



DISEASES AND PESTS OF APPLE (MALUS MILL.) SPECIES INTRODUCED IN ABSHERON

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Abstract: The article first studied the diseases and pests found in wild apple varieties introduced in Absheron. The researches were carried out in the collection area of the Central Botanical Garden, 23 wild apple varieties were taken as objects of research. One of these species was introduced from the flora of Azerbaijan, and other species were introduced from North America, and Central and East Asia. The purpose of the study was to determine which diseases and pests were found in the species studied in the conditions of Absheron, as well as to select resistant diseases and pests and use them as a breeding ground for the selection of resistant varieties. As a result, powdery mildew was found in the leaves of *M.niedzwetzkyana*, various silkworms in the leaves of *M.purpurea*, apples in the fruits of *M.pumila*, and pears in the leaves of *M.cerasifera*. The causative agent of powdery mildew was *Podosphaera leucotricha*. The leaves and shoots of the infected apple plant were damaged. As a result, infected leaves harden, and the shoots stop growing. The caterpillars of the variegated silkworm have eaten the moon and stalks of the leaves, destroying the damaged tree. In apple trees infested with apple worms, most of the fruit became unusable and productivity declined. Pear larvae are found in colonies on the undersides of leaves. As these colonies suck the sap from the leaves, the leaves fade, become discoloured and contaminated with black sticky excrement at the bottom, become discoloured and contaminated with black sticky excrement at the bottom, and the three turn brown from head to toe. Later, the leaves withered and fell off, and productivity declined. No diseases or pests were found in other species. In this regard, other wild species studied can be used as a breeding ground for selection diseases and pests.

Keywords: Absheron, *Malus*, introduction, diseases, pests.

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Introduction:

The apple tree, like many other plants, is affected by various diseases and pests. These diseases and pests damage not only the fruits but the entire plant and even lead to its death. In such plants, the assimilation process is disrupted, the plant cannot develop normally, its productivity decreases and it loses its

aesthetic properties. It has been established that the damage and losses caused by phytopathogenic organisms to plants are extremely high. Pests and diseases of fruit plants have been studied by several researchers (Arabzade, 2012); (Arabzade, 2021).

M.R. Gurbanov determined the phytosanitary status of apple orchards, D.N.



Agayeva determined the mycobiota of Absheron, I. Jafarov determined plant diseases, A.R. Aliyeva identified the natural pests of the main insects damaging fruit trees in the Lankaran region (Gurbanov, 2009); (Aghayeva, 2014); (Jafarov, 2012); (Aliyeva, 2013). K.F. Bakhshaliyeva and others, monitoring phytopathogenic microorganisms on some trees, Z.M. Mamedov studied the bioecological characteristics of the codling moth and apple fruit eater in the Sheki-Zagatala region of Azerbaijan (Bakhshaliyeva, 2014); (Mammadov, 2011). N.G. Andrianova and others discovered that apple fruits are susceptible to various fungal diseases during storage (Andrianova, 2016). Sometimes overripe fruits darken, lose their aroma and become tasteless. N.I. Savelyev and N.N. Savelyeva studied the characteristics of powdery mildew disease in apple trees due to sudden temperature changes (Saveliev, 2008). According to L.M. Yaremenko, wild small-fruited apple tree varieties are more resistant to diseases and pests than large-fruited cultivated apple tree varieties (Yaremenko, 1964). Diseases and pests are rare in wild apple trees of East Asian origin. As per the research conducted by A.L. Lip, the species *M.prunifolia* shows more resistance to fungal diseases (Yaremenko, 1964). J.Schovankova and H.Opatova have studied the impact of fungal infections on phenolic compounds and phenylalanine-ammonia lyase activity in apple fruits (Schovankova, 2011). H. Hajnari and A. Mizani researched the effect of viral infections in the soil on the quality of fruits (Hajnajari, 2014). They infected the fruits with the root of the plant. It is crucial to identify various diseases and pests to purchase high-yielding fruit varieties. Thus, it is of utmost importance to study the diseases and pests of the wild apple species introduced in Absheron and identify resistant species. The identification of resistant species will aid in the procurement of new varieties using them as seedlings.

