E-CONTENT

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Topic:Cultivation& Uses of *SPICES*-Nigella, Fenugreek &Tejpatta

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NIGELLA / BLACK CUMIN / BLACK SEED

NIGELLA SATIVA L.

Family: Ranunculaceae

Part used:Seeds

Origin and Distribution:

Black cumin has a long history in the world's crop cultivation. It was mentioned in the Holy Bible where the sowing and reaping of black cumin and fenugreek are contrasted to that of wheat. It is thought to have originated in the Mediterranean. Several scholars have expressed conflicting views on the origin of black cumin.

The date and place of domestication of the black cumin is not established, but the plant was more than 3000 years in wild culture, when it was installed in the tomb of King Egyptian Tutankhamum. Black cumin farming in olden history spanned at least North Africa, the Middle East, and South Asia, where the seed has been used in traditional system of medicine for centuries or more. Black seed has been used since ancient Egyptian civilizations. Black seed has made its way into Eastern Europe and North America in recent decades. Over the course of ages, the crop spread throughout Europe as a significant spice used in the making of bread and cakes. It shows its consumption widely in Europe, North Africa, Asia Minor, and the Mediterranean region whereas at a minor scale in Russia, Egypt, Turkey, and France.

Botany:

Nigella's original name originates from the Latin word "niger," which means "black," referring to the plant's seed color. English common names of *Nigella sativa* L. are; **Black cumin, Fennel flower,**

Nutmegflower, Black seed, Black caraway, Roman coriander, Damascena, Devil in-the-bush, and **Wild onion seed**.

Black cumin is an erect annual plant that grows up to 20 to 60 cm tall with a more or less branching system. The leaves are divided and the roots are straight taproot. The flower is hermaphrodite and solitary on the main axis.At the first bloom, the flower shows pale green coloration of petaloid sepals. After full blooming, the color is changed to pigeon blue. The flower is without involucres of bracts, and the peduncle is long and erect. Petaloid sepals are broad and ovate in a single whorl of 4 to 6. The stamen is in 3 to 4 whorls which are numerous, usually 32 to 66. The fruit is capsule (3-7 united follicles) contains numerous minute seeds. The seeds are triangular and have a rough surface. The seed is flat on one side and convex on the other, with tapered curved ends. The seeds are black on the outside and white on the interior, with mild odor and a bitter taste.

Flowering twig

Single flower with many stamens

Fruit

Seeds

***Nigella sativa* L. 1. Habit; 2. Flower (top view); 3, Fruit; 4. Dehiscing fruit; 5. Seed**

Cultivation:

Nigella is widely cultivated throughout South Europe, Syria, Egypt, Saudi Arabia, Iran, Pakistan, India and Turkey. In India it is cultivated commercially in Punjab, Jharkhand, H.P., Bihar and Assam. Small scale cultivation also taken at U.P., Rajasthan, M.P., Tamil Nadu and West Bengal states.

Climate:

Nigella is a cool season crop and is cultivated in the northern plains during winter season. Fairly warm weather during sowing with a temperature of 20-25^{0}C is desirable. Cold weather is congenial for the early growth period and crop requires warm sunny weather during seed formation and maturity.

Soil:

Nigella can thrive on wide range of soils, which are rich in organic matter and free from water logging. However, loamy, medium to heavy soils with better fertility level are most suitable. The land should get sufficient light free from shade. Soil pH range near about neutral reaction but can be grown well on soil having 5.0-8.5 pH.

Varieties:

- Ajmer Nigella-1 (AN-1), AN-20, Azad Kalonji, Pant Krishna, Kalajeera.

Plantingand Growing:

Nigella can be grown from seeds sown directly into the ground during spring or fall. The seeds should be planted about 1 cm deep and spaced 10-15 cm apart. Germination takes around 10-14 days, and the plants reach maturity in 90-120 days. It is essential to keep the soil weed-free to ensure proper growth.

Harvesting and Storage:

Harvesting of Nigella typically occurs when the seeds turn gray or black and begin to rattle inside their pods, which is usually around 30-35 days after flowering. After harvesting, the seeds should be dried in a cool, dry place before storing them in an airtight container to maintain their freshness and quality. Properly stored seeds can last for up to a year.

