# Influence of lead and cadmium on amino acids and protein content of pigeonpea seedlings

**B. SUJATHA AND B. PRIYADARSHINI** 

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# SUMMARY

Seeds of pigeonpea were grown in different concentrations of lead and cadmium for 8-days. The studies on the changes in free amino acid composition were confined to 6-day seedlings only. The total quantity of the amino acids increased with increasing lead and cadmium concentrations in both the cultivars of pigeonpea. The studies on protein content revealed the reduction in seedling axes and retention in cotyledons with increasing lead and cadmium concentrations when compared of their respective controls. From this observations it could be emphasized that the cultivar differed in response to two heavy metals.

Key words : Cultivars, Heavy metals, Pigeonpea, Proline, Protein

Lead and cadmium are toxic among the heavy metals. They are supplied to soil, air and water mainly by effluent from industries, mining, burning and leakage of waste and by fertilization with phosphates and sewage sludge. Soils contaminated with these heavy metals affect the growth, development and yield of plants (Tomsett and Thurman, 1988).

Amino acids are the primary products of inorganic nitrogen assimilation. In addition, free amino acids may also be formed by protein hydrolysis. Among the free amino acids, proline plays an important role under stress conditions and also a key role in osmoregulation (Aspinall and Paleg, 1981; Lilibute and Hellebust, 1989) protection of enzyme denaturation acts as a reservoir of carbon and nitrogen source and stabilizes the protein synthesis machinery (Fukutaku and Yamada, 1984; Kadpal and Rao, 1985). During germination and seedling growth, lead and cadmium affect the mobilization and hydrolysis of reserve proteins and their subsequent transport to growing axis (Krupa, 1988). Heavy metal toxicity causes the generation of reactive oxygen species (ROS) and its reaction with lipids, pigments, proteins and amino acids, resulting in membrane damage, inhibition of photosynthesis and enzyme inactivation (Stoeva et al., 2003; Wang et al., 2008). The inhibitory action of lead and cadmium on mobilization of seed storage proteins and consequent restricted availability of free amino acids to the growing axis impair the capacity of these tissues to carry out the synthesis of proteins involved in growth.

Correspondence to:

B. SUJATHA, Department of Botany, Andhra University, VISAKHAPATNAM (A.P.) INDIA
Authors' affiliations:
B. PRIYADARSHINI, Department of Botany, Andhra University, VISAKHAPATNAM (A.P.)

Amino acids and proteins are major components of pigeonpea. Pigeonpea is one of the important pulse crops of India. Its seed protein content is about 24% which is at par with any other legume. Seeds of pigeonpea constitute one of the principal sources of vegetable protein to the people of Indian homes hence the objectives of the initial phase of this research was to study the effect of lead and cadmium on free amino acid composition and protein content in pigeonpea cultivars.

#### MATERIALS AND METHODS

## Plant material and its growth conditions :

Seeds of pigeonpea (*Cajanus cajan*(L.)Millspaugh) cv. T21 (medium duration) and cv.LRG30 (long duration) supplied by ICRISAT, Patancheru, India were used in the present study. The seeds of uniform size and free from infection were selected for the experiments. The seeds were surface sterilized by using 0.01M sodium hypochlorite for 2 min, washed thoroughly with distilled water and were placed separately in trays lined with Whatman No.1 filter papers containing 0, 0.5, 1.0 and 1.5mM concentrations of lead (lead acetate: (CH<sub>2</sub>COO)<sub>2</sub>Pb.3H<sub>2</sub>O) and cadmium (cadmium chloride: CdCl<sub>2</sub>, 2.5H<sub>2</sub>O), respectively. Twenty five seeds were taken in each tray. Seeds germinated and seedlings grown in distilled water (zero concentration) served as controls. The seeds were allowed to germinate at 30±2°C for 8 days under a photoperiod of 12h and at 195m mol m<sup>-2</sup> s<sup>-1</sup> PPFD.

#### Amino acid analysis and total proteins:

Changes in free amino acid composition were studied in the control and treatments of 6-day old pigeonpea seedlings using LKB Automatic Amino Acid Analyser. For amino acid analysis, 200mg of plant material was homogenised in 80% alcohol. The alcohol was evaporated in vacuo and the residue was dissolved in citrate buffer pH 2.2 and was made up to a known volume. The amino acids were loaded and analysed on a cation exchange resin with buffer of carefully defined salt concentrations and pH as described in the 'Hand book and Applications for LKB Biochrom Automatic Amino Acid Analyser' which was used for this analysis. Sodium salt used for buffer preparation was passed through a teflon coil placed in a boiling water bath. Before entering the coil the column effluent was mixed with acetate buffer containing the reduced ninhydrin. This compound reacts with amino acids forming a dye complex. The absorption was determined in a flow photometer and registered on the chart of a recorder. The quantification and identification of the different amino acids were carried out using standard amino acids mixture consisting of aspartic acid, threonine, serine, glutamic acid, proline, glycine, alanine, cysteine, valine, metheonine, isoleucine, leucine, tyrosine, phenylalanine, histidine, lysine, arginine and ammonia. The LKB standard concentration is 2.5µ mole/ml except for cysteine which is 1.25µ mole/ml. Total protein content was estimated by the method of Lowry et al., (1951).

