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# Crataegus pinnatifida: A botanical, ethnopharmacological, phytochemical, and pharmacological overview

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## Abstract

**Ethnopharmacological relevance:** *Crataegus pinnatifida* belongs to the Rosaceae family and extensively distribute in North China, Europe, and North America. Its usage was first described in "Xinxu Ben Cao." The dried fruits of *Crataegus pinnatifida* Bunge or *Crataegus pinnatifida* var. major N. E. Br., also known as "Shanzha," is a famous medicine and food homology herb with a long history of medicinal usage in China. *C. pinnatifida* has the functions for digestive promotion, cardiovascular protection, and lipid reduction. It was traditionally used to treat indigestion, cardiodynia, thoracalgia, hernia, postpartum blood stagnation, and hemafecia. In recent years, *C. pinnatifida* has attracted worldwide attention as an important medicinal and economical crop due to its multiple and excellent health-promoting effects on cardiovascular, nervous, digestive, endocrine systems, and morbigenous microorganisms of the human body due to its medicinal and nutritional values.

**Aim of the review:** The current review aims to provide a comprehensive analysis of the geographical distribution, traditional usage, phytochemical components, pharmacological actions, clinical settings, and toxicities of *C. pinnatifida*. Moreover, the connection between the claimed biological activities and the traditional usage, along with the future perspectives for ongoing research on this plant, were also critically summarized.

**Materials and methods:** We collected the published literature on *C. pinnatifida* using a variety of scientific databases, including Web of Science, ScienceDirect, PubMed, Wiley, Springer, Taylor & Francis, ACS Publications, Google Scholar, Baidu Scholar, CNKI, The Plant List Database, and other literature sources (Ph.D. and MSc dissertations) from 2012 to 2022.

**Results:** In the last decade, over 250 phytochemical compounds containing lignans, phenylpropanoids, flavonoids, triterpenoids, and their glycosides, as well as other compounds, have been isolated and characterized from different parts, including the fruit, leaves, and seeds of *C. pinnatifida*. Among these compounds, flavonoids and triterpenoids were major bioactive components of *C. pinnatifida*. They exhibited a broad spectrum of pharmacological actions with low toxicity in vitro and in vivo, such as cardiovascular protection, neuroprotection, anti-inflammatory, antioxidant, antibacterial, antiviral, anti-diabetes, anti-cancer, anti-mutagenic, anti-osteoporosis, anti-aging, anti-obesity, and hepatoprotection and other actions.

**Conclusion:** A long history of traditional uses and abundant pharmacochemical and pharmacological investigations have demonstrated that *C. pinnatifida* is an important medicine and food homology herb, which displays outstanding therapeutic potential, especially in the digestive system and

cardiovascular disease. Nevertheless, the current studies on the active ingredients or crude extracts of *C. pinnatifida* and the possible mechanism of action are unclear. More evidence-based scientific studies are required to verify the traditional uses of *C. pinnatifida*. Furthermore, more efforts must be paid to selecting index components for quality control research and toxicity and safety studies of *C. pinnatifida*.

**Keywords:** Cardiovascular protection; Clinical trials; *Crataegus pinnatifida*; Neuroprotection; Phytochemistry; Traditional usage.

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