

Elemental Analysis of *Tridax procumbens* shoot extract and its significance

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ABSTRACT

Tridax procumbens is known to be used since ages for the treatment of several diseases as described in the texts of ancient Indian Medicine. It is a semi prostrate annual herb whose leaves are used for the treatment of bronchial catarrh, dysentery, diarrhoea and to prevent hairfall. Its flowers and leaves possess antiseptic, insecticidal, parasiticidal properties and are also used to check haemorrhage from cuts, bruises and wounds. The present study explores the metal composition of *Tridax procumbens* shoot extract for the selected metals.

Keywords: *Tridax procumbens*, Iron, Zinc, Calcium, Cobalt, Copper, Cadmium, Selenium, Nickel, Manganese, Lead, Atomic Absorption Spectrophotometry.

INTRODUCTION

Roots absorb Calcium(Ca) when they exist as divalent cations. Ca ion uptake into cells is passive and occurs by facilitated diffusion, through a specific Ca channel. Ca is a nutrient element for plants (Marschner, 1995)¹. Cobalt(Co) uptake by the plants is dependent on the availability in soil which is translocated in the form of organo-metallic complexes. The leaf easily takes up cobalt through the cuticle. After foliar deposition ⁵⁸Co was shown to be mobile in the plant body (Shinonaga et al, 1999b)². Copper(Cu) acts as a component of phenolases, laccase and ascorbic acid oxidase. Copper is taken up in the form of Cu²⁺ ion and sometimes as Cu⁺ ion by plants and the uptake into cells is through active transport at lower concentrations. Manganese(Mn) acts as enzyme activator in respiration and nitrogen metabolism. Mn acts as an activator for the enzymes nitrite reductase and hydroxyl amine reductase. Iron(Fe) is absorbed as Fe³⁺, Fe²⁺ or Fe chelate and its uptake is

metabolically controlled. Fe is found in citrate complexes in xylem exudate. Free ionic form of Iron causes oxidative stress in plant cells hence it is always bound to phytoferritin. Nickel(Ni) bound to anionic organic complexes in xylem exudates has been found (Tiffin, 1977)³. Ni²⁺ is known to form complexes with organic compounds. Most of Lead(Pb) in the soil is not available to plants. According to (Zimdahl, 1975)⁴, Pb is taken up passively via root hairs and is accumulated in the cell walls. Selenium(Se) occurs as organo-Se or in anionic form in the soil, and the uptake of anions increases with increased pH (Wang et al, 2000)⁵. Selenate is taken up in strong preference to selenite and competes for the same uptake site as sulfate (Asher et al, 1977)⁶. Selenite is accumulated in the roots and is transferred to aminoacid-Se to a higher extent than selenate, which is translocated to the shoot (Asher et al, 1977; Gissel-Nielsen, 1987)⁷. Zinc(Zn) acts as an activator of several enzymes, alcoholic dehydrogenase, pyridine nucleotide dehydrogenase and carbonic anhydrase. Zinc uptake from soil colloids can be facilitated by root exudates containing hytosiderophores (Zhang et al, 1989)⁸.

METHODS

The present research deals with the extraction of phyto-compounds from fresh shoot tissues of *Tridax procumbens*, digesting with acids and performing elemental analysis for Iron, Zinc, Arsenic, Calcium,

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Cobalt, Copper, Cadmium, Selenium, Nickel, Manganese and Lead by Atomic Absorption Spectrophotometer(AAnalyst700, Perkin Elmer)⁹.

Collection of plant material:

Fresh plants of *Tridax procumbens* were collected from the Plant Genetics Experimental Farm, Department of Genetics, Osmania University, washed thoroughly under the running tap water for 5 minutes. The separated shoots from the roots were cut into small pieces, weighed 40gms, dried in the hot-air-oven by gradually increasing the temperature from 50 to 300°C which was further ground in a mortar and pestle for 10 minutes to make it a fine powder.

