

Table S1. List of the genes and primers selected for q-PCR validation

Gene_id	Description	Sequences (5'-3')
HORVU1Hr1G0505 40	nitrate transporter 1:2	GTCTGGAACGGCATACTGGA TAGGTGAACATGTCGGCGAT
HORVU6Hr1G0055 90	high affinity nitrate transporter 2.6	CTGACCTTGGTGCCCCGTTAT CGCAGATGGAGAAGAGGACC
HORVU1Hr1G0091 00	Potassium transporter family protein	ACCCAACCAACATAAGACCGA TATCCATGCCCCCTCTAGCCA
HORVU3Hr1G0621 50	NAC domain containing protein 2	CGAGGACTCTACGTCGTCTG CCTAGGCTGGTGGAATCCTG
HORVU3Hr1G0660 50	Transcription factor bHLH62	AAGGGAAGCTCGCTGGAAAA CCAAGTTCTTTTCACCCTGCG
HORVU6Hr1G0338 40	Zinc finger CCCH domain-containing protein 14	TCCCCAAGGAAGAATGCCTG TTGCATCCCTCTGCAGTGTT
HORVU1Hr1G0211 70	Glutathione S-transferase family protein	GCTGACTCTCTTCGAATCGC TTCCTTGAGGCTGGATTCCC
HORVU3Hr1G0060 50	Caffeic acid 3-O-methyltransferase 1	TACCGCCTTCCTACAGCTTC TTGGGTTCTTACAAGCCACG
HORVU3Hr1G1176 40	23 kDa jasmonate-induced protein	AAGGCTCTACCATGAACGCC ATACACCGGAACGTCTTCGC
HORVU7Hr1G0470 00	ATP-dependent 6-phosphofructokinase 3	ACATGGCAAGCGTCGACTTA TCCATCAGGAGGCTGGAAGA
HORVU0Hr1G0061 20	E3 ubiquitin-protein ligase SINA-like 7	GACGTTTCTCTGCCCAGTCA ACGACTCGACTGGCTCTACA
HORVU4Hr1G0054 40	germin-like protein 4	TCTAAAAACCTAGGGGCTGGC GTCCTGTAGAGGGTCAGGGT
HvGAPDH	glycolytic dehydrogenase	glyceraldehyde-3-phosphate AGATGCCCCCTATGTTTGTGG GGTCTTCTGTGTGGCAGTGA
HvActin	actin	GCTGACCGTATGAGCAAGGA GGAAAGTGCTGAGTGAGGCT

Table S2 The DEGs encoding the others nutrient transporters identified in A9-29 compared with Hua30 under long-term LN stress

