Plant profile: *Allium sativum* Linn (Garlic)

4.1. Plant information:

**A. Title plant: Allium sativum** Linn

![Garlic Plant](image1)

**Figure 4.1 A-C: Garlic Plant**

![Garlic Flowers](image2)

**Figure 4.2 A&B: Garlic Flowers**

![Garlic Bulb](image3)

**Figure 4.3: Garlic Bulb**
B. Classification (Hahn, 1996a).

Kingdom : Plantae
Division : Angiosperms
Class : Monocotyledoneae
Order : Asparagales
Family : Alliaceae or Liliaceae or Amaryllidaceae
Genus : *Allium*
Species : *sativum* Linn

C. Vernacular names: (The Ayurvedic pharmacopoeia of India, 2007)

<table>
<thead>
<tr>
<th>Language</th>
<th>English</th>
<th>Hindi</th>
<th>Sanskrit</th>
<th>Kannada</th>
<th>Gujrati</th>
<th>Tamil</th>
<th>Bengali</th>
<th>Telugu</th>
<th>Unani</th>
<th>Marthi</th>
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<tbody>
<tr>
<td></td>
<td>Garlic</td>
<td>Lasan</td>
<td>Lasuna, rasonam</td>
<td>Bellulli</td>
<td>Lasan</td>
<td>Vallai-pundu</td>
<td>Lashar</td>
<td>Velluli, tella-gadda</td>
<td>Seer</td>
<td>Lasun</td>
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D. Parts used: Bulb

E. Habitat:

The *Alliaceae* family has 600 species in 30 genera and the family is taxonomically intermediate between the *Liliaceae* and the *Amaryllidaceae*. *Alliaceae* is a widely distributed family and the major places of distribution for the whole family are Mediterranean Europe, Asia, North and South America and Southern Africa. The strong onion or garlic smells were found in species. Garlic is a hardy perennial, native to Central Asia and cultivated worldwide, garlic requires a fertile soil and a warm, sunny climate. The culture is annual or biannual. It is grown by dividing the bulb and is harvested late in the following summer. It is usually grown at high attitudes (Williamson, 2002).

F. Botanical Description: (The Ayurvedic pharmacopoeia of India, 2007; WHO, 1999)
Macroscopic characteristics:

Garlic is a bulbous variety of plant, 30-60 cm tall, strong smelling especially when crushed. The underground portion consists of a compound bulb rise above ground to a number of narrow, keeled, grass like leaves. The inflorescence is umbellate, small bulbils are produced in the inflorescences. The flowers are variable in number and sometimes absent, seldom open and may wither in the bud. Seeds are rarely produced. It occurs as entire bulb or isolated cloves (bulblets), bulb sub-globular, 4-6 cm in diameter, consisting of 8-20 cloves, surrounded by 3-5 whitish papery membranous scales attached to a short, disc-like woody stem having numerous, wiry rootlets on the under side. Each clove is irregularly ovoid, tapering at upper end with dorsal convex surface, 2-3 cm long, 0.5 - 0.8 cm wide, each surrounded by two very thin papery whitish and brittle scales having 2-3 yellowish green folded leaves contained within two white fleshy and modified leaf bases or scales. The odour is peculiarly pungent and disagreeable, acrid in taste and gives warmth to the tongue.

Microscopic characteristics:

The bulbs show a number of concentric bulblets, each is 5–10 mm in diameter and consists of an outer scale, an epidermis enclosing a mesophyll free from chlorophyll, a ground tissue and a layer of lower epidermal cells. Dry scales consist of 2 or 3 layers of rectangular cells having end walls with a broadly angular slant. These cells contain many rhomboid crystals of calcium oxalate. The upper epidermal cells next to the dry scale layer consist of a single layer of rectangular to cubical cells next to which are several layers of large parenchymatous cells. Among these cells are interspaced many vascular bundles, each of which consists of xylem and phloem arranged alternatively. Lower epidermis consists of cubical cells which are much smaller than the upper epidermal cells. The same arrangement of tissues is met within different bulblets, 2 or 3 of which are arranged concentrically.

