Table S1.1 Diurnal variation in Eh, pH and Eh@pH7 for four rice varieties (IDSA 6, Azucena, IRBLTA2Pi, Nerica4). Regression equations over time and strength of the relationship (R^2 and P values) are given for each variety, for each day of measurement in each of four seasons (I to IV). Corresponding fertilization, sowing times, measurement dates and plant ages (DAS) are indicated. Overall mean and median of R^2 values are indicated. Measurements were made on the middle part of the last photosynthetically active leaf of the main tiller.

Variety	Season	Fertilization	Sowing Date	Date	DAS	Regression Eh vs Hour	R2 Eh vs hour	P Eh vs hour	Regression pH vs Hour	R2 pH vs hour	P pH vs hour	Regression Eh(pH7) vs Hour	R2 Eh(pH7) vs hour	P Eh(pH7) vs hour
IDSA 6	I	0	12/11/2015	1/28/2016	48	$y = 538.15x^2 - 597.59x + 422.65$	0.561	0.000	$y = -5.5522x^2 + 6.2113x + 5.0954$	0.349	0.011	$y = 212.76x^2 - 234.01x + 311.49$	0.074	0.444
IDSA 6	I	0	12/11/2015	2/22/2016	73	$y = 915.17x^2 - 1004x + 528.95$	0.803	0.000	$y = 2.3046x^2 - 1.8319x + 6.469$	0.301	0.023	$y = 1058.6x^2 - 1119.3x + 498.76$	0.811	0.000
IDSA 6	I	0	12/11/2015	2/23/2016	74	$y = 664.35x^2 - 711.43x + 450.18$	0.642	0.000	$y = -4.144x^2 + 5.0136x + 4.9282$	0.707	0.000	$y = 421.4x^2 - 416.99x + 327.96$	0.225	0.069
IDSA 6	II	NPK	4/25/2016	6/20/2016	56	$y = 898.52x^2 - 917.2x + 485.73$	0.714	0.000	$y = 0.4688x^2 + 0.0407x + 5.7636$	0.435	0.010	$y = 938.56x^2 - 928.2x + 415.6$	0.752	0.000
IDSA 6	II	NPK	4/25/2016	2/21/2016	57	$y = -186.03x^2 + 97.033x + 266.58$	0.663	0.000	$y = 31.234x^2 - 94.826x + 244.3$	0.396	0.061	$y = 31.234x^2 - 94.826x + 244.3$	0.396	0.023
IDSA 6	II	NPK	4/25/2016	2/23/2016	59	$y = 343.83x^2 - 407.55x + 378.8$	0.727	0.000	$y = -0.2573x^2 + 0.5324x + 5.7291$	0.084	0.519	$y = 339.23x^2 - 389.43x + 306.85$	0.393	0.024
Azucena	III	NPK	8/12/2016	9/20/2016	39	$y = 418.15x^2 - 475.47x + 381.43$	0.560	0.001	$y = 3.6848x^2 - 3.7588x + 6.9719$	0.275	0.065	$y = 647.34x^2 - 714.18x + 385$	0.515	0.002
Azucena	III	NPK	8/12/2016	9/21/2016	40	$y = 157.98x^2 - 226.57x + 327.96$	0.664	0.000	$y = 1.0938x^2 - 1.1016x + 6.354$	0.066	0.561	$y = 239.51x^2 - 312.22x + 294.5$	0.646	0.000
Azucena	III	NPK	8/12/2016	10/11/2016	60	$y = 138.25x^2 - 170.17x + 328.47$	0.318	0.039	$y = 0.9981x^2 - 0.9262x + 6.0455$	0.072	0.529	$y = 208.01x^2 - 237.99x + 274.95$	0.277	0.064
Azucena	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 360.31x^2 - 406.27x + 358.76$	0.576	0.000	$y = -4.3031x^2 + 4.3194x + 5.4268$	0.309	0.052	$y = 138.04x^2 - 189.13x + 274.82$	0.364	0.027
Azucena	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 275.76x^2 - 326.39x + 354.77$	0.655	0.000	$y = 0.6109x^2 - 0.6347x + 6.7082$	0.010	0.917	$y = 311.73x^2 - 364.44x + 337.58$	0.468	0.003
Azucena	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 470.04x^2 - 528.96x + 416.16$	0.698	0.000	$y = 1.8282x^2 - 2.0903x + 6.377$	0.540	0.001	$y = 582.22x^2 - 658.71x + 380.41$	0.753	0.000
IRBLTA-2Pi	I	0	12/11/2015	1/28/2016	48	$y = 464.08x^2 - 535.63x + 421.93$	0.634	0.000	$y = -5.1205x^2 + 5.2303x + 5.366$	0.395	0.005	$y = 163.21x^2 - 229.25x + 326.62$	0.480	0.001
IRBLTA-2Pi	I	0	12/11/2015	2/22/2016	73	$y = 621.53x^2 - 660.39x + 438.53$	0.460	0.002	$y = -4.1386x^2 + 4.3053x + 5.1972$	0.266	0.039	$y = 376.54x^2 - 405.32x + 331.41$	0.229	0.065
IRBLTA-2Pi	I	0	12/11/2015	2/23/2016	74	$y = 623.21x^2 - 672.59x + 446.53$	0.753	0.000	$y = -4.372x^2 + 4.734x + 5.164$	0.268	0.038	$y = 366.2x^2 - 394.38x + 338.28$	0.396	0.005
IRBLTA-2Pi	II	NPK	4/25/2016	6/20/2016	56	$y = 453.27x^2 - 505.05x + 400.85$	0.733	0.000	$y = 5.3896x^2 - 4.9605x + 7.2966$	0.368	0.025	$y = 779.62x^2 - 806.79x + 420.24$	0.713	0.000
IRBLTA-2Pi	II	NPK	4/25/2016	6/21/2016	57	$y = 175.24x^2 - 259.12x + 346.77$	0.660	0.000	$y = 2.2292x^2 - 2.2559x + 6.5518$	0.064	0.609	$y = 317.53x^2 - 405.38x + 323.22$	0.508	0.005
IRBLTA-2Pi	II	NPK	4/25/2016	6/23/2016	59	$y = -86.108x^2 - 5.148x + 293.65$	0.649	0.000	$y = -2.2226x^2 + 2.124x + 5.7498$	0.143	0.315	$y = -210.63x^2 + 111.26x + 221.98$	0.570	0.002
IRBLTA-2Pi	III	NPK	8/12/2016	9/20/2016	39	$y = 352.17x^2 - 434.17x + 371.79$	0.613	0.000	$y = -3.301x^2 + 3.856x + 5.2184$	0.167	0.213	$y = 142.31x^2 - 192.97x + 263.95$	0.222	0.119
IRBLTA-2Pi	III	NPK	8/12/2016	9/21/2016	40	$y = 488.63x^2 - 565.53x + 400.88$	0.808	0.000	$y = 2.3059x^2 - 2.6434x + 6.9917$	0.111	0.389	$y = 608.8x^2 - 707.96x + 397.72$	0.662	0.000
IRBLTA-2Pi	III	NPK	8/12/2016	10/11/2016	60	$y = 160.52x^2 - 199.58x + 336.68$	0.298	0.041	$y = 2.14x^2 - 2.0708x + 6.6246$	0.178	0.171	$y = 294.85x^2 - 331.41x + 316.55$	0.289	0.047
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 273.67x^2 - 322.82x + 343.65$	0.607	0.000	$y = -3.0166x^2 + 3.1936x + 5.9759$	0.291	0.054	$y = 93.393x^2 - 130.31x + 281.98$	0.430	0.008
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 168.6x^2 - 257.14x + 347.41$	0.658	0.000	$y = -0.4896x^2 + 0.6227x + 6.6304$	0.103	0.376	$y = 139.65x^2 - 220.55x + 325.57$	0.542	0.001
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 421.4x^2 - 441.13x + 378.85$	0.711	0.000	$y = 0.7972x^2 - 1.1993x + 6.3239$	0.318	0.032	$y = 471.41x^2 - 516.93x + 339.72$	0.738	0.000
Nerica 4	I	0	12/11/2015	1/28/2016	48	$y = 376.58x^2 - 465.86x + 404.08$	0.554	0.000	$y = -2.3934x^2 + 2.7405x + 5.6674$	0.099	0.334	$y = 238.48x^2 - 308.89x + 327.24$	0.247	0.051
Nerica 4	I	0	12/11/2015	2/22/2016	73	$y = 428.56x^2 - 488.16x + 406.76$	0.483	0.001	$y = 3.6034x^2 - 3.1382x + 6.7461$	0.439	0.002	$y = 647.99x^2 - 679.89x + 392.74$	0.476	0.001
Nerica 4	I	0	12/11/2015	2/23/2016	74	$y = 593.99x^2 - 637.88x + 434.36$	0.850	0.000	$y = -0.1329x^2 + 0.3468x + 5.957$	0.107	0.305	$y = 591.79x^2 - 623.6x + 373.93$	0.709	0.000
Nerica 4	II	NPK	4/25/2016	6/20/2016	56	$y = 192.85x^2 - 242.92x + 325.91$	0.558	0.000	$y = 3.328x^2 - 2.4347x + 6.317$	0.597	0.001	$y = 983.05x^2 - 965.24x + 423.61$	0.836	0.000
Nerica 4	II	NPK	4/25/2016	2/21/2016	57	$y = 86.11x^2 - 141.29x + 307.29$	0.545	0.003	$y = 2.3342x^2 - 2.1622x + 6.424$	0.296	0.072	$y = 238x^2 - 285.51x + 277$	0.459	0.010
Nerica 4	II	NPK	4/25/2016	2/23/2016	59	$y = 197.35x^2 - 258.87x + 332.42$	0.733	0.000	$y = 4.8873x^2 - 3.9603x + 6.6404$	0.607	0.001	$y = 502.66x^2 - 511.8x + 315.54$	0.579	0.002
Nerica 4	III	NPK	8/12/2016	9/20/2016	39	$y = 646.85x^2 - 672.72x + 410.04$	0.623	0.000	$y = 1.3856x^2 - 1.2464x + 6.4386$	0.125	0.301	$y = 734.61x^2 - 754.13x + 378.78$	0.732	0.000
Nerica 4	III	NPK	8/12/2016	9/21/2016	40	$y = 460.9x^2 - 520.07x + 376.65$	0.575	0.000	$y = 0.8986x^2 - 1.2252x + 6.5572$	0.113	0.339	$y = 521.15x^2 - 601.66x + 352.5$	0.588	0.000
Nerica 4	III	NPK	8/12/2016	10/11/2016	60	$y = 349.74x^2 - 413.15x + 383.92$	0.688	0.000	$y = 1.1133x^2 - 1.309x + 6.2656$	0.097	0.399	$y = 426.76x^2 - 504.2x + 343.62$	0.712	0.000
Nerica 4	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 377.91x^2 - 429.66x + 361.18$	0.589	0.000	$y = -4.299x^2 + 4.215x + 5.5099$	0.539	0.001	$y = 119.76x^2 - 177.45x + 272.39$	0.471	0.003
Nerica 4	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 193.04x^2 - 255.42x + 329.53$	0.603	0.000	$y = 0.2848x^2 - 0.5243x + 6.6138$	0.137	0.267	$y = 134.39x^2 - 219.49x + 292.77$	0.625	0.000
Nerica 4	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 485.63x^2 - 563.92x + 418.96$	0.843	0.000	$y = 0.0899x^2 - 0.4666x + 5.9936$	0.521	0.001	$y = 493.12x^2 - 595.99x + 360.17$	0.860	0.000
Mean							0.634			0.275			0.521	
Median							0.646			0.272			0.511	

Table S1.2 Temperature dependent variation in Eh, pH and Eh@pH7 for four rice varieties (IDSA 6, Azucena, IRBLTA2Pi, Nerica4). Regression equations over time and strength of the relationship (R^2 and P values) are given for each variety, for each day of measurement in each of four seasons (I to IV). Corresponding fertilization, sowing times, measurement dates and plant ages (DAS) are indicated. Overall mean and median of R^2 values are indicated. Measurements were made on the middle part of the last photosynthetically active leaf of the main tiller.

