

Article

# Cuminum cyminum L.: Uses in Traditional Medicine, Methods of Propagation and Cultivation

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**Abstract:** In recent years, the study of plants growing in the mountainous regions of our country has been gaining increasing popularity. For example, *Cuminum cyminum* L. (cumin) belongs to the Apiaceae family and has long been used as a medicinal and essential oil plant in both food and traditional medicine. The medicinal properties of this plant are so significant that they are difficult to fully comprehend. In this study, the importance of cumin in traditional medicine, its methods of propagation, and cultivation agrotechnology were widely analyzed. Cumin seeds contain essential oils (cumin aldehyde,  $\gamma$ -terpinene, p-cymene), flavonoids, phenolic compounds, vitamins, as well as macro- and microelements. These components ensure the high biological activity of the plant. Therefore, cumin is widely used in traditional medicine as a remedy that improves digestion and possesses anti-inflammatory, antibacterial, antispasmodic, and antioxidant properties.

**Keywords:** Cumin, Cuminum cyminum L., Medicinal Plants, Traditional Medicine, Essential Oils, Cumin Aldehyde,  $\Gamma$ -Terpinene, Flavonoids, Local Conditions, Cultivation, Application

## 1. Introduction

Nowadays, the use of medicinal plants has become very important for folk medicine. Of course, their in-depth study and wide implementation into practice is considered one of the urgent scientific directions[1]. Especially, the growing interest in treatment methods based on natural raw materials requires scientific research of folk medicine experience. Because folk medicine has always been a very relevant issue for us[2]. From this point of view, studying the biological, chemical and agrotechnical properties of medicinal plants, which play an important role in strengthening human health, is of special importance. Because human health is considered superior to everything. One of such healing and medicinal plants is — *Cuminum cyminum* L. (cumin), which belongs to the Apiaceae family and is an annual essential oil-bearing and spice plant[3]. This plant, which grows in our country, has been cultivated since ancient times in Asia, North Africa and the Mediterranean regions[4]. Nowadays, it is widely distributed in India, Iran, China and Central Asian countries and is recognized as an important agricultural crop. Of course, these countries grow the plant both for medicine and for daily consumption. Cumin seeds have a distinctive smell and taste. It can attract every person. It is considered a plant that has its place in the food industry[5]. Due to its biologically active compounds, it also has medicinal properties. According to the results of our scientific research, we have identified that cumin contains cuminaldehyde,  $\gamma$ -terpinene, p-cymene, flavonoids, phenolic compounds, and

vitamins. In addition, the presence of various macro and microelements was observed in laboratory studies. These substances determine the plant's important pharmacological properties such as antioxidant, antibacterial, anti-inflammatory, antispasmodic and antidiabetic effects[6]. Therefore, cumin is widely used not only in folk medicine, but also in modern pharmaceutical, food and cosmetic industries. The main purpose of our research is – to scientifically analyze the use of *Cuminum cyminum* L. in folk medicine, its propagation, cultivation methods and agrotechnology.

### Literature Review

In recent years, scientific interest in the study of medicinal plants has significantly increased. Because every plant in our country is considered highly medicinal. In particular, essential oil-bearing plants rich in natural bioactive compounds are gaining an important place in folk medicine and modern pharmacology[7]. For example, *Cuminum cyminum* L. (cumin) is one of the widely used medicinal resources that has long been the focus of many scientific studies. According to the literature we have reviewed, the main components of cumin seeds consist of cuminaldehyde (30–40%),  $\gamma$ -terpinene (15–20%) and  $\beta$ -pinene, which determine its pharmacological activity. These properties are very important for the food industry and pharmaceutical industry[8]. Various studies show that the ethnopharmacological use of cumin has been widely documented. In particular, in the works of our ancestor Ibn Sina, cumin was recommended as a remedy for improving digestion, treating colds, and regulating intestinal function. Although this observation was made hundreds of years ago, modern research has confirmed these findings. Contemporary scientific studies have also identified its antibacterial, antispasmodic, antioxidant, and anti-inflammatory properties[9].

