

Assessment of The Ornamental Characteristics of Medlar (*Mespilus Germanica* L.) In Uzbekistan: A Review

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Abstract

Mespilus germanica L. (common medlar) is a deciduous shrub or small tree of the Rosaceae family traditionally valued as a fruit crop but also possessing considerable ornamental potential. Despite its long history of cultivation and successful introduction into different climatic regions, its use as a landscape plant remains relatively limited, particularly in Uzbekistan. The present review evaluates the ornamental characteristics, ecological adaptability, phenological behavior, and potential landscape applications of *M. germanica* under the climatic conditions of Uzbekistan. Published scientific literature, dendrological sources, and results of long-term introduction studies conducted at the Tashkent Botanical Garden and in Southern Uzbekistan were analyzed. The species combines several ornamental features, including a compact tree habit, dense dark-green foliage, large white flowers, decorative fruits, seasonal foliage coloration, and a prolonged reproductive period. Observations from the Tashkent Botanical Garden demonstrate successful adaptation of the species to local conditions. Historical observations recorded flowering from 18 April to 1 May in 1969, whereas observations in 2023 showed flowering from 23 March to 27 April. Fruit development extended from late spring to late autumn. The species also demonstrates tolerance to heat, drought, partial shade, and relatively low soil moisture, which are important characteristics for ornamental horticulture under the continental and increasingly arid conditions of Uzbekistan. Evidence from Southern Uzbekistan further indicates that *M. germanica* exhibits a relatively short period of active shoot growth, which may represent an adaptive strategy to summer heat and water limitation. The available evidence suggests that *M. germanica* is a promising multifunctional species for solitary planting, landscape groups, green hedges, recreational areas, botanical collections, and ecological landscaping in Uzbekistan. Nevertheless, systematic evaluation of genotypic diversity, crown architecture, flowering intensity, fruit coloration, seasonal decorative value, and resistance to urban environmental stresses remains necessary.

Keywords: *Mespilus germanica* L.; medlar; ornamental plant; landscaping; introduction; phenology; drought tolerance; Tashkent Botanical Garden; Uzbekistan.

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1. Introduction

Urbanization, increasing summer temperatures, water scarcity, and the expansion of landscaped territories are creating a growing demand for ornamental woody plants capable of maintaining their aesthetic quality under stressful environmental conditions. This issue is especially relevant to Uzbekistan, where high summer temperatures, relatively low atmospheric humidity, and limited irrigation resources can restrict the use of many traditional ornamental trees and shrubs. Therefore, the introduction and evaluation of drought-tolerant, heat-resistant, multifunctional woody species represent an important direction for modern landscape horticulture.

Common medlar, *Mespilus germanica* L., belongs to the Rosaceae family and is generally described as a deciduous, densely branched shrub or small tree. The species has historically been cultivated for its edible fruits and is regarded as one of the neglected or underutilized fruit crops. A comprehensive international review by Voaides et al. emphasized that medlar has received substantially less scientific attention than major rosaceous fruit crops, despite its morphological, nutritional, biological, and ethnobotanical importance [1].

In addition to its fruit value, *M. germanica* possesses several morphological characteristics of direct ornamental importance. It develops a branched crown, relatively large dark-green leaves, conspicuous white flowers, and distinctive brownish fruits with persistent sepals. International studies describe leaves as generally elongated to obovate, approximately 6–15 cm long and 3–6 cm wide, while senescing foliage may develop attractive reddish coloration. The flowers are relatively large, white to white-pink, and contribute to spring ornamental value [2].

The fruits provide an additional ornamental component during late summer and autumn because of their unusual shape, brown to reddish-brown color, and persistent calyx. The contrast between green foliage and mature

fruits may extend the seasonal decorative period beyond flowering. Moreover, cultivated forms can produce considerably larger fruits than wild forms [3].

The potential significance of *M. germanica* for Uzbekistan is particularly associated with its ecological plasticity. Uzbek dendrological literature describes the species as tolerant of shade, drought, and high temperature and notes that it grows well on fertile, including calcareous, soils. It has also been suggested for the formation of attractive green hedges, especially in southern regions of the country [4].

The introduction history of *M. germanica* in the Tashkent Botanical Garden provides valuable local evidence regarding its long-term adaptability. According to Muradova [3], seeds originating from a botanical garden in Russia were introduced to Tashkent in 1956. Seedlings subsequently developed under local climatic conditions, and selected individuals were transferred to the European-Crimean-Caucasian exposition of the Botanical Garden. The first flowering was recorded in 1963. More recent observations indicate that the surviving specimen continues to flower and produce fruits despite growing under relatively shaded and moisture-limited conditions [3].