Variety	Season	Fertilization	Sowing Date	Date	DAS	Regression Eh vs Temperature	R2 Eh vs Temp.	P Eh vs Temp.	Regression pH vs Temperature	R2 pH vs Temp.	P pH vs Temp.	Regression Eh(pH7) vs Temperature	R2 Eh(pH7) vs Temp.	P Eh(pH7) vs Temp.
IDSA 6	I	0	12/11/2015	1/28/2016	48	$y = 1.837x^2 - 95.77x + 1505.5$	0.287	0.029	$y = -0.0166x^2 + 0.9064x - 5.4642$	0.410	0.004	$y = 0.8771x^2 - 43.328x + 783.88$	0.027	0.747
IDSA 6	I	0	12/11/2015	2/22/2016	73	$y = 2.1851x^2 - 131.88x + 2257.3$	0.066	0.486	$y = -0.0115x^2 + 0.6201x - 2.1474$	0.131	0.229	$y = 1.4938x^2 - 94.721x + 1712.1$	0.138	0.211
IDSA 6	I	0	12/11/2015	2/23/2016	74	$y = 7.255x^2 - 425.64x + 6503.5$	0.615	0.000	$y = -0.0324x^2 + 1.9934x - 24.151$	0.617	0.000	$y = 5.3574x^2 - 308.72x + 4675.2$	0.158	0.164
IDSA 6	II	NPK	4/25/2016	6/20/2016	56	$y = 4.8841x^2 - 266.78x + 3898.6$	0.685	0.000	$y = -0.0173x^2 + 0.9398x - 6.8058$	0.302	0.056	$y = 3.8602x^2 - 211.51x + 3088.8$	0.621	0.000
IDSA 6	II	NPK	4/25/2016	2/21/2016	57	$y = 1.3078x^2 - 75.369x + 1340.9$	0.392	0.024	$y = 0.0067x^2 - 0.3549x + 10.661$	0.032	0.781	$y = 1.7078x^2 - 96.729x + 1564.5$	0.392	0.024
IDSA 6	II	NPK	4/25/2016	2/23/2016	59	$y = 0.7996x^2 - 47.267x + 959.84$	0.570	0.002	$y = 0.0114x^2 - 0.5887x + 13.42$	0.215	0.163	$y = 1.4848x^2 - 82.917x + 1353$	0.284	0.081
Azucena	III	NPK	8/12/2016	9/20/2016	39	$y = -0.4398x^2 + 19.319x + 58.172$	0.425	0.007	$y = -0.0084x^2 + 0.444x + 0.3044$	0.068	0.552	$y = -0.9027x^2 + 43.187x - 299.75$	0.328	0.034
Azucena	III	NPK	8/12/2016	9/21/2016	40	$y = 2.2556x^2 - 131.44x + 2163.4$	0.674	0.000	$y = 7E{-}05x^2 - 0.0081x + 6.274$	0.007	0.939	$y = 2.2326x^2 - 130.61x + 2104.8$	0.656	0.000
Azucena	III	NPK	8/12/2016	10/11/2016	60	$y = -0.7054x^2 + 35.83x - 167.48$	0.251	0.085	$y = -0.0081x^2 + 0.4363x - 0.0183$	0.031	0.766	$y = -1.1913x^2 + 61.903x - 583.61$	0.258	0.079
Azucena	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 5.0772x^2 - 283.29x + 4195.2$	0.212	0.117	$y = -0.0665x^2 + 3.6348x - 43.117$	0.185	0.194	$y = 4.8567x^2 - 274.01x + 4070.2$	0.380	0.022
Azucena	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 17.809x^2 - 992.31x + 14058$	0.649	0.000	$y = -0.0276x^2 + 1.5219x - 14.373$	0.009	0.919	$y = 16.144x^2 - 900.58x + 12771$	0.428	0.007
Azucena	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 1.3535x^2 - 85.223x + 1607.3$	0.514	0.002	$y = 0.0047x^2 - 0.3036x + 10.68$	0.496	0.002	$y = 1.6199x^2 - 102.86x + 1823.3$	0.591	0.000
IRBLTA-2Pi	I	0	12/11/2015	1/28/2016	48	$y = 0.8299x^2 - 47.087x + 931.24$	0.426	0.003	$y = 0.0073x^2 - 0.3265x + 10.158$	0.274	0.035	$y = 1.278x^2 - 67.157x + 1128.7$	0.291	0.027
IRBLTA-2Pi	I	0	12/11/2015	2/22/2016	73	$y = -0.9317x^2 + 49.913x - 386.3$	0.095	0.351	$y = 0.0257x^2 - 1.5456x + 29.39$	0.121	0.259	$y = 0.6128x^2 - 43.108x + 963.88$	0.214	0.080
IRBLTA-2Pi	I	0	12/11/2015	2/23/2016	74	$y = 6.499x^2 - 381.65x + 5869.4$	0.588	0.000	$y = -0.0172x^2 + 1.1067x - 11.211$	0.351	0.011	$y = 5.4988x^2 - 317.08x + 4805.5$	0.245	0.052
IRBLTA-2Pi	II	NPK	4/25/2016	6/20/2016	56	$y = 2.0948x^2 - 118.22x + 1929.7$	0.742	0.000	$y = 0.0522x^2 - 2.7535x + 42.424$	0.473	0.006	$y = 5.1865x^2 - 281.44x + 4031.3$	0.756	0.000
IRBLTA-2Pi	II	NPK	4/25/2016	6/21/2016	57	$y = 0.6361x^2 - 39.823x + 877.82$	0.550	0.003	$y = 0.9244x^2 - 56.101x + 1048.1$	0.407	0.897	$y = 0.9244x^2 - 56.101x + 1048.1$	0.407	0.020
IRBLTA-2Pi	II	NPK	4/25/2016	6/23/2016	59	$y = 1.3864x^2 - 78.805x + 1376.6$	0.420	0.017	$y = 0.0208x^2 - 1.1182x + 21.08$	0.361	0.035	$y = 2.634x^2 - 146.09x + 2226.4$	0.422	0.016
IRBLTA-2Pi	III	NPK	8/12/2016	9/20/2016	39	$y = 1.3079x^2 - 75.831x + 1338.1$	0.462	0.004	$y = -0.0339x^2 + 1.8509x - 18.824$	0.205	0.142	$y = -0.839x^2 + 41.098x - 287.89$	0.333	0.032
IRBLTA-2Pi	III	NPK	8/12/2016	9/21/2016	40	$y = 2.7666x^2 - 162.1x + 2614.5$	0.813	0.000	$y = -0.0116x^2 + 0.6201x - 1.8791$	0.129	0.333	$y = 1.9511x^2 - 118.32x + 1990.8$	0.591	0.001
IRBLTA-2Pi	III	NPK	8/12/2016	10/11/2016	60	$y = 0.6429x^2 - 38.051x + 839.69$	0.199	0.135	$y = -0.0132x^2 + 0.7225x - 3.6611$	0.062	0.564	$y = -0.1496x^2 + 5.1356x + 204.85$	0.135	0.271
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 2.0711x^2 - 118.42x + 1942.6$	0.217	0.111	$y = -0.001x^2 + 0.0466x + 6.189$	0.003	0.974	$y = 2.6997x^2 - 152.83x + 2398.1$	0.370	0.020
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 17.968x^2 - 1005.7x + 14304$	0.759	0.000	$y = -0.0766x^2 + 4.2444x - 51.854$	0.130	0.285	$y = 13.408x^2 - 753.11x + 10803$	0.692	0.000
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 2.6966x^2 - 157.65x + 2571.1$	0.234	0.091	$y = 0.0015x^2 - 0.1386x + 8.6824$	0.428	0.007	$y = 2.7725x^2 - 165.38x + 2666.7$	0.468	0.003
Nerica 4	I	0	12/11/2015	1/28/2016	48	$y = 1.1558x^2 - 64.09x + 1143.2$	0.421	0.003	$y = -0.0332x^2 + 1.6494x - 13.968$	0.335	0.014	$y = -0.8069x^2 + 33.319x - 93$	0.418	0.003
Nerica 4	I	0	12/11/2015	2/22/2016	73	$y = 2.043x^2 - 119.01x + 2009.4$	0.049	0.591	$y = -0.0025x^2 + 0.1617x + 3.5766$	0.020	0.812	$y = 1.893x^2 - 109.51x + 1809.6$	0.038	0.664
Nerica 4	I	0	12/11/2015	2/23/2016	74	$y = 6.3238x^2 - 368.92x + 5646.7$	0.601	0.000	$y = 0.031x^2 - 1.7186x + 29.885$	0.210	0.084	$y = 6.6782x^2 - 358.42x + 4995.4$	0.744	0.000
Nerica 4	II	NPK	4/25/2016	6/20/2016	56	$y = 4.1681x^2 - 228.61x + 3387.6$	0.836	0.000	$y = 0.0421x^2 - 2.1755x + 33.893$	0.573	0.001	$y = 8.2097x^2 - 473.71x + 7046.7$	0.522	0.000
Nerica 4	II	NPK	4/25/2016	6/21/2016	57	$y = 0.4318x^2 - 26.793x + 668.94$	0.439	0.013	$y = 0.0007x^2 - 0.0355x + 6.4357$	0.003	0.974	$y = 0.4708x^2 - 28.998x + 639.26$	0.390	0.025
Nerica 4	II	NPK	4/25/2016	6/23/2016	59	$y = 1.4953x^2 - 84.492x + 1439.2$	0.853	0.000	$y = -0.0223x^2 + 1.2282x - 10.765$	0.263	0.101	$y = 0.164x^2 - 11.326x + 383.85$	0.290	0.077
Nerica 4	III	NPK	8/12/2016	9/20/2016	39	$y = -0.2659x^2 + 11.736x + 128.67$	0.113	0.341	$y = -0.0112x^2 + 0.6055x - 1.933$	0.122	0.312	$y = -0.9349x^2 + 47.73x - 400.23$	0.139	0.259
Nerica 4	III	NPK	8/12/2016	9/21/2016	40	$y = 1.8166x^2 - 107.15x + 1814.4$	0.494	0.002	$y = 0.018x^2 - 1.0328x + 20.962$	0.175	0.177	$y = 2.8896x^2 - 168.96x + 2652.1$	0.595	0.000
Nerica 4	III	NPK	8/12/2016	10/11/2016	60	$y = 0.8815x^2 - 53.924x + 1087.7$	0.677	0.000	$y = -0.0283x^2 + 1.5187x - 14.378$	0.444	0.005	$y = -0.8112x^2 + 36.857x - 187.07$	0.749	0.000
Nerica 4	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 3.9465x^2 - 221.71x + 3354.2$	0.186	0.157	$y = -0.0579x^2 + 3.1643x - 36.669$	0.244	0.081	$y = 0.4833x^2 - 32.684x + 747.19$	0.315	0.033
Nerica 4	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 15.103x^2 - 843.37x + 12001$	0.615	0.000	$y = 0.0307x^2 - 1.7309x + 30.784$	0.184	0.160	$y = 17.929x^2 - 1002.5x + 14199$	0.678	0.000
Nerica 4	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 2.7098x^2 - 165.01x + 2767.1$	0.687	0.000	$y = 0.009x^2 - 0.5548x + 14.3$	0.534	0.001	$y = 3.2384x^2 - 197.97x + 3204$	0.780	0.000
Mean							**0.467**			**0.238**			**0.412**	
Median							**0.478**			**0.208**			**0.391**	

Table S1.3 Solar radiation dependent variation in Eh, pH and Eh@pH7 for four rice varieties (IDSA 6, Azucena, IRBLTA2Pi, Nerica4). Regression equations over time and strength of the relationship (P and R^2 values) are given for each variety, for each day of measurement in each of four seasons (I to IV). Corresponding fertilization, sowing times, measurement dates and plant ages (DAS) are indicated. Overall mean and median of R^2 values are indicated. Measurements were made on the middle part of the last photosynthetically active leaf of the main tiller.