### **RESULTS AND DISCUSSION**

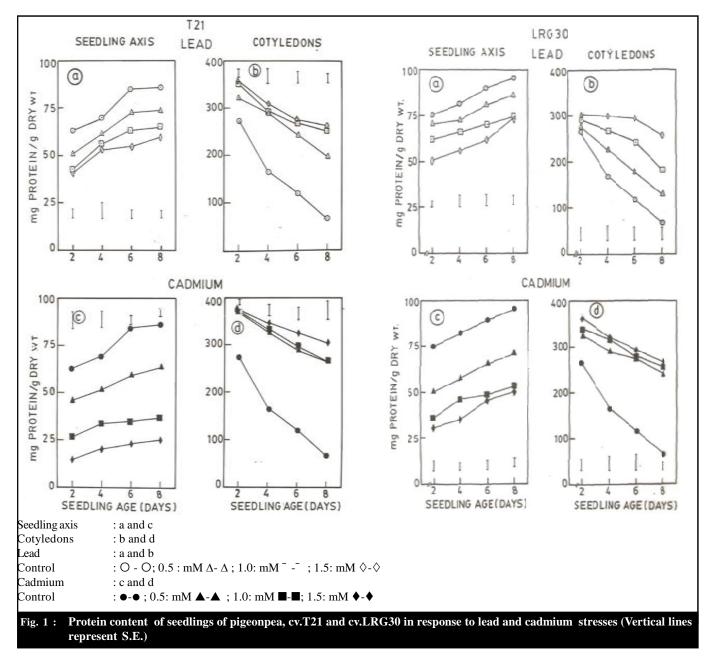
Considerable changes in free amino acid composition was observed depending upon the degree of the heavy metal stress in both the cultivars of pigeonpea. Increasing concentrations of heavy metals resulted in increasing concentration of different amino acids in the 6-day old pigeonpea seedlings. The amino acids that showed conspicuous increase in response to lead and cadmium stress in both the pigeonpea cultivars include isoleucine, leucine, metheonine, aspartic acid, proline, glutamic acid, histidine, lysine and cysteine (Table 1). It was reported that heavy metal stress preferentially results in the accumulation of proline, asparagine, isoleucine, leucine, metheonine, lysine, cysteine and valine (Fukutaku and Yamada, 1984; Costa and Morel, 1994). E1- Shintinawy and EI-Ansary (2000) monitored the changes in amino acid metabolism in soybean seedlings exposed to toxic concentrations of cadmium in order to measure the ability of the seedlings to tolerate the heavy metal. The increase of different amino acids in lead and cadmium treated pigeonpea seedlings may be attributed to individual or combined effect of the following possibilities. It might be caused by the malfunctioning of respiratory activity (Lee et al., 1976) mostly due to membrane damage (Vazqueze et al., 1992), resulting in the accumulation of several krebs cycle compounds such as 2-oxogluterate and pyruvate which may promote the synthesis of specific

amino acids. It may also results due to the complexion of lead and cadmium ions with sulfhydryl groups leading to increased metheonine and cysteine. Further, it may be due to reduced protein synthesis or increased protein breakdown (Reese and Winge, 1988; Rauser, 1990). It was interesting to note the conspicuous increase in proline content with increasing heavy metal stress in both the cultivars when compared to their respective controls (Table 1). Most of the proline accumulated in the plant tissues may be the result of net de novo synthesis from glutamic acid (Alia and Saradhi, 1991) or may be due to protein hydrolysis to free amino acids (Mikola and Mikola, 1980) or due to decreased proline oxidation (Huang and Cavalieri, 1979).

The protein content of the seedling axes during seedling growth of pigeonpea cultivars showed a continuous increase associated with a concomitant decrease in their respective colytedons. Though the protein content of the seedling axes of the lead and cadmium treated seedlings exhibited a trend similar to that of controls with age of their values were always lower than their controls. The protein content of the cotyledons of the lead and cadmium treated pigeonpea seedlings showed more retention with increasing lead and cadmium concentrations (Fig. 1). The soluble protein content in plant cells is an important indicator of their physiological state. The retention of proteins in the cotyledons of the treated pigeonpea seedlings is due to the decreased hydrolysis and transport of amino acid products from the cotyledons to the growing seedling axes under heavy metal stress. This has led to the decreased protein content in the seedling axes of the lead and cadmium treated pigeonpea seedlings resulting in decreased growth (Melnichuk et al., 1982). The lowered protein content of the pigeonpea seedling axes of the treatments may also be due to breakdown of proteins in response to lead and cadmium stress (Stewart and Larher, 1980). The reduced amount of soluble proteins was most probably a result of the reduced biosynthesis or the accelerated catabolic processes, on the other hand, the accelerated catabolism is probably due to the considerable disturbances in the membrane systems, in response to the metal phytotoxicity (Stoeva et al., 2003).

Between the two heavy metals, cadmium effected the free amino acid and protein content of the seedlings more intensely than lead. In relation to cultivar differences, cv. T21 showed greater values of total free amino acid than cv. LRG30. In cv. T21 the per cent reduction in the protein content of seedling axes and per cent retention in the protein content of cotyledons were relatively more conspicuous when compared to cv. LRG30. The cv.

