

Prospects of Introduction of Mahonia Aquifolium in Uzbekistan

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Annotation. The article summarizes the findings of a study on the ornamental features of the mahonia aquifolium, a plant introduced to Uzbekistan for ornamental purposes. In most tree species, the degree of yearly ripening of branches affects how successfully they can overwinter. The lignified portion of mahonia aquifolium shoots averages 75% of their whole length. They have three distinct color phases: crimson when in bloom, dark green in the summer, and reddish-golden-bronze in the fall. The flowers are about 8 mm in diameter, collected in many-flowered panicles or brushes in the axils of the outer scales of the apical bud, light yellow, bright, often with a lemon tint. Sepals 9, greenish-yellow; petals and stamens 6 each. Fruits are juicy berries. Berries are oblong-elliptical, up to 10 mm long, up to 8 mm wide, bluish-black, with abundant bluish bloom oblong-elliptical, up to 10 mm long, up to 8 mm wide, bluish-black, with abundant bluish bloom, covered with 2-8 seeds, sweet and sour. Oblong, chestnut, lustrous seeds measure 4.5 mm long, 2.3 mm diameter, and 1.5 mm thick. There are 5,000 berries or 100,000 seeds per kilogram [6].

Key words: mahonia, introduction, alkaloid, phenology, ascorbic acid, ontogeny, ornamental feature.

Introduction. An ever-increasing impact of technological forces on nature, and consequently on humans, is accompanied with a growth in the size of urbanized areas. The preservation of natural and artificial phytocenoses for the improvement of the environment, as well as the search for and introduction of plants into culture in order to obtain food products with increased biological value, have become especially concerning in the environmentally unfavorable conditions of the Urals.

Currently, there is a greater need for the production of mahonia aquifolium (*Mahonia aquifolium* (Pursh) Nutt), an unconventional horticulture crop used in Central Asia as an ornamental, medicinal, and berry shrub. This is because mahonia has a rich biochemical and elemental composition (such an element as copper is found only in mahonia leaves). The root of the plant contains many tannins, organic acids, vitamin C, and alkaloids [1].

It is used for cardiovascular disorders as well as to boost appetite, enhance metabolism, delay aging, and strengthen the immune system. Hepatitis, dysbacteriosis, issues with the biliary tract, and cholecystitis are all treated with mahonia root extract. Mahonia is used to treat herpes, rashes, and eczema because it has antiviral and antibacterial properties.

Mahonia medications increase blood flow and fortify blood capillary and artery walls. The fact that mahonia has anti-cancer capabilities is quite intriguing to biochemists. It has been found that berberine, which is found in berries, is able to kill more pathogenic organisms and cancer cells. So this substance protects the bone marrow and aids in its recovery following difficult procedures like chemotherapy [3,7].

Methodology (materials and methods).

Mahonia aquifolium (Pursh) Nutt plants in various ontogenic states were selected as the objects of the study. This plant was introduced into Uzbekistan in the last century as an ornamental and medicinal plant. The studies were carried out in the conditions of the Tashkent Botanical Garden of the Academy of Sciences of the Republic of Uzbekistan and in the landscaping objects of Tashkent. Phenological observations were carried out according to I.N. Beideman (1954). When studying the morphological features of fruits and seeds, we used the methodological instructions of I.A. Ivanova and N.M. Dudnik (1974), N.N. Kaden and S.A. Smirnova (1974). Seed productivity was determined by the methods of A.A. Korchagin (1960) and I.V. Vainagiy (1974).

The prospects of the introduction were conducted using a modified version of the scale developed by P.P.Lapin in the Department of Dendrology of the Main Botanical Garden in 1973. Using EXCEL software

(Microsoft Office Professional Plus 2010), experimental data were analyzed using the dispersion analysis approach proposed by B.A. Dospekhov (1985) and G.N. Zaitsev (1991).

Results and discussion. Mahonia can be found in nature considerably further south than our borders, from the Himalayas to eastern China and south to the island of Sumatra. Mahonia can also be found in nature in North America and Asia. Although several East Asian species are currently quite popular as attractive plants in Western Europe, the Nordic nations cannot support their growth due to their excessive thermophilia.

Mahonia grows naturally as an evergreen shrub up to 1 m tall that often forms thickets from root offspring. The bark has longitudinal striations and is pinkish-gray on juvenile shoots and brown-gray on older shoots.

Mahonia aquifolium is characterized by a monopodial growth of shoots, which is the result of the activity of the apical meristem. On the main stem, lateral buds develop into lateral shoots. Because of their apical bud, branches of the second order continue to grow monopodially and give rise to branches of the third and subsequent orders [1].

The apical flower bud is ovoid, up to 1 cm long, and has external membranous, strongly pointed scales that stay on the shoots for 1-2 years. The internal parts are herbaceous and blunt, and they fall off. Lateral buds are 3-5 mm long and have ovate, slightly pointed scales that are oblong-ovate.

Summing up the results of testing Mahonia aquifolia in the conditions of the sharply continental climate of Uzbekistan was carried out according to the method of integral numerical assessment of the viability and prospects for the introduction of trees and shrubs based on visual observation materials developed in the Main Botanical Garden.