Therefore, the objective of the present review was to synthesize available scientific information concerning the ornamental characteristics of *Mespilus germanica* L., with particular emphasis on research and introduction observations conducted in Uzbekistan, and to assess its potential for wider application in landscape architecture and urban and recreational greening.

2. Methods

2.1. Review design

The present study was conducted as a narrative and analytical review focusing on the ornamental, morphological, ecological, and phenological characteristics of *Mespilus germanica* L., with particular consideration of research conducted under Uzbekistan

conditions.

Scientific publications, dendrological literature, conference materials, botanical garden observations, and international research papers were reviewed and compared. Particular attention was given to studies containing original observations of *M. germanica* in Uzbekistan. The principal Uzbekistan-specific sources included the long-term introduction observations from the Tashkent Botanical Garden summarized by Muradova [3], dendrological information relevant to landscaping in Uzbekistan reported by Qayimov and Berdiyev [2], and studies of introduced woody plants conducted under the extra-arid conditions of Southern Uzbekistan by Yoziyev et al. [4]. International information was primarily synthesized from the comprehensive review of *M. germanica* by Voaides et al. [1].

Muradova's study is particularly important because it documents both historical and recent phenological observations at the Tashkent Botanical Garden. The study reported introduction from seed, survival, flowering and fruiting behavior, and experimental attempts at vegetative propagation [3].

2.2. Evaluation criteria

For assessment of ornamental potential, the reviewed information was classified into the following major groups:

1. growth habit and crown architecture;
2. foliage characteristics and seasonal coloration;
3. flower size, color, and flowering duration;
4. fruit morphology and ornamental persistence;
5. phenological rhythm under Uzbekistan conditions;

Because the available studies from Uzbekistan were not originally designed using a unified quantitative ornamental rating scale, the present review does not assign artificial numerical scores to ornamental characteristics. Instead, ornamental potential was evaluated by comparative synthesis of documented morphological and ecological attributes.

3. Results and Discussion

3.1. Growth habit and crown architecture

Mespilus germanica commonly develops as a strongly

branched shrub or small deciduous tree. Under suitable conditions, plants generally reach approximately 3–6 m in height. Uzbek dendrological descriptions report a trunk diameter of up to about 20 cm and characterize the species as densely branched and densely foliated [6].

This growth habit provides several advantages for landscape design. In contrast to large-growing shade trees, medlar can be incorporated into relatively small gardens, recreational areas, courtyards, institutional landscapes, and mixed tree-shrub compositions. Its moderate height makes the species particularly suitable for locations where large trees could interfere with buildings or infrastructure [7,8].

The branched crown can provide visual structure throughout the year. Even after leaf fall, the irregular branching architecture may retain ornamental interest. For Uzbekistan, where smaller drought-adapted landscape plants are increasingly valuable, this compact growth form may represent an important practical advantage.

3.2. Ornamental value of foliage

The foliage constitutes one of the principal components of the species' ornamental appearance during the growing season. Uzbek sources describe medlar leaves as elongated-elliptical, dark green on the upper surface and lighter green on the lower surface, with individual leaves reaching approximately 14 cm in length and 7 cm in width [2]. International studies similarly characterize the leaves as relatively large, elongated to lanceolate or obovate, with significant variation in leaf size and area among genotypes [1].

Large foliage contributes to the formation of a visually dense crown and provides a strong green background for the white flowers during spring and developing fruits during summer. Another important ornamental feature is seasonal leaf coloration. Toward senescence, leaves may develop reddish or reddish-brown shades, thereby increasing the decorative value of the species in autumn [9].

Spring: young foliage and white flowering;

Summer: dense dark-green foliage;

Late summer-autumn: foliage combined with distinctive fruits;

Autumn: foliage color transition and persistent fruits.

This prolonged succession of ornamental phases represents one of the strongest arguments for its greater inclusion in landscape planting. The main morphological

features contributing to this ornamental value are illustrated in Figure 1.



Figure 1. Morphological and ornamental features of *Mespilus germanica* L.: (a) tree habit; (b) bark; (c,d) fruit-bearing branches and foliage; (e,f) flowers; (g,h) fruits. Reproduced from Voaides et al. (2021) under the CC BY 4.0 license [10].

