplast import. Does not survive if grown on MS media without sucrose. In soil, aci2-1 had a small stature with dark green pigmentation. Rosette size was half that of the parent line. Leaves were reduced in length and width, serrated and fewer in number. Leaf protoplasts from had significantly more chloroplasts per cell than the parental line. aci2-1 also accumulated lipid droplets and large starch grains. Chloroplasts appeared smaller in aci2-1 than in the parental line.	20374530	4	2
AT2G01918	PQL3		Mutant plant Does Not show the post illumination increase in Chl fluorescence due to the loss of NDH-mediated reduction of the plastoquinone pool in darkness.	20430763		
AT1G14150	PNSL2	PQL1 PQL2	Mutant plant Does Not show the post illumination increase in Chl fluorescence due to the loss of NDH-mediated reduction of the plastoquinone pool in darkness.	20430763		
AT1G14140	PUMP3	UCP3	Mutant plant Does Not show the post illumination increase in Chl fluorescence due to the loss of NDH-mediated reduction of the plastoquinone pool in darkness.	20430763		
AT1G14150	PNSL2	PQL1 PQL2	Mutant plants showed the post illumination increase in Chl fluorescence due to the loss of NDH-mediated reduction of the plastoquinone pool in darkness.	20460499	1	0
AT1G14140	PUMP3	UCP3	Mutant plants showed the post illumination increase in Chl fluorescence due to the loss of NDH-mediated reduction of the plastoquinone pool in darkness.	20460499	1	0
AT1G23540	PERK12	ATPERK12 IGI1	Increased axillary branching, reduced stature, reduced fertility.	20473553	3	1
AT1G66600	ABO3	ABA overly sensitive mutant 3; ATWRKY63; T12I7.5; T12I7_5; WRKY DNA-binding protein 63; WRKY63	When grown on MS medium with ABA, abo3 mutant was more sensitive to ABA than the wild type during seedling establishment. Mutant seedlings exhibited slower root growth on MS medium as compared to the wild type. Mutant is impaired in ABA induced stomatal closure and more sensitive ti drought stress than the wild type.	20487379	2	2
AT1G67940	ABCI17	NAP3	atstar1 knock-out line exhibited increased sensitivity to Al. The roots of the knockout line were severely inhibited, in the presence of 2 mM Al whereas those of the wild type were hardly affected.	20498340	2	2
AT1G55600	WRKY10	MINI3	Reduced seed size	20545893	1	1
AT1G18100	WFT		Decreased rate of germination in the presence of ABA.	20551347	1	1
AT1G18100	WFT		Decreased germination when grown in the presence of ABA.	20551347	1	1
AT1G66730	LIG6		Delayed germination. Time to germination can be increased by 50%. Overall germination rate is not affected but the process is delayed. The effect is further enhanced under temperature or oxidative stress conditions.	20584150		

AT1G66730	LIG6		Delayed seed germination- even greater than in atlig6-1 alone.	20584150		
AT1G31140	AGL63	GOA	The only change in phenotype observed was a significant bending of fruits, suggesting asymmetrically longitudinal growth without any alteration in the fruit length.	20598091	1	1
AT1G31810	FH14		microspore formation is defective; microtubule arrays displayed abnormalities during the meiosis-associated process of microspore formation.	20709814	2	1
AT1G31800	CYP97A3	''cytochrome P450; cytochrome P450; F5M6.19; F5M6_19; family 97; LUT5; LUTEIN DEFICIENT 5; polypeptide 3; polypeptide 3''; subfamily A	microspore formation is defective; microtubule arrays displayed abnormalities during the meiosis-associated process of microspore formation.	20709814	2	1
AT1G09970	LRR XI-23	F21M12.36; F21M12_36; receptor-like kinase 7; RLK7	T-DNA insertion lines showed a slight but statistically significant delay in germination and was more sensitive to oxidative stress.	20811905	2	2
AT1G53240	mMDH1	mitochondrial malate dehydrogenase 1	mmdh1-2 mmdh2-1 double mutants have no detectable mitochondrial malate dehydrogenase (MDH) activity and over a 40% reduction in total leaf MDH activity. They also have growth defects under long and short days.	20876337	2	2
AT1G50900	LTD	GDC1	grow much slower than the wild type, and growth ceases at the vegetative growth stage before bolting. grana deficient. decreased chlorophyll content. accumulated very low amounts of LHCII trimer.	21098677	3	3
AT1G06490	CalS7	Arabidopsis thaliana glucan synthase-like 7; ATGSL07; atgsl7; callose synthase 7; F12K11.17; F12K11_17; glucan synthase-like 7; gsl07; GSL07; GSL7	Callose deposition in the phloem, especially in the sieve elements, is greatly redicued in cs7-1. During sieve lement development, callose fails to accumulate in the plasmodesmata of incipient sieve plates, resulting in the formation of sieve plates with less pores and no callose. Wounding can induce callose accumulation in leaves of cs7-1, but cannot induce callose accumulation in the sieve plates in this mutant. The mutant plants exhibite moderate reduction in seedling height and produce aberrant pollen grains and short siliques with aborted embryos.	21175885	1	1
AT1G65040	Hrd1B	ATHrd1B homoloG of yeasT Hrd1	Endoplasmic reticulum (ER)-associated degradation process is blocked in hrd1a hrd1b double mutant.	21187394	1	1
AT1G18260	HRD3A	EBS5	Endoplasmic reticulum (ER)-associated degradation process is blocked and the unfolded protein response is activated in ebs5-5 mutant.	21187394	1	1
AT1G10520	Pol{lambda}	ATPol{lambda} DNA polymerase {lambda}	atpol{lambda} mutants exhibit hypersensitive growth response to UV-B irradiation. Reduced proficiency in double strand break repair and nucleotide excision repair.	21227935	2	1
AT1G10510	emb2004	embryo defecTive 2004	atpol{lambda} mutants exhibit hypersensitive growth response to UV-B irradiation. Reduced proficiency in double strand break repair and nucleotide excision repair.	21227935	2	1
AT1G51460	ABCG13	ATP-binding cassette G13; F5D21.8; F5D21_8	Flowers are seriously distorted in petal morphology and display petal-to-sepal and sepal-to-sepal fusions during early flower development. The fusions disappear during later flower development.	21232060	1	1
AT1G51460	ABCG13	ATP-binding cassette G13; F5D21.8; F5D21_8	Petal epidermal cells do not have a wt conical structure and are flattened. Epidermal cuticular ridges on these cells are completely absent.	21232060	1	1
AT1G28010	ABCB14	MDR12 PGP14	Inflorescence stems from the homozygous mutants have smaller xylem vessels and smaller phloem areas compared to WT plants. Inflorescence apices also have a reduction in polar auxin transport.	21239383	2	2
AT1G56560	INVA		atinva mutants have reduced root growth, reduced invertase activity, and increased expression of antioxidant genes under basal conditions.	21441406	3	1
AT1G35580	CINV1	A alkaline cyTosolic inverTase 1 N-InvG neuTral inverTase G	atinvg mutants have reduced root growth, reduced invertase activity, and increased expression of antioxidant genes under basal conditions.	21441406	3	2
AT1G09780	iPGAM1	2; 3-biphosphoglycerate-independent phosphoglycerate mutase 1; F21M12.16; F21M12_16	Vegetative and reproductive growth are greatly reduced with respect to wild type. Pale reticulate leaf phenotype. Double mutants are self-sterile due to failure to produce pollen grains.	21813794	3	2