Uses of Nigella seeds:

Nigella seeds has been used for centuries for its culinary and medicinal properties. The seeds of the plant are rich in essential oils, vitamins and minerals, making them a valuable ingredient in traditional medicine and cooking.

- **CulinaryUses:** In culinary practices, Nigella seeds are used as a spiceto add flavor to dishes. The seeds have a slightly bitter taste with a hint of peppery flavor, making them a popular ingredient in Middle Eastern and Indian cuisines. They are often sprinkled on bread, pastries, salads, and curries to enhance the taste of dishes.

A popular spice of Bengal and East Uttar Pradesh called **Panchphoran**also include Nigella seeds along with **Fenugreek (Methi), Banarasi Rai (Mustard), Fennel (Saunf)** and **Cumin (Jeera) seeds.**

- **Medicinal Purposes:** Nigella seeds are known for their potential health benefits. They have been used in traditional medicine to treat various ailments such as respiratory conditions, inflammation, and skin disorders.
- **Cosmetic Applications:**The Nigella seed oil is used in cosmetic products for its moisturizing and nourishing properties. It is commonly found in skin care lotions.

FENUGREEK / METHI

***Trigonella foenum-greacum* L.; Family: Fabaceae,**

Origin: South East Europe/West Asia

Part used: Seeds

[Kasurimethi: *T. corniculata*, also called Champa methi]

Origin and Distribution:

Centre of origin of fenugreek is South-Europe, Mediterranean area and Western Asia. India is also to be a native of fenugreek and found growing wild in Kashmir, Punjab and upper Gangetic planes. The most common Indian name is ***Methi*** and there are many other popular regional names. The genus *Trigonella* consists of 50 species, most of which have an oriental origin in the Iranian Indian region. Of these, eleven species occur in India, out of which *Trigonella foenum-graecum* L. (Common name fenugreek) and *T. corniculata*L. (Kasuri type fenugreek) are cultivated in India.

Major fenugreek producing countries are India, Argentina, Egypt, France, Spain, Turkey, Morocco, China and Afghanistan. India is the largest producer in the World.

In India, Rajasthan, Gujarat, Uttaranchal, Uttar Pradesh, Madhya Pradesh, Maharashtra, Haryana and Punjab are the major fenugreek producing states. Rajasthan is the fenugreek bowl of the country, contributing about 80% to the country's production.

Botanical Description:

Fenugreek is an annual plant. It is regarded as the oldest known medicinal plant in recorded history. The plants are spreading and moderately branched and are weak. The flower is typically leguminous, which is small and borne on raceme. It is a typical self-pollinator in which fertilization occurs within the unopened floral buds (Cleistogamy). There are two species of the genus *Trigonella*, which are economically important. *Trigonella foenum-graecum* L. is the common Methi or Fenugreek and the other is *T. corniculata*, **Kasuri** / Champa methi / **Sickle-fruit fenugreek**. These two species differ in their growth habits and yield. Fenugreek is quick growing and produces erect shoots up to a height of one meter. It has light to dark green leaves with or without pink margin and produces 2-3 small white flowers at the axil of each leaf. The pods are slender and straw coloured when ripe, beak shaped and is about 8-10 cm long with 8-15 yellowish brown coloured and smooth surfaced seeds.

The Kasurimethi is initially slower growing and remain in a rosette condition during most of its vegetative growth period. It produces bright orange to yellow flowers. The sickle shaped pods is smaller than the common Methi.

Fenugreek is commercially important spice crop due to its multifarious uses and is extensively grown in almost every part of the country for seeds, tender shoots, and fresh leaves during winter season.

Cultural Requirements

Climate:

Fenugreek requires cool climate for its better growth. A cool growing season without extremes of temperature is favourable for best development. It is cultivated both in tropical as well as temperate region. In India, it is mainly grown as a Rabi season crop but in South India, it is also grown as rainy season crop. The crop can be grown in areas of low to moderate rainfall but cannot withstand heavy

rainfall. Continuous moist and cloudy weather invites insect — pests and a number of diseases. Dry weather during crop maturity is essential for harvesting better seed yield. Having wider adaptability, the crop can be grown successfully both in tropical and temperate regions up to an altitude of 2000 m above mean sea level.

