



**KAPURIYA ENTERPRISE**

IMPORT-EXPORT  
SPICES AND OILSEEDS

# Physical properties of Cumin Seeds

## Abstract

Cumin commonly known as “Zeera” is an important spice used for flavouring various food preparations. It has a warm aroma due to its essential oil content. Its main constituent aroma compounds are cumin aldehyde (a promising agent against alpha-synuclein aggregation) and cuminic alcohol. Though Zeera is used worldwide, but its production is mainly concentrated in India, Syria, Iran, and Turkey. The spice has several production constraints responsible for its low yield. However, by adopting the scientific package of practices, the yield can be considerably increased. In this paper, we reviewed the history, production technology, aroma profile and uses of zeera for advancement of knowledge regarding this valuable spice crop.

## Introduction

Cumin (*Cuminum cyminum*), commonly known as 'Jeera' or 'Zeera' is an important spice used in Indian kitchens for flavouring various food preparations. It is the second most popular spice in the world after black pepper. It is very pungent and aromatic and is used whole and/or ground. Though Cumin is a native of Egypt, it is mostly produced in India. India is the largest producer of cumin in the world. Apart from India it is also grown in North Africa, China, and America. Cumin's aromatic, nutty-flavoured seeds come in three colours: amber (the most widely available), white and black (both found in Asian markets). White cumin seed is interchangeable with amber, but the black seed has a more complex, peppery flavour. Cumin is one of the main ingredients in curry powders, and the combination of cumin and coriander leaves gives a characteristic smell to most Indian food. India produces 70% of the world supply and consumes 90% of that (which means that India consumes 63% of the world's cumin). Other producers are Syria (7%), Iran (6%), and Turkey (6%). The remaining 11% comes from other countries. In total, around 300,000 tons of cumin per year is produced worldwide. In 2007, India produced around 175,000 tons of cumin on an area of about 410,000 ha i.e., the average yield was 0.43 tons per hectare.

USA, European Union, Middle East, Southeast Asia are the major export markets for Indian Cumin Seed. In the international market, Nepal and Sri Lanka are the major importer preferring Cumin Seed of 95%-96% purity, whereas the European market has a strong preference for 100% purity for machine clean stocks. The main competitors in the international market are Turkey and Iran offering at cheaper rate. Though India is the largest producer of cumin seed, the country consumes most part of its produce and the rest is exported. Its produce commands premium prices in the global markets due to its quality and flavour. The cumin prices are also sensitive to the international demand and supply. Thus, the production in the other countries like Turkey and Syria affects the export prices and volume of Zeera. The crop in Syria and Turkey is harvested during August- September so the Indian produce, which is harvested during February to April, gets enough time to find good market in overseas countries. India exports cumin seed to Bangladesh, Japan, Malaysia, Nepal, Pakistan, Singapore, South Africa, UAE, UK, USA, and many other countries

and cumin seed powder to Canada, UK, USA, etc. India also exports oleoresins of cumin seed and cumin seed oil to USA, UK, Germany, etc. Nepal was the largest importer of cumin seed from India in 2003 with 28.87% share of total exports, followed by USA (14.44%), UK (11.35%), Malaysia (9.76%), Singapore (6.51%) and Japan (6.24%).

In India, cumin seed is almost exclusively cultivated in Rajasthan and Gujarat. It grows abundantly in the mild, equable climate of Gujarat and Rajasthan where rich, well drained, sandy, loamy soil and the sunny conducive environment are available. Thus, Gujarat and Rajasthan are the two main production centres in India. They contribute more than 90% of total cumin production in the country. Rajasthan is the largest producer of cumin seeds contributing about 50-55% of the total production of India. Gujarat is the second largest producer of cumin seeds. As per some of the trader's view, both the states produce almost equally. Due to cash payment, weight of commodity in front of farmers, lower market cess, high prices, availability of processors, exporters and brokers and better infrastructure facilities, a large amount of Cumin arrives in Gujarat mandis for trading purpose. In Gujarat, Banas kantha, Sabar kantha, Mehsana, Patan, Surendra Nagar and Rajkot are the major districts producing cumin seed, whereas in Rajasthan Badmer, Jalore, Nagpur, Pali, and Jodhpur are the main producing districts. As per the trade, the annual demand for the Zeera is about 2000000 bags i.e., about 110000 tonnes. As India is the largest consumer of cumin seeds in the world, the remaining stock after consumption is meant for the export purposes. Zeera is an environmental sensitive crop. Various factors such as temperature, weather, irrigation facilities, clear sky etc affect the development of crop. Productivity is mainly dependent on the climatic conditions prevailing during season. Thus, its production largely depends upon the climatic conditions and fluctuates largely depending on the same.

