INTERNATIONAL RESEARCHERS

# PROXIMATE AND ELEMENTAL PROFILE OF PLANTAGO OVATA

Abdul Ghani, Obaida Ameen, Muhammad Ikram, Mujahid Hussain, Iftikhar Ahmad
Ameer Khan,Tahira Hameed, Mishal Iftikhar, Muhammad Imran, Muhammad Farooq
Hira Fatima, Noor Muhammad, Khurram Shahzad and Muhammad Arshad

Volume No.5 Issue No.2 June 2016

www.iresearcher.org

ISSN 2227-7471

THE INTERNATIONAL RESEARCH JOURNAL "INTERNATIONAL RESEACHERS"

www.iresearcher.org



INTERNATIONAL RESEARCHERS is peer-reviewed, supported by rigorous processes of criterion-referenced article ranking and qualitative commentary, ensuring that only intellectual work of the greatest substance and highest significance is published.

INTERNATIONAL RESEARCHERS is indexed in wellknown indexing diectories

INDEX COPERNICUS INTERNATIONAL JOURNAL MASTER LIST **with ICV value 5.90**

ULRICHSWEB GLOBAL SERIALS DIRECTORY

Journal Seek

Directory of Research Journals Indexing

and moniter by

THOMSON REUTERS

# PROXIMATE AND ELEMENTAL PROFILE OF PLANTAGO OVATA

Abdul Ghani[1], Obaida Ameen[2], Muhammad Ikram[3], Mujahid Hussain[4], Iftikhar Ahmad[5], Ameer Khan[6], Tahira Hameed[7], Mishal Iftikhar[8], Muhammad Imran[9], Muhammad Farooq[10], Hira Fatima[11], Noor Muhammad[12], Khurram Shahzad[13] and Muhammad Arshad[14]

[1,2,3,4,5,6,7,8,9,13]Department of Botany, University of Sargodha, Sargodha, Punjab, Pakistan
[11]Department of Botany, The University of Lahore, Sargodha, Punjab, Pakistan
[12]Ayub Agriculture research institute Faisalabad, Pakistan
[13]Department of Basic sciences, university of veterinary and animal sciences Lahore, Pakistan

**(PAKISTAN)**

mujahid.hussain7877@gmail.com[4]

**ABSTRACT**

The study was conducted to evaluate the proximate analysis and mineral estimation of plant *Plantago ovata* belonging to the family *Plantaginaceae* which is traditionally used in different parts of Pakistan. The plant seeds were collected from market and grinded them to make powder by using electric grinder. Then this powder was stored in refrigerator at $4^0$C prior to analysis. After this, analysis was carried out. The results from the proximate analysis indicate that the plant contained crude fat 23.47%, moisture 4.22%, crude protein 7.12%, and crude fibre 54.59%, Carbohydrates 30.33%, and had Ash value of 12.01%. The mineral analysis was Potassium (K) 0.105mg/kg, Iron ($Fe^{3+}$) 0.175mg/kg, Zinc ($Zn^{2+}$)0.063 mg/kg, Manganese ($Mn^{2+}$)0.231mg/kg, Chromium ($Cr^{3+}$)0.323mg/kg Nickel ($Ni^{3+}$) 0.326mg/kg and Copper ($Cu^{2+}$)0.021mg/kg.

