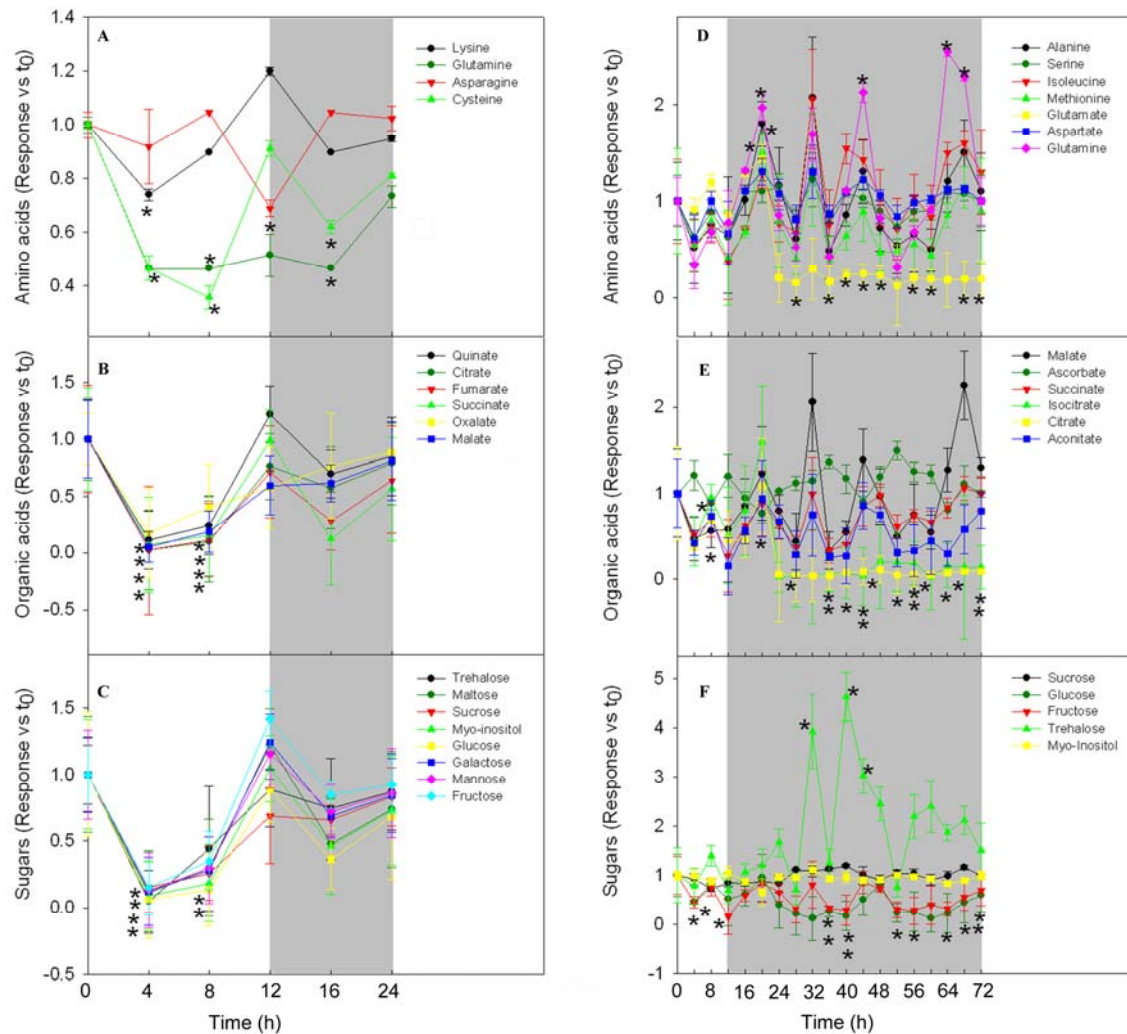


Supplemental Figure 1. Relative response ratios of diurnal-like and extended dark period of root metabolites from wild-type tomato plants (*Solanum lycopersicum* cv. Moneymaker). The plants were five-weeks old and samples were taken from mature root tips. Selected amino acids (A, D), organic acids (B, E) and sugar and polyols (C, F) are depicted in the graphs. The shaded areas are representative of the dark period, with the values representative of the mean \pm SE of four individual plants per time treatment; an asterisk (*) indicates values determined by the *t*-test to be significantly different from those normalised to the t0 timepoint ($P < 0.05$).



Supplemental Figure 2. Relative response ratios of diurnal-like and extended dark period of exudates collected from wild-type tomato plants (*Solanum lycopersicum* cv. Moneymaker). The plants were five-weeks old and samples were taken from mature root tips. Selected amino acids (A, D), organic acids (B, E) and sugar and polyols (C, F) are depicted in the graphs. The shaded areas are representative of the dark period, with the values representative of the mean \pm SE of four individual plants per time treatment; an asterisk (*) indicates values determined by the *t*-test to be significantly different from those normalised to the t₀ timepoint (P<0.05).