Variety	Season	Fertilization	Sowing Date	Date	DAS	Regression Eh vs radiation	R2 Eh vs radiation	P Eh vs radiation	Regression pH vs radiation	R2 pH vs radiation	P pH vs radiation	Regression Eh(pH7) vs radiation	R2 Eh(pH7) vs radiation	P Eh(pH7) vs radiation
IDSA 6	I	0	12/11/2015	1/28/2016	48	$y = 0.0554x^2 - 3.1385x + 297.92$	0.622	0.000	$y = -3E-05x^2 + 0.0094x + 6.5044$	0.285	0.030	$y = 0.0541x^2 - 2.5988x + 268.91$	0.339	0.013
IDSA 6	I	0	12/11/2015	2/22/2016	73	$y = 0.0145x^2 - 1.7516x + 307.52$	0.617	0.000	$y = -9E-05x^2 + 0.0075x + 6.103$	0.124	0.250	$y = 0.0089x^2 - 1.2935x + 253.84$	0.557	0.000
IDSA 6	I	0	12/11/2015	2/23/2016	74	$y = 0.0028x^2 - 0.658x + 292.99$	0.544	0.000	$y = -0.0001x^2 + 0.0154x + 6.0414$	0.719	0.000	$y = -0.0051x^2 + 0.2526x + 235.86$	0.139	0.208
IDSA 6	II	NPK	4/25/2016	6/20/2016	56	$y = 0.0231x^2 - 2.1135x + 296.85$	0.703	0.000	$y = -0.0001x^2 + 0.0083x + 5.7984$	0.378	0.022	$y = 0.0161x^2 - 1.6528x + 225.91$	0.657	0.000
IDSA 6	II	NPK	4/25/2016	2/21/2016	57	$y = 0.0116x^2 - 1.0876x + 277.44$	0.321	0.055	$y = -0.0001x^2 + 0.0077x + 6.0016$	0.305	0.065	$y = 0.0052x^2 - 0.6609x + 218.5$	0.289	0.077
IDSA 6	II	NPK	4/25/2016	2/23/2016	59	$y = 0.0057x^2 - 0.8324x + 288.88$	0.629	0.001	$y = -3E-05x^2 + 0.0037x + 5.8482$	0.096	0.467	$y = 0.0043x^2 - 0.6478x + 221.02$	0.300	0.069
Azucena	III	NPK	8/12/2016	9/20/2016	39	$y = 0.0042x^2 - 0.7209x + 271.29$	0.520	0.001	$y = 4E-05x^2 - 0.0053x + 6.1962$	0.223	0.117	$y = 0.0062x^2 - 1.0531x + 224.07$	0.516	0.002
Azucena	III	NPK	8/12/2016	9/21/2016	40	$y = 0.0108x^2 - 1.0544x + 273.3$	0.421	0.007	$y = -2E-05x^2 + 0.0007x + 6.1144$	0.082	0.482	$y = 0.0105x^2 - 1.0867x + 221.12$	0.438	0.007
Azucena	III	NPK	8/12/2016	10/11/2016	60	$y = 0.0148x^2 - 0.8825x + 290.46$	0.227	0.112	$y = 5E-05x^2 - 0.0016x + 5.8598$	0.012	0.902	$y = 0.0187x^2 - 1.0446x + 223.13$	0.200	0.150
Azucena	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 0.0193x^2 - 1.3272x + 266.63$	0.380	0.014	$y = -0.0001x^2 + 0.0059x + 6.3716$	0.033	0.764	$y = 0.0093x^2 - 0.9406x + 229.35$	0.353	0.031
Azucena	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 0.0158x^2 - 1.3132x + 280.66$	0.702	0.000	$y = -5E-05x^2 + 0.0009x + 6.5649$	0.015	0.873	$y = 0.0127x^2 - 1.2637x + 254.8$	0.512	0.002
Azucena	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 0.0191x^2 - 1.5737x + 295.59$	0.739	0.000	$y = 0.0001x^2 - 0.0097x + 5.9108$	0.708	0.000	$y = 0.0279x^2 - 2.1856x + 230.69$	0.830	0.000
IRBLTA-2Pi	I	0	12/11/2015	1/28/2016	48	$y = 0.0525x^2 - 3.0861x + 309.61$	0.714	0.000	$y = -6E-05x^2 + 0.0094x + 6.4286$	0.435	0.002	$y = 0.0491x^2 - 2.5533x + 276.14$	0.525	0.000
IRBLTA-2Pi	I	0	12/11/2015	2/22/2016	73	$y = 0.0109x^2 - 1.2108x + 296.8$	0.341	0.013	$y = -6E-05x^2 + 0.0069x + 6.1186$	0.153	0.174	$y = 0.0069x^2 - 0.7866x + 243.94$	0.191	0.108
IRBLTA-2Pi	I	0	12/11/2015	2/23/2016	74	$y = 0.0118x^2 - 1.3414x + 302.65$	0.620	0.000	$y = -9E-05x^2 + 0.0106x + 6.1525$	0.308	0.021	$y = 0.0065x^2 - 0.7149x + 252.13$	0.248	0.050
IRBLTA-2Pi	II	NPK	4/25/2016	6/20/2016	56	$y = 0.0341x^2 - 2.0506x + 292.88$	0.602	0.001	$y = 0.0002x^2 - 0.0105x + 6.3368$	0.247	0.104	$y = 0.0451x^2 - 2.6961x + 253.73$	0.647	0.000
IRBLTA-2Pi	II	NPK	4/25/2016	6/21/2016	57	$y = 0.0118x^2 - 1.2819x + 286.19$	0.578	0.002	$y = 2E-05x^2 - 0.002x + 6.0622$	0.011	0.921	$y = 0.0133x^2 - 1.4309x + 230.86$	0.422	0.016
IRBLTA-2Pi	II	NPK	4/25/2016	6/23/2016	59	$y = 0.0096x^2 - 1.1939x + 288.15$	0.525	0.004	$y = 3E-05x^2 - 0.0023x + 6.1964$	0.160	0.269	$y = 0.0116x^2 - 1.3605x + 240.83$	0.437	0.013
IRBLTA-2Pi	III	NPK	8/12/2016	9/20/2016	39	$y = 0.0095x^2 - 1.1619x + 267.03$	0.357	0.019	$y = -0.0002x^2 + 0.0156x + 6.1105$	0.253	0.084	$y = -0.0005x^2 - 0.2236x + 214.3$	0.283	0.059
IRBLTA-2Pi	III	NPK	8/12/2016	9/21/2016	40	$y = 0.0172x^2 - 1.6937x + 279.22$	0.784	0.000	$y = 0.0205x^2 - 1.9966x + 243.07$	0.566	0.674	$y = 0.0205x^2 - 1.9966x + 243.07$	0.566	0.001
IRBLTA-2Pi	III	NPK	8/12/2016	10/11/2016	60	$y = 0.0027x^2 - 0.4662x + 288.47$	0.152	0.228	$y = -2E-05x^2 + 0.0006x + 6.1731$	0.002	0.980	$y = 0.0022x^2 - 0.4694x + 239.59$	0.119	0.320
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 0.0302x^2 - 1.799x + 271.9$	0.577	0.000	$y = -0.0003x^2 + 0.0149x + 6.6593$	0.330	0.033	$y = 0.0123x^2 - 0.8827x + 251.5$	0.389	0.015
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 0.0226x^2 - 1.8196x + 284.14$	0.574	0.000	$y = -0.0002x^2 + 0.0068x + 6.7725$	0.124	0.305	$y = 0.0126x^2 - 1.4222x + 270.63$	0.528	0.001
IRBLTA-2Pi	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 0.0132x^2 - 0.9876x + 282.39$	0.365	0.017	$y = 1E-06x^2 - 0.003x + 6.0025$	0.285	0.049	$y = 0.0135x^2 - 1.1945x + 222.97$	0.531	0.001
Nerica 4	I	0	12/11/2015	1/28/2016	48	$y = 0.0659x^2 - 3.5694x + 303.4$	0.626	0.000	$y = 6E-05x^2 + 9E-05x + 6.3453$	0.044	0.625	$y = 0.0698x^2 - 3.5997x + 265.14$	0.451	0.002
Nerica 4	I	0	12/11/2015	2/22/2016	73	$y = 0.014x^2 - 1.4338x + 300.38$	0.417	0.003	$y = -1E-05x^2 + 0.0012x + 6.1354$	0.003	0.967	$y = 0.0131x^2 - 1.3572x + 248.64$	0.336	0.014
Nerica 4	I	0	12/11/2015	2/23/2016	74	$y = 0.01x^2 - 1.1668x + 296.66$	0.700	0.000	$y = -3E-05x^2 + 0.003x + 6.0542$	0.050	0.583	$y = 0.0083x^2 - 1x + 240.32$	0.552	0.000
Nerica 4	II	NPK	4/25/2016	6/20/2016	56	$y = 0.0321x^2 - 2.3568x + 294.59$	0.812	0.000	$y = -8E-05x^2 + 0.0049x + 5.8943$	0.067	0.574	$y = 8.2097x^2 - 473.71x + 7046.7$	0.522	0.000
Nerica 4	II	NPK	4/25/2016	6/21/2016	57	$y = 0.0076x^2 - 0.8093x + 272.03$	0.440	0.013	$y = -7E-07x^2 - 5E-05x + 5.9895$	0.002	0.988	$y = 0.0078x^2 - 0.8471x + 212.38$	0.422	0.016
Nerica 4	II	NPK	4/25/2016	6/23/2016	59	$y = 0.0055x^2 - 0.7754x + 273.68$	0.673	0.000	$y = -6E-05x^2 + 0.0073x + 5.8662$	0.170	0.246	$y = 0.0021x^2 - 0.3785x + 206.95$	0.257	0.108
Nerica 4	III	NPK	8/12/2016	9/20/2016	39	$y = 0.0087x^2 - 1.0765x + 266.5$	0.416	0.008	$y = -2E-05x^2 + 0.0009x + 6.2094$	0.171	0.185	$y = 0.0074x^2 - 1.032x + 219.74$	0.491	0.002
Nerica 4	III	NPK	8/12/2016	9/21/2016	40	$y = 0.0059x^2 - 0.8587x + 259.75$	0.476	0.003	$y = 3E-05x^2 - 0.0039x + 6.2604$	0.077	0.485	$y = 0.0078x^2 - 1.1135x + 215.87$	0.493	0.002
Nerica 4	III	NPK	8/12/2016	10/11/2016	60	$y = 0.0282x^2 - 1.9562x + 295.47$	0.737	0.000	$y = -2E-05x^2 - 0.001x + 5.9461$	0.056	0.594	$y = 0.0278x^2 - 2.0745x + 233.24$	0.664	0.000
Nerica 4	IV	Hoagland	12/2/2016	1/10/2017	39	$y = 0.2251x^2 - 6.3728x + 284.2$	0.632	0.011	$y = -0.0026x^2 + 0.0558x + 6.2402$	0.543	0.420	$y = 0.0708x^2 - 3.0417x + 239.06$	0.504	0.030
Nerica 4	IV	Hoagland	12/2/2016	1/11/2017	40	$y = 0.023x^2 - 1.5112x + 268.61$	0.507	0.002	$y = 7E-06x^2 - 0.004x + 6.4865$	0.250	0.075	$y = 0.024x^2 - 1.761x + 237.59$	0.536	0.001
Nerica 4	IV	Hoagland	12/2/2016	1/30/2017	59	$y = 0.0181x^2 - 1.6745x + 290.43$	0.823	0.000	$y = 0.0001x^2 - 0.0078x + 5.8651$	0.446	0.005	$y = 0.0247x^2 - 2.1666x + 222.82$	0.859	0.000
Mean							**0.552**			**0.215**			**0.447**	
Median							**0.577**			**0.165**			**0.471**	

Table S2. Means and pairwise comparisons of Eh, pH and Eh@pH7 for three leaf parts (Base, Middle, Tip) in three growing seasons (II to IV) for increasing plant age (DAS from 40 to 80) and two water managements (Upland = aerobic; Lowland = anaerobic).

Rice plants of variety Nerica4 (seasons II and III) and IR64 (season IV) were sown in 25 April 2016, 12 August 2016 and 02 December 2016 in season I to IV, respectively, fertilized with NPK in seasons II to III and Hoagland's solution in season IV. Measurements were made on the last photosynthetically active leaf of the main tiller in seasons II and III, and on the last photosynthetically active leaf (leaf 2) and the leaf emerged two leaves earlier (leaf 4) for the main tiller, tiller 1 and tiller 2 in season IV. When data were collected on different leaves, pooled data are also analyzed (leaf 2 and leaf 4 in season 4). Mean temperature and solar radiation intensity at the day of measurement are indicated. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test).

