Numerical Data

Effects of cadmium on rice yield and its parameter

Variety	Treatment	Panicles/pot	Spikelet number/pot	100-grain weight (g)	Seed setting rate (%)	Grain yield/pot (g)
V1	Cd0	30.33 ± 0.33^{a}	121.07 ± 0.58^{bc}	23.97 ± 0.33^{a}	89.1 ± 0.11^{a}	78.44 ± 1.40^{a}
	Cd1	23.66 ± 0.88^{b}	127.52 ± 3.88^{b}	19.88 ± 0.38^{b}	85.963 ± 1.45^{b}	51.48 ± 1.61^{b}
	Cd2	20.00 ± 0.57^{c}	142.34 ± 2.87^{a}	19.03 ± 0.32bc	82.293 ± 0.74^{c}	44.51 ± 0.48^{c}
	Cd3	17.33 ± 0.88^{d}	113.63 ± 5.25^{c}	18.1 ± 0.11c	79.92 ± 0.45^{c}	28.35 ± 0.05^{d}
V2	Cd0	27.67 ± 0.33^{a}	116.35 ± 2.46^{c}	23.60 ± 0.28^{a}	92.32 ± 0.84^{a}	70.12 ± 1.60^{a}
	Cd1	25.33 ± 0.33^{b}	132.01 ± 2.39^{ab}	21.55 ± 0.17^{b}	87.86 ± 1.49^{b}	63.41 ± 2.69^{b}
	Cd2	23.66 ± 0.33^{c}	123.49 ± 2.58^{bc}	19.05 ± 0.47^{c}	86.883 ± 0.32^{b}	48.31 ± 0.66^{c}
	Cd3	20.33 ± 0.66^{d}	140.32 ± 7.90^{a}	18.63 ± 0.19^{c}	80.697 ± 1.15^{c}	42.75 ± 1.38^{c}
V3	Cd0	32.33 ± 0.33^{a}	113.11 ± 2.03^{a}	24.98 ± 0.24^{a}	93.79 ± 0.72^{a}	85.63 ± 1.01^{a}
	Cd1	31.66 ± 0.33^{a}	111.66 ± 0.70^{a}	24.03 ± 0.12^{ab}	89.90 ± 0.25^{b}	76.37 ± 0.19^{b}
	Cd2	28.67 ± 0.33^{b}	110.93 ± 0.14^{a}	23.38 ± 0.47^{bc}	88.12 ± 0.42^{c}	65.5 ± 0.73^{c}
	Cd3	26.66 ± 0.33^{c}	98.58 ± 2.1^{5b}	22.66 ± 0.33^{c}	86.22 ± 0.43^{d}	51.42 ± 2.10^{d}
V4	Cd0	25.66 ± 0.33^{a}	131.33 ± 3.60^{b}	22.44 ± 0.67a	90.29 ± 0.96^{a}	68.37 ± 3.59^{a}
	Cd1	23.33 ± 0.33^{b}	139.15 ± 1.73^{ab}	21.05 ± 0.49^{ab}	87.67 ± 1.03^{a}	59.87 ± 1.46^{b}
	Cd2	21.66 ± 0.33^{c}	148.57 ± 6.18^{a}	19.66 ± 0.22^{bc}	83.54 ± 0.74^{b}	52.87 ± 2.43^{bc}
	Cd3	19.66 ± 0.33^{d}	150.92 ± 3.7^{2a}	19.30 ± 0.60^{c}	81.99 ± 0.47^{b}	46.95 ± 1.73^{c}
V5	Cd0	27.66 ± 0.33^{a}	130.58 ± 0.53^{ab}	24.04 ± 0.50^{a}	89.70 ± 0.55a	77.9 ± 1.43^{a}
	Cd1	25 ± 0.5774^{b}	117.65 ± 0.60^{bc}	23.44 ± 0.10a	80.05 ± 0.77^{b}	55.19 ± 1.42^{b}
	Cd2	24.33 ± 0.66^{b}	103.53 ± 11.81^{c}	21.83 ± 0.56^{b}	77.13 ± 3.54^{b}	41.94 ± 3.22^{c}
	Cd3	18.33 ± 0.66^{c}	147.21 ± 4.34^{a}	19.65 ± 0.21^{c}	76.98 ± 1.52^{b}	40.77 ± 1.36^{c}

Three replicated means (±SE) were calculated for each treatment. Values with different letters are significantly different at $p<0.05$. Cd0 = 0 mg Cd/kg, Cd1 = 50 mg Cd/kg, Cd2 = 100 mg Cd/kg, and Cd3 = 150 mg Cd/kg

