



Chromium Numerical Data

Pennisetum sinense: A Potential Phytoremediation Plant for Chromium Deletion from Soil (2020)

Table 1: Growth traits of *P. sinense* cultured in pots at maturity in the second year after planting.

Traits	Range	Average
Height (cm)	198.7–372.8	335.7
Length of internode (cm)	6.4–14.3	10.7
Effective tillers	3–8	5.8
Leaf length (cm)	33.5–85.6	56.7
Maximum stem circumference (cm)	1.9–2.9	2.5
Root/shoot ratio	0.31–0.64	0.51
Biomass of aerial part (kg/pot FW)	/	1.68
Theoretical yield (t/hm ² FW)	/	168

Effects of Cr on P. sinense Growth

Source: <https://www.mdpi.com/2071-1050/12/9/3651>

Chromium Morpho-Phytotoxicity (2020)

Table 1: Chromium-induced seed germination inhibition in various plant species.

Plant Species	Common Name	Chromium Concentration	Medium	Time of Exposure (Days)	Seed Germination (%)
<i>Avena sativa</i>	Oat	500 mg/kg Cr(VI)	Soil	7	≈82
		2000 mg/kg Cr(III)			≈95
<i>Beta vulgaris</i>	Swiss chard	50 μM Cr(III)	Distilled water	12	71
<i>Brassica juncea</i>	Mustard	300 μM Cr(VI)	1/2-strength Hoagland	3	80.8
<i>Brassica oleracea</i>	Cabbage	300mg/kg Cr(VI)	Distilled water	3	≈65
<i>Cajanus cajan</i>	Pigeon Pea	100 ppm	Distilled water	3	93
<i>CUCUMIS sativus</i>	Cucumber	300 mg/kg Cr(VI)	Distilled water	3	≈96
<i>Glycine MAX</i>	Soybean	200 mg/L Cr(VI)	Hydroponic	-	72.6
<i>Lactuca sativa</i>	Lettuce	300 mg/kg Cr(VI)	Distilled water	3	≈50
<i>Lactuca sativa</i>	Lettuce	50 μM Cr(III)	Distilled water	12	94
<i>Oryza sativa</i>	Rice	100 μM Cr(VI)	Distilled water	4	≈50
<i>Sorghum bicolor</i>	Sorghum	500 mg/kg Cr(VI)	Soil	7	≈60
		2000 mg kg Cr(III)			≈10
<i>Spinacia oleracea</i>	Spinach	50 μM Cr(III)	Distilled water	15	64
<i>TRITICUM AESTIVUM</i>	Wheat	100 ppm			63
		300 mg/kg Cr(VI)	Distilled water	0.17	≈90
		500 mg/kg Cr(VI)	Distilled water	3	≈70
		2000 mg/kg Cr(III)	Soil	7	≈25
<i>Zea MAYS</i>	Corn	300 mg/kg Cr(VI)	Distilled water	3	≈99

Table 2: Chromium-induced reduction in root growth as compared to control of various plant species.

Plant Species	Common Name	Chromium Concentration	Medium	Time of Exposure (Days)	Root Growth (%)
<i>Arabidopsis thaliana</i>	Arabidopsis	200 μ M Cr(VI)	1/2 MS	1	92.8
<i>Avena sativa</i>	Oat	500 mg/kg Cr(VI)	Soil	7	\approx 40
		2000 mg/kg Cr(III)			\approx 55
<i>Brassica CAMPESTRIS</i>	Cabbage	1 mg/L Cr(VI)	1/2-strength Hoagland	21	\approx 35 FW
<i>Brassica juncea</i>	Mustard	300 μ M Cr(VI)	1/2-strength Hoagland	15	43.7
<i>Brassica napus</i>	Oilseed Rape	400 μ M Cr(VI)	Hoagland's	6	\approx 50
<i>Brassica oleracea</i>	Cabbage	300 mg/kg Cr(VI)	Distilled water	3	\approx 25
<i>Cajanus cajan</i>	Pigeon Pea	100 ppm	Distilled water	10	32
<i>CUCUMIS sativus</i>	Cucumber	300 mg/kg Cr(VI)	Distilled water	3	\approx 15
<i>Lactuca sativa</i>	Lettuce	300 mg/kg Cr(VI)	Distilled water	3	<10
<i>Oryza sativa</i>	Rice	80 μ M Cr(VI)	1/4 -strength Kimura B	7	78
<i>Sorghum bicolor</i>	Sorghum	500 mg/kg Cr(VI)	Soil	7	\approx 10
		2000 mg/kg Cr(III)			\approx 30
		500 μ M Cr(VI)		-	\approx 57
		10 mg/kg Cr(VI)	Sand	7	\approx 20
		300 mg/kg Cr(VI)	Quartz sand	3	< 10
<i>Triticum aestivum</i>	Wheat	500 mg/kg Cr(VI)	Distilled water	7	\approx 10
		2000 mg/kg Cr(III)	Soil		\approx 45
<i>Zea mays</i>	Corn	300 mg/kg Cr(VI)	Distilled water	3	\approx 43%
		173 μ M Cr(VI)	Hydroponic	7	\approx 70%

Table 3: Chromium-reduced shoot growth as compared to control in various plant species.

Plant Species	Common Name	Chromium Concentration	Medium	Time of Exposure (Days)	Shoot Growth (%)
<i>Arabidopsis thaliana</i>	Arabidopsis	800 µM Cr(VI)	1/2-strength MS	2	≈50 FW
<i>Avena sativa</i>	Oat	500 mg/kg Cr(VI)	Soil	7	Reduced
		2000 mg/kg Cr(III)			
<i>Brassica CAMPESTRIS</i>	Cabbage	1 mg/L Cr(VI)	1/2-strength Hoagland	21	≈70 FW
<i>Brassica juncea</i>	Mustard	300 µM Cr(VI)	1/2-strength Hoagland	15	89.1
<i>Brassica napus</i>	Oilseed Rape	400 µM Cr(VI)	Hoagland	6	58–67
<i>Cajanus cajan</i>	Pigeon Pea	100 ppm	Distilled water	10	Reduced
<i>HORDEUM vulgare</i>	Barley	100 µM Cr(VI)	Nutrient solution	50	≈7–20 DW
<i>Oryza sativa</i>	Rice	80 µM Cr(VI)	Hydroponic	7	77
<i>PARTHENIUM hysterophorus</i> <i>SOLANUM NIGRUM</i>	Santa Maria BlackNightshade	500 µM Cr(VI)	Soil	21	43 FW
					65 DW
					110 FW
<i>Sorghum bicolor</i>	Sorghum	500 mg/kg Cr(VI)	Soil	7	115 DW
		2000 mg kg Cr(III)			Reduced
<i>TRITICUM AESTIVUM</i>	Wheat	500 µM Cr(VI)	Sand	7	≈80%
		10 mg/kg Cr(VI)			Quartz sand
<i>Zea MAYS</i>	Corn	173 µM Cr(VI)	Hydroponic	7	≈80%

Table 4: Chromium-altered leaf morphology and growth as compared to control in various plant species.