4.2. Historical perspective of garlic

The potential benefit of garlic has origins in antiquity and employed for treatment of disease and maintenance of health. It was in use at the beginning of recorded history and first mention of garlic appears in Sumerian recipe written about 3000 B.C. From miracle drug to vampire repellent to offering for the gods, this unassuming plant has had an undeniably important place in many aspects of human history. Garlic was
found in Egyptian pyramids and in ancient Greek temples. There are Biblical references regarding the use of garlic by Israelites in Egypt. Garlic was an important medicine to the ancient Egyptians listed in the medical text *Codex Ebers* (1550 B.C), especially for the working class involved in heavy labor and also reports several remedies for a variety of diseases. During the earliest Olympics in Greece, garlic was fed to the athletes for increasing stamina, perhaps one of the earliest “performance enhancing” agents (Rivlin, 2001).

Hippocrates, the revered Greek physician, prescribed garlic for a variety of conditions. The most famous Roman physician Galen described garlic as ‘Theriaca rusticoriam’ translated as ‘poor man’s treacle’. Garlic is also known as ‘bulb of the tree of life’ or ‘camphor of the poor man’ or ‘stinking rose’. It is the finest antidote against many poisoning conditions (Binding, 1981). Natural remedies have natural smells and garlic has strong pungent odour. It is reported by Sir John Harington, writing in ‘The Englishman’s Doctor’, in the year 1609, had this to say about garlic:

‘Garlic then have power to save from death.

Bear with it though it maketh unsavory breath,

and scorn nor garlic like some that think, it

Only maketh men wink and drink and stink.’ - Sir John Harington

In ancient India, there are records in the Sanskrit language documenting the use of garlic remedies about 5000 years ago. Ancient medical traditions in India i.e., Tibbi, Unani and Ayurveda, made extensive use of garlic as a central part of the healing efficacy of plants. The leading Indian ancient medical text, *Charaka-Samhitita* recommends garlic for the treatment of heart disease and arthritis for over many centuries. In another ancient Indian medical textbook, *Bower Manuscript* (~300 AD), garlic was used for fatigue, parasitic disease, digestive disorder and leprosy. Scientific research started in the second half of the 19th century with the work of Louis Pasteur in 1858, who first noted antibacterial properties of garlic. Later on, in 1932 Albert Schweitzer treated amoebic dysentery with garlic. Garlic has also captured a secure position in modern medical science, especially in the years following World War II (Hahn, 1996b; Rivlin, 2001).

In recent years, garlic has highly valued because of its excellent effectiveness in atherosclerosis, its ability to lower elevated serum cholesterol and triglycerides levels,
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hypotensive effects, anticarcinogenic effects, and glucose lowering effect in moderate diabetic condition. Garlic also inhibits thrombocyte aggregation and activates fibrinolysis. More recently, the research interest is focused on antioxidant and anticancer activities of garlic. In fact, oxidative damage has been recognized to play a role in aging and in chronic diseases, including cardiovascular, neurodegenerative, inflammatory diseases and cancer.

In modern medicine, researchers are trying to validate many of these properties of garlic, especially in terms of the identity of the active components, their mechanisms of action and exploring the potential benefits as food supplement in disease prevention and treatment (Banerjee & Maulik, 2002).

4.3. Traditional uses of Garlic:

Garlic has been passed down the generation and used as a traditional medicine in various cultures throughout the world, which holds strong impact on the treatment of many disease conditions. Garlic has been indicated in treatment of various diseases in different parts of the world. The indications as follows:

4.3.1. Internal uses: (Ross, 2003)

Nervous system: Brain tonic, facial paralysis, epilepsy, weak memory, diminished vision, sedative and sciatica.

Digestive system: Dysentery, diarrhoea, flatulence, indigestion, low appetite, colic pain, spasmodylic, constipation, worm infestation, piles, hepatitis and liver diseases.