Season II: Nerica 4

Leaf part	DAS	Water management	N	Eh (mV) Mean		Pr>Diff	pH Mean		Pr>Diff	Eh@pH7 (mV) Mean		Pr>Diff	Temperature (°C)	Solar Radiation (W/m2)
Base	61	Upland	4	304.3	a	0.264	5.89	b	< 0.0001	239.0	a	0.938	30.57 a	62.11 a
		Lowland	4	289.9	a		6.15	a		238.0	a		30.75 a	58.45 a
	80	Upland	3	307.9	a	0.598	5.50	a	0.363	217.9	a	0.438	30.60 a	47.83 a
		Lowland	3	317.5	a		5.57	a		231.7	a		30.73 a	47.71 a
Middle	61	Upland	4	263.2	a	0.411	6.03	a	<0.0001	205.4	a	0.338	30.80 a	62.11 a
		Lowland	4	272.6	a		5.67	b		192.5	a		30.55 a	58.45 a
	80	Upland	3	285.7	a	0.112	5.50	a	0.198	195.5	a	0.556	30.80 a	47.83 a
		Lowland	3	297.2	a		5.38	a		199.8	a		30.67 a	47.71 a
Tip	61	Upland	4	274.1	a	0.013	5.62	b	0.000	191.7	a	0.803	30.80 a	62.11 a
		Lowland	4	245.7	b		6.05	a		188.8	a		30.75 a	58.45 a
	80	Upland	3	278.8	a	0.914	5.34	b	0.043	178.8	a	0.133	30.80 a	47.83 a
		Lowland	3	279.5	a		5.54	a		191.7	a		30.67 a	47.71 a
Leaf	**61**	**Upland**	**12**	**279.9**	**a**	**0.268**	**5.96**	**a**	**0.220**	**210.9**	**a**	**0.712**	**30.65 a**	**62.11 a**
		Lowland	**12**	**269.4**	**a**		**5.85**	**a**		**206.8**	**a**		**30.68 a**	**58.45 a**
	80	**Upland**	**3**	**290.8**	**a**	**0.426**	**5.45**	**a**	**0.369**	**197.4**	**a**	**0.314**	**30.69 a**	**47.83 a**
		Lowland	**9**	**298.1**	**a**		**5.50**	**a**		**207.7**	**a**		**30.73 a**	**47.71 a**

Season II: Nerica 4

Leaf part	Water management	DAS	N	Eh (mV) Mean		Pr>Diff	pH Mean		Pr>Diff	Eh@pH7 (mV) Mean		Pr>Diff	Temperature (°C)	Solar Radiation (W/m2)
Base	Upland	61	4	304.3	a	0.775	5.89	a	0.001	238.0	a	0.174	30.57 a	62.11 a
		80	3	307.9	a		5.50	b		217.9	a		30.60 a	47.83 b
	Lowland	61	4	290.0	a	0.14	6.15	a	< 0.0001	239.0	a	0.643	30.75 a	58.48 a
		80	3	317.5	a		5.57	b		231.7	a		30.73 a	47.71 a
Middle	Upland	61	4	263.2	a	0.072	6.04	a	0.000	205.4	a	0.439	30.80 a	62.11 a
		80	3	285.5	a		5.50	b		195.5	a		30.80 a	47.83 b
	Lowland	61	4	272.6	b	0.042	5.67	a	0.006	192.5	a	0.515	30.55 a	58.48 a
		80	3	297.2	a		5.38	b		199.8	a		30.67 a	47.71 a
Tip	Upland	61	4	274.1	a	0.519	5.62	a	0.005	191.7	a	0.155	30.80 a	62.11 a
		80	3	278.8	a		5.34	b		178.8	a		30.67 a	47.83 b
	Lowland	61	4	245.7	b	0.016	6.05	a	0.000	188.8	a	0.821	30.75 a	58.48 a
		80	3	279.7	a		5.54	b		191.7	a		30.80 a	47.71 a
	Lowland	61	4	290.0	a	0.14	6.15	a	< 0.0001	239.0	a	0.643	30.75 a	58.48 a
		80	3	317.5	a		5.57	b		231.7	a		30.73 a	47.71 a
Middle	Upland	61	4	263.2	a	0.072	6.04	a	0.000	205.4	a	0.439	30.80 a	62.11 a
		80	3	285.5	a		5.50	b		195.5	a		30.80 a	47.83 b
	Lowland	61	4	272.6	b	0.042	5.67	a	0.006	192.5	a	0.515	30.55 a	58.48 a
		80	3	297.2	a		5.38	b		199.8	a		30.67 a	47.71 a
	Upland	61	4	274.1	a	0.519	5.62	a	0.005	191.7	a	0.155	30.80 a	62.11 a
Leaf	**Upland**	**61**	**12**	**279.9**	**a**	**0.226**	**5.85**	**a**	**< 0.0001**	**210.9**	**a**	**0.200**	**30.65 a**	**62.11 a**
		80	**9**	**290.8**	**a**		**5.48**	**b**		**197.4**	**a**		**30.69 a**	**47.83 b**
	Lowland	**61**	**12**	**269.4**	**b**	**0.01**	**5.96**	**a**	**<0.0001**	**206.8**	**a**	**0.934**	**30.68 a**	**58.48 a**
		80	**9**	**298.1**	**a**		**5.50**	**b**		**207.7**	**a**		**30.73 a**	**47.71 a**

Season IV: IR 64

Leaf part	DAS	Leaf	N	Eh (mV) Mean		Pr>Diff	pH Mean		Pr>Diff	Eh@pH7 (mV) Mean		Pr>Diff	Temperature (°C)	Solar Radiation (W/m2)
Base	55	L2	3	237.4	a	0.581	6.53	a	0.006	209.0	a	0.441	31.77 a	41.78 b
		L4	3	231.4	a		6.24	b		185.4	b		32.20 a	63.39 a
Middle	55	L2	3	216.1	a	0.071	6.37	a	0.029	178.2	a	0.622	32.10 a	41.78 b
		L4	3	205.3	a		6.09	b		150.2	b		32.27 a	63.39 a
Tip	55	L2	3	191.5	a	0.441	6.19	a	0.155	142.6	a	0.155	32.03 a	41.78 b
		L4	3	177.1	a		5.98	b		115.4	a		32.17 a	63.39 a
Leaf	**55**	**L2**	**9**	**215.0**	**a**	**0.135**	**6.36**	**a**	**< 0.0001**	**176.6**	**a**	**0.001**	**32.21 a**	**41.78 b**
		L4	**9**	**204.6**	**a**		**6.10**	**b**		**150.3**	**b**		**31.97 a**	**63.39 a**

Table S3.1. Intra-plant spatial variability of leaf Eh, pH and Eh@pH7 in season II on 40-41 DAS-old plants. Means over 4 plants, standard deviation and rankings based on pairwise comparisons depending on leaf position (Leaf 2 to 10) on five tillers (main and 1 to 4). Across tillers, leaves of the same ages are pooled into 5 age classes (1 to 5 from youngest to oldest), with corresponding mean, standard deviation and ranking. Plants of the rice variety Nerica4 were sown in 17th August 2016, then grown in aerobic conditions, fertilized with NPK. Measurements were made on the middle part of the leaf. Mean temperature was 29.2°C and mean solar radiation intensity was 46.2W/m2. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season II 17 August 2016   40-41 DAS   n=4   Nerica 4   Upland   NPK   Mean temp: 29.2°C   Mean solar radiation : 46.2W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 11				Leaf 8				Leaf 7				Leaf 6				Leaf 5				Younguest			
Leaf 10	239.9	6.8	ab	Leaf 7	240.7	13.8	ab	Leaf 6	253.5	1.1	ab	Leaf 5	260.1	19.0	ab	Leaf 4	252.1	2.5	ab	1	249.2	11.3	ab
Leaf 9	239.7	3.2	ab	Leaf 6	231.2	7.5	b	Leaf 5	258.6	13.1	ab	Leaf 4	250.2	20.6	ab	Leaf 3	241.3	4.8	ab	2	244.2	15.1	b
Leaf 8	242.3	10.7	ab	Leaf 5	247.1	14.1	ab	Leaf 4	256.0	6.3	ab	Leaf 3	257.8	24.3	ab	Leaf 2	267.0	2.5	a	3	254.1	14.2	ab
Leaf 7	235.2	12.7	ab	Leaf 4	261.8	10.1	ab	Leaf 3	257.2	14.8	ab	Leaf 2	260.7	13.7	ab	Leaf 1				4	253.7	17.1	ab
Leaf 6	264.9	12.0	ab	Leaf 3	245.4	6.1	ab	Leaf 2	263.8	13.7	ab	Leaf 1								5	259.8	14.3	a
Leaf 5				Leaf 2				Leaf 1												Oldest			

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Tiller 4	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 11				Leaf 8				Leaf 7				Leaf 6				Leaf 5				Younguest			
Leaf 10	6.30	0.03	a	Leaf 7	6.30	0.07	a	Leaf 6	6.29	0.10	a	Leaf 5	6.29	0.02	a	Leaf 4	6.32	0.13	a	1	6.30	0.05	a
Leaf 9	6.15	0.12	ab	Leaf 6	6.07	0.05	abc	Leaf 5	6.08	0.13	abc	Leaf 4	6.18	0.14	ab	Leaf 3	6.18	0.16	ab	2	6.13	0.12	b
Leaf 8	5.96	0.09	bcd	Leaf 5	5.97	0.04	bcd	Leaf 4	5.99	0.12	bcd	Leaf 3	5.99	0.12	bcd	Leaf 2	6.02	0.05	bcd	3	5.98	0.09	c
Leaf 7	5.97	0.02	bcd	Leaf 4	5.87	0.08	cd	Leaf 3	5.92	0.05	bcd	Leaf 2	5.85	0.12	cd	Leaf 1				4	5.91	0.08	d
Leaf 6	5.77	0.15	d	Leaf 3	5.83	0.06	cd	Leaf 2	5.92	0.01	bcd	Leaf 1								5	5.82	0.12	e
Leaf 5				Leaf 2				Leaf 1												Oldest			

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 11				Leaf 8				Leaf 7				Leaf 6				Leaf 5				Younguest			
Leaf 10	197.9	7.4	ab	Leaf 7	198.7	12.3	ab	Leaf 6	211.0	5.9	ab	Leaf 5	217.6	12.8	a	Leaf 4	211.4	5.2	ab	1	207.3	11.2	a
Leaf 9	188.6	10.4	ab	Leaf 6	175.9	8.4	ab	Leaf 5	203.6	16.0	ab	Leaf 4	200.9	32.2	ab	Leaf 3	192.0	14.1	ab	2	192.8	19.1	b
Leaf 8	180.3	11.3	ab	Leaf 5	185.6	12.2	ab	Leaf 4	195.8	6.9	ab	Leaf 3	197.2	23.4	ab	Leaf 2	209.1	9.5	ab	3	192.2	15.9	b
Leaf 7	173.6	13.1	b	Leaf 4	194.0	10.4	ab	Leaf 3	192.8	12;8	ab	Leaf 2	184.5	11.3	ab	Leaf 1				4	189.2	13.7	b
Leaf 6	191.3	3.7	ab	Leaf 3	175.1	12.4	ab	Leaf 2	199.2	12.9	ab	Leaf 1								5	186.3	11.8	b
Leaf 5				Leaf 2				Leaf 1												Oldest			

Table S3.2. Intra-plant spatial variability of leaf Eh, pH and Eh@pH7 in season II on 61-64 DAS-old plants. Means over 4 plants, standard deviation and rankings based on pairwise comparisons depending on leaf position (Leaf 3 to 12) on five tillers (main and 1 to 4). Across tillers, leaves of the same ages are pooled into 6 age classes (1 to 6 from youngest to oldest), with corresponding mean, standard deviation and ranking. Plants of the rice variety Nerica4 were sown in 17 August 2016, then grown in aerobic conditions, fertilized with NPK. Measurements were made on the middle part of the leaf. Mean temperature was 30.2°C and mean solar radiation intensity was 49.9W/m2. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season I 17 August 2016 61-64 DAS n=4 Nerica 4 Upland NPK Mean temp: 30.2°C Mean solar radiation : 49.92W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 12	278.7	28.7	a	Leaf 9	290.7	10.6	a	Leaf 8	280.9	29.0	a	Leaf 7	277.2	35.5	a	Leaf 6	281.0	17.9	a	1	281.7	0.5	a
Leaf 11	252.0	16.1	a	Leaf 8	246.3	9.1	a	Leaf 7	256.2	4.5	a	Leaf 6	253.8	16.8	a	Leaf 5	261.4	9.0	a	2	253.9	11.8	b
Leaf 10	255.0	9.6	a	Leaf 7	253.1	3.1	a	Leaf 6	250.2	13.7	a	Leaf 5	266.1	5.3	a	Leaf 4	254.0	17.2	a	3	255.7	11.3	b
Leaf 9	252.9	9.7	a	Leaf 6	250.9	12.3	a	Leaf 5	247.7	12.3	a	Leaf 4	263.7	18.5	a	Leaf 3	260.7	18.2	a	4	255.2	14.4	b
Leaf 8	251.0	11.1	a	Leaf 5	252.3	11.4	a	Leaf 4	258.8	7.5	a	Leaf 3	260.5	25.0	a	Leaf 2			a	5	254.7	11.8	b
Leaf 7	250.7	18.0	a	Leaf 4	280.4	16.7	a	Leaf 3	274.4	1.0	a	Leaf 2				Leaf 1				6	267.8	19.5	b
Leaf 6				Leaf 3				Leaf 2				Leaf 1								Oldest			

