

**BIOLOGICAL AND THERAPEUTIC USES OF AMOMUM SUBULATUM ROXB: A  
REVIEW**

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**ABSTRACT**

*Amomum subulatum* Roxb (Zingiberaceae) is commonly known as 'Badi Elaichi' or Greater Cardamom is a well known Indian medicinal plant widely used in the treatment of many clinical conditions. It is a perennial herbaceous crop, cultivated mainly in marshy places across hills near water streams. It is a well known spice, used as flavouring agent to various dishes native to the Eastern Himalayan region particularly Bhutan, Nepal, and India. It is reported as an official drug in Unani as well as Ayurvedic system of medicine for centuries. The major constituent of large cardamom is volatile oil (2-4%). It is the principal aroma-giving compound and 1, 8-cineole is the major active compound, in an extent 60 to 80% of the total volatile oil. The monoterpene hydrocarbon content range is from 5 to 17%, out of which lamonene, sabinene, and pinenes are significant components. Terpinols comprise approximately 5 to 7% of the oil. Its uses has been described by Hakeem Kabiruddin in his book "Makhzanul-mufradat". Seeds and dry ripe fruit are used for its therapeutic actions such as stimulant (muharriq), laxative (mulayyan), aromatic (moattar), carminative (kasir riyah) and gastroprotective (Muqawwi-e-meda), cardioprotective (nuqavi-qalb) property. Keeping in view the medicinal properties of *A. subulatum* Roxb (Badi Elaichi) an attempt has been made to give overview on the processing technology, chemistry, bioactivity and therapeutic uses of large cardamom and its components and to discuss on some lagging aspects.

**KEYWORDS:** *Amomum subulatum* Roxb, Stimulant, Aromatic, Unani medicine, Biological activity.

**INTRODUCTION**

*Amomum subulatum* Roxb (Zingiberaceae) is commonly known as greater cardamom. It is native to the Eastern Himalayan region particularly Bhutan, Nepal, and India. Also found in Srilanka (Anonymous, 1987). Major producers are Nepal (52%), India (37%) and Bhutan (11%) (Gautam, et al., 2016)(Gopal, et al., 2012).

**PLANT PROFILE**

**BOTANICAL DESCRIPTION** (Ali, 1979)

<b>Kingdom</b>	Plantae
<b>Division</b>	Magnoliophyta
<b>Class</b>	Liliospida
<b>Order</b>	Zingiberales
<b>Family</b>	Zingiberaceae
<b>Genus</b>	Amomum
<b>Species</b>	Subulatum

**UNANI DESCRIPTION** (Anonymous, 1987)

**Unani name:** Heel kalan  
**Synonyms:** Badi elaichi  
**Temperament:** Hot 2, Dry 2

<b>Taste:</b>	Pungent
<b>Corrective(s):</b>	Gum Kateera ( <i>Sterculia urens</i> Linn.)
<b>Substitute(s):</b>	<b>Heel khurd</b> <i>Elletria cardamomum</i> <b>Maton (True cardamom);</b> <i>Amomum aromaticum</i> <b>Roxb (Bengal cardamom);</b> <i>A.kepulaga</i> <b>Sprague and Burkill (The round cardamom from java);</b> <i>A.dealbatum</i> <b>Roxb. (Syn. A.maximum</b> <b>Roxb.);</b> <i>A.krervanh Pierre. (Cambodian cardamom)</i> (Anonymous, 1987).
<b>Controversy:</b>	It is sometimes confused with Ethiopian or Korarima cardamom ( <i>Aframomum korarima</i> )
<b>Dose:</b>	500 mg-1 gm (Anonymous, 2007)
<b>Toxicology:</b>	No toxic effect on human body if taken in limited amount.