Plant Species	Common Name	Chromium Concentration	Medium	Time of Exposure (Days)	Induced Changes in Leaf Growth and Morphology
<i>Arabidopsis thaliana</i>	Arabidopsis	800 µM Cr(VI)	1/2-strength MS	2	Reduced: growth, water content (RWC), chlorophyll (chl), cell and tissue viability
<i>Brassica juncea</i>	Mustard	300 µM Cr(VI)	Semi-hydroponic medium	5	Reduced: growth, RWC, and chl content
<i>Brassica napus</i>	Oilseed Rape	400 µM Cr(VI)	Hoagland	6	61–71% Reduced biomass
<i>HORDEUM vulgare</i>	Barley	100 µM Cr(VI)	Nutrient solution	50	≈62–67% Reduced DW
<i>Oryza sativa</i>	Rice	80 µM Cr(VI)	Hydroponic	7	Chlorosis
<i>Zea MAYS</i>	Corn	173 µM Cr(VI)	Hydroponic	7	Reduced leaf number

Table 5: Chromium-mediated reduction in the total plant biomass as compared to control in various plant species.

Plant Species	Common Name	Chromium Concentration	Medium	Time of Exposure (Days)	Total Biomass Production (%)
<i>Amaranthus viridis</i> and <i>Amaranthus cruentus</i>	Green and Blood Amaranth	50 µM	1/2-strength Hoagland	7	>50 FW ≈80 FW
<i>Arabidopsis thaliana</i>	Arabidopsis	800 µM Cr(VI)	1/2-strength MS	2	50 FW 75 DW
<i>Brassica juncea</i>	Mustard	300 µM Cr(VI)	Semi-hydroponic medium	5	80–89 growth
<i>Brassica juncea</i>	Mustard	100 µM Cr(VI)	Soil	20	>50 FW and DW
<i>Brassica napus</i>	Oilseed Rape	400 µM Cr(VI)	Hoagland	6	67 DW
<i>Brassica napus</i>	Rapeseed	500 µM Cr	Soil	56	30.6 FW 28 DW
<i>Citrus reticulata</i>	Kinnow Mandarin	750 µM Cr(VI)	Soil	120	63 DW
<i>Cyperus alternifolius</i> and <i>Coix lacryma-jobi</i>	Umbrella Palm and Adlay Millet	40 mg/L Cr(VI)	Soil	120	77 DW 44 DW
<i>Hordeum vulgare</i>	Barley	100 µM Cr(VI)	Quartz sand	60	≈23.7DW
<i>Lemna minor</i>	Duckweed	500 µM Cr(VI)	SIS growth medium	7	60
<i>Oryza sativa</i>	Rice	80 µM Cr(VI)	Hydroponic	7	58
<i>Parthenium hysterophorus</i> and <i>Solanum nigrum</i>	Santa Maria Black Nightshade	500 µM Cr(VI)	Soil	21	65.5 FW 64.DW 110 FW 106 DW
<i>Solanum melongena</i>	Eggplant	25 µM Cr(VI)	1/2-strength Hoagland	7	87 FW 83 DW
<i>Triticum aestivum</i>	Wheat	500 µM Cr(VI)	Sand Quartz sand	7	≈65%
<i>Zea mays</i>	Corn	173 µM Cr(VI)	Hydroponic	7	≈85 FW

Table 6: Chromium-induced alteration in the uptake and translocation of the essential nutrients in various plant species.

Plant Species	Common Name	Nutrients	Alteration in Uptake/Translocation
<i>Brassica juncea</i>	Brown Mustard	Na, K, Ca, Mg, C, H, and N	Reduced both
<i>Cocos nucifera</i>	Coconut Palm	Fe, K, Cu, Zn, Mn, and Mg	Uptake
<i>Hordeum vulgare</i>	Barley	P, K, Mg, S, Fe, Zn, Mn, and Ca	Uptake and Translocation
<i>Lactuca sativa</i>	Lettuce	K, Mg, Fe, and Zn	Uptake/translocation
<i>Oryza sativa</i>	Rice	N, P, K, Ca, Mg, Mn, Zn, Fe, and Cu	Uptake/translocation
<i>Pisum sativum</i>	Pea	Decreased micro and macronutrients (except S)	Uptake/translocation
<i>Raphanus sativus</i>	Radish	Fe, S, P, Zn, Mn, Cu, and B	Translocation
<i>Solanum lycopersicum</i> and <i>Solanum melongena</i>	Tomato and Eggplant	Affected N, P and K content	Translocation

Source: <https://pubmed.ncbi.nlm.nih.gov/32365493/>

Comparative growth analysis of okra (*Abelmoschus esculentus*) in the presence of PGPR and press mud in chromium contaminated soil (2020)

Table: 1: Effect of plant growth promoting rhizobacteria alone and in combination with press mud on shoot and fruit attributes of okra in Cr contaminated soil.

Treatments	Shoot attributes			Fruit attributes	
	SL (cm)	SFW (g)	SDW(g)	FFW (g)	FDW (g)
Control	34.23 ± 0.60 fg	27.05 ± 1.15b-d	4.68 ± 0.11b-d	43.23 ± 1.16de	14.41 ± 0.20de
Cr (20 mg kg-1)	27.476 ± 0.78h	14.00 ± 0.82f	1.91 ± 0.07 f	25.77 ± 3.45g	8.38 ± 0.21g
Str-1	48.89 ± 1.06bc	34.26 ± 0.75b	6.56 ± 0.17b	54.74 ± 1.35bc	19.44 ± 0.74bc
Str-2	46.73 ± 0.58cd	30.37 ± 1.78bc	5.37 ± 0.38bc	57.67 ± 0.68b	18.54 ± 0.68b
PrM@2%	44.55 ± 0.34c-e	33.86 ± 0.91b	5.93 ± 0.10b	47.73 ± 1.09cd	16.15 ± 0.29cd
Str-1+PrM@2%	62.44 ± 0.73a	54.75 ± 1.54a	11.52 ± 0.86a	97.37 ± 0.76a	32.72 ± 0.28a
Str-2+ PrM@2%	54.93 ± 1.77b	49.25 ± 0.68a	10 ± 0.07a	101.63 ± 2.42 a	27.76 ± 0.88a
Str-1 + Cr (20 mg kg-1)	31.07 ± 1.74gh	21.74 ± 1.25d-f	2.46 ± 0.05d-f	36.18 ± 1.45ef	12.18 ± 0.58ef
Str-2 + Cr (20 mg kg-1)	28.67 ± 1.20gh	18.67 ± 2.68ef	2.07 ± 0.14ef	33.37 ± 1.16 fg	11.41 ± 0.47 fg
Str-1 + PrM@2% + Cr (20 mg kg-1)	40.67 ± 1.09de	24.8 ± 1.87c-e	4.4 ± 0.19c-e	49.26 ± 1.09cd	16.84 ± 1.03b-d
Str-2 + PrM@2% + Cr (20 mg kg-1)	39.33 ± 1.83ef	22.24 ± 1.19c-e	4 ± 0.07c-e	51.18 ± 0.71bc	17.92 ± 1.47b-d
PrM@2% + Cr (20 mg kg-1)	28.67 ± 1.46gh	20.89 ± 1.01d-f	2.26 ± 0.08 d-f	38.78 ± 0.55ef	13.5 ± 1.04ef

Treatment-Means apportioning same letter (s) do not differ significantly at $p \leq 0.5$.