## **Botany**

It is a flowering plant in the family Apiaceae, native from the east Mediterranean to South Asia. Cumin is the dried seed of the herb *Cuminum cyminum*, a member of the parsley family. The cumin plant grows to 30–50 cm tall and is harvested by hand. It is an annual herbaceous plant, with a slender, glabrous, branched stem that is 20–30 cm tall and has a diameter of 3–5 cm. Each branch has two to three sub-branches. All the branches attain the same height; therefore, the plant has a uniform canopy. The stem is coloured grey or dark green. The leaves are 5–10 cm long, pinnate or bipinnate, with thread-like leaflets, divided into long, narrow segments like Fennel, but much smaller and are of deep green colour, generally turned back at the ends. The upper leaves are nearly stalkless, but the lower ones have longer leaf stalks. The flowers are small, white, or pink, and borne in umbels. Each umbel has five to seven umbellets. Anthesis starts from outer umbellets and proceeds towards inwards. Anther dehiscence starts at 6-8 a.m. in the morning and continues till 2.00 p.m. Like other umbelliferous plants, protandrous condition is found in the crop. The flowers remain surrounded with stamens and experience self-pollination. The fruit is a lateral fusiform or ovoid achene 4–5 mm long, containing two mericarps with a single seed. The seeds are elongated, approximately 6 mm long and light yellowish brown in colour. It has characteristic strong and heavy flavour and is slightly bitter and somewhat disagreeable. On the external surface of the seeds, fine ridges are found, in between which four ridges are found. Along with these ridges, capillaries run parallel which serves as a strong organ of volatile oil in the seeds. The crop is diploid and  $2n = 14$ .

## Origin and distribution

Cumin has been in use since ancient times. Seeds excavated at the Syrian site Tell ed-Der have been dated to the second millennium BC. They have also been reported from several New Kingdom levels of ancient Egyptian archaeological sites. In the ancient Egyptian civilization, cumin was used as spice and as preservative in mummification. Cumin is believed to be a native of Egypt and Syria, Turkistan, and eastern Mediterranean region. It is extensively cultivated in Iran, India, Syria, Turkey, Morocco, China, Southern Russia, Indonesia, and Japan. Iran being major exporter of cumin seed is the India's major competitor in foreign trade.



**Figure 1** Botany of Cumin (I) Plant (II) Seed (III) Spice

## Production Constraints

- Lack of suitable variety adapted to wide range of soil and climatic condition.
- Inherent poor production capacity.
- Shallow root system.
- Highly sensitive to soil and climate.
- Small seeds with low viability and vitality
- Unsolved chronic maladies of wilt and blight.

## Zeera cultivation

### Climate and soil

Cumin is a drought-tolerant, tropical, or subtropical crop. It has a growth season of 100–120 days. The seeds can emerge at 2 to 5 °C, an optimum of 20–30 °C is required. Cumin is vulnerable to frost damage, especially at flowering and early seed formation stages. The optimum growth temperature ranges are between 25 and 30° C. The Mediterranean climate is most suitable for its growth. Cultivation of cumin requires a long, hot summer of three to four months. At low temperatures, leaf colour changes from green to purple. High temperature might reduce growth period and induce early ripening. High humidity during flowering and

fruiting period initiates the development of diseases like blight and powdery mildew causing damage to the crop. It is grown as an irrigated crop during winter in Indian condition.

It can be successfully cultivated on well drained medium to heavy textured soil of average to high fertility. However, fertile, sandy, or loamy soils with good aeration, proper drainage and high oxygen availability are preferred. The pH optimum of the soil ranges from 6.8 to 8.3.

## Uses

Cumin seed is used as a spice for its distinctive flavour and aroma. Cumin can be found in some cheeses, such as Leyden cheese, and in some traditional bread from France. Cumin is an ingredient in chilli powder (often Tex-Mex or Mexican style), and is found in achiote blends, adobos, sofrito, garam masala, curry powder, and baharat. In South Asian cooking, it is often combined with coriander seeds in a powdered mixture called dhana zeera. Cumin can be used ground or as whole seeds. It helps to add an earthy and warming feeling to food, making it a staple in certain stews and soups, as well as spiced gravies such as curry and chilli. It is also used as an ingredient in some pickles and pastries.

