

# Detection of Elements Present in Edible Seeds of *Cleome viscosa*

Sangita M. Lavate<sup>1\*</sup>, C.D. Shendkar<sup>1</sup>, Rasika Torane<sup>2</sup> and Nirmala Deshpande<sup>1</sup>

<sup>1</sup>Department of Chemistry, Yashwantrao Mohite College, Erandwane, Kothrud, Pune-411038, Maharashtra, India.

<sup>2</sup>Department of Chemistry, Dr. T. R. Ingale Research Laboratory, S.P. College, Tilak Road, Pune 411030, Maharashtra, India.

\*Corres. Author: [sangitalavate@gmail.com](mailto:sangitalavate@gmail.com)  
Mobile No. 09764286551

**Abstract:** *Cleome viscosa* Linn. (Capparidaceae), commonly known as “wild or dog mustard,” is an annual, sticky herb found as a common weed all over the plains of India and throughout the tropics of the world. The whole plant and its parts (leaves, seeds, and roots) are widely used in traditional and folkloric systems of medicine. Taking this into consideration the metal content of *Cleome viscosa* seeds was carried out. The presence of sodium, Potassium, Calcium, Manganese, Magnesium, Iron, Zinc, copper, Boron, Silicon was noted. Quantitative determination showed higher percentage of Magnesium, Silicon, Phosphorous, Calcium and nitrogen.

**Keywords:** *Cleome viscosa* (L), Atomic absorption spectroscopy, Flame photometry, Colorimetric method.

## Introduction

*Cleome viscosa* is a pantropical weed common in cultivated fields, waste areas and settlements throughout West Africa<sup>1</sup>. It belongs to capparidaceae family. Almost all parts of the plant are used to treat a variety of health complaints. They are useful in liver diseases, chronic painful joints and in mental disorders<sup>2</sup>. The juice of the plant is used as a condiment<sup>3</sup>. The seeds are anthelmintic, carminative, cardiac stimulant and are useful in fever and diarrhea<sup>4</sup>. Externally it acts as rubefacient and vesicant<sup>5</sup>. The pungent seed can be pickled or used as a mustard substitute in curries<sup>3, 6</sup>. The seed oil is used for cooking<sup>6</sup>. Leaves are used as an external application to wounds and ulcers<sup>5</sup>. Leaves and young shoots are cooked as a vegetable<sup>6</sup>. The paste of the root is applied externally in the treatment of eraches<sup>6</sup>. It has also edible uses. The pharmacological studies have shown that *C.viscosa* possesses various notable biological activities such as anthelmintic, antimicrobial, analgesic, anti-inflammatory,

immunomodulatory, antipyretic, psychopharmacological, antidiarrheal and hepatoprotective activities<sup>4</sup>. A wide variety of phytoprinciples have been isolated from the plant<sup>4</sup>. Comparative study of few metal content of seeds in temperate and tropical halophytes have been reported<sup>7</sup>. Thus *C.viscosa* a medicinally important plant with wide biological activities consider for the further detection of elements. The present work includes detection of elements from seeds of the plant using Atomic absorption spectroscopy, Kjeldahals method, colorimetric method and Flame photometer. In this present study thirteen elements are detected.

## Experimental

### Material and Methods

#### Plant material:

The seeds of *cleome viscosa* Family capparidaceae obtained as a market sample. The taxonomic identification was accomplished with the help of flora of Bombay Presidency<sup>8</sup> and Flora of Maharashtra<sup>9</sup> for identification. The seeds were authenticated from

Botanical survey of India, Pune, Maharashtra, India. Its Authentication No. is BSI/WRC/Tech/2010/1028. Pune, India.

#### Preparation of Ash for Nutritional Analysis:

The medicinally important plant *Cleome viscosa* was scanned qualitatively and material consisting of important minerals would represent the inorganic parts of the experimental material under study.

A Perkins - 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. Photometric colorimeter of systronics, model 113 was used for phosphorous. Ash was prepared by taking air shed dried powdered seeds (1gm) and keeping it in muffle furnace at 550°C till constant weight was obtained. The major constituent of 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 material was filtered through Whatmann filter paper no.40. The residue was made chloride free (Tested with AgNO<sub>3</sub>) 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 (Table -2).

#### Importance of Elements:

Trace elements are spark plugs of life because they are required to activate hundreds of enzymes reactions within the body<sup>10</sup>. The acid soluble seeds of *Cleome viscosa* (L) which are edible showed the presence of elements like potassium, calcium, sodium, magnesium, iron, manganese, silicon, boron, chloride, nitrogen and zinc along with copper, phosphorous.

Herbs are also classified as stimulatory and sedative based upon their mineral content, if the herbs are rich source of potassium, phosphorous and iron they are stimulatory herbs<sup>10</sup>. Herbs those are rich in calcium and magnesium are sedative herbs<sup>10</sup>. As the leaves of *Cleome viscosa* are rich in calcium, magnesium, phosphorous and nitrogen they are sedative herbs. But the elements like Potassium, Manganese, Iron, Zinc, Copper, Boron, Chlorides and Sodium are present as minor constituents minor constituents.