**Keywords:** *Plantago ovata*, proximate analysis, mineral estimation

## 1. INTRODUCTION

Medicinal plants play an important role in providing the health care services to people (especially rural) and are used by almost 80% of the trivial communities all over the world. Each medicinal plant species has its own nutritional composition beside possessing pharmacologically important phytochemicals. These nutrients important for the physiological functions of the body (human). Such nutrients, biochemical like carbohydrates, fats and proteins play an important role in satisfying human needs for energy and life processes. Several workers approximately three quarter of earth people depend on plants and plant extracts for their healthcare. India offers a distinctive chance for discovery of drugs for many researchers (Shaded *et al*., 2006). Many researchers are focusing on medicinal plants since only just a mean not many plant species have been investigated for their therapeutic property, potential, mechanism of action, safety evaluation and toxicological studies (Ravi shankr*et al.,* 2007). Isphagol (*Plantago ovata*) is an important therapeutic crop and Ayurveda herbs. The genus *Plantago* consist of 200 species, from which 10 are present in India. Isabgol is an annual herb, which attains a height of 32 – 49 cm when is cultivated. Stem is not too much soft and plant is hairy with large narrowly linear, length is 7.6 – 19 cm and leaves size is 0.7 cm, appearing in whorled. (Kostic*et al*., 2011). The spikes 1.3 to 4.1cm long and about 0.4 cm broad in size, cylindrical to ovoid in shape and bear 44 to 67 flowers. flowers contain both mean bisexual, anemophilous, tetramerous and protogynous and favoring out-crossing. Fruit contain a capsule, about 8 mm long, boat in shape, and containing smooth rosy-white seeds. Epidermis of seed formed from polyhedral cells further more thickended by a secondary deposition (a foundation of mucilage) (Chopra, 1930). Seeds coating provides the husk on mechanical milling (Liu, 2011). The husk and seeds are also used as medicinal purpose. Its seed contain mucilage (10-12%), fatty oil (5%) and in large concentration aluminous mater (inactive glycoside viz. Cubin (C13H19O8H20) pharmacologically) and a pentose sugar. also has the property of retaining water and absorbing which is also used in checking diarrhea. It is alleviating kidney, diuretic and gonorrhea, bladder complaints, arthritis and also hemorrhoids (Ansari *et al*., 1996).

**Figure 1:** *Plantago ovata* plant and its seeds

| Scientific classification | |
|---|---|
| **Kingdom:** | Plantae |
| **(unranked):** | Angiosperms |
| **(unranked):** | Eudicots |
| **(unranked):** | Asterids |
| **Order:** | Lamiales |
| **Family:** | Plantaginaceae |
| **Subfamily:** | Plantagineae |
| **Genus:** | *Plantago* |
| **Species** | ovata |

## 2. MATERIAL AND METHODS

### Collection and Treatment of Sample

The plant seeds were collected from market and ground them to make powder by using electric grinder. Then powder was stored in refrigerator at $4^0$C prior to analysis. After this, analysis was carried out.

### Proximate Composition

Determination of proximate composition was carried out in accordance with AOAC method (1990). Proximate composition of a substance constitutes the different classes of nutrients present in the samples such as

carbohydrates, protein, fat, crude fibre, ash and moisture as well as caloric value calculated from values of carbohydrate, fat and protein.

**Detection of Ash:**

I took 1g of oven dried sample in china dish and burnt the sample in burner till that became smoke free. Then I ignited the sample in muffle furnace at 600°C till white grey ash was obtained.

The values of ash were determined by applying the following formulae;

$$\textbf{Ash } \% = \frac{\boldsymbol{Weight\ of\ ash}}{\boldsymbol{Weight\ of\ sample}} \times \mathbf{100}$$

**Detection of Moisture Contents:**

I took 5g of dried sample in a china dish and put that in hot air oven at 105°C for 24 hours. After that I placed that in desiccator, weighed the sample and repeated the procedure after 2 hours till constant weight was obtained. The contents of moisture was also detected by applying the following formulae

$$\textbf{Moisture amount} = \frac{\boldsymbol{Weight\ of\ sample\ before\ drying - weight\ of\ sample\ after\ drying}}{\boldsymbol{Weight\ of\ sample\ after\ drying}} \times \mathbf{100}$$

**Detection of Crude Fat:**

For that purpose, I used Soxhlet apparatus. I took 2g of dried sample and put that in thimble. Thimble was then fitted in Soxhlet apparatus and fat in flask was obtained.

**Detection of Crude Protein**

I took 1g of dried sample in a flask and added 5g of digestion mixture ($K_2SO_4$, $FeSO_4$, and CuSO4) in the flask. Then added 25ml $H_2SO_4$ and provided heat till transparent material was obtained. Distilled water was added to make it dilute. 10 ml of this sample was taken and distilled it with 50 mg of zinc and sodium hydro oxide. Added methyl red as indicator and titrated it with sulphuric acid until light pink color appeared. The amount of acid used show the amount of protein. Micro-Kjeldahl apparatus was used for that purpose.

**Detection of Crude Fiber:**

Crude fibers were determined by using the method of acid base digestion I took 3g of oven dried sample and removed the fat by Soxhlet apparatus and digested the sample in 1.25% $H_2SO_4$ and NaOH separately. Then I filtered the contents and the material was washed three times by using distilled water. Then I transferred the residue in china dish placed the dish in oven at 105°C for 24 hours, then ignited the residue in muffle furnace at 600°C to obtain ash and from that ash, crude fibers were measured. The difference between the Weights of the sample was the contents of crude fibers.

