

PESTS AND DISEASES OF BARBERRY SPECIES (*BERBERIS L.*) AND MEASURES TO CONTROL THEM

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Abstract. The article presents the results of research on the study of pests and diseases found in plants of the collection of species of the genus Barberry (*Berberis L.*) of the Tashkent Botanical Garden of the Academy of Sciences of Uzbekistan. These pests and diseases are the causes of a decrease in the decorative and medicinal characteristics of plants. The results of the research made it possible to develop a system of combined protection of representatives of the genus Barberry (*Berberis L.*) from pests and diseases.

Keywords: fungus, mycelium, fungicide, insecticide, haustoria, conidia, *Puccinia grains*, *Microsphere Berberis*, *Ascochyta berberidina*, *Phylostica Berberidae*, *Phylostic Berberidae*, *Aphis berberidis*, *Aphis berberidis*, *Arge berberis*, *Apholita, berberidis*.

Introduction. The types of Barberry (*Berberis L.*) – It has long attracted the attention of people as an ornamental, berry and medicinal plant. First of all, it was noted that it has healing properties, about which the Babylonians and Indians of the ancient world left written information.

Barberry (*Berberis L.*) As medicinal plants, many researchers have studied their biochemical composition, the pharmaceutical properties of biologically active substances, especially alkaloids, obtained from the fruit, root, and bark of zirk, and the possibilities of using them for the treatment of diseases have been widely studied. The interest in Barberry species is explained by the richness of alkaloids (especially berberine) and biologically active substances in their fruit, leaf, stem bark and root [7].

Today, in the field of greening of our Republic, introduced species of zirk and their decorative forms are widely used. Research of biodiversity and genetic resources of *Berberis L.* species, selection of promising forms, development of biochemical analysis and breeding methods, establishment of plantations are being carried out by our scientists in our republic.

Due to the high medicinal and ornamental properties of *Berberis L.* species, the selection of species suitable for the climatic conditions of our country, together with the development of cultivation agrotechnics, the study of their pests and diseases, and the development of a system of coordinated control against them, long-term preservation of the ornamental properties of the plant and high-quality and abundant supply for the pharmaceutical industry has important theoretical and practical significance in obtaining a product.

Research object and methodology. In carrying out the scientific work, infected specimens of *Berberis L.* species kept in the collection of the Tashkent Botanical Garden of the Academy of Sciences of Uzbekistan served as a source. The collection of samples was carried out during the entire growing season of the plant. Herbarium samples were prepared from diseased plant samples based on accepted methods.

Mycological and phytopathological analysis of herbarium samples was carried out microscopically in laboratory conditions. Planting of micromycetes in the nutrient medium and their preservation were carried out according to accepted methods [2,3,4]. Determining the species composition of the identified micromycetes are available identifiers [5,6] and "Flora gribov Uzbekistana" (1983-1997) data were used.

Determination of the species composition of pests of medicinal plants was performed based on the existing identifier published by Akhremovich (1976) [1].

Results of research. Tashkent Botanical Garden of the Academy of Sciences of Uzbekistan has supported using the research carried out in the Tashkent Botanical Garden named after Rusanov (2019-2022), the development of pests such as powdery mildew, rust, spotting diseases, as well as the development of pests such as zirk aphid, zirk arrakashi and zirk fruit-eater and damage to plants to various degrees were noted in representatives of the *Berberis L.* family (1, Table 2).

According to the data of Table 1, powdery mildew is the most common disease, while rust, brown spot and gray spot diseases are moderately common. Among the plant pests, it was observed that barberry aphid, barberry arrakashi, and barberry fruit-eater were encountered in some cases.

1-table

Species of Barberry (*Berberis L.*) composition of pests and diseases recorded in representatives of the genus (2019-2021).

№	Name of harmful organisms	Degree of damage to species <i>Berberis L.</i>
1.	Barberry's rust disease – <i>Puccinia graminis Pers.</i>	**
2.	Barberry's powdery mildew disease – <i>Microsphaera berberidis (DC) Lev.</i>	***
3.	Barberry's brown spot disease – <i>Ascochyta berberidina Sacc.</i>	**
4.	Barberry's gray spot disease - <i>Phyllosticta berberidis Rab.</i>	**
5.	Burberry's spot disease - <i>Phyllosticta berberidicola Speg.</i>	*
6.	Burberry's seprorios disease - <i>Septoria berberidis Niessl</i>	*
7	Liosomaphis– <i>Aphis berberidis Fitch.</i>	**
8	Barberry sawfly – <i>Arge berberidis Schr.</i>	**
9	Barberry grinder beetle– <i>Crapholitha berberidis L.</i>	*

Note: *It happens a lot; **it happens often; *seldom ;-doesn't happen**

Barberry's powdery mildew disease (*Microsphaera berberidis*). The first symptoms of the disease begin with the formation of a soft, white, flour-like powder on the upper side of the plant leaves, then the powder covers both sides of the leaves. The growth of the leaves slows down or stops, they partially turn yellow or have a pale color, the edges are bent down. Young branches and flower buds are also affected, and on them, a relatively thick layer of white powder, consisting of mycelial and conidial sporulation organs, develops.