Acid Digestion:

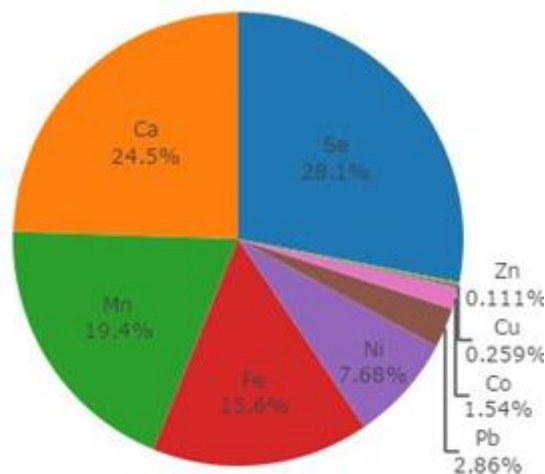
From the above powdered 40 gms shoot material, Aliquots of 40mg powder was weighed into 10 different beakers each of 50ml, to which 6ml of a mixture of Perchloric Acid (HClO₄) and Nitric Acid (HNO₃) in 1:5 ratio was added to each beaker. These 10 beakers were placed in an open space for 2 hours, to which a mixture of Hydrochloric acid (HCl) and Nitric acid (HNO₃) in 1:1 ratio was added to each beaker and kept on a hot plate at 300°C for 4 hours. After the contents in beakers dried, 5ml of Hydrochloric acid (HCl) was added to each beaker and kept on the hot plate until the entire liquid content in the beakers got evaporated. Later, 5ml of de-ionized water was added to each beaker and the solution thus made was tested for the presence of metals and also quantified by Atomic Absorption Spectro-photometer (AAnalyst700, Perkin Elmer).

RESULTS

The Spectro-photometric analysis showed the presence of Iron (Fe) = 1.2659mg/L, Zinc (Zn) =

0.009mg/L, Calcium(Ca) = 1.986 mg/L, Cobalt(Co) = 0.125 mg/L, Copper(Cu) = 0.021 mg/L, Cadmium(Cd) = 0.006 mg/L, Selenium(Se) = 2.278 mg/L, Nickel(Ni) = 0.623 mg/L, Manganese(Mn) = 1.573 mg/L and Lead (Pb) = 0.232mg/L. However, the analysis did not show the presence of Arsenic in the sample.

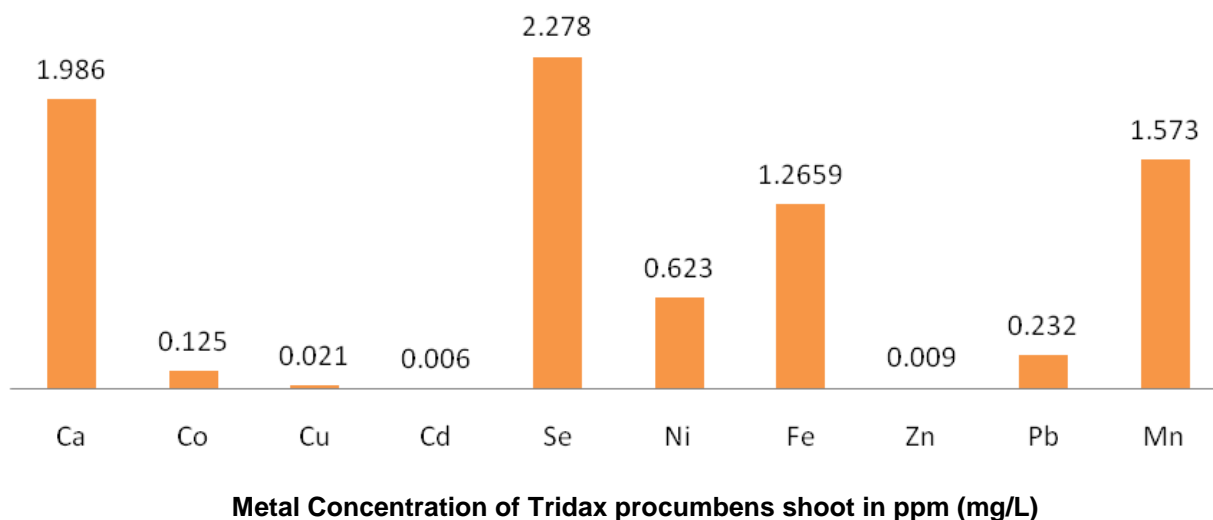
Figure-1. Percentage concentration of specific metals in shoot tissue of *Tridax procumbens*



SIGNIFICANCE

Presence of Iron and Zinc in bound (complex forms) and unbound forms may be attributed to its properties such as rapid wound healing and prevention of hair fall, etc. Presence of Selenium at a high concentration suggests that it can be used as a potential bio-accumulator of the metal. Besides, presence of Lead shows that this may not be recommended as a probiotic but if done so should be under appropriate medical supervision. Thus specific

Figure-2. Graph representing the metal profile of acid digested *Tridax procumbens* shoot



medicinal properties of *Tridax procumbens* may be attributed to its metallic composition.

Conflict of Interests:

The authors declare that there is no conflict of interests regarding the publication of this paper.

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