Table: 2: Effect of plant growth promoting rhizobacteria alone and in combination with press mud on root attributes of okra in Cr contaminated soil.

Treatments	Root attributes		
	Root length (cm)	Root fresh weigh(g)	Root dry weigh (g)
Control	17.66 ± 0.34de	7.67 ± 1.19 b-d	3.06 ± 0.48b-d
Cr (20 mg kg-1)	11 ± 0.58f	4.20 ± 1.01d	1.68 ± 0.41d
Str-1	24.33 ± 0.60 c	11.02 ± 1.56b	4.40 ± 0.62b
Str-2	21.43 ± 0.31cd	9.86 ± 1.32bc	3.94 ± 0.53bc
PrM@2%	20 ± 1.00cd	9.26 ± 1.84bc	3.70 ± 0.73bc
Str-1+ PrM@2%	35 ± 1.15 a	18.34 ± 0.39a	7.33 ± 0.16a
Str-2+ PrM@2%	29.33 ± 2.03 b	17.96 ± 0.26a	7.18 ± 0.10a
Str-1 + Cr (20 mg kg-1)	14.66 ± 0.88ef	6.92 ± 0.10b-d	2.77 ± 0.04b-d
Str-2 + Cr (20 mg kg-1)	13.18 ± 0.74ef	6.19 ± 0.25cd	2.47 ± 0.10cd
Str-1 + PrM@2% + Cr (20 mg kg-1)	17.83 ± 0.60de	7.82 ± 0.43b-d	3.19 ± 0.18 b-d
Str-2 + PrM@2% + Cr (20 mg kg-1)	17.43 ± 0.44de	7.53 ± 0.23b-d	3.09 ± 0.09b-d
PrM@2% + Cr (20 mg kg-1)	13.83 ± 0.44ef	5.53 ± 0.08cd	2.21 ± 0.04cd

Treatment-Means apportioning same letter (s) do not differ significantly at $p \leq 0.5$.

Table 3: Effect of plant growth promoting rhizobacteria alone and in combination with press mud on physiological parameters of okra in Cr contaminated soil.

Treatments	Physiological attributes		
	Photosynthesis rate ($\mu\text{mol m}^{-2} \text{s}^{-1}$)	Transpiration rate ($\text{mmol H}_2\text{O m}^{-2} \text{s}^{-1}$)	WUE ($\text{mmol CO}_2 \text{mol}^{-1} \text{H}_2\text{O}$)
Control	11.83 \pm 0.67 d-f	5.37 \pm 0.24 b-d	2.05 \pm 0.04 b-d
Cr (20 mg kg ⁻¹)	8.16 \pm 0.60 h	3.74 \pm 0.47 d	1.44 \pm 0.03 d
Str-1	14.16 \pm 0.33 cd	6.37 \pm 0.48 b	2.63 \pm 0.04 b
Str-2	15.1 \pm 0.80 c	6.09 \pm 0.40 bc	2.36 \pm 0.03 bc
PrM@2%	13.6 \pm 0.31 cd	5.67 \pm 0.44 b-d	2.26 \pm 0.32 b-d
Str-1+PrM(2%)	19.03 \pm 0.23 b	9.99 \pm 0.01 a	4.29 \pm 0.10 a
Str-2+PrM(2%)	22.16 \pm 0.57 a	8.88 \pm 0.20 a	4.09 \pm 0.14 a
Str-1 + Cr (20 mg kg ⁻¹)	9.2 \pm 0.47 f-h	4.48 \pm 0.61 b-d	1.68 \pm 0.01 cd
Str-2 + Cr (20 mg kg ⁻¹)	10.36 \pm 0.32 e-h	4.33 \pm 0.62 cd	1.57 \pm 0.10 cd
Str-1 + PrM@2% + Cr (20 mg kg ⁻¹)	11.53 \pm 0.52 d-g	5.45 \pm 0.23 b-d	2.2 \pm 0.06 b-d
Str-2 + PrM@2% + Cr (20 mg kg ⁻¹)	12 \pm 0.78 de	5.13 \pm 0.15 b-d	2.01 \pm 0.46 b-d
PrM@2% + Cr (20 mg kg ⁻¹)	8.86 \pm 0.59 gh	4.10 \pm 0.12 d	1.56 \pm 0.19 cd

Treatment-Means apportioning same letter (s) do not differ significantly at $p \leq 0.5$.

Source: <https://www.sciencedirect.com/science/article/pii/S0045653520320609>

Citric Acid Assisted Phytoremediation of Chromium through Sunflower Plants Irrigated with Tannery Wastewater (2020)

Table 1: The physicochemical characteristics of the soil used in the pot study.

Texture	Sandy Loam
Silt	15.0%
Sand	67.9%
Clay	17.10%
EC	1.96 dS m ⁻¹
pH	7.61
SAR	1.89 (mmol L ⁻¹) ^{1/2}
Available P	2.11 mg kg ⁻¹
Organic matter	0.59 %
HCO ₃ ⁻¹	2.51 mmol L ⁻¹
SO ₄ ⁻²	11.44 mmol L ⁻¹
Cl ⁻	5.45 mmol L ⁻¹
Ca ²⁺ + Mg ²⁺	13.98 mmol L ⁻¹
K ⁺	0.04 mmol L ⁻¹
Na ⁺	5.23 mmol L ⁻¹
Available Zn ²⁺	0.77 mg kg ⁻¹
Available Cu ²⁺	0.31 mg kg ⁻¹
Available Cr	0.16 mg kg ⁻¹

The EC stands for electrical conductivity and SAR stands for sodium adsorption ratio.

Table 2: Characteristics of tannery wastewater used for irrigation.

Parameters	Values
COD	2897 mg L ⁻¹
BOD	876 mg L ⁻¹
TOC	969 mg L ⁻¹
Oil & grease	11 mg L ⁻¹
pH	4.13
EC	91.8 dS/m
TDS	64,968
Total Cr	329 mg L ⁻¹
K ⁺	41 mg L ⁻¹
Carbonate	ND
Ca ²⁺ +Mg ²⁺	3.1 mmol _c L ⁻¹

COD stands for chemical oxygen demand, BOD stands for biological oxygen demand, TOC stands for total organic compounds, EC stands for electrical conductivity, TDS stands for total dissolved solids, and ND stands for not detected.