**VERNACULAR (COMMON) NAME**

**English:** Greater / Nepal cardamom  
**Hindi:** Bari elachi/bari illayaca

<b>Urdu:</b>	Badi Elaichi, Heel Kalan; / poorbi elaichi	<b>Telugu:</b>	Pedda Elakulu
<b>Kannada:</b>	Dodda Yalakki, Nepdi Elakki	<b>French:</b>	Cardamome
<b>Sanskrit</b>	Bhadra, stulaila Bhadrail	<b>German:</b>	Kardamom
<b>Bengali:</b>	Baara aliach	<b>Italian:</b>	Cardamomo, Cardamone
<b>Malayalam:</b>	Valiya Elam, Perelam	<b>Spanish:</b>	Cardamomo
<b>Gujrati:</b>	Elaicho, Mothi Elichi	<b>Burmese:</b>	Phalazee
<b>Marathi:</b>	Mothi Elayachi	<b>Chinese:</b>	Ts'ao-k'ou
<b>Oriya:</b>	Bada aleicha, Aleicha	<b>Indian:</b>	lachi, e(e)lachi, ela(i)chi, illaichi
<b>Punjabi:</b>	Budi Eleichi	<b>Persian:</b>	Qakilahe kalan
<b>Tamil:</b>	Periya Elam, Beraelam, Kattu Elam	<b>Indonesian:</b>	Kapulaga

### HABIT AND HABITAT

<b>Plant</b>	Tall evergreen, perennial, herbaceous monocot type(Gopal, et al., 2012)(Bhist, et al., 2011)
<b>Native</b>	Eastern Himalayas, cultivated in Nepal, northern West Bengal, Sikkim, Bhutan and hills of Assam
<b>Best season Plant growth</b>	Small springs (jhoras), temperature of 4-20°C, with annual rainfall of 2000-2500 mm and more than 90 % humidity (Chaudhary, 2009)
<b>Best region</b>	Along the moist and shady side of hilly slopes and mountain streams, above the main sea level usually at an altitude of 765 to 1675 meters.(Gopal, et al., 2012)
<b>Plant maturation</b>	Plant matures till the third year of its growth(Gopal, et al., 2012)
<b>Height</b>	Ranges from 1.5 to 3 meter(Bhist, et al., 2011)
<b>Harvesting</b>	Harvesting usually done during end of September and continues until January, depending on the diversity of plant and height of the plantation place(Mohan, et al., 2013)

### PRODUCTION

<b>Total world production</b>	12,278.20 MT(Gautam, et al., 2016)
<b>World's top producer</b>	Nepal(Singh, et al., 2011),(Gautam, et al., 2016)
<b>Commercial cultivation</b>	Spreads over 37 districts of Nepal(Chaudhary, 2009),(Gautam, et al., 2016)
<b>97 % of the total national production</b>	Eastern development region of Nepal
<b>81 % of the national production</b>	Four major districts (Taplejung, Ilam, Sankhuwasabha and Panchthar)
<b>Annual production in Nepal</b>	6,600 Metric Ton (MT)(Gautam, et al., 2016)
<b>Main cash crops</b>	Sikkim and Darjeeling district of West Bengal, India (K.R.Aneja, 2009)
<b>Cardamom holdings in Sikkim</b>	Smaller than 1-Hectare (ha) area and around 30% of total cultivators have 1-3 ha of cardamom holdings(Sharma, et al., 2009)
<b>Major production area in India</b>	Sikkim(Gautam, et al., 2016)
<b>Plantation area on Indian Himalayan region</b>	550 ha covering a total of 34,252 ha in India (Sharma, et al., 2000)with an annual production of over 4,500 MT
<b>Cultivation in Southeast Asian countries</b>	Thailand, Indonesia, Laos and China(Gautam, et al., 2016)

### VARIETIES

<b>Himalayan regions</b>	Ramsey, Golsey, Chibesey, Dambersey, Sawney and Kantidar
<b>Nepal</b>	Ramsey, Golsey and Chibesey(GS, 1998)
<b>Sikkim</b>	Ramsey, Golsey, Sawney, Kopringer, Madhusay and Rhangbhang (Ramsey, Golsey and Sawney are considered for commercial production as these cultivars are well suited to high altitudes and can be cultivated even in steep slopes(Gautam, et al., 2016) ((Hartkamp, 1993)
<b>Others</b>	Ramla, Chivey Ramsey, Garday Seto Ramsey, Ramnag, Seto Golsey, Slant Golsey, Red Sawney, Green Sawney, Mingley (Singh, 2013), Barlanga (Bhist, et al., 2011), Bebo, Boklok Tali, Jaker and Belak.