Source: https://www.hindawi.com/journals/jchem/2017/1405878/abs

Effects of cadmium application on the growth parameters of *E. crus-galli*

Treatments (mg·kg-1)	FW (g per plant)		Organ length (cm)		Till number per plant
	Root	Aboveground parts	Root	Aboveground parts	
0.3	15.36±0.58^{b}	30.07±4.69 ^{a}	30.60±0.94^{bc}	122.83±2.02^{b}	6.00±0.58^{a}
0.6	17.48±0.58^{b}	24.97±2.01^{a}	29.17±1.43^{c}	110.40±3.65^{b}	5.33±0.33^{a}
0.9	23.97±0.58^{a}	45.84±1.98^{a}	35.67±2.41^{a}	112.80±1.31^{b}	5.67±0.89^{a}
1.5	21.72±0.58^{a}	43.56±5.79^{a}	34.93±1.21^{ab}	109.53±2.28^{a}	6.67±0.65^{a}
Control	23.54±4.33^{a}	32.01±3.44^{a}	37.53±0.94^{a}	124.33±0.58^{a}	6.00±0.48^{a}

Values are mean ± standard error (SE) of three replications. Different small letters within the same short columns indicate significant differences between treatments according to Duncan's multiple range test at $p< 0.05$ level

Source: http://www.pjoes.com/pdf/26.2/Pol.J.Environ.Stud.Vol.26.No.2.779-784.pdf

Dry biomass (g/plant) of different plant tissues along with root length (cm) and total leaf area (cm^2) of *Eichhornia crassipes* grown in different cadmium concentrations.

$CdCl_2$ (mg L^{-1})	Day (d)	Root	Shoot	Leaf	Root length (cm)	Total leaf area (cm2)
Control	0 d 21 d	0.44 ± 0.002 1.58 ± 0.36	0.51 ± 0.003 2.13 ± 0.19	0.62 ±0.009 2.35 ± 0.22	9.9 ± 0.264 20.3 ± 0.45	165.0 ± 8.88 311.4 ± 4.20
5	0 d 21 d	0.44 ± 0.002 0.86 ± 0.02* (–45.56%)	0.51 ± 0.003 1.25 ± 0.25* (–41.31%)	0.62 ± 0.003 1.22 ± 0.19* (–48%)	9.9 ± 0.173 18.2 ± 0.50 (–10.34%)	165.6 ± 1.52 276.5 ± 7.31* (–11.21%)
10	0 d 21 d	0.44 ± 0.003 0.67 ± 0.01* (–57.34%)	0.51 ± 0.003 0.76 ± 0.02* (–64.08%)	0.62 ± 0.003 0.83 ± 0.008* (–64.46%)	9.9 ± 0.20 17.2 ± 0.37* (–15.27%)	165.6 ± 3.21 254.7 ± 10.14* (–18.21%)
15	0 d 21 d	0.44 ± 0.003 0.55 ± 0.01* (–64.6%)	0.50 ± 0.002 0.61 ± 0.01* (–71.12%)	0.62 ± 0.006 0.72 ± 0.008* (–69.19%)	9.96 ± 0.251 15.4 ± 0.40* (–24.13%)	165.3 ± 3.20 225.9 ± 12.15* (–27.45%)
20	0 d 21 d	0.44 ± 0.001 0.46 ± 0.01* (–70.75%)	0.50 ± 0.003 0.53 ± 0.01* (–75.16%)	0.62 ± 0.009 0.65 ± 0.01* (–72.17%)	9.9 ± 0.057 14.5 ± 0.20* (–28.57%)	164.66 ± 4.5 205.8 ± 4.32* (–33.91%)

Values are mean ± SD of 3 replicates; values in the parentheses include percent decrease in mean values as compared to the corresponding control values.

Source: http://journals.tubitak.gov.tr/biology/issues/biy-16-40-1/biy-40-1-7-1411-86.pdf

Leaf dry weight of Premia and Blitz seedlings grown in the root media containing distilled water (Control), 2 µmol/L $Cd^{2+,}$ 2 µmol/L

Treatments	Leaf Dry Weight(mg)	
	Control	Cd
Premia	16.92 ± 1.923[a]	17.31 ± 1.846[a]
Blitz	21.35 ± 2.5[b]	21.92 ± 2.885[b]

Mean weights in mg ± SD, the same letters indicate no statistically significant differences at P < 0.05)

Source: https://www.degruyter.com/downloadpdf/j/agri.2016.62.issue-4/agri-2016-0013/agri-2016-0013.pdf