AT2G05070	LHCB2.2		The mutant shows ABA insensitivity in stomatal movement, including promotion of stomatal closure and inhibition of stomatal opening. The detached leaves of the mutant lose more water than those of the wild-type plants under dehydration condition; both young seedlings and mature plants of the mutant have lower capacity to conserve water during drought stress in comparison with wild-type plants. The ROS levels increase in the mutant in comparison with wild-type plants in both the whole leaves and in guard cells. Treatment with low concentrations of ABA reduces ROS levels in both whole leaves(1 to 10 uM ABA application) and in guard cells(5 uM ABA application) in the mutant plants.	22143917	2	1
AT1G29920	LHCB1.1	AB165 CAB2 LHCP-B	The mutant shows ABA insensitivity in stomatal movement, including promotion of stomatal closure and inhibition of stomatal opening. The detached leaves of the mutant lose more water than those of the wild-type plants under dehydration condition; both young seedlings and mature plants of the mutant have lower capacity to conserve water during drought stress in comparison with wild-type plants. The ROS levels increase in the mutant in comparison with wild-type plants in both the whole leaves and in guard cells. Treatment with low concentrations of ABA reduces ROS levels in both whole leaves(1 to 10 uM ABA application) and in guard cells(5 uM ABA application) in the mutant plants.	22143917	2	1
AT1G29920	LHCB1.1	AB165 CAB2 LHCP-B	lhcb1 lhcb6 double mutant show ABA insensitivity than wild-type in stomatal movement, including promotion of stomatal closure and inhibition of stomatal opening. The detached leaves of the double mutant lose more water than those of wild-type plants under dehydration condition, and that both young seedlings and mature plants of the double mutant have lower capacity to conserve their water during drought stress in comparison with wild-type plants. The ROS levels increase in the double mutants in comparison with wild-type plants in both the whole leaves and in guard cells. Low concentrations ABA treatments reduce ROS levels of double mutents in both whole leaves(1 to 10 μM ABA application) and in guard cells(5 μM ABA application).	22143917	2	1
AT1G15820	LHCB6	CHLOROPHYLL PROTEIN 24; CP24; F7H2.16; F7H2_16; light harvesting complex photosystem II subunit 6	The mutant shows ABA insensitivity in stomatal movement, including promotion of stomatal closure and inhibition of stomatal opening. The detached leaves of the mutant lose more water than those of the wild-type plants under dehydration condition; both young seedlings and mature plants of the mutant have lower capacity to conserve water during drought stress in comparison with wild-type plants. The ROS levels increase in the mutant in comparison with wild-type plants in both the whole leaves and in guard cells. Treatment with low concentrations of ABA reduces ROS levels in both whole leaves(1 to 10 uM ABA application) and in guard cells(5 uM ABA application) in the mutant plants.	22143917	2	1
AT1G15820	LHCB6	CHLOROPHYLL PROTEIN 24; CP24; F7H2.16; F7H2_16; light harvesting complex photosystem II subunit 6	lhcb1 lhcb6 double mutant show ABA insensitivity than wild-type in stomatal movement, including promotion of stomatal closure and inhibition of stomatal opening. The detached leaves of the double mutant lose more water than those of wild-type plants under dehydration condition, and that both young seedlings and mature plants of the double mutant have lower capacity to conserve their water during drought stress in comparison with wild-type plants. The ROS levels increase in the double mutants in comparison with wild-type plants in both the whole leaves and in guard cells. Low concentrations ABA treatments reduce ROS levels of double mutents in both whole leaves(1 to 10 μM ABA application) and in guard cells(5 μM ABA application).	22143917	2	2
AT1G15820	LHCB6	CHLOROPHYLL PROTEIN 24; CP24; F7H2.16; F7H2_16; light harvesting complex photosystem II subunit 6	lhcb6 cch double mutant shows ABA insensitivity than wild-type in stomatal movement, including promotion of stomatal closure and inhibition of stomatal opening, and the strength of the ABA insensitive phenotypes is comparable to that of the cch mutant, stronger than that of the lhcb6 single mutant and lhcb1 lhcb6 double mutant.	22143917	2	2
AT1G43710	SDC	EMB1075 SDC1	Under long day conditions, the size of atsdc-1 seedlings was much smaller than that of the wild type and the mutant never reached the height of the mature wild type. Mutant was sterile and had multiple inflorescences. Under short day conditions, atsdc-1 flowered earlier than the wild type and smaller size and multiple inflorescence defects in the mutant could be rescued.	22489147	2	1
AT1G31880	BRX	BREVIS RADIX NIP3;1 NLM9	Short-root phenotype, characterized by short primary root and more branched root system.	15031265	1	1
AT2G15820	OTP51		Homozygous otp51-2 mutants can only survive in sucrose-supplemented in vitro cultures under low light conditions. The small developmentally delayed mutants are pale yellow under normal light conditions. otp51-2 mutants fail to splice intron 2 of the the ycf3 transcript encoded in the chloroplast genome. Because YCF3 is required for the proper assembly of photosystem I (PSI), These mutants have multiple defects related to photosynthesis. They have lower levels of total protein, thylakoid membrane protein, and chlorophyll than wild-type plants when both are grown hydroponically. Chlorophyll a/b ratios are elevated in otp51-2 mutants, several PSI and PSII proteins cannot be detected, chlorophyll fluorescence patterns are altered, and the quantum efficiency of PSII is reduced. otp51-2 mutants also have el			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Cytokinin-induced partial inhibition of cell division and greening of hypocotyl-derived calli.			

AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Reduced sensitivity to cytokinin in root growth assay (exogenous application of cytokinins inhibits wildtype root elongation).			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Cytokinin insensitive (no inhibition of growth compared to wildtype).			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Occasionally produces inflorescence stems with abnormal and non-functional flowers which did not produce seeds.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Shoot and root growth is very slow and leaf number is decreased compared to wildtype.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Reduced cytokinin-induced inhibition of adventitious root formation compared to wildtype.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No significant response in the cytokinin-induced assay for stimulation of cell division and greening of hypocotyl-derived calli.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Prolonged plastochron.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Shorter root than wildtype plant.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	The diameter of the shoot apical meristem is about three times smaller than that of wildtype.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	The size and activity of the root apical meristem is decreased with respect to wildtype.			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	Enhancement of the inhibition of cytokinin-induced stimulation of cell division and greening of hypocotyl-derived calli compared to the responsed observed with CRE1 single mutants (e.g. cre1-10).			
