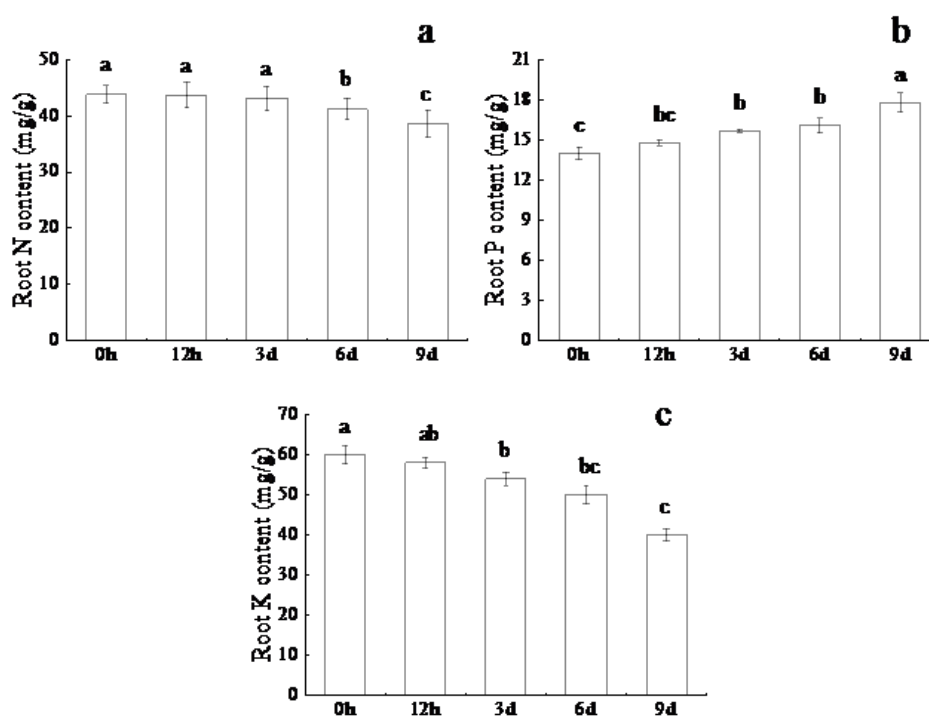


**Figure S1.** Parameters of *M. halliana* under Fe deficient stress: **a** root dry weight; **b** aerial dry weight; **c** root to aerial; **d** height. Results are shown as mean (  $n = 3$  )  $\pm$  SE. Different letters indicate statistical differences different treatments (One - way ANOVA,  $P < 0.05$ ).



**Figure S2.** Elemental parameters of *M. halliana* root under Fe deficient stress: **a** nitrogen content;

**b** phosphorus content; **c** potassium content. Results are shown as mean ( n = 3)  $\pm$  SE. Different letters indicate statistical differences different treatments (One - way ANOVA,  $P < 0.05$ ).

**Table S1.** Relative concentration and fold-changes in the *M. halliana* of major metabolites under Fe deficient stress.

Timepoint	Metabolites	Quant Mass	VIP	P-value	FC
R12h-R0d	Norleucine	86	2.03691	5.30899E-07	5.03584E-07
	Indolelactate	115	2.03671	7.08557E-07	2.25793E-06
	L-Malic acid	73	1.79917	0.000145402	0.806106889
	adenine	84	1.55173	0.000399918	0.47406363
	3-(4-hydroxyphenyl)propionic acid	179	1.73866	0.000439309	0.094773502
	N-Methyl-DL-alanine	130	1.70165	0.000747707	1.468138763
	aspartic acid	100	1.69377	0.001123272	0.70087648
	phenylalanine	218	1.65382	0.001568429	1.262169528
	N-Methyl-L-glutamic acid	98	1.71889	0.001780634	3.09633E-06
	Methyl Phosphate	135	1.72502	0.001960856	0.503369138
	Maleimide	207	1.6418	0.001991871	1.478553902
	Aminooxyacetic acid	73	1.53478	0.00209883	1.501661018
	oxalic acid	151	1.61555	0.002673869	1.407241796
	Cysteinyglycine	115	1.58659	0.002732845	1.380610864
	fumaric acid	143	1.58653	0.003268495	0.768740118
	3-hydroxy-L-proline	101	1.53691	0.00405438	1.372214814
	Allantoic acid	103	1.53988	0.004763567	1.643053414
	D-Arabitol	103	1.42956	0.005754264	1.651045704
	Citraconic acid degr1	89	1.49375	0.00620982	1.31529380