						T21					
Α.	Amino acid		Lead Concent			E.	Amino acid			entrations (mM)	
	Associa sold	0.0	0.5	2.987	1.5			0.0	0.5	1.0	1.5
	Aspartic acid Threonine	1.012	0.097 0.526	0.227	3.491 0.945		Aspartic acid Threonine	0.075 0.135	2.085 0.235	3.126 0.135	4.162 0.324
	Serine	0.235	1.979	2.650	4.562		Serine	0.133	0.235	0.782	1.692
	Glutamic acid	2.974	1.927	0.358	0.632		Glutamic acid	0.306	0.406	0.426	0.349
	Glycine	0.998	1.156	1.162	2.001		Glycine	0.901	1.202	1.344	0.492
	Alanine	-	0.984	0.317	0.304		Alanine	0.899	0.202	0.114	2.216
	Valine Metheonine	0.001	0.079 0.597	1.194 1.256	0.196 1.494		Valine	0.200	0.207	0.407	0.596
	Isoleucine	0.151	1.821	1.824	1.276		Metheonine Isoleucine	-	1.513 1.487	2.009 2.127	3.012 2.560
	Leucine	0.276	0.694	0.704	1.094		Leucine	0.252	2.425	1.321	2.719
1	Tyrosine	0.002	0.021	0.398	0.199		Tyrosine	0.492	0.546	0.576	0.672
	Phenylalanine	0.216	0.184	0.987	0.270		Phenylalanine	0.124	0.295	0.423	0.694
	Histidine	0.434 0.156	0.493 1.976	1.762 0.954	0.515 1.617		Histidine	0.687	0.786	0.987	0.262
	Lysine Ammonia	1.001	0.394	1.612	0.621		Lysine	0.721 0.116	0.535 0.398	0.216 0.297	0.495 0.649
	Arginine	0.404	-	0.697	0.856		Ammonia Arginine	0.116	0.398	0.145	0.849
	Proline	-	0.240	0.435	2.382		Proline	-	1.014	3.113	4.256
Lead	Cysteine	-	2.567	-	0.459		Cysteine	0.013	0.402	0.427	0.475
Ľ	Total	7.862	15.735	19.524	23.214	LRG30	Total	5.260	14.379	15.714	25.863
B.			Ladour	(					1.10		T
	Amino acid	Lead Concentrations (mM)           0.0         0.5         1.0         1.5				F.	Amino acid	0.0	0.5	ntrations (mM) 1.0	1.5
	Aspartic acid	-	0.032	0.619	1.268	+	Aspartic acid	0.057	0.032	1.565	2.483
	Threonine	1.016	0.483	0.193	0.726		Threonine	0.145	1.128	0.708	1.226
	Serine	0.245	1.924	2.350	3.242		Serine	0.517	1.857	2.634	3.558
	Glutamic acid	3.744	1.858	1.168	1.433		Glutamic acid	0.106	0.477	-	0.955
	Glycine	0.857	1.132	2.066	2.501		Glycine	0.200	0.501	0.988	1.001
	Alanine Valine	-	0.762 0.034	0.210 1.131	0.108 0.154		Alanine Valine	0.901 0.899	-	0.072	-
	Metheonine	-	0.397	0.993	0.134		Metheonine		-	1.001	1.002
	Isoleucine	0.162	1.621	1.627	1.216		Isoleucine	-	0.567	0.155	1.945
	Leucine	0.281	0.669	0.803	1.053		Leucine	-	0.214	0.930	1.044
	Tyrosine	- 0.221	- 0.191	0.192	0.180		Tyrosine	0.350	0.180	0.036	0.336
	Phenylalanine Histidine	0.231 0.416	0.181 0.694	0.956 1.458	1.107 1.215		Phenylalanine Histidine	0.153 0.587	0.100 0.805	0.453 0.620	0.282 1.200
	Lysine	0.416	1.831	0.755	1.215		Lysine	0.587	0.805	0.620	0.559
	Ammonia	0.996	0.279	1.410	1.221		Ammonia	0.141	1.531	0.714	1.338
	Arginine	0.400	-	0.600	0.758		Arginine	-	0.375	0.199	0.508
	Proline	-	-	0.281	0.187		Proline	-	2.075	3.141	0.154
C.	Cysteine Total	8.524	2.454 14.351	16.811	1.454 19.378		Cysteine Total	4.745	0.510 10.719	0.712 14.000	0.010 17.601
	Total	0.524	. 14.551	10.011	17.578	T21	Totai	4.745	10.719	14.000	17.001
	Amino acid		CadmiumConce			G	Amino acid			centrations (mM	
		0.0	0.5	1.0	1.5		i inino uciu	0.0	0.5	1.0	1.5
					5.2.42	1		0.055	0 4 50	0.404	
	Aspartic acid	0.002	0.997	4.723	5.343		Aspartic acid	0.075	2.152	3.194	6.232
	Threonine	1.012	1.890	2.127	0.798		Threonine	0.135	0.294	0.346	0.472
	Threonine Serine Glutamic acid Glycine	1.012 0.235	1.890 1.776 3.806 1.497	2.127 3.126 0.021 4.976	0.798 4.854 1.762 5.684		Threonine Serine Glutamic acid Glycine	0.135 0.216 0.306 0.901	0.294 0.786 0.569 1.396	0.346 1.642 0.397 2.586	0.472 2.794 0.564 4.723
	Threonine Serine Glutamic acid Glycine Alanine	1.012 0.235 2.974	1.890 1.776 3.806 1.497 0.385	2.127 3.126 0.021 4.976 0.708	0.798 4.854 1.762 5.684 0.792		Threonine Serine Glutamic acid Glycine Alanine	0.135 0.216 0.306 0.901 0.899	0.294 0.786 0.569 1.396 0.498	0.346 1.642 0.397 2.586 0.692	0.472 2.794 0.564 4.723 0.816
	Threonine Serine Glutamic acid Glycine Alanine Valine	1.012 0.235 2.974 0.998	1.890 1.776 3.806 1.497 0.385 0.954	2.127 3.126 0.021 4.976 0.708 0.254	0.798 4.854 1.762 5.684 0.792 0.121		Threonine Serine Glutamic acid Glycine Alanine Valine	0.135 0.216 0.306 0.901 0.899 0.200	0.294 0.786 0.569 1.396 0.498 0.798	0.346 1.642 0.397 2.586 0.692 0.894	0.472 2.794 0.564 4.723 0.816 0.983
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine	1.012 0.235 2.974 0.998 - 0.001	1.890 1.776 3.806 1.497 0.385 0.954 0.389	2.127 3.126 0.021 4.976 0.708 0.254 1.573	0.798 4.854 1.762 5.684 0.792 0.121 0.239		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine	0.135 0.216 0.306 0.901 0.899	0.294 0.786 0.569 1.396 0.498 0.798 3.043	0.346 1.642 0.397 2.586 0.692 0.894 4.093	0.472 2.794 0.564 4.723 0.816 0.983 5.193
	Threonine Serine Glutamic acid Glycine Alanine Valine	1.012 0.235 2.974 0.998	1.890 1.776 3.806 1.497 0.385 0.954	2.127 3.126 0.021 4.976 0.708 0.254	0.798 4.854 1.762 5.684 0.792 0.121		Threonine Serine Glutamic acid Glycine Alanine Valine	0.135 0.216 0.306 0.901 0.899 0.200	0.294 0.786 0.569 1.396 0.498 0.798	0.346 1.642 0.397 2.586 0.692 0.894	0.472 2.794 0.564 4.723 0.816 0.983
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492	$\begin{array}{c} 0.294 \\ 0.786 \\ 0.569 \\ 1.396 \\ 0.498 \\ 0.798 \\ 3.043 \\ 1.560 \\ 3.569 \\ 0.297 \end{array}$	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649 \end{array}$