Materials and Methods:

The research was conducted on 23 new and newly introduced wild apple species in the collection area of the Central Botanical Garden,

including *Malus spectabilis* Ait., *M. hupehensis* Pamp., *M. sargentii*. Rehd., *M. floribunda* Sieb., *M. zumi* Mats., *M. prunifolia* Borkh., *M. mandshurica* Kom., *M. halliana* Koehne., *M. micromalus* Max., *M. prattii* Hemsl., *M. baccata* L., *M. hissarica* S. Kudr., *M. kirghisorum* Al. et An., *M. niedzwetzkyana* Dieck., *M. sieversii* Ledeb., *M. cerasifera* Spash., *M. pumila* Mill., *M. purpurea* Rehder., *M. orientalis* Uglitzk., *M. coronaria* L., *M. ioensis* Britton., *M. platycarpa* Rehd., *M. toringo* Siebold.

The Absheron region has a mild-hot and dry subtropical climate due to its flatness, making it a semi-desert area. The average annual air temperature ranges between 13.6 to 14.9°C, while the average annual precipitation is 203.3 mm. It has been observed that the Central Botanical Garden has grey-brown soils suitable for the Absheron peninsula (Mammadov, 2012). Various researchers including D.N. Aghayeva, I. Jafarov, O. Mirzayev, K. Asadov, H. M. Shikhlinski, A. B. Yahyayev, Y. Lanak, etc. have conducted studies based on references (Aghayeva, 2014; Jafarov, 2012; Mirzayev, 2012; Shikhlinski, 2014; Yahyayev, 2011; Hajnajari, 2014).

Results and discussions:

Phytopathological studies were conducted on the introduced apple varieties and identified diseases and pests. During the research, the following diseases and pests were found in the apple varieties in the Central Botanical Garden collection area.

Powdery mildew disease was discovered in *M. niedzwetzkyana* caused by a fungus named *Podosphaera leucotricha* Salm. This fungus mainly attacks the leaves and pods of the apple plant. The disease was first noticed between April 3rd and May 10th. Infected plant parts had a greyish-white coating. Both surfaces of the leaves were entirely covered with the fungus, which reduced the assimilation surface in the infected leaves, and the assimilation-dissimilation processes were disrupted. Leaves that were infected with the disease became hardened, curled, and deformed, and the development of buds stopped. In the summer, black dots appear on the white cover, which is



the fruit body of the mushroom. These black dots contained spores that would be shed and spread by wind and insects, infecting other plants. Our research has shown that harsh winters have weakened the development of powdery mildew. On the other hand, in mild winters and dry years, the disease is more developed, and pests are more common in plants infected with powdery mildew (Fig. 1.a).

Ocneria dispar L. has been discovered on the leaves of *M. purpurea*. This pest is known to cause significant damage to fruit trees. The caterpillars of the modified silkworm form inside the eggs and overwinter on tree bark and branches. In early spring, the caterpillars emerge from their cocoons and start feeding on buds, flowers, shoots, and leaves, before moving on to the bark. The caterpillars are covered in long hairs, which makes them easily spread by the wind from one part of the plant to another and from one tree to another. These pests can withstand very low temperatures, causing severe damage to trees over extended periods, ultimately leading to the destruction of the affected trees (Figure 1. b).

The fruit of *M. pumila* species is infested by the Apple Fruit Borer (*Carpocapsa pomonella* L.), which is often referred to as the primary pest of apple plants. During the summer, the

caterpillars, which emerge from eggs, mainly feed on the pulp of the fruit and render the fruit completely useless. Each caterpillar usually damages 1-2 fruits before it moves to the edge of the fruit, creates a way out, and drops down on web threads. As a consequence, most of the fruits in the apple trees that were infected with the apple worm become inedible, resulting in a decrease in productivity (as shown in Figure 1. c) with 60-90% of the fruits being wormed.

