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Effect of heavy metals (Cd, Pb, Cu) on seed germination of *Arachis hypogeae.* L

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Abstract

The present study was conducted to determine the effect of cadmium, Lead, and copper on seed germination of Arachis hypogeae.L. Seeds were germinated under laboratory condition. Every part of cadmium, Lead, and copper showed significantly decreased on seed germination of Arachis hypogeae.L as compare to control. Increasing concentration of Cd at 75 and 100 mg/L extremely ($p < 0.05$) affected the groundnut seed germination compared with control. Lead treatment at 75 and 100 mg/L significantly ($p < 0.05$) reduced seed germination of groundnut as compared with control. Copper treatment at 100 mg/L also condensed seed germination of Arachis hypogeae.L compared with control. Cadmium produced more significant effect on seed germination of Arachis hypogeae.L than lead and copper.

Key Words: Cd, Pb, Cu, Germination, *Arachis hypogeae L.*

INTRODUCTION

Heavy metals can enter a water supply by industrial and consumer waste, or even from acidic rain breaking down soils and releasing heavy metals into streams, lakes, rivers, and groundwater. Evaluated heavy metals contaminated soils are widely spread and concerns have been raised over the potential risks to humans, animals and agriculture crops [2]. Heavy metals are great interest for research purpose with respect to toxicological importance to human health, plants and animals [8, 7, 1]. Germination and seedling establishment are vulnerable stages in the plant life cycle [10]. Cadmium derives its toxicological properties from its chemical similarity to zinc an essential micronutrient for plants, animals and humans. Cadmium is biopersistent and, once absorbed by an organism, remains resident for many years although it is eventually excreted. Cadmium (Cd) is a highly toxic trace element and has been ranked No. 7 among the top 20 toxins [11]. The main sources of lead entering an ecosystem are atmospheric lead paint chips, used ammunition, fertilizers and pesticides and lead-acid batteries or other industrial products. Led contents in soil and wheat tissues along with the roads were decreased with increase in distance from the roads [6]. Copper does not break down in the environment and because of that it can gather in plants and animals when it is found in soils. Subsequent nutritional studies have demonstrated that copper and other metals are essential for optimal growth of plants and animals [5].

MATERIALS AND METHODS

The wealth fresh seeds of groundnut were purchased from N. G. Ranga Agriculture University, Tirupati, Chittoor (DT), A. P, India. Seeds were washed with distilled water, two minutes immersion in 0.1N of $Hgcl_2$ for seed coat contamination after that four times rinsed the seeds under running tap water. Seeds were placed on whatman paper

NO.40 in pertidishes for one week incubation in laboratory conditions by addition of heavy metals concentrations (25, 50, 75, and 100 mg/L) as well as used the distilled water to control respectively. The investigation was carried out in the laboratory conditions. Seed germination was estimated through the germination percentage.

RESULTS AND DISCUSSION

In this investigation carried out the heavy metals effect on seed germination of Arachis hypogee. L. The ground nut is the only nut that grows below the earth. Groundnut is probably the most famous edible wild plant eastern North America. It can also produce peapods just below the flowers and these pods are also edible. The results were showed, cadmium, lead and copper decreased the seed germination of *Arachis hypogeae. L.* The highest germination percentage was estimated in the control of Copper, Lead and Cadmium and lowest germination percentage was evaluated the treatment at 100 mg/L in the experimental metals. It was closely observed that increasing concentration of cadmium obviously affected the seed germination of groundnut at higher level (75 and 100 mg/L) compare to control (Tab: 1). It was observed due to the findings of [4] who estimated the effect of cadmium on Zinnia plant species. The decrease in germination percentage of cowpea seeds may be related to the negative effects of cadmium on water uptake and water movement [3]. Percentage of seed germination of *Arachis hypogeae. L* was significantly ($p < 0.05$) decreased by lead treatment at higher level (75, 100 mg/L) as compare to control (Tab: 2). It is investigated accordance of [13] who evaluated the hinder effect of lead on *Brassica penkinensis Rupr*. The reduction in germination percentage of Albizia lebbeck L due to the effect of heavy metal lead [12]. Copper treatment at 100 mg/L affected ($p < 0.05$) germination percentage of *Arachis hypogeae. L* compare to control (Tab: 3). It was confirmed through the evidence of [9] who dissected effect of zinc and copper on *Vigna mungi (L).*

Table 1: Effect of Cadmium Sulphate on germination of Arachis hypogeae. L (%).

Control	25 mg/L	50 mg/L	75 mg/L	100mg/L
91.6 ± 0.79	82.3 ± 0.72	69.6 ± 1.65	43.6 ± 0.71	19.6 ± 0.71

Values arithmetic mean ±S. E. are replicates.

Table 2: Effect of Lead Sulphate on germination of Arachis hypogeae. L (%).

Control	25 mg/L	50 mg/L	75 mg/L	100mg/L
92.6 ± 1.18	87.33 ± 0.71	80.3 ± 0.57	72.6 ± 0.71	41.6 ± 0.98

Values arithmetic mean ±S. E. are replicates

Table3: Effect of Copper Sulphate on germination of Arachis hypogeae. L (%).

Control	25 mg/L	50 mg/L	75 mg/L	100mg/L
94.3 ± 0.71	92.0.3 ± 0.81	84.0. ± 0.46	73.3 ± 0.71	67.6 ± 1.18

Values arithmetic mean ±S. E. are replicates

CONCLUSION

The present study was concluded that heavy metal pollution on seeds is very detrimental to seed germination. It was observed that the huge amount of different varieties of chemical substances using in agriculture field leads to soil pollution and turn into adverse effects on crop plants. So there was consequents reduction in the seed germination of crop plant *Arachis hypogeae. L.* The reason for low percentage in germination of groundnut might be due to physiological mechanism. Further work is recommended to reduce the enhancement of heavy metal pollution in all sources.

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