In most tree species, the degree of yearly ripening of branches affects how successfully they can overwinter. The lignified portion of mahonia aquifolium shoots averages 75% of their whole length. A leading factor in the introduction, winter hardiness is measured on a scale, and in our study, winter damage does not exceed 50% of the length of annual shoots (point II) [5].

The degree of a plant's winter hardiness determines how well it can maintain its natural mode of growth and many of the characteristics for which it is used in culture. Even after severe freezing, plants can regenerate their crowns because to their ability to develop new shoots, but how severe the freezing was is a biological trait. Mahonia aquifolium has a strong capacity for producing new shoots (high shoot-forming capacity). Although it is a winter-hardy species, enough new shoots are produced to support and grow a typical life form and and maintain habitus.

Mahonia aquifolia has leathery, evergreen leaves that hang on the stalks for three to four years. They have three distinct color phases: crimson when in bloom, dark green in the summer, and reddish-golden-bronze in the fall. Compound, pinnate leaves range in size from 5 to 9 leaflets, are up to 15-20 cm long, and typically have a reddish petiole. Leaflets are leathery, dark green above, glossy, and have a depressed network of veins. Below, they are dull and pale green with notched-sharp-toothed edges, and they are 3 to 9 cm long and 1.5 to 2.5 cm wide. Lateral divisions are unequal and are on reddish petioles. Bristly, 2–5 mm long stipules [4,8].

The leaves' green color does not return right away after the winter. This is a result of the absence of the favorable temperatures and sunlight requirements for the recovery of the photosynthetic process. The location is another important factor. Compound pinnate leaves can grow up to 20 cm long and have 3 to 9 leaflets each.

The light yellow, brilliant, and frequently lemon-tinted blooms are about 8 mm in diameter and clustered in many-flowered panicles or brushes in the axils of the outer scales of the apical bud. Sepals 9, greenish-yellow; petals and stamens 6 each. The flowers of the mahonia aquifolium are bisexual, actinomorphic, up to 8 mm in diameter. The flower has nine sepals, six petals arranged in two circles, each petal with a big nectary at the base, and six stamens. One carpel makes up the gynoecium. The stigma is sessile with an expanded upper part, the ovary is superior. The carpel can produce up to 8-10 ovules, and placentation is laminar.

The fruits are juicy berries. Berries are oblong-elliptical, up to 10 mm long, up to 8 mm wide, bluish-black, with abundant bluish bloom oblong-elliptical, up to 10 mm long, up to 8 mm wide, bluish-black, with abundant bluish bloom, covered with 2-8 seeds, sweet and sour. Oblong, chestnut, shiny seeds measure 4.5 mm long, 2.3 mm diameter, and 1.5 mm thick. There are 5,000 berries or 100,000 seeds per kilogram; each

1,000 seeds weigh between 7.5 and 11.5 g. Blooming occurs from April through May. The fruit season runs from August through September [6].

Round, sickle-shaped, and club-shaped seeds are common. The epidermal cell walls are thickened and lignified, and the surface of the seed coat is dense, smooth, and shiny. The outer and inner epidermis of the outer integument, the parenchyma of the outer integument, which comprises a layer of palisade cells, the outside and inner epidermis of the inner integument, and the parenchyma of the inner integument all contribute to the formation of the seed coat.

Sizes of seeds range from 0.18 to 0.55 cm in length, 0.07 to 0.28 cm in width, and 0.05 to 0.23 cm in thickness. The endosperm is fully formed and has protein and oils as backup materials. The embryo grows to a length of 4/3 seeds. It has roots and flat, well-developed cotyledons. The hypocotyl is equally as long as the cotyledons and very short, practically immediately entering into the root.

The embryonic root ends with a growth cone covered with a root cap. *Mahonia aquifolium* seeds have a fully developed embryo, yet even when the right circumstances are present, germination does not take place. *Mahonia* seeds exhibit a deep physiological hibernation that they only emerge from after extensive stratification. It is advised to stratify *mahonia aquifolium* seed for three months at a temperature between 0 and +5 degrees Celsius.

Shape: rounded and marginally oblong. The fruits are blue-black in color with a bluish bloom, and they contain 2-4 or more seeds on average, which fill nest of the ovary.

Conclusion

1. The length of the lignified part of *mahonia aquifolium* shoots is typically 75% of their total length. Winter hardiness is considered as a leading factor in the introduction, and in our study, winter damage does not exceed 50% of the length of annual shoots.

2. *Mahonia aquifolia* has leathery, evergreen leaves that hang on the stalks for three to four years. They have three distinct color phases: crimson when in bloom, dark green in the summer, and reddish-golden-bronze in the fall. Compound, pinnate leaves range in size from 5 to 9 leaflets, are up to 15-20 cm long, and typically have a reddish petiole. Leaflets are leathery, dark green above, glossy, and have a depressed network of veins. Below, they are dull and pale green with notched-sharp-toothed edges, and they are 3 to 9 cm long and 1.5 to 2.5 cm wide. lateral unequal, on reddish petioles 0.5-2 cm long [4,8].

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