



Effect on wheat cultivars (*Triticum aestivum* cv. Lyp-90, Sarc-1, 7-Cerros, Pato, Pb-85, Tchere, Blue Silver, LU-26S, 12001, 10158, 12016, Chinese Spring)

The net impact of individual and combined stress on plant growth

Crop: Wheat (*Triticum aestivum* cv. Lyp-90, Sarc-1, 7-Cerros, Pato, Pb-85, Tchere, Blue Silver, LU-26S, 12001, 10158, 12016, Chinese Spring)
 Stress 1: Salt (100mM NaCl)
 Stress 2: Hypoxia
 Stage of plant: 10 day old seedling

The table shows the effect of hypoxia and salt alone and in combination on the growth and physiology of wheat cultivars.

	Treatment	Plant response to stress (reduction over control %)				Plant response to stress (reduction over control %)	
		Type A parameters*				Type B parameters*	
		Grain yield	Straw yield	Plant height	Tillers /plant	Transpiration	Photosynthesis
Lyp-90	Hypoxia	3.7↓	-16.7↑	N/A	N/A	16.1↓	21.1↓
	Salt (100mM NaCl)	-51.9↑	-20.8↑	N/A	N/A	19.6↓	12.2↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	25.9↓	10.4↓	N/A	N/A	25.0↓	20.0↓
Sarc-1	Hypoxia	75.2↓	65.4↓	N/A	N/A	8.3↓	20.7↓
	Salt (100mM NaCl)	57.4↓	61.7↓	N/A	N/A	8.3↓	16.4↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	87.1↓	82.7↓	N/A	N/A	-3.3↑	24.1↓
7-Cerros	Hypoxia	40.5↓	29.1↓	N/A	N/A	40.0↓	57.1↓
	Salt (100mM NaCl)	62.0↓	60.5↓	N/A	N/A	25.0↓	20.9↓

	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	84.8↓	73.3↓	N/A	N/A	16.7↓	18.7↓
Pato	Hypoxia	50.0↓	73.0↓	N/A	N/A	19.4↓	22.1↓
	Salt (100mM NaCl)	72.4↓	83.6↓	N/A	N/A	22.6↓	22.1↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	87.9↓	86.8↓	18.1↓	21.1↓	1.6↓	4.2↓
Pb-85	Hypoxia	39.3↓	39.6↓	N/A	N/A	14.5↓	26.5↓
	Salt (100mM NaCl)	58.9↓	51.4↓	N/A	N/A	17.7↓	11.2↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	87.5↓	81.1↓	18.8↓	25.9↓	12.9↓	13.3↓
Tchere	Hypoxia	50.8↓	22.9↓	N/A	N/A	8.9↓	14.5↓
	Salt (100mM NaCl)	45.9↓	32.9↓	N/A	N/A	16.1↓	-1.3↑
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	78.7↓	62.9↓	N/A	N/A	17.9↓	26.3↓
Blue Silver	Hypoxia	2.9↓	8.9↓	N/A	N/A	9.7↓	27.3↓
	Salt (100mM NaCl)	0.0	20.0↓	N/A	N/A	12.9↓	5.1↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	73.5↓	53.3↓	N/A	N/A	12.9↓	12.1↓
LU-26S	Hypoxia	58.6↓	57.2↓	N/A	N/A	27.3↓	24.4↓
	Salt (100mM NaCl)	-17.2↑	45.4↓	N/A	N/A	41.8↓	30.2↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	69.0↓	74.2↓	N/A	N/A	25.5↓	5.8↓
12001	Hypoxia	-69.7↑	-14.4↑	N/A	N/A	3.8↓	-3.9↑
	Salt (100mM NaCl)	-12.1↑	14.6↓	N/A	N/A	34.6↓	15.8↓

	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	66.7↓	50.4↓	N/A	N/A	21.2↓	0.0
10158	Hypoxia	-373.1↑	-46.7↑	N/A	N/A	-3.8↑	0.0
	Salt (100mM NaCl)	-280.8↑	37.4↓	N/A	N/A	34.0↓	14.9↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	-188.5↑	41.2↓	17.9↓	7.1↓	9.4↓	-16.2↑
12016	Hypoxia	-545.0↑	-202.6↑	N/A	N/A	24.1↓	24.4↓
	Salt (100mM NaCl)	-115.0↑	27.3↓	N/A	N/A	40.7↓	32.9↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	-135.0↑	-46.1↑	N/A	N/A	51.9↓	32.9↓
Chinese Spring	Hypoxia	71.8↓	60.2↓	N/A	N/A	8.7↓	18.5↓
	Salt (100mM NaCl)	25.6↓	66.4↓	N/A	N/A	17.4↓	25.9↓
	Salt (100mM NaCl) + Hypoxia (2 days later) (Sequential stress)	68.6↓	79.0↓	20.8↓	23.3↓	0.0	12.3↓

Reference – Akhtar J, Gorham J, Qureshi RH (1995) Combined effect of salinity and hypoxia in wheat (*Triticum aestivum* L.) and wheat -*Thinopyrum amphiplids*. Plant and Soil 173(1): 177-58.

Note: 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 less/not affected by stress leading to improved resistance (higher the value lesser the damage).
- 3) "0.0" value indicates plant parameter behaved similarly under control and stress condition (no damage).

*' - For more information on parameter classification, please refer to the 'methodology' tab.

Inference from the study: Akhtar et.al. 1995, studied the interaction of hypoxia and salinity in twelve cultivars of wheat plants. Plants were subjected to single and sequential salt and hypoxia stress treatment. Grain yield, straw yield, plant height, and tillers per plant were reduced synergistically under combined stress. Transpiration was reduced synergistically for cultivars lyp-90, tchere, blue silver, 12001, and 12016 under combined stress. Photosynthesis was reduced synergistically for cultivars sarc-1, tchere, and 12016. **Thus, this stress combination is detrimental to the growth and physiology of wheat cultivars.**