

## Phytoremediator Plants Tolerance Level by Showing Effect of Heavy Metal on Growth Pattern of a Plant

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### ABSTRACT

*Heavy metals (Pb, Cd, Cr etc) are hazardous to human beings, plants, animals. Due to industrialization, sewage human activities etc, they are dumped into the soil, air, water. Increase in concentration of heavy metals reduction in length of aerial parts roots, shoots of a plant is observed. Increase in dry weight is also observed in the presence of heavy metals. Reduction in length of aerial parts root, shoot of a plant is observed at 160-170mg and above of heavy metal. The present study suggests that Phytoremediator Plants have 60%-95% of tolerance level. Decrease in length of root, shoot suggests that the heavy metal transferred to Root and shoot. Increase in dry weight suggests that heavy metal is affecting the seedling and removal of heavy metal from soil near root area. Reduction in lengths of aerial parts is observed at higher concentrations and the plants tolerance level is also high at particular concentrations which suggests that they have maximum Phytoremediation capacity.*

**Keywords**-Phytoremediator, Heavy metals, Tolerance, Root, Shoot, Growth.

### I INTRODUCTION

Phytoremediator Plants are involved in the technique of Phytoremediation (1-6). Heavy metals like Cd, Cr, Pb are harmful to the environment, human beings, plants and animals. (1-6) Heavy metal sources- Cadmium- Paints and pigments, Plastic stabilizer's electroplating, incineration of cadmium containing plastic phosphate fertilizer. Chromium- Tanneries, steel industries, fly ash. Lead- Aerial emission from combustion of leaded petrol, battery manufacture, herbicides and insecticides. (1,5,6).

Phytoremediator plants- Brassica juncea (Mustard), Lycopersicon esculentum (Tomato), Helianthus Annus (Sunflower).

### II AIMS AND OBJECTIVE

The present original study aim is to prevention of heavy metal contamination of soil and water. The present original study deals with the study of heavy metal removal by tolerance range or eradication by Phytoremediator Plants. The main objective is to show the potential of plants as Phytoremediator. Objective is to clean the environment, by tolerance II

### III METHODOLOGY

Plants are treated with heavy metals like Pb, Cd, Cr at different concentration. Its length of aerial parts are measured. Slight reduction is observed at low concentration but at high concentration shows more reductions in length. The length and fresh mass of roots and shoots were measured using a meter scale. Plants are placed in oven at 80°C for 72 hours. The dried plants were weighed to record the plant dry mass.

### IV RESULTS AND DISCUSSION

Decrease in length of root, shoot suggests that the heavy metal is transferred to root and shoot. Increase in dry weight suggests that heavy metal is affecting the seedling and removal of heavy metal from soil near root area. At 0.6g decrease in root length of Brassica was observed from 5.9 to 5.0 and 13 to 9.9 under lead stress. Similarly Cd, Cr also shows reduction in root and shoot length with increased dry wt in tomato, mustard and Sunflower at above 160mg of heavy metal. Tolerance level can be calculated by  $It = Ime/Ic \times 100$  ie increase/decrease in root length in metal solution to control  $\times 100$ . Tomato Chromium treated control root 10.2, 6.5, shoot 61.5, 41cm, Brassica juncea lead treated root 21 to 18, cadmium treated 16 to 6 shoot 80 to 75, 78-56cm at 93.75% tolerance level, Sunflower chromium treated 13 to 12.5 root, 61 to 55, lead treated root 34 to 8.9, shoot 53 to 1.6, 90% tolerance level eicchornea crassipes leaf area 12.6 to 8.6 and 8.0 at 50 and 75ppm 68% tolerance.

**Table 1**  
**Length of Root, Shoot (cm) Ti of Phytoremediator**

<b>Control</b>	<b>13</b>	<b>61</b>
<b>Chromium 200ppm</b>	<b>12.5</b>	<b>55 Ti 90.16%</b>
<b>Control</b>	<b>34</b>	<b>53</b>
<b>Lead 200mg</b>	<b>2</b>	<b>15</b>
	<b>Root</b>	<b>Shoot</b>

**Table 2**  
**Helianthus Annus**

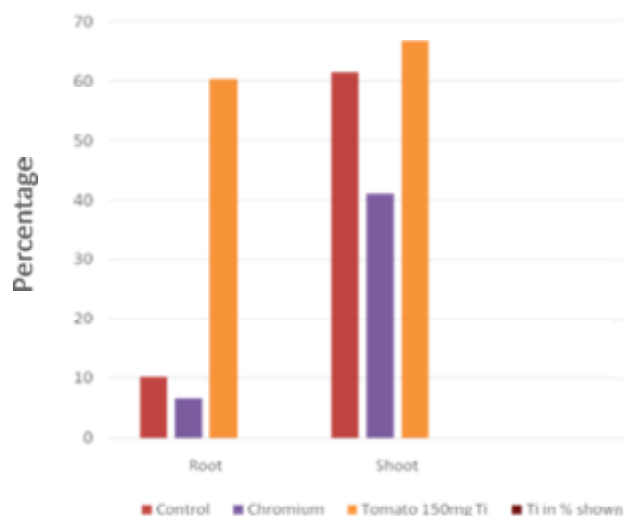
	<b>Root</b>	<b>Shoot</b>
<b>Control</b>	<b>10.2 Ti 60.4%</b>	<b>61.5 Ti 66.06%</b>
<b>Chromium 150mg</b>	<b>6.5</b>	<b>41</b>