			1	5
Cumic Acid	221	1.53918	0.00621014	1.33389727
			2	9
22-Ketocholesterol	204	1.46878	0.00634435	0.61703561
			2	5
phenylacetaldehyde	105	1.46008	0.00796661	1.32694275
			8	5
putrescine	102	1.4947	0.00831357	1.32940373
			4	2
citric acid	147	1.4401	0.00887683	0.76098590
			6	4
Benzoylformic acid	70	1.46543	0.00947354	0.22822665
			6	8
1-Methylhydantoin	116	1.44941	0.00963188	1.25900074
			8	2
dibenzofuran	56	1.44765	0.00970413	1.30458317
			7	3
p-benzoquinone	79	1.43832	0.01008569	1.31726652
			5	2
2'-Hydroxyacetophenone	70	1.44549	0.01054126	2922332.71
			2	7
3-Methylamino-1,2-propanediol	117	1.73854	0.01186822	2.9867884
			5	
maltose	204	1.36339	0.01272455	0.76391799
			6	7
norvaline	221	1.37548	0.01369246	1.32387570
			2	3
m-cresol	165	1.12374	0.01445709	5.08846376
			6	5
methyl octanoate	87	1.38493	0.01451148	1.30678255
			9	2
2-aminoethanethiol	130	1.37547	0.01520672	1.27327397
				1
Epicatechin	73	1.64181	0.01545545	3.113155488
			4	
D-Glyceric acid	189	1.40294	0.01746143	0.75954496
			7	1
D-erythro-sphingosine	204	1.32017	0.01833370	0.49273325
			7	3
beta-Glutamic acid	100	1.37271	0.01905719	1.57009684
			5	7
Nicotinoylglycine	207	1.33115	0.02067317	1.24873593
				1

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Methyl Palmitoleate	128	1.3619	0.02074021 9	0.18419198 6
creatine degr	147	1.51197	0.02286082 6	2.42003902 3
xylitol	103	1.2814	0.02300787 3	1.27452293 3
sucrose	73	1.51461	0.02468120 8	4.18746401 5
dl-p-Hydroxyphenyllac tic acid	179	1.36035	0.02620692	3.83495219 2
kyotorphin	171	1.69721	0.02682382 8	0.24125457 4
Saccharic acid	73	1.32185	0.027771116	0.84004638 3
N-Ethylglycine	130	1.27609	0.02796480 6	1.23752227 5
Allo-inositol	217	1.34645	0.02799379 8	1.43485622 4
2-ketoadipate	73	1.31699	0.02865289 4	0.75004922
glycine	86	1.28628	0.02879014 7	1.16967565 8
Ethanolamine	100	1.27546	0.03172858	0.80870522 1
5-Aminovaleric acid	102	1.25663	0.03244067 3	1.304564811
lactic acid	117	1.33889	0.03266279 7	1.71308876 5
Dithioerythritol	221	1.22578	0.03314395 7	1.30910389 9
xylose	103	1.25211	0.03324587 8	0.70343431
Methylmalonic acid	147	1.23677	0.03490322 8	1.28670759 6
valine	72	1.24793	0.03532022 7	0.588111146
Dodecanol	75	1.20305	0.03840978 5	1.27126158 7
farnesol	103	1.18052	0.04237900 1	1.27439939 8
mannitol	205	1.20313	0.04647061 3	1.48778957
R3d-R0d	22-Ketocholesterol	204	1.08005	3.79309E-0 0.14823131