### DESCRIPTION

#### MACROSCOPICAL CHARACTERS

Fruits of *Amomum subulatum* are flattened anteriorly having 15-20 irregular, dentate-undulate wings which extend from the apex to base for two-thirds of its length (Gopal, et al., 2012). The ripened fruit is reddish brown, trilobular, and contains dark pink seeded capsules.(Gautam, 2016) Capsules are 20–25 mm long and oval to globular in shape, echinate, irregular,

trilobular, Dark red-brown in color, In each cell several aromatic seeds are present held together by a gummy sugary pulp (Rahmatullah, et al., 2009). Leaves are Oblong and lanceolate, with length 30-60 cm, green glabrous on both sides. Leafy shoots are shaped by long sheath-like stalks surrounding one another. Globose, dense and shortly peduncled spikes are there. Calyx and corolla tube segments are shorter than the tube, sub-obtuse in shape, and upper one is cuspidate. Lip is

Emarginated, obovate-cuneate, yellowish white and somewhat longer than the corolla-segments. Rhizomes are branched and creeping, with some erect leafy shoots and panicles. Its peduncle is short and buds are enclosed in tight red bracts. (Anonymous, 1987). Stem is around 90-120cm.



“Fig. 1” Flowers of *Amomum subulatum*.

Flowering occurs mainly in spring season. Individual flowers stay open for three days and some more. At the same time, new flowers open successively. The inflorescence present in flower for over a month (Sharma, et al., 2000).



“Fig. 2” Fruits and Seeds of *Amomum subulatum*

Fruits and Seeds of *Amomum subulatum* shows a very thin membranous aril composed of several layers of collapsed cells containing oil globules and prismatic crystals of calcium oxalate; testa consist of single layered epidermis of rectangular cells followed by 1-2 layers of collapsed, thin-walled parenchymatous cells, beneath this a single layer of large rectangular cells containing containing oil globules present which is internally surrounded by several layers of flattened, thin-walled, parenchymatous cells; perisperm consists of polygonal, thin walled, parenchymatous cells containing round to oval starch grains measuring 2-5  $\mu$  in diameter, and cluster of calcium oxalate crystals perisperm surrounded externally by thin-walled, sclerenchymatous, radially elongated dark brown beaker like cells; perisperm enclose the endosperm and embryo, both composed of polygonal, thin-walled, parenchymatous cells, rich in protein. (Anonymous, 2007).

### MICROSCOPICAL CHARACTERS

Epidermis of testa consisting of one layer of cells, subrounded, the outside walls are relatively thickened. Hypodermis consisting of single layer of cells, with brown-red pigment. Oil cells single layered, tangentially and elongated. Pigment layer having several layers of brown cells. Endotesta consisting of single layer of palisade sclerenchymatous cells, brown-red, amid heavily thickened inner and lateral walls, lumina very small, about one-twentieth to one-tenth the thickness of sclerenchymatous cells, borders are indistinct. Ratio of thickness of lumina to endotesta palisade sclerenchymatous cells is 1:10–1:20 (Wu, et al., 2014).

In transverse section of seed the outer epidermis of testa together with arillus does not appear, as they got disintegrated during sectioning. The inner epidermis is single layered, thick-walled, compact and radially elongated and measure 83.25×49.95-99.95×66.60 $\mu$ . This layer is followed by perisperm which is composed of 10-15 layers of radially elongated parenchyma cells fully packed with simple, small, mostly globular starch grains. These cells also contain rosettes of calcium oxalate, usually 12.9-17.20 $\mu$  in diameter. Occasionally, prismatic crystals are also met within this tissue. The perisperm is followed by endosperm, the cells of which are parenchymatous, usually 8-10 layered thick and light yellow in colour.

The embryo which is thin-walled, more or less isodiametric and fully packed with reserve food material is embedded in the endosperm, and measure 17.20-43.00-51.60 $\mu$  in diameter.

**POWDER**-Light brown shows fragments of testa, polygonal, thin-walled, perisperm cells, globules rarely cluster of calcium oxalate crystals, round to oval, simple, starch grains measuring 2-5 $\mu$  in diameter.

