

## ELEMENTAL PROFILE ANALYSIS OF SOME INDIAN TRADITIONAL MEDICINAL SPICE SEEDS OF BALLARI DISTRICT, KARNATAKA USING AAS TECHNIQUE

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### ABSTRACT

**Objective:** Karnataka (India) is the darling child of nature where about 722 medicinal plants are available. Ions of different metal elements have an important role in both the reactions. Few elements are essential to the body as nutrients called minerals. Present study deals with trace element analysis were carried out in Indian traditional medicinal spice seeds of Ballari district, Karnataka, India.

**Methods:** 0.25g each of the powdered medicinal plant spice seeds samples digested in 6.5 ml of acid solution to study the trace element like Mn, Fe, Cu, Zn, Cd, and Cr in Coriander seeds, Ajwain seeds, Pepper seeds, Cumin seeds and Sweet cumin seeds at ppm levels were figured out by using AAS analysis.

**Results:** Analysed trace mineral contents of these spice plants resulted highest level of Manganese is 1.92 ppm, Ferrous is 3.69 ppm and in Chromium is 0.0980 ppm in Ajwain seeds, Copper is 0.42 ppm in Coriander seeds, Zinc is 3.02 ppm and Cadmium is 0.0070 ppm in Sweet cumin seeds and lowest were found Mn is 0.65 ppm, Fe is 2.43 ppm in Coriander seeds, Cu is 0.15 ppm in Cumin seeds, Zn is 1.64 ppm in Pepper seeds, Cd is 0.0018 in Ajwain seeds and Cr is 0.0669 ppm in Sweet cumin seeds were studied in (n=3 ppm) all the sample selected spice seeds by AAS and suggests that the monitoring of trace elements in these medicinal plants does not exceed the limiting values set by World Health Organization to use it as a medicinal application.

**Conclusion:** These Indian traditional medicinal spice plant seeds can be safely used for food and medicinal purposes.

**Keywords:** Medicinal Plants, Spice seeds, AAS, Trace elements, Minerals.

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### INTRODUCTION

Plants have been used in treating human diseases for thousands of years. Indian traditional medicinal plant is any plant which, in one or more of its organ, contains substances that can be used for therapeutic purposes or which is a precursor for the synthesis of useful drugs. Botanist reported that about seven hundred and twenty-two types of medicinal plants are available here in Karnataka. 6000 y ago, it appears that people (Neanderthal man) valued herbs as medicinal plants. Because of their potential impact on human health, medicinal plants really can play an important role in healing and soothing of various diseases. It is told that minerals are important for their curative and poisonous effect on human health and are responsible for the formation of the active chemical constituents present in medicinal plants [1]. Rocks that contain minerals are breaking into smaller particles due to the climate change and then became part of the soil.

These minerals, content in the soil, are absorbed by all the living plants. Such plants are devoured as food stuff by both animals and human beings. The plants absorb most of the essential elements from the soil in which they grow and serve as indicators of the materialisation and are in fact used for the medicinal purpose [2]. Heavy metals are the matter of concern in the herbal drugs as certain plants have the tendency to store them from the soil, polluted water and atmosphere [3]. All the elements such as various major, minor and trace elements concentration are important for determining the effectiveness of medicinal plants in treating numerous diseases and to understand their pharmacological action.

These medicinal spice plants and their products are known for various medicinal properties and used widely for the treatment of different diseases in animal as well as human welfare. Recently, spices application reported to have array of medicinal compounds and various medicinal properties. Hence, our aim of the present context is to evaluate the trace elements of medicinal plant spice seeds of Ballari district, ecological zone of southern North Karnataka, India.

### MATERIALS AND METHODS

#### Sample collection

Sampling area of all the 5 medicinal spice plants, listed in table 1 with local name, scientific name, parts of plants and medicinal use, were collected from the fields of Ballari district, Karnataka is situated almost at the southern North Karnataka.



Fig. 1: Types of the investigated traditional Indian medicinal spice seeds of Ballari district, Karnataka, India

#### Digestion process

0.25g each of the powdered plant seeds samples digested in 6.5 ml of acid solution (HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, HClO<sub>4</sub> in the ratio of 5:1:0.5). The corresponding solution was heated until white fumes had appeared. The clear solution was diluted up to 50 ml with distilled water and filtered with Whatman filter paper no.1.