			5	2
3-(4-hydroxyphenyl)propanoic acid	179	1.68003	5.15391E-05	1.38915E-07
Diglycerol	129	1.54227	8.28298E-05	2.133202219
kyotorphin	171	1.68116	0.000125768	4.87424E-06
phenylalanine	218	1.53902	0.000223202	1.445804545
pyrogallol	77	1.5488	0.00024408	2.014093797
Norleucine	86	1.31622	0.000275104	0.15672961
succinic acid	147	1.54078	0.00031859	1.93251209
Cumic Acid	221	1.51146	0.000510743	1.600284974
Gallic acid	147	1.41862	0.000559509	2.316154408
5-Aminovaleric acid	102	1.51412	0.000599899	1.822829429
Methyl Phosphate	135	1.51932	0.000624189	0.398953271
oxalic acid	151	1.48798	0.000637108	1.757943158
aspartic acid	100	1.45753	0.000679525	0.586033896
Maleimide	207	1.48652	0.000710893	2.312896734
Nicotinoylglycine	207	1.48298	0.000796705	1.947218813
trehalose	73	1.2875	0.00095403	2.409912432
Aminooxyacetic acid	73	1.49276	0.00099623	2.364353657
putrescine	102	1.47836	0.001083921	1.825979303
Indolelactate	115	1.29023	0.001288615	0.221747647
Glucose-1-phosphate	217	1.41612	0.001487692	2.267608622
5-Methoxytryptamine	130	1.46777	0.001502478	1.863225083
D-Glyceric acid	189	1.38847	0.00153209	0.68389762

				4
Dithioerythritol	221	1.44075	0.00156629	1.78013220
			3	8
Methyl Palmitoleate	128	1.32832	0.00161277	0.00036815
			5	9
2-aminoethanethiol	130	1.45474	0.00168292	1.82541213
			1	5
N-Methyl-L-glutamic acid	98	1.38404	0.00178063	3.09633E-0
			4	6
2-Keto-L-gulonic acid	103	1.28317	0.00183882	0.21174344
			7	4
N-Ethylglycine	130	1.44803	0.00185186	1.79609619
			4	2
Pyruvic acid	89	1.28753	0.00188474	2.96682620
			2	9
dibenzofuran	56	1.43822	0.00191139	1.76306978
			4	5
p-benzoquinone	79	1.43551	0.00194450	1.76559897
			4	5
2-ketoadipate	73	1.283	0.00197630	0.24939931
			1	1
norvaline	221	1.40904	0.00208027	2.08157510
			4	2
1-Methylhydantoin	116	1.43153	0.00226325	1.68285320
			4	8
phenylacetaldehyde	105	1.43556	0.00226896	1.69912277
			1	
Digalacturonic acid	105	1.43813	0.00228283	2167125.53
			3	9
Citraconic acid degr1	89	1.41679	0.00254084	1.77065264
			4	2
Allo-inositol	217	1.36965	0.00268498	1.76363161
			6	1
Methylmalonic acid	147	1.39698	0.00270068	1.66649872
			7	7
N-Methyl-DL-alanine	130	1.43338	0.00270264	1.82096991
				9
alanine	116	1.46053	0.00307763	1.93690006
			1	8
methyl octanoate	87	1.40184	0.00317667	1.74635362
			7	5
3-hydroxy-L-proline	101	1.40384	0.00340575	1.91234997
			3	