Source: <https://www.mdpi.com/2223-7747/9/3/380>

Amelioration effect of chromium-tolerant bacteria on growth, physiological properties and chromium mobilization in chickpea (*Cicer arietinum*) under chromium stress (2020)

Table 1: Identification Cr tolerance bacteria based on the 16S rRNA gene sequencing and their closest sequence similarity in NCBI, GenBank

Strain name	Name of Identified Bacteria	NCBI accession number	Most closely related species (sequence similarity, %)	Length (bp) of 16S rRNA
S2VWR5	<i>Bacillus subtilis</i>	KT254653	<i>Bacillus subtilis</i> strain AMUBS-1 (99)	758
S1VKR11	<i>Stenotrophomonas maltophilia</i>	KT355715	<i>Stenotrophomonas maltophilia</i> strain AK2 (99)	1417
S3VKR16	<i>Stenotrophomonas maltophilia</i>	KT355717	<i>Stenotrophomonas maltophilia</i> strain AK2 (99)	1416
S3VKR17	<i>Bacillus cereus</i>	KT254652	<i>Bacillus cereus</i> strain PPB11 (99)	686
S3VKR2	<i>Bacillus thuringiensis</i>	KT254642	<i>Bacillus thuringiensis</i> strain YWC2-8 (100%)	1487

Table 2: Plant growth promoting properties of Cr tolerant bacteria

Isolate name	Siderophore	PO ₄	K
S1VKR11	–	+	–
S3VKR2	–	+	+
S3VKR16	–	+	–
S3VKR17	+	–	+
S2VWR5	+	+	+

+ positive; – negative

Source: <https://link.springer.com/article/10.1007%2Fs00203-019-01801-1>

Synergistic use of biochar and acidified manure for improving growth of maize in chromium contaminated soil (2020)

Table 1: Basic soil and biochar properties.

Parameters	Soil parameters	Biochar parameters	Acidified manure
pH	8.2 ± 0.01	6.28 ± 0.04	3.50 ± 0.20
EC (dS m ⁻¹)	1.36 ± 0.04	1.99 ± 0.10	4.12 ± 2.23
Soil texture	Silty loam	–	–
CEC (cmol kg ⁻¹)	11.56 ± 0.71	36.5 ± 0.90	15.21 ± 3.6
C (%)		54.81 ± 1.79	69.13 ± 5.1
Total nitrogen (%)	0.054 ± 0.01	1.02 ± 0.07	1.21 ± 0.20
Available phosphorus (g kg ⁻¹)	4.46 ± 0.13	2.34 ± 0.04	0.86 ± 0.05
Extractable potassium (g kg ⁻¹)	94 ± 4.36	12.40 ± 0.85	2.10 ± 0.15
Calcium (g kg ⁻¹)	–	23.3 ± 1.90	6.50 ± 0.95
Magnesium (g kg ⁻¹)	–	7.34 ± 0.09	4.20 ± 0.25
Sulfur (g kg ⁻¹)	–	3.72 ± 0.13	–
Iron (Fe) (mg kg ⁻¹)	–	83.3 ± 2.59	–
Chromium-III (mg kg ⁻¹)	40.45 ± 1.90	–	–
Chromium VI (mg kg ⁻¹)	12.02 ± 1.02	–	–
Total chromium	55.47 ± 2.81 (mg kg ⁻¹)	0.05 ± 0.01 (µg kg ⁻¹)	–

Table 2: Treatment plan for pot experiment.

CK	Control
B1	1.5% biochar
B2	3% biochar
AML	5% (w/w) acidified farm yard manure (FYM) (slurry)
B1 + AML	1.5% biochar + 5% (w/w) acidified FYM (slurry)
B2 + AML	3% biochar + 5% (w/w) acidified FYM (slurry)
AMS	5% (w/w) acidified manure (solid)
B1 + AMS	1.5% biochar + 5% (w/w) acidified FYM (solid)
B2 + AMS	3% biochar + 5% (w/w) acidified FYM (solid)

Table 3: Biochar and acidified manure effect on agronomic parameters.

Treatments	Plant height (cm)	Root length (cm)	Shoot dry weight (g)	Root dry weight (g)
CK	28 ± 2.05 e	8.6 ± 0.9 e	5 ± 0.26 f	1.1 ± 0.01 e
B1	38 ± 1.87 cd	19 ± 0.8 cd	6 ± 0.16 de	2.1 ± 0.13 cd
B2	48 ± 2.27 ab	25 ± 2.3 ab	7 ± 0.12 abc	2.7 ± 0.08 ab
AML	32 ± 3.17 de	17 ± 0.8 d	6 ± 0.15 e	1.9 ± 0.08 d
B1 + AML	43 ± 3.06 bc	22 ± 0.8 bc	7 ± 0.08 cd	2.4 ± 0.13 bc
B2 + AML	51 ± 1.31 ab	27 ± 1.9 a	8 ± 0.16 ab	2.8 ± 0.13 a
AMS	34 ± 2.72 de	21 ± 1.3 cd	6 ± 0.09 de	2.0 ± 0.07 d
B1 + AMS	44 ± 1.87 bc	28 ± 1.3 a	7 ± 0.22 bc	2.4 ± 0.06 bc
B2 + AMS	54 ± 1.12 a	29 ± 1.9 a	8 ± 0.10 a	2.9 ± 0.04 a

CK: Control; B1: 1.5% biochar; B2: 3% biochar; AML: 5% (w/w) acidified manure-slurry; AMS: 5% (w/w) acidified farm yard manure-solid. Column showed mean of three repeats and bars showed standard error ($p \leq 0.05$).

Table 4: Biochar and acidified manure effect on physiological parameters.

Treatments	RWC	EL	Photo. R	TR	SC	WUE	Chlorophyll contents
CK	66 ± 3.20 c	11 ± 0.65 a	10.7 ± 1.5 9 c	2 ± 0.25 e	143 ± 6.98 e	1.63 ± 0.3 1 f	28 ± 2.2 e
B1	70 ± 0.72 bc	10 ± 0.30 ab	11.9 ± 1.2 8 bc	3 ± 0.60 cde	166 ± 7.02 de	2.80 ± 0.3 6 de	38 ± 2.9 cd
B2	76 ± 3.47 ab	6 ± 0.42 c d	13.5 ± 1.7 3 bc	4 ± 0.65 bc	199 ± 10.5 7 bc	3.63 ± 0.3 5 cd	46 ± 2.2 ab
AML	68 ± 1.74 c	10 ± 0.20 a	11.9 ± 1.3 1 bc	2 ± 0.25 de	149 ± 7.79 e	2.40 ± 0.2 6 ef	35 ± 2.6 d
B1 + AML	71 ± 0.95 bc	8 ± 0.95 b	12.3 ± 1.2 1 bc	3 ± 0.17 bcd	178 ± 9.75 cd	3.17 ± 0.1 5 cde	39 ± 2.40 cd
B2 + AML	76 ± 2.69 ab	6 ± 0.42 c d	14.7 ± 1.3 5 b	4 ± 0.60 abc	210 ± 9.63 ab	3.97 ± 0.4 2 bc	47 ± 2.24 ab
AMS	68 ± 1.64 c	10 ± 0.35 a	13.4 ± 0.8 1 bc	3 ± 0.45 bcd	159 ± 8.76 de	3.37 ± 0.4 5 cd	37 ± 2.25 cd
B1 + AMS	71 ± 2.73 bc	7 ± 0.51 c	19.1 ± 0.8 2 a	5 ± 0.40 ab	208 ± 7.28 ab	4.60 ± 0.4 0 ab	42 ± 2.29 bc
B2 + AMS	79 ± 0.91 a	5 ± 0.25 d	20.4 ± 0.9 0 a	5 ± 0.3 5a	225 ± 5.31 a	4.97 ± 0.1 5 a	51 ± 1.50 a

CK: Control; B1: 1.5% biochar; B2: 3% biochar; AML: 5% (w/w) acidified manure-slurry; AMS: 5% (w/w) acidified farm yard manure-solid. RWC: Relative water content; EL: electrolyte leakage; TR: transpiration rate; SC: stomatal conductance; WUE: water use efficiency. Column showed mean of three repeats and bars showed standard error ($p \leq 0.05$).