Supplemental Table SI. Relative root exudates of FL and mMDH antisense lines collected at the end of the light period. Metabolites were determined as outlined in „Material and Methods“. The data set were normalised with respect to the wild type, and expressed per whole plant root FW. Values are presented as mean \pm SE of six individual plants per line; values set in bold type were determined by the *t*-test to be significantly different ($P < 0.05$) from the wild type (WT).

Metabolite	WT	mMDH7	mMDH8	mMDH21	FL11	FL41	FL63
Aconitate	1.00 \pm 0.62	1.68 \pm 0.48	0.80 \pm 0.37	0.71 \pm 0.42	3.18 \pm 0.21	3.01 \pm 0.59	0.88 \pm 0.26
Alanine	1.00 \pm 0.22	0.95 \pm 0.07	0.87 \pm 0.40	1.42 \pm 0.34	2.01 \pm 0.39	2.06 \pm 0.29	1.37 \pm 0.05
Arabinose	1.00 \pm 0.36	0.95 \pm 0.14	1.07 \pm 0.41	1.63 \pm 0.31	3.19 \pm 0.14	1.90 \pm 0.24	1.86 \pm 0.27
Arginine	1.00 \pm 0.47	0.74 \pm 0.35	0.57 \pm 0.57	1.41 \pm 0.62	1.87 \pm 0.45	0.78 \pm 0.39	2.01 \pm 0.60
Asparagine	1.00 \pm 0.29	0.94 \pm 0.14	1.84 \pm 0.50	1.53 \pm 0.34	2.47 \pm 0.08	3.63 \pm 0.39	1.81 \pm 0.23
Aspartate	1.00 \pm 0.21	1.65 \pm 0.11	0.41 \pm 0.43	2.10 \pm 0.35	3.86 \pm 0.18	2.36 \pm 0.19	2.66 \pm 0.18
β -Alanine	1.00 \pm 0.19	1.36 \pm 0.15	2.05 \pm 0.58	2.24 \pm 0.34	3.81 \pm 0.06	2.53 \pm 0.22	3.57 \pm 0.23
Benzoate	1.00 \pm 0.15	0.76 \pm 0.11	0.76 \pm 0.25	0.85 \pm 0.14	2.38 \pm 0.08	1.64 \pm 0.19	1.28 \pm 0.16
Citrate	1.00 \pm 0.18	0.94 \pm 0.35	0.60 \pm 0.30	1.63 \pm 0.29	4.12 \pm 0.09	2.37 \pm 0.43	1.80 \pm 0.12
Cysteine	1.00 \pm 0.26	0.62 \pm 0.13	0.65 \pm 0.23	0.94 \pm 0.25	2.35 \pm 0.19	1.37 \pm 0.34	2.02 \pm 0.19
Dehydroascorbate	1.00 \pm 0.60	0.22 \pm 0.48	0.14 \pm 0.37	0.16 \pm 0.35	0.79 \pm 0.33	0.51 \pm 0.44	0.29 \pm 0.29
Fructose	1.00 \pm 0.26	0.96 \pm 0.28	0.69 \pm 0.29	0.96 \pm 0.33	1.35 \pm 0.19	1.42 \pm 0.27	1.13 \pm 0.22
Fructose 6-P	1.00 \pm 0.29	0.45 \pm 0.29	0.83 \pm 0.31	1.78 \pm 0.65	2.64 \pm 0.30	1.91 \pm 0.54	2.91 \pm 0.50
Fumarate	1.00 \pm 0.10	1.09 \pm 0.12	1.27 \pm 0.37	1.27 \pm 0.16	3.52 \pm 0.17	1.83 \pm 0.31	1.58 \pm 0.09
GABA	1.00 \pm 0.12	0.62 \pm 0.36	0.85 \pm 0.39	0.83 \pm 0.26	2.90 \pm 0.27	1.39 \pm 0.41	0.99 \pm 0.37
Galactose	1.00 \pm 0.10	1.20 \pm 0.17	0.45 \pm 0.30	1.18 \pm 0.16	4.03 \pm 0.10	1.99 \pm 0.50	2.25 \pm 0.14
Galacturonate	1.00 \pm 0.56	0.95 \pm 0.49	0.97 \pm 0.40	0.99 \pm 0.64	4.87 \pm 0.44	2.76 \pm 0.63	1.50 \pm 0.51
Glucose	1.00 \pm 0.12	0.80 \pm 0.28	0.46 \pm 0.23	1.12 \pm 0.29	2.49 \pm 0.32	2.94 \pm 0.39	1.60 \pm 0.07