**Detection of dry matter:**

The contents of dry matter was detected by applying the formula

**Dry matter in percentage= 100 - moisture amount**

**Detection of Carbohydrates:**

The amount of NFE was detected by using formula

**Carbohydrates% = 100 - (CP + MM + Fat + Fiber)**

**Estimation of Mineral Element**

Mineral elements estimations indicate the amount of inorganic elements present in the sample. The determination was carried out using standard procedures. During the determination, the sample was first ashes and

dissolved in a solvent, and the resultant solution aspirated into an air-acetylene flame. The mineral element determined were; Zinc (Zn), Manganese (Mn), Copper (Cu), Potassium (K), Iron (Fe), and Nickel ($Ni^{3+}$) and this was done by spectrophotometric method, for Na, K, using flame emission spectrophotometer and AAS for others. Before determining the concentration of any element in the sample, a calibration curve of the element in the sample, was prepared using prepared standard stock solutions for the elements (Pendias & Pendias, 1992)

## 3. RESULTS AND DISCUSSIONS

The data obtained in the course of the experiment are shown in the tables below and the discussion of these result are also given.

### Proximate Composition

The results of proximate composition of *Plantago ovata* are presented in Table 1.

The proximate analysis showed the moisture content of *Plantago ovata* was 12.01% (w/w). This result indicated low shelf life of seed hence long storage would lead to spoilage due to its susceptibility to microbial attack. This supports the practice of storage in dry form by users (Elizabeth, 2005). Moisture content is among the most vital and mostly used measurement in the processing, preservation and storage of food (Choudhary *et al*., 2006).

**Table 1:** Proximate Composition of *Plantago ovata*

| Parameters | Composition |
|---|---|
| **Moisture content (%)** | 4.22% |
| **Ash content** | 12.01%. |
| **Fiber content** | 54.59%, |
| **Fat content** | 23.47% |
| **Crude protein** | 7.12% |
| **Carbohydrates** | 30.33% |
| **Dry matter** | 50% |

Ash content was 12.01%. Ash in food contributes the residue remaining after all the moisture has been removed as well as the organic material (fat, protein, carbohydrates, vitamins, organic acid etc.) have been incinerated at a temperature of about 500ºC (Jasmine *et al*.,2007). Ash content is generally taken to be a measure of the mineral content of the original food (Zubaida*et al*.,2007). Crude fibre in food or plant is an indication of the level of non-digestible carbohydrate and lignin. The crude fibre obtained for *Nigella sativa* was 10.23%(DM). This low level is considered appropriate, because it aids absorption of glucose and fat. Although crude fibre enhances digestibility, its presence in high level can cause intestinal irritation, lower digestibility and decreased nutrient usage. Crude fibre is made up largely of cellulose together with a little lignin which is indigestible in human (Qadir, 1991).

The crude fat content obtained for *Nigella sativa* was 44.23% (D. M). Fat provides very good sources of energy and aids in transport of fat soluble vitamins, insulates and protects internal tissues and contributes to important cell processes (Okaka*et al*., 2001). Moreso, it is good to add lipid (fat) to most of our diets, because many body functions depend on lipids. The crude protein of *Nigella sativa* was % (DM). The recommended dietary allowance (RDA) for protein is 56g for individual weighing 70kg and 46g for adult weighing 50kg; children may consume 2kg/day (Devi *et al*., 2008). The plant is a moderate source of protein. According to Alloway (1990), proteins from plant sources have lower quality but their combination with many other sources of protein such as animal protein may result in adequate nutritional value. Plantago ovate has dry matter content of 30.33%. The dry matter of plant and animal material would be its solids, i.e. all its constituents excluding water. The dry matter of food include carbohydrates, fats, proteins,vitamins, minerals,and antioxidants (e.g., thiocyanate, anthocyanin, and quercetin) .Carbohydrates, fats,

and proteins, which provide the energy in foods (measured in kilocalories or kilojoules), make up ninety percent of the dry weight of a diet.

*Plantago ovata* has Carbohydrate value (50%).This plant is a moderate source of carbohydrate when compared with the Recommended Dietary Allowance (RDA) of 130g. There is no specific dietary requirement for carbohydrate because energy can also be derived from protein, fat and alcohol. However, a diet that does not contain carbohydrate can lead to muscle breakdown, ketosis and dehydration. This can be prevented by 50 to 100 grams of carbohydrate per day, but levels above this are desirable. Sources of complex carbohydrates, such as starch, are recommended as these often also provide necessary vitamins, elements (minerals) and dietary fibre.