### Results and Discussion:

Table – 1 Ash from *Cleome viscosa* (L)

Particulars	Seed Sample
Acid Soluble Ash	88.11%
Acid Insoluble Ash	11.89%

Table – 2 Element Contents of *Cleome viscosa*

Metal	Element Method	Seeds
Nitrogen	Kjeldahals method	2.8928%
Phosphorous	Colorimetric method	0.3255%
Potassium	Flame Photometer	0.07253%
Calcium	Flame Photometer	0.3835%
Manganese	Atomic absorption Spectrophotometer	0.00643%
Iron	Atomic absorption Spectrophotometer	0.0406%
Zinc	Atomic absorption Spectrophotometer	0.00288%
Copper	Atomic absorption Spectrophotometer	0.000648%
Boron	Atomic absorption Spectrophotometer	0.01292%
Chlorides	Atomic absorption Spectrophotometer	0.0335%
Sodium	Atomic absorption Spectrophotometer	0.01821%
Silicon	Atomic absorption Spectrophotometer	2.7375%
Magnesium	Atomic absorption Spectrophotometer	0.3184%

Percentage of nitrogen may be encouraging to use the plant as manure. Most of the green manure plants contain from 0.3 to 0.8% nitrogen<sup>11</sup>. Therefore the high nitrogen content of *Cleome viscosa* seeds has a great significance in evaluating the plant as a green manure plant. Moreover an ideal green manure plant should be inexpensive, be easily established, should grow rapidly, be capable of growing on poor soil<sup>12</sup>. *Cleome viscosa* possesses all these requirements and hence qualify itself as a potential green manure plant.

Phosphorous is tied to calcium in bone structure and plays a significant role in CNS function. Many enzymes contain as a base phosphoproteins. Phospholipids are involved in nerve conduction. Phosphate is the primary iron in extracellular and intracellular fluid; it aids absorption of dietary constituents, helps to maintain the blood at a slightly alkaline level, regulatory enzyme activity and is involved in the transmission of nerve impulses<sup>10,13</sup>.

Potassium plays important role in treatment of diabetes as it has effect on secretion of insulin. Excess of potassium can produce neurological disturbances such as numbness of hand and feet<sup>10</sup>. Sudden death that can occur in fasting, anorexia nervosa or starvation is often a result of heart failure caused by potassium deficiency. Potassium deficiency may cause symptoms of fatigue, weakness, mental depression, abnormal heartbeats and irregularities in the ECG, dry skin, glucose intolerance, low blood pressure, and muscle cramps etc<sup>10</sup>.

Calcium plays a major role in CNS function. Calcium is seen as a major factor in neurotransmission and is required in the synaptic discharge of neurotransmitter. Increase in intracellular levels of calcium promotes fusion of synaptic vesicles within the axon membrane of the neuron, there by assisting in neurotransmission with the CNS. Calcium is essentials for nerve impulses conduction and activates some enzymes, which generate neurotransmitters<sup>10,13</sup>.

Manganese deficiency cause skeletal abnormalities, retarded bone growth, change in hair colour to growth, abnormalities in pancrease, disturbances in lipid and carbohydrate metabolism<sup>10</sup>.

Iron plays a significant role in oxygen transport in the body. A deficiency of Iron can impair neuronal development. Iron deficiency results in sweating, rapid pulse, prolonged sleep, cessation of the menses, aversion to eating and heavy feeling of body<sup>10,14</sup>.

Zinc deficiencies are associated with mental impairments. Zinc deficiency may be associated with mental lethargy, emotional disorder and irritability<sup>10,13</sup>.

Copper is an important mineral in dopamine synthesis. Low level of dopamine results in decrease in activity of central nervous system. A deficiency of copper may cause hypertension, antibiotic sensitivity, hyperactivity, hyperglycemia, manic disorders insomnia, allergies and osteoporosis<sup>10,13,14</sup>.

Boron helps to regulate the bodys use of calcium, phosphorus and magnesium. The main task of this mineral is to control cell growth. It enhances brain function, promotes alertness, and plays a role in how the body utilizes energy from fats and sugars. Memory and brain function can be improved with boron. It thus helps to prevent abnormalities in growth. A shortage of boron might influence the balance of calcium, magnesium and phosphorous resulting in bone loss and increasing the risk of arthritis and elevated blood pressure<sup>10</sup>.

Along with sodium, chloride works as a mineral electrolyte and plays a crucial role in distribution of fluids throughout the body. Chloride helps in maintaining the fluid balance, both within as well as outside the cells. It is also essential for maintaining the required blood volume and proper blood pressure<sup>10</sup>.

Silicon in plants provides structural support and improves tolerance to diseases, drought and metal toxicity<sup>10</sup>.

Magnesium is a key element in cellular metabolism. For high metabolic rate, cells require high magnesium. In presence of higher percentage of potassium and phosphorous, absorption of magnesium increases. As magnesium is a natural sedative, it makes the person feel sleepy. Loss of magnesium leads to hyper – irritability. Adults may suffer muscles tremors, memory loss, inability to concentrate, apathy and depression<sup>10,13</sup>.

Sodium maintains the acid alkali (pH) balance in the body. It is necessary to maintain electrical potentials of the nervous system. Deficiency of sodium may cause diarrhea, vomiting and excessive sweating, nausea, dizziness poor concentration, cramps confusion, dehydration, depression and muscle weakness<sup>10,14</sup>.

Thus *Cleome viscosa*(L) can be used to overcome these deficiencies, as these are not only a rich source of nitrogen, phosphorous, silicon and manganese but also provides other micronutrients like calcium, sodium, iron, zinc, magnesium, copper, boron and potassium.

### **Conclusion**

The above results indicate that the seeds of *Cleome viscosa* are a good source of essential nutrients required for the well being of human body. The presence of potassium, phosphorus, iron, calcium, magnesium, copper etc. in high concentration in the seeds of *Cleome viscosa* suggests its use in therapeutic purposes. Thus the presence of the nutraceutically valued minerals in the plant points toward the possibility of their use to restore the different imbalances caused in the body.

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