Gluconate	1.00 \pm 0.26	1.54 \pm 0.15	0.19 \pm 0.48	1.31 \pm 0.22	2.24 \pm 0.28	2.00 \pm 0.47	1.42 \pm 0.33
Glucose 6-P	1.00 \pm 0.19	0.52 \pm 0.30	0.91 \pm 0.31	1.78 \pm 0.61	2.73 \pm 0.25	2.02 \pm 0.55	2.42 \pm 0.46
Glutamate	1.00 \pm 0.23	1.16 \pm 0.23	1.36 \pm 0.37	1.33 \pm 0.19	3.68 \pm 0.07	1.94 \pm 0.34	1.69 \pm 0.06
Glutamine	1.00 \pm 0.18	0.66 \pm 0.11	0.51 \pm 0.42	1.54 \pm 0.53	1.58 \pm 0.21	10.29 \pm 0.31	1.07 \pm 0.20
Glutarate	1.00 \pm 0.20	1.12 \pm 0.22	0.94 \pm 0.24	3.07 \pm 0.55	3.02 \pm 0.16	3.83 \pm 0.37	1.19 \pm 0.16
Glycerate	1.00 \pm 0.11	1.10 \pm 0.04	1.23 \pm 0.43	1.47 \pm 0.21	2.72 \pm 0.09	2.04 \pm 0.24	2.05 \pm 0.15
Glycerol	1.00 \pm 0.16	1.20 \pm 0.19	0.97 \pm 0.22	1.15 \pm 0.15	4.08 \pm 0.09	2.07 \pm 0.22	2.24 \pm 0.03
Glycerol 1-P	1.00 \pm 0.24	0.80 \pm 0.17	1.21 \pm 0.33	1.90 \pm 0.46	2.19 \pm 0.28	1.55 \pm 0.27	3.21 \pm 0.19
Glycine	1.00 \pm 0.16	1.36 \pm 0.18	1.61 \pm 0.45	1.89 \pm 0.27	4.42 \pm 0.09	2.58 \pm 0.17	2.52 \pm 0.11
Isoleucine	1.00 \pm 0.20	0.78 \pm 0.19	1.61 \pm 0.50	1.17 \pm 0.39	2.54 \pm 0.11	1.61 \pm 0.23	1.96 \pm 0.27
Isomaltose	1.00 \pm 0.25	1.55 \pm 0.20	4.76 \pm 0.67	2.94 \pm 0.36	3.60 \pm 0.21	3.93 \pm 0.42	1.42 \pm 0.37
Leucine	1.00 \pm 0.32	0.64 \pm 0.11	1.16 \pm 0.37	1.82 \pm 0.56	1.74 \pm 0.11	0.79 \pm 0.23	2.94 \pm 0.53
Lysine	1.00 \pm 0.59	1.02 \pm 0.45	0.57 \pm 0.53	0.76 \pm 0.54	2.55 \pm 0.56	0.67 \pm 0.27	1.75 \pm 0.50
Malate	1.00 \pm 0.15	1.01 \pm 0.30	1.43 \pm 0.44	1.66 \pm 0.18	4.57 \pm 0.16	1.58 \pm 0.52	1.51 \pm 0.27
Maltitol	1.00 \pm 0.31	1.71 \pm 0.08	0.98 \pm 0.30	1.44 \pm 0.37	5.03 \pm 0.20	2.68 \pm 0.45	2.41 \pm 0.44
Maltose	1.00 \pm 0.64	1.13 \pm 0.30	2.23 \pm 0.43	0.72 \pm 0.34	2.96 \pm 0.29	1.56 \pm 0.29	1.61 \pm 0.23
Mannose	1.00 \pm 0.10	1.34 \pm 0.15	0.48 \pm 0.25	1.19 \pm 0.16	4.03 \pm 0.10	2.00 \pm 0.50	1.87 \pm 0.30
Methionine	1.00 \pm 0.15	0.78 \pm 0.11	1.14 \pm 0.42	1.17 \pm 0.27	3.09 \pm 0.14	1.03 \pm 0.27	1.86 \pm 0.41
Myo-inositol	1.00 \pm 0.30	0.76 \pm 0.48	0.56 \pm 0.45	0.61 \pm 0.51	2.01 \pm 0.36	1.83 \pm 0.55	1.64 \pm 0.23
Myo-inositol 1-P	1.00 \pm 0.24	0.96 \pm 0.31	1.12 \pm 0.30	1.79 \pm 0.53	3.12 \pm 0.29	2.38 \pm 0.45	2.94 \pm 0.39
Myo-inositol 2-P	1.00 \pm 0.26	1.18 \pm 0.30	1.21 \pm 0.38	1.15 \pm 0.57	2.79 \pm 0.36	1.73 \pm 0.47	2.69 \pm 0.44
Oxalate	1.00 \pm 0.26	0.68 \pm 0.27	1.02 \pm 0.65	1.24 \pm 0.26	4.81 \pm 0.24	3.62 \pm 0.24	1.44 \pm 0.07
Palmeate (16:0)	1.00 \pm 0.58	0.73 \pm 0.50	0.40 \pm 0.40	0.39 \pm 0.39	1.80 \pm 0.32	1.94 \pm 0.50	0.82 \pm 0.39
Phenylalanine	1.00 \pm 0.26	0.85 \pm 0.13	0.92 \pm 0.35	1.31 \pm 0.31	2.50 \pm 0.19	1.35 \pm 0.21	1.95 \pm 0.34