At the end of summer, the whole plant is covered with such a dust that it looks like it was sprinkled with flour. The fungus first infects the plant in the vegetative mycelium (oidium) and sacs overwintering in the buds of infected plants on the leaves. Halted spores emerge from cleistothecium overwintering in shed plant debris. Conidia are the source of infection during the growing season.

The fungus feeds through the haustoria formed by entering the epidermal cells of infected plant parts. Plant

at the end of the vegetation period, the formation of conidia is completed, and cleistothecium, spherical fruit bodies of the fungus, which are brown at first, then turn black, appear on the leaves.

Infected plants cannot prepare for winter, so they become resistant to autumn frosts. An adult plant becomes resistant to other pathogens, pests and adverse weather conditions.

Barberry's rust disease – *Puccinia graminis* Pers. The causative agent is obligate parasite, basidiomycete fungus *Puccinia graminis* Pers. A full cycle, different boss type. Zirk is an intermediate plant in the spread of the disease. The main host plants are natural and cultivated species. The primary infection of the fungus is caused by basidiospores, which are produced in the basidia that develop from the teliospores of the overwintering joint of the fungus.

Yellow spots on the upper part of the infected leaves of zirk, and a pustule that bursts the epidermis, and small, round, irregularly located, powdery, brown spots are formed on the lower part. The fungus is propagated in the open field in the second half of the spring season or the first half of the summer season with the help of etsiisporos.

Etsiari are formed in the form of yellow pads, usually on branches, sometimes on leaf bands, leaves and flower bands.

1-Table

The species composition of the diseases recorded in representatives of the genus Barberry (*Berberis L.*) and morbidity rate (2019-2021).

№	Order	Family	The name of the disease and the causative agent	Damage level, score	Damage type
1.	Barberry's rust Uredinales	Barberry's rust Pucciniaceae	Barberry's rust disease – <i>Puccinia graminis</i> Pers.	2	The disease affects the leaf band, leaf, young branch and flower band of the plant
2.	Barberry's powdery mildew Erisiphales	Barberry's powdery mildew Erisiphaceae	Barberry's powdery mildew disease – <i>Microsphaera berberidis</i> (DC) Lev.	3	The disease affects the leaves, stems and fruits of the plant
3.	pycnidaceous mushrooms Spharopsidales	pycnidaceous mushrooms Spharopsidaceae	Barberry's brown spot disease – <i>Ascochyta berberidina</i> Sacc.	2	The disease affects the leaves and young shoots of the plant
4.	pycnidaceous mushrooms Spharopsidales	pycnidaceous mushrooms Spharopsidaceae	Barberry's white spot disease - <i>Phyllosticta berberidis</i> Rab.	2	The disease damages the leaves of the plant and causes the plant to weaken
5.	pycnidaceous mushrooms Spharopsidales	pycnidaceous mushrooms Spharopsidaceae	Barberry's dark red spot disease - <i>Phyllosticta berberidicola</i> Speg.	1	The disease damages the leaves of the plant and causes the plant to weaken
6.	pycnidaceous mushrooms Spharopsidales	pycnidaceous mushrooms Spharopsidaceae	Burberry's seprorios disease - <i>Septoria berberidis</i> Niessl	1	The disease mainly damages the leaves of the plant, causes premature shedding and delays the process of lignification of young shoots.