Differential Cd assimilation and Translocation ratio in wheat and kodo millet

Cd concentration in µm	*Triticum aestivum*			*Paspalum scrobiculatum*		
	Cadmium assimilation (mg/kg)			Cadmium assimilation (mg/kg)		
	Root	Shoot	Shoot/Root Ratio	Root	Shoot	Shoot/Root Ratio
10	14.50±1.24[a]	1.79±0.40[a]	1.79±0.40[a]	73.28±0.88[a]	7.32±0.44[a]	0.0996
20	11.08±1.46[b]	2.45±0.64[a]	0.22227	103.40±1.6[b]	19.59±0.83[b]	0.1986
50	17.52±1.14[c]	6.43±0.31[a]	0.3674	164.27±1.5[c]	57.33±2.83 [c]	0.3488
100	46.29±2.58[d]	30.00±1.9[b]	0.6481	248.82±2.4[d]	150.13±1.91 [d]	0.6028
500	97.32±2.23[e]	80.43±1.4[c]	0.8621	896.32±1.9[e]	896.32±1.9[e]	0.8182

The values followed by different letters are significantly different at a significance level of $p<0.05$

Source: www.tandfonline.com/doi/full/10.1080/15226514.2016.1207608?scroll=top...true

Effect of Cd on induction of PCs in leaves, stems and roots of cabbage variety Pluto

Plant Part	Cd level (μgl^{-1})	Concentration of PCs and GSH[a]				
		PC2	PC3	PC4	GSH	PCs+GSH
		(mmol thiol [-SH] KG^{-1} dw)				
Leaves	Control[b] 500	0a 0.20b	0a 0.50b	0a 0.46b	2.37a 2.24a	2.37a 3.40b
Stem	Control[b] 500	0a 0.30b	0a 0.25b	0a 0.15b	5.60a 5.50a	5.60a 6.20b
Roots	Control[b] 500	0.50±0.03 1.50±0.12	0.80±0.03 2.50±0.40	0.55±0.01 2.40±0.30	4.10±0.15 4.85±0.20	5.95±0.20 11.3±0.80

Plants were harvested after 4 weeks of Cd exposure. For a plant part, means with the same letter are not significantly different (P>0.05). LSD comparisons are valid only within the one plant part and one constituent a Each value is the mean of four replicates b Cadmium in the control is due to background contamination of the hydroponic solution (1μgL−1)

Source: Environ Sci Pollut Res (2016) 23:5296–5306

Effect of exogenous betaine on photosynthesis parameters, SPAD value and Fv/Fm in maize seedlings exposed to Cd for 7 days

	Pn (1mol m^{-2} s^{-1}	Gs mmol m^{-2} s^{-1}	Ci 1LL-1	Tr(mmol-2 s^{-1})	WUE (µmol $mmol^{-1}$)	SPAD value	Fv/Fm
Control	11.9 ± 1.1b	79.0 ± 9.5a	190.2 ± 21.5bc	0.82 ± 0.04b	14.4±1.3 a	35.24 ±4.1a	0.8 ±0.01a
Betaine	14.1±0.6 a	89.2±3.5 a	155.3±21.0 c	1.03±0.01 a	13.7±0.5 a	13.7±0.5a	0.8±0.01a
Cd	Cd±0.2d	51.1±3.1 b	302.6±18.3 a	0.59±0.04 d	6.3±0.7c	15.74±1.1 c	0.61±0.02 b
Cd + Betaine	7.3+0.1c	57.0+3.5 b	194.6+16.0 b	0.74+0.03 c	9.9+0.6b	23.13+4.0 b	0.64+0.02 b

Data were means of three independent replicates (each replicate containing seven plants). Different letters indicate significant differences (P\0.05) among the four treatments Pn net photosynthetic rate,Gs stomatal conductance,Ciintercellular CO2 concentration,Tr transpiration rate,WUE water use efficiency,Fv/Fmoptimal/maximal photochemical efficiency of PSII in the dark

Source: Acta Physiol Plant (2016) 38:95

Cadmium up take with varying cadmium concentrations on different harvest days

Cadmium Accumulation in soils	Harvest Days					
	15 days		30 days		45 days	
	root	shoot	root	shoot	root	shoot
Control	0.68±0.003	0.8±0.005	0.93±0.002	1.14±0.003	1.12±0.002	1.4±0.001
TC1	6.56±0.003	7.9±0.02	8.25±0.002	10.5±0.02	9.35±0.003	12.1±0.01
TC2	15.3±0.003	19.4±0.002	19.07±0.001	25.07±0.003	17.1±0.002	22.8±0.001
TC3	24.1±0.002	37.8±0.01	30.52±0.01	41.25±0.005	32.14±0.008	43.9±0.006
TC4	28.9±0.002	41.04±0.008	34.1±0.004	45.5±0.008	36.2±0.006	48.62±0.006

Source: http://www.cwejournal.org/vol10no1/assessment-of-cadmium-and-chromium-stress-on-growth-physiology-and-metal-uptake-using-mirabilis-jalapa/

