



## Phytotoxic effect of zinc on seed germination and seedling growth of rice plants

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Article Chronicle : *Received* : 04.06.2012; *Revised* : 05.09.2012; *Accepted* : 25.10.2012

Key Words : Phytotoxic, Heavy metal, Zinc, Seed germination, Seedling growth

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Department of Botany, Aska Science College, Aska, GANJAM (ODISHA) INDIA Email : dhikarysankarprasad @yahoo.co.in **SUMMARY :** Experiments were conducted in plastic Petridishes containing well mixed cow dung manure and garden soil in laboratory conditions in order to find out the phytotoxic effect of zinc on seed germination and seedling growth of three cultivars of rice (Gayatri, Ratna and Heera). The test heavy metal enhanced the seed germination and seedling growth at lower concentrations whereas, higher concentrations caused retarding effects. The optimum concentrations for maximum percentage of seed germination were found in 0.01 mg/l followed by 0.1 mg/l and 1.0 mg/l. More or less similar results were also noticed in seedling growth of all test cultivars of rice tested. Lower concentration of zinc 0.01 and 0.1 mg/l exhibited stimulatory effect on seed germination and seedling growth. Concentration of zinc > 1.0 mg/l acted as phytotoxic to the parameters studied. Among the rice cultivars, Ratna was found more resistant to zinc followed by Heera and Gayatri.

HOW TO CITE THIS ARTICLE : Adhikary, S.P. (2012). Phytotoxic effect of zinc on seed germination and seedling growth of rice plants. *Asian J. Environ. Sci.*, **7** (2): 172-176.

inc being a non-biodegradable heavy metal, persists in the environment and accumulates in different parts of living and non-living matter and has been created a significant ecological disbalance. The accumulation of zinc components which do not constitute a part of any biogeochemical cycle is obviously harmful. Total value of zinc in soil depends on chemical composition of raw materials in the soil. Zinc value in soil is usually 10 to 300 mg/kg with an average of 50 mg/kg (Mousavi, 2011). Zinc is in different forms in the soil as water soluble, exchange, connected to organic matter and stabilized by the secondary clay minerals (Alloway, 2008). Zinc is one of the essential micronutrients playing a significant role in many vital metabolic processes (Rout and Das, 2003). Zinc toxicity has been reported in several plants when excessive levels of zinc was added (Brawn and Rasmussen, 1971). Zinc is known to play a significant role in chlorophyll synthesis, protein synthesis, carbohydrate metabolism and activation of oxidation process and enzymes (Singh, 1969). Deficiency of zinc has been established as a major cause of poor yields or crop failures in various parts of India (Fakkar and Randhawa, 1978). Zn could also increase the biosynthesis of chlorophyll and carotenoids ultimately providing beneficial for the photosynthetic machinery of the plant system (Aravind and Prasad, 2004). Zinc is a must for plant development, its above critical limit and deficiency is a major global problem hindering plant cultivation. Basing on the above facts, the present investigation deals with the identification of tolerance concentration of zinc for rice cultivation, find out resistant variety and rationalize the Zn phytotoxicity.

## EXPERIMENTAL METHODOLOGY

## **Test chemicals:**

 $ZnSO_4$ .7 $H_2O$  was chosen as test chemical. Stock solution of the test chemical (1g/l) concentration was prepared by dissolving 4.397g of  $ZnSO_4$ .7 $H_2O$  in 100 ml of distilled water. From that stock solution, concentration of 0.01, 0.1, 1.0, 10, 20 and 30 mg/l were prepared by proportional