### Sample analysis and atomic absorption spectroscopy (AAS) measurement

The standard working solutions of elements of interest were prepared to make the standard calibration curve. Absorption for a sample solution uses the calibration curves to determine the concentration of a particular element in that sample. AVarian

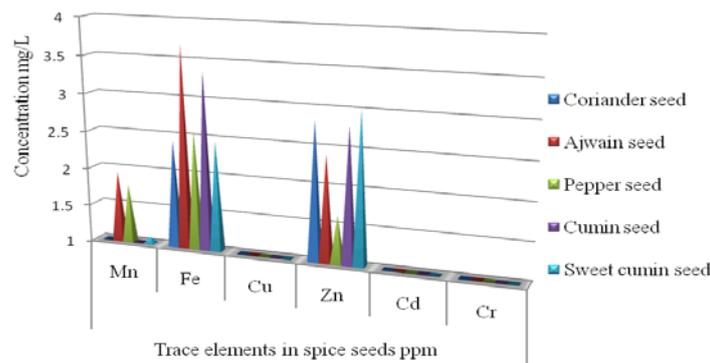
AA240FS Atomic Absorption Spectroscopy (AAS) was used for the determination of 6 metals that is, Mn, Zn, Fe, Cu, Cr and Cd. Cathode lamps were used for the radiation source. Air acetylene gas was used for all the experiments. This method provides both sensitivity and selectivity since other elements in the sample will not generally absorb the chosen wavelength and thus, will not interfere with the measurement.

**Table 1: Name of seeds, common name, scientific name, family, elements studied and medicinal application of the spice seeds**

Seeds name	Local name	Scientific name and family	Elements	Medicinal Use & Application
Coriander seed	Dhania	<i>Coriandrum sativum</i> Umbelliferae	Iron, Copper, Calcium, Sodium, Phosphorus Potassium, Manganese, Zinc, Magnesium	Swellings, Diarrhea, High cholesterol levels, mouth ulcers, Anemia, Menstrual disorders, Digestion, Small pox, Eye care, Conjunctivitis, Skin disorders, Blood sugar disorders
Ajwain seed	Ajwain	<i>Trachyspermum ammi</i> Apiaceae	Sodium, Potassium, Calcium, Copper, Iron, Magnesium, Zinc Manganese, Phosphorus,	Excessive bleeding, Diabetes, Colic Disease, Arthritics, Reduction in weight, Bed wetting, Ear pain, Joint pains, Greying of hair, Paralysis, Eye cleanser, Piles
Pepper seed	Kali mirch	<i>Piper nigrum</i> Piperaceae	Potassium, Calcium, Zinc, Manganese, Iron, Magnesium.	Gastro diseases, Cough, Cold, Skin treatment, Metabolism, Dental health, Antiarthritic, Carminative, Regulates Blood, Wrinkles, Cancer prevention and controlling, Helps heart rate and blood pressure, Indigestion reduces t
Black Cumin seed	Shahi jeera	<i>Bunium bulbocastanum</i> Apiaceae	Iron, Copper, Calcium, Potassium, Manganese, Selenium, Magnesiumm Zinc.	Cold, Kidney, Asthma, Anemia, Cancer, Piles, Diabetestoothache.
Sweet cumin seed	Cumin seeds	<i>Cuminum cyminum</i> Apiaceae	Iron, Manganese	Common Cold, Kidney, Bronchities Asthma, Disorders, Anemia, Cancer, Piles, Diabetes, Respirator Disorder

**Table 2: Concentration of trace elements studied in spice seeds of (in ppm: n=3) Ballari district, Karnataka, India**

Seeds name	Trace elements					
	Mn	Fe	Cu	Zn	Cd	Cr
Coriander seed	0.65	2.43	0.42	2.85	0.0042	0.0706
Ajwain seed	1.94	3.69	0.32	2.42	0.0018	0.0980
Pepper seed	1.78	2.58	0.72	1.64	0.0030	0.0802
Cumin seed	0.75	3.37	0.15	2.80	0.0043	0.0752
Sweet cumin seed	1.08	2.47	0.19	3.02	0.0070	0.0669



**Fig. 2: Concentration of trace elements studied in spice seeds of Ballari district, Karnataka, India**

## RESULTS AND DISCUSSION

Selection of the plants used for this study was based on their extensive use in the traditional system of medicine in India table 1 summarises the botanical as well as the common name of the plant, its part used, the place of collection, major metallic constituents and medicinal uses. As is evident from the table, efforts were made to procure samples from the fields of Ballari district, Karnataka, India. The medicinal uses of these plants in Ayurveda cover a number of ailments including hypertension, neurological disorders, asthma, immuno-stimulants, antibacterial, menstrual disorders, rheumatism and urinary tract infection, etc. In table 2, concentrations in the

seeds have got significance with Mn, Fe, Cu, Zn, Cr and Cd. This indicates that the relation among them is meaningful for human as well as animal welfare to use it as remedial measures.