Lipid peroxidation (MDH) and activities of superoxide (SOD), catalase (CAT), as carbate peroxidase (APX), guaiacal peroxidase (GPX) and Glutathione reductase (GR) in the roots and leaves of 60-day-old *Pfaffia glomerata* plants cultivated during 20 days in nutritive solution containing 0,15, 45 and 90 µmol Cd L^{-1}. Values are the mean of five measurements:

			Min	mg protein Min^{-1}	protein Min^{-1}	mg protein Min^{-1}
Root						
0	27.30 c	1.26 d	0.33 b	7.65 c	9.35 b	1.32 a
15	37.43 b	5.86 a	0.29 b	8.62 b	8.05 c	0.53 b
45	44.62 a	4.75 b	0.20 c	4.94 d	9.57 b	0.44 b
90	48.36 a	3.55 c	0.49 a	9.40 a	10.20 a	0.58 b
Leaves						
0	144.45 b	5.49	0.79 b	2.36	0.82 c	0.50 c
15	137.72 b	8.23	0.84 b	3.94	0.74 c	0.52 c
45	129.07 b	6.33	1.00 a	3.38	1.00 b	0.76 b
90	298.81 a	6.91 NS	0.60 c	3.28 NS	1.60 a	0.95 a

Source: Cd-tolerance markers of *Pfaffia glomerata* (Spreng.) Pedersen plants: anatomical and physiological features, Brazilian journal of plants physiology, 2012

Effect of Cd on photosynthetic pigments (mg g−1 fw) of *B. monnieri* at different concentrations and exposure periods

Cd concentrations (µM)	Photosynthetic pigments (mg g^{-1} fw)	Exposure periods (h)		
		48	96	144
Control	Chlorophyll	1.32 ± 0.15	1.29 ± 0.04	1.37 ± 0.11
	Carotenoid	(0.33 ± 0.03)	(0.32 ± 0.02)	(0.33 ± 0.01)
10	Chlorophyll	1.23 ± 0.07	1.20 ± 0.08	1.06 ± 0.09^{AB}
	Carotenoid	$(0.38 \pm 0.03)^{a}$	$(0.39 \pm 0.01)^{a}$	$(0.31 \pm 0.02)^{b}$
50	Chlorophyll	1.18 ± 0.06^{A}	0.96 ± 0.09^{AB}	0.76 ± 0.08^{AB}
	Carotenoid	$(0.41 \pm 0.01)^{a}$	$(0.42 \pm 0.03)^{a}$	$(0.29 \pm 0.02)^{ab}$
100	Chlorophyll	1.15 ± 0.04^{A}	0.93 ± 0.03^{AB}	0.69 ± 0.03^{AB}
	Carotenoid	(0.32 ± 0.03)	$(0.27 \pm 0.03)^{ab}$	$(0.22 \pm 0.03)^{ab}$
200	Chlorophyll	0.99 ± 0.02^{A}	0.66 ± 0.06^{AB}	0.57 ± 0.05^{AB}
	Carotenoid	$(0.28 \pm 0.02)^{a}$	$(0.25 \pm 0.01)^{a}$	$(0.18 \pm 0.02)^{ab}$

The plants were referred with initial metal concentration at every 48 h. All values are means of triplicates ±SD. LSD ($p < 0.01$)

Source: http://www.sciencedirect.com/science/article/pii/S004565350500723X

Antioxidant enzymes modified in different plant species exposed to variable cadmium concentration

Cadmium concentration (µM)	Exposure time	Plant Species	Antioxidant enzymes modified	References
5	10 d	Pisum sativum	CAT, APOX, GPOX	Metwally et al., 2003
1 and 10	10 d	Triticum alurum	CAT, SOD, APOX, GPOX	Milone et al., 2003
4 and 40	7 d	Pisum sativum	CAT, SOD, APOX, GPOX	Dixit et al., 2001
5 and 50	48 h	Populus conescens	CAT, SOD, APOX, GR, MDAR	Schutzendubel and Polle, 2002
50	21 d	Phragmites australis	CAT, SOD, APOX, GR	Ianelli et al., 2002
50, 100 and 200	48 h	Glycine max	CAT, SOD, APOX	Balestrasse et al., 2001
500	12 h	Helianthus annus	CAT, SOD, APOX, GR, DHAR	Gallego et al., 1996
100 and 500	20 d	Oryza sativa	CAT, SOD, GPOX	Shah et al ., 2001
300 and 500	21 d	Arabidopsis thaliana	CAT, SOD, APOX, GPOX, GR	Cho and Seo, 2004
2000 and 5000	0.96 h	Sacchrum officinarum	CAT, SOD, GR	Fprnazier et al., 2002
5000	0.24 h	Oryza sativa	CAT, SOD, APOX, GPOX, GR	Hsu and Kso, 2004

Source: Cadmium toxicity in plants, Brazilian journal of plants physiology, 2005