**PART(S) USED** - Dried ripe fruits and seeds. (Anonymous, 1987)

**COLLECTION**- The method of harvesting and curing (heaping) the cobs before stripping in the traditional method are by employing locally made wood fired curing house for drying. However, there are some enhanced methods suggested to maintain the quality of produce (Rao, et al., 1993b)(Rout, et al., 2003). The freshly harvested capsules are deep red in colour but after drying by traditional smoking method the fruits acquired a dark brown colour. The mature fruits are plucked from the plants once per month. The yield continues to increase for the period of 6-10 years, thereafter remaining steady.

**PRESERVATION AND STORAGE**- According to Sulochanamma et al Capsules which were packed in unlined high density polyethylene (HDPE) woven sack material, polypropylene (PP) and ethylene terephthalate/polyethyene (PET/ PE) and stored under

humid condition, registered high moisture pick up. Loss in volatile oil was appreciable under dry condition in unlined woven sack. Under normal storage condition, capsules packed in PP and PET/PE registered marginal change in moisture and volatile oil contents. Also retention of major flavour component 1, 8 cineol, which

contributes to 84.3% of volatile oil, was in the range of 93.9-97.4%. Seeds packed in PET, glass and HDPE jars and foil laminate exhibited 15-30% loss in volatile oil over a period of 240 days under normal storage condition and moisture content was within the maximum permissible limit. (Sulochamma, *et al.*, 2008).

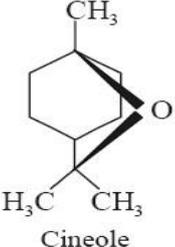
### DISEASES

<b>Fungal</b>	Flower rots (Fusarium and Rhizoctonia sp.) Leaf streak (Pestalotiopsis royenae) wilt (Fusarium oxysporum) ( <i>Sanghamitra, 2008</i> )
<b>Viral</b>	Chirkey and Foorkey
<b>Chirkey- character</b>	Mosaic appearance and pale streak on leaves (2008). Streaks turn the plant to pale brown and then plant will dry and wither leading to extensive reduction in flowering of plant
<b>Transmission of disease</b>	By mechanical sap inoculation and by aphid, Rhopalosiphum maidis Fitch ( <i>Sanghamitra, 2008</i> )
<b>Foorkey- character</b>	Excessive sprouting and formation of bushy dwarf clumps at the base of mother plants, which gradually leads to death. Numerous small tillers also appear at the base of affected plants, which becomes stunted and failure to give any production. The spikes/inflorescence is transformed into leafy vegetative parts and fruit formation is suppressed.
<b>Transmission of disease</b>	Through infected rhizomes and further spread within a plantation by aphids ( <i>Vijayan, et al., 2014</i> )
<b>Transmitting vector</b>	Aphid, Micromyzus kalimpongensis ( <i>Joshi, et al., 2016</i> )
<b>Causative agent</b>	Nano virus

### QUALITY CONTROL ANALYSIS

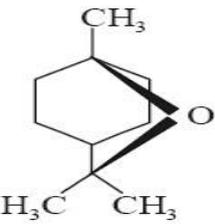
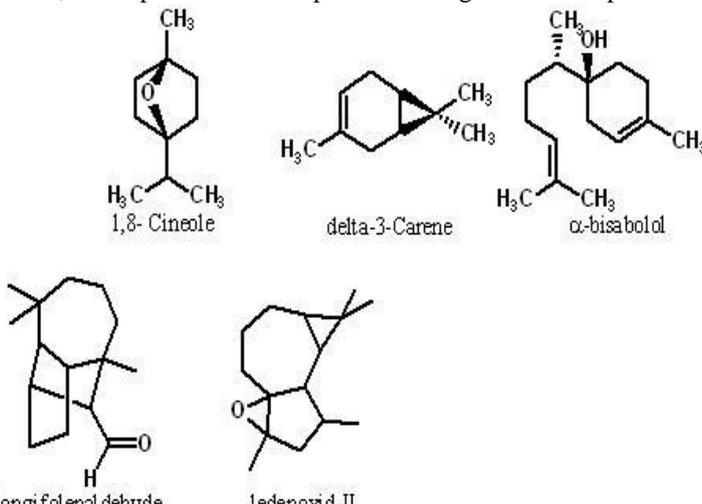
<b>Foreign matter</b>	≤ 1%, Appendix 2.2.2 (Anonymous, 2007)
<b>Total ash</b>	≤ 4%, Appendix 2.2.3 (Anonymous, 2007)
<b>Acid insoluble ash</b>	≤ 1.5%, Appendix 2.2.4 (Anonymous, 2007)
<b>Alcohol soluble extractive</b>	≥ 5%, Appendix 2.2.6 (Anonymous, 2007)
<b>Water soluble extractive</b>	≥ 14%, Appendix 2.2.7 (Anonymous, 2007)
<b>Volatile ether extract</b>	3.0%
<b>Non-volatile Ether extract</b>	2.31%
<b>Volatile oil</b>	≥ 1% v/w, Appendix 2.2.10 (Anonymous, 2007)
<b>Alkalinity of water soluble ash</b>	0.90%
<b>Water soluble ash value</b>	2.15%
<b>Acid insoluble ash value</b>	0.42%

