E-CONTENT

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Topic: Cultivation, Production & Uses of *SPICES* – Garlic, Asafoetida, Star Anise & Chharila.

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GARLIC / Lahsun; *Allium sativum*; Family: Liliaceae

Edible part: Bulb (Cloves)

Garlic is a species in the Onion genus *Allium*. It is native to Central Asia and North-eastern Iran, and has long been a staple in the cuisines of many cultures. It is well known for its unique flavour and numerous health benefits.Garlic is easy to grow and requires minimal care, making it a popular crop for home gardeners.

China, Korea, India, USA, Spain, Argentina and Egypt are the major garlic growing countries. In India it is commonly cultivated in Gujarat, Orissa, Maharashtra, Uttar Pradesh, Madhya Pradesh and Rajasthan. Gujarat is the top producing state. It is a low maintenance crop.

Garlic crop in the field

Harvested Garlic (Fresh)

Mature & DriedGarlic-Bulb & Cloves

IMPORTANT POINTS:

-The aroma in garlic is due Diallyl disulphide.
-China ranks first in production.
-Cultivated Indian varieties are short-day types.
-Egypt ranks first in productivity.
-India ranks third in production and second in the area in the world.
-An antibacterial substance Allicin present in garlic.

VARIETIES:

-Agrifound white (G-41) TSS-41,
-Agrifound parvati (G-313)
-Godavari,
-Yamuna Safed (G-1) TSS 38-40, suitable for North India
-Yamuna Safed-2 (G-50)

CLIMATE AND SOIL REQUIREMENTS:

Garlic is a hardy crop and is tolerant to frost. The climate requirement of garlic is similar to onion and in India, it is cultivated in winter season. It prefers a mild climate that is not so hot nor cool. Garlic requires a cool and moist climate at the time of plant growth and a dry climate at maturity. Indian varieties perform better in short-day conditions. It requires well-drained loamy soil with a pH between 6.0-6.5. The soil should be rich in organic matter and free from weeds.

CULTIVATION PRACTICES

The cultivation of garlic in India involves several steps, including land preparation, seed selection, planting, and harvesting. The crop is usually grown as a rabi crop (winter crop) and takes about 200-240 days to mature.

Land Preparation

The land is prepared by ploughing it two to three times to bring the soil to a fine tilth. This helps in proper seed germination and root development.

Seed Selection

The selection of good quality seeds is crucial for successful garlic cultivation. Farmers usually prefer to use certified seeds from reputed agencies to ensure good yield and disease resistance.

Planting

The seeds are planted in rows, keeping a distance of 15-20 cm between each row. The depth of planting varies between 2-3 cm, depending on the soil conditions. Irrigation is provided immediately after planting to ensure proper seed germination.

Irrigation and Fertilization

Garlic requires regular irrigation during its growth period. The frequency of irrigation depends on the soil type and climatic conditions. Fertilizers are applied based on the soil test report to ensure optimal nutrient availability for the crop.

Pests and Diseases Control

Common pests affecting garlic cultivation in India include thrips, nematodes, and leaf miners. Diseases such as white rot, basal rot, and downy mildew can also cause significant damage to the crop. Regular monitoring of the crop and timely application of appropriate pesticides and fungicides can help control these pests and diseases.

Harvesting and Post-Harvest Management

Garlic is ready for harvest when the lower leaves turn yellow and dry up. The bulbs are carefully dug out from the soil using a spade or a digging fork. After harvesting, the bulbs are sun-dried for 7-10 days before storage. Proper post-harvest management practices can help maintain the quality of garlic and prolong its shelf life.

USES:

Garlic is a versatile ingredient that is used in a wide variety of dishes around the world. All parts of the plant, inflorescence, leaves, and cloves have been used from earliest time as a condiment or spice for flavouring soup, sausages and salads.It is a key ingredient in many savoury dishes, such as soups, stews, and sauces. Garlic is also used in marinades, rubs, and dressings to add flavour to meats, vegetables, and salads. In addition to its use in cooking, garlic has also been used for medicinal purposes for thousands of years.

Garlic is rich in vitamins and minerals, including vitamin C, vitamin B6, Manganese, Selenium, and Iron. It also contains Sulphur compounds, such as **Allicin, Diallyl disulphide, S-allylcysteine, and Diallyl trisulfide**which are believed to be responsible for many of its health benefits.

In United States almost half of the produce is dehydrated for use in mayonnaise products, salad dressings and in several meat preparations.