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Tiller 4	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 12	6.56	0.13	a	Leaf 9	6.47	0.15	ab	Leaf 8	6.39	0.05	ab	Leaf 7	6.30	0.14	abc	Leaf 6	6.31	0.11	abc	1	6.40	0.15	a
Leaf 11	6.27	0.18	abc	Leaf 8	6.27	0.13	abc	Leaf 7	6.18	0.07	bcd	Leaf 6	6.06	0.22	cde	Leaf 5	5.96	0.09	de	2	6.15	0.20	b
Leaf 10	5.98	0.11	de	Leaf 7	5.94	0.14	de	Leaf 6	5.90	0.14	def	Leaf 5	5.73	0.16	efg	Leaf 4	5.80	0.24	efg	3	5.87	0.15	c
Leaf 9	5.83	0.10	efg	Leaf 6	5.83	0.12	efg	Leaf 5	5.76	0.09	efg	Leaf 4	5.68	0.15	efg	Leaf 3	5.62	0.15	efg	4	5.75	0.13	d
Leaf 8	5.74	0.08	efg	Leaf 5	5.59	0.09	fg	Leaf 4	5.66	0.06	efg	Leaf 3	5.62	*	efg	Leaf 2				5	5.66	0.10	de
Leaf 7	5.65	0.13	efg	Leaf 4	5.46	0.08	g	Leaf 3	5.51	0.01	fg	Leaf 2				Leaf 1				6	5.55	0.12	e
Leaf 6				Leaf 3				Leaf 2				Leaf 1								Oldest			

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 12	252.3	31.4	a	Leaf 9	258.9	19.5	a	Leaf 8	244.4	28.7	ab	Leaf 7	235.3	41.2	abc	Leaf 6	239.5	26.8	abc	1	246.1	28.4	a
Leaf 11	208.1	24.7	bc	Leaf 8	202.4	13.1	c	Leaf 7	207.1	8.5	bc	Leaf 6	197.2	14.1	c	Leaf 5	199.0	17.1	c	2	202.8	15.2	b
Leaf 10	193.6	11.3	c	Leaf 7	189.7	7.5	c	Leaf 6	184.0	18.4	c	Leaf 5	189.5	10.4	c	Leaf 4	182.1	22.5	c	3	187.8	14.1	c
Leaf 9	182.3	15.6	c	Leaf 6	180.8	14.4	c	Leaf 5	173.2	8.5	c	Leaf 4	175.9	16.6	c	Leaf 3	170.2	17.9	c	4	176.9	13.6	c
Leaf 8	175.3	9.7	c	Leaf 5	167.5	15.0	c	Leaf 4	179.1	6.8	c	Leaf 3	159.6	*	c	Leaf 2				5	172.3	11.6	c
Leaf 7	169.6	10.5		Leaf 4	177.9	1.7	c	Leaf 3	184.5	0.4	c	Leaf 2				Leaf 1				6	176.2	9.1	c
Leaf 6				Leaf 3				Leaf 2				Leaf 1								Oldest			

Table S3.3. Intra-plant spatial variability of leaf Eh, pH and Eh@pH7 in season I on 39-40 DAS-old plants. Means over 4 plants, standard deviation and rankings based on pairwise comparisons of Eh, pH and Eh@pH7 depending on leaf position (Leaf 2 to 8) on four tillers (main and 1 to 3). Across tillers, leaves of the same ages are pooled into 3 age classes (1 to 3 from youngest to oldest), with corresponding mean, standard deviation and ranking. Plants of the rice variety Nerica4 were sown in 11 February 2016, then grown in aerobic conditions, without fertilization. Measurements were made on the middle part of the leaf. Mean temperature was 31.8°C and mean solar radiation intensity was 64.5W/m2. F-value and P of the ANOVA were Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season I   11 February 2016   39-40 DAS   n=4   Nerica 4   Upland   No fertilizer   Mean temp: 31.8°C   Mean solar radiation : 64.5W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 9				Leaf 6				Leaf 5				Leaf 4				Youngest			
Leaf 8	241.6	7.2	a	Leaf 5	252.2	2.0	a	Leaf 4	242.0	6.4	a	Leaf 3	260.0	7.0	a	1	252.1	9.6	a
Leaf 7	241.5	10.4	a	Leaf 4	241.8	6.1	a	Leaf 3	239.7	8.7	a	Leaf 2	251.3	1.1	a	2	243.6	8.2	a
Leaf 6	252.3	14.8	a	Leaf 3	256.7	15.3	a	Leaf 2	244.5	10.0	a	Leaf 1	255.0	10.1	a	3	250.0	12.4	a
Leaf 5				Leaf 2				Leaf 1								Oldest			

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 9				Leaf 6				Leaf 5				Leaf 4				Youngest			
Leaf 8	6.70	0.16	abc	Leaf 5	6.81	0.04	a	Leaf 4	6.72	0.09	ab	Leaf 3	6.79	0.06	a	1	6.75	0.10	a
Leaf 7	6.64	0.11	abc	Leaf 4	6.57	0.11	abc	Leaf 3	6.59	0.07	abc	Leaf 2	6.64	0.12	abc	2	6.61	0.10	b
Leaf 6	6.41	0.05	c	Leaf 3	6.54	0.21	abc	Leaf 2	6.47	0.18	bc	Leaf 1	6.60	0.16	abc	3	6.51	0.16	c
Leaf 5				Leaf 2				Leaf 1								Oldest			

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 9				Leaf 6				Leaf 5				Leaf 4				Youngest			
Leaf 8	223.6	5.8	ab	Leaf 5	240.9	3.7	ab	Leaf 4	225.2	9.4	ab	Leaf 3	247.3	7.6	a	1	234.3	12.6	a
Leaf 7	220.0	15.6	ab	Leaf 4	215.9	2.3	ab	Leaf 3	215.0	10.1	ab	Leaf 2	229.9	7.2	ab	2	222.5	10.8	b
Leaf 6	217.3	13.1	ab	Leaf 3	228.9	27.7	ab	Leaf 2	212.5	20.5	b	Leaf 1	231.2	18.9	ab	3	220.2	20.2	b
Leaf 5				Leaf 2				Leaf 1								Oldest			

Table S3.4. Effect of two opposite soil gradients (T1 = natural; T2 = opposite) on intra-plant spatial variability of leaf and soil Eh, pH and Eh@pH7 in season III for 30 DAS-old plants. Upper and Middle panels are T1 = natural soil gradient; and T2 = opposite soil gradient, respectively. Means over 4 plants, standard deviation and rankings based on pairwise comparisons depending on leaf position (Leaf 1 to 7) on four tillers (main and 1 to 3). Across tillers, leaves of the same ages are pooled into 6 age classes (1 to 6 from youngest to oldest), with corresponding means, standard deviations and ranking. Plants of the rice variety Nerica4 were sown in 19-22 November 2016, then grown in aerobic conditions, fertilized with Hoagland's solution. Measurements were made on the middle part of the leaf. Mean temperature was 29.8 and 29.1°C and mean solar radiation intensity was 35.0 and 31.8W/m2 for T1 and T2, respectively. Lower panel is measurement across 3 soil depths (3, 8 and 13cm) for each of the two soil gradients. Means over 8 pots, standard deviation and rankings based on pairwise comparisons depending on depth. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season III 19-22 November 2016 — 30 DAS — n=4 — Nerica 4 — Upland — Hoagland — T1 = "Natural soil gradient" — Mean temp: 29.8°C — Mean radiation: 35.0 W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 8				Leaf 5				Leaf 4				Leaf 3				Younguest			
Leaf 7	247.6	19.7	bcd	Leaf 4	270.3	16.2	abc	Leaf 3	234.2	7.3	cd	Leaf 2	253.9	12.0	abcd	1	250.2	18.1	b
Leaf 6	220.9	4.9	d	Leaf 3	248.2	21.7	bcd	Leaf 2	245.4	22.7	bcd	Leaf 1	248.7	11.8	bcd	2	240.8	19.3	b
Leaf 5	229.4	16.3	cd	Leaf 2	240.7	22.9	bcd	Leaf 1	270.4	37.4	abc					3	246.8	30.4	b
Leaf 4	240.2	6.6	bcd	Leaf 1	255.9	12.0	abcd									4	248.1	12.3	b
Leaf 3	280.9	17.0	ab													5	280.9	17.0	a
Leaf 2	292.9	5.5	a													6	292.9	5.5	a
																Oldest			

Season III 19-22 November 2016 — 30 DAS — n=4 — Nerica 4 — Upland — Hoagland — T1 = "Natural soil gradient" — Mean temp: 29.8°C — Mean radiation: 35.0 W/m2

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 8				Leaf 5				Leaf 4				Leaf 3				Younguest			
Leaf 7	6.75	0.08	a	Leaf 4	6.68	0.07	a	Leaf 3	6.62	0.14	ab	Leaf 2	6.66	0.11	a	1	6.68	0.11	a
Leaf 6	6.66	0.04	a	Leaf 3	6.61	0.08	ab	Leaf 2	6.55	0.10	abc	Leaf 1	6.34	0.15	cd	2	6.55	0.15	abc
Leaf 5	6.52	0.04	abc	Leaf 2	6.55	0.13	abc	Leaf 1	6.36	0.16	bcd					3	6.49	0.13	bc
Leaf 4	6.48	0.08	abc	Leaf 1	6.23	0.11	d									4	6.40	0.15	c
Leaf 3																5			
Leaf 2																6			
																Oldest			

Season III 19-22 November 2016 — 30 DAS — n=4 — Nerica 4 — Upland — Hoagland — T1 = "Natural soil gradient" — Mean temp: 29.8°C — Mean radiation: 35.0 W/m2

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 8				Leaf 5				Leaf 4				Leaf 3				Younguest			
Leaf 7	232.6	22.2	ab	Leaf 4	251.4	20.3	a	Leaf 3	211.9	8.3	ab	Leaf 2	233.5	18.1	ab	1	231.1	21.1	a
Leaf 6	200.4	2.6	b	Leaf 3	225.0	249.0	ab	Leaf 2	219.1	26.5	ab	Leaf 1	213.4	3.3	ab	2	214.2	18.8	a
Leaf 5	200.8	14.8	b	Leaf 2	214.1	15.4	ab	Leaf 1	223.6	33.8	ab					3	211.8	21.4	a
Leaf 4	209.3	8.5	ab	Leaf 1	215.8	9.0	ab									4	211.5	8.4	a
Leaf 3																5			
Leaf 2																6			
																Oldest			

Season III 19-22 November 2016 — 30 DAS — n=4 — Nerica 4 — Upland — Hoagland — T2 = "Reversed soil gradient" — Mean temp: 29.1°C — Mean radiation: 31.8 W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 8				Leaf 5				Leaf 4				Leaf 3				Younguest			
Leaf 7	243.4	12.5	abc	Leaf 4	245.9	13.5	abc	Leaf 3	245.9	39.7	abc	Leaf 2	250.6	24.3	abc	1	246.4	22.5	bc
Leaf 6	196.7	12.3	c	Leaf 3	236.1	11.0	abc	Leaf 2	240.9	15.4	abc	Leaf 1	245.3	40.2	abc	2	229.7	28.7	c
Leaf 5	214.4	17.1	bc	Leaf 2	249.6	30.8	bc	Leaf 1	245.6	24.8	abc					3	237.5	27.1	bc
Leaf 4	234.6	13.7	bc	Leaf 1												4	234.6	13.7	bc
Leaf 3	274.1	31.8	ab													5	274.1	31.8	ab
Leaf 2	294.8	7.6	a													6	294.8	7.6	a
																Oldest			

Season III 19-22 November 2016 — 30 DAS — n=4 — Nerica 4 — Upland — Hoagland — T2 = "Reversed soil gradient" — Mean temp: 29.1°C — Mean radiation: 31.8 W/m2

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 8				Leaf 5				Leaf 4				Leaf 3				Younguest			
Leaf 7	6.78	0.08	a	Leaf 4	6.66	0.09	ab	Leaf 3	6.77	0.07	abc	Leaf 2	6.51	0.36	abcd	1	6.70	0.16	ab
Leaf 6	6.68	0.07	ab	Leaf 3	6.51	0.08	abcd	Leaf 2	6.62	0.13	abc	Leaf 1	6.37	0.11	cd	2	6.56	0.15	ab
Leaf 5	6.46	0.07	bcd	Leaf 2	6.28	*	d	Leaf 1	6.32	*	d					3	6.41	0.10	b
Leaf 4	6.41	0.08	bcd	Leaf 1												4	6.41	0.08	b
Leaf 3																5			
Leaf 2																6			
																Oldest			

