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A REVIEW OF THE GEOGRAPHICAL DISTRIBUTION AND ECONOMIC IMPORTANCE OF PASTINACA SATIVA L. (PARSNIP)

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Abstract

This article provides information on the geographical distribution, and practical applications of *Pastinaca sativa* (parsnip). In the food industry, *P. sativa* is used in confectionery, baby food, and livestock feed due to its sweet taste. Regarding its medicinal properties, the article discusses its effects on the central nervous system, respiratory, digestive, hepatic, dermatological, cardiovascular, and urinary systems, as well as its diuretic, immune-boosting, and anti-metabolic disease potential.

Keywords: *Pastinaca sativa*, geographical distribution, food industry, medicinal properties, invasive species, pharmacology.

Introduction

The genus *Pastinaca* L. belongs to the family Apiaceae and occupies an important position in the plant kingdom. According to the Plants of the World Online (POWO) database, which is currently considered one of the most reliable

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botanical sources, the genus *Pastinaca* comprises 16 recognized species [1,7,11]. These include:

Pastinaca argyrophylla Delip., *P. armena* Fisch. & C.A.Mey., *P. aurantiaca* (Albov) Kolak., *P. clausii* (Ledeb.) Calest., *P. erzincanensis* Menemen & Kandemir., *P. gelendostensis* (Yıld. & B.Selvi) Hand., *P. glandulosa* Boiss. & Hausskn., *P. hirsuta* Pančić., *P. kochii* Duby., *P. lucida* L., *P. pimpinellifolia* M.Bieb., *P. sativa* L., *P. trysia* Stapf & Wettst., *P. vanensis* Demir, Sefalı & Yapar., *P. yıldizii* Dirmenci., *P. zozimoides* Fenzl [5,6,10,14].

Most of these species are distributed in subtropical and temperate climatic zones and exhibit both similarities and differences in their morphological characteristics, such as root shape, leaf structure, and flowering period.



Figure 1. General appearance of *P. sativa*.

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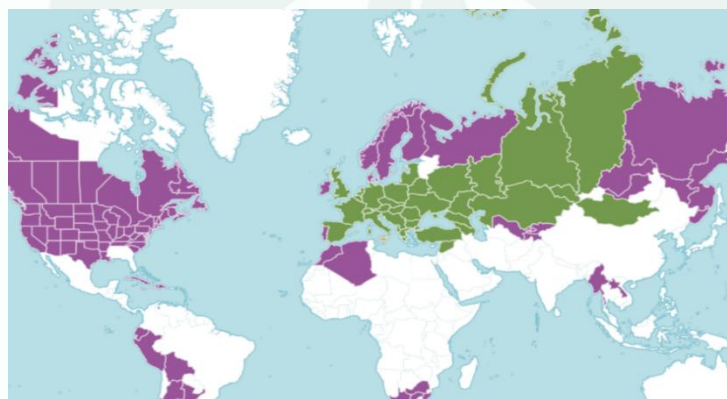
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The natural distribution of the genus *Pastinaca* is primarily associated with the Eurasian continent, particularly the Mediterranean basin, Europe, and southeastern regions of Asia. In Europe, the genus occurs in Albania, Austria, the Baltic States, Belarus, Belgium, Bulgaria, Central European Russia, Corsica, Czech Republic–Slovakia, Eastern European Russia, France, Germany, the United Kingdom, Greece, Hungary, Italy, Crimea, Levant–Syria, the North Caucasus, the northwestern Balkan Peninsula, Poland, Romania, Sardinia, Spain, Switzerland, Transcaucasia, and Ukraine [2,11]. In Asia, *Pastinaca* species are found in the Altai region, Kazakhstan, Krasnoyarsk, Mongolia, Western Siberia, southeastern and eastern Russia, and Turkey, including its European part. The central distribution area of the genus is considered to be the Mediterranean region and the Near East, including Lebanon and the Caucasus, where plants grow mainly in open habitats, fields, and forest margins. The natural range of *Pastinaca sativa* extends from Europe to Central Siberia and the Levant, making it the most widely distributed representative of the genus.



● Native range

● Introduced areas

Figure 2. Distribution range of species of the genus *Pastinaca*.