Raw garlic is used in the preparation of garlic powder, garlic salt, garlic vinegar, garlic cheese croutons, garlicked potato chips, garlic bread, garlicked bacon etc. Spray dried garlic products, liquid garlic preparations are other products.

In India and other Asian and Middle East Countries, garlic is used in pickles, curry powders, curried vegetables, meat preparations etc.

When using garlic as a spice, it is important to consider the form in which it is being used. Fresh garlic cloves can be minced, crushed, or sliced to release their flavours, while garlic powder or granules are more concentrated and can be sprinkled directly onto dishes.

HEENG/ASAFOETIDA; *Ferulaasafoetida*: FAMILY: Apiaceae

Habitat : Native to the Middle East and Central Asia, primarily found in Iran and Afghanistan

Edible part : An oleogum-resin obtained by incision of root.

- ***F. narthex***-grow in Kashmir.
- ***F. jaeschkiana***- grow in Himanchal Pradesh

Asafoetida is obtained from the resin or gum extracted from the roots of the plant and possesses a potent and distinctive flavour that has found its way into countless culinary and medicinal applications.

In Indian cuisine, asafoetida is treasured for its ability to infuse dishes with a tantalizing taste, even when used in small quantities. It serves as a fantastic alternative to onions and garlic, making it an excellent choice for those with allergies to these ingredients.

Asafoetida, also known as **"Food of the God"**, or **"devil's dung"** or **"stinking gum."**

BOTANY:

A coarse umbelliferous plant with thick, large, fleshy roots (covered with bristly fibres) and a stout, branching stem that can reach up to 2 meters in height. The leaves are 3-4 pinnate, with oblong leaflets having a serrated margin with wide sheathing petioles. The flowers are small, pale greenish-yellow, and appear in large compound umbels. The fruit is a schizocarp, oval, flat, thin, foliaceous, reddish-brown with pronounced vittae, splitting into two mericarps when ripe.

Ferula asafoetida

Cultivation:

Asafoetida is primarily cultivated in Iran, Afghanistan, and India. The plant thrives in arid and semi-arid regions with well-drained soil. It takes about four to five years for the plant to mature and produce resin. The cultivation process begins with sowing the seeds in early spring. Asafoetida thrives in dry and cool climates. Asafoetida prefers arid and semi-arid regions with rocky or sandy soil. It grows best in full sun and requires well-drained soil. The plant is drought-tolerant and can survive in harsh conditions.

Once the seedlings emerge, they are thinned out to maintain a spacing of about 30 cm between plants. The plants are then allowed to grow undisturbed for four years until they reach maturity. At this point, the resin is harvested by making incisions on the stem of the plant and collecting the exuded sap.

Harvesting:

The first step in asafoetida extraction is harvesting the resin from the roots of the plant. The resin is collected by making small incisions in the bark of the plant's root and allowing the resin to ooze out.Themilky substance that hardens upon exposure to air. The resin is then collected and processed for use.

The plant is indigenous to Afghanistan and grows from 800 to 1000 meters above sea level. These high plains are arid in winter but are thickly covered in summer with a luxuriant growth of these plants. June is the month, the juice is collected from plants about four years old. The roots of plants which have not flowered are exposed and slashed, then shaded from the sun for five /six weeks and left for the gummy oleoresin to leak out and harden. It is then scraped off in reddish lumps and put into leather bags and sent to Herat, where it is adulterated before being place on the market.

A very fine variety of Asafetida is obtained from the leaf bud in the centre of the root, is used in India, where it is known in the markets as **KANDAHARRE HEENG.** It appears in reddish-yellow flakes and when squeezed gives out an oil.

The odour of Asafoetida is stronger and more tenacious than that of the Onion, the taste is bitter and acrid; the odour of the gum resin depends on the volatile oil. It is much used in India and Persia in spite of its offensive odour as a condiment (Substances which are added to dishes before/after cooking to enhance the taste of the food) and is thought to exercise a stimulant action on the brain. It is a local stimulant to the mucous membrane, especially to the alimentary tract, and therefore is a remedy of great value as a carminative in flatulent colic and useful addition to laxative medicine. There is evidence that the volatile oil is eliminated through lungs, therefore it is excellent for asthma bronchitis, whooping-cough etc.