Season III 19-22 November 2016 — 30 DAS — n=4 — Nerica 4 — Upland — Hoagland — T2 = "Reversed soil gradient" — Mean temp: 29.1°C — Mean radiation: 31.8 W/m2

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 8				Leaf 5				Leaf 4				Leaf 3				Younguest			
Leaf 7	230.2	9.5	a	Leaf 4	225.8	18.6	a	Leaf 3	213.2	11.5	a	Leaf 2	203.4	16.8	a	1	220.8	16.0	a
Leaf 6	177.5	9.8	a	Leaf 3	207.7	14.3	a	Leaf 2	218.2	16.1	a	Leaf 1	187.7	6.9	a	2	197.8	20.5	ab
Leaf 5	185.3	19;5	a	Leaf 2	172.0	*	a	Leaf 1	186.4	*	a					3	183.8	16.1	b
Leaf 4	199.3	16;4	a	Leaf 1												4	199.3	16.4	ab
Leaf 3																5			
Leaf 2																6			
																Oldest			

Season III	19-22 November 2016	**30 DAS**	n=8	Soil	Upland	Hoagland			
Soil treatment	Soil depth (cm)	Eh (mV)	Standard deviation	Ranking (5%)	pH	Standard deviation	Ranking (5%)	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
T1 =	3	510	20.1	d	6.40	0.19	a	474	20.0	b
"Natural soil	8	570	11.2	bc	6.16	0.12	b	520	7.2	a
gradient"	13	604	17.4	ab	5.85	0.06	c	536	19.5	a
T2 =	3	593	43.9	ab	5.68	0.18	c	514	37.8	ab
"Reversed	8	608	16.6	ab	5.82	0.14	c	538	16.9	a
soil gradient"	13	538	43.0	cd	6.49	0.20	c	509	51.2	ab

Table S3.5. Effect of two opposite soil gradients (T1 = natural; T2 = opposite) on intra-plant spatial variability of leaf and soil Eh, pH and Eh@pH7 in season III for 58 DAS-old plants. Upper and Middle panels are T1 = natural soil gradient; and T2 = opposite soil gradient, respectively. Means over 3 plants, standard deviation and rankings based on pairwise comparisons depending on leaf position (Leaf 2 to 11) on six tillers (main, Tillers 1 to 3 and Tiller 1.1). Across tillers, leaves of the same ages are pooled into 6 age classes (1 to 6 from youngest to oldest), with corresponding means, standard deviations and ranking. Plants of the rice variety Nerica 4 were sown in 19-22 November 2016, then grown in aerobic conditions, fertilized with Hoagland's solution. Measurements were made on the middle part of the leaf. Mean temperature was 28.9°C and mean solar radiation intensity was 38.2 and 43.4W/m2 for T1 and T2, respectively. Lower panel is measurement across 3 soil depths (3, 8 and 13cm) for each of the two soil gradients. Means over 6 pots, standard deviation and rankings based on pairwise comparisons depending on depth. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season III 19-22 November 2016 — 58 DAS — n=3 — Nerica 4 — Upland — Hoagland — T1 = "Natural soil gradient" — Mean temp: 28.9°C — Mean solar radiation : 38.2 W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1-1	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 12				Leaf 9				Leaf 8				Leaf 7				Leaf 6				Leaf 6				Youngest			
Leaf 11	255.4	21.6	a	Leaf 8	257.7	21.6	a	Leaf 7	256.7	50.4	a	Leaf 6	256.9	2.5	a	Leaf 5	294.4	24.1	a	Leaf 5				1	265.9	23.7	a
Leaf 10	260.1	12.1	a	Leaf 7	268.1	12.8	a	Leaf 6	260.9	9.6	a	Leaf 5	270.6	17.1	a	Leaf 4	262.5	14.0	a	Leaf 4	270.2	5.7	a	2	260.8	11.8	a
Leaf 9	257.1	2.1	a	Leaf 6	257.8	13.3	a	Leaf 5	273.3	2.1	a	Leaf 4	255.9	11.3	a	Leaf 3	262.4	10.9	a	Leaf 3	255.8	15.9	a	3	263.1	9.9	a
Leaf 8	255.0	5.9	a	Leaf 5	259.8	15.7	a	Leaf 4	253.6	2.2	a	Leaf 3	263.1	3.4	a	Leaf 2	297.4	5.4	a	Leaf 2	280.8	13.9	a	4	269.8	17.8	a
Leaf 7	262.3	13.2	a	Leaf 4	260.5	4.0	a	Leaf 3	258.6	2.6	a	Leaf 2	279.6	7.3	a	Leaf 1				Leaf 1				5	259.4	15.5	a
Leaf 6	274.1	30.0	a	Leaf 3				Leaf 2				Leaf 1												6	280.8	18.5	a
Leaf 5				Leaf 2				Leaf 1																Oldest			

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Tiller 4	pH	Standard deviation	Ranking (5%)	Tiller 1-1	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 12				Leaf 9				Leaf 8				Leaf 7				Leaf 6				Leaf 6				Youngest			
Leaf 11	6.74	0.01	a	Leaf 8	6.69	0.02	a	Leaf 7	6.52	0.15	abc	Leaf 6	6.46	0.02	abcd	Leaf 5	6.57	0.15	ab	Leaf 5				1	6.56	0.18	a
Leaf 10	6.45	0.23	abcd	Leaf 7	6.34	0.16	bcde	Leaf 6	6.23	0.23	defgh	Leaf 5	6.31	0.21	bcdef	Leaf 4	6.18	0.08	defghi	Leaf 4	6.26	0.11	cdefg	2	6.22	0.16	b
Leaf 9	6.17	0.11	defghi	Leaf 6	6.09	0.13	efghi	Leaf 5	6.10	0.06	efghi	Leaf 4	6.00	0.07	fghi	Leaf 3	5.91	0.03	hi	Leaf 3	5.96	0.05	ghi	3	6.02	0.10	c
Leaf 8	6.09	0.02	efghi	Leaf 5	6.02	0.07	efghi	Leaf 4	5.96	0.05	ghi	Leaf 3	5.90	0.13	hi	Leaf 2	5.83	0.08	i	Leaf 2	5.85	0.06	i	4	5.94	0.12	c
Leaf 7	6.08	0.06	efghi	Leaf 4	5.96	0.03	ghi	Leaf 3	5.82	0.07	i	Leaf 2	5.79	0.13	i	Leaf 1				Leaf 1				5	5.93	0.15	c
Leaf 6	5.95	0.04	ghi	Leaf 3				Leaf 2				Leaf 1												6	5.95	0.04	c
Leaf 5				Leaf 2				Leaf 1																Oldest			

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1-1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 12				Leaf 9				Leaf 8				Leaf 7				Leaf 6				Leaf 6				Youngest			
Leaf 11	240.1	20.7	ab	Leaf 8	239.1	23.0	ab	Leaf 7	228.5	50.7	ab	Leaf 6	229.7	6.5	ab	Leaf 5	269.1	20.4	a	Leaf 5				1	239.6	26.1	a
Leaf 10	227.4	24.0	ab	Leaf 7	228.9	20.9	ab	Leaf 6	215.0	6.6	b	Leaf 5	196.3	7.2	ab	Leaf 4	213.7	16.1	b	Leaf 4	226.2	10.7	ab	2	214.2	17.6	b
Leaf 9	207.6	8.5	b	Leaf 6	203.3	16.1	b	Leaf 5	220.0	4.2	b	Leaf 4	197.4	6.3	b	Leaf 3	197.5	9.3	b	Leaf 3	193.7	19.1	b	3	204.4	10.5	b
Leaf 8	200.6	6.9	b	Leaf 5	201.7	0.4	b	Leaf 4	191.5	4.9	b	Leaf 3	207.2	0.3	b	Leaf 2	227.6	2.0	ab	Leaf 2	212.3	10.1	b	4	206.6	14.3	b
Leaf 7	207.5	13.6	b	Leaf 4	198.7	2.3	b	Leaf 3	188.0	6.8	b	Leaf 2				Leaf 1				Leaf 1				5	195.3	16.0	b
Leaf 6	210.5	30.5	b	Leaf 3				Leaf 2				Leaf 1												6	218.2	17.4	b
Leaf 5				Leaf 2				Leaf 1																Oldest			

Season III 19-22 November 2016   58 DAS   n=3   Nerica 4   Upland   Hoagland   T2 = "Reversed soil gradient"   Mean temp: 28.9°C   Mean solar radiation : 43.4 W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1-1	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 12				Leaf 9				Leaf 8				Leaf 7				Leaf 6				Leaf 6				Youngest			
Leaf 11	246.2	6.4	a	Leaf 8	272.5	28.4	a	Leaf 7	291.3	13.2	a	Leaf 6	275.0	14.1	a	Leaf 5				Leaf 5				1	275.1	21.5	a
Leaf 10	275.8	28.6	a	Leaf 7	261.7	5.8	a	Leaf 6	255.3	11.9	a	Leaf 5	272.0	30.6	a	Leaf 4	257.0	11.4	a	Leaf 4				2	261.9	10.2	a
Leaf 9	255.2	17.6	a	Leaf 6	273.6	9.7	a	Leaf 5	261.4	14.0	a	Leaf 4	255.0	12.1	a	Leaf 3	269.2	20.3	a	Leaf 3	267.9	11.2	a	3	264.4	16.9	a
Leaf 8	250.2	12.9	a	Leaf 5	250.3	4.0	a	Leaf 4	260.8	17.8	a	Leaf 3	248.9	6.6	a	Leaf 2	266.4	2.9	a	Leaf 2	270.1	5.0	a	4	258.4	18.0	a
Leaf 7	251.7	5.6	a	Leaf 4				Leaf 3	260.7	18.5	a	Leaf 2	249.5	6.8	a	Leaf 1	293.7	1.4	a	Leaf 1	293.3	13.5	a	5	256.0	13.4	a
Leaf 6	268.0	4.3	a	Leaf 3				Leaf 2				Leaf 1												6			
Leaf 5				Leaf 2				Leaf 1																Oldest			

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Tiller 4	pH	Standard deviation	Ranking (5%)	Tiller 1-1	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 12				Leaf 9				Leaf 8				Leaf 7				Leaf 6				Leaf 6				Youngest			
Leaf 11	6.53	0.42	a	Leaf 8	6.51	0.27	a	Leaf 7	6.72	0.07	a	Leaf 6	6.52	0.32	a	Leaf 5				Leaf 5				1	6.56	0.23	a
Leaf 10	6.38	0.27	a	Leaf 7	6.29	0.22	a	Leaf 6	6.50	0.14	a	Leaf 5	6.40	0.26	a	Leaf 4	6.62	0.10	a	Leaf 4				2	6.33	0.19	b
Leaf 9	6.21	0.25	a	Leaf 6	6.12	0.19	a	Leaf 5	6.19	0.07	a	Leaf 4	6.20	0.3	a	Leaf 3	6.31	0.3	a	Leaf 3	6.36	*	a	3	6.13	0.16	b
Leaf 8	6.17	0.25	a	Leaf 5	5.93	0.07	a	Leaf 4	6.00	0.07	a	Leaf 3	6.03	0.13	a	Leaf 2	6.09	0.21	a	Leaf 2	6.23	0.46	a	4	6.00	0.09	b
Leaf 7	6.11	0.16	a	Leaf 4				Leaf 3	5.93	0.11	a	Leaf 2	5.98	0.08	a	Leaf 1				Leaf 1				5	5.99	0.12	b
Leaf 6	6.05	0.17	a	Leaf 3				Leaf 2				Leaf 1												6	5.93	*	b
Leaf 5				Leaf 2				Leaf 1																Oldest			

