

Chapter 7

Foeniculum vulgare (Fennel): A Versatile Herb With Culinary, Medicinal, and Environmental Significance

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ABSTRACT

*This chapter opens with the description of fennel (*Foeniculum vulgare* Mill), an annual herb cultivated for its seeds, leaves, fruits, and essential oil and valued for its pleasant aroma, medicinal and nutritional properties. Taxonomy, different varieties, and botanical description will be described. The principal constituents from volatile oil and fruits are 50-60% anethole and 15-20% fenchone. Several studies on *F.vulgare* suggest that this herb possesses many culinary and traditional applications. It has been used for remedy of different disorders such as it acts as antimicrobial, stimulant, antiflatulent, carminative, muscle relaxant, and expectorant etc, Toxicity and allergenicity are mentioned. *Foeniculum* has potential to be used as a good source of traditional medicine and it provides the noteworthy basis in pharmaceutical biology for the development /formulation of new drugs and future clinical uses. The fragmented information available in the literature regarding ethno-medicinal applications, morphology, phytochemistry, and toxicology of *Foeniculum vulgare* will be gathered.*

DOI: 10.4018/979-8-3693-1986-4.ch007

INTRODUCTION

Foeniculum vulgare Mill, is generally called as FENNEL, that's aromatic and erect herb. It is perennial herb instead of annual. The plant, *Foeniculum vulgare* (Fennel) is from the family Umbelliferae, which is now known as Apiaceae. Philip Miller is the one who first validly published the name *Foeniculum vulgare* according to the intercontinental guidelines approved at Cambridge, from then till now Fennel is known as *Foeniculum vulgare* Mill. He published this name in 1768 in his eighth edition "Garden Dictionary" (Badgular et al., 2014). *Foeniculum vulgare* is cultured in the EU and other south countries. Fennel is mostly cultivated in the dry soil and along the riverbanks and in the Mediterranean regions (Ayub et al., 2008). Cultivation history of this herb is vast. This plant is grown in many countries of the world like South America, North Africa, Asia and other hot regions (Volák & Stodola, 1998). It is also known as saunf in countries like Pakistan, India, Kashmir and Rajasthan. Sweet fennel, bitter fennel, Common fennel and wild fennel are different names of this plant (Díaz-Maroto et al., 2006).

Foeniculum vulgare, have the chromosome number of $2n$ diploid 22. The fruit of fennel have sweet taste and its aroma is spicy. Green parts of this plant are also used as salads. Fennel fruits also contain volatile oil and because of this oil fennel is used in pharmaceuticals, can also be used in perfumery and for food flavoring. Fennel has anti-inflammatory and antibacterial properties (Ruberto et al., 2000). Fennel can be used against viral, bacterial and fungus infections (Dua et al., 2013; Kaur & Arora, 2009; Manonmani & Khadir, 2011; Morales et al., 2012; Orhan et al., 2012). Fennel have various advantageous properties such as hypoglycemic, chemo preventive, hepatoprotective, estrogenic, antitumor and cytoprotective (Abou El-Soud et al., 2011; Mallni et al., 1985; Oktay et al., 2003; Özbek et al., 2003; Pradhan et al., 2008). In Some studies, it is showed that *F. vulgare* can also be effective in reducing stress and can also beneficial in memory-enhancement (Koppula & Kumar, 2013). The cultivation of fennel on a large scale is of interest due to its valuable essential oil content and medicinal properties. In Pakistan, fennel yields are typically lower compared to other fennel-growing nations, often grown on a small scale for medicinal purposes, without the use of fertilizers. Research from various regions indicates that the addition of Nitrogen (N) can enhance both seed yield and oil content. Furthermore, when Phosphorus (P) is combined with Nitrogen (N), it can boost growing process improve yield and quality of the seed .Therefore, the application of fertilizers (NP) increases the development, crop, and seed value of this plant in Pakikstan. Fennel seeds also contains dietary fiber and other compounds like creosol and alpha-pinene, which can help improve crowding. They also contain numerous flavonoids with antioxidant properties. Fennel's essential oil is prized for its carminative, digestive, and anti-flatulent properties. Worldwide, contemporary

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