Processing:

The collected resin is sun-dried and then processed into different forms such as lumps, granules, or powder. During processing, the resin is often mixed with rice flour or turmeric to prevent it from sticking together and to improve its flowability. The processed asafoetida has a strong odour and a bitter taste. It is important to note that the quality of

asafoetida varies depending on the region it comes from. Afghan asafoetida considered as the highest quality due to its milder flavour and aroma.

Drying:
After collection, the resin is left to dry in the sun. This process can take several days. Once dried, the resin is broken into small pieces for easier handling and transportation.

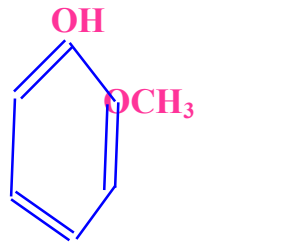
Cleaning:
The dried resin pieces are cleaned to remove any impurities or foreign materials. This is typically done by hand, with workers carefully inspecting each piece and removing any unwanted matter.

Purification:
The cleaned resin is then purified through a process known as "sublimation." This involves heating the resin until it turns into a vapour, which is then collected and allowed to cool and solidify. The resulting product is a pure, white or yellowish-white substance known as **"asafoetida tears."**

Grinding:
The purified asafoetida tears are then ground into a fine powder for use in cooking or medicinal applications. This powder can be further processed to create different grades of asafoetida, depending on its intended use.

Constituents

- Resin= 62%, } Also contains organic sulphur compounds.
- Gum= 25%, }
- Oil= 07%, The essential oil contains **Organic disulphide** and **Umbelliferon**
- Ferulic acid(which causes foul odour), Water, small quantities of various impurities.



FERULIC ACID

CATEGORIES OF ASAFOETIDA
Asafoetida can be broadly categorized into two distinct types:

- **Red Asafoetida/ Lal Heeng**
- White Asafoetida/ Safed Heeng

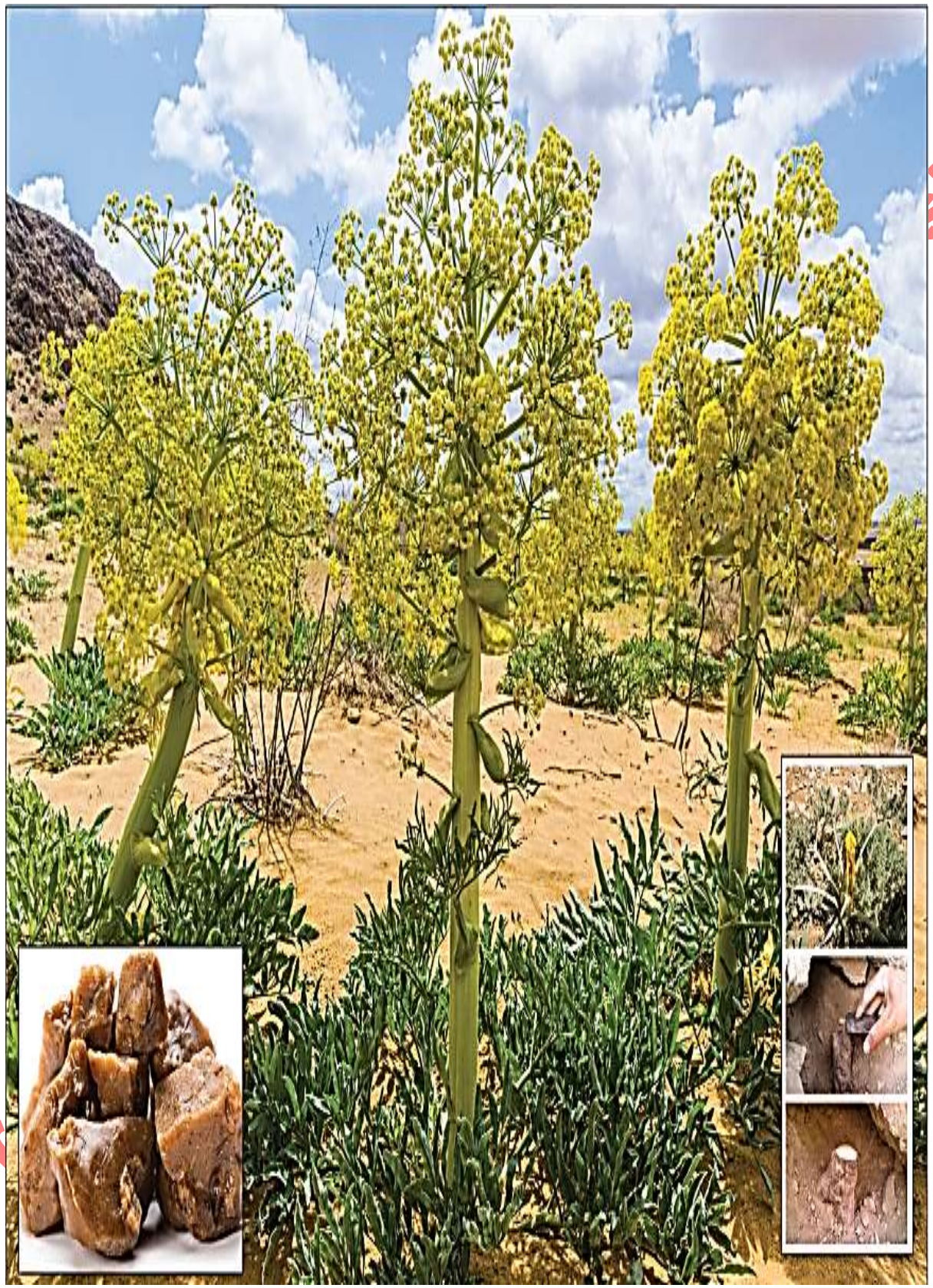
Uses of Asafoetida:

Asafoetida has a wide range of uses. In Food Industry, Asafoetida is primarily used as a flavouring agent in Indian cuisine, mostly as **condiment**. It is added to dishes like lentil soups, vegetable curries, and pickles to enhance their flavour. It is also used as a digestive aid and to reduce flatulence.

ASAFOETIDA'S ORIGIN-WISE PUNGENCY, SMELL & FLAVOR PROFILES

ORIGIN	CATEGORY	TRADE NAME	SMELL	TASTE & FLAVOR	PUNGENCY METER
Afghanistan	Red	Afghani Hadda	Strong	Savoury	High
Iran	Red	Irani Hadda	Pleasant	Earthy	High
Uzbekistan	Red	Peer	Intense	Savoury	High
Tajikistan	White	Tajaki	Intesne	Savoury	High
Iran	White	Hingra	Strong	Bitter	Medium
Uzbekistan	White	Kabuli white	Pleasant	Earthy	Medium
Afghanistan	White	Mazari	Pleasant	Sweet	Mild
Kazakhstan	Red	Kazaki Peer	Pleasant	Savoury	Mild

How to prepare Asafoetida Powder



Heeng in its original Habitat

STAR ANISE/Chakriphool/Anasphal-*Illicium verum* Hook.; Family:Schisandraceae

Native: South East China and Vietnam

Commercial part: Dried fruit

Star anise is a spice that is widely used in cooking and traditional medicine**. It has star shaped fruit.**China and Vietnam are the two major producers of Star anise, contributing to over 90% of the global production. Other countries, including India, Indonesia, and Japan, also produce star anise but in smaller quantities.

BOTANY:

Star anise is an evergreen tree attaining a height of 8-15 meters and a diameter of 25 cm. The leaves are entire, 10-15 cm long, 2.5 – 5 cm broad, elliptic, glossy, and dark green in colour.The flowers are solitary, fragrant, white to red in colour. Fruits are star-shaped, woody, reddish brown consisting of 6-8 carpels arranged in a whorl. Each carpel is 10 mm long, boat shaped, hard and wrinkled containing a seed. Seeds are brown, compressed, ovoid, smooth, shiny and brittle.

The essential oil of star anise is primarily composed of trans-anethole, which gives it its characteristic flavour and aroma.

Young Fruits

CULTIVATION:

The cultivation of star anise involves specific requirements to ensure optimal growth and yield. Star anise trees are evergreen and grow best in tropical and subtropical climates. They require well-drained soil with a pH level between 6.5 and 7.5 and partial shade. The trees need regular watering, especially during dry periods, to thrive.

The propagation of star anise is typically done through seeds or cuttings. Seeds are sown in nurseries and later transplanted to the field once they have developed into seedlings. The trees take about 6-8 years to reach maturity and start producing fruits.

In India, it is produced to a small extent in Arunachal Pradesh.

PROCESSING:

Spice is obtained from the star-shaped pericarp of the fruit.The star-shaped fruits of the star anise tree are harvested for their culinary and medicinal uses. The fruits are picked before they ripen fully to ensure the highest concentration of essential oils and flavour compounds. After harvesting, the fruits are dried either in the sun or through artificial drying methods.