id	fold change				description
	0d	7d	14d	21d	
Potassium transporter					
HORVU1Hr1G009100	2.87	3.67	6.45	5.40	Potassium transporter family protein
HORVU2Hr1G064770	1.96	1.48	1.31	8.50	Potassium transporter family protein
HORVU3Hr1G013670	inf	inf	inf	38.37	Potassium transporter family protein
HORVU6Hr1G073510	0.70	1.04	0.51	3.98	Potassium transporter family protein
HORVU2Hr1G100440	1.77	2.19	0.70	1.13	high-affinity K+ transporter 1
HORVU2Hr1G082740	1.15	0.84	0.68	2.58	Voltage-gated potassium channel subunit beta-2
HORVU3Hr1G072850	0.96	1.07	2.41	0.82	Potassium channel KAT3
HORVU7Hr1G040970	1.52	2.93	2.10	1.80	Potassium channel SKOR
Zinc transporter					
HORVU1Hr1G070460	0.90	1.40	2.14	0.96	Zinc transporter 5
HORVU2Hr1G112230	0.96	1.05	0.92	2.30	Zinc transporter 8
HORVU4Hr1G082000	1.99	3.09	1.16	1.01	Zinc transporter 2
HORVU7Hr1G097270	0.67	2.32	0.86	1.30	Zinc transporter 7
Iron transporter					
HORVU2Hr1G101310	1.33	2.61	0	1.03	Vacuolar iron transporter homolog 5
HORVU4Hr1G031840	0.22	0.37	0.43	0.30	vacuolar iron transporter 1
HORVU6Hr1G061000	2.12	1.67	2.22	3.51	Vacuolar iron transporter homolog 1
HORVU4Hr1G013220	1.53	1.05	0.97	2.24	Divalent metal cation transporter MntH
HORVU7Hr1G078330	0.22	inf	inf	inf	Divalent metal cation transporter MntH
sugar transporter					
HORVU1Hr1G029920	8.75	1.98	1.11	1.40	Bidirectional sugar transporter N3
HORVU1Hr1G065100	2.48	2.67	1.33	1.35	Bidirectional sugar transporter N3
HORVU2Hr1G007130	2.87	2.62	2.62	2.09	sugar transporter 6
HORVU2Hr1G079670	1.38	2.42	7.66	1.68	sugar transporter protein 12
HORVU3Hr1G018740	15.51	inf	inf	13.90	sugar transporter 1
HORVU3Hr1G112110	0.28	0.64	0.35	0.58	sugar transporter 6
HORVU4Hr1G067450	1.59	2.23	0.50	2.12	sugar transporter protein 7
HORVU7Hr1G019240	0.04	0.12	0.10	0.06	sugar transporter 9
HORVU7Hr1G019280	0.11	1.02	0.43	0.24	sugar transporter 1
Magnesium transporter					
HORVU3Hr1G041850	inf	inf	inf	15.55	Magnesium transporter NIPA2
HORVU7Hr1G022700	0.08	0.09	0.09	0.06	Magnesium transporter NIPA2
Boron transporter					
HORVU4Hr1G081330	1.29	0.66	0.24	0.31	Boron transporter 4

Bold font indicates a significant change in A9-29 vs Hua30 ($P < 0.05$), the same as below.

Table S3 The DEGs encoding transcription factors (TFs) were identified in A9-29 compared with Hua30 under long-term LN stress

id	Fold change				description
	0d	7d	14d	21d	
HORVU0Hr1G012740	2.05	1.28	1.18	1.05	WRKY family transcription factor
HORVU0Hr1G012750	2.17	1.50	1.07	1.30	WRKY family transcription factor
HORVU0Hr1G030830	0.41	0.59	0.95	1.05	WRKY family transcription factor
HORVU1Hr1G090110	0.67	3.17	1.25	1.64	WRKY family transcription factor
HORVU2Hr1G109330	0.49	0.65	1.35	1.08	WRKY family transcription factor
HORVU3Hr1G058670	0.49	4.72	0.66	72.13	WRKY family transcription factor
HORVU3Hr1G059220	inf	1.22	1.83	2.79	WRKY family transcription factor
HORVU5Hr1G065420	0.28	0.75	0.59	1.15	WRKY family transcription factor
HORVU1Hr1G081300	0.96	0.97	0.74	3.67	Heat stress transcription factor A-4d
HORVU2Hr1G014590	0.73	0.35	0.25	0.39	Heat stress transcription factor A-2b
HORVU2Hr1G095320	0.99	0.75	2.05	1.05	Heat stress transcription factor B-2a
HORVU5Hr1G068320	1.12	2.17	1.57	2.18	Heat stress transcription factor B-1
HORVU7Hr1G056820	0.66	0.65	2.18	1.05	Heat stress transcription factor B-2b
HORVU1Hr1G066390	1.16	1.80	2.85	2.21	GRAS family transcription factor
HORVU1Hr1G069140	2.16	1.31	1.07	2.33	GRAS family transcription factor
HORVU4Hr1G020490	1.08	2.56	1.05	1.86	GRAS family transcription factor
HORVU4Hr1G061310	2.37	1.43	0.63	1.19	GRAS family transcription factor
HORVU1Hr1G055710	2.25	1.12	1.40	0.56	Ethylene-responsive transcription factor 2
HORVU1Hr1G063100	0.72	3.05	0.43	2.37	Ethylene-responsive transcription factor 1
HORVU1Hr1G064030	1.41	3.28	1.46	9.08	Ethylene-responsive transcription factor 1
HORVU1Hr1G090250	3.49	1.64	0.44	2.54	Ethylene-responsive transcription factor 1
HORVU2Hr1G094810	1.34	1.90	1.34	2.17	Ethylene-responsive transcription factor 1
HORVU2Hr1G097850	2.58	2.05	1.32	1.30	Ethylene-responsive transcription factor 1
HORVU3Hr1G090740	1.41	2.10	0.83	3.87	Ethylene-responsive transcription factor 13
HORVU4Hr1G000700	0.75	1.09	1.06	2.95	Ethylene-responsive transcription factor 1B
HORVU4Hr1G013410	2.14	5.99	0.83	1.49	Ethylene-responsive transcription factor 9
HORVU4Hr1G052870	0.62	0.87	0.35	4.68	AP2-like ethylene-responsive transcription factor
HORVU5Hr1G036590	1.51	2.56	0.51	3.62	Ethylene-responsive transcription factor 1
HORVU5Hr1G068450	2.09	2.19	0.81	2.55	Ethylene-responsive transcription factor