### QUALITATIVE ANALYSIS: (Anonymous, 1987).

<b>Alkaloids:</b>	<b>positive</b>
<b>Steroids :</b>	<b>negative</b>
<b>Triterpenoids :</b>	<b>negative</b>
<b>Tannins:</b>	<b>negative</b>
<b>OTHER PROPERTIES:</b>	
<b>Flavour</b>	Due to aromatic Compounds
<b>Pungency</b>	Cineole  Cineole
<b>Pleasant aroma</b>	Terpinyl acetate (Karisappa, 1987)
<b>Very harsh aroma</b>	High cineole and low terpenyl acetate.
<b>Fruit</b>	Seeds -70% Skin -30% (J.S, 1993)

### CHEMICAL CONSTITUENTS

The chemical composition varies with region, variety, and age of the product.

<b>Major Constituent</b>	<p>1,8-cineole around (65–80%)(Bhandari, et al., 2013)</p>  <p style="text-align: center;">Cineole</p>
<b>Minor Constituent</b>	<p>Terpenyl acetate (traces to five per cent), Monoterpene hydrocarbon (5-17%) of which limonene, sabinene, the terpinenes and the pinenes are significant components.</p>  <p style="text-align: center;"> <span>1,8- Cineole</span>      <span>delta-3-Carene</span>      <span>α-bisabolol</span>  <span>longifolinaldehyde</span>      <span>ledenoxid-II</span> </p>
<b>Terpineols</b>	5-7% of the oil
<b>Starch</b>	43.21%
<b>Crude fiber</b>	22.0%
<b>Protein</b>	6.0%
<b>Fruit</b>	<p>Fruit contains 1.95 to 3.23% of essential oil. The major constituent of essential oil is 1,8-cineole (65–80%). Of which monoterpene hydrocarbon content is in the range of 5–17% having limonene, sabinene, and the pinenes in large quantity. Total terpineols comprises approximately 5% of the oil. According to chempakam et al presence of pleasant cardamom like aroma is basically due to Terpenyl acetate and color of <i>Amomum subulatum</i> is due to presence of two pinkish-red pigments namely the cyaniding-3-glucoside and cyaniding-3,5-diglucoside.</p>
<b>Seeds (1-2.5% spice)</b>	<p>Essential oil (Rao, et al., 1993)(Nigam, et al., 1960) extracted by liquid carbon dioxide and the oil thus obtained compared with the steam distilled oil. Steam distillation of crushed seeds is done to obtain essential oils and it yield 2.5% dark brown coloured liquid with cineole-like aroma, with the following physical constants: specific gravity at 29°C, 0.9142, refractive index at 29 °C, 1.460, optical rotation in chloroform is 18°. Quantitative chromatographic analysis of the composition of distilled essential oil was reported previously (Nigam, et al., 1960)(Lawrence, 1970). Highest volatile oil content was obtained as 3.32% in variety Golsey Dwarf, whereas the lowest was 1.95% in variety White Ramna (PN, et al., 1986) Cardamonin (2',4'-dihydroxy-6'-methoxychalcone) and alpinetin (7-hydroxy-5-methoxyflavanone) and glycosides viz., petunidin 3,5-diglucoside, leucocyanidin-3-O-β-D-glucopyranoside and a new aurone glycoside subulin whose structure was established as 6,3',4',5'-tetrahydroxy-4-methoxyaurone-6-O-α-L-rhamnopyranosyl (1 4) – β – D – glucopyranoside (Bhist, et al., 2011; Lakshmi V, 1976) (Rao, et al., 1993b) Protocatechualdehyde, 1,7-bis (3,4-dihydroxyphenyl) hepta-4E,6E-dien-3-one, protocatechuic acid, and 2,3,7-trihydroxy-5-(3,4-dihydroxy-E-styryl)-6,7,8,9-tetrahydro-5H benzocycloheptene, are isolated from greater cardamomum. (Kikuzaki H, 2001).</p>