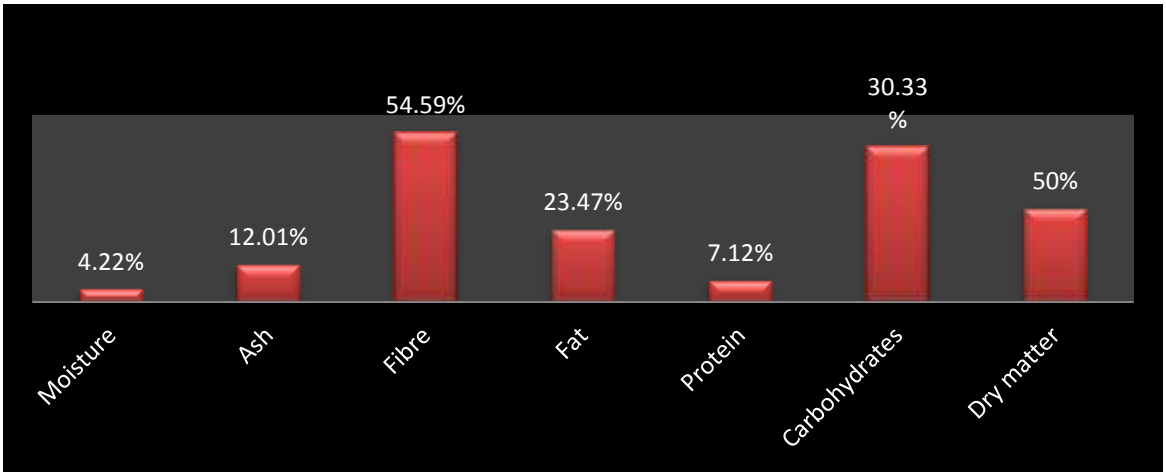


**Figure 2:** Proximate Composition of *Plantago ovata*

## 4. MINERAL ELEMENT COMPOSITION

Table 2 presents the result of mineral element composition of *Plantago ovata*, in mg/kg dry matter. The zinc content of *Plantago ovata* was 0.026mg/kg. The Recommended Dietary Allowance (RDA) for zinc is 13mg/kg (Anonymous, 1998). Zinc is essential in the activation of certain enzymes. These include dehydrogenase, alkaline phosphatase and carboxypeptidase. Zinc containing organic compounds is employed as astringent and anti-fungal agents. It aids wound healing and metabolism of nucleic acid and insulin. Zinc in excess causes anemia and if deficient in the body can lead to dermatitis.

The value obtained for Chromium was 0.323mg/kg. Effect of copper deficiency in the body results in anemia while excess in the body can cause brain damage (Fuji *et al*., 2003). Chromium is enzyme activator and maintenance of the structure of nucleic acid and potentiation of action of insulin and some biological functions that are controlled by this element. Several epidemiological studies linking Cr efficiency with the risk factors of cardiovascular diseases.

**Table 2:** Mineral Element Composition (mg/kg, dry matter) of *Plantago ovata:*

| Minerals | Conc. |
|---|---|
| **Zn** | 0.063mg/kg |
| **Cr** | 0.323mg/kg |
| **Mn** | 0.231mg/kg |
| **Cu** | 0.021mg/kg |
| **K** | 0.105mg/kg |
| **$Fe^{2+}$** | 0.175mg/kg |
| **$Ni^{3+}$** | 0.326mg/kg |

The manganese content of *Plantago ovata* was 0.231mg/kg. The Recommended Dietary Allowance (RDA) for manganese varies between 2mg/kg to 8mg/kg (Iqbal, 2002). Certain trace elements such as copper, iron, and manganese constitute essential part of any balanced diet. Some of them are micronutrient to the plants and if not present in the right proportion may have adverse effect on human and plants.

The content of copper was 0.021mg/kg. The Recommended Dietary Allowance of copper according to Kajita*et al*., (2001) is 3.5mg. Copper is very vital in diet because it is involved in the proper usage of iron (Fe) and especially for the synthesis of cytochrome oxidase, which contains both iron (Fe) and copper (Cu). Excess copper can lead to jaundice (Wilson's disease).

