



DECORATIVE CHARACTERISTICS OF INTRODUCED WILD APPLE (*MALUS MILL*) SPECIES IN ABSHERON

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Abstract: The ecological significance of introduced decorative apple (*Malus Mill.*) species to the Central Botanical Garden has been studied in the article. Research has been conducted on 19 apple plant species, and it has been determined that the majority of these studied apple species have been evaluated with a score of 3 and 4 for their decorative qualities. These species maintain their decorative appearance for an extended period during the spring, summer, and autumn seasons. Specifically, *M.mandshurica*, *M.micromalus*, *M.baccata*, *M.niedzwetzkyana*, *M.pumila*, *M.purpurea*, *M.orientalis* have been rated with 4 points, while the following species: *M.spectabilis*, *M.hupehensis*, *M.sargentii*, *M.floribunda*, *M.zumi*, *M.prunifolia*, *M.halliana*, *M.sieversii*, *M.cerasifera* have been rated with 3 points. Based on statistical results, the fact that many of these species are considered highly promising and promising indicates their better adaptation to the Absheron conditions. In this regard, the selection of consistently decorative species included in separate clusters and their use in improving the ecological situation in Absheron and obtaining new varieties in decorative gardening and breeding work is purposeful.

Keywords: Malus, introduction, decorativeness, greening, vitality, cluster

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Introduction:

Environmental security issues, which are one of the key factors in ensuring sustainable development, have been incorporated into the national security strategy of many countries due to their importance and national priorities (Agayev, 2013). The development of an environmental security system is not only based on scientific principles but also plays a decisive role in disseminating this idea across all sectors of society (Aremenko, 1964). The issue of environmental protection has been recognized as one of the fundamental functions of states by international legal theorists, aimed at the continuous, sustainable use of the Earth's natural resources for the benefit of current and future generations and the effective management of the global environment to protect against harmful effects (ANAS, 2012). Addressing the violation of ecological balance and the negative effects it poses to living organisms, including plants, is one of the most important issues facing every individual (Sadigov, 2019). Evaluating the prospects and

decorative qualities of apple varieties is crucial for their selection and use in greening and landscaping in various areas.

Many wild apple species are distinguished by their high decorative qualities. (E.L. Wolf, 1915) noted in the book "Decorative Shrubs and Trees for Parks and Gardens" that there is no other beautiful flowering plant suitable for decorating gardens except apple. French horticulturist L. Tille recognized the high decorative characteristic of the *M.niedzwetzkyana* species and said, "There is nothing more interesting than this small tree" (Aremenko, 1964)

Various researchers around the world have found that wild apple species, widespread in Central Asia, are resilient to various biotic and abiotic factors in the environment (Sadigov, 2019). E.N. Sadigov has obtained various new apple varieties by using wild apple species as rootstocks. According to L.M.Yaremenko Decorative apples belong to the group of light-loving plants. In well-lit areas, their growth and development are accelerated, enhancing their decorative qualities, and they are successfully

used in landscaping. M.S. Aleksandrov (Aleksandrova, 2014) and Y.V. Sedina (Sedina, 2010) have noted that many wild apple species differ in morphological characteristics and are annually decorative. Small-fruited decorative apples are well-known to gardeners and decorators, and there is a growing demand for such varieties. According to K.Q. Tkachenko (Tkachenko, 2009), apple varieties are typically used for their beautiful flowers, fruits, decorative appearance during flowering and fruiting periods, and the autumnal coloring of leaves (Aleksandrova, 2014). In addition to productive apple orchards in various countries, it is also possible to see numerous decorative apple plantations along roadsides (Serebryakov, 1952).

In this regard, the research work is relevant, as it can play a crucial role in identifying resilient apple varieties with high quality, which can contribute to improving the ecological situation and their use in decorative gardening.

Material and methods:

As the research material, 19 wild apple species from the collection area of the Central Botanical Garden were selected. The research assessed the prospects based on vitality indicators (Suhih, 1979) and decorative qualities (Suhih B.F. 1979) of the apple species. To evaluate the decorative qualities of the studied species, a five-point scale suggested by B.F.Suhikhin was used (Suhih, 1979). Plants with decorative features during the vegetation period were rated with 4 points, and those possessing them during a specific time of the vegetation period were rated with 3 points.

The obtained results were statistically analyzed, organized, and scientific and practical conclusions were drawn. Cluster analysis of samples was carried out using the Ward method based on the Euclidean genetic distance index.

Results and discussions:

For assessing the decorative characteristics of the species based on planting types: individually (in the foreground and perspective) and in groups (along alleys, in gardens, on street plantings, in hedges, vertical landscaping, etc.), the species were grouped. (Table 1). When selecting varieties for decorative gardening, several decorative qualities are taken into consideration, including the external appearance of plants (height, shape, color of leaves, flowers, and fruits), color change in summer and autumn, flowering (timing of blooming), and the duration of fruiting. Other important factors include abundant flowering, the effectiveness of flowers, resistance to diseases and pests, soil requirements, adaptability to drought, cold, and continuous foliage.