Soil:

Fenugreek can be grown in almost all type of soils having good drainage but grow best on well drained loamy soils. Organic matter rich clay-loam soil may also be used if adequate drainage facilities are available. However, it can be grown on sandy or gravely soils with slightly compromising yield. For rainfed cultivation, black cotton soils are best suited for its successful cultivation. Although the crop is sensitive to salinity except very low yet it can tolerate the pH up to 8.5, but in neutral soils having a pH range from 6.0 to 7.0 it always gives higher yield with better quality of leaves.

Cropping System:

Fenugreek can be grown as mixed or intercrop. Being leguminous crops it fits well as component crop for most of inter cropping systems involving fennel, coriander, ajwain, dill and winter vegetable crops.

Cultivated Varieties:

Variety selection depends primarily on its adaptation to the soil and climatic conditions and preferably should have resistance / tolerance to pests and diseases prevailing in that region. There are many varieties released for cultivation to different areas. Some important varieties recommended for different states are as under-

STATE	VARIETY
Rajasthan	-Ajmer Methi 1 (AFg-1) -Ajmer Methi 2 (AFg-2) -Ajmer Methi 3 (AFg-3) -Ajmer Methi 4 (AFg-4) -Ajmer Methi 5 (AFg-5)
Gujarat	Gujarat GM-1
Tamil Nadu	Tamil Nadu CO-1
Bihar	Bihar RajendraKranti
Haryana	-Hisar Sonali -Hisar Suvarna -Hisar Mukta -Hisar Madhavi (HM-350)
Uttar Pradesh and Uttaranchal	-Pant Ragini -Pusa Early Bunching -Pusa Kasuri

Cultural Practices

Preparation of Land:

The land should be well prepared for better germination and growth of fenugreek. A total of 3-4 ploughings are required. The first ploughing should be done by soil turning plough followed by 2-3 ploughing with harrow to bring the soil to a fine tilth. At the time of sowing there should be good moisture in the soil for better germination of seed.

Sowing Time:

Fenugreek, being cool season crop, is sown in the month of October to November in northern plains, whereas, in hilly tracts, it is sown from March to May, depending on altitude. In areas with mild climate, fenugreek for fresh greens may be grown round the year except extreme hot months of summer and rainy season. In southern states of India, particularly Karnataka, Andhra Pradesh and Tamil Nadu, fenugreek is sown twice, Once in rabi (September- December) and again in Kharif season (June-July).

Sowing time recommended for different states in fenugreek

States	Sowing time
Rajasthan	First week of October to last week of November
Gujarat	Last of September to First week of October
Bihar	Middle of October
Uttar Pradesh	October- November
Tamil Nadu	First week of October
Haryana	Middle of October up to November
Andhra Pradesh	First week of October

Seed Rate:

The quantity of seed required for the sowing of unit area depends on the purpose for which the crop is sown. For common type the seed requirement is 20-25 kg/ha and for Kasuri type the seed requirement is 10-12 kg/ha.

Seed rate required for sowing fenugreek

STATE	SEED RATE
Rajasthan	20-25 kg/ha
Gujarat	20-25 kg/ha
Bihar	20-25 kg/ha
Uttar Pradesh	15-20 kg/ha
Tamil Nadu	20-25 kg/ha
Haryana	20-25 kg/ha
Andhra Pradesh	30 kg/ha

Seed Treatment:

Fenugreek is a legume crop, it fixes nitrogen about 283 kg per hectare per year from the atmosphere into the soil. The role of Rhizobium in fenugreek production is well established, and thus inoculation of seed with Rhizobium culture before sowing has proved beneficial in getting higher seed yield. Seeds should be treated with *Rhizobium meliloti* local culture prior to sowing, especially when the crop is sown in new field. Seed should also be treated with Trichoderma culture10g/kg seed for the control of seed and soil borne fungal diseases.