Once dried, the star anise fruits are ready for processing. They can be used whole or ground into a powder for culinary purposes. The essential oil extracted from star anise is also highly valued for its aromatic properties and is used in perfumes, soaps, and other products.

USES OF STAR ANISE:

Star anise is a versatile spice that is commonly used in both sweet and savoury dishes of China, Vietnam, and India. It has a strong licorice-like flavour and aroma, making it a popular ingredient in many cuisines around the world. Star anise is widely used as a spice in various cuisines, especially in Asian and Middle Eastern cooking.Its distinct flavour makes it an essential ingredient in many dishes, including soups, stews, curries, and baked goods. It is also used as a flavouring agent in alcoholic beverages such as absinthe and pastis.

In Chinese cooking, star anise is a key component of five-spice powder, which is used to season meats and vegetables.

Apart from its culinary uses, star anise also has medicinal properties. It contains compounds that have antioxidant, anti-inflammatory, and antimicrobial effects.

Mature Fruits

Dried Fruits with Seeds

CHHARILA

(Kalpassi/ PathharKe Phool/Chirilla/Shillapuspa/Chhadila/Charela/Black Stone Flower/Stone Flower)

***Parmeliaperlata* (Huds.) Ach.;** Family: Parmeliaceae

This plant is a type of lichen and is found in the hilly areas of the Indian Subcontinent, particularly in the Himalayan region. It is especially seen in Himachal Pradesh, Punjab, Kerela, Bengal, and cultivated in Kashmir hills and Himalayas.

It is greenish black in colour and the lower surface of the plant is blackish brown and hairy. It is bitter in taste and considered easy to digest. These plants are highly nutritious and are thus used as fodder.

Chharila contains **Alkaloids, Proteins, Glucose, Phenols, Vitamins, Glycosides, Usnic acid, Lecaronic acid, Salazinic acid, Atronin and Terpenes** which are highly useful for treating

several health issues. It is an important constituent of many Ayurvedic compositions which play an important role in maintaining overall health and well-being.

Three *Permalia* speciesviz.

- ***P. perlata*** (L.) Ach.,
- ***P. perofrata***(Wulf.) Ach., and
- ***P. sancti-angelii*** Lynge are sold as Chharila in Indian market.

P. perlatais generally used as spice to enhance the taste and flavour of food.

Chharila thallus on tree bark

BOTANY:

This plant belongs to the lichen group. It typically grows on rocks, tree barks, or soil in high-altitude regions. The thallus is foliose, meaning it has a leafy or lobed structure. The colour of chharila can vary from grayish-green to brownish depending on environmental factors.

Thallus is flattened, adnate, 3-8 cm broad, foliose, greenish mineral grey (or yellowish-white on top and black on lower surface) in colour, having sublinear to irregular 2-4 mm wide lobes. The marginal cilia are distinct, 0.3-0.7 mm long. The upper surface of the thallus is plane and continuous, which is moderately to densely isidiate (having Isidia / Soralia). Each Isidia or Soralia (bud like vegetative structures present on upper surface of the thallus) is cylindrical, erect, simple to branched, up to 0.5 mm high. The lower surface of the thallus is moderately rhizinate. The rhizines are (rootless that attach the lichen to its substrate) are delicate, simple or in part sparsely furcated. Apothecia are adnate, 1-3 mm in diameter and amphithecia also isidiate.

USES:

Traditionally, it has been used for enhancing the taste of food due to its astringent, bitter taste. It is fascinating to know that it was initially used just like a normal spice. It was also used for treating sores, bronchitis, inflammations, scabies, blood disorders, dyspepsia, seminal weaknesses, renal pain, liver pain, womb pain and leprosy.

In Indian cuisine, chharila is used as a flavoring agent in various dishes, imparting a unique aroma and taste. It is often added to curries, dals (lentil dishes), chutneys, and pickles.

In Himalayan cuisine, Chharila is used as a spice to enhance the flavour of various dishes. It is often dried and powdered before being added to soups, stews, and meat preparations. The unique taste profile of Chharila adds depth and complexity to traditional recipes, making it a sought-after ingredient in local culinary practices.

Typically used in meat dishes like *NIHARI* (paaya), Bombay biryani, and goat meat stews.

Dried Chharila

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T H A N X