

Fig. S1. Pairwise correlation matrix of plant stress indicators (red in side bar) and plant health attributes (blue in side bar) in the combined data set (all treatments and genotypes). Abbreviations used: ZnC, shoot zinc concentration; citA, root citrate accumulation; malA, root malate accumulation; citE, total citrate efflux rate; malE, total malate efflux rate; spmalE, active malate efflux; spcitE, active citrate efflux; aaE, total amino acid efflux (leakage); FRL, fine root maintenance; TRM, total root maintenance; RTL, root length; TDW, total dry weight; SDW, shoot dry weight; RDW, root dry weight.

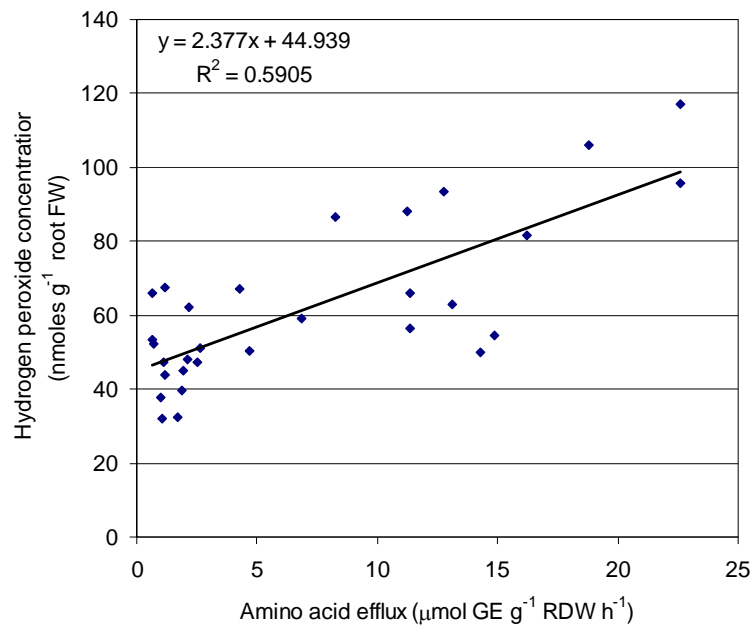


Fig. 2. Relationship between hydrogen peroxide accumulation in roots and amino acid efflux.

Table S1. Average parameter values and statistical significance (*NS* = not significant; *, **, *** = $P < 0.05, 0.01, 0.001$, respectively)

Treatment	Genotype	Root dry weight (g)	Shoot dry weight (g)	Total root length (mm)	Shoot Zn (mg kg ⁻¹)	Total root loss (%)	Fine root loss (%)	Root citrate (μmoles g ⁻¹ RFW)	Root malate (μmoles g ⁻¹ RFW)	Citrate efflux (μmoles g ⁻¹ h ⁻¹ RDW)	Malate efflux (μmoles g ⁻¹ h ⁻¹ RDW)	Amino acid efflux (μmoles g ⁻¹ h ⁻¹ RDW)
Control	Jalmagna	0.09	0.81	7535	42	0	0	6.9	3.6	0.54	0.20	2.07
	RIL46	0.06	0.50	5643	35	0	0	7.2	4.6	0.68	0.20	2.29
	IR74	0.07	0.55	6479	39	0	0	8.5	4.8	0.61	0.16	2.08
	IR36	0.05	0.46	4890	38	0	0	8.1	4.4	0.74	0.20	1.72
Bicarbonate stress	Jalmagna	0.07	0.51	4620	25	43	46	12.2	9.7	0.67	0.20	3.24
	RIL46	0.05	0.39	4450	25	31	31	11.9	10.5	1.33	0.25	4.31
	IR74	0.04	0.33	3009	28	64	65	13.6	8.8	1.27	0.33	5.93
	IR36	0.04	0.35	2580	26	67	69	13.5	9.1	0.79	0.32	5.70
Zn deficiency stress	Jalmagna	0.08	0.66	7571	13	20	20	10.9	14.3	0.26	0.28	1.18
	RIL46	0.05	0.35	4832	11	33	32	9.6	13.3	0.51	0.32	3.07
	IR74	0.05	0.33	4413	12	44	44	11.0	16.5	0.42	0.17	2.03
	IR36	0.05	0.28	3469	11	41	40	10.4	13.1	0.46	0.15	3.99
Dual bicarbonate-Zn stress	Jalmagna	0.05	0.39	2475	14	75	75	13.1	11.8	1.05	0.23	10.72
	RIL46	0.02	0.24	1723	12	86	85	13.6	12.9	0.85	0.27	10.28
	IR74	0.02	0.24	1540	14	92	92	15.3	11.7	0.91	0.33	31.35
	IR36	0.02	0.21	1396	12	89	88	13.2	10.8	1.13	0.28	14.64
<i>Statistical significance</i>	<i>G</i> × <i>T</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	*	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>	*	*
	<i>T</i>	**	*	***	–	<i>NS</i>	***	*	***	<i>NS</i>	–	–
	<i>G</i>	<i>NS</i>	<i>NS</i>	*	–	<i>NS</i>	*	<i>NS</i>	<i>NS</i>	<i>NS</i>	–	–