Table 5: Biochar and acidified manure effect on anti-enzyme activities.

Treatments	SOD	POD	CAT	APX
CK	176 ± 2.85 a	200 ± 5.26 a	10 ± 1.06 a	17.2 ± 1.95 a
B1	131 ± 7.79 cd	157 ± 7.59 c	9 ± 0.46 ab	14.6 ± 0.72 abc
B2	124 ± 6.62 de	110 ± 4.90 d	8 ± 0.75 ab	10.6 ± 1.67 de
AML	165 ± 5.11 ab	184 ± 6.76 ab	10 ± 0.42 a	16.7 ± 0.49 ab
B1 + AML	146 ± 10.35 bc	149 ± 7.10 c	9 ± 0.36 ab	13.9 ± 0.25 bc
B2 + AML	119 ± 8.60 def	108 ± 3.90 d	8 ± 0.70 b	9.6 ± 0.79 ef
AMS	159 ± 8.82 ab	176 ± 7.55 b	8 ± 0.20 b	13.2 ± 0.75 cd
B1 + AMS	103 ± 2.72 f	113 ± 8.89 d	8 ± 0.21 b	8.1 ± 0.35 ef
B2 + AMS	104 ± 6.49 ef	99 ± 2.79 d	8 ± 0.38 b	7.6 ± 0.38 f

CK: Control; B1: 1.5% biochar; B2: 3% biochar; AML: 5% (w/w) acidified manure-slurry; AMS: 5% (w/w) acidified farm yard manure-solid. SOD: Superoxide dismutase; POD: peroxidase dismutase; CAT: catalase activity assay; APX: ascorbate peroxidase activity. Column showed mean of three repeats and bars showed standard error ($p \leq 0.05$).

Source: <https://www.tandfonline.com/doi/full/10.1080/15226514.2019.1644286>

Assisted phytoremediation of chromium spiked soils by *Sesbania Sesban* in association with *Bacillus xiamenensis* PM14: A biochemical analysis (2020)

Table 1: Basic properties of soil.

Properties of soil	Value
Soil texture	Loamy
Soil pH	7.1
Soil EC (dsm ⁻¹)	0.3
Organic matter (%)	0.7
Phosphorus (ppm)	4.3
Potassium (ppm)	110
Nitrate-nitrogen (ppm)	0.02
Extractable Cr (ppm)	0.5

Table 2: Effects of plant growth promoting bacteria PM14 on Growth parameters of *S. sesban* in Cr polluted soil.

Cr (mg kg ⁻¹)	Treatment	Root length (Cm)	Shoot Length (Cm)	Fresh wt (g)	Dry wt (g)
0	Uninoculated	3.33 ± 0.10a	15 ± 0.24c	17.03 ± 0.23c	3.5 ± 0.17b
	PM14	3.5 ± 0.09a	17.40 ± 0.05a	21.06 ± 0.18a	4.33 ± 0.12a
50	Uninoculated	2.66 ± 0.03bc	13.06 ± 0.31e	15.06 ± 0.14e	3.2 ± 0.12bc
	PM14	3.46 ± 0.14a	16.06 ± 0.07b	18.03 ± 0.12b	3.56 ± 0.20b
100	Uninoculated	2.03 ± 0.14d	12.53 ± 0.07e	12.06 ± 0.31f	2.95 ± 0.01c
	PM14	3.2 ± 0.08 ab	15 ± 0.24c	17.03 ± 0.07c	3.43 ± 0.04b
200	Uninoculated	1.99 ± 0.01d	10.03 ± 0.12f	10.5 ± 0.19g	2.5 ± 0.07d
	PM14	2.4 ± 0.36cd	14 ± 0.09d	16 ± 0.33d	3 ± 0.05c

Uninoculated: non-inoculated control, PM14: *B. xiamenensis* PM14.

Table 3: Effects of plant growth promoting bacteria PM14 on the photosynthetic pigments of *S. sesban* in Cr polluted soil.

Cr (mg kg ⁻¹)	Treatment	Chlorophyll <i>a</i> (µg ⁻¹ ml)	Chlorophyll <i>a</i> (µg ⁻¹ ml)	Carotenoids (µg ⁻¹ ml)
0	Uninoculated	2.28 ± 0.02b	0.32 ± 0.04 ab	10.46 ± 0.21b
	PM14	3.15 ± 0.34a	0.55 ± 0.32a	12.40 ± 1.21a
50	Uninoculated	1.45 ± 0.32cde	0.28 ± 0.08 ab	8.39 ± 1.31c
	PM14	2.50 ± 0.17 ab	0.40 ± 0.10 ab	9.91 ± 0.01b
100	Uninoculated	1.35 ± 0.38de	0.27 ± 0.05 ab	7.81 ± 0.12cd
	PM14	2.10 ± 0.09bc	0.33 ± 0.04 ab	8.36 ± 0.38c
200	Uninoculated	0.85 ± 0.70e	0.21 ± 0.08b	6.90 ± 0.03c
	PM14	1.90 ± 0.09dbcd	0.26 ± 0.10 ab	8.12 ± 0.46cd

Uninoculated: non-inoculated control, PM14: *B. xiamenensis* PM14.

Source: <https://www.sciencedirect.com/science/article/pii/S0981942819304619>

Zinc-lysine Supplementation Mitigates Oxidative Stress in Rapeseed (*Brassica napus* L.) by Preventing Phytotoxicity of Chromium, when irrigated with Tannery Wastewater (2020)

Table 1: Physicochemical properties of loam sand used in the pot experiment.

Texture	Clay Loam
Silt	12.9
Sand	63.4
Clay	22.3
pH (H ₂ O mixture)	7.1
Electrical conductivity (dS m ⁻¹)	3.83
Cation exchange capacity (cmol kg ⁻¹) 4.9	4.89
Soluble CO ₃ ⁻² (mmol L ⁻¹)	0.87
Soluble HCO ₃ (mmol L ⁻¹)	3.78
Soluble Cl ⁻ (mmol L ⁻¹)	6.31
Soluble Ca ²⁺ + Mg ²⁺ (mmol L ⁻¹)	15.89
Organic matter (%)	0.49
Ni (mg kg ⁻¹)	0.21
Cu (mg kg ⁻¹)	0.35
Zn (mg kg ⁻¹)	0.84
Cr (mg kg ⁻¹)	0.24

Table 2: Characteristics of tannery wastewater used for irrigation of the soil used in the pot experiment.