Sowing Method:

Fenugreek can be sown either in lines or by broadcasting seeds in well- prepared flat seedbeds and raking the bed surface prudently, however, sowing in lines is comparatively better than the broadcasting since it facilitates the intercultural operations, like hoeing and weeding. Line to line spacing of 25-30 cm is required and later the plants are thinned to maintain 10-15 cm spacing within the lines. The seed germinates in about 5-7 days of sowing. The field should have adequate moisture at the time of sowing. Although the depth of the sowing seeds

depends on soil type and soil moisture at the time of sowing, but being small size, the seeds of common fenugreek are usually sown at a depth oft-3 cm and Kasuri fenugreek at 1.0-1.5 cm.

Manures and Fertilizers:

The fenugreek crop has been reported to show very good responsive behaviour towards absorption of both macro as well as micro-nutrients. The crop removes N, P and K in the ratio of 2 : 1 : 1 from the soil, in the uptake order of 10 , 3.5, 8.2 kg respectively. Therefore to maintain a steady state of productivity, application of FYM (10 t/ha) has a beneficial effect on the enhancement of vegetative growth and resulted in higher dry matter production of fenugreek. Application of one ton per hectare of neem cake has also proved beneficial. The microbial inoculation with *Azospirillum*, *Azotobactor* and *Rhizobium* has been reported to be suitable means for organic cultivation of fenugreek. Doses of fertilizer depend on fertility status of the soil and variety.

Fertilizer recommended for fenugreek

State	Fertilizer recommended
Rajasthan	10 FYM at the time of field preparation. 40 kg N (applied at the time of sowing and at post flowering stage), 40 kg P_2O5
Gujarat	40 kg N, 40 kg P_2O5/ha
Bihar	40 kg N, 60 kg P_2O5, 20 kg K_2O
Uttar Pradesh	60 : 50 : 10 kg NPK/ha
Tamil Nadu	N 50 kg/ha, 25 kg/ha and 40 kg K/ha

Irrigation:

Fenugreek, being primarily an irrigated crop, requires light irrigation at frequent interval for its quick growth but can also be cultivated under rainfed conditions in certain parts of the country. Usually the crop is sown when the field is having plenty of soil moisture so irrigation is not applied unless the seedling attain 2- 4 true leaves, however, if the initial moisture in the field at sowing is inadequate, a light irrigation should be applied very soon after sowing and should be followed by another light irrigation on third day to facilitate rapid and uniform germination. Subsequent irrigations are given at 12 to 15 days interval, depending on soil type, season, rainfall, and other temporary weather conditions. In general, frequent and light irrigations are essential for quick foliage growth and as a thumb rule, each cutting should be followed by a light irrigation. The early growth period and seed setting are the critical stages for irrigation requirement. Too much irrigation is also as harmful as the scarcity of moisture, since excessive moisture in any form and at any stage increases the incidence of root rot and powdery mildew. Care should be taken to avoid water stress at pod and seed development stages. Normally 6-7 irrigations are required in light soil and 4-5 irrigations are needed in heavy soil.

Storage:

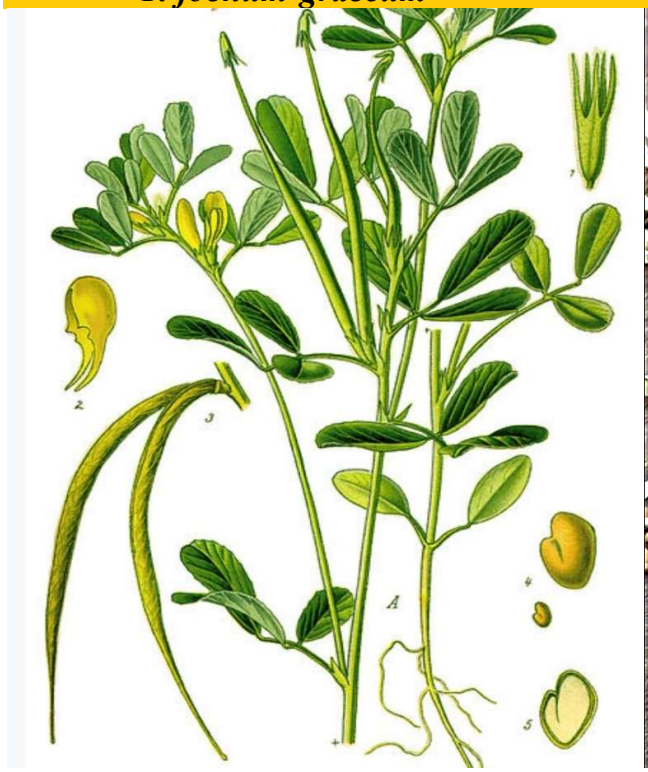
Seeds are stored in gunny bags lined with polythene film. Vacuum gravity separator is used for cleaning fenugreek seeds. The properly cleaned fenugreek seeds are stored with an initial moisture level of 7-8 % and at an equilibrium relative humidity of 40 %. Fenugreek seeds well packed is stored in ventilated dry and cool place under ordinary conditions till sowing of next season crop.