AT2G01830	WOL	AHK4 ARABIDOPSIS HISTIDINE KINASE 4 ATCRE1 CRE1 CYTOKININ RESPONSE 1 WOL1 WOODEN LEG WOODEN LEG 1	No cytokinin-induced inhibition of adventitious root formation.			
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Reduced stature, bushy plants, reduced number of ovules, reduced fertility. Homeotic conversion of floral organs such as carpeloid sepals and stamen like petals.Defects in ovule and embryo sac development.Reduced pollen.			
AT1G77300	EFS	ASH1 HOMOLOG 2 ASHH2 CCR1 EARLY FLOWERING IN SHORT DAYS LAZ2 LAZARUS 2 SDG8 SET DOMAIN GROUP 8	Short bushy plants. Reduced fertility-ovule number reduced by 80%			
AT1G67370			Despite no apparent defect in DNA double-strand breaks formation in asy1, DNA cross-over formation is severely compromised.			
AT1G64440	UGE4	REB1 RHD1	Bulging epidermal cells on the roots. The percentage of these cells appears to be dependent on environmental conditions (light intensity for example). This phenotype is not observed in the meristem but is first observed basal of the meristem.			
AT1G64440	UGE4	REB1 RHD1	Root growth significantly diminished.			
AT1G64440	UGE4	REB1 RHD1	At 18ºC, the phenotype is indistinguishable from that of wildtype.			
AT1G64440	UGE4	REB1 RHD1	At the restrictive temperature, epidermal bulging is observed and roots fail to grow straight in the elongation zone although this mutation does not appear to abolish gravitropic sensitivity.			
AT1G64440	UGE4	REB1 RHD1	Temperature sensitive (33ºC) phenotype.			
AT1G61040	VIP5		Defective in maintenance of FLC activity in nonvernalized plants. Undetectable FLC mRNA expression. Early flowering under short day photoperiods.			
AT1G27320	AHK3	ORE12	No inhibition of stimulation of cell division and greening of hypocotyl-derived calli when treated with cytokinin (similar to wildtype response).			
AT1G27320	AHK3	ORE12	Normal roots.			
AT1G27320	AHK3	ORE12	Smaller leaves and shorter stems than wildtype.			
AT1G27320	AHK3	ORE12	Enhancement of the inhibition of cytokinin-induced stimulation of cell division and greening of hypocotyl-derived calli compared to the responsed observed with CRE1 single mutants (e.g. cre1-10).			
AT1G27320	AHK3	ORE12	Reduced sensitivity to cytokinin in root growth assay (exogenous application of cytokinins inhibits wildtype root elongation).			
AT1G27320	AHK3	ORE12	Cytokinin insensitive (no inhibition of growth compared to wildtype).			
AT1G27320	AHK3	ORE12	Occasionally produces inflorescence stems with abnormal and non-functional flowers which did not produce seeds.			
AT1G27320	AHK3	ORE12	Shoot and root growth is very slow and leaf number is decreased compared to wildtype.			
AT1G04870	PRMT10	PRMT4.2	This mutant has delayed flowering compared to wild type plants when grown under long day conditions. Analysis of growth under short day conditions indicates that these mutants are not disrupted in the photoperiod pathway. They also seem to be able to respond to vernalization signals and to gibberellin. But they have an impaired autonomous pathway to flowering. FLC transcripts are up-regulated and SOC1 transcripts are down-regulated in these mutants through an unknown mechanism. There are no discernible changes in several types of histone modifications examined at the FLC locus in this mutant background nor are there changes in transcript levels for several autonomous pathway genes.			
AT1G04870	PRMT10	PRMT4.2	This mutant has delayed flowering compared to wild type plants when grown under long day conditions.			
AT1G02580	MEA	EMB173 EMBRYO DEFECTIVE 173 FIS1 MEDEA SDG5	Heterozygous embryos abort if the mutant allele is derived from the female, but develop normally if it is derived from the male. Embryos derived from mutant eggs abort irrespective of the paternal contribution. Thus, the mea mutant displays maternal-effect embryo lethality.			

New Relation

Gene names	phenotype	pubmed id
pom2	This flower had reduced filament elongation as well as thickening of the style	7743935
pom2	low fertility	7743935
CORE	shoot cell expansion	7743935
CORE	severe defects in cell elongation, root growth (as defined by length increase) was severely reduced	7743935
KNAT1	overexpression of genes active in the shoot apical meristem can lead to abnormal leaf development	9427751
AGO1	fewer flower	9427751
ACL	defective in general cell expansion and may also be affected in basic processes of cell wall biosynthesis	9427751
MEA	regulating gene expression through modulation of higher-order chromatin structure	9545225
ABA1	abscisic acid－deficient	9668132
NPQ1	synthesizes sufficient abscisic acid	9668132
ARC6	initiates both proplastid and chloroplast division	10417716
ARC6	Chloroplast size	10417716
ARC1	ARC1 acts independently of the other four ARC genes	10417716
LER	early flowering under short days	10469647
GI	GI mutants have elongated hypocotyls and are resistant to the herbicide paraquat	10469647
GI	GI mutant plants accumulate starch under some conditions	10469647
ABC	produce the four organ types of the typical eudicot flower	10821278
ABC	pecify the fate of flower organ primordia	10821278
MADS-box	diverse aspects of plant development and their functional roles correlate closely with their domains of RNA accumulation	10821278
ERECTA	internode elongation between internal flowers	10821278
SEP1/2/3	overlapping functions required for petal, stamen and carpel development	10821278
RSF1	hypocotyl elongation was less inhibited in both FR and blue light	10982420
RSF1	cryptochrome-mediated blue-light signaling	10982420
EGO1	mutants show gametogenesis defects and sterility	11016954
CRE1	CRE1 expression conferred a cytokinin-dependent growth phenotype on a yeast mutant that lacked the endogenous histidine kinase SLN1	11234017
UROD	responsible for the accumulation of uroporphyrin III and lesion-mimic phenotype	11489187
FT	encodes a protein with similarity to phosphatidylethanolamine binding protein;	10852935
FWA	controls floral meristem identity genes redundantly with LFY	10852935
LFY	LFY may activate other floral meristem identity genes, which could be repressed by the combination of fwa	10852935
AN	regulate the polarity of cell growth by controlling the arrangement of cortical MTs; regulates polar elongation in the leaf－width direction	11889033
ROT3	regulates polar elongation in the leaf－length direction	11889033
MERI5	play a role at the early stages of leaf morphogenesis	11889033
phyA	responsible photoreceptor in far-red light, mediates anthocyanin accumulation by a common pathway to the cryptochromes, involving stimulation of biosynthesis via an HY5-dependent signalling pathway, which also mediates responsivity to cytokinins	17217468
PIP5K	plays an essential role in coordinating plant growth, especially in response to environmental factors	17220200
At5PTase1	have nonredundant roles in hydrolyzing inositol second-messenger substrates and that regulation of Ins(1,4,5)P3 levels is important during germination and early seedling development	17237190