Proline	1.00 \pm 0.28	1.29 \pm 0.21	1.52 \pm 0.43	3.64 \pm 0.37	2.92 \pm 0.25	1.93 \pm 0.36	1.85 \pm 0.41
Putrescine	1.00 \pm 0.50	0.74 \pm 0.40	0.62 \pm 0.27	0.66 \pm 0.47	2.69 \pm 0.38	3.13 \pm 0.65	1.49 \pm 0.35
Quinate	1.00 \pm 0.08	1.17 \pm 0.12	0.72 \pm 0.14	1.49 \pm 0.18	3.81 \pm 0.10	1.79 \pm 0.41	1.90 \pm 0.13
Raffinose	1.00 \pm 0.37	0.83 \pm 0.33	6.05 \pm 0.71	3.97 \pm 0.44	2.20 \pm 0.17	2.14 \pm 0.41	1.52 \pm 0.12
Rhamnose	1.00 \pm 0.12	1.00 \pm 0.15	2.16 \pm 0.54	1.78 \pm 0.20	3.37 \pm 0.22	4.82 \pm 0.40	1.62 \pm 0.15
Ribose	1.00 \pm 0.11	1.05 \pm 0.13	1.35 \pm 0.47	1.48 \pm 0.25	3.37 \pm 0.09	1.92 \pm 0.23	2.11 \pm 0.12
Saccharate	1.00 \pm 0.16	1.01 \pm 0.16	0.57 \pm 0.32	0.93 \pm 0.22	3.20 \pm 0.20	1.63 \pm 0.31	1.63 \pm 0.12
Serine	1.00 \pm 0.18	1.14 \pm 0.21	2.61 \pm 0.66	3.02 \pm 0.39	3.08 \pm 0.14	1.92 \pm 0.31	3.29 \pm 0.28

Metabolite	WT	mMDH7	mMDH8	mMDH21	FL11	FL41	FL63
Shikimate	1.00 ± 0.15	1.36 ± 0.12	0.46 ± 0.48	1.59 ± 0.15	4.19 ± 0.22	2.02 ± 0.24	2.14 ± 0.17
Stearate (18:0)	1.00 ± 0.41	0.76 ± 0.38	0.44 ± 0.21	0.56 ± 0.32	1.76 ± 0.26	2.06 ± 0.39	1.04 ± 0.31
Succinate	1.00 ± 0.22	1.23 ± 0.22	0.84 ± 0.14	1.52 ± 0.32	3.60 ± 0.22	1.57 ± 0.44	2.11 ± 0.21
Sucrose	1.00 ± 0.25	0.98 ± 0.33	1.44 ± 0.44	1.83 ± 0.46	3.92 ± 0.67	1.19 ± 0.65	1.77 ± 0.36
t-4-HO-Proline	1.00 ± 0.19	1.62 ± 0.21	1.85 ± 0.56	2.17 ± 0.37	3.66 ± 0.16	1.77 ± 0.32	2.12 ± 0.05
Tartrate	1.00 ± 0.35	1.00 ± 0.30	0.40 ± 0.21	2.00 ± 0.56	6.73 ± 0.34	2.23 ± 0.42	1.12 ± 0.05
Threonate	1.00 ± 0.27	0.57 ± 0.12	0.64 ± 0.25	0.95 ± 0.22	2.37 ± 0.25	1.41 ± 0.32	1.99 ± 0.19
Threonine	1.00 ± 0.20	0.75 ± 0.15	2.76 ± 0.68	1.9 ± 0.27	2.42 ± 0.14	1.60 ± 0.27	3.06 ± 0.29
Trehalose	1.00 ± 0.30	0.08 ± 0.44	0.71 ± 0.46	0.73 ± 0.37	3.19 ± 0.15	1.00 ± 0.15	0.59 ± 0.26
Tryptophan	1.00 ± 0.52	0.72 ± 0.49	0.98 ± 0.40	1.00 ± 0.57	1.72 ± 0.36	0.85 ± 0.60	1.45 ± 0.61
Tyramine	1.00 ± 0.59	0.94 ± 0.48	0.55 ± 0.45	0.63 ± 0.44	2.41 ± 0.51	0.62 ± 0.32	1.52 ± 0.46
Valine	1.00 ± 0.18	0.81 ± 0.13	1.38 ± 0.49	1.18 ± 0.27	2.62 ± 0.09	1.32 ± 0.21	1.75 ± 0.25
Xylose	1.00 ± 0.33	0.81 ± 0.47	0.89 ± 0.21	1.46 ± 0.24	3.07 ± 0.09	2.42 ± 0.46	1.75 ± 0.24

Supplemental Table SII Absolute endo-metabolites concentrations (mmol.g⁻¹ FW) of mature root tips determined in 5 week-old transgenic FL and mMDH lines. Values are presented as mean ± SE of six individual plants per line; values set in bold type were determined by the *t*-test to be significantly different (*P*<0.05) from the wild type (WT).