Parameters	Values	Permissible Limits *
EC (dS m ⁻¹)	1.41	<1.5
Sodium absorption rate (mmol L ⁻¹) ^{1/2}	4.02	<7.5
Residual sodium carbonate (mmol c L ⁻¹)	2.24	<2.0
Ni (mg L ⁻¹)	0.09	0.20
Cd (mg L ⁻¹)	0.04	0.01
Pb (mg L ⁻¹)	1.24	5.0
Co (mg L ⁻¹)	0.02	0.05
Cr (mg L ⁻¹)	4.03	0.10
Zn (mg L ⁻¹)	1.95	2.00

Table 3: Effect of different levels of tannery wastewater on plant growth and biomass under the same concentrations of Zinc-lysine application in *B. napus*.

Treatments	Plant Height (cm)	Number of Leaves	Leaf Area (cm ²)	Root Length (cm)	Root Fresh Weight (mg)	Root Dry Weight (mg)	Leaf Fresh Weight (mg)	Leaf Dry Weight (mg)
Ck	31 ± 0.6ab	11 ± 1ab	110 ± 7ab	13 ± 0.4cd	4025 ± 55b	837 ± 36b	19,336 ± 740b	2457 ± 50b
T1	34 ± 1.0a	13 ± 1a	126 ± 5a	17 ± 1a	5038 ± 70a	999 ± 46a	23,675 ± 1200a	2658 ± 64a
T2	22 ± 1.6de	6 ± 0.6bc	72 ± 5d	12 ± 0.6de	1661 ± 57d	334 ± 13d	11,991 ± 467d	1573 ± 56d
T3	29 ± 1.2bc	8 ± 0.6b	91 ± 4c	15 ± 0.7ab	2191 ± 64c	470 ± 18c	15,599 ± 561c	1804 ± 50c
T4	17 ± 0.6ef	6 ± 1c	38 ± 3f	10 ± 0.3e	798 ± 37f	198 ± 12e	5005 ± 100f	729 ± 30f
T5	24 ± 1.7cd	8 ± 0.6b	53 ± 3e	14 ± 0.8bc	1179 ± 53e	292 ± 19d	6872 ± 170e	909 ± 30e
T6	10 ± 0.6g	5 ± 0.6c	17 ± 1g	8 ± 0.5f	414 ± 13g	88 ± 6f	3142 ± 70g	433 ± 24g
T7	11 ± 2.8fg	6 ± 0.6bc	19 ± 3g	10 ± 0.6e	505 ± 19g	103 ± 10f	3665 ± 75fg	507 ± 28g

Values are demonstrated as means of three replicates along with standard deviation (SD; n = 3). One-way ANOVA was performed and mean differences were tested by highest significant deviation (HSD) at p < 0.05. Different lowercase letters indicate a significant difference between the treatments. Different abbreviations used in the table are as follows: Ck (without irrigation with wastewater + 0 mg/L Zn-lysine), T1 (without irrigation with wastewater + 10 mg/L Zn-lysine), T2 (33% irrigation with wastewater + 0 mg/L Zn-lysine), T3 (33% irrigation with wastewater + 10 mg/L Zn-lysine), T4 (66% irrigation with wastewater + 0 mg/L Zn-lysine), T5 (66% irrigation with wastewater + 10 mg/L Zn-lysine), T6 (100% irrigation with wastewater + 0 mg/L Zn-lysine) and T7 (100% irrigation with wastewater + 10 mg/L Zn-lysine).

Phytoremediation: elimination of hexavalent chromium heavy metal using corn (*Zea mays* L.) (2020)

Table 1: Chemical and physical values of the experiment soil

Parameter	Result	Unit	Evaluation
pH	7.72	-	Slightly alkaline
Salt	0.08	%	Low
Lime	0.70	%	Low
Sand	33.33	%	Clay Loam (CL)
Silt	32.13	%	
Clay	34.53	%	
Organic matter	0.58	%	Insufcient
Available phosphorus (P)	20.42	mg/kg	Medium
Exchangeable potassium (K)	50.98	mg/kg	Little
Exchangeable calcium (Ca)	170.3	mg/kg	Little
Exchangeable magnesium (Mg)	60.1	mg/kg	Sufcient
Available copper (Cu)	0.58	mg/kg	Sufcient
Available iron (Fe)	2.61	mg/kg	Medium
Available manganese (Mn)	5.60	mg/kg	Sufcient
Available zinc (Zn)	3.25	mg/kg	Sufcient
Extractable chromium Cr(VI)	0.80	mg/kg	Non toxic

Source:https://www.researchgate.net/publication/343897871_Phytoremediation_elimination_of_hexavalent_chromium_heavy_metal_using_corn_Zea_mays_L

Mitigation of chromium toxicity in *Arabidopsis thaliana* by sulfur supplementation(2019)

Table1: Effects of Cr(III) and Cr(VI) on glutathione (GSH), soluble protein (SP), malondialdehyde (MDA), catalase (CAT), superoxide dismutase (SOD) and peroxidase (POD) activities, in the roots of *Arabidopsis thaliana*.

Treatment	GSH [nmol/gFW]	SP [mg/g]	MDA [nmol g ⁻¹ FW]	CAT [mmol/g/min FW]	SOD [U g ⁻¹ FW]	POD [mmol/g/min FW]
CK	42.5±3.54 ^c	6.75±0.35 _a	5.30 ± 1.21 ^d	0.45 ± 0.05 ^a	575.27 ± 35.36 ^a	44.12 ± 4.49 ^a
CK + S	50.0±7.10 ^c	7.50±0.71 _a	4.95 ± 1.31 ^d	0.46 ± 0.07 ^a	595.34 ± 7.07 ^a	45.50 ± 7.78 ^a
Cr(III)	65.0±7.08 ^b	5.50 ± 0.70 ^b	10.75 ± 3.35 ^b	0.37 ± 0.03 ^b	365.04 ± 49.50 ^b	33.44 ± 2.12 ^b
Cr(III)+S	95.0±7.09 ^a	6.50 ± 0.69 ^a	7.85 ± 2.25 ^c	0.44 ± 0.01 ^a	509.93 ± 42.43 ^a	39.50 ± 4.95 ^{ab}
Cr(VI)	65.0±7.10 ^b	4.50 ± 0.70 ^c	23.95 ± 3.45 ^a	0.36 ± 0.08 ^b	224.76 ± 35.36 ^c	21.11 ± 5.99 ^c
Cr(VI) +S	85.0±7.09^a	5.50 ± 0.71^b	12.15 ± 3.12^b	0.40 ± 0.07^{ab}	475.35 ± 35.35^a	37.50 ± 3.54^b

All the values are the means of three replicates. Different letters on mean values are statistically different (P < 0.05).

