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EFFECT OF LEAD ACETATE TOXICITY ON MORPHOLOGICAL PARAMETER OF SEED GERMINATION OF RED HOT PEPPER (*CAPSICUM ANNUUM L.)*

Y. Chandrakala
Jayoti Vidyapeeth Women's University, Vedant Gyan Valley, Jharna, Jaipur Rajasthan 303122,
*Corresponding Author: chandrakala_rie@rediffmail.com

ABSTRACT
A wide variety of contaminations enter into our environment due to extensive of industrial production, energy and fuel production and intensive agriculture. Among the heavy metals, lead is an element that easily accumulates in soils and sediments. Lead levels in the environment are currently a matter of great concern. Although lead is not an essential element for plants, it is absorbed and accumulates. In the present study the experiments were conducted to find out the effect of Lead acetate on the morphological parameter of germination of Red Hot Pepper (*Capsicum annuum L.)*(ie) germination (%), Seed vigour index, seedling tolerance index, percentage of phytotoxicity. In germination parameters, germination (%) and Seed vigour index has showed significant growth in 10 mg/l of lead acetate than control and then it decreased gradually with increase in concentration of lead acetate. The Percentage of phytotoxicity was minimum in 10 mg/l of lead acetate as compare to 200 mg/l of lead acetate.
The percent phytotoxicity and seedling length was affected by the lead acetate concentration in seedling.

Keywords: Germination (%), Seed vigour index, seedling tolerance index, percentage of phytotoxicity, *Capsicum annuum L.*

INTRODUCTION
Heavy metals are a group of non-biodegradable elements with a tendency to bioaccumulate in living systems. They are industrially and biologically important and include metals such as lead (Pb), cadmium (Cd), nickel (Ni), cobalt (Co), iron (Fe), zinc (Zn), chromium (Cr), iron (Fe), arsenic (As), silver (Ag) and the platinum group elements. Lead is known to cause a wide range of toxic effects in living organisms, including those of morphological, physiological and biochemical origin. Plants are the target of a wide range of pollutants that vary in concentration, specification and toxicity. Lead is known to induce a broad range of toxic effects to living organism which include the morphological, physiological, and biochemical. This metal impairs plant growth, root elongation, seed germination, seeding development, transpiration, chlorophyll production, lamellar organization in the chloroplast, and cell division. The extend of the intensity of plant stress, the stage of plant development, and the particular organs. The level of lead found in plants often correlates with the level present in the environment. Several studies shows the pesticides residues frequently occur on surface water and soil in agricultural areas (Y.Chandrakala and P.K. Mohapatra, 2012).

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MATERIAL AND METHODS

The present investigation entitled "Effect of lead acetate toxicity on the morphological parameter of seed germination of Red Hot Pepper (*Capsicum annuum L.)*" was carried out in the Department of Science and Technology, FEM, Jayoti Vidyapeeth Women's University,Jaipur.

An experiment was conducted with Red Hot Pepper (*Capsicum annuum L.)* using a completely randomized design of five replications. The Red Hot Pepper (*Capsicum annuum L.)* seeds were superficially sterilized with 0.1% mercury chloride solution to prevent surface contamination, and then the seeds were rinse with distilled water. The seeds were tested for standard germination test in a seed germinator at at 30±2°C. Using paper towel. Each set was uniformly treated with different treatments 10, 25, 50, 75,100 and 200 mg/l of lead acetate. Control seeds were treated with distilled water. Each treatment, including the control, was repeated five times. Germination was recorded every 24 hours and on day 8th of each treatment, five seedlings were randomly selected to record seedling growth. Seed quality parameters viz; germination (%), Seedling length (cm), Seed vigour index- I (Abdul Baki and Anderson .,1973), seedling tolerance index (Turner and Marshall (1972)), percentage of phytotoxicity of the effluent (Chou et al., (1978). And the data were subjected to analysis of variance (Gomez and Gomez , 1984).

RESULTS AND DISCUSSION

The effect of different concentration of lead acetate on germination parameters are summarized in Table1.

Table 1: The results regarding the effect of morphological parameter of seed germination of Red Hot Pepper (*Capsicum annuum L* at 8th DAS.

Treatment lead acetate (mg/l)	Germination Percentage (%)	Total Seedling Length (cm)	Seed Vigour Index - 1	Tolerance index	Percentage of phytotoxicity
0	92	5.5	368	0	0
10	98	6.8	392	1.03	3.44
25	76	5.7	304	0.93	6.89
50	66	5.3	264	0.86	13.79
75	54	4.5	216	0.69	31.03
100	42	3.5	168	0.52	48.27
200	36	2.5	144	0.34	65.51

The effect of lead in the polluted soil has an effect on germination. In germination parameters all above said values table 1 were showed higher except in 10 mg/l of lead acetate than control and then it decreased gradually. The similar trends was observed by Al-Yemini and Al-Hetal, (2001) in *Vigna ambacensis*. The lead treatment up to 10 mg/l of lead acetate was found to increase the germination percentage over control. Root and shoot length of Red Hot Pepper seedling increased 10 mg/l and then it decreased with an increase in lead acetate concentration. Root and shoot length were found to be higher at 10 mg/l of lead acetate at high levels may inhibit the root growth directly by inhibition of cell division or cell elongation or

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combination of both, resulting in the limited exploration of the soil volume for uptake and translocation of nutrients and water and induced mineral deficiency (Foy *et al.,* 1978). Pb moves predominantly into root apoplast and thereby in the radial manner across the cortex and accumulates near the endodermis. The endodermis act as a barrier to the movement of Pb in the roots compared to shoots (Jones *et al*., 1973; Verma and Dubey, 2003). It alters the mineral nutrition and water balance, modifies hormonal levels and affects the structure and permeability of the plasma membrane (Romerio *et al.*, 2006).

Seedling length of Red Hot Pepper seedling increased at 10 mg/l, increase in seedling length might be the result of higher embryo-cell wall extensibility. Increased seedling length and its growth may be due to increase in cell division within the apical meristem of seedling shoots and roots which was responsible for increase in overall seedling growth. But then it decreased with an increase gradually with concentration of lead acetate 200mg/l. These results showed that lead contamination has negatively affected root and shoot development. Seedling length is an important character as it decides the vigour of seed which is an important component in seed studies. By overproducing ROS, lead poisoning results in the suppression of ATP synthesis, lipid peroxidation, and DNA damage. Lead significantly reduces water and protein content, transpiration, chlorophyll production, seed germination, seedling development, and seedling growth.

A glance of the data showed that maximum vigour index-1 (392) was recorded in 10mg/l lead acetate. Seedling Vigour Index is a qualitative term about the sum of those properties of the seed which determine the potential level of activity and performance of the seed or lot during germination and seedling emergence.

Tolerance index was observed to show a decreasing trend from 10 mg to 200 mg/l lead acetate. Tolerance to lead acetate decreased when treatment reached to 200 mg amounting to 0.34.

CONCLUSION Lead acetate in soil certainly improve germination % and seedling vigour, establishment up to 10 mg/l beyond which it has adverse effect on the seed germination of Red Hot Pepper (*Capsicum annuum L*.. Hence it might be suggested that higher concentration of lead in the soil may not be suitable for crops growth. Proper care should be taken in disposal of lead contaminated effluent to avoid soil pollution.

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