At5PTase2	have nonredundant roles in hydrolyzing inositol second-messenger substrates and that regulation of Ins(1,4,5)P3 levels is important during germination and early seedling development	17237190
NST1	key regulators of the formation of secondary walls in woody tissues of Arabidopsis thaliana	17237351
NST3	key regulators of the formation of secondary walls in woody tissues of Arabidopsis thaliana	17237351
IFL1/REV	controls the identity of the adaxial side of various organs, including xylem (Talbert et al., 1995; Zhong and Ye, 1999; Emery et al., 2003), is perhaps involved in regulating the identity of xylem because ifl1 mutant plants fail to form interfascicular fibers in inflorescence stems but differentiate ectopic xylem-like sclerified cells in upper regions of inflorescence stems as a result of a reduction of basipetal transport of auxin	17237351
TEOSINTE BRANCHED1, CYCLOIDEA, and PCF (TCP)	has been reported to play roles in various aspects of plant development	17307931
TCP3SRDX	induce abnormal development in various organs, regardless of their identity	17307931
CUC	cotyledons and lateral organ primordia, preventing organ development	17307931
BRE1	cell size	17329565
LFY	transcriptionally activated upon the floral transition	17351828
SAG12	a gene associated with senescence and has been defined as an authentic molecular marker of senescence	17355433
PARL1	expressed early in embryonic development, in regions associated with cell division and in vascular cells, is localized to the nucleus	17369435
AP2	control embryo development in specific and early embryo expressiondomains	17376809

SnRK2	is activated by hyperosmotic stress and is also involved in abscisic acid (ABA) signaling in response to water stress	17404219
APX1	APX1 is a key hydrogen peroxide (H2O2) removal enzyme (Pnueli et al., 2003), the expression of which is known to be induced by wounding and other oxidative stresses	17416636
TRANSPORT INHIBITOR RESPONSE1 (TIR1)	mediate the degradation of AUXIN/INDOLE-3-ACETIC ACID (AUX/IAA) repressors in response to auxin	17435085
PIL5	increases abscisic acid (ABA) levels by activating ABA biosynthetic genes and repressing an ABA catabolic gene	17449805
UGE2 and UGE4	synergistically influenced cell wall galactose content, which was correlated with shoot growth	17496119
NUA	acts as a docking site at the inner nuclear pore for activities required for desumoylation and mRNA export and that disruption of this docking affects the expression of key regulators of plant development	17513499
EER4	egulates a previously unknown resetting or dampening mechanism for the ethylene signalling pathway	17526916
EIN2	necessary to induce developmental arrest during seed germination, and seedling establishment, as well as subsequent vegetative growth, thereby allowing the survival and growth of plants under the adverse environmental conditions.	17533512
DUB	cell growth and differentiation, neural function, gene regulation, embryogenesis, eye development, stress, and oncogenesis	17559514
FUL	inabaxial tissue specification	17592013
SHP	inabaxial tissue specification	17592013
JAGGED	ncodes a putative transcription factor with a single C2H2 zinc-finger domainand promotes growth in lateral organs	17592013
BOP1 and BOP2	are largely restricted to the base of developing lateral organs	17601823
PUCHI	encodes a putative APETALA2/ethylene-responsive element binding protein transcription factor, is required for the coordinated pattern of cell divisions during lateral root formation in Arabidopsis thaliana	17630277
XERICO	promotes accumulation of abscisic acid (ABA) that antagonizes GA effects	17922773
GAMYB	modulates GA-regulated floral development	17922773
ATHB-1	encodes a homeodomain Leu zipper protein involved in leaf development	17922773
IAA13	is a repressor of auxin signaling involved in embryonic root development	17922773
SPATULA	inhibit seed germination by repressing GA3ox transcription and inducing expression of GA2ox	17922773
PIL5	inhibit seed germination by repressing GA3ox transcription and inducing expression of GA2ox	17922773
MONOPTEROS	ncodes a transcription factor mediating embryo axis formation and vascular development	17960244
ORE7	encodes an AT-hook motif protein	17971039
PDLP1	damaging effect of reduced cell-to-cell communication	18215111
LOF1	has a role in meristem initiation ormaintenance	19542355
CUC	function in organ separationduring reproductive development	19542355
LAS	function in organ separationduring reproductive development	19542355
At5g23940	encodes an acyl-transferase, also led to altered trichome phenotype	19626137
MOS4	suppress the autoimmune phenotypes of snc1, and that MOS4 is part of a nuclear complex called the MOS4-Associated Complex (MAC) along with the transcription factor AtCDC5 and the WD-40 protein PRL1	19629177
GL3	is known to activate the expression of downstream target genes, including an HD-Zip transcription factor GL2 and a WRKY transcription factor TTG2	19717615
TTG1	is known to activate the expression of downstream target genes, including an HD-Zip transcription factor GL2 and a WRKY transcription factor TTG2	19717615
GL1	is known to activate the expression of downstream target genes, including an HD-Zip transcription factor GL2 and a WRKY transcription factor TTG2	19717615
TRIPTYCHON (TRY)	encodes a single-repeat MYB protein that acts as a negative regulator of trichome initiation	19717615
SBP-box	ontrol shoot maturation not only in the vegetative phase but also in the reproductive phase, and that SBP-box genes have divided roles in shoot maturation	19880401
FUL	controls fruit and leaf development as well as inflorescence architecture	19880401
AtVPS16	responsible for vacuoleless1 (vcl1), which is defective in vacuole formation, and the homozygous mutant showed the embryonic lethal phenotype	19884248
PcG	early flowering, that is also caused by mutations in genes encoding other proteins related to chromatin remodelling such as LIKE-HETEROCHROMATIN PROTEIN 1/TERMINAL FLOWER 2 (LHP1/TFL2), EARLY BOLTING IN SHORT DAYS (EBS) and INCURVATA 2	19947980
STIMPY	plays a unique role in maintaining pluripotency and proliferation in meristematic tissue in Arabidopsis	20110319
STIP	acts downstream of cytokinin-sensing in the establishment of the SAM during this period	20110319
ABCG40	transport diterpenoids associated with plant defense based on three findings (18 i) it is up-regulated by pathogen infection, (ii) its amino acid sequence is similar to those of other diterpenoid transporters such as NpABC1 and SpTUR2, and (iii) the atabcg40 mutant plant is altered in tolerance to the toxicity of diterpenoid sclareol	20133880
DREB1	regulon and enhances plant freezing tolerance	20230648
BRC	prevents the rosette branch outgrowth downstream of the MAX pathway, and the pathway including BRC component required auxin induced apical dominance	20473553

HXK	regulates ROS levels and perhaps also the signalling pathways leading to antioxidant defence responses	21441406
Atisa1-1	Debranching enzyme activity is absent	15743447
ISA3	fulfil the same role as ISA1/ISA2.	15743447
ACX1	root elongation	15743450