Spices Board, India in conjunction with CFTRI, Mysore prepared a draft International Standards Organisation (ISO) proposal on greater cardamom and submitted it to the Bureau of Indian Standards (BIS). The draft proposal for BIS adoption reads as follows:

## CAPSULES

<b>Superfluous matter</b>	Not more than 5% by weight
<b>Insect scratched capsules</b>	Not more than 5% by weight
<b>Moisture</b>	Not more than 14% by weight
<b>Volatile oil (%) ml/100 g</b>	Volatile oil (%) ml/100 g
<b>Colour</b>	Should be natural and capsules free from artificial colours

## SEEDS

<b>Moisture</b>	Not more than 13% by weight
<b>Volatile oil</b>	Not less than 2% by weight
<b>Total ash</b>	Not more than 5% by weight
<b>Acid insoluble ash</b>	Not more than 2% by weight
<b>Extraneous matter</b>	Not more than 2% by weight
<b>Insect damaged seeds</b>	Not more than 2% by weight
<b>Colour and flavor</b>	Should be natural and characteristic
<b>Others</b>	Should be free from moulds and insects

## PHARMACOLOGICAL ACTIVITIES

<b>Anti-inflammatory</b>	Ethanollic and aqueous extract of fruit at dose of 100 mg/ml and 200 mg/ml exhibited anti-inflammatory activity against carrageenan induced paw edema in rat(Alam, et al., 2011)
<b>Analgesic activity</b>	Methanolic extract at dose 100 and 300 mg/kg and ethyl extract at dose of 200 and 400 mg/kg of seeds showed significant ( $p < 0.001$ ) analgesic effect (Shukla, et al., 2010)
<b>Antimicrobial activity</b>	<i>In vitro</i> antimicrobial activity of acetone, ethanol and methanol extracts of <i>A. subulatum</i> and <i>Elettaria cardamomum</i> fruit was evaluated against <i>Lactobacillus acidophilus</i> , <i>Streptococcus mutans</i> , <i>Staphylococcus aureus</i> <i>Saccharomyces cerevisiae</i> . and <i>Candida albicans</i> Secondary metabolites such as tannins, alkaloids and flavonoids were reported in <i>A. subulatum</i> and showed antimicrobial activities. Petroleum ether extract of <i>A. Subulatum</i> exhibited antimicrobial activity against <i>Staphylococcus aureus</i> , <i>Escherichia coli</i> and <i>Pseudomonas aeruginosa</i> (Kumar, et al., 2010). Significant inhibitory effect against various keratinophilic and dermatophytic fungi was also reported in the essential oil from seeds. (Jain PC, 1976) <i>In vitro</i> antimicrobial activity of fruit extracts were investigated against <i>Streptococcus mutans</i> , <i>Staphylococcus aureus</i> , <i>Lactobacillus acidophilus</i> , <i>Candida albicans</i> and <i>Saccharomyces cerevisiae</i> (Aneja, et al., 2009). Methanol extract of rind of <i>A. subulatum</i> exhibited amazing antimicrobial activity against <i>E. coli</i> . as compared with ciprofloxacin, it was found comparable in strength against <i>S. aureus</i> . Methanolic extract of fruits of <i>A. subulatum</i> was found to be efficient against <i>S. aureus</i> . It was found equal to standard drug against <i>B. pumilus</i> and <i>P. aeruginosa</i> . Essential oil isolated from whole fruits showed good results against <i>B. pumilus</i> . It was found equal to the standard used against <i>S. epidermidis</i> , <i>P. aeruginosa</i> and <i>S. cerevisiae</i> . It was also found that methanol extracts of fruit and rind as well as essential oil all possesses antifungal activity but less than standard drug used. It can be seen from the results obtained for MIC that rind extract of <i>A. subulatum</i> is having lesser values as compared to fruit extract of <i>A. subulatum</i> in majority of microorganisms. Methanol extract of rind was showing remarkably lower MIC in case of <i>S. aureus</i> (10 µg/disc)(Agnihotri, et al., 2010 Sep-Oct)
<b>Antioxidant activity</b>	The phytoconstituents of seed such as 1,8-Cineole, alpha-terpineol, protocatechualdehyde and protocatechuic acid exhibited antioxidant activity and have potential health benefits by inhibiting lipid peroxidation (Kikuzaki, et al., 2001)(Ritender, et al., 2014)(Jessie SW, 2005). The seeds have antioxidant activity; they activate hepatic and cardiac antioxidant enzymes. (Verma et al., 2010)
<b>Cardio-adaptogen activity</b>	<i>A. subulatum</i> is used in treatment for patients with Ischemic Heart Disease (IHD), facing regular stressful conditions on regular consumption (Verma et al., 2010)
<b>Antiulcer activity</b>	Antiulcer activity was reported in the Crude methanolic extract of the fruits(Jafri, et al., 2001)Methanolic fraction, petroleum ether soluble fraction and ethyl acetate soluble fraction, in ethanol induced ulcer gives significant ulcer protection(Sen, et al., 2009) Its Essential oil inhibited ulcer development by 60.91% ( $p < 0.001$ ), notably in ethanol and aspirin induced gastric ulcer (Jafri, et al., 2001). In rats liver damage is induced by ethanol and hepatoprotective activity was observed by the methanolic extract of <i>A. Subulatum</i> seeds, as evidenced by the functional, physical, biochemical and histological parameters(Parmar, et al., 2009)
<b>Hypolipidemic activity</b>	Due to the presence of polyphenol content <i>A. subulatum</i> has significant power to suppress lipid peroxidation. Lipid peroxidation in rat liver homogenate was also inhibited by Antioxidant

