



Analysis of soil lead (Pb) on Seed Germination, Seedling Growth and Antioxidant activity of Gram (*Cicer arietenum*) and Pea (*Pisum sativum*)

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ABSTRACT: Soil is a valuable and non renewable resource which is essential for growth of plants Present study was carried out to determine the effect of different concentration of heavy metals on seed germination and seedling growth of above plant. The major effects of heavy metals on seeds are manifested by overall abnormalities and decreases in seed germination, reduced root and shoot elongation, dry weight, total soluble protein level. This study suggested that the effect of heavy metals on seeds of plants affecting the germination.

Keywords: Lead, Seed germination, Seedling, Soil.

INTRODUCTION

Soil is one of the most important factor of environment in it may be defined as that earthy material in which plant can grow. Hence it is essential for germination of seeds, and growth of plants thus soil supporting every life on earth. However in the modern world several industries will dumped their solid waste in soil due to which soil gets polluted and it was found that in compare to water and air pollution, soil pollution is very harmful because the pollutant which are mixed with soil they will show their harmful effect towards environment for a long period. Numerous soil pollutants restrict the growth of plants. Presence of heavy metals in environment, which is accumulated by plants the accumulation of these heavy metals in plants caused physiological and bio- chemical changes and ecosystem due to presence of heavy metal the fertility of soil gets badly affected ultimately affect the crop productivity and causes harmful health effect towards mankind. The major sources of pollution in India are over burdens of vehicle , mines, industrial effluents excess use of fertilizer and pesticides and all these releases huge amount of solid waste in soil (heavy metals discharge) out of which the concentration of Pb is in excess. Hence in the present communication an attempt has been made to point out the role of Pb on seed germination and seedling growth and some antioxidant enzymes activities of above plants.

MATERIAL AND METHODS

Healthy seeds of Gram, pea, cow-pea were used. Various lead solutions of $Pb(NO_3)_2$ were prepared in deionizer water. Before going to start the experiments all the glassware and decontaminate vessels and test tubes were washed thoroughly with detergent solution and later it was then cleaned under running tap water further rinsed with distilled water and oven dried, after that 100 ml of each lead nitrate solution was filled in wide mouth glass bottles. 50-100 seeds of each variety in each solution were exposed for 48 and 60 hours for scoring average percent germination and average shoot growth respectively. Each experiment was run in triplicate test solution were also change every 24 hours and in each case average values for control were compared with those obtained for various lead solution and find out result. The activity of antioxided enzymes (APX) was measured the using method of Nakno and Asada.

RESULTS AND DISCUSSION

For the present study the effect of heavy metal on seed germination and seedling growth were studied under laboratory conditions.

Our observation indicates that the Pb has been reported to strongly affect the seed morphology and physiology. It inhibits germination, root elongation, seedling development, plant growth transpiration, chlorophyll production. It also shows that the Pb adversely influenced the seed germination and plant growth. When the concentration of metals exceeded upto certain levels then sometimes an abnormal growth was found.

The root and shoot of plants were also decreased with increasing concentration of Pb metals and it can be attributed in part to the inhibition of mitosis, the reduced synthesis of cell wall and change in the polysaccharide metabolism.

Result of this study showed the activity of antioxidant enzymes are elevated with increased Pb concentration when plants were treated with Pb the activity of antioxidant enzymes such as APX was increased and it was also observed that the seed germination and root development in plants was gradually reduced with the increases of Pb concentration and we also found that the root growth and seed germination was sensitive to lead.

Therefore there is a need to undertake further studies to establish the state of knowledge on the responses of plants to metal toxicities.

Table 1: Germination Behavior of seed following exposure to various concentration of Pb (NO₃)₂ Solution

S. No.	Seed Type	Concentration of Pb (NO ₃) ₂ Solution PPM			
		10	100	1000	1000
1	GRAM	NA	NA	SR	SR
2	PEA	SR	SR	SR	SR

Table 2: Shoot length in seeds exposed to various concentration of Pb (NO₃)₂ solutions.

S. No.	Seed Type	Concentration of Pb (NO ₃) ₂ Solution PPM			
		10	100	1000	1000
1	GRAM	SR	SI	SR	SR
2	PEA	NA	NA	SI	SR

NA: Not Affected.

SR: Significant Reduction.

SI: Significantly Increased.

CONCLUSION

The conclusion of the present study showed that the seed germination and root development in plant was gradually reduced with the increase of Pb concentration. In addition, it was observed that Pb also affects antioxidative activity in plants.

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