The pear woodworm, also known as *Stephanitis pyri* F. or *Corythucha padi*, has been found on the leaves of *M. cerasfera* trees. This pest spreads during the flowering season when female woodworms lay their eggs on the underside of the leaves. Once hatched, the larvae form colonies on the underside of the leaves and feed by sucking cell sap. This feeding causes the leaves to lose their colour and become discoloured, with the lower part being contaminated with black, sticky excrement, and the upper part turning brown. Eventually, the leaves dry out, fall off and the buds stop developing. Affected trees also experience weakened height growth, failure to form fruit buds, and a sharp drop in productivity (as shown in Figure 1.d).

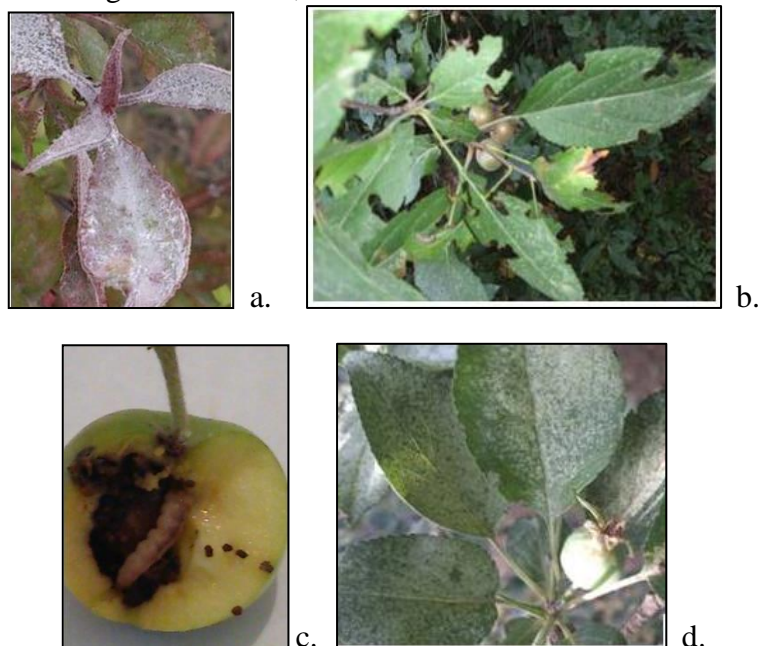


Figure 1. a. Powdery mildew disease in the spikelet of *M. niedzwetzkyana* species; b. Damage to leaves of *M. purpurea* species by the modified silkworm; c. The damage caused by



the apple fruit borer to the fruits of the species *M. pumila*; d. Damage caused by pear woodworm to leaves of *M. cerasifera* species

To prevent diseases and pests from harming the trees, agrotechnical and chemical control measures were taken. In the autumn, after the leaves had fallen, eggs that were found on the trunks and branches of the trees, as well as any dried leaves, branches, and fruits that had fallen on the ground, were burned. Various chemical preparations were also used to combat diseases and pests. Sulfur-containing fungicides, Almaz hundazole, Sakozeb M-45, Bekchi-5 SG were used to tackle silkworms, Croyl-250 for apple fruit-eaters, and Valsarel and Hequidor for pear woodworms. Powdery mildew was also treated with these chemicals, and the chemical control was repeated 2-3 times throughout the year.

Conclusion:

During the research conducted on some wild apple species introduced in Absheron, various diseases and pests were detected. For instance, powdery mildew was found in the pods of *M.niedzwetzkyana*, silkworm in the leaves of *M.purpurea*, apple fruit borer in the fruits of *M.pumila*, and pear woodworm in the leaves of *M.cerasifera*. However, the other studied apple varieties did not show any diseases or pests. This means that the other wild species that were studied in the selection process can be utilized as breeding stock. They can be used to obtain varieties that are more resistant to diseases and pests.

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