Metabolite	WT	mMDH7	mMDH8	mMDH21 mmol.g ⁻¹ FW	FL11	FL41	FL63
aconitate	20.29 ± 9.66	20.00 ± 7.01	17.71 ± 7.15	17.86 ± 6.89	11.27 ± 5.87	4.84 ± 1.68	15.39 ± 11.18
Alanine	0.01 ± 0.00	0.01 ± 0.00	0.03 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	0.04 ± 0.01	0.02 ± 0.00
Arabinose	1.89 ± 0.62	5.04 ± 1.67	5.50 ± 1.55	2.85 ± 1.10	2.31 ± 0.71	3.72 ± 1.62	1.56 ± 0.39
Arginine	7.68 ± 2.79	7.05 ± 3.22	13.11 ± 6.46	7.47 ± 4.51	5.27 ± 2.94	11.86 ± 7.11	6.56 ± 3.95
ascorbate	7.96 ± 2.89	15.55 ± 8.17	9.73 ± 3.15	6.36 ± 2.49	5.09 ± 2.57	2.32 ± 0.76	2.02 ± 1.11
Asparagine	12.30 ± 4.30	14.93 ± 4.34	17.50 ± 14.94	10.78 ± 4.94	10.18 ± 6.92	9.43 ± 5.03	19.69 ± 15.35
Aspartate	0.08 ± 0.04	0.07 ± 0.04	0.05 ± 0.01	0.03 ± 0.02	0.17 ± 0.08	0.06 ± 0.02	0.04 ± 0.01
Citrate	12.19 ± 3.95	17.37 ± 5.28	21.28 ± 6.53	8.44 ± 3.24	5.75 ± 1.52	2.84 ± 1.38	3.57 ± 1.71
Cysteine	0.02 ± 0.00	0.04 ± 0.02	0.05 ± 0.02	0.02 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.01 ± 0.00
Dehydroascorbate	16.75 ± 5.47	20.86 ± 7.23	24.09 ± 12.81	15.73 ± 5.92	6.69 ± 2.22	10.70 ± 8.11	3.58 ± 0.87
Fructose	12.99 ± 4.68	10.08 ± 5.57	20.10 ± 8.44	9.96 ± 2.58	2.17 ± 0.87	0.98 ± 0.52	2.23 ± 0.78
Fumarate	0.20 ± 0.06	0.40 ± 0.24	0.65 ± 0.36	0.17 ± 0.04	0.68 ± 0.32	0.22 ± 0.07	0.20 ± 0.07
GABA	833 ± 175	938.89 ± 344	1147 ± 458	711 ± 272	239 ± 52	350 ± 125	208 ± 44
Galactose	35.46 ± 11.17	72.49 ± 32.19	44.26 ± 21.99	61.89 ± 35.18	11.22 ± 3.59	14.10 ± 7.98	6.94 ± 3.06
Galacturonate	57.91 ± 29.57	82.04 ± 40.57	100.62 ± 56.80	64.09 ± 31.39	60.07 ± 42.36	15.45 ± 8.91	50.10 ± 42.73
Glucose	38.95 ± 12.65	49.50 ± 18.94	35.91 ± 17.26	63.95 ± 34.21	18.28 ± 5.06	10.30 ± 4.27	9.83 ± 3.88
Glutamate	206.64 ± 84.47	179.04 ± 80.87	243.79 ± 78.55	199.54 ± 97.70	53.62 ± 22.66	33.20 ± 8.55	25.99 ± 12.15
Glutamine	146.25 ± 48.08	828.00 ± 338.59	1534.67 ± 933.70	1016.67 ± 551.89	14.29 ± 2.79	29.33 ± 12.75	8.89 ± 1.65
Glycerol 3-P	0.88 ± 0.27	1.35 ± 0.34	1.58 ± 0.65	1.47 ± 0.82	2.07 ± 0.86	2.40 ± 0.53	0.49 ± 0.18
Glycine	0.04 ± 0.01	0.06 ± 0.03	0.04 ± 0.01	0.04 ± 0.01	0.08 ± 0.01	0.03 ± 0.01	0.04 ± 0.01
Isocitrate	0.06 ± 0.02	0.12 ± 0.04	0.08 ± 0.03	0.07 ± 0.03	0.07 ± 0.03	0.02 ± 0.01	0.06 ± 0.04
Isoleucine	0.11 ± 0.03	0.15 ± 0.05	0.25 ± 0.13	0.30 ± 0.15	0.19 ± 0.09	0.10 ± 0.03	0.13 ± 0.04
Leucine	0.13 ± 0.05	0.13 ± 0.07	0.41 ± 0.18	0.16 ± 0.07	0.20 ± 0.09	0.17 ± 0.11	0.13 ± 0.04
Lysine	0.24 ± 0.07	0.89 ± 0.55	1.03 ± 0.64	0.65 ± 0.26	0.36 ± 0.14	0.28 ± 0.16	0.29 ± 0.14
Malate	1.76 ± 0.54	1.86 ± 1.14	3.18 ± 0.86	1.82 ± 0.60	0.66 ± 0.23	0.39 ± 0.13	1.15 ± 0.37