It has been determined that almost all varieties are highly decorative, both when planted individually and in groups. Some apple varieties exhibit higher decorative qualities when planted individually. When planted individually, they attract more attention with their external appearance, flowers, and fruits. *M.spectabilis*, *M.prunifolia*, *M.sieversii*, and *M.mandshurica* varieties are more effective in hedges and along roadsides, while *M.sargentii* is more suitable for lawns and around tall trees.

Table 1. Classification of apple varieties by planting type

№	Species name	Main planting types							
		groups	one by one one by one		along alleys (in gardens)	street plantings	unstructured living hedges, on borders	"In living hedges with a given shape"	if vertical landscaping
			foregroun d	in prospect					
1.	<i>M. spectabilis</i>	+	+	-	+	+	-	-	-
2.	<i>M. hupehensis</i>	+	-	+	-	+	-	-	-
3.	<i>M. sargentii</i>	+	-	+	-	-	-	-	+
4.	<i>M. floribunda</i>	+	-	+	-	+	-	-	-
5.	<i>M. zumi</i>	+	-	+	-	+	-	-	-



6.	<i>M. prunifolia</i>	+	-	+	+	+	+	+	+
7.	<i>M. mandshurica</i>	+	+	-	+	-	-	-	+
8.	<i>M. halliana</i>	+	-	+	-	-	-	-	-
9.	<i>M. micromalus</i>	+	-	+	-	+	-	-	+
10.	<i>M. prattii</i>	+	-	+	-	-	-	-	-
11.	<i>M. baccata</i>	+	-	+	+	-	-	-	+
12.	<i>M. hissarica</i>	+	-	+	-	-	-	-	-
13.	<i>M. kirghisorum</i>	+	+	+	+	-	-	-	+
14.	<i>M. niedzwetzkyana</i>	+	-	+	-	-	+	+	+
15.	<i>M. sieversii</i>	+	-	+	+	+	-	-	-
16.	<i>M. cerasifera</i>	-	-	-	+	-	-	-	-
17.	<i>M. pumila</i>	-	-	+	-	-	-	-	+
18.	<i>M. purpurea</i>	+	+	+	-	-	-	-	-
19.	<i>M. orientalis</i>	+	+	-	-	+	-	-	-

Therefore, they are widely used in creating park compositions. *M.halliana*, *M.niedzwetzkyana*, and *M.micromalus* varieties are suitable for botanical gardens, dendrological collections, and for shading in urban areas. Their large size also makes them suitable for planting along roadsides. (Gurbanov, 2015) *kirghisorum* and *M.orientalis* varieties can be planted in forests, both individually and in groups. *M.baccata* is particularly decorative during the flowering period, making it suitable for various mixed and multi-stem groups. Different-sized, circularly trimmed trees are used in these groups. In the center of the group, holly, oak, and common medlar trees are planted. *M.coronaria* is part of the American group and is found in the forests of North America. Its flowers are white or pink, and it is highly decorative. *M.hissarica* is often encountered alongside oak and various trees. *M. purpurea* is effective for planting both individually and in combination with silver-leaved plants (such as silverberry, chokeberry, silver oak, etc.) (Robinson, 2006) The decorative quality of the studied varieties has been assessed using a

rating scale (Table 2).

It has been established that the decorative qualities of most species are rated at 3-4 points. The species maintain a decorative appearance for a long time in spring, summer, and autumn. *M.mandshurica*, *M.Micromalus*, *M.baccata*, *M.niedzwetzkyana*, *M.pumila*, *M.purpurea*, *M.orientalis*, receive 4 points, while the remaining species, including *M.spectabilis*, *M. hupehensis*, *M.sargentii*, *M.floribunda*, *M.zumi*, *M.prunifolia*, *M.halliana*, *M.sieversii*, *M.cerasifera*, are rated at 3 points.

One of the indicators of decorative quality is the external appearance of trees. *M. hupehensis*, *M.floribunda*, *M.prunifolia*, *M.halliana*, *M.cerasifera*, *M.micromalus*, *M.prattii*, *M.baccata*, *M.niedzwetzkyana*, *M.purpurea* have a beautiful appearance both during flowering and fruiting. *M.niedzwetzkyana*, *M.purpurea*, *M.sieversii* varieties are highly effective in decorative horticulture because their leaves, bark, flowers, fruits, and wood have a reddish pigment (anthocyanin). In breeding, it can be used as initial material in obtaining apple varieties with red flesh.