The potassium content was 0.105mg/kg. According to National Research Council (1974), the Recommended Dietary Allowance of potassium is 1875-5625mg/kg for adults. Potassium is very vital in regulation of water and electrolyte balance and acid-base balance in the body, as well as responsible for nerve action and functioning of the muscles. Deficiency of potassium leads to muscle paralysis (Ahmed *et al*., 2005).

The iron content of *Plantago ovata* was 0.175mg/kg. According to Pravin *et al*., (2009), the recommended daily requirement of iron for man is 6 – 40mg/kg. Iron is very important in the formation of hemoglobin in red blood cells and deficiency of iron leads to anemia. *Plantago ovata* could be used to improve the anemic condition of a patient.

In case of $Ni^{3+}$ the concentration in this plant was (0.326mg/kg). Due to anthropogenic activities the concentration of $Ni^{3+}$ in plants is arising day by day. The most common problem arising from $Ni^{3+}$ is an sensitive to Skin called as itchiness of nickel, which mostly occure when skin is not dry, besides this $Ni^{3+}$ also recognized as a carcinogenic and badly affect lungs and also nasal cavity. It is mostly present in the pancreas that's why required in low concentration for the body. also plays a significant role role in theformation of the insulin. Deficiency of $Ni^{3+}$ leads to the liver disease (Pendias & Pendias, 1992). Environemtal protected agency has suggested daily $Ni^{3+}$ intake <1 mg, more than this is toxic (Smith, 1990).

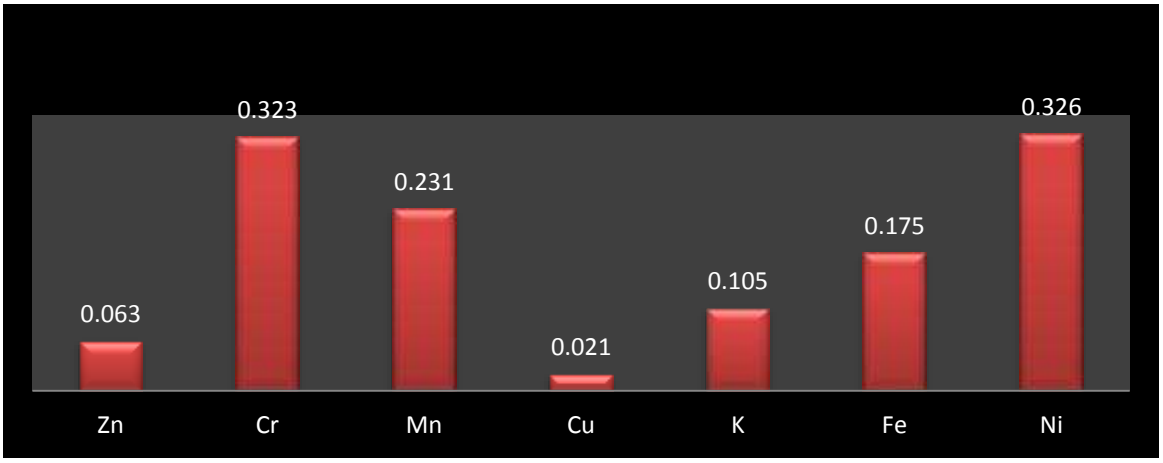


**Figure 3.** Mineral Element Composition (mg/kg, dry matter)

## 5. CONCLUSION

This work was carried out to evaluate the proximate and nutrient composition of *Plantago ovata*. The proximate composition analysis showed much about the nutritive value of the plant. However, mineral elements analysis also revealed that *Plantago ovata* performed some significant roles in alleviating series of sickness that can result in cough. Hence *Plantago ovata* seeds husk which is presently used to treat all the chronic diseases of stomach. Since heavy metals composition of the plant is within the acceptable range.

## 6. REFERENCES:


Alloway, B.J. 1990. Cadmium content in heavy metals in soils.*In* B.J., Blackie, Glasgow, 321; p. Ameenah Gurib-Fakim, (2005). The use of plant products in the development of functional foods, addresses the needs for validation of plant extracts and always stressing on safety, efficacy and quality of Phyto-medications. Journal of Biological Sciences, 23(1):1-93.

Anonymous,1 998.District Census Report of Attock, population census organization Statistical Division, Islamabad-Pakistan. Pakistan Journal of Botany, 7(4):206-208.

Ahmad, Habib, Khan, ShujaulMulk, Ghafoor, Sajidul and Ali, Niaz.2009. 'Ethno-botanical Study of Upper Siran, Journal of Herbs, Spices & Medicinal Plants, 15(7):1, 86 – 97.