Galactinol	81	1.34419	0.00353081 2	0.46109791 7
oxamic acid	147	1.40981	0.00373567 5	1.67283238 2
ribitol	205	1.29663	0.00380754 3	1.56842181
Dodecanol	75	1.37526	0.00463800 1	1.69340326 9
oxoproline	157	1.36367	0.00481148 7	2.46357980 1
2-hydroxypyridine	78	1.16088	0.00593728 9	1.45022567
methyl trans-cinnamate	57	1.32706	0.00600735 8	1.91456890 7
xylitol	103	1.20597	0.00600987 5	1.50891806 6
farnesol	103	1.33116	0.00682313 6	1.66222705 6
N-Acetyltryptophan	73	1.10199	0.00736112 3	0.11639641 1
fructose	103	1.25703	0.00741508 9	1.57504660 7
quinic acid	73	1.28111	0.00821926 9	0.58285312 6
glycerol	205	1.25122	0.00909460 3	1.55004841 1
Tagatose	103	1.22538	0.00954900 4	1.51673872 4
L-Malic acid	73	1.23636	0.01170690 6	0.85215796 3
Benzyl thiocyanate	91	1.28025	0.01199209 6	0.24577827 5
Carnitine	117	1.21133	0.01333110 8	2.43236777 9
Bis(2-hydroxypropyl)amine	219	1.26484	0.01622559 5	0.34594991 9
valine	72	1.2276	0.01992368	0.55422290 7
Benzoylformic acid	70	1.03075	0.02084927 2	0.32963643 7
threonine	219	1.12354	0.02535015 8	0.61796299 7
Lyxose	103	1.07167	0.02633070	1.49400982

			7	7
	creatine degr	147	1.06593	0.02898293 1.36243286
			5	8
	phloroglucinol	103	1.06642	0.03266995 1.41901941
			4	1
	lactic acid	117	1.45455	0.04217286 5.42082932
			1	4
	alpha-ketoglutaric acid	73	1.04762	0.04250075 1.62778784
			4	1
	asparagine	132	1.1822	0.04266461 0.47398830
			8	9
	D-erythro-sphingosine	204	1.05907	0.04454723 0.45859820
			4	1
	urea	69	1.08549	0.04858912 0.45814505
			1	4
R3d-R12h	succinic acid	147	1.83074	0.00016802 2.35445390
			5	2
	Diglycerol	129	1.8465	0.00024623 1.78250945
			2	1
	22-Ketocholesterol	204	1.34582	0.00125626 0.24023137
			4	1
	Digalacturonic acid	105	1.77466	0.00228283 2167125.53
			3	9
	2-Keto-L-gulonic acid	103	1.44494	0.00256973 0.26790999
			8	4
	pyrogallol	77	1.61045	0.00374554 1.59501701
			3	2
	alanine	116	1.58128	0.00562378 1.77916005
			2	8
	Pyruvic acid	89	1.49472	0.00608834 2.23039501
			8	7
	dl-p-Hydroxyphenyllac tic acid	179	1.19968	0.00613488 0.05220402
			8	4
	Nicotinoylglycine	207	1.54228	0.00695970 1.55935195
			7	3
	myo-inositol	217	1.47369	0.00827945 1.33842126
			4	2
	Allantoic acid	103	1.45256	0.00847513 0.70180209
			6	4
	xylose	103	1.45552	0.00858700 1.61410988
			8	
	Alizarin	73	1.39065	0.00946216 0.1466681
			1	



5-Methoxytryptamine	130	1.46546	0.00992822	1.55371280 2
Gallic acid	147	1.32654	0.01118134 3	1.81613700 9
Maleimide	207	1.48178	0.01180533 8	1.56429652 7
Glucose-1-phosphate	217	1.44696	0.01340514 6	1.71125951 1
ribitol	205	1.35965	0.01343909 8	1.48875888 3
norvaline	221	1.394	0.01499350 7	1.57233424 4
Ethanolamine	100	1.35337	0.01509512 6	1.25747569 1
Aminooxyacetic acid	73	1.43834	0.01584826 1	1.57449226 5
quinic acid	73	1.37131	0.01661736 9	0.64662134 2
N-Ethylglycine	130	1.36498	0.01862926 5	1.45136473 8
2-ketoadipate	73	1.4595	0.01952972 1	0.33251059 3
3-Hydroxypropionic acid	219	1.47235	0.02030743 9	0.35003183 1
2-aminoethanethiol	130	1.33051	0.02144618 9	1.43363657 5
L-dopa	218	1.48734	0.02199709 6	0.49478554 7
glycerol	205	1.31474	0.02215673 4	1.48162431 3
Galactinol	81	1.4591	0.02481993 7	0.55392975 4
5-Aminovaleric acid	102	1.3025	0.02482475 3	1.39727011 9
3-Methylamino-1,2-pr opannediol	117	1.4918	0.02636783 2	0.40515629 3
putrescine	102	1.25094	0.03028623 6	1.37353255 4
L-glutamic acid	84	1.17829	0.03537853 8	1.96062550 5
1-Methylhydantoin	116	1.22111	0.03568519 1	1.33665783 7
dibenzofuran	56	1.19744	0.03932024	1.35144299