Maltitol	2475 ± 1125	12570 ± 4446	4918 ± 2596	12752 ± 4979	2926 ± 1433	1776 ± 1138	1670 ± 865
Maltose	0.17 ± 0.06	0.42 ± 0.09	0.33 ± 0.09	0.38 ± 0.11	0.29 ± 0.08	0.15 ± 0.08	0.10 ± 0.03
Mannitol	0.81 ± 0.26	1.25 ± 0.43	1.44 ± 0.45	1.03 ± 0.39	1.73 ± 1.10	3.73 ± 3.34	7.13 ± 4.72
Methionine (x10)	1.20 ± 0.50	0.70 ± 0.20	0.20 ± 0.10	0.60 ± 0.20	0.20 ± 0.10	0.10 ± 0.10	0.10 ± 0.02

Myo-inositol	9.53 ± 3.83	6.69 ± 1.98	4.32 ± 1.20	3.65 ± 1.19	2.60 ± 0.79	2.65 ± 1.27	1.14 ± 0.24
Palmeate (16:0)	10.06 ± 3.55	21.62 ± 8.32	15.87 ± 6.34	11.78 ± 4.95	8.83 ± 2.87	4.88 ± 1.30	4.95 ± 1.90
Penylalanine	0.06 ± 0.02	0.10 ± 0.04	0.08 ± 0.04	0.05 ± 0.03	0.03 ± 0.01	0.03 ± 0.01	0.02 ± 0.01
Proline	9.83 ± 3.69	13.81 ± 7.88	13.89 ± 5.82	15.16 ± 9.89	12.79 ± 6.39	2.35 ± 0.54	10.19 ± 2.98
Putrescine	356 ± 107	990 ± 298	465 ± 193	1155 ± 442	380 ± 103	372 ± 239	242 ± 79
Quinate	1.30 ± 0.48	1.11 ± 0.43	1.90 ± 0.57	2.06 ± 1.28	1.49 ± 0.49	0.86 ± 0.31	0.56 ± 0.15
Ribose	2304 ± 604	4099 ± 1365	3342 ± 1567	2262 ± 1090	2115 ± 985	343 ± 81	1274 ± 241
Serine	121.73 ± 69.54	367.56 ± 150.06	287.11 ± 140.70	206.96 ± 98.98	147.25 ± 57.66	136.99 ± 87.64	104.85 ± 21.84
Shikimate	0.08 ± 0.02	0.26 ± 0.08	0.08 ± 0.03	0.07 ± 0.02	0.07 ± 0.03	0.01 ± 0.00	0.02 ± 0.01
Stearate (18:0)	3.59 ± 1.20	23.99 ± 10.09	26.77 ± 10.93	18.51 ± 8.31	23.49 ± 6.23	7.15 ± 1.37	5.56 ± 2.12
Succinate	7.53 ± 2.85	33.88 ± 11.32	100.84 ± 30.96	96.90 ± 36.18	38.84 ± 14.68	67.28 ± 39.27	83.06 ± 19.67
Sucrose	4.53 ± 1.37	9.24 ± 4.08	8.07 ± 3.24	4.96 ± 1.31	4.19 ± 2.84	1.20 ± 0.43	0.96 ± 0.32
Threonine	0.04 ± 0.01	0.07 ± 0.03	0.04 ± 0.01	0.07 ± 0.04	0.06 ± 0.02	0.04 ± 0.01	0.05 ± 0.02
Trehalose	3.89 ± 1.27	5.22 ± 1.50	8.76 ± 3.95	5.03 ± 1.79	5.45 ± 1.55	2.29 ± 1.45	2.28 ± 0.99
Tryptophan	41.88 ± 13.50	116.39 ± 31.05	140.36 ± 73.82	62.75 ± 42.50	31.07 ± 13.86	53.13 ± 31.50	79.17 ± 39.70
Tyrosine	1.49 ± 0.42	4.94 ± 1.75	7.87 ± 5.35	1.40 ± 0.22	1.36 ± 0.90	1.99 ± 1.33	1.80 ± 1.38
Valine	19.38 ± 5.15	18.60 ± 5.27	36.41 ± 16.90	19.69 ± 6.18	28.42 ± 9.89	27.55 ± 15.54	17.33 ± 3.76
Xylose	0.73 ± 0.28	6.54 ± 2.72	1.53 ± 0.42	1.80 ± 0.59	1.22 ± 0.68	1.05 ± 0.65	0.43 ± 0.13

Supplemental Table SIII Absolute exudate concentrations (mmol g⁻¹ FW) of root exo-metabolites recovered at the end of the light period from transgenic FL and mMDH antisense lines. Values are presented as mean ± SE of six individual plants per line; values set in bold type were determined by the *t*-test to be significantly different (P<0.05) from the wild type (WT).