					1
HORVU5Hr1G080790	1.72	1.55	2.25	2.54	Ethylene-responsive transcription factor
					1
HORVU6Hr1G062430	2.03	1.80	0.89	2.22	Ethylene-responsive transcription factor
					5
HORVU6Hr1G065430	1.41	1.45	0.98	2.54	Ethylene-responsive transcription factor
					13
HORVU6Hr1G078520	1.94	1.73	0.64	2.16	Ethylene-responsive transcription factor
					9
HORVU1Hr1G024280	0.98	2.21	0.95	10.00	Transcription factor bHLH51
HORVU2Hr1G073240	0.01	0.00	0.04	0.02	Transcription factor bHLH130
HORVU3Hr1G005500	10.05	7.09	7.11	3.15	Transcription factor bHLH35
HORVU3Hr1G018680	0.57	1.09	2.05	1.28	Transcription factor bHLH51
HORVU3Hr1G048770	0.47	0.66	1.45	0.41	Transcription factor bHLH87
HORVU3Hr1G066050	75.91	36.03	34.35	21.28	Transcription factor bHLH62
HORVU3Hr1G066600	0.44	0.42	2.33	3.53	Transcription factor bHLH87
HORVU5Hr1G097520	0.46	1.06	0.40	0.56	Transcription factor bHLH85
HORVU1Hr1G067680	inf	inf	inf	3.81	Basic-leucine zipper (bZIP) transcription factor family protein
					bZIP transcription factor 53
HORVU4Hr1G053980	1.23	1.54	1.48	2.50	bZIP transcription factor family protein
HORVU5Hr1G030780	350.42	inf	inf	56.19	bZIP transcription factor family protein
HORVU7Hr1G097370	0.34	1.23	2.81	0.00	Basic-leucine zipper (bZIP) transcription factor family protein
					factor family protein
HORVU7Hr1G097390	0.26	1.33	0.41	0.00	Basic-leucine zipper (bZIP) transcription factor family protein
					factor family protein
HORVU7Hr1G117010	inf	3.70	3.24	1.63	Basic-leucine zipper (bZIP) transcription factor family protein
					factor family protein
HORVU7Hr1G117020	1.87	1.68	2.34	1.72	Basic-leucine zipper (bZIP) transcription factor family protein
					factor family protein
HORVU2Hr1G040400	0.79	0.42	0.23	1.12	B3 domain-containing transcription factor VAL3
					factor NGA2
HORVU3Hr1G010190	1.24	1.09	2.04	1.65	B3 domain-containing transcription factor NGA2
					factor NGA2
HORVU3Hr1G010260	0.04	0.02	0.00	0.10	AP2/B3 transcription factor family protein
					protein
HORVU3Hr1G064640	2.12	1.80	0.86	2.00	AP2/B3 transcription factor family protein
					protein
HORVU3Hr1G067350	3.49	1.82	6.89	3.14	AP2/B3 transcription factor family protein
					protein
HORVU4Hr1G082090	1.52	2.62	1.68	2.52	AP2/B3 transcription factor family protein
					protein
HORVU7Hr1G002230	0.73	0.96	0.41	1.02	AP2/B3 transcription factor family protein
					protein
HORVU6Hr1G081980	2.46	1.97	0.89	2.31	AP2 domain transcription factor-like