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1-1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 12				Leaf 9				Leaf 8				Leaf 7				Leaf 6				Leaf 6				Youngest			
Leaf 11	218.0	18.7	ab	Leaf 8	243.3	37.8	ab	Leaf 7	274.8	12.8	a	Leaf 6	246.3	33.2	ab	Leaf 5				Leaf 5				1	250.2	29.1	a
Leaf 10	239.1	43.9	ab	Leaf 7	219.6	16.7	ab	Leaf 6	225.7	19.9	ab	Leaf 5	236.3	40.6	ab	Leaf 4	234.6	5.5	ab	Leaf 4				2	21.2	16.7	ab
Leaf 9	208.3	32.3	ab	Leaf 6	221.3	18.2	ab	Leaf 5	213.0	17.3	ab	Leaf 4	207.6	22.8	ab	Leaf 3	228.3	37.1	ab	Leaf 3	234.0	*	ab	3	208.4	17.2	abc
Leaf 8	200.5	26.4	ab	Leaf 5	186.7	7.6	b	Leaf 4	201.2	16.8	ab	Leaf 3	191.2	8.9	ab	Leaf 2	212.6	8.8	ab	Leaf 2	228.8	38.8	ab	4	192.9	12.6	c
Leaf 7	197.1	16.3	ab	Leaf 4				Leaf 3	207.3	11.7	ab	Leaf 2	188.2	11.4	b	Leaf 1				Leaf 1				5	199.2	16.5	bc
Leaf 6	211.4	5.8	ab	Leaf 3				Leaf 2				Leaf 1												6	207.3	*	abc
Leaf 5				Leaf 2				Leaf 1																Oldest			

Season III   19-22 November 2016   **58 DAS**   n=6   Soil   Upland   Hoagland

Soil treatment	Soil depth (cm)	Eh (mV)	Standard deviation	Ranking (5%)	pH	Standard deviation	Ranking (5%)	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
T1 =	3	504	20.1	d	6.69	0.19	a	486	29.9	b
"Natural soil	8	558	40.1	c	6.34	0.37	b	509	56.0	ab
gradient"	13	580	30.0	bc						
T2 =	3	619	17.7	a	5.71	0.14	c	542	18.3	a
"Reversed	8	608	15.1	ab	5.96	0.09	c	546	20.1	a
soil gradient"	13	496	18.4	d						

Table S3.6. Effect of two water management regimes (Upland = aerobic; Lowland = anaerobic) and variety on intra-plant spatial variability of leaf Eh (Upper panel), pH (Middle panel) and Eh@pH7 (Lower panel) in season IV for 43-46 DAS-old plants. Within each panel, data are presented for the two varieties IR64 (in Upland and Lowland managements), and Nerica 4 (in Lowland management). Means over 4 plants, standard deviation and rankings based on pairwise comparisons depending on leaf position (Leaf 2 to 9) on three tillers (main, 1 and 2). Across tillers, leaves of the same ages are pooled into 4 age classes (1 to 4 from youngest to oldest), with corresponding means, standard deviations and ranking. Plants were sown in 13 February 2017 , fertilized with Hoagland's solution. Measurements were made on the middle part of the leaf. Mean temperature was 32.0°C and mean solar radiation intensity was 50.7W/m2. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season IV 13 February 2017 43-46 DAS n=4 IR 64 Upland Hoagland Mean temp: 32.0°C Mean solar radiation : 50.7W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	265.0	13.8	a	Leaf 6	259.2	21.7	a	Leaf 5	258.1	25.8	a	1	260.8	19.3	a
Leaf 8	234.2	7.1	a	Leaf 5	239.0	22.3	a	Leaf 4	233.1	14.8	a	2	235.4	14.7	b
Leaf 7	239.3	14.2	a	Leaf 4	237.3	12.9	a	Leaf 3	239.2	9.3	a	3	238.6	11.2	b
Leaf 6	228.3	9.4	a	Leaf 3	234.7	12.5	a	Leaf 2	255.7	12.5	a	4	240.0	16.3	b
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS n=4 IR 64 Lowland Hoagland Mean temp: 32.0°C Mean solar radiation : 52.4W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	262.5	22.5	a	Leaf 6	252.4	4.2	a	Leaf 5	271.6	21.9	a	1	262.1	18.5	ab
Leaf 8	248.7	7.4	a	Leaf 5	251.5	4.1	a	Leaf 4	252.9	5.7	a	2	251.0	5.6	b
Leaf 7	255.8	8.5	a	Leaf 4	261.2	11.1	a	Leaf 3	253.7	11.4	a	3	256.9	10.0	ab
Leaf 6	274.4	14.9	a	Leaf 3	263.0	14.2	a	Leaf 2	269.5	14.6	a	4	269.0	14.1	a
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS n=4 Nerica 4 Lowland Hoagland Mean temp: 32.0°C Mean solar radiation : 55.06W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	245.9	6.5	a	Leaf 6	247.4	34.4	a	Leaf 5	236.6	10.0	a	1	243.3	19.6	a
Leaf 8	223.9	8.2	a	Leaf 5	224.1	3.8	a	Leaf 4	227.4	14.9	a	2	225.1	9.2	b
Leaf 7	236.1	11.4	a	Leaf 4	231.8	15.3	a	Leaf 3	234.1	16.3	a	3	234.0	13.2	ab
Leaf 6	237.5	12.8	a	Leaf 3	235.3	18.9	a	Leaf 2	234.5	16.5	a	4	235.7	14.8	ab
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS n=4 IR 64 Upland Hoagland Mean temp: 32.0°C Mean solar radiation : 50.7W/m2

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	6.51	0.07	a	Leaf 6	6.58	0.19	a	Leaf 5	6.55	0.06	a	1	6.55	0.10	a
Leaf 8	6.35	0.17	ab	Leaf 5	6.33	0.14	ab	Leaf 4	6.46	0.13	a	2	6.38	0.14	b
Leaf 7	6.13	0.12	bc	Leaf 4	6.13	0.14	bc	Leaf 3	6.17	0.05	bc	3	6.14	0.11	c
Leaf 6	5.93	0.14	c	Leaf 3	5.94	0.03	c	Leaf 2	5.98	0.07	c	4	5.95	0.08	d
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS n=4 IR 64 Lowland Hoagland Mean temp: 32.0°C Mean solar radiation : 52.4W/m2

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	6.44	0.10	ab	Leaf 6	6.50	0.01	a	Leaf 5	6.55	0.01	a	1	6.50	0.07	a
Leaf 8	6.18	0.13	bcd	Leaf 5	6.23	0.06	bc	Leaf 4	6.11	0.16	cd	2	6.17	0.12	b
Leaf 7	5.87	0.14	de	Leaf 4	5.90	0.16	de	Leaf 3	6.09	0.27	cde	3	5.95	0.21	c
Leaf 6	5.76	0.17	e	Leaf 3	5.88	0.17	de	Leaf 2	5.86	0.17	de	4	5.83	0.16	c
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS n=4 Nerica 4 Lowland Hoagland Mean temp: 32.0°C Mean solar radiation : 55.06W/m2

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	6.49	0.11	a	Leaf 6	6.57	0.1	a	Leaf 5	6.58	0.04	a	1	6.55	0.09	a
Leaf 8	6.14	0.10	b	Leaf 5	6.13	0.08	b	Leaf 4	6.15	0.05	b	2	6.14	0.07	b
Leaf 7	6.02	0.05	b	Leaf 4	6.01	0.05	b	Leaf 3	6.07	0.10	b	3	6.03	0.07	c
Leaf 6	5.98	0.05	b	Leaf 3	5.99	0.13	b	Leaf 2	5.98	0.11	b	4	5.98	0.09	c
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS   n=4 IR 64 Upland Hoagland   Mean temp: 32.0°C   Mean solar radiation : 50.7W/m2

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	235.6	14.5	a	Leaf 6	230.2	24.7	ab	Leaf 5	231.3	27.7	ab	1	232.5	20.5	a
Leaf 8	195.2	14.4	abc	Leaf 5	199.1	29.8	abc	Leaf 4	200.6	18.4	abc	2	198.3	19.9	b
Leaf 7	186.7	16.8	bc	Leaf 4	184.7	19.2	bc	Leaf 3	193.1	9.2	abc	3	187.7	15.0	bc
Leaf 6	165.5	18.8	c	Leaf 3	170.7	14.1	c	Leaf 2	188.5	3.1	abc	4	174.9	15.8	c
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS   n=4 IR 64 Lowland Hoagland   Mean temp: 32.0°C   Mean solar radiation : 52.4W/m2

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	229.0	26.5	ab	Leaf 6	222.2	4.0	abc	Leaf 5	244.7	21.7	a	1	232.0	20.5	a
Leaf 8	199.3	5.5	bc	Leaf 5	205.2	6.9	bc	Leaf 4	199.5	10.8	bc	2	201.3	7.8	b
Leaf 7	187.6	6.3	c	Leaf 4	195.0	15.7	bc	Leaf 3	198.8	9.8	bc	3	198.4	11.3	b
Leaf 6	199.5	16.5	bc	Leaf 3	195.0	10.4	bc	Leaf 2	200.8	17.4	bc	4	193.8	13.9	b
Leaf 5				Leaf 2				Leaf 1				Oldest			

Season IV 13 February 2017 43-46 DAS   n=4 Nerica 4 Lowland Hoagland   Mean temp: 32.0°C   Mean solar radiation : 55.06W/m2

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 10				Leaf 7				Leaf 6				Youngest			
Leaf 9	214.9	5.8	a	Leaf 6	221.6	40.6	a	Leaf 5	211.6	8.5	a	1	216.0	22.3	a
Leaf 8	172.2	11.4	b	Leaf 5	172.1	4.8	b	Leaf 4	176.0	15.3	b	2	175.6	10.4	b
Leaf 7	177.0	13.4	b	Leaf 4	171.8	13.6	b	Leaf 3	177.9	12.0	b	3	174.2	12.1	b
Leaf 6	176.1	10.5	b	Leaf 3	174.0	14.1	b	Leaf 2	172.7	10.2	b	4	173.4	10.7	b
Leaf 5				Leaf 2				Leaf 1				Oldest			

Table S3.7. Field condition intra-plant spatial variability of leaf Eh, pH and Eh@pH7 on 44-46 DAS-old plants of the rice variety Nerica 4 in Upland management in season V. Means over 4 plants, standard deviation and rankings based on pairwise comparisons depending on leaf position (Leaf 1 to 9) on five tillers (main and 1 to 4). Across tillers, leaves of the same ages are pooled into 5 age classes (1 to 5 from youngest to oldest), with corresponding means, standard deviations and ranking. Plants were sown in 20 February 2017, rainfed and fertilized with NPK. Measurements were made on the middle part of the leaf. Mean temperature was 33.0°C and mean solar radiation intensity was 55.6W/m2. Values followed by different letters indicate significant difference between leaf positions at 95% confidence interval (REGW-Q test). Leaf and tiller numbering according to Katayama (1951).

Season V 20 February 2017 44-46 DAS n=4 Nerica 4 Rainfed, field condition, NPK Mean temp: 33°C Mean solar radiation : 55.6W/m2

Main tiller	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh (mV)	Standard deviation	Ranking (5%)
Leaf 9	228.2	21.6	ab	Leaf 6	231.0	2.9	ab	Leaf 5	234.8	7.6	ab	Leaf 4	245.9	17.5	ab	Leaf 3	243.1	0.2	ab	1	244.20	22.60	ab
Leaf 8	223.6	13.9	ab	Leaf 5	236.0	5.2	ab	Leaf 4	256.1	35.1	ab	Leaf 3	246.1	31.5	ab	Leaf 2	256.1	18.4	ab	2	229.90	20.90	b
Leaf 7	207.0	10.8	b	Leaf 4	229.3	6.8	ab	Leaf 3	238.3	25.1	ab	Leaf 2	254.3	28.1	ab	Leaf 1	235.9	4.8	ab	3	242.30	23.20	ab
Leaf 6	219.1	18.9	b	Leaf 3	253.4	12.3	ab	Leaf 2	258.2	20.6	ab	Leaf 1	253.3	16.9	ab					4	255.70	29.30	ab
Leaf 5	237.3	20.4	ab	Leaf 2	264.2	28.9	ab	Leaf 1	282.7	15.4	a									5	250.60	20.20	ab
Leaf 4																				Oldest			

Main tiller	pH	Standard deviation	Ranking (5%)	Tiller 1	pH	Standard deviation	Ranking (5%)	Tiller 2	pH	Standard deviation	Ranking (5%)	Tiller 3	pH	Standard deviation	Ranking (5%)	Tiller 4	pH	Standard deviation	Ranking (5%)	Leaf age class	pH	Standard deviation	Ranking (5%)
Leaf 9	6.53	0.10	a	Leaf 6	6.49	0.21	a	Leaf 5	6.57	0.06	a	Leaf 4	6.57	0.10	a	Leaf 3	6.59	0.13	a	1	6.53	0.08	a
Leaf 8	6.45	0.13	a	Leaf 5	6.40	0.22	a	Leaf 4	6.35	0.23	a	Leaf 3	6.39	0.19	a	Leaf 2	6.28	*	a	2	6.24	0.11	b
Leaf 7	6.21	0.11	a	Leaf 4	6.20	0.13	a	Leaf 3	6.13	0.19	ab	Leaf 2	6.14	0.20	ab	Leaf 1	5.83	0.18	ab	3	6.00	0.21	c
Leaf 6	6.07	0.11	ab	Leaf 3	6.04	0.17	ab	Leaf 2	5.87	0.23	ab	Leaf 1	5.75	0.27	b					4	5.87	0.17	c
Leaf 5	5.81	0.12	ab	Leaf 2	5.86	0.03	ab													5	5.77	0.10	c
Leaf 4																				Oldest			