Source: <https://www.sciencedirect.com/science/article/abs/pii/S0147651319307006>

Appraisal of chromium and cobalt contents of vegetables grown in soil irrigated with sewage water: A risk for consumers' health(2019)

Table1: Analysis of variance and mean values of chromium (mg/kg) in soil and vegetables treated with canal and sewage water

	Chromium		
	Mean ± S.E.		Mean Square
	CW	SW	
Soil	0.900±0.198	1.800±0.063	9.720 ^{**}
<i>R. sativus</i>	0.303±0.075	0.600±0.227	0.177 [*]
<i>B. rapa</i>	0.110±0.184	0.216±0.198	7.375 [*]
<i>Z. officinale</i>	0.241±0.113	0.470±0.227	42.074 ^{***}
<i>C. baccatum</i>	0.196±0.063	0.393±0.075	2.928 ^{ns}
<i>C. frutescens</i>	0.144±0.126	0.288±0.126	39.089 ^{***}
<i>C. annuum</i>	0.190±0.075	0.378±0.184	16.892 [*]
<i>S. lycopersicum</i>	0.221±0.198	0.428±0.113	17.947 ^{ns}
<i>C. longa</i>	0.250±0.184	0.525±0.063	7.118[*]

*, **, ***= significant at 0.05, 0.01 and 0.001 levels, ns = non-significant

*Canal water (CW) and sewage water (SW).

The highest value of Cr was observed in *Solanum lycopersicum* irrigated with SW and the lowest in *Brassica rapa* irrigated with CW. In all vegetables, the daily intake of metal values for Cr was higher in SW as compared to the CW.

The mean Cr concentration in soil varied from 0.9 to 1.80 mg/kg. Higher Cr values in soil were observed during sewage water irrigation and lower values were found in canal water irrigation.

Source: https://www.researchgate.net/publication/330669207_Appraisal_of_chromium_and_cobalt_contents_of_vegetables_grown_in_soil_irrigated_with_sewage_water_A_risk_for_consumers'_health

Chromium detoxification mechanism induced growth and antioxidant responses in vetiver (*Chrysopogon zizanioides* (L.) Roberty) (2019)

Table1: Effect of Cr stress on growth, tolerance indices (TI), biomass and translocation factor (TF) of Vetiver

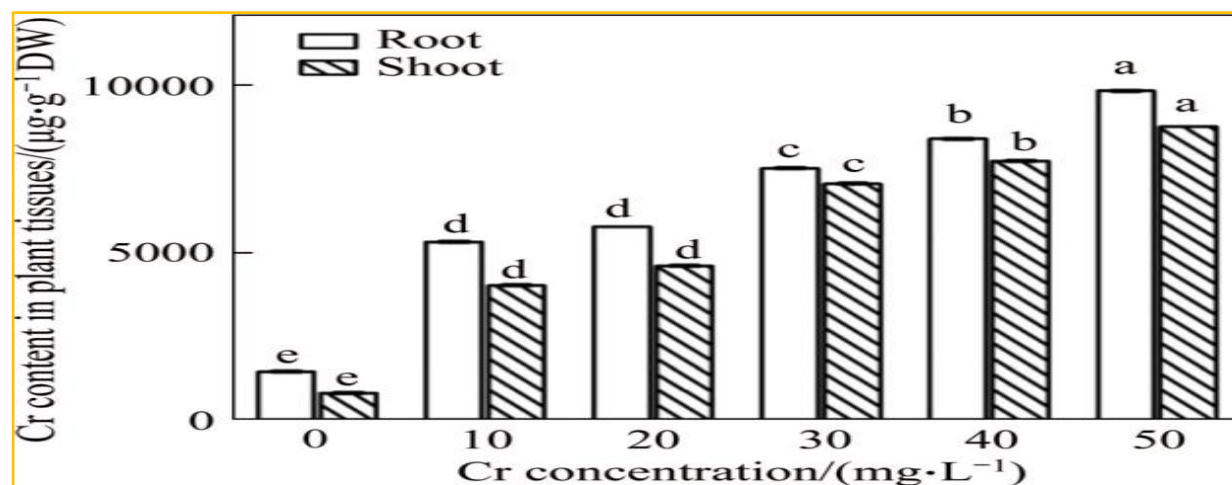
Cr Concentration / (mg.L ⁻¹)	Shoot length/cm	Root length/cm	IT/%		Biomass/g	TF/%
			Shoot	Root		
0	48.0 ± 0.57 ^a	19.3 ± 0.33 ^a	—	—	4.112 ± 0.00 ^a	—
10	43.3 ± 0.88 ^b	16.3 ± 0.88 ^b	90.2	84.4	4.043 ± 0.02 ^a	75.6
20	40.0 ± 0.57 ^c	13.6 ± 0.33 ^c	83.3	70.4	4.020 ± 0.01 ^a	85.8
30	36.3 ± 0.88 ^d	13.0 ± 0.57 ^c	75.6	67.3	3.800 ± 0.05 ^{ab}	94.0
40	35.3 ± 0.88 ^d	13.1 ± 0.60 ^c	73.5	67.8	3.641 ± 0.02 ^b	96.0
50	30.3 ± 0.88 ^e	10.6 ± 0.88 ^d	63.1	54.9	3.630 ± 0.01 ^b	89.0

Data are means ± S.E. (n=3). Different letters on each error bar indicate significant differences at P<0.05.

Shoot and root growth varied significantly depending on the concentration of Cr treatment. After 16 d of exposure, plant growth decreased by 36.8% and 45.0% in shoots and roots, respectively, in the 50 mg/L Cr treatment. Similarly, the root and shoot index of tolerance (IT) values also decreased under Cr-induced stress conditions. However, the decline in root length was more pronounced than that of shoot length under Cr stress. Vetiver plant biomass declined with increasing Cr concentration in the growth medium. The maximum biomass reduction was 12.1% in the 50 mg/L Cr treatment.

Source: <https://link.springer.com/content/pdf/10.1007%2Fs11771-019-4021-y.pdf>

Chromium accumulation in root and shoot tissues of vetiver grown with its different concentration.(2019)



Root and shoot Cr accumulation was increased gradually with the increase of Cr concentration. The higher level of Cr accumulation was 9808 µg/g DW and 8731 µg/g DW for roots and shoots, respectively, at the 50 mg/L Cr concentration, with Cr accumulation higher in root than in shoot. This result indicated that roots served as a partial barrier against the transport of Cr to the shoot and Cr concentration was largely acquired then stored in vetiver roots.