**Table 3**  
**Lycopersicon Esculentum**

<b>Control</b>	<b>21</b>	<b>80</b>
<b>Lead 250mg</b>	<b>18 Ti 85.71%</b>	<b>75 Ti 93.75%</b>
<b>Control</b>	<b>16</b>	<b>78</b>
<b>Cadmium 100mg</b>	<b>6</b>	<b>56</b>
	<b>Root</b>	<b>Shoot</b>

**Table 4**  
**Brassica Juncea**

<b>Cadmium</b>	<b>Leaf Area</b>			
<b>Control</b>	<b>12.7</b>			
<b>50ppm</b>	<b>8.6 Ti 68.25%</b>			
<b>75ppm</b>	<b>8.0 Ti 63.49%</b>			



**Fig. 1 Effect on Root and Shoot length – Phytoremediator Plant**

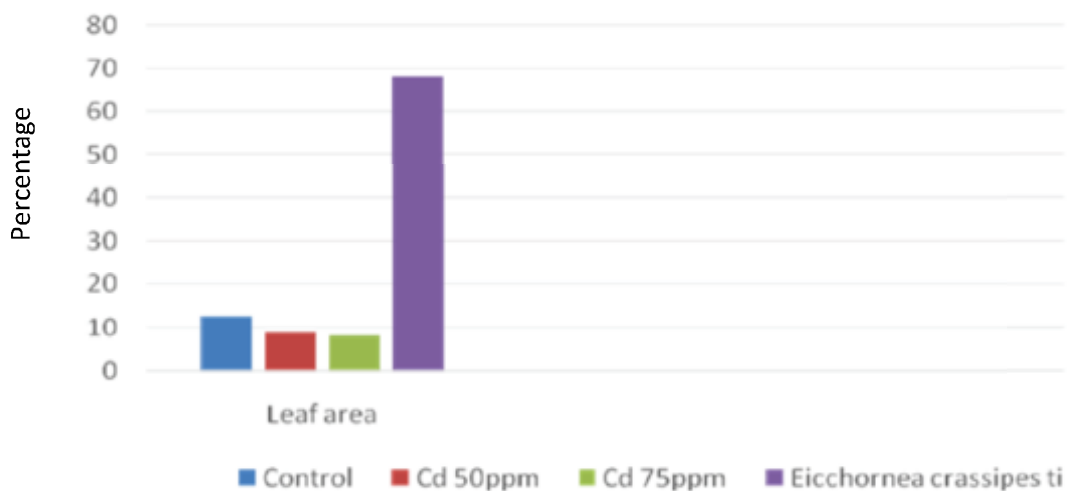


Fig. 2 Effect on Leaf area Eichornea Crassipies

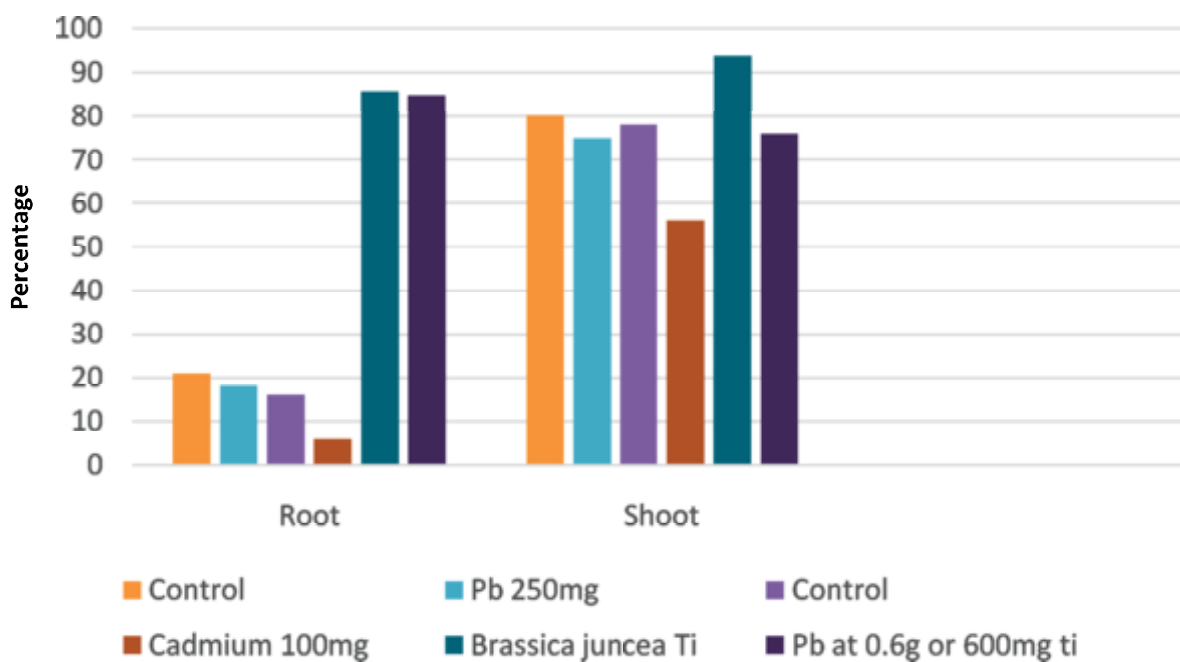
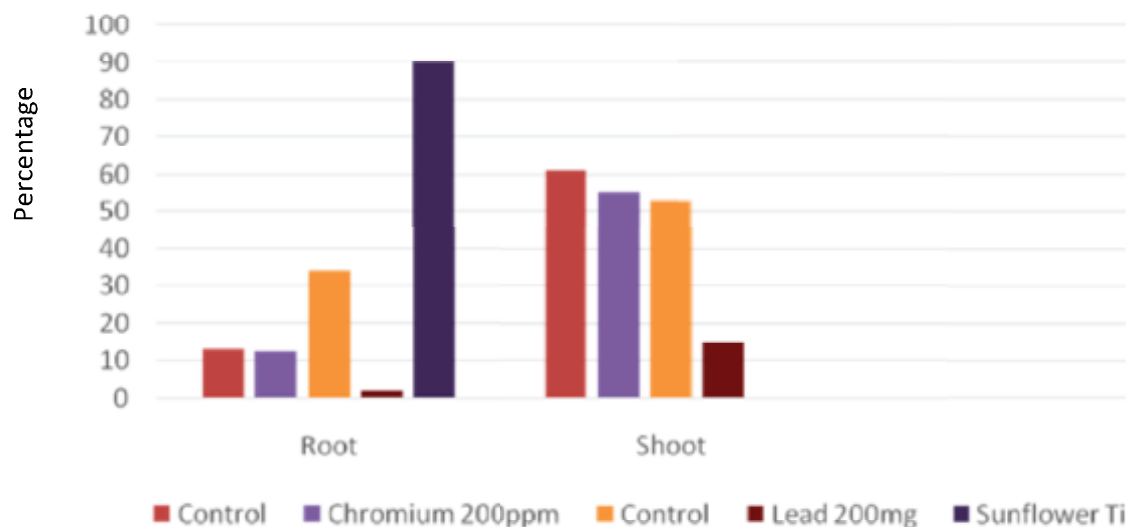


Fig. 3 Effect on Root and Shoot – Phytoremediator Plant Brassia juncea (Mustand)

Root Length (cm)-Graph1-Control, Graph 2-Pb 250 mg, Graph 3-Control,Graph 4-Cd 100mg, Graph 5-Ti, Graph 6-Pb at 0.6g or 600mg Ti.

Shoot Length (cm)--Graph1-Control, Graph 2-Pb 250 mg, Graph 3-Control,Graph 4-Cd 100mg, Graph 5-Ti, Graph 6-Pb at 0.6g or 600mg Ti.



