

Effect on maize (*Zea mays*) hybrids

The net impact of individual and combined stress on plant growth

The table shows the effect of individual and combined drought and cold stress on the physiology of maize hybrids

Plant: Maize (*Zea mays*) hybrid Pioneer 3995, Northrup King 403 and Pride II08
Stress 1: 15 and 19°C
Stress 2: Volumetric water content; 0.297-0.302(C1) and 0.150-0.156 (D1) m³ water/m³ soil for 30°C (CT); 0.270-0.272 (C2) and 0.159-0.140 (D2) m³ water/m³ soil for 19°C and 0.316-0.315 (C3) and 0.156-0.137 (D3) m³ water/m³ soil for 15°C)
Stage of the plant: Seedling

Hybrids	Stress treatments	Plant response to stress (percent reduction over control)
		Type A parameter*
		Mean root length at emergence
Pioneer 3995	Drought (D1 @CT)	4.7 ↓
	Low temperature 1 (C2 @LT1)	-1.6 ↑
	Drought+Low temperature 1 (D2@LT1)	48.7 ↓
	Low temperature 2 (C3 @LT2)	23.04 ↓
	Drought+Low temperature 2 (D3@LT2)	33.5 ↓
Northrup King 403	Drought (D1 @CT)	42.5 ↓
	Low temperature 1 (C2 @LT1)	0
	Drought+Low temperature 1 (D2@LT1)	58.03 ↓
	Low temperature 2 (C3 @LT2)	36.3 ↓
	Drought+Low temperature 2 (D3@LT2)	56.5 ↓
Pride II08	Drought (D1 @CT)	57.8 ↓
	Low temperature 1 (C2 @LT1)	3.6 ↓
	Drought+Low temperature 1 (D2@LT1)	60.2 ↓
	Low temperature 2 (C3 @LT2)	32.5 ↓
	Drought+Low temperature 2 (D3@LT2)	67.45 ↓

Volumetric water content; 0.297-0.302(C1) and 0.150-0.156 (D1) m³ water/ m³ soil for 30 °C (CT); 0.270-0.272 (C2) and 0.159-0.140 (D2) m³ water/ m³ soil for 19 °C and 0.316-0.315 (C3) and 0.156-0.137 (D3) m³ water/ m³ soil for 15 °C)

For raw data – Click here (.xlsx file)

Reference-

Cutforth HW, Shaykewich CF and Cho CM. (1985) Soil water-soil temperature interactions in the germination and emergence of corn (*Zea mays* L.). *Canadian Journal of Soil Science* 65: 445-455.

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 affected by stress that lead to reduced susceptibility (higher the value less the damage).

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

The inference from the study: Cutforth et al 1985 showed that combined cold and drought stress caused more reduction in plant growth as compared to the individual stresses. The hybrid Pioneer 3995 was found to be most resistant to the individual and combined stress treatments exhibiting the least reductions in the plant growth under the stress conditions.