

## TRACE ELEMENTS IN INDIGENOUS MEDICINAL DIURETIC PLANTS IN HUMAN HEALTH AND DISEASE (*CYMOPOGON CITRATUS* (DC) STAPF., *RAPHANUS SATIVUS* LINN. AND *ZEAMAYS* LINN.)

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Three indigenous medicinal plants reported to be diuretic have been selected for the study of trace elements and their possible role in human health. Twelve trace elements (Cu, Zn, Mn, Fe, Cu, Ni, Cd, Pb, Cr, Ag, Na and K) have been detected and estimated in ash of various parts (leaves of *Cymbopogon citratus* (DC) Stapf., seeds of *Raphanus sativus* Linn. and corn silk of *Zea mays* Linn.).

**Key words:** Diuretic medicinal plants, Trace elements, *Cymbopogon citratus*, *Raphanus sativus*, *Zea mays*.

### Introduction

Trace elements are widely distributed in nature in variable proportions and they play a vital role in the growth, health and maintenance of human body, in the same way as the proteins, vitamins, and other essential nutrients do. While the trace elements are of great interest and importance, for their therapeutic efficacy, their total or partial lack may result in characteristic pathological deficiency signs and symptoms. Therefore, daily intake of trace elements should be such that their lack does not lead to any diseases / disturbance (Bukhari *et al* 1987).

Medicinal plants play an important and vital role in traditional medicine. In most developing countries, most of the flora remain virtually unexplored from point of view of the medicinal utilization through traditional eastern system of medicine. In the present studies, twelve trace elements Cu, Zn, Mn, Fe, Co, Ni, Cd, Pb, Cr, Ag, Na and K have been estimated in the following three indigenous medicinal plants.

1. *Cymbopogon citratus* (DC) Stapf.  
Family Gramineae (Chopra *et al* 1958)
2. *Raphanus sativus* Linn.  
Family Cruciferae (Nadkarni 1954; Chopra *et al* 1958; Watt *et al* 1962)
3. *Zea mays* Linn.  
Family Gramineae (Watt *et al* 1962)

These plants are used as a diuretic and also used for the treatment of cancer, cardiovascular diseases and hypercholesterolemia (Nadkarni 1954; Chopra *et al* 1958; Watt *et al* 1962).

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### Materials and Methods

Seeds of *Raphanus sativus* Linn. (Voucher No. 501) and stigma (corn silk) of *Zea mays* (Voucher No. 502), one kg each, were purchased from local market and leaves of *Cymbopogon citratus* (DC) Stapf. (Voucher No. 499) were taken (cultivated in PCSIR Laboratories Complex, Karachi and identified by the Pharmacognosy Section of this laboratory). The sample leaves of *Cymbopogon citratus* (DC) Stapf., seeds of *Raphanus sativus* Linn. and corn silk (stigmata) of *Zea mays* Linn. were separated, washed, oven dried, powdered, ignited in muffle furnace at 550°C to obtain ash of various parts and then used for the analysis.

1. *Instruments.* i. Hitachi Z-8000 Atomic Absorption Spectrophotometer equipped with Zeeman background correction and a data processor was used for elemental analysis of the samples. ii. Sodium and potassium were estimated by flame photometer (Corning Model 410).

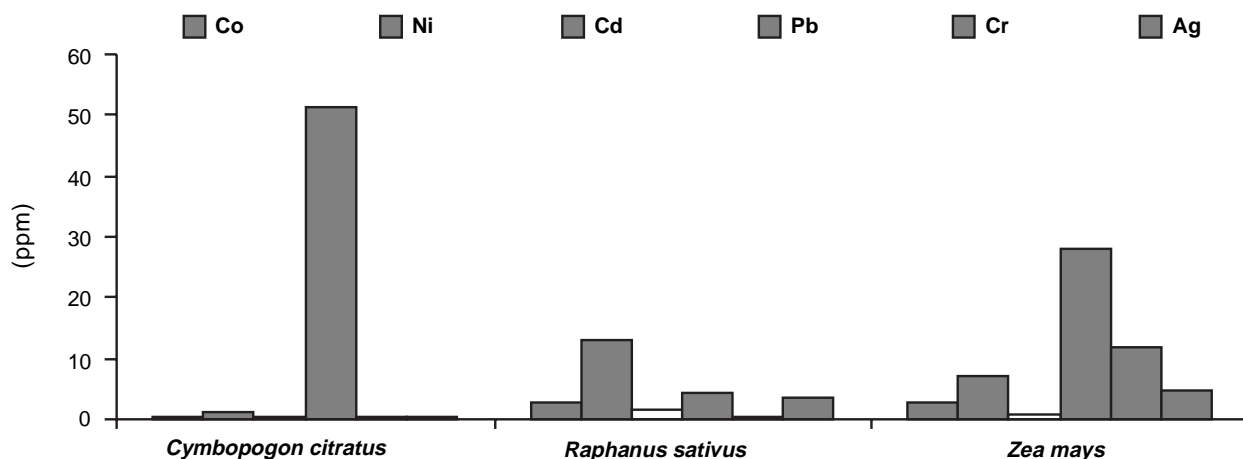
2. *Procedure.* 1.0 gm of ash was digested with 10.0 ml concentrated nitric acid (Analar) (HNO<sub>3</sub>) in acid washed pyrex tube at 120°C till the solution was clear and volume was reduced to about 1.0 ml. The solution was made upto 10.0 ml with double distilled water. Similarly, a blank sample was also prepared. Estimations were made using standard addition technique. The dilutions were made such as to keep the concentration of different elements within the linear range of absorbance (Williams 1984). Sodium and potassium were estimated by flame photometer (William 1984).