	enzyme activities, lipid conjugated dienes and hydroperoxides due to presence of polyphenol which is having strong reducing power and superoxide radical scavenging activity (Hafidh, et al., 2009)(Sharma, et al., 2000)
<b>Anti-Diabetic Activity</b>	<i>A. subulatum</i> decreases the insulin resistance induced by the fructose feeding.(Vavaiya, et al., 2012)
<b>Hepatoprotection</b>	Methanolic extract of <i>A. subulatum</i> (MEAS) has hepato protective activity and the mechanisms underlying its protective effects may be related to mitochondrial protection and especially the regulation of VDAC expression, also indicate that the mechanisms underlying its protective effects may be related to mitochondrial protection and especially the regulation of voltage-dependent anion channel (VDAC) expression.(Gandhi, et al., 2011)
<b>USES IN UNANI SYSTEM OF MEDICINE</b>	
<b>Muharrrik (stimulant activity)</b>	(Anonymous, 1987)
<b>Mulayyin (laxative)</b>	(Anonymous, 1987)
<b>Moattar (aromatic)</b>	(Anonymous, 1987)
<b>Muqawwi-e Meda (stomachic)</b>	(Anonymous, 1987), (Ali, 2005)(Zakariya razi, 1991), (Safiuddin, 1979)
<b>Mufarrrah(Exhilarant)</b>	(Takmeed, et al., 1987), (Safiuddin, 1979)
<b>Hazim (Digestive)</b>	(Takmeed, et al., 1987), (Safiuddin, 1979)
<b>Muqavvi-asnan lissa(Gum protective)</b>	(Hakeem, 1999), (Safiuddin, 1979)
<b>Muwavvi qalab(Cardiotonic)</b>	
<b>Kasir-riyah (carminative)</b>	(Takmeed, et al., 1987), (Safiuddin, 1979)
<b>Imtnay-qay-wa-gisyan(Anti-emetic)</b>	(Takmeed, et al., 1987), (Safiuddin, 1979)
<b>Mujaffif –e-rutubat(Decassant)</b>	(Takmeed, et al., 1987)
<b>Sudaa (Headach)</b>	(Zakariya razi, 1991),
<b>Habis(Astringent)</b>	(Takmeed, et al., 1987)
<b>Aujay jigar(Hepatic pain)</b>	(Zakariya razi, 1991)
<b>Muqavvi jigar (Hepatoprotective)</b>	(Takmeed, et al., 1987) (Kumar, et al., 2013)
<b>Mushtaahi(Appetizer)</b>	
<b>Sudda jigar(Antithrombotic)</b>	(Takmeed, et al., 1987)
<b>Mufattit hisaat (Lithotrophic)</b>	(Takmeed, et al., 1987)
<b>Muteeb dahan(Mouth freashner)</b>	(Safiuddin, 1979)
<b>Mulattif (Diluent)</b>	(Takmeed, et al., 1987)

