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Supplementary Material

Nitrate increases ethylene production and aerenchyma formation in roots of lowland rice plants under water stress

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Table S1. Gene numbers and primers of actin, *OsLSD1.1*, *OsLSD2*, *OsEDS*, *OsPAD4* and *OsACS5* for q-RT-PCR

Gene	Number	Primers
actin	Os03g0718100	F: CAACACCCCTGCTATGTACG R: CATCACCAGAGTCCAACACAA
<i>OsLSD1.1</i>	Os08g0159500	F: CGAGATGGCGCAGTTAGTTTG R: TCGCACC GCGTATATACATCA
<i>OsLSD2</i>	Os03g0639600	F: CCCCCCACCAACTTCAG R: TCTCGACAACAACGGTTACATTCT
<i>OsEDS</i>	Os09g0392100	F: CCGCCGGTTGGTTGAG R: TCCTCGTTCTTGGAATGCCTAT
<i>OsPAD4</i>	Os11g0195500	F: GCCGACTACCACCGAAACAA R: CGGCCATGGGTGATGTAAG
<i>OsACS5</i>	Os01g0192900	F: GATTACCATGGCCTCAAGAGCTT R: CGCGTATCTTCCCCATGAAG

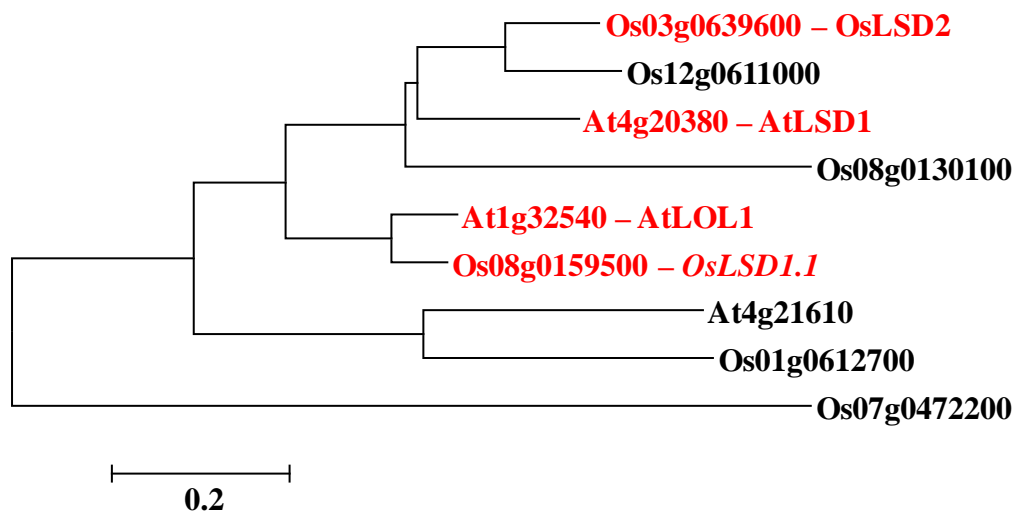


Fig. S1. Phylogenetic analysis tree of *LSD* proteins in rice and *Arabidopsis* plant. Genetic distance calculated by MEGA 5.2 (<http://www.megasoftware.net>). The *LSD* family members was searched according to 'http://plantfdb.cbi.pku.edu.cn/'. Six *LSD* members (Os01g0612700, Os03g0639600 (*OsLSD2*), Os07g0472200, Os08g0130100, Os08g0159500 (*OsLSD1*), Os12g0611000) and three members (At1g32540 (*AtLOL1*), At4g20380 (*AtLSD1*) and At4g21610) were selected in rice plant and in *Arabidopsis*.