Metabolite	WT	mMDH7	mMDH8	MDH21	FL11	FL41	FL63
	mmol.g ⁻¹ FW						
Aconitate	0.10 ± 0.01	0.03 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.06 ± 0.01	0.06 ± 0.03	0.02 ± 0.01
Alanine (x10)	0.05 ± 0.01	0.05 ± 0.00	0.05 ± 0.02	0.08 ± 0.03	0.11 ± 0.04	0.11 ± 0.03	0.07 ± 0.00
β-Alanine	1.06 ± 0.20	1.43 ± 0.21	2.17 ± 1.26	2.37 ± 0.82	4.02 ± 0.26	2.67 ± 0.60	3.77 ± 0.88
Arabinose	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.01	0.05 ± 0.02	0.10 ± 0.01	0.06 ± 0.01	0.06 ± 0.02
Arginine	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.02 ± 0.01	0.03 ± 0.01	0.01 ± 0.01	0.03 ± 0.02
Asparagine	7.92 ± 2.33	7.42 ± 1.05	14.55 ± 7.27	12.11 ± 4.11	19.56 ± 1.51	28.74 ± 11.14	14.32 ± 3.29
Aspartate (x10)	0.10 ± 0.02	0.13 ± 0.01	0.03 ± 0.01	0.16 ± 0.06	0.30 ± 0.05	0.18 ± 0.03	0.20 ± 0.04
Benzoate	0.20 ± 0.03	0.15 ± 0.02	0.15 ± 0.04	0.17 ± 0.02	0.49 ± 0.04	0.34 ± 0.06	0.26 ± 0.04
Citrate	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.00	0.04 ± 0.01	0.10 ± 0.01	0.06 ± 0.02	0.04 ± 0.01
Cysteine (x10)	0.03 ± 0.01	0.02 ± 0.00	0.02 ± 0.00	0.03 ± 0.01	0.07 ± 0.01	0.04 ± 0.01	0.06 ± 0.01
Dehydroascorbate (x10)	0.28 ± 0.17	0.06 ± 0.03	0.04 ± 0.01	0.05 ± 0.02	0.22 ± 0.07	0.14 ± 0.06	0.08 ± 0.02
Fructose	0.03 ± 0.01	0.03 ± 0.01	0.02 ± 0.01	0.03 ± 0.01	0.05 ± 0.01	0.05 ± 0.01	0.04 ± 0.01
Fumarate (x10)	0.20 ± 0.02	0.26 ± 0.03	0.31 ± 0.11	0.30 ± 0.05	0.85 ± 0.14	0.44 ± 0.14	0.38 ± 0.04
GABA	63.04 ± 7.88	38.86 ± 14.11	53.39 ± 20.75	52.27 ± 13.69	182.90 ± 48.73	87.76 ± 36.26	62.25 ± 23.31
Galactose (x10)	0.30 ± 0.03	0.41 ± 0.07	0.16 ± 0.05	0.41 ± 0.07	1.39 ± 0.13	0.69 ± 0.34	0.78 ± 0.11
Galacturonate (x10)	0.20 ± 0.12	0.21 ± 0.10	0.22 ± 0.09	0.22 ± 0.14	1.08 ± 0.47	0.61 ± 0.38	0.33 ± 0.17
Glucose (x10)	0.30 ± 0.04	0.28 ± 0.08	0.16 ± 0.04	0.39 ± 0.12	0.88 ± 0.28	1.04 ± 0.41	0.56 ± 0.04
Glutamate	9.97 ± 2.25	11.54 ± 2.69	13.57 ± 5.05	13.23 ± 2.49	36.72 ± 2.64	19.35 ± 6.52	16.88 ± 0.99
Glutamine	0.21 ± 0.04	0.14 ± 0.01	0.11 ± 0.05	0.33 ± 0.17	0.34 ± 0.07	2.21 ± 0.69	0.23 ± 0.05
Glutarate	0.05 ± 0.01	0.05 ± 0.01	0.05 ± 0.01	0.15 ± 0.08	0.15 ± 0.02	0.19 ± 0.07	0.06 ± 0.01
Glycerol 1-P	0.07 ± 0.02	0.06 ± 0.01	0.08 ± 0.03	0.13 ± 0.06	0.15 ± 0.04	0.11 ± 0.03	0.22 ± 0.04
Glycine (x10)	0.04 ± 0.01	0.06 ± 0.01	0.07 ± 0.03	0.08 ± 0.02	0.20 ± 0.02	0.12 ± 0.02	0.11 ± 0.01
Isoleucine (x10)	0.1 ± 0.02	0.08 ± 0.01	0.16 ± 0.08	0.12 ± 0.05	0.26 ± 0.03	0.16 ± 0.04	0.20 ± 0.05
Isomaltose (x10)	0.15 ± 0.04	0.23 ± 0.05	0.70 ± 0.47	0.43 ± 0.16	0.53 ± 0.11	0.58 ± 0.24	0.21 ± 0.08
Leucine (x10)	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.01	0.02 ± 0.01	0.02 ± 0.00	0.01 ± 0.00	0.04 ± 0.02