3. *Calibration.* Calibration curves were prepared for each element keeping in view their linear working ranges.

**Table 1**Trace elements in indigenous medicinal diuretic plants *Cymbopogon citratus* (DC) Stapf. (leaves), *Raphanus sativus* Linn. (seeds) and *Zea mays* Linn. (corn silk)

Sr. No.	Name of Plant	Trace elements											
		Cu	Zn	Mn	Fe	Co	Ni	Cd	Pb	Cr	Ag	Na	K
1.	<i>Cymbopogon citratus</i> (DC) Stapf. (leaves)	64.77 ± 0.01	59.09 ± 3.00	31.82 ± 2.00	594.30 ± 4.00	-	1.14 ± 0.10	-	51.14 ± 2.00	-	-	2727.27 ± 1.50	10795.45 ± 0.80
2.	<i>Raphanus sativus</i> Linn. (seeds)	51.55 ± 0.02	524.07 ± 4.00	326.47 ± 5.00	1348.84 ± 1.00	2.58 ± 0.40	12.89 ± 0.60	1.72 ± 0.50	4.30 ± 1.00	Traces ± 1.00	3.44 ± 1.00	17612.30 ± 1.00	13209.20 ± 1.20
3.	<i>Zea mays</i> Linn. (corn silk)	50.85 ± 0.02	417.73 ± 0.55	217.91 ± 5.00	1153.29 ± 2.00	2.72 ± 0.50	7.26 ± 0.70	0.91 ± 0.20	28.15 ± 2.00	11.81 ± 0.70	4.54 ± 0.80	19070.10 ± 1.30	122593.50 ± 1.00

Mean value ± S.D. (n=5)

**Fig. 1** Trace elements in indigenous medicinal diuretic plants *Cymbopogon citratus* (DC) Stapf. (leaves), *Raphanus sativus* Linn. (seeds) and *Zea mays* Linn. (corn silk).

4. **Calculation.** Amount of different elements in ppm in the sample solutions were obtained from the data processor (Table 1).

## Results and Discussion

Medicinal plants were analysed for their trace elements contents. Onawunmi *et al* (1984) reported that *Cymbopogon citratus* commonly known as lemon grass had been used for medicinal purposes in West Africa. It is used for the treatment of nervous and gastrointestinal disturbances (Carlini *et al* 1986). Mirza *et al* (2001) had shown that the lemon grass tea is as safe as other widely used green tea. It was found that the leaves of *Cymbopogon citratus* contain Fe, Mn, Zn, Cu, Ni and Pb but Co, Cr and Ag are not present in the leaves, whereas Na and K contents are very high but low as compared to two other plant contents *Raphanus* and *Zea mays* (Table 1).

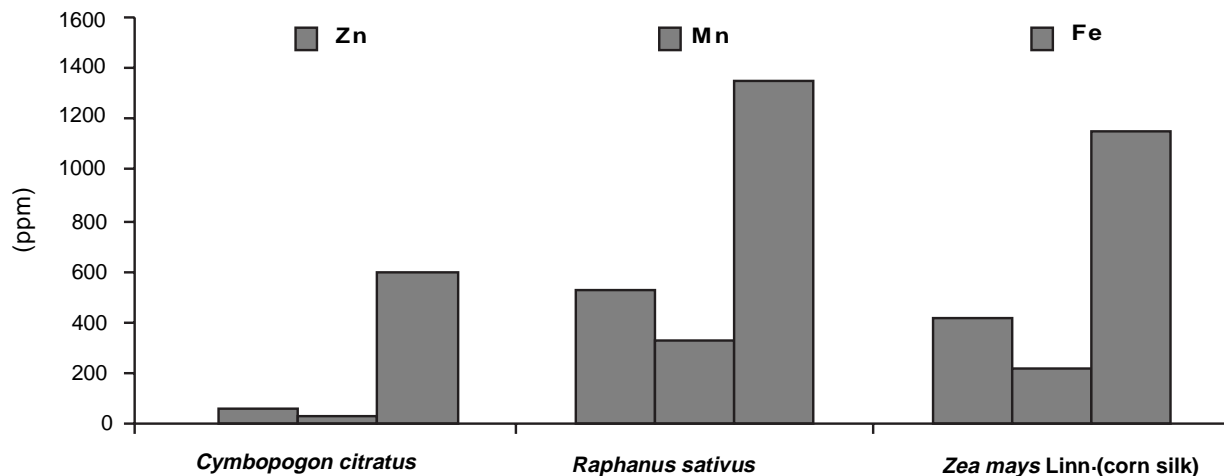
*Cymbopogon citratus* has a  $\beta$ -sitosterol, it acts as an anticholesteremic agent (Wang *et al* 1979). The presence of Mn