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216	$\begin{array}{c} 1.890\\ 1.776\\ 3.806\\ 1.497\\ 0.385\\ 0.954\\ 0.389\\ 0.121\\ 1.827\\ 0.425\\ 2.467\end{array}$	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 3.569\\ 0.297\\ 0.897\end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234 \end{array}$
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Phenylalanine Histidine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434	$\begin{array}{c} 1.890\\ 1.776\\ 3.806\\ 1.497\\ 0.385\\ 0.954\\ 0.389\\ 0.121\\ 1.827\\ 0.425\\ 2.467\\ 1.975\end{array}$	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\\ 0.250\\ \end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Phenylalanine Histidine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 3.569\\ 0.297\\ 0.897\\ 6.129\end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\end{array}$
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216	$\begin{array}{c} 1.890\\ 1.776\\ 3.806\\ 1.497\\ 0.385\\ 0.954\\ 0.389\\ 0.121\\ 1.827\\ 0.425\\ 2.467\end{array}$	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine	0.135 0.216 0.306 0.901 0.899 0.200 - - - - 0.252 0.492 0.124 0.687 0.721	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 3.569\\ 0.297\\ 0.897\\ 6.129\\ 0.689\end{array}$	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.889	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\\ 0.002 \end{array}$
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156	$\begin{array}{c} 1.890\\ 1.776\\ 3.806\\ 1.497\\ 0.385\\ 0.954\\ 0.389\\ 0.121\\ 1.827\\ 0.425\\ 2.467\\ 1.975\\ 0.872\end{array}$	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\\ 0.250\\ 1.217\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Phenylalanine Histidine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 3.569\\ 0.297\\ 0.897\\ 6.129\end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\end{array}$
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001	$\begin{array}{c} 1.890\\ 1.776\\ 3.806\\ 1.497\\ 0.385\\ 0.954\\ 0.389\\ 0.121\\ 1.827\\ 0.425\\ 2.467\\ 1.975\\ 0.872\\ 0.896\end{array}$	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\\ 0.250\\ 1.217\\ 0.892\\ 0.612\\ 0.856\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline	0.135 0.216 0.306 0.901 0.899 0.200 	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 0.297\\ 0.897\\ 6.129\\ 0.689\\ 0.729\\ 0.125\\ 4.296\end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\\ 0.889\\ 0.442\\ 0.492\\ 4.567\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\\ 0.002\\ 0.242\\ 0.649\\ 4.672\\ \end{array}$
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 -	$\begin{array}{c} 1.890\\ 1.776\\ 3.806\\ 1.497\\ 0.385\\ 0.954\\ 0.389\\ 0.121\\ 1.827\\ 0.425\\ 2.467\\ 1.975\\ 0.872\\ 0.896\\ 0.774\\ 0.124\\ \end{array}$	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\\ 0.250\\ 1.217\\ 0.892\\ 0.612\\ 0.856\\ 0.757\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 0.116	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 0.297\\ 0.897\\ 6.129\\ 0.689\\ 0.729\\ 0.125\\ 4.296\\ 0.225\end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\\ 0.889\\ 0.442\\ 0.492\\ 4.567\\ 0.349\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 0.649\\ 0.234\\ 6.497\\ 0.002\\ 0.242\\ 0.649\\ 4.672\\ 0.432\\ \end{array}$
Ш	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\\ 0.250\\ 1.217\\ 0.892\\ 0.612\\ 0.856\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900		Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline	0.135 0.216 0.306 0.901 0.899 0.200 	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 0.297\\ 0.897\\ 6.129\\ 0.689\\ 0.729\\ 0.125\\ 4.296\end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\\ 0.889\\ 0.442\\ 0.492\\ 4.567\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\\ 0.002\\ 0.242\\ 0.649\\ 4.672\\ \end{array}$
mium	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175	$\begin{array}{c} 2.127\\ 3.126\\ 0.021\\ 4.976\\ 0.708\\ 0.254\\ 1.573\\ 0.127\\ 3.765\\ 0.394\\ 0.545\\ 0.250\\ 1.217\\ 0.892\\ 0.612\\ 0.856\\ 0.757\end{array}$	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527	LRG 30	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Armonia Arginine Proline Cysteine Total	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 0.116	$\begin{array}{c} 0.294\\ 0.786\\ 0.569\\ 1.396\\ 0.498\\ 0.798\\ 3.043\\ 1.560\\ 0.297\\ 0.897\\ 6.129\\ 0.689\\ 0.729\\ 0.125\\ 4.296\\ 0.225\\ 28.052\\ \end{array}$	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\\ 0.889\\ 0.442\\ 0.492\\ 4.567\\ 0.349\end{array}$	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\\ 0.002\\ 0.242\\ 0.649\\ 4.672\\ 0.432\\ 45.866\end{array}$
dmium J	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conce 0.5	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 0.116	0.294 0.786 0.569 1.396 0.498 3.043 1.560 3.569 0.297 0.897 6.129 0.689 0.729 0.125 4.296 0.225 28.052 Cadmium Coo	$\begin{array}{c} 0.346\\ 1.642\\ 0.397\\ 2.586\\ 0.692\\ 0.894\\ 4.093\\ 1.516\\ 4.297\\ 0.486\\ 0.998\\ 6.239\\ 0.486\\ 0.998\\ 0.482\\ 0.492\\ 4.567\\ 0.349\\ 34.209\end{array}$	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 21.175 Cadmium Conc 0.856	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318	LRG 30 H.	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - - 0.013 5.260	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.729 0.125 4.296 0.225 2.8.052 Cadmium Coo 0.5	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.889 0.442 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1) 1.5 4.043