				5	1
	fumaric acid	143	1.26301	0.04104445	1.31120588 8
	cycloleucine	157	1.06828	0.04355521 1	0.16757296 5
	benzoic acid	179	1.26592	0.04356776	2.30546733
	Dithioerythritol	221	1.17039	0.04509407 5	1.35980972 1
	Citraconic acid degr1	89	1.15422	0.04512512 1	1.34620313 4
	p-benzoquinone	79	1.16416	0.04573717 8	1.34035060 2
	phloroglucinol	103	1.20226	0.04738206 8	1.45106310 7
	asparagine	132	1.43343	0.04897754 3	0.45248261 7
	Carnitine	117	1.13873	0.04975941 3	1.80362413 8

**Table S2** Metabolic pathway in the *M. halliana* under Fe deficient treatment

Timepoints	ID Annotation	Annotation	p-value	-log(p-value)
R12h-R0d	ath01064	Biosynthesis of alkaloids derived from ornithine, lysine and nicotinic acid	5.55E-04	3.26E+00
	ath00630	Glyoxylate and dicarboxylate metabolism	9.99E-04	3.00E+00
	ath00020	Citrate cycle (TCA cycle)	1.05E-03	2.98E+00
	ath01070	Biosynthesis of plant hormones	5.02E-03	2.30E+00
	ath01065	Biosynthesis of alkaloids derived from histidine and purine	5.40E-03	2.27E+00
	ath00480	Glutathione metabolism	6.82E-03	2.17E+00
	ath00330	Arginine and proline metabolism	9.72E-03	2.01E+00
	ath00760	Nicotinate and nicotinamide metabolism	1.03E-02	1.99E+00
	ath00360	Phenylalanine metabolism	1.16E-02	1.94E+00
	ath00310	Lysine degradation	1.23E-02	1.91E+00
	ath01066	Biosynthesis of alkaloids derived from terpenoid and polyketide	1.30E-02	1.89E+00
	ath00260	Glycine, serine and threonine metabolism	1.38E-02	1.86E+00
	ath00500	Starch and sucrose metabolism	1.45E-02	1.84E+00
	ath00040	Pentose and glucuronate interconversions	1.70E-02	1.77E+00