Culinary Uses:

Sun dried leaves, which are having aromatic qualities, are used as spice for seasoning of foods in off-seasons. The seed is mainly used as a spice, masala mixes, curry mixes, powders, flavor to foods baked foods, and condiments.

T. foenum-graecum

T. corniculata



T. foenum-graecum

T. corniculata

BAY LEAF / Tejpatta, Tejpat, Indian Bay Leaf, Indian Cassia, Indian Cassia Bark, Tamala cassia

***Cinnamomum tamala* (Buch.-Ham.) T. Nees&Eberm.; Family:** Lauraceae

Indian bay-leaves are the leaves of a tree closely related to **Cinnamon**. The tough, three-veined leaves are popular in Northern India. They were well known to the Romans under the name **malobathrum** and used both for perfumery and in cooking.

BOTANY:

A small to medium sized tree occurring in the tropical and sub-tropical Himalayas extending to North East India up to an altitude of 2000 meters msl. It also grows in Bhutan, Nepal, Bangladesh and Myanmar, most forests of Assam and Meghalaya. Bark rough, dark grey and aromatic. Leaves 12.5 -20 cm long, 5-7.5 cm wide at the centre, 3 converging nerves from the base to apex. Young leaves pink, margins entire apex acute/acuminate, both surfaces smooth, alternate/sub-opposite, ovate-oblong/elliptic, acuminate with the tip, glabrous, pink

when young, aromatic. Inflorescence terminal axillary panicle. Flowers very small with foetid smell. Fruit a drupe.

TYPES OF BAY LEAVES:

The term bay leaves refer to leaves obtained from several plants. Based on the origin of the leaf it has been classified into different types viz.

- Indian bay leaf,
- bay laurel,
- Indonesian bay leaf,
- West Indian bay leaf,
- California bay leaf, and
- Mexican bay leaf.

Indian bay leaf or malabathrum is obtained from *Cinnamomum tamala*, Lauraceae. Indian bay leaves are longer and wider, usually olive green in colour, and have three veins running the length of the leaf. They have a fragrance and taste similar to cinnamon (cassia) bark, but milder.

Bay laurel, Mediterranean or European bay leaf is obtained from ***Laurus nobilis***, Lauraceae. Bay laurel leaves are shorter than Indian bay leaf and light-to medium-green in colour with one large vein down the length of the leaf. The fresh bay laurel leaves are very mild and do not develop their full flavour until several weeks after picking and drying.

California bay leaf is taken from California bay tree (***Umbellularia californica***, Lauraceae).

Indonesian bay leaf or Indonesian laurel or more popularly, **salam leaf** is a bay leaf from the Myrtaceae family (***Syzygium polyanthum***). It is very uncommon outside Indonesia.

West Indian bay leaf is nothing but the leaf of the West Indian bay tree (***Pimenta racemosa***, Myrtaceae) and is used culinarily (especially in Caribbean cuisine) and to produce the cologne called **bay rum**.

Mexican bay leaf is obtained from ***Litsea glaucescens***, Lauraceae. Mexican bay leaves are long and tapering with slightly fluted edges.