Table 2. The evaluation of the decorative qualities of apple varieties

№	Species name	Scores				
		1	2	3	4	5
1.	<i>M. spectabilis</i>	-	-	+	-	-
2.	<i>M. hupehensis</i>	-	-	+	-	-
3.	<i>M. sargentii</i>	-	-	+	-	-
4.	<i>M. floribunda</i>	-	-	+	-	-
5.	<i>M. zumi</i>	-	-	+	-	-
6.	<i>M. prunifolia</i>	-	-	+	-	-
7.	<i>M. mandshurica</i>	-	-	-	+	-
8.	<i>M. halliana</i>	-	-	+	-	-
9.	<i>M. micromalus</i>	-	-	-	+	-
10.	<i>M. prattii</i>	-	-	-	-	-

11.	<i>M. baccata</i>	-	-	-	+	-
12.	<i>M. hissarica</i>	-	-	-	-	-
13.	<i>M. kirghisorum</i>	-	-	-	-	-
14.	<i>M. niedzwetzkyana</i>	-	-	-	+	-
15.	<i>M. sieversii</i>	-	-	+	-	-
16.	<i>M. cerasifera</i>	-	-	+	-	-
17.	<i>M. pumila</i>	-	-	-	+	-
18.	<i>M. purpurea</i>	-	-	-	+	-
19.	<i>M. orientalis</i>	-	-	-	+	-

In various types of plantings, beautiful contrasting compositions can be created, especially when planted next to groups of light green or silvery-colored trees. These species are used in landscape design for single and group hedges.

During the statistical analysis of the obtained results, the data were systematized and grouped based on viability indicators. The species studied using the Euclidean genetic distance index were divided into 5 main groups based on viability indicators (Figure 1).

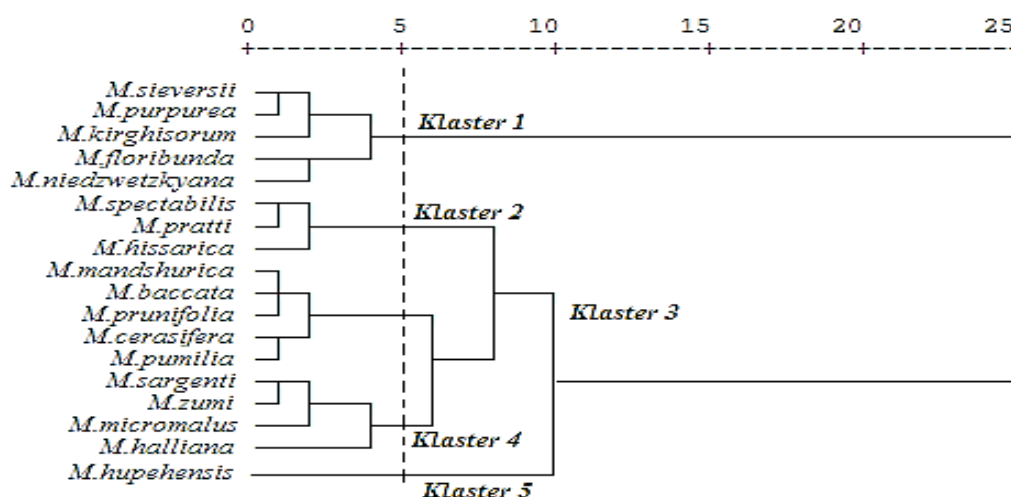


Figure 1. Grouping of apple species based on the application of the Euclidean genetic distance index according to the indicators of apple species' viability.

It turned out that the species included in cluster 5, in terms of viability indicators, differed from the other species. Analysis of the results showed that this species is relatively less promising compared to others. The 5 types included in cluster 1 were entirely promising, while the types included in clusters 2, 3, and 4 were also promising.

It should be noted that the high number of clusters indicates a significant diversity among apple varieties. Those within the same cluster are similar to each other in terms of their vital characteristics, while they differ from the

varieties in other clusters. Therefore, it is possible to select varieties with the highest qualities from different clusters for breeding work to develop new varieties with superior characteristics.

The majority of the varieties have been rated with 3 and 4 points based on their decorative qualities. The flowers of the studied varieties are white, pink, and red in color, making them suitable for creating beautiful compositions in individual and group plantings in gardens, along roadsides, and in parks (Figure 2).



Figure 2.Decorative appearance of some apple varieties: 1, 2 - *M. pumila*, 3-*M. niedzwetzkyana*; 4th, 5th. si versions; 6th *spectabilis*, 7th. *hissarika*, 8th *kirghizorum*; 9th *floribunda*; 10 - *M. bakkata*, 11 - *M. mandshurika*, 12 - *M. prunifolia*

Conclusion:

Based on the results, it should be emphasized that the full and prospective adaptability of the studied varieties to the Absheron conditions is indicative of their suitability. Selecting decorative and stress-tolerant varieties that belong to different clusters and continuing ecological improvement in the Absheron region is appropriate for leadership in ornamental horticulture and the development of new varieties in breeding work.

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