### Ferrous

The average content of Fe range between 3.69-2.42 ppm/100g (table 2) in the estimated 6 medicinal plant seeds. The variation due to climatic variability, physicochemical and presence of mining activities in selected areas. It is an important hemoglobin component responsible for oxygen transport in the human body [4]. The normally tolerable range of iron (Fe) is 15-120 mg/day. Iron is undoubtedly the most important nutrient and its deficiency causes of several disorders

[5]. Similar findings reveals that the concentration of Fe in Coriander seed, and Ajwain seed, were 129 and 355 mg/g-1 respectively by [6, 7] reported that the highest Fe is estimated in *Pergularia tomentosa* 292 mg/g-1 among the estimated seven medicinal plants.

### Zinc

The average content of Zn ranged between 2.85-3.02 ppm/100g (table 2) in the estimated 5 medicinal plant seeds. The highest amount of Zn is recorded in the Sweet cumin seed (3.02 ppm) and least amount was recorded in Pepper seed (1.64 ppm). It is clear from the above results accumulation of high amount of Zn content in the field of Ballari district; the soil contains rich amount of minerals due to mining activities, and it is a second abundant element in estimated 5 medicinal plants. The physiological activities of the plant influence the Zn absorption and the interaction with many elements like Fe, Mn and Cu, affects Zn uptake [8]. Zn is the component of more than 270 enzymes [9] and its deficiency causes many physiological disorders. Besides, it is responsible for stimulating the growth of epidermal and epithelial cells [10]. The normal per day intake of Zn level is 12-15 mg/day. The similar kind of reports in seeds has been reported by researchers [5-7].

### Manganese

The average content of Mn arranged between 1.94-1.78 ppm/100g (table 2) in the estimated 5 medicinal plant Seeds. The highest amount of Mn is recorded in the Ajwain seeds (1.94 ppm) and the lowest amount was recorded in Pepper seeds (1.78 ppm). From the results, it is clear that variation among the different area samples the highest content of Mn was detected in plants collected from Ballari fields, due to soil contains a high amount of Mn. Manganese is an important electrolyte also responsible for proper bones and liver function. It also works as co-factor in more than 300 metabolic reactions [11]. Normal daily intake of Mn is 2-8 mg/day. Sheded *et al.*, estimated the manganese from seven medicinal plants, he was found Mn in *Acacia ehrenbergiana* 339 mg/kg-1 highest amount were detected [5]. According to findings of Reddy and Reddy, most of the plants examined plants are safe [12].

### Copper

The average content of Cu ranged between 0.42-0.72 ppm/100g in the estimated 5 medicinal plant spice seeds is presented in table 2. The highest amount of Cu is recorded in the Coriander seeds (0.72 ppm) and least amount was recorded in Pepper seeds (0.42 ppm). Cu is the main constituent of the bone, connective tissue, brain, heart, and many other body organs [13]. Normal daily intake of copper is 2-5 mg/day. The Cu is macronutrients, which is essential to human health and nutrition by Reddy and Reddy *et al.*, [12, 14]. Sheded *et al.*, reported that range of Cu contents in 50 medicinally important leafy materials growing in India [5, 15].

### Chromium

Highest Chromium content found in Ajwain seeds (0.0980 ppm) only among tested spices which is more than WHO and Germany limitations [15, 16] as shown table 1. The daily chromium intake from food range is 50–200 µg/day.

### Cadmium

High Cadmium content found in Sweet cumin seeds (0.0070 ppm) where its accumulation causes reducing glucose level in blood, gastrointestinal disorder, cardiovascular shock, etc., [18]. Normal daily intake of Cd in food is 0.049 gm/kg. It is naturally occurs in rocks and soil. Table 2 showed that Chromium ranged 0.0669-0.0980 ppm that may be a result of its low solubility water and plant uptake (6-12).

### CONCLUSION

Trace elements are useful in human physiological activities. Therefore concluded that the plants under study are rich in elements may also help in biodiversity function etc. A total 6 elements had been determined in 5 medicinal plant spices collected from the fields of Ballari district, Karnataka, India, these are commonly used in curing various human ailments. From the results, indicated that variations in elemental composition and concentration between the

species and depends upon ecological area. Therefore, it is reflecting differences in the physiological functioning of the specific plants depending upon the elemental interaction within it. Also it will be helpful to develop an approach towards a direct link between elemental content and its curative probability having coherence with the traditional use of spices.

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### CONFLICT OF INTERESTS

Declared none

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