3.3. Flowering and spring ornamental effect

The flowers of *M. germanica* are among its most conspicuous ornamental features. Uzbek dendrological literature describes relatively large white flowers reaching approximately 5 cm in diameter [2]. Unlike species producing very small clustered flowers, medlar develops visually distinct individual flowers against the dark-green foliage. The white color produces strong contrast with the leaves and contributes to a clean and naturalistic appearance appropriate for parks, botanical

gardens, private landscapes, and ecological planting schemes.

Historical observations carried out in the Tashkent Botanical Garden in 1969 showed that flowering started on 18 April and continued until 1 May, corresponding to approximately 13 days of flowering. In contrast, observations conducted in 2023 indicated flowering from 23 March until 27 April, giving a considerably longer flowering period of approximately 35 days [3].

Table 1. Flowering and fruiting phenology of *Mespilus germanica* in the Tashkent Botanical Garden

Observation period	Beginning of flowering	End of flowering	Flowering duration	Beginning of fruit formation	End of fruiting period
1969	18 April	1 May	13 days	1 June	8 October
2023	23 March	27 April	35 days	22 May	Late November

Source: synthesized from Muradova [3].

The apparent shift toward earlier and longer flowering is noteworthy. However, it should be interpreted cautiously because observations originate from different years and possibly different environmental contexts. It cannot be

attributed solely to genetic adaptation without multi-year replicated climatic data. Nevertheless, the ability of the species to flower regularly after decades of cultivation demonstrates successful completion of its reproductive

cycle under Tashkent conditions. From an ornamental perspective, prolonged flowering is desirable because it increases the period during which plants contribute prominently to the landscape.

3.4. Fruit as an ornamental element

After flowering, medlar retains aesthetic importance through fruit formation. The fruits are highly characteristic and are readily distinguished by their persistent enlarged sepals. Depending on genotype and growing conditions, their color ranges from yellowish or reddish in some descriptions to brown and dark brown during advanced maturation. Uzbek dendrological literature reports fruits approximately 4–7 cm in diameter, while the Tashkent Botanical Garden description indicates abundant fruit formation [2,3].

International studies have demonstrated substantial variation in fruit size, shape, and weight among medlar genotypes, indicating considerable potential for selecting ornamental forms with particularly attractive fruits [1]. At the Tashkent Botanical Garden, fruit formation in 1969 extended from approximately 1 June to 8 October, whereas in the 2023 observations it began on 22 May and continued until the end of November [3].

Thus, following spring flowering, the species may maintain reproductive ornamental features for approximately five to six months. This is highly relevant to landscape design because many flowering ornamental woody plants lose most of their visual distinctiveness immediately after flowering. In medlar, by contrast, flowering is followed by the gradual development and coloration of unusual fruits, providing a transition between spring, summer, and autumn landscape phases.

3.5. Adaptability to the climatic conditions of Uzbekistan

One of the major challenges in selecting ornamental plants for Uzbekistan is adaptation to high temperature and periodic soil-water deficit. Available local evidence suggests that *M. germanica* possesses potentially valuable stress-tolerance characteristics. Uzbek dendrological sources characterize it as tolerant to drought, heat, and partial shade. It grows particularly well on fertile soils, including calcareous soils [2].

Long-term experience at the Tashkent Botanical Garden provides additional evidence. Seeds were introduced in 1956, seedlings emerged during 1957-1958, and 15 young plants were transferred to the European-Crimean-

Caucasian section in 1960. The first flowering was observed in 1963. According to the 2024 report, one of the original trees remains in the collection. The surviving individual grows in a relatively shaded location with limited moisture while continuing to flower and produce fruits satisfactorily [3].

The survival of an introduced individual for several decades is evidence of considerable ecological compatibility with local conditions, although the decline from 15 original individuals to one surviving specimen also demonstrates that survival rate and causes of plant loss require additional investigation [11].

Research from Southern Uzbekistan provides further useful information. Yoziyev, Samatova, and Buronova studied introduced woody species under the extra-arid conditions of Kashkadarya and Surkhandarya. In their classification, *M. germanica* was assigned to the group of introduced species with a short shoot-growth period of approximately 41–70 days. The authors interpreted shortened active growth and increased spring growth intensity as one of the general adaptation strategies of introduced woody plants under the hot and dry conditions of Southern Uzbekistan [4].

This characteristic is particularly relevant to landscaping in arid environments. Completing much of the active shoot-growth phase before the onset of extreme summer heat can potentially reduce exposure of actively growing tissues to severe heat and atmospheric drought.