Ansari T.M, Ikram and Najam-ul-Haq*et al*.2004. The content of essential trace metal for example (zinc, manganese, copper and iron) in plants of medicinal importance. Journal of Biological Sciences, 4(1-2): 95-99.

AOAC (1990). Official methods of analysis.15th edition.Association of Official Analytical Chemists, Washington DC, USA.

Bharani, A, Ganguly, A. Bhargava, K.D.2001. Salutary effect of *Termina liaarjuna* in patients with severe refractory heart failure. International Journal of Cardiol. 49(3): 191-9.

Choudhury, R. P., Kumar, A., &Garg, A. N., (2006). Analysis of Indian mint (*Mentha spicata*) for essential, trace and toxic elements and its antioxidants behavior. Journal of Pharmaceutical and Bio-medical Analysis, 41(8): 825-832.

Devi, N. K., N. H. Sharma and S. Kumar. 2008. Assessment of essential and trace elements in some medicinal plants by PIXE and PIGE techniques. International Journal of Pharmacy and Pharmaceutical Sciences, 266(13): 1605-1610.

Elizabeth, K.M., (2005): Antimicrobial activity of Termina liabellerica. Indian Journal of Clinical Biochemistry, 2005, 20 (2) 150-153.

Fuji, Y., T. S. S. Parvez, M. M. Y. Ohmae and and O. Iida. 2003. Screening of 239 medicinal plant species for allelopathic activity using sandwich method. Journal of Weed Biology and Mangement.4 (3): 233-241.

Hassan, M.A. and Khan, M.S. 2005. Ethno botanical records in Bangladesh-1: plants used for healing fractured bones. Journal of Asiatic Societies Bangladesh (Sc.) XII (1&2): 33-39.

Iqbal, M. Z and S. A. Rehman. 2002. Analyzed the effects of Cd, Zn, Cr and Pb on seed germination and seedling growth of plants. Pakistan Journal of Environmental Science, 11(8): 47-49.

Jasmine, R., P. Daisy and B. N. Selvakumar. 2007. Invitro efficacy of flavonoids from Eugenia jambolana seeds against ESβL-producing multidrug resistant enteric bacteria. Research Journal of Microbiology, 6(4): 369-374.

Kostic, D., Mitic, A. Zarubica, M. Mitic, J. Velickovik, S. Ranjdelovic. 2011. Content of trace metals in medicinal plants and their extracts. Indian Journal of Microbiology., 65(2): 165-170.

Liu, D., W. Jiang and X. Gao. 2003. Effects of Cadmium on root growth, cell division and nucleoli in root tips of Garlic. African Journal of Physiological Plantarum.47: 79-83.

Okaka, J.C., N. T. Enoch, A. Akobundu and N.C. Okaka. 2001. Human Nutrition: An integrated approach, second edition.International Journal of Research and Reviews in Pharmacy and Applied science, 34(4):126-139.

PravinSingare, Ram Lokhande, MahadeoAndhale, RaghunathAcharya (2010). Assessment of essential trace elements in Ayurvedic Indian medicinal herbs with the help of instrumental neutron activation analysis and atomic absorption spectroscopy.World Journal of Science, Technology and Sustainable Development. 3(6): 493–495.

Pendias A.K. and Pendias, (1992). Determination of trace elements in Soils and Plants. International Journal of. Environmental studies. 39(2):55-60.

Qadir, N and M.Z. Iqbal. 1991.Growth of some plants rose from polluted and unpolluted seeds. International Journal of. Environmental studies. 39(2):55-60.

Ravi shankar, B and V. J. A. Shukla. 2007. Approach to Indian medicine system and review of Ayurveda, Siddha and Unani medicine systems. African Journal of Traditional, Complementary and Alternative Medicines, 4 (3): 319-337.

Shaded, A. K., L. Khan, I. Hussain, K. B. Marwat and N. Akhtar. 2008. Citations of evidences of essential and non-essential heavy metals in some selected herbs, which are widely used in the preparation of herbal products and homogeneous extracts. Pakistan Journal of Weed Sciences. Res., 14(1-2): 101-110.

Zubaida, Y., Z. K. Shinwari and S. M. Ali. 2007. Ethno botanical importance of salt range species of District Karak, Pakistan. Pakistan Journal of Pollution Sciences. 13(7): 27-29.