may be correlated with therapeutic properties i.e. antidiabetic and for cardiovascular diseases. Cu and Zn being chemical antagonist and both have an important role in controlling lipid level. The content of Cu is high in *Cymbopogon* as compared to two other plants contents.

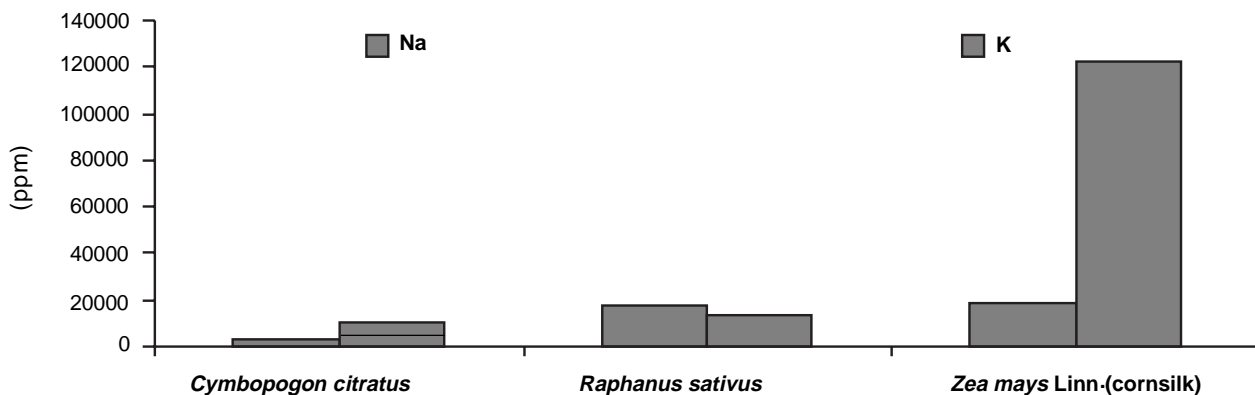
It was observed that *Raphanus sativus* Linn. seeds contain Cu, Zn, Mn, Fe, Co, Ni, Cd, Pb, Ag, Na and K. Chromium is also present in trace amounts. The contents of Zn, Mn, Fe and Ni are very high as compared to *Cymbopogon* and *Zea mays* (Table 1).

The seeds of *Raphanus sativus* Linn. have been used in the treatment of cancer (Quisumbing 1951) and also show diuretic and lithotryptic activity (Watt *et al* 1962).

*Zea mays* (corn silk) is a chemical complex medicinal plant, having valuable properties. The substances found in it are sitosterol, fatty and volatile oils, saponins, a bitter glucosidic substance, vitamin C and vitamin K. Corn silk acts as a diuretic agent (Bobravshev 1962). It is also used for kidney and bladder complaints (Watt *et al* 1962).



**Fig. 2** Trace elements in indigenous medicinal diuretic plants *Cymbopogon citratus* (DC) Stapf. (leaves), *Raphanus sativus* Linn. (seeds) and *Zea mays* Linn. (corn silk).



**Fig. 3** Trace elements in indigenous medicinal diuretic plants *Cymbopogon citratus* (DC) Stapf. (leaves), *Raphanus sativus* Linn. (seeds) and *Zea mays* Linn. (corn silk).

*Zea mays* (corn silk) contains Cu, Zn, Mn, Fe, Co, Ni, Cd, Pb, Cr, Ag, Na and K. The contents of Na, K and Cr are very high as compared to two other plant contents (Table 1 and Fig. 1- 3).

Sodium and potassium are the major ions in the body fluids. The regulation of the proper concentration of these ions in the extracellular and intracellular fluid is critical for homeostasis (Montgomery *et al* 1996).

Trace elements in one form or in another form play an important role in the field of medicine in combating disease as a curative or preventive agent. It is concluded from the above study that trace elements content in these plants may play an important role in human health.

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