

MORPHOLOGICAL AND BIOLOGICAL CHARACTERISTICS OF THE MEDICINAL PLANT MILK THISTLE (*SILYBUM MARIANUM*)

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Abstract

This article provides information on the distribution, morphology, and biological characteristics of the medicinal plant *Silybum marianum* (milk thistle). It highlights its structure, medicinal properties, and the role it plays in human life. The study discusses the significance of the plant in agriculture, medicine, and industry, as well as its cultivation techniques and chemical composition. Additionally, the article examines the importance of milk thistle as a pharmaceutical raw material and its potential applications in food and spice production.

Keywords: Medicinal properties, chemical composition, species, genus, sowing period, propagation, productivity, disease, raw material, spice, pharmaceuticals, reproduction.

Introduction

Medicinal plants have been used since the millennia preceding our era. Today, the demand for medicinal plants continues to grow, leading to an increasing need to expand the diversity of raw materials derived from medicinal, aromatic, and edible plants. In order to meet public needs, approximately 60% of natural pharmaceutical agents and new types of food products are produced from raw materials originating from medicinal plants.

In this context, the introduction and cultivation of valuable medicinal plant species, as well as meeting the population's demand for natural therapeutic products, is considered one of the most pressing issues. Among such plants, *Silybum marianum* L. (commonly known as milk thistle) plays a vital role due to its healing properties. Owing to these properties, milk thistle holds significant importance in agriculture, medicine, and industry.

In light of current global challenges such as rapid population growth and ecological changes, which contribute to the emergence of various diseases, it is imperative to increase the cultivation of plants that retain medicinal, edible, and aromatic qualities. Consequently, establishing large-scale plantations of such valuable plants is gaining importance. From this perspective, expanding the cultivation of milk thistle—a highly beneficial medicinal plant—in various regions of Uzbekistan, including the Uchko‘prik district of Fergana region, is of great importance.



Morphology and Biology of the Milk Thistle Plant (*Silybum marianum* L.)

Among medicinal plants, *Silybum marianum* L., commonly known as milk thistle, occupies a significant place in human health due to its well-known therapeutic properties. This plant is widely used in agriculture, medicine, and various industries owing to its diverse bioactive compounds. In the context of growing global population and deteriorating ecological conditions, the emergence of new diseases has driven the search for novel and effective natural remedies. Milk thistle is cultivated in the southern regions of Uzbekistan and belongs to the family Asteraceae. It is classified as an annual or biennial herbaceous plant.

Milk thistle is characterized by its striking appearance—bright green leaves with white veins and flowers that range from red to purple hues. Originally native to Southern Europe and Western Asia, the plant is now distributed globally. Morphologically, milk thistle grows as an upright, conical plant, reaching heights between 30 and 200 cm and can have a basal diameter of up to 160 cm. Its stem is covered with fine cotton-like hairs, and mature specimens may develop hollow, branching stems. The leaves are lanceolate to oblong, 15–60 cm in length, deeply pinnate with spiny edges. They are smooth, hairless, and glossy green with milky white veins.

The plant produces flower heads that are 4 to 12 cm long, usually red to purple in color, and bloom from June to August in the northern hemisphere (December to February in the southern hemisphere). The flower heads are encased by spiny bracts with triangular appendages and thick yellowish tips. The fruit is a black achene surrounded by a yellowish or whitish ring and equipped with a long, silky pappus that aids in wind dispersal, acting like a parachute.

Milk thistle flowers consist of dozens of tubular florets, ranging in color from almost white to deep purple. The plant grows rapidly from seeds, producing a compact rosette of leaves in its first year and reaching a height of 60 cm. In the second year, the stem elongates significantly, often doubling in size. The plant can ultimately reach a height of up to 1.5 meters. Its buds appear singly or in clusters emerging from the root branches, and the entire plant surface is covered with sharp spines. Leaf morphology varies from dissected to whole, with spiny margins and prominent veins lined with thorns.

The fruits exhibit longitudinal ridges and are equipped with a bundle of long hairs, often several times longer than the fruit itself. This extraordinary plant is most commonly found across Europe—especially in the central and southern regions—as well as in parts of Russia. It often thrives in arid lands, roadsides, vacant lots, and disturbed areas.

