



Chromium Uptake Efficiency of *Spinacea oleracea* from Contaminated Soil

DEEPALI; GANGWAR K. K.

Department of Zoology & Environmental Sciences, Faculty of Life Sciences,
Gurukul Kangri University, Haridwar-249 404, India
E-mail: deepali.phd@rediffmail.com

ABSTRACT: The aim of the study was to evaluate the uptake of chromium by *Spinacea oleracea* and its accumulation in roots and shoots of plants grown in pots at various concentrations of chromium (30, 60, 90, 120, 150 mg/l). The results revealed that the levels of chromium accumulation in roots and shoots were higher at minimum concentration level @ JASEM

Chromium accumulation in soil can cause serious problems and may affect the physiology of plants and animals. Vegetables grown at contaminated sites could take up and accumulate metals at concentrations that are probably toxic to human health. Toxicity of chromium is observed at multiple levels, from reduced yield, through effects on leaf and root growth, to inhibition on enzymatic activities and mutagenesis (Arun *et al.*, 2005). To remove heavy metals from soil, some cost-effective techniques are recently introduced. Considerable attention is being paid to a remediation technique using plants that can extract metals from the soil and concentrate them in the upper parts.

MATERIALS AND METHODS

A pot culture experiment was conducted to investigate the accumulation of chromium by spinach (*Spinacea oleracea*). Synthetic solutions of chromium having various concentrations of 30, 60, 90, 120, 150 mg/l, were prepared and given to the plants. Shoot and root samples of plants were collected and washed with tap water followed by dilute HCl, distilled water and then oven dried at 67 °C and grind with a pestle mortar and sieved. These plant samples were digested with HNO₃-HClO₄ diacid mixture and analyzed by atomic absorption spectrophotometer (Perkin Elmer 3100).

RESULTS AND DISCUSSION

The Cr accumulation in the roots and shoots of *spinacea oleracea* in percent are shown in fig. 1.

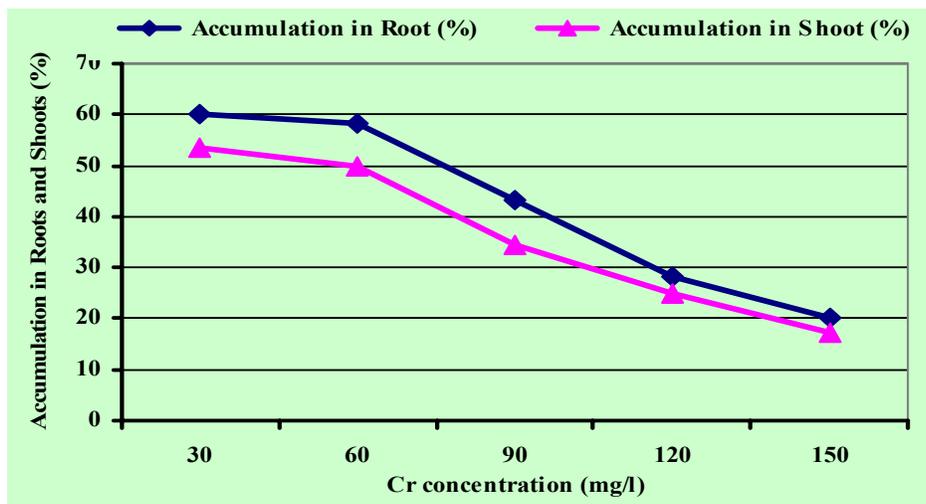


Fig 1: Chromium accumulation (%) in root and shoot of *Spinacea oleracea*

The Cr accumulation in the root extracts were found 60%, 58.33%, 43.33%, 28.33% and 20 % at 30, 60, 90, 120, 150 mg/l, respectively. While, in shoot extracts 53.33%, 50%, 34.4%, 25% and 17.33% of Cr accumulation were recorded at aforesaid concentrations. From the above results it is clear that higher chromium removal takes place at minimum concentration. Similarly, Verma *et al.*

(2005) observed that metal take up by water hyacinth (*Eichornia crassipes*) was higher at low concentration (20 %) and decreased there after with increase in concentration. From the above result it is also concluded that metal accumulation is higher in roots as compare to shoots. On the contrary, Dheri *et al.* (2007) reported maximum removal of hexavalent chromium 42% through spinach

* Corresponding author: Deepali

(*Spinacea oleracea*). The chromium uptake by plants has been found to be positively correlated to chromium application by many workers (Cervantes *et al.*, 2001; Babalola *et al.*, 2008; Singaram, 1994; Singh, 2001; Jain *et al.*, 2000; Negi *et al.*, 2007; Karunyal *et al.*, 1994). This research suggests that spinach (*Spinacea oleracea*) is found to be effective for removal of chromium from contaminated soil as well as economical and environmentally safe.

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