*Biological Forum – An International Journal* **6**(1): 42-43(2014)

**ISSN No. (Print): 0975-1130**
**ISSN No. (Online): 2249-3239**

# The Influence of Heavy Metal Lead (Pb) on Seeds Generation, Seedling Growth of Cow-Pea (*Vigna Sinensis*)

***Atul Thakkar***
*Astral Institute of Technology and Science, Indore, (MP)*

*(Corresponding author Atul Thakkar)*
*(Received 20 December, 2013, Accepted 16 January, 2014)*

**ABSTRACT: Plant growth mainly depends on the biotic and biotic factors. Heavy metal concentrations are the important factors that influence the crop and plant growth worldwide. The paper present regarding the influence of Pb on the generation of seed in the cow pea (*Vigna sinensis*). We analyzed the percentage of germinated seeds in different condition using ($Pb(NO_3)_2$) 10, 100, 1000, 10000 ppm with control condition. Analysis shows, decreased seed germination at increased concentration of Pb.**

**Keywords:** Cow pea, Heavy metal, Germination, Concentration.

## INTRODUCTION

Heavy metals as lead and zinc are naturally present in the environment their presence has gradually been increasing with the increase of industrialization and urbanization. Different levels of heavy metals contained in soil, water and air cause pollution after reaching certain concentrations metals are continuously released into the biosphere by naturally and by industrial, automobile activities etc.

Degradation of environment adversely affects germination growth and biodiversity of plants metals are of special interest with respect to the toxicological importance to human health, plants and animals. Lead is one of the best known heavy trace elements with a long history of toxicity .its exposure is becoming a great concern because of its toxic nature wide spread occurrence and long life in biological system. Lead can be founding batteries, ceramics, chemicals and fertilizer. Lead is also used in a number of products including gasoline paints pesticides, glass etc. Lead inhibition to germination and retardation of plant growth due to lead toxicity. The toxic effects are associated with inhibition of the enzymatic activity reduction of the intensity of photosynthesis and respiration.

The paper presents the result of a study concerning the influence of the different concentration of Pb on some physiological and morphological effects on cow- pea (*Vigna sinensis*).

## MATERIAL AND METHODS

As a biological Material we used: Seeds of cow pea (*Vigna sinensis*). Five experimental variants have been prepared: A control variant (With distilled water in wide mouth glass bottles) four variant of heavy metal treatments. The heavy metal was used Pb as nitrate (Pb $(NO_{3)2)}$ in a concentration of 10 ppm, 100 ppm, 1000 ppm. 50 seeds of cow- pea in each solution were exposed for 48 hours and 60 hours for scoring average percent germination and shoot growth respectively each experiment was run in triplicates.

Average values for control was compared with various lead solutions and analyzed percentage of germination and growth respectively.

## RESULTS AND DISCUSSION

Result (Tables A and B) clearly indicate that Pb exert it effect during germination and seeding growth. Germination of cow- pea (*Vigna sinensis*) seeds in not affected up to 1000 ppm but shoot growth is unusual (line controls) up to100 PPM. It is evident from the results that different concentration of Pb affects differently in seed germination and growth. Present study revealed that high concentration of Pb adversely influenced the seed germination. High Pb concentration inhibits germination of seed respectively. When the concentration of metals exceeded certain levels, an abnormal germination was observed.

**Table 1. Germination behaviors of seed following Exposure to Various Concentrations of Pb $(NO_3)_2$-Solution.**

| Seed type | Concentration of $Pb(NO_3)_2$–Solution (ppm) | | | |
|---|---|---|---|---|
| | 10 | 100 | 1000 | 10000 |
| COW-PEA | NA | NA | NA | SR |

**Table 2. Shoot Lengths in Seeds exposed to Various Concentrations of Pb $(NO_3)_2$ Solution.**

| Seed type | Concentration of Pb $(NO_3)_2$–Solution (ppm) | | | |
|---|---|---|---|---|
| | 10 | 100 | 1000 | 10000 |
| COW-PEA | NA | NA | SR | SR |

NA- Not Affected, SR- Significant Reduction.

## REFERENCES


Oncel, I., Keles, Y., Ustun, A.S., Interactive effects of temperature and heavy metal stress on the growth and some biochemical compounds in wheat seedlings, *Environ. Pollution*, 315-320, 2000.

Tomlescu Ioana, Mihaela, Radoviciu Edith Mihaela, Merca Vasilica Viorica, Tuduce Adela Dana, Effect of copper, zinc and lead and their combinations on the germination capacity of two cereals, *Journal of agricultural sciences*, **15**, 39-42, 2004.

Weiqiang, Li., Khan, Mohammad , A., Shinjiro, V., Yuji, K., Effects of heavy metals on seed germination and early seedling growth of Arabidopsis thaliana., *Plant Growth Regulation*, 45-50, 2005.

Seregin, V., Kozhevnikova, A.D., Physiological role of nickel and its toxic effects on higher plants Russian, *Journal of Plant Physiology*, **53**, 257-277, 2006.

Sharma, R.K., Agrawal, M., and Marshall, F.M., Heavy metal contamination of vegetables in Urban India; a case study at Varanasi, *Environ. Pollution*, 254-263, 2008.

Muhammad Shafiq, Iqbal, M. Zafar; Mohammad, Athar. Effect of lead and cadmium on germination and seedling growth of lecucaena leucocephala. *Journal of science environment manage,* **12**(2), 61-66, 2008.

Zaidi, M.S., Khan, M., Ahemad, M., Plant growth promotion by phosphate solubilizing bacteria., *Acta microbiological et Immunologica Hungarica*, **56**, 2009.

Abranches, J.L., Batista, G.S., Ramos, S.B., and Prado, R.M., Resposta da aveia preta a aplicacao de zinco em Latossolo Vermelho Distrofico. *Rer. Bras. Ci. Agrarias*. **4**, 278-282, 2009.

Mani, Rajkumar, Noriharu Ae, Majeti Narsimha, V. Prasad. Potential of siderophore-producing bacteria for improving heavy metal phytoextraction. *Trends in bio technology*, **28**, 142–149, 2010.

Heidari, Mostafa., and Sarani, Semin, Effects of lead and cadmium on seed germination seedling growth and antioxidant enzymes activities of mustard, *ARPN Journal of Agricultural and Biological Science*. **6**, 2011.

Singh, H.P., Kaur, G., Batish, D.R., Kohli, R.K., Inhibited radical emergence in *Brassica capestris* involves alterations in starch-metabolizing enzymes. *Biol Trace Elem. Res.* 144-301, 2011.

Abdollah, Hatamazadeh., Ali Reza Noroozi Sharat, Mohammad Hasan Vafei, Mehdi Saleshi, Golale Ahmadi. Effect of some heavy metals (Fe, Cu and Pb) on seed germination and incipient seedling growth of *Festuca rubra* ssp. Commutate, *International journal of agriculture and crop sciences*. **4**, 1068-1073, 2012.

Srinivas J., Purushotham, A.V., and Murali, Krishna, K.V.S.G. The effect of heavy metals on seed germination and plantgrowth on Coccinia, Mentha and *Trigonella* Plant Seed in Timmapuram, E.G. *International research Journal of Environment Sciences*, **2**: 20-24, 2013.

Abranches, J.L., Batista, G.S., Ramos, S.B., and Prado, R.M., Resposta da aveia preta a aplicacao de zinco em Latossolo Vermelho Distrofico. *Rer. Bras. Ci. Agrarias.* **4**, 278-282, 2009.