CULTIVATION:

In India, tejpatta trees are mostly cultivated in the states like Kerala, Karnataka, and North Eastern states like the Meghalaya region especially, Gharo, Khasi, Jaintia&Nilgiri hills. It grows naturally or is cultivated at an altitude of 900-2500 m above mean sea level in the states like Sikkim, Assam & Mizoram. Tejpata leaf production is highest in Meghalaya and the productivity ranges from 30- 70 kg per tree per year. The cultivation of tejpatta forms part of an agroforestry system in northeast India.

Tejpatta trees can be planted at a spacing of 3 x 2 m in regular plantations. Seeds take 2-3 weeks for germination. Seeds lose their viability very fast and they should be sown fresh after removing the pulp.

About 94% of germination is obtained by sowing seeds immediately after their harvest. Delayed sowing reduces germination percentage. Germination is reduced to 52% if seeds are sown two weeks after harvesting and complete loss of viability are observed in seeds sown after 40 days. Seeds are sown closely on prepared beds during the month of June-July. When seedlings are four months old or when they reach a height of 15 cm, they are transplanted into polythene bags of 30 x 15 cm in size. After a further period of 10-12 months, they are sufficiently hardy and can be planted in the main field. Trees take six to nine years to attain the harvestable stage. Harvesting of the leaves is generally done when trees are 8-10 years old. The tree is perennial and repeated harvesting at yearly intervals is possible. The trees can be cultivated with limited management inputs.

HARVESTING:

The leaves are harvested when the tree attains an age of 10 years which continue for a century. Mature leaves are collected during October to March. Active wholesale markets for the commodity exist mainly in Meghalaya and West Bengal.

The harvesting of tejpatta leaf is dependent on the age and growth pattern of the trees. The harvesting of leaves can begin as early as five years maturity depending on the canopy development. Tejpatta is generally harvested in dry and mild weather from October to December and in some places, the collection is continued till March. Since rains can affect the aroma and quality of leaves, harvesting during monsoon months is not preferred. The leaves are usually collected once a year from young trees, and in alternate years from older trees. Tejpatta leaves are harvested when the leaves are mature and contain maximum flavour and essential oil.

PROCESSING:

Tejpatta plucking is the general practice followed for harvesting tejpatta leaves. At the time of harvest, the small branches are excised with the leaves and dried in the shade. Along with the harvest, pruning of the trees is also undertaken to avoid the rapid growth of branches. Any dead and diseased branches are also removed at this stage. These dried branches are then bundled for the market. The cultivation cost is modest as limited inputs are used. Leaves are collected (small branches with leaves are also tied into bundles), dried in the sun, and marketed. A single tree of average size yields about 10–20 kg of leaves every year. There is a high degree of correlation between the diameter of the tree at breast height and the yield of the fresh leaves.

The mature fresh leaves after it is handpicked are allowed to dry on a wire mesh screen by spreading it in a thin layer. It is allowed to dry for at least two weeks in a warm area under shade but not in direct sunlight. Sun-drying has some disadvantages like losing of its natural color

Hot air mechanical drying at 60°C is considered the best method for producing dry bay leaf. Slow drying of leaves in a warmer area away from direct sunlight allows to temper the bitterness from fresh leaves as it tends to be slightly bitter when fresh. Freshly dried leaves will have a better deeper flavour and can be stored in an airtight jar or plastic bags away from direct sunlight. Dried bay leaves are very fragrant and hardly disintegrate during the cooking process and they are usually removed before eating. The moisture content of fully dried bay leaf should not be more than 9%.

USES:

The leaves of are aromatic having a clove-like taste and a faint pepper-like odour. The bulk of the tejpatta produced in the country is consumed in the domestic market.

Bay leaf is used as a spice to impart flavour to a variety of dishes of various cuisines around the world, both vegetarian and non-vegetarian. The leaf is used for flavouring stews, dishes that need a long time to cook, and soups. It is one of the constituents of the Indian Garam masala – a mixture of spices.

Canopy of fully grown tejpatta trees

Young leaves

Dried leaves with three prominent veins

Flowers

Mediterranean or European bay leaf

Indian Bay leaf

Indonesian bay leaf

West Indian bay leaf

Mexican bay leaf

Californian bay leaf

Source: https://chefs.ookul.co/

Pro

Different types of bay leaves

Map showing occurrence of Tejpatta

Declaration

T H A N X