Source: <https://link.springer.com/article/10.1007/s11771-019-4021-y>

Toxic effects of chromium on some quality parameters of *Sorghum bicolor* (L.) (2018)

Table1: Effect of Cr (VI) on total chlorophyll and chlorophyll-a and b (mg g⁻¹ fresh weight) in leaves of sorghum (*Sorghum bicolor* (L.) plant at different growth stages

Cr (VI) mg kg ⁻¹ soil	Days								
	35	70	90	35	70	90	35	70	90
	Total chlorophyll			Chlorophyll-a			Chlorophyll-b		
T ₁	3.25	4.61	2.90	1.77	2.88	1.45	1.48	1.73	1.45
1.0	3.12	5.10	2.91	1.69	2.44	1.41	1.43	2.66	1.50
2.0	2.73	4.45	2.32	1.57	2.00	1.26	1.16	2.45	1.06
4.0	2.40	4.04	-	1.37	1.98	-	1.03	2.06	-
	A	B	A×B	A	B	A×B	A	B	A×B
SE (m)	0.09	0.10	0.17	0.03	0.03	0.05	0.09	0.10	0.17
CD at 5%	0.26	0.30	0.51	0.08	0.09	0.16	0.26	0.30	0.51

Each value is the mean of three determinations. T₁= control, *Plants unable to survive with 4.0 mg Cr (VI) kg⁻¹ soil at 90 DAS, A = Treatment, B = Stages, A×B = Interaction

Table2: Effect of Cr (VI) on crude protein content (per cent dry weight) in leaves, stem and root of sorghum (*Sorghum bicolor* (L.) plant at different growth stages

Cr (VI) mg kg ⁻¹ soil	Days a								
	35	70	90	35	70	90	35	70	90
	Leaves			Stem			Root		
T ₁	8.96	11.54	10.11	5.69	7.89	4.13	2.35	4.57	3.32
1.0	6.16	7.91	6.44	4.46	5.67	4.88	2.07	3.57	3.35
2.0	6.03	7.46	6.25	3.88	4.68	3.88	1.87	2.77	2.46
4.0	4.67	5.73	-	3.35	3.68	-	1.45	1.88	-
	A	B	A×B	A	B	A×B	A	B	A×B
SE (m)	0.03	0.03	0.06	0.03	0.04	0.06	0.03	0.03	0.05
CD at 5%	0.07	0.08	0.13	0.09	0.07	0.10	0.08	0.09	0.13

Each value is the mean of three determinations, T₁= control, *Plants unable to survive with 4.0 mg Cr (VI) kg⁻¹ soil at 90 DAS, A = Treatment, B = Stages, A×B = Interaction

Table3: Effect of Cr (VI) on in vitro dry matter digestibility (per cent dry weight basis) in leaves and stem of sorghum (*Sorghum bicolor* (L.) plants at different growth stages.

Cr (VI) mg kg ⁻¹ soil	Days :					
	35	70	90	35	70	90
	Leaves			Stem		
T ₁	55.60	51.80	48.40	43.60	42.40	38.60
1.0	54.4	48.50	46.83	40.20	37.40	35.50
2.0	50.40	48.50	46.83	38.40	34.40	32.40
4.0	48.80	46.40	-	33.60	31.40	-
	A	B	A×B	A	B	A×B
SE (m)	0.07	0.09	0.15	0.08	0.09	0.16
CD at 5%	0.16	0.24	0.42	0.21	0.23	0.36

Each value is the mean of three determinations, T₁= control, *Plants unable to survive with 4.0 mg Cr (VI) kg⁻¹ soil at 90 DAS, A = Treatment, B = Stages, A×B = Interaction

Source: <https://pdfs.semanticscholar.org/83b1/d138e7a18c62fc90e2dc688a1dbbe39b44ba.pdf>

Interactive effect of cadmium and zinc on chromium uptake in spinach grown in Vertisol of Central India (2018)

Table1: Effect of Cr, Cd and Zn application on respective metal concentration and uptake

Cr levels (mg/kg)	Cr concentration		Cr uptake (mg/pot)		Cd levels (mg/kg)	Cd concentration		Cd uptake (mg/pot)		Zn levels (mg/kg)	Zn concentration		Zn uptake (mg/pot)	
	(lg/g)		Shoot	Root		(lg/g)		Shoot	Root		(lg/g)		Shoot	Root
0	6.24	8.99	0.102	0.009	0	11.47	19.08	0.177	0.019	0	11.89	24.26	0.164	0.019
50	9.38	32.6	0.029	0.144	1	12.24	27.53	0.180	0.022	10	11.92	30.06	0.177	0.025
100	18.5	43.9	0.028	0.249	2	13.42	34.95	0.200	0.033	20	13.32	32.34	0.219	0.030
LSD (5%)	1.67	6.31	0.041	0.072		1.21	4.38	NS	0.012		NS	NS	NS	NS
SEm±	0.23	1.15	0.001	0.011		0.02	1.05	–	0.002		–	–	–	–

Mean data of all the treatment combinations

Source: <https://link.springer.com/content/pdf/10.1007%2Fs13762-017-1396-x.pdf>

Chromium accumulation in maize and cowpea after successive applications of composted tannery sludge (2018)

Table1: Bioaccumulation factor of Cr in different parts of maize and cowpea plant cultivated in soil submitted to consecutive applications of composted tannery sludge

applications of composted tannery sludge.				
CTS (Mg ha ⁻¹)	Maize			
	Roots	Stems	Leaves	Grains
0	12.26 ± 3.64	0.46 ± 0.26	1.14 ± 0.30	1.08 ± 0.23
2.5	2.98 ± 0.53	0.07 ± 0.03	0.16 ± 0.05	0.08 ± 0.04
5	2.89 ± 0.44	0.05 ± 0.03	0.13 ± 0.04	0.02 ± 0.02
10	1.51 ± 0.42	0.03 ± 0.00	0.06 ± 0.02	< 0.01
20	0.98 ± 0.36	0.01 ± 0.01	0.07 ± 0.02	< 0.01
CTS (Mg ha ⁻¹)	Cowpea			
	Roots	Pods	Leaves	Grains
0	5.53 ± 1.59	1.02 ± 0.26	2.00 ± 0.70	0.12 ± 0.03
2.5	1.31 ± 0.16	0.17 ± 0.03	0.34 ± 0.04	0.03 ± 0.00
5	0.88 ± 0.29	0.09 ± 0.05	0.23 ± 0.07	0.07 ± 0.01
10	0.60 ± 0.28	0.07 ± 0.05	0.26 ± 0.06	0.07 ± 0.03
20	0.56 ± 0.05	0.03 ± 0.00	0.18 ± 0.04	0.03 ± 0.01

± standard error of the mean (n = 4).

Source: <https://sci-hub.tw/10.4025/actasciagron.v40i1.35361>

Chromium toxicity and ultrastructural deformation of *Cicerarietinum* with special reference of root elongation and coleoptile growth (2017)

Table1: Variation of percentage of germination, coleoptile growth and root length with different concentration of Cr 6p solution.

Concentration of Cr ^{6p} solution	Germination (% of reduction)	Coleoptyl growth (% of reduction)	Root length (% of reduction) 48 h
Control	100 ^a	100 ^a	100^a
20	10 ^d ± 0.010	2.27 ^e ± 0.117	22.48^e ± 0.170
40	13 ^c ± 0.061	4.55 ^d ± 0.081	25.84^d ± 0.219
80	30 ^b ± 0.413	29,55 ^{bc} ± 0.114	47.85^{bc} ± 0.011
100	31^b ± 0.011	31.82^b ± 0.710	50.72^b ± 0.910

Mean ± SD of three replicate. Means followed by the same letter (S) within treatment are not significantly different at 5% using Duncan's multiple range test (DMRT). Means of three replicates are taken. Present results indicate that the growth of coleoptiles is also affected by Cr(VI) solution and abrupt reduction occur at 80 mg/L.

Source: <https://www.sciencedirect.com/science/article/pii/S1512188717300404>