HORVU3Hr1G068900	1.14	2.09	2.13	1.50	MADS-box transcription factor 32
HORVU3Hr1G095090	0.91	2.33	0.91	1.62	MADS-box transcription factor family protein
HORVU3Hr1G095200	2.07	0.96	1.78	1.12	MADS-box transcription factor family protein
HORVU3Hr1G116800	1.45	0.00	0.24	0.00	MADS-box transcription factor family protein
HORVU4Hr1G032440	1.02	0.49	0.95	1.13	MADS-box transcription factor family protein
HORVU5Hr1G095630	0.94	0.54	0.19	0.37	MADS-box transcription factor 14
HORVU7Hr1G023940	0.80	2.50	2.12	3.73	MADS-box transcription factor 25
HORVU7Hr1G036130	3.45	2.56	1.52	1.24	MADS-box transcription factor 55
HORVU7Hr1G054390	4.38	inf	6.59	7.95	MADS-box transcription factor family protein
HORVU7Hr1G082640	0.00	0.00	0.00	0.01	MADS transcription factor
HORVU7Hr1G091210	3.27	0.99	1.71	22.04	MADS-box transcription factor 16
HORVU7Hr1G108280	1.64	1.37	1.03	2.40	MADS-box transcription factor 29
HORVU3Hr1G010620	1.40	2.44	2.07	0.99	myb-like transcription factor family protein
HORVU3Hr1G025030	1.95	1.21	0.48	1.20	myb-like transcription factor family protein
HORVU6Hr1G019460	0.46	1.09	0.64	0.78	myb-like transcription factor family protein
HORVU6Hr1G066000	0.56	5.09	0.98	2.02	myb-like transcription factor family protein
HORVU5Hr1G086780	0.06	0.02	0.04	0.03	NAC transcription factor
HORVU0Hr1G000710	2.11	2.03	1.84	1.93	Transcription factor
HORVU0Hr1G010230	1.47	0.58	1.04	0.18	Nuclear transcription factor Y subunit A-
7					
HORVU0Hr1G014200	1.35	1.34	3.02	1.27	Orphans transcription factor
HORVU0Hr1G029190	0.00	0.09	0.00	0.24	global transcription factor group E8
HORVU0Hr1G032230	0.62	1.59	1.54	2.11	transcription factor-related
HORVU1Hr1G023170	0.00	3.77	0.95	3.15	Transcription factor jumonji (jmc) domain-containing protein
HORVU1Hr1G065570	0.09	0.09	0.09	0.10	Transcription factor
HORVU1Hr1G073870	1.01	1.22	0.53	0.38	transcription factor-related
HORVU1Hr1G091520	1.05	0.17	0.59	0.59	Transcription factor RADIALIS
HORVU2Hr1G046270	1.18	1.10	0.36	0.94	Trihelix transcription factor GT-4
HORVU2Hr1G114070	0.50	1.90	1.30	0.76	Transcription factor ORG2
HORVU3Hr1G018440	0.25	0.07	1.42	1.27	Transcription factor IIB 60 kDa subunit
HORVU5Hr1G008340	0.54	0.53	0.44	0.40	TCP family transcription factor 4
HORVU5Hr1G011780	0.74	2.08	0.58	1.01	Transcription factor EB
HORVU6Hr1G095070	0.16	0.21	0.61	0.23	sequence-specific DNA binding transcription factors;sequence-specific