The therapeutic potential of milk thistle is attributed to the more than **350** biologically active compounds present in the plant. Most notably, its seeds and fruits contain approximately 300 medicinally relevant substances, including silymarin, a flavonolignan complex known for its liver-protective, antioxidant, and anti-inflammatory effects.

Therapeutic Properties

Milk thistle (*Silybum marianum* L.) has been used since ancient times to treat diseases of the liver and gallbladder. Historically, it was considered one of the most potent natural remedies against various forms of poisoning. More than 2,000 years ago, ancient Greeks utilized milk thistle seeds for treating liver disorders. The plant contains over 200 biologically active compounds beneficial to human health, including essential vitamins (A, B complex, D, E, K, F) and trace elements such as zinc, copper, and selenium.



Milk thistle is recognized as a powerful natural antioxidant and detoxifying agent, capable of neutralizing harmful toxins and poisons. Its most prominent bioactive compound, silymarin, is considered the only known natural substance proven to regenerate and protect hepatocytes (liver cells). This makes milk thistle unparalleled in its role in the prevention and treatment of liver cirrhosis, toxic hepatitis, and viral hepatitis.

The plant also contributes to enhanced immune function, and supports mental, physical, and reproductive vitality. It promotes efficient metabolic processes, prevents fat accumulation in the liver, heart, and lower back regions, and aids in the breakdown of unnecessary lipids, thus contributing to healthy weight management. Notably, it strengthens vital organs (heart, liver, kidneys) while facilitating non-invasive weight loss without adverse effects.

Studies and anecdotal evidence report milk thistle's effectiveness in preventing and managing inflammatory conditions such as the common cold, prostatitis, female reproductive tract inflammations, benign prostatic hyperplasia (BPH), uterine fibroids, and even hernias. In some documented cases, large fibroids and adenomas have reportedly regressed with continuous administration of milk thistle extracts.

Moreover, the plant exhibits antidiabetic properties, helping prevent and alleviate the complications of diabetes mellitus. It also reinforces vascular integrity, playing a protective role against myocardial infarction and stroke. Externally, milk thistle has been successfully applied in treating eczema, chronic wounds, burns, varicose veins, and scar reduction. It also contributes to skin regeneration and rejuvenation.

Compared to many other medicinal plants, milk thistle's therapeutic efficacy is reported to be 2–3 times higher, as confirmed by pharmacological experiments and clinical studies.

Conclusion

The integration of medicinal plants into agricultural crop systems is recognized as a vital approach for conserving the natural genetic resources of these species while ensuring sustainable, high-quality yields and a stable supply of raw materials. Compared to wild-growing medicinal plants, cultivated varieties provide more predictable and standardized outputs. However, the expansion of cultivation areas for certain medicinal plants faces several challenges, including low yield potential, limited seed availability, constrained biological traits, and prolonged flowering and maturation periods.

Improving primary seed systems and propagation techniques for such species remains a critical issue. In recent years, there has been growing scientific interest in studying the physiological and biochemical processes of medicinal plants to enhance their resilience to adverse soil-climatic conditions and stress factors. In this regard, targeted physiological research on milk thistle (*Silybum marianum*)—focusing on its biology, morphology, water exchange characteristics, and economic potential—represents a pressing research priority for optimizing its cultivation and zonal adaptability.

Based on the results of the conducted experiments, the following conclusions can be drawn: Among the studied varieties of milk thistle, the Debyut variety exhibited the highest average daily water retention capacity under water-deficit conditions, while the Samaryanka-77 variety showed the lowest performance. The Panacea variety demonstrated intermediate values. In terms of total water retention across all vegetative stages, Debyut again outperformed the others, whereas





Panacea displayed the lowest total water-holding ability.

These findings confirm that milk thistle possesses physiologically and biologically significant varietal differences, which support its potential for large-scale cultivation across diverse soil and climatic zones of Uzbekistan. The establishment of region-specific, high-performing varieties can therefore play a vital role in meeting the growing demand for medicinal plant-based products.

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