### THERAPEUTIC USES

It is used to treat Dyspnoea, thirst, nausea, itching, inflammation of the eyelids. According to (Nigam et al., 1960)(Aneja et al., 2009) these are also used for Throat troubles, dental caries, Cough, Congestion of the lungs, Pulmonary tuberculosis, Vomiting, biliousness, Abdominal pains. According to Unani literature, useful for zof-e-meda (Anonymous, 2007), zof-e-hazam(indigestion), nafakh –e-shikam(flatulence) (Anonymous, 2007), Bu-e-deedan (Anonymous, 2007), Rectal diseases(Anonymous, 1999).

<b>Seeds</b>	Tonic to heart and liver, Astringent to bowels, Hypnotic, Appetizer and cause Belching, Stomachic in action.
	Stimulant (muharririk), laxative (mulayyan), Aromatic (moattar), Carminative (kasir riyah), Gastroprotective (Muqawwi-e-meda) and Cardioprotective (muqavi-qalb).

	Decoction used as gargle in afflictions of the teeth and gums.
	With melon seeds, recommended as diuretic for gravel of the kidney.
	Antidote for snake and scorpion venom.
	Outside covering is good for headache and for the teeth, heals stomatitis.
<b>Fruit</b>	Indigestion, Vomiting, Bilioussness, Acne, Gout, Spasms and Cardiac Arthymia. (Rahmatullah, et al., 2009)
	Insecticide
<b>Culinary uses</b>	
<b>Pods</b>	As pulses (whole or split), spice and condiment.
	Indian sweet dishes and drinks like punches and milled Wines
	Pickled herring and flavors custard
	Chewed customarily (like nuts)
	Indian masticory, with betel pan.
	For baking in Scandinavia and in Danish pastries
	Cardamom coffee used as a symbol of hospitality and reputation in All over the the Arab world
	Moghul cuisine (Northern India), Biriyanis
	Adds Flavour to coffee cake, Rice Puddings, Porridges.
	Give Flavour to Tea, drunk with Milk (www.nutrition-and-you.com)
Enhance Micro-propagation from Rhizome Buds.(Sajina, et al., 1997)	

**UNANI FORMULATIONS AVAILABLE:**  
(Anonymous, 2002), (Anonymous, 2007), (Anonymous, 1987).

Anushdaroo-E-Sada  
Arq Elaichi  
Arq Gazar Ambary  
Dawa Ul Misk  
Dawa-E-Mazmaza  
Jawarish Anarain  
Jawarish Bisbasa  
Jawarish Safarjali Mushil  
Jawarish Tamarhindi  
Jawarish Ood Sheerin  
Majoon Azraqi  
Majoon Qurtum  
Majoon Seer Alvi Khan  
Majoon Zanjabeel  
Safoof Chutki Atfal Qabiz  
Safoof-E-Kath  
Sharbat-E-Nankhwah  
Zaroor Katha

### CONCLUSION

Large cardamom is very popular since prehistoric time. It is more valued due to its acceptable taste, flavor and aroma. It has been reported to possess valuable therapeutic properties. Fruits of *Amomum subulatum* are prescribed mainly to treat indigestion, vomiting, biliousness, acne, gout, spasm and cardiac arthymia. Besides, it has been used as an insecticide. Still very limited research has been carried out on clinical studies of active compounds of large cardamom. Hence, this is challenging area for the scientists to explore its medicinal value. As this crop does not require much input, and has value for its medicinal as well as spices point of view, further investigations are required to isolate and characterize the specific active components of large cardamom. Additionally to validate the properties which are already mentioned in ancient literature. Recommendations is on intense and thorough research on

large cardamom in upcoming days to identify the impending medicinal values.

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