					DNA binding
HORVU7Hr1G042170	1.38	0.62	2.24	1.40	transcription factor-related
HORVU7Hr1G084240	2.18	3.20	3.18	2.48	Transcription factor HY5
HORVU3Hr1G010200	0.06	0.45	0.00	0.11	auxin response factor 16
HORVU3Hr1G022060	142.39	166.91	inf	31.47	auxin response factor 6
HORVU3Hr1G064590	inf	inf	11.04	inf	auxin response factor 20
HORVU4Hr1G083690	0.01	0.00	0.00	0.03	auxin response factor 2
HORVU5Hr1G026200	inf	inf	inf	105.97	auxin response factor 8
HORVU5Hr1G103130	0.00	0.00	0.00	0.01	auxin response factor 2
HORVU7Hr1G108360	0.50	0.86	0.65	0.39	auxin response factor 16

Table S4 The hormone signaling-related DEGs were identified in A9-29 compared with Hua30 under long-term LN stress

id	Fold change				description
	0d	7d	14d	21d	
HORVU2Hr1G034680	2.10	1.51	0.89	2.73	Auxin-responsive GH3 family protein
HORVU2Hr1G088460	0.94	0.64	0.88	3.28	Auxin-responsive GH3 family protein
HORVU2Hr1G110430	1.05	0.55	1.02	0.31	SAUR-like auxin-responsive protein family
HORVU2Hr1G122970	0.21	0.31	0.70	0.88	Auxin-induced protein 5NG4
HORVU3Hr1G092460	0.47	1.80	1.16	2.28	SAUR-like auxin-responsive protein family
HORVU3Hr1G094000	0.83	0.79	0.69	0.50	Auxin efflux carrier family protein
HORVU4Hr1G026680	0.95	1.12	1.10	2.03	Auxin efflux carrier family protein
HORVU5Hr1G062510	1.72	2.89	3.65	1.36	Dormancy/auxin associated family protein
HORVU5Hr1G076690	0.87	0.81	0.75	0.48	SAUR-like auxin-responsive protein family
HORVU5Hr1G086030	0.00	0.00	0.00	0.00	Auxin induced protein
HORVU5Hr1G087880	2.18	1.88	0.87	2.13	Auxin efflux carrier family protein
HORVU7Hr1G057740	1.50	0.77	4.58	0.22	SAUR-like auxin-responsive protein family
HORVU7Hr1G091350	1.76	0.95	2.26	0.92	SAUR-like auxin-responsive protein family
HORVU7Hr1G107360	0.46	1.83	0.81	2.55	SAUR-like auxin-responsive protein family
HORVU3Hr1G066450	1.25	1.39	0.33	0.77	IAA-amino acid hydrolase ILR1-like 2
HORVU5Hr1G027710	0.21	0.16	0.18	0.19	IAA-amino acid hydrolase ILR1-like 7
HORVU5Hr1G055060	1.52	2.32	1.25	1.69	IAA-amino acid hydrolase ILR1-like 9
HORVU1Hr1G066340	0.79	0.67	0.79	0.47	putative indole-3-acetic acid-amido synthetase GH3.9
HORVU1Hr1G074200	0.06	0.00	0.00	0.02	Indole-3-acetaldehyde oxidase
HORVU5Hr1G052150	1.86	4.76	2.28	2.66	Indole-3-glycerol phosphate synthase
HORVU5Hr1G123470	0.74	2.35	1.66	1.07	Indole-3-acetaldehyde oxidase
HORVU7Hr1G114660	1.38	2.04	1.51	2.05	Indole-3-glycerol phosphate synthase
HORVU7Hr1G117360	2.46	2.29	2.78	1.86	Indole-3-acetaldehyde oxidase
HORVU2Hr1G034860	2.75	1.11	1.34	2.18	Gibberellin-regulated family protein
HORVU2Hr1G090030	0.86	1.27	1.47	2.67	Gibberellin 2-beta-dioxygenase 8
HORVU3Hr1G022840	1.03	0.78	2.45	1.30	gibberellin 3-oxidase 1
HORVU5Hr1G097030	0.64	inf	5.29	inf	Gibberellin-regulated family protein
HORVU7Hr1G101720	0.00	0.63	0.37	1.01	gibberellin 2-oxidase 6
HORVU7Hr1G120380	0.77	0.79	0.69	0.29	Gibberellin-regulated family protein
HORVU2Hr1G004620	0.20	0.45	0.36	0.60	Copalyl diphosphate synthase 2
HORVU1Hr1G094290	1.06	2.05	0.62	2.25	Cytokinin riboside 5'-monophosphate phosphoribohydrolase