ath00710	Carbon fixation in photosynthetic organisms	2.33E-02	1.63E+00
ath00250	Alanine, aspartate and glutamate metabolism	2.52E-02	1.60E+00
ath00730	Thiamine metabolism	2.93E-02	1.53E+00
ath00910	Nitrogen metabolism	2.93E-02	1.53E+00
ath00770	Pantothenate and CoA biosynthesis	3.15E-02	1.50E+00
ath00970	Aminoacyl-tRNA biosynthesis	4.20E-02	1.38E+00
ath00300	Lysine biosynthesis	4.31E-02	1.37E+00
ath00680	Methane metabolism	4.81E-02	1.32E+00
ath01063	Biosynthesis of alkaloids derived from shikimate pathway	5.33E-02	1.27E+00
ath00640	Propanoate metabolism	5.33E-02	1.27E+00
ath00460	Cyanoamino acid metabolism	6.72E-02	1.17E+00
ath00280	Valine, leucine and isoleucine degradation	6.72E-02	1.17E+00
ath00230	Purine metabolism	6.94E-02	1.16E+00
ath01061	Biosynthesis of phenylpropanoids	7.86E-02	1.10E+00
ath01062	Biosynthesis of terpenoids and steroids	8.05E-02	1.09E+00
ath00240	Pyrimidine metabolism	1.25E-01	9.03E-01
ath00190	Oxidative phosphorylation	1.55E-01	8.10E-01
ath00350	Tyrosine metabolism	1.87E-01	7.28E-01
ath00430	Taurine and hypotaurine metabolism	1.90E-01	7.21E-01
ath00740	Riboflavin metabolism	1.98E-01	7.03E-01
ath00380	Tryptophan metabolism	2.06E-01	6.86E-01
ath00600	Sphingolipid metabolism	2.31E-01	6.36E-01
ath00290	Valine, leucine and isoleucine biosynthesis	2.55E-01	5.93E-01
ath00410	beta-Alanine metabolism	2.78E-01	5.56E-01
ath00620	Pyruvate metabolism	2.86E-01	5.44E-01
ath00030	Pentose phosphate pathway	2.86E-01	5.44E-01
ath00561	Glycerolipid metabolism	2.86E-01	5.44E-01
ath00908	Zeatin biosynthesis	3.37E-01	4.72E-01
ath00650	Butanoate metabolism	3.44E-01	4.63E-01
ath00052	Galactose metabolism	3.51E-01	4.55E-01
ath00340	Histidine metabolism	3.71E-01	4.31E-01
ath00564	Glycerophospholipid metabolism	3.84E-01	4.16E-01
ath00053	Ascorbate and aldarate metabolism	3.91E-01	4.08E-01
ath00051	Fructose and mannose metabolism	3.97E-01	4.01E-01
ath00270	Cysteine and methionine metabolism	4.47E-01	3.50E-01
ath00960	Tropane, piperidine and pyridine alkaloid biosynthesis	5.13E-01	2.90E-01

	ath00966	Glucosinolate biosynthesis	5.43E-01	2.65E-01
	ath00130	Ubiquinone and other terpenoid-quinone biosynthesis	5.53E-01	2.57E-01
	ath00520	Amino sugar and nucleotide sugar metabolism	6.03E-01	2.20E-01
	ath00860	Porphyrin and chlorophyll metabolism	7.40E-01	1.31E-01
L3d-L0d	ath00250	Alanine, aspartate and glutamate metabolism	7.57E-06	5.12E+00
	ath00630	Glyoxylate and dicarboxylate metabolism	1.14E-05	4.94E+00
	ath00020	Citrate cycle (TCA cycle)	8.05E-05	4.09E+00
	ath01064	Biosynthesis of alkaloids derived from ornithine, lysine and nicotinic acid	1.31E-04	3.88E+00
	ath00040	Pentose and glucuronate interconversions	3.94E-04	3.40E+00
	ath01065	Biosynthesis of alkaloids derived from histidine and purine	7.62E-04	3.12E+00
	ath01070	Biosynthesis of plant hormones	1.25E-03	2.90E+00
	ath00052	Galactose metabolism	1.40E-03	2.85E+00
	ath00360	Phenylalanine metabolism	2.16E-03	2.67E+00
	ath00710	Carbon fixation in photosynthetic organisms	2.53E-03	2.60E+00
	ath01066	Biosynthesis of alkaloids derived from terpenoid and polyketide	2.53E-03	2.60E+00
	ath00260	Glycine, serine and threonine metabolism	2.73E-03	2.56E+00
	ath00330	Arginine and proline metabolism	2.89E-03	2.54E+00
	ath00770	Pantothenate and CoA biosynthesis	4.03E-03	2.39E+00
	ath00290	Valine, leucine and isoleucine biosynthesis	4.48E-03	2.35E+00
	ath01061	Biosynthesis of phenylpropanoids	5.96E-03	2.22E+00
	ath00300	Lysine biosynthesis	6.56E-03	2.18E+00
	ath00640	Propanoate metabolism	9.12E-03	2.04E+00
	ath00650	Butanoate metabolism	1.22E-02	1.91E+00
	ath00970	Aminoacyl-tRNA biosynthesis	1.24E-02	1.91E+00
	ath00460	Cyanoamino acid metabolism	1.31E-02	1.88E+00
	ath00760	Nicotinate and nicotinamide metabolism	1.58E-02	1.80E+00
	ath00310	Lysine degradation	1.89E-02	1.72E+00
	ath00430	Taurine and hypotaurine metabolism	2.41E-02	1.62E+00
	ath01063	Biosynthesis of alkaloids derived from shikimate pathway	2.48E-02	1.61E+00
	ath00740	Riboflavin metabolism	2.64E-02	1.58E+00