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - - 7.862	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 2.5917 entrations (mM) 1.0 1.513 3.919	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine	0.135 0.216 0.306 0.901 0.899 0.200 - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.897 0.299 0.689 0.729 0.125 4.296 0.225 28.052 <b>Cadmium Co</b> 0.5 <b>2.714</b> 1.839	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.442 0.492 4.567 0.349 4.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 0.649 0.234 6.497 0.002 0.242 0.649 0.242 0.649 4.672 0.432 45.866 1) 1.5 1.5
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 - - 7.862 - - 0.0	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290 1.240	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - - 0.013 5.260 - - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 3.043 1.560 0.297 0.897 6.129 0.689 0.729 0.125 4.296 0.225 28.052 Cadmium Co 0.5 2.714 1.839 1.061	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1) 1.5 4.043 0.946 1.371
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - - 7.862	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 2.5917 entrations (mM) 1.0 1.513 3.919	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - 0.013 5.260 - - - 0.057 0.145 0.517 0.106	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.729 0.125 4.296 0.225 2.8.052 Cadmium Coo 0.5 2.714 1.839 1.061 0.338	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.889 0.442 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anapartic acid Threonine Serine Glutamic acid Alanine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 225.917 1.0 1.513 3.919 3.490 0.015 4.763 0.504	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - - 0.013 5.260 - - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 3.043 1.560 0.297 0.897 6.129 0.689 0.729 0.125 4.296 0.225 28.052 Cadmium Co 0.5 2.714 1.839 1.061	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1) 1.5 4.043 0.946 1.371
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - - 7.862 - - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.513 3.919 3.490 0.015 4.763 0.504 0.154	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine	0.135 0.216 0.306 0.901 0.899 0.200 - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.729 0.125 4.296 0.225 2.8052 Cadmium Coo 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 ncentrations (mM 1.00 3.217 1.700 1.305 0.998 1.229 0.137	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Antino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 2.5917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine	0.135 0.216 0.306 0.901 0.899 0.200 	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.897 0.299 0.689 0.729 0.125 4.296 0.225 28.052 <b>Cadmium Con</b> 0.5 <b>Cadmium Con</b> 0.5 <b>Cadmium Con</b> 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.486 0.998 0.442 0.492 4.567 0.349 4.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 1.5 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anapartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - 1.016 0.245 3.744 0.851 - - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 225.917 	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine	0.135 0.216 0.306 0.901 0.899 0.200 - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.225 28.052 28.052 28.052 28.055 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 0.649 0.234 6.497 0.002 0.242 0.649 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.046
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Antino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 2.5917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - 0.013 5.260 - - - 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.729 0.125 4.296 0.225 2.8.052 Cadmium Cor 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 .209 .217 1.700 1.305 0.998 1.229 0.137 -2.351 2.071 0.864	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.054
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anapartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - 0.044 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 225.917 	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406 5.500 1.006 0.243	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine	0.135 0.216 0.306 0.901 0.899 0.200 	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.225 28.052 28.052 28.052 28.055 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 0.649 0.234 6.497 0.002 0.242 0.649 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.046
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Antion acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - 1.016 0.245 3.744 0.851 - - 0.162 0.281 - - 0.231 0.416	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.154 1.430 0.154 1.430 0.153 3.214 0.192 0.503 0.153	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406 5.500 1.006 0.243 0.330	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Valine Metheonine Isoleucine Isoleucine Tyrosine Phenylalanine Histidine	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.729 0.125 4.296 0.225 2.8052 Cadmium Coo 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.054 0.540 0.138 0.168