HORVU3Hr1G019850	0.40	0.73	0.77	1.24	cytokinin oxidase/dehydrogenase 6
HORVU3Hr1G050770	1.18	1.55	0.80	3.02	Cytokinin riboside 5'-monophosphate phosphoribohydrolase
HORVU3Hr1G089250	1.12	2.24	1.48	1.22	Ethylene insensitive 3 family protein
HORVU5Hr1G080340	3.02	2.47	0.70	1.10	ethylene-responsive element binding factor 13
HORVU5Hr1G080350	2.23	2.30	1.87	0.97	Ethylene-responsive element binding factor 14
HORVU5Hr1G080430	3.28	1.72	1.54	1.64	ethylene-responsive element binding factor 13
HORVU3Hr1G047220	296.9	2346.9	493.2	66.5	ABA-responsive protein
HORVU5Hr1G006190	0.67	0.95	0.13	1.43	ABA-responsive protein, putative, expressed

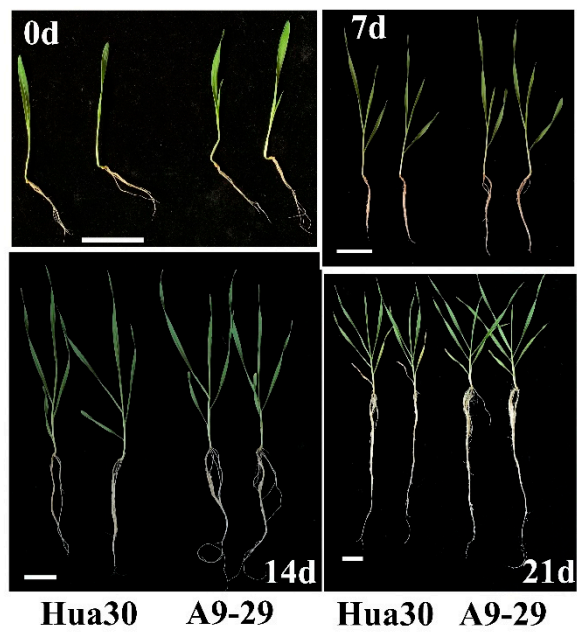
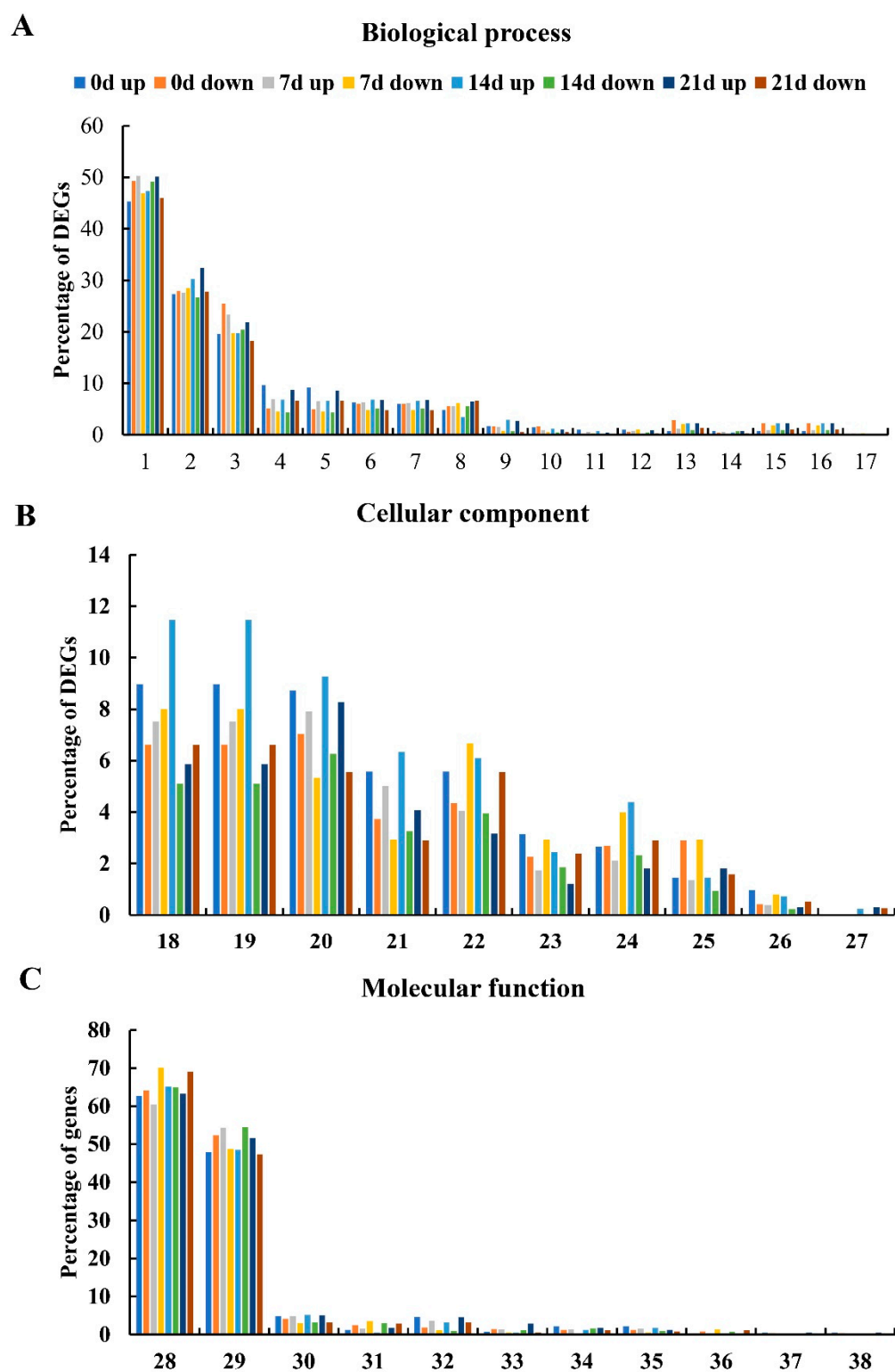


Figure S1. The root phenotypes of Hua 30 and A9-29 at different time points at low N condition.



FigureS2 GO analysis of DEGs in each category. (A) Biological process. (B) Cellular component. (C) Molecular function. The number on X-axis indicates different GO terms as follows: 1-metabolic process; 2-cellular process; 3-single-organism process; 4-biological regulation; 5-regulation of biological process; 6-localization; 7-establishment of localization; 8-response to stimulus; 9-multicellular organismal process; 10-cellular component organization or biogenesis; 11-

developmental process; 12-signaling; 13-multi-organism process; 14-negative regulation of biological process; 15-reproduction; 16-reproductive process; 17-immune system process; 18-cell; 19-cell part; 20-membrane; 21-membrane part; 22-organelle; 23-organelle part; 24-macromolecular complex; 25-extracellular region; 26-membrane-enclosed lumen; 27-extracellular region part; 28-binding; 29-catalytic activity; 30-transporter activity; 31-antioxidant activity; 32-nucleic acid binding transcription factor activity; 33-nutrient reservoir activity; 34-electron carrier activity; 35-enzyme regulator activity; 36-structural molecule activity; 37-molecular transducer activity; 38-receptor activity. The *Y*-axis indicates the percentage of DEGs.