NPR1	plant immunity	15799997
PR	cell death	15799997
FRA3 mutant	displays an aberrant organization of F-actin cables and a dramatic reduction in secondary wall thickness in fiber cells	15805481
CalS1	pathogen infection	15842618
CalS12	pathogen infection	15842618
Aptu1-1 mutant	No significant modification of the starch accumulation phenotype was observed in the Atpu1-1 mutant.	15849301
BMY8	low temperature	15894744
DET2	shorter hypocotyls	15773850
SWP	defining the duration of the cell proliferation phase in the leaf primordium	15937226
CDC2A	reduces cell proliferation in leaves while increasing cell size	15937226
SIM	Shoot organogenesis induced on SIM medium in seedling-root explants of WT and lec mutants.	16034595
SMT2	growth and development	16040657
BR	hypocotyl elongation	16040657
ADC2	Overexpression of ADC2 in Arabidopsis induces dwarfism	16045478
RBR1	cell division	16055636
AGO2	embryo development	16081530
OsERP3	OsERP3 protein is homologous to C2-type Ca2+ binding motifs	16113226
TAN	functions both in the early and late phases of embryo development.	16113228
PIN1	auxin transport	16210544
IKU2	encodes a leucine-rich repeat receptor kinase, a large family of genes with roles in signal transduction pathways in plant development and metabolism	16293693
BMY8	exhibit a more sensitive phenotype for photosynthetic apparatus functionality	16297066
TWN2	The first is ValRS, where the seed phenotype exhibited by twn2 (Zhang and Somerville, 1997) is indicative of a weak allele with an insertion in the 5 untranslated region (UTR) of a gene thought to encode a protein localized to the cytosol and mitochondria.	16297076
WOL	WOL is not essential for phloem development	11114832
KNAT1 and STM	redundant in embryo and vegetative development in the absence of AS1	11934861
stm-2	they form fewer lateral shoots and more flowers, most of which remain incomplete	11934861
STM	STM may have additional roles in meristem maintenance that are assumed by other factors redundant with STM that are only revealed in as1 stm-1 double mutants.	11934861
stm-11 knat2	stm-11 knat2 double mutants have a stm phenotype and have no GUS expression	11934961
atgpat1-1	To ascribe the impaired male fertility of the atgpat1-1 mutant to the disruption of AtGPAT1	12897259
AtGPAT1	The absence of AtGPAT1 may enhance or activate the expression of other GPAT isoforms to compensate for the loss of function normally exerted by AtGPAT1 during oil synthesis.	12897259
KU70	Two types of experiments were performed to verify that the telomere elongation phenotype was associated with the T-DNA insertion in KU70	12032094
aba2-11	aba2-11 seeds were relatively insensitive to such osmotic stress, germinated well, and were able to green and expand cotyledons.	12172025
aba2-11	aba2-11 plants were more sensitive to salt or water stress at later stages of development	12172025
CRE1	result in reduced cytokinin sensitivity in callus proliferation, greening, and shoot formation, and in inhibition of root growth, whereas hyperexpression of ARR1 results in the opposite phenotype	12410813
ARR1	result in reduced cytokinin sensitivity in callus proliferation, greening, and shoot formation, and in inhibition of root growth, whereas hyperexpression of ARR1 results in the opposite phenotype	12410813
POLAR	two transcriptional corepressors have been identified that regulate lateral growth in leaves: AN, which promotes polar cell expansion	12615938
DRL1	The relationship between DRL1 gene function and cell cycle regulation could explain the reduction in leaf cell number upon recessive mutation	12615938
ant1	The ANT gene promotes cell proliferation, and in the ant1 mutant, the reduced cell number in organs also is compensated for by an increase in cell size.	12615938
SLY1	Mutations in SLY1 prevent the degradation of RGA in both the presence and absence of GA, leading to RGA inhibition of stem elongation and a dwarf phenotype.	12724538
rga-24	The rga-24 mutation clearly resulted in a partial rescue of the sly1-10 dwarf phenotype but did not significantly suppress the germination or fertility defects of sly1-10.	12724538
SLY1	Loss of SLY1 function results in all of the phenotypes expected of a GA response mutant, including increased seed dormancy, growth as a dark green dwarf, delayed flowering, and reduced fertility.	12724538
sly1-2	The first screen recovered the ethyl methanesulfonate-induced sly1-2 allele that suppressed the ability of abi1-1 (abscisic acid-insensitive) to germinate on 3 μM abscisic acid.	12724538

las-4	Different from the wild type, in which lateral shoots are positioned in the axils of their subtending leaves, the las-4 mutant showed a tendency toward concaulescence, that is, the point of separation between lateral shoots and the main axis was often displaced acropetally (Fig. 2E,F).	12730136
AtREV3	If AtREV3 also is involved in TLS of several kinds of DNA damage, rev3-1 plants that have suffered such DNA damage should show root growth defects similar to those caused by UV treatments.	12953110
HOT2	In previous work, we identified single recessive alleles of four loci required for thermotolerance of hypocotyl elongation, hot1-1, hot2-1, hot3-1, and hot4-1.	12805605
HSP101	Despite this decrease, 10-d-old hot3-1 plants showed normal acquired thermotolerance (Fig. 3), indicating that the level of Hsp101 must still be sufficient for thermotolerance at this growth stage.	12805605
PHYB	whereas PHYB translocates into the nucleus only under red light	14508006
PHYA	Hypocotyl elongation is regulated by both PHYA and PHYB	14508006
PHYB	Hypocotyl elongation is regulated by both PHYA and PHYB	14508006
CHS	The expression of the chalcone synthase gene (CHS), which encodes the first enzyme in the anthocyanin biosynthesis pathway, is modulated by light	14508006
PIF3	We showed that PIF3 is a positive component for CHS induction, whereas it is a negative component for the inhibition of hypocotyl elongation, cotyledon opening, and cotyledon expansion.	14508006
ELF3	The mutation in ELF3 caused longer hypocotyls and enhanced acute induction of CAB by light, whereas ELF3 overexpression caused shorter hypocotyls	14508006
CCA1	The overexpression of either CCA1 or LHY caused longer hypocotyls and induction of CAB	14508006
PRR9	Plants that constitutively express PRR5 or PRR9 exhibit a hypersensitive seedling deetiolation phenotype in Rc and flower early, indicating that the aberrant expression of these genes interferes with normal phytochrome responses	14563930
PRR7	The reduced sensitivity of prr7 to Rc also was evident in the expansion of the cotyledons.	14563930
PRR7	prr7 also had a defect in its responsiveness to FRc, apparent as reduced inhibition of hypocotyl elongation.	14563930
phy	The characterization of phy mutants demonstrates that these photoreceptors have crucial functions during seed germination, seedling deetiolation, shade avoidance, and the transition from vegetative to reproductive growth	14615593