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.081 1.607 0.324 2.113 1.354 0.671	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 2.5917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.181 3.214 0.192 0.503 0.945	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.727 0.7270000000000	4	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Arginine Arginine Arginine Proline Cysteine Total Antino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 - - 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - 0.350 0.153 0.581 0.689	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.125 4.296 0.225 28.052 Cadmium Cor 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.517 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.442 0.492 4.567 0.349 34.209 	0,472 2,794 0,564 4,723 0,816 0,983 5,193 4,126 3,586 0,649 0,234 6,497 0,002 0,242 0,649 4,672 0,432 45,866 1 1 1.5 4,043 0,946 1,371 1,483 1,240 0,428 - 1,060 1,046 1,054 0,540 0,138 0,168 1,149
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - 0.00 - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.181 3.214 0.192 0.503 0.153 0.945 0.791	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406 5.500 1.006 0.243 0.330 0.631 0.041	ł	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Aspartic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia	0.135 0.216 0.306 0.901 0.899 0.200 - - - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - - - 0.013 5.260 - - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 3.569 0.297 0.897 6.129 0.689 0.729 0.125 4.296 0.225 2.8.052 Cadmium Coo 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.489 0.489 0.489 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.054 0.540 0.138 0.168
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.155 1.001 0.404 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.081 1.607 0.324 2.113 1.354 0.671	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 2.5917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.181 3.214 0.192 0.503 0.945	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.727 0.7270000000000	ł	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Valine Metheonine Isoleucine Isoleucine Isoleucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 - - 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - 0.350 0.153 0.581 0.689	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.729 0.125 4.296 0.225 2.8.052 Cadmium Coo 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842 1.274	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.054 0.540 0.138 0.168 1.149 0.168
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Lysine Proline Serine Glutamic acid Glycine Alanine Yaline Metheonine Isoleucine Leucine Lysine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Cysteine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - 0.00 - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 21.175 Cadmium Conce 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.081 1.607 0.324 2.113 1.354 0.671 0.750 0.574 0.120	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.0154 4.763 0.504 0.154 1.430 0.154 1.533 0.945 0.757 1.217 1.0 1.0 1.513 3.214 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.533 0.945 0.757 1.217 1.0 1.513 1.217 1.0 1.513 1.217 1.0 1.513 1.217 1.0 1.513 1.217 1.0 1.513 1.217 1.0 1.513 1.217 1.513 1.217 1.513 1.217 1.513 1.217 1.513 1.217 1.513 1.217 1.513 1.217 1.514 1.513 1.217 1.513 1.217 1.513 1.217 1.513 1.514 1.513 1.514 1.513 1.514 1.515 1.517	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406 5.500 1.006 0.243 0.330 0.631 0.041 4.620 3.789 2.500	ł	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 - 0.007 0.145 0.517 0.106 0.200 0.901 0.200 0.901 0.252 0.492 - 0.135 0.517 0.145 0.517 0.105 0.517 0.106 0.200 0.252 0.492 - 0.153 0.581 0.689 0.141 - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 3.569 0.297 0.897 6.129 0.689 0.729 0.125 4.296 0.225 2.8.052 Cadmium Coo 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842 1.274 0.156 2.175	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.489 0.489 0.489 0.489 0.489 0.492 4.567 0.349 3.4209  ncentrations (mM 1.00 3.217 1.700 1.305 0.998 1.229 0.137 - 2.351 2.071 0.864 0.211 1.354 0.873 0.700 1.206 1.084 0.545 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 0.649 4.672 0.432 0.432 4.672 0.432 4.5.866 1.5 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.046 1.054 0.540 0.545 - -
Cadmium .T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - - 0.00 - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.81 1.607 0.324 2.113 1.354 0.671 0.750 0.574	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.154 1.430 0.181 3.214 0.192 0.503 0.153 0.945 0.750	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.660 2.135 1.406 5.500 1.006 0.2135 1.406 5.500 1.006 0.233 0.330 0.631 0.041 4.620 3.789	ł	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Arginine Arginine Arginine Proline Cysteine Total Antino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phonylalanine	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 - - 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - 0.350 0.153 0.581 0.689	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.125 4.296 0.225 28.052 Cadmium Cor 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842 1.274 0.156	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 4.5.866 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.054 0.540 0.138 0.168 1.149 0.550 -