**Fig. 4 Effect on Root Shoot length of Phytoremediator Plant Helianthus Annus (Sunflower)**

Root Length (cm)-Graph1 Control, Graph 2-Chromium200ppm, Graph 3-Control,Graph 4-Lead 200mg, Graph-5 Ti,Shoot Length (cm)-Graph1 Control, Graph 2-Chromium200ppm, Graph 3-Control,Graph 4-Lead 200mg, Graph-5 Ti.

## VIII CONCLUSION

By selected plants we can minimize heavy metal from soil and water and we can remove it also.By Phytoremediator Plants we can clean soil and water.

## REFERENCES

[1] Rohman Razaq R,2017:Rev. On Phytoremediation: Env:friendly tech.

[2] Sadique Abdurrahman: Rev.on Heavy Metal Contamination in Water, Soil, effects, sources and Phytoremediation Techniques.

[3] Aug 2013Rev.on EDTA Enhanced Phytoremediation of Heavy Metals,27 aug.2013.

[4] N Sarwar;2017:Rev.Phytoremediation strategies for soils contaminated with heavy metals.

[5] Hazrat Ali, Ezzat Khan et al :Rev. On Phytoremediation of heavy metals concepts and applications.

[6] Zakir Hussain Malik et al.IJAAER(2017),Rev. On Phytoremediation :A Novel strategy and ecofriendly green technology for removal of toxic metals ;3(1):(1-18).