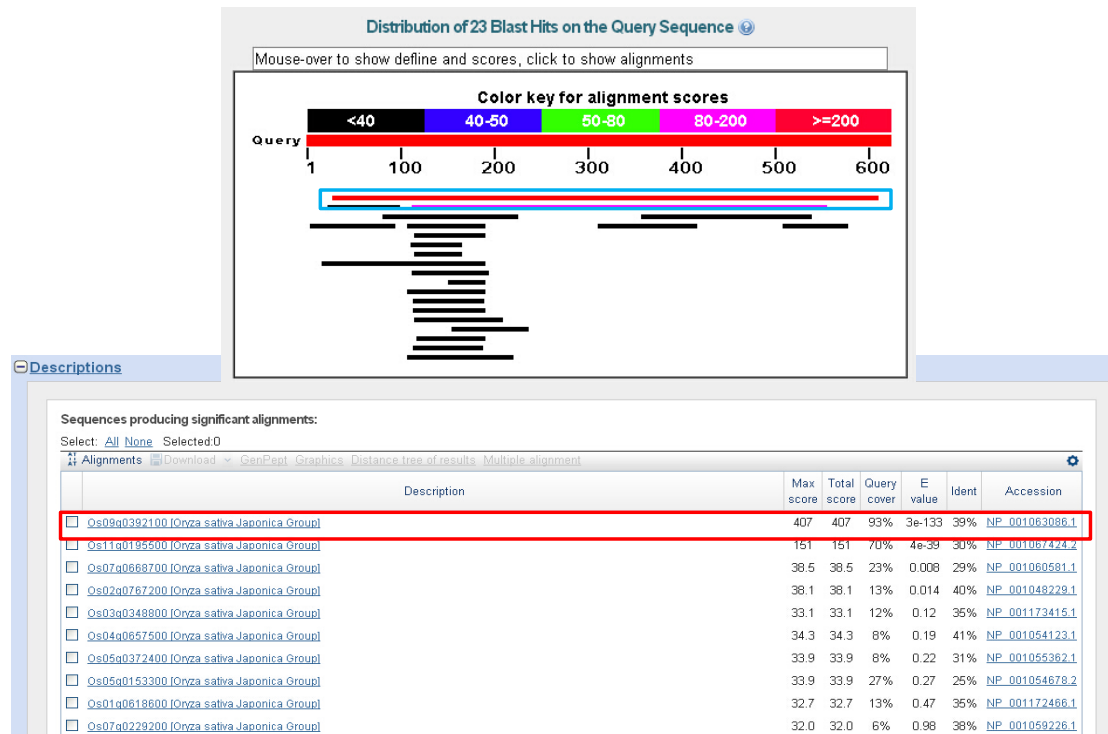
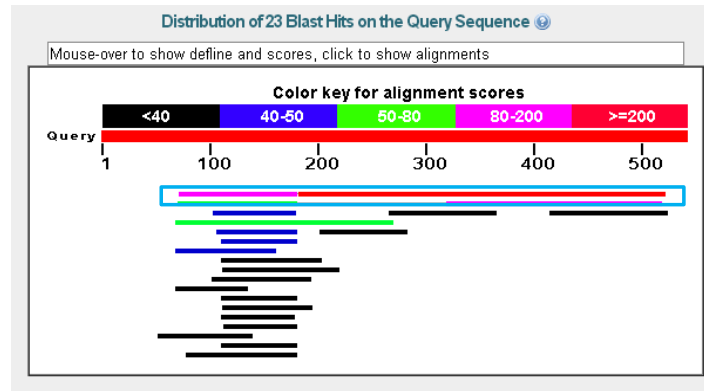


Fig. S2. The homologous genes of *AtEDS* in rice by searching in the Gene-bank of National Center for Biotechnology Information (NCBI). The gene of marked with rectangles was *OsEDS*, which we selected in our study.



Sequences producing significant alignments:

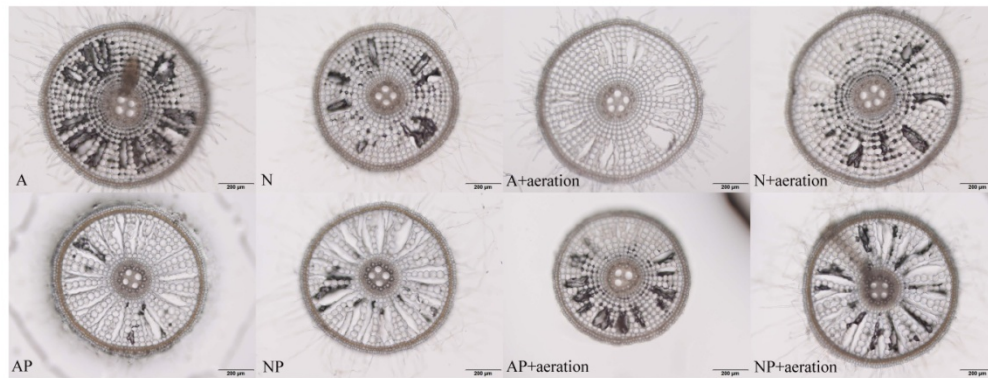
Select: [All](#) [None](#) Selected: 0

Alignments [Download](#) [GenPept](#) [Graphics](#) [Distance tree of results](#) [Multiple alignment](#)

	Description	Max score	Total score	Query cover	E value	Ident	Accession
<input type="checkbox"/>	Os11q0195500 Orzya sativa Japonica Group	251	340	82%	2e-75	38%	NP_001067424.2
<input type="checkbox"/>	Os09q0392100 Orzya sativa Japonica Group	110	169	57%	1e-25	32%	NP_001063086.1
<input type="checkbox"/>	Os03q0348800 Orzya sativa Japonica Group	48.5	48.5	14%	8e-07	36%	NP_001173415.1
<input type="checkbox"/>	Os05q0372400 Orzya sativa Japonica Group	50.1	50.1	37%	1e-06	25%	NP_001055362.1
<input type="checkbox"/>	Os07q0668700 Orzya sativa Japonica Group	45.4	45.4	13%	4e-05	36%	NP_001060581.1
<input type="checkbox"/>	Os08q0143600 Orzya sativa Japonica Group	43.9	43.9	13%	1e-04	37%	NP_001060978.1
<input type="checkbox"/>	Os11q0655800 Orzya sativa Japonica Group	41.6	41.6	17%	8e-04	33%	NP_001088389.1
<input type="checkbox"/>	Os02a0653900 Orzya sativa Japonica Group	38.9	38.9	17%	0.006	28%	NP_001047607.1
<input type="checkbox"/>	Os01q0618600 Orzya sativa Japonica Group	36.6	36.6	19%	0.025	27%	NP_001172466.1

Fig. S3. The homologous genes of *AtPAD4* in rice by searching in the Gene-bank of National Center for Biotechnology Information (NCBI). The gene of marked with rectangle was *OsPAD4*, which we selected in our study.

(a)



(b)

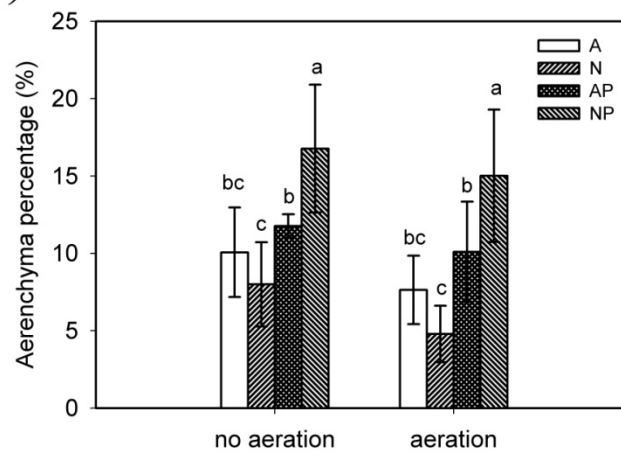


Fig. S4. The comparison of root cortical aerenchyma formation between aeration and non-aeration hydroponic culture in Shanyou 63 plant. (a) aerenchyma images of root transverse sections, which were cut from the middle of 7–8 cm long, newly formed adventitious roots. Bars = 200 μm. (b) The percentage of aerenchyma in the root cross-section. Aeration hydroponic culture was conducted with aerating air to the nutrient solution by the same method used for exogenous ethylene treatment (The flow rate was 75 L h^{-1}), and the dissolved oxygen concentration (mg L^{-1}) was measured (A, 7.7 ± 0.8 ; N, 7.7 ± 1.0 ; AP, 6.6 ± 1.4 ; NP, 6.0 ± 1.2). The data represent the mean \pm s.d. Significant differences ($P < 0.05$) between treatments are indicated by different letters.