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anapartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Lysine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - - - - - - 0.00 - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.081 1.607 0.324 2.113 1.354 0.671 0.750 0.574 0.120 - 15.652	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.154 1.430 0.154 1.430 0.181 3.214 0.192 0.503 0.153 0.945 0.750 0.547 23.708	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.660 2.135 1.406 5.500 1.006 0.243 0.330 0.631 0.041 4.620 3.789 2.500 38.497	н	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Tyrosine	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 - 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - - 0.350 0.153 0.581 0.689 0.141 - - - - - - - - - - - - -	0.294 0.786 0.786 0.478 0.798 3.043 1.560 0.297 0.897 0.297 0.297 0.729 0.125 4.296 0.225 28.052 Cadmium Con 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842 1.274 0.156 2.175 19.376	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 4.567 0.349 4.567 0.349 1.0 3.217 1.700 1.305 0.998 1.229 0.137 - 2.351 2.071 0.864 0.211 1.354 0.873 0.700 1.206 1.084 0.545 - 2.2,980	$\begin{array}{c} 0.472\\ 2.794\\ 0.564\\ 4.723\\ 0.816\\ 0.983\\ 5.193\\ 4.126\\ 3.586\\ 0.649\\ 0.234\\ 6.497\\ 0.002\\ 0.242\\ 0.649\\ 4.672\\ 0.432\\ 45.866\\ \hline \end{array}$
cv. T	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Antino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.081 1.607 0.324 2.113 1.354 0.671 0.750 0.574 0.120 - 15.652 V. T21	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.503 0.5153 0.945 0.757 0.503 0.553 0.945 0.757 0.573 0.545 0.504 0.554 0.554 0.554 0.554 0.757 25.917 0.513 0.514 0.545 0.545 0.545 0.554 0.554 0.554 0.554 0.555 0.757 25.917 0.513 0.514 0.554 0.554 0.554 0.554 0.554 0.554 0.757 25.917 0.513 0.514 0.554 0.554 0.554 0.554 0.554 0.555 0.757 25.917 0.513 0.514 0.554 0.554 0.554 0.554 0.554 0.555 0.757 25.917 0.513 0.514 0.553 0.945 0.757 0.553 0.945 0.757 0.553 0.545 0.553 0.545 0.553 0.545 0.554 0.553 0.554 0.554 0.554 0.555 0.555 0.557 0.553 0.554 0.557 0	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.606 2.135 1.406 5.500 1.006 0.243 0.330 0.631 0.041 4.620 3.789 2.500 38.497 is : C	H. cv. LRG3	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - 0.350 0.153 0.581 0.689 0.141 - - - - - - - - - - - - -	0.294 0.786 0.786 0.478 0.498 0.798 3.043 1.560 0.297 0.897 0.897 0.225 28.052 Cadmium Con 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842 1.274 0.156 2.175 19.376 Cv. LRG	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.442 0.492 4.567 0.349 4.567 0.349 4.567 0.349 1.0 3.217 1.700 1.305 0.998 1.229 0.137 - 2.351 2.071 0.864 0.211 1.354 0.873 0.700 1.206 1.084 0.545 - 2.980 30 Seedlin 30 Seedlin	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.046 1.054 0.540 0.138 0.168 1.149 0.450 - 0.545 - 30.744 mg axis : D
	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anapartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Lysine Prolysine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - - - - - - - - - - - - - - - - -	1.890 1.776 3.806 1.497 0.385 0.954 0.389 0.121 1.827 0.425 2.467 1.975 0.872 0.896 0.774 0.124 - 21.175 Cadmium Conc 0.5 0.856 1.290 1.240 0.106 3.247 0.180 0.780 0.357 0.081 1.607 0.324 2.113 1.354 0.671 0.750 0.574 0.120 - 15.652	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 entrations (mM) 1.0 1.513 3.919 3.490 0.015 4.763 0.504 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.154 1.430 0.503 0.5153 0.945 0.757 0.503 0.553 0.945 0.757 0.573 0.545 0.504 0.554 0.554 0.554 0.554 0.757 25.917 0.513 0.514 0.545 0.545 0.545 0.554 0.554 0.554 0.554 0.555 0.757 25.917 0.513 0.514 0.554 0.554 0.554 0.554 0.554 0.554 0.757 25.917 0.513 0.514 0.554 0.554 0.554 0.554 0.554 0.555 0.757 25.917 0.513 0.514 0.554 0.554 0.554 0.554 0.554 0.555 0.757 25.917 0.513 0.514 0.553 0.945 0.757 0.553 0.945 0.757 0.553 0.545 0.553 0.545 0.553 0.545 0.554 0.553 0.554 0.554 0.554 0.555 0.555 0.557 0.553 0.554 0.557 0	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.606 2.135 1.406 5.500 1.006 0.243 0.330 0.631 0.041 4.620 3.789 2.500 38.497 is : C	н	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Tyrosine	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - 0.350 0.153 0.581 0.689 0.141 - - - - - - - - - - - - -	0.294 0.786 0.786 0.478 0.498 0.798 3.043 1.560 0.297 0.897 0.897 0.225 28.052 Cadmium Con 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.888 1.957 1.842 1.274 0.156 2.175 19.376 Cv. LRG	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 4.567 0.349 4.567 0.349 1.0 3.217 1.700 1.305 0.998 1.229 0.137 - 2.351 2.071 0.864 0.211 1.354 0.873 0.700 1.206 1.084 0.545 - 2.2,980	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 45.866 1.5 1.5 4.043 0.946 1.371 1.483 1.240 0.428 - 1.060 1.046 1.054 0.540 0.138 0.168 1.149 0.450 - 0.545 - 30.744 mg axis : D