### 2. Research Methodology

From an agronomic point of view, cumin is well adapted to hot and arid climatic conditions and is widely cultivated in India, Iran, China, and Central Asia. It has a short vegetation period of 100–120 days and is propagated by seeds. According to literature, seeds germinate well at low temperatures (<20°C), while germination decreases at higher temperatures. Furthermore, scientific sources indicate that cumin is also used in the prevention of various diseases[10]. For example, it is used as a natural remedy in cases of dyspepsia, flatulence, diarrhea, cough, and colds[11]. The active components in its essential oils effectively act against microorganisms, which justifies its importance as a raw material in the pharmaceutical industry. Therefore, cumin currently occupies an important place in pharmaceutical production[12].

In addition, scientific sources report that cumin seeds contain up to 10% oil, proteins, mineral substances, and about 1.5% essential oils. These compounds form the basis for its application in the food industry, pharmaceuticals, cosmetology, and even as an insecticide[13].

### 3. Results and Discussion

In our article, *Cuminum cyminum* L. (cumin) is considered a medicinal resource with multifunctional biological and pharmacological properties[14]. As a result of the research, a number of important findings were obtained regarding its use in folk medicine, phytochemical composition, and agronomic characteristics. According to scientific sources, the main biologically active compounds in cumin seeds are essential oils such as cuminaldehyde,  $\gamma$ -terpinene, and p-cymene. These compounds determine the plant's antioxidant, antibacterial, and anti-inflammatory effects. In addition, flavonoids and phenolic compounds have been found to help neutralize free radicals in the human body[15].

**Table 1.** Scientific Analytical Table on *Cuminum cyminum* L. (Cumin)

No	Aspect	Key Information	Scientific Significance
1	Taxonomy	Apiaceae family, <i>Cuminum cyminum</i> L., 2n = 14 chromosomes	Determines botanical classification of the plant

2	Morphological characteristics	Upright stem, small seeds, compound umbel inflorescence, height 30–60 cm	Important for plant identification and morphology
3	Vegetation period	100–120 days	Enables short-term cultivation
4	Climatic conditions	Adapted to hot and arid regions	Suitable for cultivation in Uzbekistan
5	Main chemical compounds	Cuminaldehyde (30–40%), $\gamma$ -terpinene (15–20%), p-cymene, flavonoids, phenolic compounds	Responsible for pharmacological activity
6	Essential oil content	Up to 1.5% essential oil, 10% fatty oil, proteins, minerals	Increases medicinal and industrial value
7	Pharmacological properties	Antibacterial, antioxidant, anti-inflammatory, antispasmodic, antidiabetic	Used in medicine and pharmaceuticals
8	Traditional medicine use	Improves digestion, treats colds, reduces flatulence, cough, and intestinal disorders	Widely used in ethnomedicine
9	Agronomic features	Propagated by seeds; germination is higher at temperatures below 20°C	Defines cultivation technology
10	Industrial applications	Food industry, pharmaceuticals, cosmetics, perfumery	High economic importance
11	Biological activity	Antioxidant, antibacterial, immunomodulatory properties	Promising natural therapeutic agent
12	Ecological significance	Environmentally sustainable and low-resource demanding crop	Important for sustainable agriculture

#### 4. Conclusion

It can be stated that *Cuminum cyminum* L. (cumin) is not only a traditional spice but also a medicinal raw material with high biological activity. Cumin belongs to the Apiaceae family and is a genetically stable ( $2n = 14$ ) and ecologically adaptable plant that can be successfully cultivated under various climatic conditions. It can also be successfully grown in arid regions. Recent scientific data show that cumin seed essential oils mainly contain volatile compounds such as cuminaldehyde,  $\gamma$ -terpinene, p-cymene, sabinene, and limonene. These compounds further enhance the biological properties of cumin. In addition, recent studies have shown that cumin polysaccharides and phenolic fractions play an important role in activating the immune system and reducing inflammatory mediators such as TNF- $\alpha$  and IL-6. Pharmacological studies confirm that cumin extracts have a positive effect on metabolic processes, particularly in regulating blood glucose levels and enhancing the antioxidant defense system. Therefore, this plant plays an important role in traditional medicine.

From an agronomic point of view, it has been found that seed germination, growth rate, and essential oil content of cumin are sensitive to environmental factors, especially temperature and soil moisture. This requires the development of precise agro-technical cultivation practices. Overall, *Cuminum cyminum* L. is considered a promising natural resource for modern biotechnology, pharmaceuticals, the food industry, and phytotherapy. Further in-depth research on this plant will expand the possibilities of identifying new bioactive compounds and applying them in practical medicine.

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