	ath01062	Biosynthesis of terpenoids and steroids	3.02E-02	1.52E+00
	ath00240	Pyrimidine metabolism	3.43E-02	1.46E+00
	ath00730	Thiamine metabolism	3.93E-02	1.41E+00
	ath00910	Nitrogen metabolism	3.93E-02	1.41E+00
	ath00010	Glycolysis / Gluconeogenesis	5.41E-02	1.27E+00
	ath00030	Pentose phosphate pathway	5.73E-02	1.24E+00
	ath00620	Pyruvate metabolism	5.73E-02	1.24E+00
	ath00660	C5-Branched dibasic acid metabolism	5.73E-02	1.24E+00
	ath00750	Vitamin B6 metabolism	5.73E-02	1.24E+00
	ath00561	Glycerolipid metabolism	5.73E-02	1.24E+00
	ath00380	Tryptophan metabolism	7.49E-02	1.13E+00
	ath00480	Glutathione metabolism	7.76E-02	1.11E+00
	ath00280	Valine, leucine and isoleucine degradation	8.85E-02	1.05E+00
	ath00340	Histidine metabolism	9.98E-02	1.00E+00
	ath00053	Ascorbate and aldarate metabolism	1.12E-01	9.51E-01
	ath00500	Starch and sucrose metabolism	1.24E-01	9.07E-01
	ath00270	Cysteine and methionine metabolism	1.49E-01	8.27E-01
	ath00190	Oxidative phosphorylation	1.79E-01	7.47E-01
	ath00350	Tyrosine metabolism	2.37E-01	6.25E-01
	ath00600	Sphingolipid metabolism	2.65E-01	5.77E-01
	ath00400	Phenylalanine, tyrosine and tryptophan biosynthesis	2.83E-01	5.48E-01
	ath00410	beta-Alanine metabolism	3.18E-01	4.98E-01
	ath00900	Terpenoid backbone biosynthesis	3.35E-01	4.75E-01
	ath00523	Polyketide sugar unit biosynthesis	3.43E-01	4.65E-01
	ath00680	Methane metabolism	3.43E-01	4.65E-01
	ath00960	Tropane, piperidine and pyridine alkaloid biosynthesis	5.70E-01	2.44E-01
	ath00966	Glucosinolate biosynthesis	6.01E-01	2.21E-01
	ath00520	Amino sugar and nucleotide sugar metabolism	6.61E-01	1.80E-01
	ath00230	Purine metabolism	6.82E-01	1.66E-01
	ath00860	Porphyrin and chlorophyll metabolism	7.94E-01	1.00E-01
L3d-L12h	ath00250	Alanine, aspartate and glutamate metabolism	5.56E-05	4.25E+00
	ath00040	Pentose and glucuronate interconversions	1.01E-04	4.00E+00
	ath00052	Galactose metabolism	4.74E-04	3.32E+00
	ath00350	Tyrosine metabolism	5.58E-04	3.25E+00
	ath00020	Citrate cycle (TCA cycle)	7.31E-04	3.14E+00
	ath00360	Phenylalanine metabolism	7.40E-04	3.13E+00