var	However, variegated leaves contain chlorotic portions in which plastids appear to lack normal thylakoids; thus, thylakoid amounts may be lower in var mutants than in the wild type when equal amounts of fresh tissue are used.	14630971
PEX5	Overexpression of PEX5 can partially rescue the sucrose dependence and root growth defects of pex6.	14745029
HMGR	HMGR is essential for cytokinin biosynthesis in tobacco Bright Yellow-2 cultured cells, and inhibition of HMGR reduces cytokinin content and cell proliferation activity	14871314
YABBY	expressed in primary lateral organs where they play roles in organ polarity and growth	16623911
KAN	KAN genes have roles in ovule development, as indicated by the reduced growth of the outer integument observed in some kan mutant combinations	16623911
AtNAP	These data strongly suggest that AtNAP and its homologs play an important role in leaf senescence in Arabidopsis and possibly in other plant species.	16640597
NAC	Roles of the NAC family genes include embryo and shoot meristem development, lateral root formation, auxin signaling, defense and abiotic stress response	16640597
AtNAP	RNA gel blot analysis showed that the expression of AtNAP in rosette leaves of Arabidopsis is closely associated with the progression of leaf senescence	16640597
SAG12	SAG12 is a highly senescence-specific gene in Arabidopsis and has been widely used as a molecular marker for leaf senescence	16640597
FIE	Mutations impairing components of the MEA-FIE complex show pre- and post-fertilization phenotypes associated with abnormal cell proliferation	16651654
fis	In these fis class mutants (mea, fie, fis2, and msi1), the central cell initiates endosperm development without fertilization.	16651654
FIS	in FIS class genes all mutations lead to maternal-effect seed abortion.	16651654
PSI	Both organisms are impaired in PSI activity, but differ substantially in that Ycf37-deficient Synechocystis cells can grow photoautotrophically and accumulate a functional PSI complex, whereas the higher plant mutant is lethal and lacks PSI completely	16679416
AGL24	AGL24 promotes inflorescence identity, and its expression is downregulated by APETALA1 (AP1) and LEAFY to establish floral meristem identity.	16679456
AGL24	Mutations in AGL24 confer a dosage-dependent late-flowering phenotype, indicating that AGL24 is a promoter of the floral transition	16679456
SVP	svp mutants show a dosage-dependent early-flowering phenotype, indicating that SVP is a repressor of the floral transition	16679456
SVP	These experiments showed that SVP is expressed in the secondary inflorescence meristems but was absent in the primary inflorescence meristem.	16679456
AGL24	AGL24 is also expressed in the floral meristem, and in later stages of flower development, weak expression is observed in stamens and carpels.	16679456
AG	AG is the class C gene of Arabidopsis and is expressed in the inner part of the floral meristem where stamen and carpel primordia develop	16679456

AG	The LUG and SEU proteins are considered to form a corepressor complex that prevents AG expression in the outer two whorls during flower development	16679456
ap1	Furthermore, in the axil of the first-whorl organs, a new ap1 flower develops.	16679456
RTE1	The suppressed phenotype segregated 1:16, indicating that rte1-2 could not suppress the Landsberg etr1 allele.	16682642
POLAR	Polar auxin transport plays an important role in a wide variety of plant growth processes	16690816
axr4	The axr4 mutant is resistant to 2,4-D, and because AUX1 may be functional in the LRC in axr4 mutants, this would suggest that functional AUX1 in the LRC alone is not sufficient for 2,4-D－sensitive root growth.	16690816
AUX1	Our results suggest that the axr4 phenotype, including auxin-resistant root growth and reduced gravitropism, is caused by defective AUX1 trafficking in epidermal cells.	16690816
AtALMT1	Al-activated root exudation of malate and citrate was profiled in the root exudate solutions from WT and AtALMT1 MT plants grown in hydroponic culture.	16740662
rol1-2	The moderate influence of rol1-1 suggests that this mutation mainly affects the cell wall structure, whereas the effect of rol1-2 is more dramatic and might also include other processes besides the biosynthesis of Rha.	16766693
LRX6	LRX6 is specifically expressed during lateral root development in wild-type plants (Baumberger et al., 2003a) and is not known to influence root hair formation	16766693
ATS1	It was also apparent that the reduced growth allows the plant to maintain a relatively high PG level, and one might conclude that regulatory mechanisms are in place to coordinate PG biosynthesis in the chloroplast and plant growth at the level of ATS1.	16774646
ATS1	Repression of ATS2 expression resulted in reduced growth, but the plants were pale-yellow and had more strongly reduced PG contents than ATS1 RNAi lines	16774646
gl2	Analyses of gl2 mutants revealed that the GL2 gene is necessary for both root hairless cell specification and the local outgrowth of the trichome in shoot epidermal cells	16778018
HDG2	As is the case with the GL2 promoter (Hung et al., 1998), the HDG2 promoter was found to drive GUS expression in the hairless cell files of the hypocotyl epidermis (Fig. 5, B and C), in which stomatal differentiation is repressed.	16778018
HDG12	The excess branching phenotype of the trichome in hdg11-1 is enhanced by hdg12-2, suggesting that both HDG11 and HDG12 act in repressing the outgrowth of trichomes.	16778018
sgr5-1	The sgr5-1 mutant shows reduced gravitropism in the inflorescence stem but its root and hypocotyl have normal gravitropism.	16813575
SGR5	Analysis of GUS expression under the control of the SGR5 promoter revealed that SGR5 is mainly expressed in the endodermis, the gravity-sensing tissue in inflorescence stems.	16813575
sgr2	direction of gravity in mutants that exhibit no or reduced gravitropism, namely sgr2	16813575
sgr5-2	The sgr5-2 allele derived from the Landsberg erecta ecotype also showed reduced shoot gravitropism compared with wild-type L er	16813575
tgd2-1	Expression of the tgd2-1 mutant cDNA caused a dominant-negative effect replicating the tgd2 mutant phenotype.	16818883
SEN1	Expression of SEN1 is indicative of senescence	16829587
PSKR1	Root growth of pskr1-1 seedlings was slightly reduced, whereas root growth of AtPSKR1ox was comparable to that of wild type	16829587
PSKR1	culture, resulting in formation of a smaller callus than the wild type after 6 weeks	16829587
PSKR1	Moreover, in the root elongation assay, pskr1-1 seedlings exhibited the same cytokinin response as wild-type seedlings	16829587
NADK3	Consistent with the results for young seedlings, we found that nadk3 adult plants were more susceptible to osmotic stress, high salt and ABA than wild-type, although they were relatively tolerant to stress compared to young seedlings	16856986
NADK3	Our results suggest that NADK3 is a negative regulator of ABA responses during seed germination in Arabidopsis.	16856986
TIC21	We renamed CIA5 as Arabidopsis Tic21 (At Tic21) and propose that it functions as part of the inner membrane protein-conducting channel and may be more important for later stages of leaf development.	16891400