Circulatory system: Hypertension, arteriosclerosis, odema due to circulatory disorders, and diuretic.

Respiratory system: Chronic cough, expectorant, asthma, whooping cough, tuberculosis, bronchitis, allergies, lung diseases, sinusitis, tuberculosis, hoarsness of voice and pneumonia.


Endocrine disorders: Diabetes

Skeletal system: arthritis and rheumatism.

Reproductive system: Regulation of menstrual function, dysmenorrhoea, amenorrhoea, production of semen, leucorrhoea, vaginitis, to speed labor and aphrodisiac.
Skin: Pruritis, acne, emphysema and psoriasis.

Miscellaneous: pyrexia, analgesic, diaphoretic, enteric fever, infectious diseases, fungal infections, remedy for plague and in many contagious diseases, dentistry, as blood purifier, inflammation, anthelmintic, rabies, antidote for snake bite, mushroom and *aconitum* poisoning, in food poisoning and prevention of malaria.

4.3.2. External uses:

Inflammation, pain killer, infection of wounds and boils, tooth ache, leprosy and to treat insect bites, as poultice on inflamed joints, hair growth, antiseptic and disinfectant.

4.3.3. Applications / Uses in Ayurveda:

The mythological stories about the origin of lasuna are described differently in different ayurvedic texts like *Kasyapa samhita, Gada nighraha, Astanga hrdaya* and *Harita samhita*. It is used not only in the rejuvenation of the body but its therapeutic excellence is compared to ambrosia in ayurveda. The legendary Indian physicians Charaka, Susruta and Vagbhata called garlic as mahushuea, as a tonic and as a remedy for skin diseases, loss of appetite, dyspepsia, cough, anorexia, rheumatic conditions, abdominal diseases, spleen enlargement and hemorrhoids - almost a panacea. It is indicated in varying therapeutic purposes and to name a few viz, heart disease, diabetes, infections, leprosy, diseases of nervous system, fracture of bones, malaria, tuberculosis, cataract, kidney stone, gout, epilepsy, jaundice, leucoderma, piles, bronchial asthma, chronic fever, phantom tumour, oedema, night blindness, tymphanitis etc (Dash, 1989).

Garlic is one among the potent drugs chosen for *kalpa* therapy (*Rasona Kalpa*) and is used for the promotion of positive health and prevention of diseases including aging process in healthy individuals. Kasyapa-samhita refers garlic in many conditions, it cures common diseases, increases longevity, appetizer, aphrodisiac, clarifier of memory, improves intellect, strength, complexion and eye sight, in ageing, cleanser of the channels, allows disease free state, producer of sperm, spermatric fluid, ovum and ovarian hormones. It is indicated in fracture, diseases of bones and in persons suffering from all diseases of vata. This is also administered for curing some of the obstinate and otherwise incurable diseases. Garlic should be mixed with other ingredients like oil, ghee, milk, sugar, curd, triphala, kutaja and aswagandha in
different aliments. Many important preparations of garlic in ayurveda are available based on the individual’s condition and prepared using various vehicle viz, ghee, wine, milk, curd, buttermilk, vinegar, lemon juice, alcohol and garlic preparations like, oil preparations of garlic, juice, powder, paste, decoction, ointment, collyrium, linctus and tablet. It is also given in combination of various drugs in different diseases (Dash, 1989; Tiwari, 2002).

4.3.4. Traditional uses of garlic in diabetes:

In Norway and middle Europe, garlic has been used as a folk medicine to ameliorate the diabetic condition and to reduce insulin requirements (Mathew & Augusti, 1973). In Persian folklore medicine, garlic is used in diabetes and its positive effect on pancreatic tissue (Jelodar et al., 2005). In England, Yugoslavia and Saudi Arabia, hot water extract of dried/fresh bulb is taken orally for diabetes (Ross, 2003). India has a rich history of using herbs in treating diabetes and use of garlic for in the management of diabetes is still prevalent in society (Mukherjee et al., 2006; Modak et al., 2007).