**Table 1** Nutritional composition of cumin

| <b>Nutrient</b>      | <b>Unit</b> | <b>Value per 100 g</b> |
|----------------------|-------------|------------------------|
| <b>Proximities</b>   |             |                        |
| Water                | g           | 8.06                   |
| Energy               | kcal        | 375                    |
| Protein              | g           | 17.81                  |
| Total lipids (fat)   | g           | 22.27                  |
| Carbohydrates        | g           | 44.24                  |
| Fibre, total dietary | g           | 10.5                   |
| Sugars, total        | g           | 2.25                   |
| <b>Minerals</b>      |             |                        |
| Calcium              | mg          | 931                    |
| Iron                 | mg          | 66.36                  |
| Magnesium            | mg          | 366                    |
| Phosphorus           | mg          | 499                    |
| Potassium            | mg          | 1788                   |
| Sodium               | mg          | 1788                   |
| Zinc                 | mg          | 4.80                   |
| <b>Vitamins</b>      |             |                        |
| Vitamin-C            | mg          | 7.7                    |
| Thiamine             | mg          | 0.63                   |
| Riboflavin           | mg          | 0.33                   |
| Niacin               | mg          | 4.58                   |
| Vitamin-B6           | mg          | 0.44                   |
| Folate-DFE           | µg          | 10                     |
| Vitamin B-12         | µg          | 0                      |
| Vitamin A            | IU          | 1270                   |
| Vitamin E            | Mg          | 3.33                   |

|                                  |    |       |
|----------------------------------|----|-------|
| Vitamin D                        | IU | 0     |
| Vitamin K                        | mg | 5.4   |
| <b>Lipids</b>                    |    |       |
| Fatty acids, total saturated     | g  | 1.54  |
| Fatty acids, total monosaturated | g  | 14.04 |
| Fatty acids, total polysaturated | g  | 3.28  |
| Cholesterol                      | mg | 0     |

In Sanskrit, cumin is known as Jiraka "that which helps digestion" and is called zeera in Persian/Urdu. In the Ayurvedic system, dried cumin seeds are believed to have medicinal purposes. These seeds are powdered and used in different forms like Kashaya (decoction), arishta (fermented decoction), vati (tablet/pills), and processed with ghee (a semifluid clarified butter). It is used internally and sometimes for external applications also. In southern Indian states, such as Kerala, Andhra Pradesh and Tamil Nadu, a popular drink called Jira water is made by boiling cumin seeds. Jeera is stimulant, antispasmodic and carminative. Because of its disagreeable flavour, its medicinal use at the present day is almost confined to veterinary practice, in which it is employed as a carminative. Formerly Cumin had considerable repute as a corrective for the flatulency of languid digestion and as a remedy for colic and dyspeptic headache. Bruised and applied externally in the form of a plaster, it was recommended as a cure for stitches and pains in the side caused by the sluggish congestion of indolent parts, and it has been compounded with other drugs to form a stimulating liniment.

### **Other Medicinal properties**

Cumin is stomachic, diuretic, carminative, stimulant, astringent, and antispasmodic. It is valuable in dyspepsia diarrhoea and hoarseness and may relieve flatulence and colic. In the West, it is now used mainly in veterinary medicine, as a carminative, but it remains a traditional herbal remedy in the East. It is supposed to increase lactation and reduce nausea in pregnancy. Used in a poultice, it relieves swelling of the breast or the testicles. Smoke in a pipe with ghee, is taken to relieve the hiccups. Cumin also stimulates the appetite.

### **Suitability of Zeera for Future**

The product has an active cash market. The large players, however, control a major section of the market. Though arrival of the commodity is only during March-May, its consumption is spread throughout the year. In addition, the consumption is spread throughout the country, though the cultivation is from Gujarat and Rajasthan. The prices display high volatility due to its seasonal nature and widespread demand within and outside the country. The product exhibits the normal homogeneity visible in agricultural commodities and can be effectively graded. Weather at the production centres, pests and diseases have an influence on the production of spices. The market is not perfectly organized, and this influences the information flow. The major trading centres are Unjha (Gujarat), Niwai, Kekri (Rajasthan), Delhi, Jaipur, and Rajkot.

## CUMIN PLANTS







## CUMIN SEEDS





## CUMIN SEEDS POWDER