CIA5	Expression data and single and double mutant phenotypes of cia5 and At tic20-I suggest that CIA5 and Tic20 may perform similar functions and that CIA5 is more important for later and Tic20 is more important for earlier stages of leaf development.	16891400
AP1	In whorl 2, PI, AP3, AP1 and SEP presumably regulate a set of downstream structural genes (so called realizators that encode proteins required for the cell division and differentiation events that lead to petal organogenesis.	16902407
AP1	RABBIT EARS, whose expression is under the control of AP1, is involved in second whorl organ development	16902407
BIG	Very recently, an E3 ubiquitin ligase－encoding gene, BIG BROTHER (BB), has been shown to limit plant organ size by controlling cell proliferation	16902407
BPEp	(C) RT－PCR analysis of BPEp (top) and BPEub (middle) mRNA accumulation in wt A. thaliana inflorescence (i), flower buds (b), open flowers at the onset of petal senescence (o), rosette leaves (Lr), cauline leaves (Lc) and inflorescence stem (s)	16902407
AP3	Therefore, BPEp presumably acts downstream of the PI/AP3 heterodimer during petal development.	16902407

AP1	As the tissues used in this experiment were mostly from flower buds older than stages 5 and 6, BPEp accumulation is most likely to be controlled by the protein complex formed by AP3, PI, SEP and AP1 during petal organogenesis.	16902407
BPEp	Therefore, BPEp is the first protein that specifically limits petal organ size by controlling the postmitotic rate of cell growth and expansion	16902407
AS1	demonstrating that AS1 and PIN1function redundantly to promote leaf development.	16971475
esp3	One class of mutants represented by esp3 had reduced stature, early flowering (see below), and altered leaf morphology	17008405
MSI1	Development of msi1-as plants wasdelayed, and plants had a reduced rosette size, a delayed flowering time andreduced growth of primary shoots, although more severe symptoms of fasciation,such as stem bifurcation, were not observed	17021044
WSGs	The absence of starch was coupled with the accumulation of very high levels of WSGs (whatever extraction method was used) that were not observed in other lines (Tables 3 and 4 Moreover, this double mutant displayed a lower growth rate, a reduced size of the mature plant, a pale color, and a general wilting of the inflorescence	17028209
AtIPT3	Mutants lacking AtIPT3, 5, and 7 were severely inhibited in shoot growth, whereas lateral roots elongated more	17062755
ELCis	The multinuclear phenotype found in elc mutants indicates that ELCis involved in the regulation of cell division.	17090720
SLIM1	Both slim1-1 and slim1-2 alleles showed 30% reduction of root growth compared with the parental line	17114350
CP24	However, the photosynthetic rate in limiting light was slightly depressed in the plants lacking CP24, and there was a reduction in growth rate of the koLhcb6 plants compared with the wild type: the rate of increase in rosette diameter was slower, the average time for flowering increased by several days, and the fresh weight was lower	17114352
nrp1-1	In the nrp1-1 nrp2-1 double mutant, arrest of cell cycle progression at G2/M and disordered cellular organization occurred in root tips	17122067
FLC	vernalization represses FLC expression, thus causing rapid flowering	17138694
mtk/eto3	When Met cycle knockout and ethylene overproduction were combined in the mtk/eto3 double mutant, a reduced capacity for ethylene synthesis was observed in seedlings	17144895
mtk/eto3	The mtk/eto3 double mutant displayed a metabolic plant phenotype that was similar to mtk with reduced AdoMet levels at sulfur-limiting conditions.	17144895
AtEBP	AtEBP is an ethylene-induced gene that served as a positive control for ethylene treatment	17144895
hac1	Consistent with the flowering phenotypes, the FLC mRNA levels in the hac1 hac5 and hac1 hac12 double mutants were considerably increased compared to those in the hac1 single mutants	17144897
tmt1	in wild-type plants and 0.39 and 0.41 μmol/g fresh weight, respectively, in the two tmt1 mutant lines (Figure 8A representing slightly 30%) reduced glucose contents.	17158605
OMR1	Visual analysis of tha2-1/tha2-1 P35S-omr1-5 homozygotes showed some chlorosis, leaf curling, and misshapen flowers (see Supplemental Figure 10 online) but otherwise viable plants with normal seed set	17172352
gid1a	Although single mutants developed normally, gid1a gid1c and gid1a gid1b displayed reduced stem height and lower male fertility, respectively, indicating some functional specificity	17194763
DELLA	Deletions or specific missense mutations of the conserved motifs (DELLA and/or VHYNP) within the DELLA domain render the mutant proteins resistant to GA-induced degradation, leading to a GA-insensitive dwarf phenotype	17194763
ga1-3	This is clearly illustrated in the severely GA-deficient mutant ga1-3, which displays dramatically reduced leaf expansion, and stem and root elongation	17194763
PAC	It is interesting to note that PAC can inhibit root growth further in the gid1a-1 gid1b-1 gid1c-1 mutant	17194763
gid1a	The gid1a single mutant and both double mutants lacking functional GID1a display phenotypic defects in reproductive development, including stem length, silique length, and fertility	17194763
cdka	In accordance, the overexpression of a mutant cdka;1 allele in which the putative phosphorylated Tyr residue is mutated also did not result in an obvious cell division phenotype	17209125
MADS-box	This suggests that while the MIKC factors are important for controlling flower development, type I MADS-box genes might control specific processes during ovule and seed development	18346189
AGL80	In the agl80 mutant the nucleolus and vacuole of the central cell fail to mature properly; in addition, endosperm development is not initiated after fertilization of agl80 female gametophytes	18346189
etr1-3	In contrast, mutations that block ethylene responses, etr1-3 and ein2-5, enhance root formation and render it insensitive to the effect of ACC, even though these mutants have reduced root elongation at high ACC doses	18363780
pny	The pny mutant also exhibits defects in fruit development as the pny fruit shows a narrower replum, an abnormal pattern of lignification, and septum fusion defects	18390591
bam3	Representative plants were selected to show the reduced growth rate of bam3 and bam4 mutants	18390594
LUG	Second, we identified a relatively minor role of LUH compared with LUG in flower development, as the luh-1 single mutation does not affect flower development but luh-1/+ can enhance the floral phenotype of lug	18390806

ARF2	ARF2 has also been shown to mediate auxin-responsive gene expression and negatively regulates cell expansion	18483219
AP2	Loss-of-function mutations in AP2, encoding a transcription factor, lead to a range of floral defects that correlate with increased seed mass	18483219
BIG	The E3 ligase BIG BROTHER (BB) negatively regulates the duration of cell proliferation in leaves and petals, possibly by targeting growth stimulators for degradation, and is proposed as a bona fide organ size regulator	18483219