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The distribution of the genus is considerably broader due to anthropogenic influence. *Pastinaca* species are now found worldwide, particularly in the Americas (North America: Alaska, Arizona, California, etc.; South America: Argentina, Bolivia, Chile), Africa (Morocco), Australia (Tasmania), and other parts of Asia (Laos, Myanmar). This expansion has largely occurred as a result of human activities such as agriculture, transportation, and trade. In some regions, *P. sativa* is regarded as an invasive species; for example, it has spread as a wild plant in the northern states of the United States [2,11].

Numerous scientific studies have been conducted on the morphology, biology, chemical composition, medicinal properties, ecology, population dynamics, and agricultural significance of *Pastinaca sativa*. However, several research areas remain insufficiently explored, particularly seed physiology, physiological stress mechanisms in seeds, and population genetics. Taxonomic studies of parsnip have mainly focused on the floras of Europe and Asia, while such research has not been carried out under the environmental conditions of Uzbekistan. Therefore, our initial investigations are aimed at assessing its distribution and economic importance.

Stephen L. Jury is a leading taxonomist specializing in the Apiaceae family and has revised several species of the genus *Pastinaca*. He has prepared numerous descriptions of the flora of Asia Minor (Turkey), the Caucasus, and Iran [5].

The studies of Kit Tan and Hasan Yıldırım, dedicated to the flora of Turkey, describe new *Pastinaca* species and examine the geographical differentiation of the genus within Turkey [14].

Pimenov A. and Leonov M. (Russia) investigated the phylogenetic position of *Pastinaca* within the Apiaceae family [10].

Stahl W. (Germany) studied the activity and mechanisms of action of flavonoids and antioxidants in parsnip [13].

Ożarowski M. and Kicel M. (Poland) conducted research on the biological activity of medicinal extracts derived from *Pastinaca* species [8].

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Scientists of the Iranian phytopharmacological school have investigated the physiological effects of furanocoumarins and their relationship with PUVA therapy. Numerous scientific studies on parsnip are still ongoing today [4].

Pastinaca sativa has been consumed as a food crop since ancient times and is a root vegetable rich in sugars, carbohydrates, organic acids, vitamins, and essential oils. Its sweet taste is mainly associated with the high accumulation of starch, sucrose, glucose, and fructose, which makes it a valuable raw material for various food products. Parsnip is widely used fresh in salads, soups, vegetable dishes, and meat-based meals. Compared to carrot, parsnip has a higher level of sweetness; therefore, it is used as vegetable purée for biscuits and pies, as a natural sugar source in confectionery products, and as a filling component in low-fat dietary desserts. Parsnip purée is easily digestible, low-allergenic, and has a balanced glucose–fructose ratio; consequently, it is included in baby foods from the age of six months in many countries. Due to its low glycemic index, high fiber content, and natural sweetness, parsnip is also used in dietary products that improve intestinal function and in pectin-rich dietetic foods. Owing to its high nutritional value, the root is also suitable for use as livestock feed [3,12].



Figure 3. Use of *P. sativa* in food products.

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Pastinaca sativa has long been used as a medicinal plant in traditional medicine and modern phytotherapy. Its biologically active compounds include furanocoumarins, flavonoids, essential oils, polyacetylenes, pectins, organic acids, vitamins, and trace elements. Due to this chemical composition, parsnip exhibits a wide range of pharmacological effects. Furanocoumarins are considered the primary compounds affecting the skin and nervous system, while flavonoids possess antioxidant and anti-inflammatory properties. Essential oils demonstrate antimicrobial and bronchodilatory effects. Organic acids and pectins regulate digestive system activity. Vitamins such as vitamin C, B-group vitamins, K, as well as minerals including Fe and Mg, positively influence immune function and metabolic processes. Furanocoumarins help stabilize neuronal activity and exhibit antistress and mild sedative effects. In clinical phytotherapy, parsnip has been reported to be effective in cases of neurosis, insomnia, and mild depressive conditions. Its essential oils may be used as expectorants and are applied in folk medicine for asthma and bronchitis. High levels of potassium and flavonoids improve vascular elasticity and help normalize cholesterol levels, making parsnip beneficial in cardiovascular diseases and edema. It is also used as a natural diuretic and in folk medicine for mild forms of pyelonephritis. Decoctions prepared from the root aid in improving intestinal function, and diuretic properties have also been identified in the seeds [4,8,9,13].

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