3.6. Potential landscape applications in Uzbekistan

Solitary planting. Because of its moderate size, broad crown, attractive flowers, and characteristic fruits, medlar can be used as a specimen plant in lawns, courtyards, botanical displays, and recreational spaces.

Group compositions. The species can be combined with other flowering and foliage plants in mixed landscape compositions. Its white spring flowers and green summer crown make it relatively easy to combine with ornamental shrubs possessing red, purple, yellow, or silver foliage.

Green hedges and boundary planting. Uzbek dendrological sources indicate the potential of *M. germanica* for creating attractive green hedges. Its dense branching and foliage make it potentially suitable for free-growing hedges, particularly where a naturalistic appearance is preferred to regularly clipped formal hedges [2].

Fruit-ornamental gardens. One particularly promising application is edible landscaping. Because medlar combines ornamental value with edible fruits, it can perform both aesthetic and productive functions. This multifunctionality is relevant to botanical gardens, educational institutions, sanatoriums, agro-tourism facilities, household gardens, and demonstration landscapes.

Water-conscious landscaping. Tolerance to heat and periodic water deficit suggests potential use in

landscapes designed to reduce irrigation demand. However, the exact irrigation requirements of medlar in different regions of Uzbekistan still require controlled experimental evaluation.

3.7. Integrated assessment of ornamental characteristics

Based on the available literature, the major ornamental characteristics of medlar can be summarized as follows.

Table 2. Main ornamental characteristics and their landscape significance

Characteristic	Expression in <i>M. germanica</i>	Ornamental significance
Plant habit	Shrub or small tree, generally 3–6 m	Suitable for small and medium landscapes
Crown	Densely branched and foliated	Attractive silhouette and hedge potential
Leaves	Large, elongated, dark green	Strong summer foliage effect
Autumn foliage	Reddish to reddish-brown coloration may occur	Extends seasonal ornamental value
Flowers	Large, predominantly white	Strong spring visual attraction
Flowering	Up to 35 days in 2023 Tashkent observations	Relatively prolonged decorative phase
Fruits	Distinctive fruits with persistent calyx	Summer-autumn decorative value
Fruit period	Can extend to late November in Tashkent	Long seasonal effect
Heat tolerance	Reported as relatively high	Relevant to Uzbekistan's hot climate
Drought tolerance	Reported in Uzbek dendrological literature	Potential for reduced-water landscapes
Shade tolerance	Successful growth reported under partial shade	Flexibility in planting sites
Functional value	Ornamental + edible	Suitable for multifunctional landscaping
Hedge suitability	Dense branching and foliage	Suitable for free-growing green barriers

These characteristics show that the ornamental importance of medlar should not be evaluated solely on the basis of flower appearance. Its principal advantage lies in the combination of several seasonal and functional traits.

3.8. Limitations of existing research in Uzbekistan

Despite promising results, the scientific basis for large-scale ornamental use of medlar in Uzbekistan remains incomplete. The most important limitation is the small number of published local studies specifically evaluating ornamental characteristics. Most available Uzbek research has focused on introduction, phenology, propagation, general dendrology, or adaptation rather

than standardized landscape assessment.

Furthermore, the current Tashkent Botanical Garden observations appear to be based largely on a very limited number of surviving mature specimens. Consequently, the available evidence cannot adequately characterize intraspecific variability.

A standardized ornamental rating system would be particularly useful for comparing *M. germanica* with other woody species currently used in landscaping in Uzbekistan.

4. Conclusion

The available evidence indicates that *Mespilus*

germanica L. has considerable potential as an ornamental and multifunctional woody plant for landscaping in Uzbekistan. Its compact crown, dense dark-green foliage, white flowers, decorative fruits, and seasonal foliage coloration provide ornamental value from spring to autumn. Long-term observations at the Tashkent Botanical Garden, together with studies from Southern Uzbekistan, confirm its ability to flower, fruit, and adapt to relatively dry and hot continental conditions. This is particularly important for Uzbekistan, where the expansion of green spaces is increasingly linked with the need for heat- and drought-tolerant species that can maintain decorative value under limited water availability. The wider use of *M. germanica* could contribute to diversifying the assortment of ornamental woody plants, enriching urban and recreational landscapes, supporting water-efficient landscaping, and promoting the conservation and practical use of an underutilized fruit species. Therefore, *M. germanica* can be considered a promising species for solitary and group plantings, green hedges, botanical collections, recreational areas, and multifunctional green spaces in Uzbekistan, while further multi-year studies across different regions and genotypes are needed to develop broader practical recommendations.

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