Effect on amaranth species

The net impact of individual and combined stress on plant growth

Stress 1: Drought
Stress 2: Lead & Copper
Stage of plant: Seedling

The table shows the impact of individual and combined drought and heavy metal lead/copper stress on amaranth yield

Species	Treatment	Response under combined stress (Type A parameters*)			
		Reduction over control (%)			
		Plant height (cm)	Ground diameter (mm)	Single plant aboveground wet weight (g)	Single plant aboveground dry weight (g)
A. retroflexus	Lead acetate (35 mg/kg.soil) + PEG 6000 (75 g/L) (Simultaneous stress)	54.33 ↓	50.96 ↓	84.44 ↓	79.82 ↓
	Cupric sulphate (35 mg/kg.soil) + PEG 6000 (75 g/L) (Simultaneous stress)	37.00↓	40.38 ↓	80 ↓	73.68 ↓
	PEG 6000 (75 g/L)	60.62 ↓	57.69 ↓	86.66 ↓	82.45 ↓
	Lead acetate (35 mg/kg.soil)	-11.02↑	-7.69 ↑	26.66 ↓	34.21 ↓
	Cupric sulphate (35 mg/kg.soil)	-1.57↑	-7.69 ↑	27.77 ↓	21.92 ↓
A. tricolor	Lead acetate (35 mg/kg.soil) + PEG 6000 (75 g/L) (Simultaneous stress)	67.36↓	55.03↓	88.02↓	82.03 ↓
	Cupric sulphate (35 mg/kg.soil) + PEG 6000 (75 g/L) (Simultaneous stress)	61.05↓	53.48 ↓	88.02↓	82.03 ↓
	PEG 6000 (75 g/L)	64.21 ↓	59.68 ↓	89.43 ↓	83.59 ↓
	Lead acetate (35 mg/kg.soil)	-6.31 ↑	-6.976 ↑	32.39↓	28.12 ↓
	Cupric sulphate (35 mg/kg.soil)	-8.42↑	-15.50 ↑	19.71↓	1.56 ↓

Note: *Values presented in the table were calculated using the formula described below.*

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

'⬇'- indicates plant parameter is more affected by stress that leads to high susceptibility (higher the value more the damage).
'⬆'- indicates plant parameters less/not affected by stress leading to improved resistance (higher the value lesser the damage)

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

Reference- Wang S, Wei M, Cheng H, Wu B, Du D, Wang C (2020). Indigenous plant species and invasive alien species tend to diverge functionally under heavy metal pollution and drought stress. Ecotoxic. Environ. Saf. **205:** 111160

Inference from the study: Wang *et al*., studied the interactive effect of drought and heavy metal Lead, and Copper on two Amaranth species plants. The combined treatment of drought and heavy metal caused a high percentage reduction of plant biomass in species *A. tricolor* than *A. retroflexus*.

Effect on pigeon pea cultivars (*Cajanus cajan* L.)

The net impact of individual and combined stress on plant growth

Stress 1: Drought
Stress 2: Cadmium & Chromium
Stage of plant: Seedlings

The table shows the impact of individual and combined drought and heavy metal cadmium/chromium stress on dry weight & root length of pigeon pea cultivars

	Treatment	Response under combined stress (Type A parameters*)			
		Dry weight (g/10 seedlings)		Root length (cm)	
		4DAS	8DAS	4DAS	8DAS
LRG-41	Cadmium (20ppm) + PEG 6000 (-0.9MPa) (Simultaneous stress)	0.91	1	0.23	0.33
	Chromium (100ppm) + PEG 6000 (-0.9MPa) (Simultaneous stress)	0.8	0.87	0	0.1
Yashoda-45	Cadmium (20ppm) + PEG 6000 (-0.9MPa) (Simultaneous stress)	1	0.87	0.43	0.67
	Chromium (100ppm) + PEG 6000 (-0.9MPa) (Simultaneous stress)	1.09	0.96	0.23	0.33

	Untreated	1.12	1.22	1.43	5.03

Reference– Swapna B, Rama Gopal G (2015). Impact of combination of water stress and heavy metals on germination and seedling growth of two Pigeon Pea (Cajanus Cajan L. millspaugh) cultivars . Biolife **3:** 917-921

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

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

Inference from the study: Swapna and Rama Gopal, 2015 studied the interactive effect of drought and two heavy metal, Cadmium, and Chromium on pigeon pea cultivars LRG-41 and Yashoda-45. The combined stress of drought and heavy metals showed detrimental effect on both the cultivars by reducing the dry weight and root length of the seedlings in comparison with the untreated plants.