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Hazardous Elements of Green Manure-*Ipomoea carnea*

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Ipomoea carnea (Mahananda in Marathi) is a native of South America and available abundantly in all the states of India due to its adaptation to the Indian climatic conditions. It belongs to convolvulaceae family and fistulosa subfamily. This non-woody plant can be successfully grown in temperate and tropical climatic conditions. It is frequently found in plains and lowlands near water sources. It is a narcotic hallucinogen, causes depression, general weakness, loss of body weight and death of animals after prolonged periods of plant intake. Taking this into consideration an elemental analysis was carried out. The qualitative and quantitative elements present in the leaves and stem of *Ipomoea carnea* was performed. It was found that the leaves and stem contain hazardous elements like lead, mercury and cadmium. Lead is absent in leaf while it is present in very low quantity in the stem. Mercury and cadmium are absent in the stem while these are present in the leaves. Amount of calcium present in the leaves is significantly higher as compared to all other elements and also that of stem.

Key Words: *Ipomoea carnea*, Elements, Atomic absorption spectrophotometry, Flame photometry, Colorimetry.

INTRODUCTION

Ipomoea is a large and complex genus comprising over 600 species of vines and shrubs widely distributed throughout the tropics and subtropics[1]. *Ipomoea carnea* (Mahananda) is one of them. It is abundant in all states of India due to its adaptation to Indian climatic conditions[2]. It belongs to the convolvulaceae family and fistulosa sub family[3]. It is herb or under shrub, frequently found in planes and low lands near water sources. Leaves of this plant are ovate-cordate, entire and acuminate. The stem is non-woody and generally hollow. Flowers are whitish blue[4]. The milky juice of this plant is used for the treatment of Leucoderma in Chhattisgarh, India[4]. Many

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industrialists of Chhattisgarh were using *Ipomoea carnea* along with *Typha* to treat polluted tanks[4]. It was used as green manure crop in Chhatisgarh[4]. Application of organic manure like *Ipomoea carnea* or its combination with urea was found superior to other green and organic manures[5]. It is a potential source for alternate feedstock of biogas production and pulp for paper industry[6,7]. Several reports are available on the biological activities of *Ipomoea carnea*. Immunomodulatory activity of aqueous extract of *Ipomoea carnea* was tested on peritoneal cells of rat[8]. Water extract *Ipomoea carnea* in combination with some other extracts were tested for their HIV type I reverse transcriptase inhibitory activity[9]. Effects of alkaloids from *Ipomoea carnea* on intracellular lysosomal glycosidase activity in humane lymphoblast culture were studied[10]. The clinical, biochemical, heamatological and pathological effects of long term administration of *Ipomoea carnea* to growing goats were reported[11]. Published work was available on the effect of aqueous extract of *Ipomoea carnea* leaf on isolated frog and mouse heart[12]. Causing problem as a pasture weed, *Ipomoea carnea* was reported as a toxic plant. Feeding expriments, however, showed that cattle have to ingest a large quantity of the plant before effects of intoxication were produced[13].

Considering the various industrial uses but the reported toxicity of the plant, a complete chemical analysis of the components present in the plant worth study. The present work is an analytical study to determine the elements present in the stem and leaves of *Ipomoea carnea*.

EXPERIMENTAL

A Perkin-Elmer 3110 Atomic absorption spectrophotometer was used for the quantitative determination of the transition elements. A flame photometer of Madiflame, model 127 was used for the determination of alkali and alkaline earth metals. Photoelectric colorimeter of systronics, model 113 was used for phosphorous. Ash was prepared by taking 1 g dried seed and powdered sample of leaves and stem and keeping it in muffle furnance at 550 ºC till constant weight was obtained. The major constituent of ash was determined qualitatively and quantitatively. For the detection of metals the ash was converted to chloride and was tested for metals by applying standard procedures. Initially the ash was dissolved in 10 % HCl (5.0 mL) and evaporated to dryness on water bath. The material was filtered through Whatmann filter paper no. 40. The residue was made chloride free (tested with $AgNO_3$) by washing with hot water. The acid soluble and acid insoluble parts of the ash were determined gravimetrically (Table-1). The filtrate was diluted to 50 mL and used to estimate metal contents by using standard methods as illustrated in Table-2.

TABLE-1
ASH FROM *Ipomoea carnea*

Particulars	Leaves sample (%)	Stem sample (%)
Acid soluble ash	8.76	7.50
Acid insoluble ash	0.06	0.20

TABLE-2
ELEMENT CONTENTS OF *Ipomoea carnea*

Element	Method	Percentage	
		Leaves	Stem
Nitrogen	Kjeldahl method	3.120000	2.210000
Phosphorous	Colorimetric method	0.720000	0.780000
Sulfur	Colorimetric method	0.690000	0.001800
Potassium	Flame photometry	2.550000	2.620000
Magnesium	Flame photometry	0.770000	0.110000
Calcium	Flame photometry	5.350000	0.690000
Aluminum	Atomic absorption spectrophotometry	0.054880	0.004390
Copper	Atomic absorption spectrophotometry	0.001200	Nil
Zinc	Atomic absorption spectrophotometry	0.002300	0.004900
Iron	Atomic absorption spectrophotometry	0.078900	Traces
Manganese	Atomic absorption spectrophotometry	0.013700	0.000900
Lead	Atomic absorption spectrophotometry	Nil	0.000119
Mercury	Atomic absorption spectrophotometry	0.000047	Nil
Cadmium	Atomic absorption spectrophotometry	0.000014	Nil

RESULTS AND DISCUSSION

Metal analysis of an acid soluble leaves ash of *Ipomoea carnea* showed the presence of common elements like potassium, calcium, magnesium, iron, manganese, zinc along with aluminium, copper and heavy metals like lead, mercury and cadmium. Quantities of copper, iron, manganese, zinc, mercury, cadmium and aluminium were found negligible in it. Stem showed potassium, calcium and magnesium as the major constituents in comparison to zinc, iron, manganese, lead and aluminium. The amount of mercury and cadmium in leaves as well as lead and aluminium in stem were very low. The percentage of phosphorous and potassium was found negligible in the leaves than in the stem. Lead was found to be absent in the leaves whereas it was present in low quantity in the stem. Calcium percentage was obtained much higher in the leaves than in stem. The maximum percentage of nitrogen was encouraging to use the plant as a green manure. Most of the green manure plants contain 0.3 to 0.8 % nitrogen[11]. Therefore, the high nitrogen

content of *Ipomoea carnea* leaf and stem has a great significance in evaluating the plant as a green manure. Moreover, an ideal green manure plant should be inexpensive, easily established, should grow rapidly and capable of growing on poor soil[13]. *Ipomoea carnea* possesses all these requirements and hence qualify itself as a potential green manure plant. The percentage of metals and other elements present in leaves and stem of *Ipomoea carnea* are reported in Table-2.

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