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# *Eclipta alba* (L.) a Promising Weed for Extraction of Cadmium

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***Abstract:*** This study was aimed to assess the phytoextraction potential of *Eclipta alba* roots under various concentrations of Cadmium. Potted plants were treated with 2.5, 5, 10, 15, 20 and 25mg/kg of Cd, individually. The hypocotyl of *Eclipta alba* were analysed for heavy metal content at 30, 60 and 90 DAT. The range of heavy metal uptake in experimental plant was found to be significantly different ($P<0.05$) in all the treatments with highest extraction in 20mg/kg.

***Keywords:*** Bringraj, Heavy metal, Pharmacognosy, Weed

## INTRODUCTION

According to Nriagu, [3], contamination of the biosphere by heavy metals has increased sharply at the beginning of the 20th century, posing major environmental and human health problems worldwide. Serious repercussions on human life and environment is mainly from polluted soils. The ability of plants to degrade, take up, or tolerate the effects of pollutants is the *sine qua non* of phytoremediation. As per Salt et. al [5], phytoremediation can be divided into phytoextraction, phytodegradation, rhizofiltration, phytovolatalization and phytostabilization and various physiological mechanisms are involved in each of these processes. Phytoremediation methods may be appealing as it is a friendly approach since plants rather than chemicals are involved. According to Varun et. al [6], many plants have been well documented as hyperaccumulators as well as indicators of high metal concentrations in soil, but these are slow growing, and not very wide-spread. This experiment was set up to identify a weed plant that could tolerate concentrations of Cd in soil. *E. alba* (L.) is an annual multibranched herbaceous plant that reaches up to the height of 30-50 cm and belongs to Asteraceae family. It was hypothesized that weeds with high tolerance could be tested for their phytoremediation potential. Thus, the aim of the present investigation is to evaluate the phytoremedial potential of *E. alba*, with respect to Cd.

## MATERIALS AND METHODS

Seeds of *E. alba* were collected from uncontaminated soil. Seeds were first sterilized in 0.1% $HgCl_2$ and then allowed to germinate in a germination tray. After germination, seedlings were transplanted to pots having 5kg garden soil (loam) with a layer of crocks and gravel of about 1.5 inches depth at the bottom. Single plant per pot was maintained. The seedlings were first allowed to grow for 6 weeks after which Cd was added to pots at varying concentration (0, 2.5, 5, 10, 15, 20 and 25 mg/kg soil) as aqueous

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solution using $CdCl_2.5H_2O$ salt. Pots were kept in a random block design and watered as when required in such a way as to prevent loss of contaminants by leaching. At each sampling date, i.e. 30, 60 and 90 days after treatment (DAT) plants were harvested and taken for metal uptake analysis. The statistical significance of differences among means was determined by two-way analysis with replications (ANOVA) at a significance level of $P<0.05$.

## RESULTS AND DISCUSSION

Cd uptake in roots of *E. alba* is shown in Table 1. Cadmium content significantly increased with increasing metal concentration and the exposure period at all the testing days. An increase in Cd uptake and accumulation was observed for treatments 20mg/kg and 10mg/kg of 90DAT that is 6.77±0.11 and 5.89±0.11 , respectively and was found to be highly significant. At 25mg/kg the uptake and accumulation was found to be 2.54±0.02 which was found to be greater than 15mg/kg (1.60±0.03). At 5mg/kg uptake and accumulation was found to be 0.95±0.04. At Cd-2.5mg/kg the accumulation was 0.65±0.05 after 90DAT as recorded by ICP-MS.

As per Panda et.al. [4] and Chen et. al. [1], cadmium induced oxidative stress has been reported by many worker. It has been reported that even at low concentrations, cadmium alters plant metabolism. According to Mohan and Hosetti [2], Cd was found to inhibit growth in many plant species such as *Lemna*.

**Table 1: Cadmium uptake and accumulation (mg/kg) in *Eclipta alba* at successive days of study**

| *S. No.* | *Treatment mg/kg* | *30 DAT* | *60 DAT* | *90 DAT* |
|---|---|---|---|---|
| 1 | Control | Receives DW* | | |
| 2 | Cd- 2.5 | BLQ** | 0.61±0.02 | 0.65±0.05 |
| 3 | Cd-5.0 | 0.77±0.04 | 0.86±0.06 | 0.95±0.04 |
| 4 | Cd-10.0 | 4.93±0.10 | 5.34±0.12 | 5.89±0.11 |
| 5 | Cd-15.0 | 2.22±0.07 | 1.50±0.04 | 1.60±0.03 |
| 6 | Cd- 20.0 | 5.63±0.14 | 5.98±0.12 | 6.77±0.11 |
| 7 | Cd-25.0 | 1.58±0.14 | 1.63±0.01 | 2.54±0.02 |

* DW- Distilled water
** BLQ- Below Limit of Quantification
± is the Standard error of the mean

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