

Effect on rice (*Oryza sativa* L.) genotypes

The net impact of stress on plant growth

The table shows the effect of individual and combined salt and ozone stress on growth, biomass and ion allocation in rice genotype Pokkali

Crop: Rice (*Oryza sativa* L.) genotypes Pokkali, CSR-1, IR 36, IR 26 and IR 2153
Stress 1: Salinity- 25 or 50 mM of NaCl
Stress 2: Ozone- 88 nmol mol⁻¹
Stage of the plant: Vegetative

Genotypes	Stress treatments	Plant response to stress				Type C parameters*	
		Type A parameters*				Ion concentrations in leaves (mM)#	
		Shoot dry weight	Root dry weight	Plant height	Number of tillers	Na ⁺	K ⁺
Pokkali	Ozone	17.9 ↓	21.1 ↓	15.2 ↓	12.5 ↓	NA	308
	25mM NaCl	41.9 ↓	46.1 ↓	10.3 ↓	30 ↓	NA	313
	25mM NaCl and Ozone	56.4 ↓	39.1 ↓	21.9 ↓	37.5 ↓	NA	279
	50mM NaCl	43.6 ↓	53.9 ↓	23.3 ↓	32.5 ↓	51	264
	50mM NaCl and Ozone	55.9 ↓	52.3 ↓	32.3 ↓	32.5 ↓	72	216
CSR-1	Ozone	6.5 ↓	9.6 ↓	-2.7 ↑	-39.1 ↑	NA	271
	25mM NaCl	50.3 ↓	24.1 ↓	4.6 ↓	13 ↓	NA	287
	25mM NaCl and Ozone	36.6 ↓	42.2 ↓	0.8 ↓	4.3 ↓	NA	249
	50mM NaCl	47.7 ↓	34.9 ↓	8.1 ↓	0	252	242
	50mM NaCl and Ozone	54.2 ↓	47 ↓	16.4 ↓	26.1 ↓	340	186
IR 36	Ozone	6.1 ↓	9.3 ↓	-0.8 ↑	6 ↓	NA	236
	25mM NaCl	53.9 ↓	27.8 ↓	13.9 ↓	40 ↓	NA	265
	25mM NaCl and Ozone	45.4 ↓	39.2 ↓	14.9 ↓	24 ↓	NA	202
	50mM NaCl	52.1 ↓	44.3 ↓	14.2 ↓	46 ↓	197	186
	50mM NaCl and Ozone	40.6 ↓	54.6 ↓	22.9 ↓	34 ↓	55	155
IR 26	Ozone	4.2 ↓	2.2 ↓	16.3 ↓	10.7 ↓	NA	198
	25mM NaCl	35.2 ↓	10.9 ↓	17.4 ↓	35.7 ↓	NA	228
	25mM NaCl and Ozone	40.8 ↓	28.3 ↓	23.2 ↓	35.7 ↓	NA	165
	50mM NaCl	54.9 ↓	13 ↓	32.6 ↓	39.3 ↓	837	144
	50mM NaCl and Ozone	54.9 ↓	28.3 ↓	39.9 ↓	53.6 ↓	357	106
IR 2153	Ozone	5.3 ↓	3.8 ↓	4.7 ↓	0	NA	262
	25mM NaCl	37.1 ↓	26 ↓	25.4 ↓	6.2 ↓	NA	279
	25mM NaCl and Ozone	39.7 ↓	28.8 ↓	27.2 ↓	15.6 ↓	NA	224
	50mM NaCl	48.3 ↓	36.5 ↓	31.4 ↓	12.5 ↓	557	205
	50mM NaCl and Ozone	51.6 ↓	46.1 ↓	37.2 ↓	21.9 ↓	165	165

NA- data not available; Control values for Na⁺ concentration in leaf-NA, K⁺ concentration in leaf- 407(Pokkali), 375(CSR1), 315(IR36), 262(IR26), 311(IR2153).



Reference-

Welfare K, Flowers TJ, Taylor G and Yeo AR (1996). Additive and antagonistic effects of ozone and salinity on the growth, ion contents and gas exchange of five varieties of rice (*Oryza sativa* L.). *Environmental Pollution* 92(3):257-66.

Note:

The values presented in the table were calculated using the formula described below.

$$\text{Reduction over control (\%)} = \frac{(\text{Value Control} - \text{Value Stress})}{\text{Value Control}} \times 100$$

- 1) - indicates plant parameters affected by stress that lead to high susceptibility (higher the value more the damage).
- 2) - indicates plant parameters affected by stress that lead to reduced susceptibility (higher the value less the damage).

‘#’-Values are presented as it is from the source article without subjecting to the calculation.

‘’ - For more information on parameter classification, please refer to the ‘methodology’ tab*

The inference from the study: Welfare et al., 1996 studied the impact of combined salt and ozone treatment on five rice genotypes differing in salt stress sensitivity. Among the five genotypes, Pokkali and CSR-1 are salt-tolerant, IR 2153 and IR 36 are moderately salt- resistant, and IR 26 is salt sensitive. The authors observed that combined salt and ozone stress reduce plant biomass, growth, and tiller number substantially in all genotypes to greater extents than the individual stresses.