Main tiller	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 1	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 2	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 3	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Tiller 4	Eh@pH7 (mV)	Standard deviation	Ranking (5%)	Leaf age class	Eh@pH7 (mV)	Standard deviation	Ranking (5%)
Leaf 9	200.1	15.7	a	Leaf 6	200.2	9.5	a	Leaf 5	209.1	4.1	a	Leaf 4	220.2	23.4	a	Leaf 3	218.6	7.5	a	1	216.10	21.80	a
Leaf 8	190.7	21.2	a	Leaf 5	199.8	15.7	a	Leaf 4	217.4	44.4	a	Leaf 3	209.8	35.1	a	Leaf 2	199.9	*	a	2	178.80	12.70	b
Leaf 7	159.3	11.7	a	Leaf 4	181.4	7.1	a	Leaf 3	177.2	10.1	a	Leaf 2	190.1	0.2	a	Leaf 1	165.5	15.9	a	3	179.30	21.30	b
Leaf 6	162.9	21.3	a	Leaf 3	195.6	15.1	a	Leaf 2	202.6	3.1	a	Leaf 1	178.2	26.1	a					4	182.00	31.20	b
Leaf 5	165.7	23.5	a	Leaf 2	193.4	45.8	a	Leaf 1	226.6	*	a									5	166.20	7.40	b
Leaf 4																				Oldest			

Table S.4. Means and pairwise comparisons of Eh, pH and Eh@pH7 for four rice varieties (IDSA 6, Azucena, IRBLTA2Pi, Nerica4) in four growing seasons (I to IV) and increasing plant age (DAS from 39 to 74). When data were collected on successive days, pooled data are also analyzed (e.g. 73-74DAS). Plants were sown in 12 November 2015, 25 April 2016, 12 August 2016 and 02 December in season I to IV, respectively, then grown in aerobic conditions, not fertilized in season I, fertilized with NPK in seasons II and III and Hoagland's solution in season IV. Measurements were made on the middle part of the last photosynthetically active leaf of the main tiller. Mean temperature and solar radiation intensity are indicated. Values followed by different letters indicate significant difference between varieties at 95% confidence interval (REGW-Q test). F and P values of the ANOVA are indicated.

Season I	DAS	n	Varieties IRBLTA-2Pi	IDSA 6	Nerica4	F	P	Mean Temp. (°C)	Mean Solar rad. (Wm-2)
Eh (mV)	48 DAS	10	269.4 a	263.5 a	264.9 a	0.41	0.666	25.63	38.88
	73 DAS	10	267.3 a	256.8 b	269.9 a	10.40	**0.000**	29.57	68.42
	74 DAS	10	267.8 a	261.6 a	267.3 a	1.24	0.306	29.10	71.92
	73-74 DAS	20	267.6 a	259.2 b	268.6 a	7.59	**0.001**	29.37	70.16
pH	48 DAS	10	6.70 a	6.82 a	6.39 b	13.43	**<0.0001**	25.63	38.88
	73 DAS	10	6.28 a	6.19 ab	6.15 b	3.29	0.053	29.57	68.42
	74 DAS	10	6.45 a	6.43 a	6.09 b	14.23	**<0.0001**	29.10	71.92
	73-74 DAS	20	6.37 a	6.31 b	6.12 b	11.92	**<0.0001**	29.37	70.16
Eh@pH7 (mV)	48 DAS	10	251.8 a	252.6 a	228.7 b	4.49	**0.021**	25.63	38.88
	73 DAS	10	224.1 a	208.5 b	218.8 a	6.10	**0.007**	29.57	68.42
	74 DAS	10	235.3 a	228.0 a	213.2 b	6.47	**0.005**	29.10	71.92
	73-74 DAS	20	229.8 a	218.2 b	216.0 b	5.73	**0.005**	29.37	70.16

Season II	DAS	n	Varieties IRBLTA-2Pi	IDSA 6	Nerica4	F	P	Mean Temp. (°C)	Mean Solar rad. (Wm-2)
Eh (mV)	56 DAS	10	262.1 a	259.2 a	255.0 a	1.83	0.181	27.81	30.12
	57 DAS	10	257.2 a	260.1 a	255.7 a	0.35	0.709	29.83	66.42
	59 DAS	10	264.1 a	262.8 a	249.7 b	6.34	**0.006**	29.66	76.56
	56-57-59 DAS	30	261.0 a	260.6 a	253.6 b	5.05	**0.008**	29.10	57.70
pH	56 DAS	10	6.24 a	5.92 b	6.00 b	26.76	**<0.0001**	27.81	30.12
	57 DAS	10	6.04 a	6.00 a	5.97 a	0.46	0.639	29.83	66.42
	59 DAS	10	6.24 a	5.97 b	5.95 b	13.24	**0.000**	29.66	76.56
	56-57-59 DAS	30	6.17 a	5.96 b	5.97 b	19.66	**<0.0001**	29.10	57.70
Eh@pH7 (mV)	56 DAS	10	216.7 a	194.6 b	195.1 b	16.96	**<0.0001**	27.81	30.12
	57 DAS	10	199.5 a	199.4 a	194.0 a	0.48	0.622	29.83	66.42
	59 DAS	10	218.6 a	200.9 b	186.4 c	14.84	**<0.0001**	29.66	76.56
	56-57-59 DAS	30	211.3 a	198.2 b	192.0 b	16.22	**<0.0001**	29.10	57.70

Season III	DAS	n	Varieties IRBLTA-2Pi	Azucena	Nerica4	F	P	Mean Temp. (°C)	Mean Solar rad. (Wm-2)
Eh (mV)	39 DAS	20	243.3 a	247.8 a	239.5 a	1.48	0.245	28.47	53.14
	40 DAS	10	241.8 b	253.8 a	235.7 b	11.83	**0.000**	29.97	49.96
pH	39 DAS	20	6.29 a	6.03 b	6.19 a	7.09	**0.003**	28.47	53.14
	40 DAS	10	6.21 a	6.09 b	6.16 ab	2.90	0.074	29.97	49.96
Eh@pH7 (mV)	39 DAS	20	200.9 a	189.8 a	191.3 a	1.90	0.170	28.47	53.14
	40 DAS	10	195.0 a	199.2 a	185.0 b	4.27	**0.026**	29.97	49.96

Season IV	DAS	n	Varieties IRBLTA-2Pi	Azucena	Nerica4	F	P	Mean Temp. (°C)	Mean Solar rad. (Wm-2)
Eh (mV)	39 DAS	20	250.7 a	246.1 a	240.3 b	4.13	**0.027**	27.43	30.67
	40 DAS	10	254.8 ab	258.4 a	246.9 b	3.67	**0.039**	28.03	26.74
pH	39 DAS	20	6.79 a	6.44 b	6.50 b	23.27	**<0.0001**	27.43	30.67
	40 DAS	10	6.80 a	6.56 b	6.38 c	33.30	**<0.0001**	28.03	26.74
Eh@pH7 (mV)	39 DAS	20	239.0 a	210.6 b	210.2 b	35.86	**<0.0001**	27.43	30.67
	40 DAS	10	242.8 a	231.9 b	210.0 c	17.14	**<0.0001**	28.03	26.74

Table S5.1. Means and pairwise comparisons of Eh, pH and Eh@pH7 in three growing seasons (II, III, IV) for two rice varieties (IRBLTA2Pi, Nerica4) at 59-60 DAS. Plants were sown 25 April 2016 in season II, 12 August 2016 in season III and 02 December in season IV, then grown in aerobic conditions ("upland" management), fertilized with NPK in seasons II to III and Hoagland's solution in season IV. Measurements were made on the middle part of the last photosynthetically active leaf of the main tiller. Values followed by different letters indicate significant difference between seasons at 95% confidence interval (REGW-Q test). F and P values of the ANOVA are indicated.

| | Variety | n | Season | | | F | P |
			Season II	Season III	Season IV		
Eh (mV)	Nerica4	10	249.6 c	265.2 a	256.5 b	12.09	**0.000**
	IRBLTA-2Pi	10	264.1 a	276.8 a	267.2 a	3.08	0.063
pH	Nerica4	10	5.95 a	5.85 b	5.76 c	12.84	**0.000**
	IRBLTA-2Pi	10	6.24 a	6.17 a	5.89 b	37.57	**<0.0001**
Eh@pH7 (mV)	Nerica4	10	186.4 b	196.4 a	182.1 b	6.39	**0.006**
	IRBLTA-2Pi	10	218.6 a	226.8 a	200.5 b	9.68	**0.001**
Temperature (°C)	Nerica4	10	29.71 a	29.25 a	29.43 a	0.69	0.511
	IRBLTA-2Pi	10	29.72 a	29.20 a	29.43 a	0.80	0.459
Solar radiation (W/m2)	Nerica4	10	68.91 a	28.44 b	38.13 b	12.25	**0.000**
	IRBLTA-2Pi	10	77.35 a	27.66 b	34.68 b	15.45	**<0.0001**

Table S5.2.

Means and pairwise comparisons of Eh, pH and Eh@pH7 in two growing seasons (III, IV) for three rice varieties (Azucena, IRBLTA2Pi, Nerica4) at 39-40 DAS. Plants were sown 12 August 2016 in season III and 02 December in season IV, then grown in aerobic conditions, fertilized with NPK in season III and Hoagland's solution in season IV. Measurements were made on the middle part of the last photosynthetically active leaf of the main tiller. Mean temperature and solar radiation intensity are indicated. Values followed by different letters indicate significant difference between varieties at 95% confidence interval (REGW-Q test). F and P values of the ANOVA are indicated.

| | Variety | n | Season | | F | P |
			Season III	Season IV		
Eh (mV)	Nerica4	20	237.6 b	243.6 a	4.10	**0.050**
	Azucena	20	250.8 a	252.3 a	0.25	0.621
	IRBLTA-2Pi	20	242.6 b	252.8 a	9.56	**0.004**
pH	Nerica4	20	6.18 b	6.44 a	55.61	**<0.0001**
	Azucena	20	6.06 b	6.50 a	100.26	**<0.0001**
	IRBLTA-2Pi	20	6.24 b	6.79 a	174.10	**<0.0001**
Eh@pH7 (mV)	Nerica4	20	188.2 b	210.1 a	38.14	**<0.0001**
	Azucena	20	194.2 b	222.4 a	39.29	**<0.0001**
	IRBLTA-2Pi	20	198.1 b	241.0 a	112.49	**<0.0001**
Temperature (°C)	Nerica4	20	29.23 a	27.72 b	12.22	**0.001**
	Azucena	20	29.22 a	27.77 b	12.30	**0.001**
	IRBLTA-2Pi	20	29.21 a	27.70 b	11.91	**0.001**
Solar radiation (W/m2)	Nerica4	20	51.69 a	28.66 b	10.51	**0.002**
	Azucena	20	50.19 a	28.83 b	11.13	**0.002**
	IRBLTA-2Pi	20	51.25 a	29.63 b	10.32	**0.003**

Figure S1. Measurement of leaf Eh and pH in a field laboratory to prevent electromagnetic interference

Eh measurement in leaf
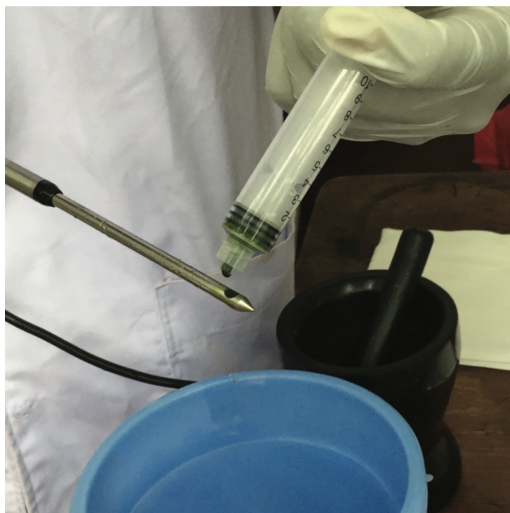
pH measurement in leaf

Field laboratory, free from electromagnetic interference