

Effect on maize (*Zea mays*) cultivars

The net impact of individual and combined stress on plant growth

The table shows the effect of individual and combined drought and freezing stress on the physiology of maize cultivars

Plant: Maize (*Zea mays*) cultivars XD889, XD319, Yu13 and Yu37
Stress 1: 15% PEG for 23d
Stress 2: 15/12 °C day/night for 5 days.
Stage of the plant: Seedling

Cultivars	Stress treatments	Plant response to stress (percent reduction over control)							
		Type A parameters *				Type B parameters*		Type C parameters*	
		Shoot length #	Shoot fresh weight #	Root length #	Root fresh weight #	Chlorophyll a (mg/g FW)**	Chlorophyll b (mg/g FW)**	Total soluble sugar content (mg/g FW)**	Free proline content (µg/g FW)**
XD889	Drought	11.1↓	52.5↓	-1.6↑	33.9↓	1.16	0.31	199	37
	Chilling	42.2↓	67.5↓	8.5↓	45.7↓	1.42	0.36	101	46
	Drought +Chilling	48.1↓	75↓	10.1↓	48.4↓	1.2	0.33	180	51
XD319	Drought	25.3↓	54.8↓	1.4↓	28.5↓	1.25	0.35	166	33
	Chilling	51.5↓	58.1↓	16.2↓	35.1	1.32	0.33	99	33
	Drought +Chilling	53.6↓	70.9↓	19.0↓	37.7↓	1.22	0.35	154	43
YU13	Drought	27.3↓	44.4↓	25.8↓	29.5↓	1.31	0.35	167	33
	Chilling	52.7↓	57.8↓	19.6↓	41.0↓	1.57	0.38	96	35
	Drought +Chilling	58.5↓	77.8↓	24.7↓	47.4↓	1.43	0.38	141	41
YU37	Drought	10.4↓	43.2↓	5.8↓	5.7↓	1.19	0.32	179	33
	Chilling	44.6↓	69.6↓	18.4↓	23.9↓	1.31	0.36	121	37
	Drought +Chilling	49.5↓	73.2↓	16.6↓	29↓	1.34	0.34	168	50

Control- Chlorophyll a-1.4(XD889),1.43(XD319), 1.78(Yu13), 1.47(Yu37); Chlorophyll b-0.37(XD889), 0.4(XD319), 0.43(Yu13), 0.35(Yu37); Total soluble sugar-194(XD889),174(XD319), 181(Yu13), 182(Yu37); Free proline content-18(XD889), 17(XD319), 15(Yu13), 20(Yu37)

For raw data – Click here (.xlsx file)

Reference- Hussain HA, Men S, Hussain S, Ashraf U, Zhang Q, Anjum SA, Ali I and Wang L. (2019). Individual and concurrent effects of drought and chilling stresses on morpho-physiological characteristics and oxidative metabolism of maize cultivars. *BioRxiv*: 829309.

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.

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

The inference from the study: Hussain et al., 2019 studied the effect of individual and combined drought and cold stress on growth and physiology of four cultivars of maize and found that combined stress brought about a greater reduction in shoot and root length, chlorophyll content and other physiological parameters. It was observed that the cultivars XD889 and XD319 performed better than the cultivars Yu13 and Yu37 under combined stress conditions. **Thus, it can be concluded that combined drought and cold stress was more damaging than individual stresses.**