ath01064	Biosynthesis of alkaloids derived from ornithine, lysine and nicotinic acid	3.04E-03	2.52E+00
ath01065	Biosynthesis of alkaloids derived from histidine and purine	3.82E-03	2.42E+00
ath00650	Butanoate metabolism	5.59E-03	2.25E+00
ath00460	Cyanoamino acid metabolism	5.99E-03	2.22E+00
ath00330	Arginine and proline metabolism	6.29E-03	2.20E+00
ath00760	Nicotinate and nicotinamide metabolism	7.31E-03	2.14E+00
ath00310	Lysine degradation	8.78E-03	2.06E+00
ath00190	Oxidative phosphorylation	9.13E-03	2.04E+00
ath01066	Biosynthesis of alkaloids derived from terpenoid and polyketide	9.31E-03	2.03E+00
ath01061	Biosynthesis of phenylpropanoids	1.13E-02	1.95E+00
ath00430	Taurine and hypotaurine metabolism	1.41E-02	1.85E+00
ath00740	Riboflavin metabolism	1.55E-02	1.81E+00
ath01070	Biosynthesis of plant hormones	2.38E-02	1.62E+00
ath00010	Glycolysis / Gluconeogenesis	3.25E-02	1.49E+00
ath01063	Biosynthesis of alkaloids derived from shikimate pathway	3.63E-02	1.44E+00
ath00640	Propanoate metabolism	4.28E-02	1.37E+00
ath01062	Biosynthesis of terpenoids and steroids	6.01E-02	1.22E+00
ath00630	Glyoxylate and dicarboxylate metabolism	6.14E-02	1.21E+00
ath00053	Ascorbate and aldarate metabolism	6.90E-02	1.16E+00
ath00500	Starch and sucrose metabolism	7.68E-02	1.11E+00
ath00380	Tryptophan metabolism	1.71E-01	7.67E-01
ath00520	Amino sugar and nucleotide sugar metabolism	1.91E-01	7.19E-01
ath00710	Carbon fixation in photosynthetic organisms	1.93E-01	7.14E-01
ath00730	Thiamine metabolism	2.15E-01	6.68E-01
ath00910	Nitrogen metabolism	2.15E-01	6.68E-01
ath00770	Pantothenate and CoA biosynthesis	2.22E-01	6.54E-01
ath04070	Phosphatidylinositol signaling system	2.22E-01	6.54E-01
ath00400	Phenylalanine, tyrosine and tryptophan biosynthesis	2.22E-01	6.54E-01
ath00290	Valine, leucine and isoleucine biosynthesis	2.30E-01	6.38E-01
ath00410	beta-Alanine metabolism	2.51E-01	6.00E-01
ath00030	Pentose phosphate pathway	2.58E-01	5.88E-01
ath00620	Pyruvate metabolism	2.58E-01	5.88E-01
ath00660	C5-Branched dibasic acid metabolism	2.58E-01	5.88E-01

ath00750	Vitamin B6 metabolism	2.58E-01	5.88E-01
ath00561	Glycerolipid metabolism	2.58E-01	5.88E-01
ath00300	Lysine biosynthesis	2.58E-01	5.88E-01
ath00900	Terpenoid backbone biosynthesis	2.65E-01	5.77E-01
ath00523	Polyketide sugar unit biosynthesis	2.72E-01	5.65E-01
ath00480	Glutathione metabolism	2.98E-01	5.26E-01
ath00562	Inositol phosphate metabolism	3.05E-01	5.16E-01
ath00564	Glycerophospholipid metabolism	3.49E-01	4.57E-01
ath00260	Glycine, serine and threonine metabolism	3.67E-01	4.35E-01
ath00270	Cysteine and methionine metabolism	4.08E-01	3.89E-01
ath00240	Pyrimidine metabolism	4.24E-01	3.73E-01
ath00960	Tropane, piperidine and pyridine alkaloid biosynthesis	4.71E-01	3.27E-01
ath00970	Aminoacyl-tRNA biosynthesis	5.05E-01	2.97E-01
ath00130	Ubiquinone and other terpenoid-quinone biosynthesis	5.10E-01	2.92E-01
ath00230	Purine metabolism	5.79E-01	2.37E-01
ath00950	Isoquinoline alkaloid biosynthesis	5.87E-01	2.31E-01

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