cv. Ti Lead	Threonine         Serine         Glutamic acid         Glycine         Alanine         Valine         Metheonine         Isoleucine         Leucine         Tyrosine         Phenylalanine         Histidine         Lysine         Ammonia         Arginine         Proline         Cysteine         Total             Amino acid             Aspartic acid         Threonine         Serine         Glutamic acid         Glycine         Alanine         Valine         Metheonine         Isoleucine         Tyrosine         Phenylalanine         Histidine         Lysine         Ammonia         Arginine         Proline         Cysteine         Total         21       Seedling axis :         Cotyledons : 1	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - 0.0 - - - - - - - - - - - - - - - -	1.890       1.776       3.806       1.497       0.385       0.954       0.389       0.121       1.827       0.425       2.467       1.975       0.872       0.896       0.774       0.124       21.175       Cadmium Conc       0.5       0.856       1.290       1.240       0.106       3.247       0.180       0.780       0.357       0.081       1.607       0.324       2.113       1.354       0.671       0.750       0.574       0.120	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406 5.500 1.006 0.2135 1.406 5.500 1.006 0.2135 1.406 5.500 1.006 0.243 0.330 0.631 0.041 4.620 3.789 2.500 38.497 4.5 C : G	H. cv. LRG3 Lead	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total 30 Seedling ax Cotyledons	0.135 0.216 0.306 0.901 0.899 0.200 - - - - - - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.125 4.296 0.225 28.052 Cadmium Co 0.5 2.714 1.839 1.061 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.842 1.274 0.156 2.175 1.9.376 Cadmium LRG Cadmium L	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 1.0 3.217 1.700 1.305 0.998 1.229 0.137 - 2.351 2.071 0.864 0.211 1.354 0.873 0.700 1.206 1.084 0.545 - 2.980 30 Seedlin n Cotyle	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 4.5366 1.5 1.5 4.043 0.946 1.371 1.483 1.240 0.0428 - 1.060 1.044 1.054 0.540 0.540 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 0.545 1.149 0.5450
cv. Ti Lead	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Antino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Tyrosine Phenylalanine Histidine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total	1.012 0.235 2.974 0.998 - - 0.001 0.151 0.276 0.002 0.216 0.434 0.156 1.001 0.404 - - 7.862 - - 0.0 - - - - - - - - - - - - - - - -	1.890       1.776       3.806       1.497       0.385       0.954       0.389       0.121       1.827       0.425       2.467       1.975       0.872       0.896       0.774       0.124       21.175       Cadmium Conc       0.5       0.856       1.290       1.240       0.106       3.247       0.180       0.780       0.357       0.081       1.607       0.324       2.113       1.354       0.671       0.750       0.574       0.120	2.127 3.126 0.021 4.976 0.708 0.254 1.573 0.127 3.765 0.394 0.545 0.250 1.217 0.892 0.612 0.856 0.757 25.917 	0.798 4.854 1.762 5.684 0.792 0.121 0.239 1.708 13.001 1.206 0.470 0.331 0.876 0.121 2.890 2.900 1.430 47.527 1.5 4.318 0.548 3.650 1.526 5.420 0.774 0.060 2.135 1.406 5.500 1.006 0.2135 1.406 5.500 1.006 0.2135 1.406 5.500 1.006 0.243 0.330 0.631 0.041 4.620 3.789 2.500 38.497 38. C : G edling ax	es of 6-day	Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total Anginine Proline Cysteine Total Amino acid Aspartic acid Threonine Serine Glutamic acid Glycine Alanine Valine Metheonine Isoleucine Leucine Leucine Tyrosine Phenylalanine Histidine Lysine Ammonia Arginine Proline Cysteine Total 30 Seedling ax Cotyledons	0.135 0.216 0.306 0.901 0.899 0.200 - 0.252 0.492 0.124 0.687 0.721 0.116 0.123 - 0.013 5.260 - - 0.057 0.145 0.517 0.106 0.200 0.901 0.899 - - 0.350 0.153 0.581 0.689 0.141 - - - - - - - - - - - - -	0.294 0.786 0.569 1.396 0.498 0.798 3.043 1.560 0.297 0.897 0.297 0.897 0.125 4.296 0.225 0.25 0.5 0.5 0.5 0.5 0.17 1.001 0.358 0.569 0.215 0.017 1.001 1.743 0.441 0.036 0.090 1.842 1.274 0.156 2.175 1.9376 cv. LRG Cadmiunt cv. LRG	0.346 1.642 0.397 2.586 0.692 0.894 4.093 1.516 4.297 0.486 0.998 6.239 0.482 0.492 4.567 0.349 34.209 1.0 3.217 1.700 1.305 0.998 1.229 0.137 - 2.351 2.071 0.864 0.211 1.354 0.873 0.700 1.206 1.084 0.545 - 2.980 30 Seedlin n Cotyle 0 in respon	0.472 2.794 0.564 4.723 0.816 0.983 5.193 4.126 3.586 0.649 0.234 6.497 0.002 0.242 0.649 4.672 0.432 4.5366 0 0 1.5 4.043 0.946 1.371 1.483 1.240 0.946 1.371 1.483 1.240 0.946 1.054 0.540 0.540 0.540 0.545 0.545 1.149 0.545 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.545 1.149 0.545 0.546 1.149 0.545 0.546 1.149 0.545 0.546 1.15 0.546 0.546 0.546 0.546 0.546 0.546 0.547 0.546 0.546 0.546 0.546 0.547 0.546 0.540 0.546 0.540 0.546 0.540 0.546 0.540 0.545 0.546 0.540 0.545 0.546 0.540 0.545 0.546 0.540 0.540 0.545 0.546 0.540 0.545 0.546 0.55



LRG30 possessed relatively better tolerance mechanism

to elevated concentrations of lead and cadmium.

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