PI3K	The broad and significant role of PI3K was first suggested by the results of Welters et al. (1994) showing that plants containing an antisense construct for VPS34 are severely inhibited in growth and development.	18515640
K-uk	The turnover rates of K-G-3 and K-uk might be different from those of other kaempferol glycosides, leading to abnormal levels of free aglycone kaempferol, which in turn affect plant development	18567791
STT3a	Mutations in STT3a, a subunit of the oligosaccharyltransferase complex responsible for protein N-glycosylation, may also affect the cell wall, particularly under salt stress	18612099
DC3000	Transgenic Arabidopsis plants with constitutively suppressed AteIF5A-2 exhibited marked resistance to programmed cell death induced by virulent Pst DC3000, and there was a corresponding reduction in pathogen growth and development of disease symptoms in the plant tissue	18633122
AteIF5A-2	The results indicate that AteIF5A-2 is a key element of the signal transduction pathway resulting in plant programmed cell death	18633122
DHS	For example, constitutive suppression of DHS in Arabidopsis results in several phenotypes, including delayed natural leaf senescence, delayed bolting, increased rosette leaf and root biomass, and enhanced seed yield	18633122
GL2	Root hair-like cell expansion in the hypocotyl epidermis was previously observed in transgenic plants expressing recombinant GLABRA2 (GL2), which was modified to activate the expression of genes involved in root hair cell differentiation	18718934
ibr	Indeed, these ibr mutants display additional phenotypes associated with peroxisome defects, such as sucrose dependence during seedling development due to slowed oxidation of seed storage fatty acids	18725356
ibr1	ibr1 and ibr10 mutants display IBA- and 2,4-DB-resistant root elongation	18725356
PAD4	A reasonable hypothesis is the so-called amplification loop model, in which SA induces the expression of the PAD4 gene and then the PAD4 protein activates SA synthesis after pathogen infection	18753285
BAH1	These results suggest that BAH1 regulates pathogen-induced localized cell death and age-related cell death in SA-dependent and SA-independent manners, respectively	18753285
LEC1	a cellular environment that promotes embryo development and that this environment coordinates the morphogenesis and maturation phases	11573014
LEC2	somatic embryo formation	11573014
FUS3	encodes a regulatory protein	11573014
ABI3	a transcription factor that operates primarily during the maturation phase	11573014
ARR5	lateral root formation	14973166
BA	root elongation	14973166
ARR8	primary root tip	14973166
ARR4	shoot formation	14973166
ARR4	hypersensitive phenotype	14973166
FDH	the cell wall	14973169
gus	flower	14973169
HISTONE	inflorescence	14973282
AP1	flower	14973282
Sav-0	short-root phenotype	15031265
Uk-1	root phenotype	15031265
F2	root phenotype	15031265
gus	cell proliferation	15031265
F3	root phenotype	15031265
SHY2	root growth	15031265
Uk-1	root growth	15031265
Sav-0	cell number	15031265
ARR15	altered development	15053761
MTs	cell expansion	15084720
DC3000	DC3000	15085136
AHK2	growth and development	15155880
AHK2	seedling phenotype	15155880
AHK2	growth and development	15155880
AHK4	phosphate starvation	15155880
AHK2	leaf phenotype	15155880
SLY1	infertile	15155881
DELLA	plant growth	15155881
POLAR	cell expansion	15155883
CYTOKININ	shoot induction	15166290
CYTOKININ	cell division	15166290
AHK2	inflorescence	15166290
AXR1	longer hypocotyls	15181201
ASK1	flower	15208391
E3	organ development	15208391
HY5	shorter hypocotyls	15208391

E3	flower	15208391
SA	pseudomonas syringae	15269331
EDS1	cell death	15269331
PCD	cell death	15269331
HR	plant defense	15269331
NPR1	cell death	15269331
EDS1	plant defense	15269331
PIL5	gravitropism	15486102
PHYB	seed germination	15486102
HFR1	hypocotyl elongation	15486102
PHYB	gravitropism	15486102
HFR1	constitutive photomorphogenic phenotypes	15486102
PIL5OX	far-red light	15486102
PIL5	hypocotyl elongation	15486102
PHYB	seed germination	15486102
PEX5	reduced auxin response	15548601
PEX5	seed development	15548601
NCED	a key regulatory enzyme in ABA biosynthesis	15574845
OF	cell pattern	15618487
SCM	epidermis development	15618487
GUS	lateral root primordium	15659098
LATERAL	vascular differentiation	15659631
INVOLVED	cell wall biosynthesis	15659631
IN	root elongation	15659631
LATERAL	lateral root formation	15659631
HOT1-4	thermotolerance	15659638
COIL	thermotolerance	15659638
HOT1-4	heat stress	15659638
RE	pale-green leaves	15686525
FB1	cell death	15703061
POLAR	required for vascular differentiation and patterning	16299182
POLAR	auxin accumulation	16299182
CA2	vascular development	16299182
ARR8	circadian phenotype	16326972
PHYB	reduced phyb signaling	16326972
PHYB	long-hypocotyl phenotype	16339853
LEP	curled leaves	16339853
LEP	leaf development	16339853
LEP	short-hypocotyl phenotype	16339853
LEP	mutant seedling phenotype	16339853
GATA	seed germination	16359390
ABH1	aba-hypersensitive	16359390
L1	abscisic acid	16359390
SA	germination efficiency	16359390
SE	root system	16361392
PHYA	seed germination	16361392
PHYB	far-red light	16361392
COBRA	cell expansion	16367956
RIN4	cell death	16367962
SAG12	senescence	16367962
EDS1	loss-of-function phenotype	16367962
BRs	shoot elongation	1637964
AXR2	root elongation	1637964
DET2	hypocotyl elongation	1637964
ActP	physiological response	16367966
RCN1	the regulatory subunit of protein phosphatase 2A	16377756
AXR3	bushy phenotype	16377756
SEN4	a marker gene for dark-induced and age-dependent leaf senescence	16407152
RABBIT EARS	a regulator of petal development	16412084
AP3	cell division	16412084
AP2	flower	16412084
LUG	reduced number	16412084
T1	inflorescence	16412086
GFP	flower	16415209
POLAR	auxin transport	16460509
GLC	ethylene treatment	16461383
CHIP	plant growth	16467298
CDC48A	as a monomer and may function in regulating plant growth	16473966
SA	defense pathway	16473969
EDS1	lacking a functional SA pathway	16473969
PPR	control cytoplasmic male sterility	16489121
HPAEC-PAD	high performance anion-exchange	16495218
RPM1	structurally related	16531493
cyclin B1	promoter－GFP fusion	16553896
BOP	lateral organ development	16554365
NPR1	severe disease symptoms	16603654
CCA1	expression had an altered phase	16617099

R	a higher degree of pathogen-induced stress	16623885
LRP1	produced an elongated root phenotype	18835563
FLC	inhibits the expression of flowering-time integrators	18849490
WUS	shoot stem cells and leaf development	18950478
VH1/BRL2	repressed by ABA	19000166
ARF7 and ARF19	LR formation	19037657
gs	photorespiratory nitrogen metabolism	19048287
IPT	increased secondary growth	19074290
ABI5	the expression of the LEA gene	191553448
PNY	aspects of floral specification	191757771
Erd15	induced under dehydration stress	19210750
MYB	required for trichome initiation	19223001
RPT5a	essential for male gametophyte development	19223514
AGD10	root hair development	19237690