Lysine (x10)	0.12 ± 0.07	0.12 ± 0.05	0.07 ± 0.04	0.09 ± 0.05	0.30 ± 0.17	0.08 ± 0.02	0.20 ± 0.10
Malate	0.02 ± 0.01	0.02 ± 0.01	0.04 ± 0.02	0.04 ± 0.01	0.11 ± 0.02	0.04 ± 0.02	0.04 ± 0.01
Maltitol	1.23 ± 0.38	2.10 ± 0.17	1.20 ± 0.37	1.77 ± 0.65	6.16 ± 1.25	3.29 ± 1.50	2.96 ± 1.31
Maltose (x10)	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.00 ± 0.00	0.02 ± 0.00	0.01 ± 0.00	0.01 ± 0.00

Mannose	8.49 ± 0.85	11.35 ± 1.75	4.06 ± 1.00	10.08 ± 1.65	34.21 ± 3.33	16.96 ± 8.48	15.87 ± 4.77
Methionine(x10)	0.03 ± 0.00	0.02 ± 0.00	0.03 ± 0.01	0.04 ± 0.01	0.09 ± 0.01	0.03 ± 0.01	0.06 ± 0.02
Myo-inositol	0.04 ± 0.01	0.03 ± 0.02	0.02 ± 0.01	0.03 ± 0.01	0.09 ± 0.03	0.08 ± 0.04	0.07 ± 0.02
Oxalate *	0.02 ± 0.01	0.01 ± 0.00	0.02 ± 0.01	0.02 ± 0.01	0.08 ± 0.02	0.06 ± 0.01	0.02 ± 0.00
Palmeate (16:0) (x10)	0.10 ± 0.10	0.10 ± 0.05	0.06 ± 0.02	0.05 ± 0.02	0.25 ± 0.08	0.27 ± 0.14	0.12 ± 0.04
Phenylalanine (x10)	0.06 ± 0.02	0.05 ± 0.01	0.05 ± 0.02	0.08 ± 0.02	0.14 ± 0.03	0.08 ± 0.02	0.11 ± 0.04
Proline	0.11 ± 0.03	0.14 ± 0.03	0.16 ± 0.07	0.39 ± 0.14	0.31 ± 0.08	0.21 ± 0.07	0.20 ± 0.08
Putrescine	6.54 ± 3.26	4.81 ± 1.90	4.04 ± 1.11	4.32 ± 2.02	17.57 ± 6.71	20.46 ± 13.27	9.77 ± 3.42
Quinate	0.03 ± 0.00	0.04 ± 0.01	0.02 ± 0.00	0.05 ± 0.01	0.13 ± 0.01	0.06 ± 0.02	0.06 ± 0.01
Raffinose	0.03 ± 0.01	0.02 ± 0.01	0.21 ± 0.15	0.14 ± 0.06	0.08 ± 0.01	0.07 ± 0.03	0.05 ± 0.01
Rhamnose	1.51 ± 0.18	1.51 ± 0.23	3.28 ± 1.77	2.70 ± 0.55	5.11 ± 1.10	7.31 ± 2.95	2.46 ± 0.37
Ribose	145.58 ± 16.46	153.14 ± 20.10	196.63 ± 93.35	215.37 ± 53.25	491.02 ± 44.89	278.89 ± 64.79	307.64 ± 38.21
Serine	2.16 ± 0.38	2.46 ± 0.52	5.65 ± 3.75	6.53 ± 2.52	6.67 ± 0.91	4.16 ± 1.28	7.12 ± 2.01
Shikimate (x10)	0.09 ± 0.01	0.12 ± 0.01	0.04 ± 0.02	0.14 ± 0.02	0.36 ± 0.08	0.17 ± 0.04	0.18 ± 0.03
Stearate (18:0) (x10)	0.10 ± 0.04	0.08 ± 0.03	0.05 ± 0.01	0.06 ± 0.02	0.18 ± 0.05	0.21 ± 0.08	0.11 ± 0.03
Succinate	0.51 ± 0.11	0.62 ± 0.14	0.43 ± 0.06	0.77 ± 0.25	1.82 ± 0.40	0.79 ± 0.35	1.07 ± 0.22
Sucrose (x10)	0.05 ± 0.01	0.05 ± 0.02	0.08 ± 0.03	0.10 ± 0.05	0.22 ± 0.14	0.07 ± 0.04	0.10 ± 0.03
Tartrate	0.52 ± 0.18	0.52 ± 0.15	0.21 ± 0.04	1.03 ± 0.57	3.48 ± 1.17	1.15 ± 0.49	0.58 ± 0.03
Threonine (x10)	0.03 ± 0.01	0.02 ± 0.00	0.07 ± 0.05	0.05 ± 0.01	0.06 ± 0.01	0.04 ± 0.01	0.08 ± 0.02
Trehalose	0.06 ± 0.01	0.01 ± 0.00	0.05 ± 0.02	0.05 ± 0.02	0.20 ± 0.03	0.06 ± 0.01	0.04 ± 0.01
Tryptophan	4.12 ± 2.13	2.94 ± 1.43	4.03 ± 1.63	4.10 ± 2.34	7.07 ± 2.55	3.50 ± 2.12	5.94 ± 3.63
Valine	2.90 ± 0.52	2.36 ± 0.32	3.99 ± 1.94	3.42 ± 0.94	7.60 ± 0.67	3.82 ± 0.82	5.06 ± 1.26
Xylose (x10)	0.05 ± 0.02	0.04 ± 0.02	0.04 ± 0.01	0.07 ± 0.02	0.15 ± 0.01	0.11 ± 0.05	0.08 ± 0.02

*($\mu\text{mol.g}^{-1}$ FW)