**Pests recorded in representatives of the genus *Barberry* (*Berberis* L.).
species composition and degree of damage (2019-2021).**

№	Detachment	Family	The name of the pest	Damage level, points	Type of damage
1.	Isosceles <i>Homoptera</i>	<i>Liosomaphis</i> <i>Aphidadea</i>	<i>Liosomaphis</i> – <i>Aphis</i> <i>berberidis</i> Fitch.	2	It damages the leaves and young branches of the plant and reduces its decorativeness.
2.	Hymenoptera <i>Hymenoptera</i>	Grinder beetle <i>Tenthredinidae</i>	Barberry grinder beetle – <i>Arge</i> <i>berberidis</i> Schr.	3	It feeds on the leaf plate and damages the leaf
3.	Lepidoptera <i>Lepidoptera</i>	Leaf rollers <i>Tortricidae</i>	Barberry sawfly – <i>Crapholitha berberidis</i> L.	2	The disease affects the leaves, young shoots and fruits of the plant

Barberry's brown spot disease (*Ascochyta berberidina*.) The sign of the disease appears in the form of brown spots with dark green edges on the upper part of the plant leaf. The period of spore formation of the fungus is in the form of dots scattered over the spots. The disease is caused by a pathogen that lives under and on the surface of the bark. The first signs of the disease begin with the drying of the branches, and if timely control measures are not applied, it will spread and cause the entire bush to dry up. Phytosanitary cleaning should be carried out. The origin and development of the disease is the excessive accumulation of excess moisture in the soil, therefore, it is recommended to reduce the soil moisture with the help of drainage in the places where the zirk plant grows.

Barberry's white spot disease (*Phyllosticta berberidis*.) On both sides of the leaf of the diseased plant, the edges are brownish-reddish and the rounded edge is manifested in the form of spots with brownish-reddish masses. Later, the spots turn white, but the reddish color remains. In the upper part of the spots, in the form of a small brown spot, the process of spore formation of pycnidia and pycnosporos takes place, and these pycnosporos serve to spread the disease during the vegetation period of the plant. The source of infection is stored in the pycnosporos pycnidia on the fallen leaves of the plant and initiates primary infection in the spring. The damage of the disease is expressed by the early shedding of the infected leaves of the plant and the decrease in decorativeness.

Burberry's seprorios disease (*Septoria berberidis*.) The first symptoms of the disease begin with the appearance of small round brown spots on the leaves of the plant, later the spots turn white and are covered with black pathogenic pycnidia. By autumn, some large brown spots appear on the young branches of the plant. These spots turn white over time, and black dots, pseudothecia of the fungus, form on the surface of the spot.

In early spring, fungal sacs and sacspores are formed in pseudothecia. This stage of the development of the fungus is called *Mycosphaerella berberidis* (Auersw.) Lindau.

The primary infection of the disease is caused by chaltaspores in the spring, and during the growing season, the disease spreads through pycnosporos. The damage of the disease is expressed by the early shedding of the leaves of the plant and the delay in the harvest, the woodiness of the diseased branches is delayed and in some cases they crack, and the decrease in the decorativeness of the plant is expressed.

Barberry's dark red spot disease (*Phyllosticta berberidicola*)

On the young leaves of the plant, a large dark red border appears in the form of spots with a dark red border, later the affected plant leaves turn yellow and the spots turn white. Dark brown fungal pycnidia of various sizes are formed in spots on the leaf, and unicellular colorless

pycnospores are formed in the pycnidia. During the growing season of the plant, the disease is spread by means of pycnospores. The source of infection is stored in the pycnospored pycnidia on the fallen leaves of the plant and initiates the primary infection of the disease in the spring. The damage of the disease is expressed by the early shedding of infected leaves of the plant, the violation of physiological processes in the plant, the decrease in the quality of the crop and the decorativeness.

Liosomaphis (*Aphis berberidis* Fitch.). Order Homoptera, aphids - family Aphididae, genus Aphis. Mature breed (image) about 2 mm, yellow-green color, head reddish. This insect hibernates in the egg phase. Gives 10-12 generations in a year. Plants have the characteristic of live reproduction during the growing season.

The insect feeds on the underside of the leaf by sucking plant sap and causes the plant to weaken. It has the characteristic of developing initially on young branches and leaves. Favorable temperature for development is +24-+260 C. It gives one generation in 6-8 days when the average daily temperature is +24-+260 C. Egg-laying autumn aphids are yellow-green or brownish-yellow in color. Eggs are 0.4-0.5 mm, oblong oval, black, shiny. The larva is greenish-red. His eyes are red, his legs and mustache are black.

Barberry grinder beetle (*Arge berberidis* Schr.) An insect of the family Tenthredinidae, order Hymenoptera, the mature insect is 4-6 mm in size, dark shiny, the wing is shiny, the middle part is dark, the wing veins are dark brown. The mustache is 9-jointed, black. Eggs are 0.6 mm, light green oblong oval shape. The false worm is 7-9 mm greenish-yellow in color, the head is brown or black, and there are three pairs of thorax and seven pairs of abdominal legs.

The bulb is yellowish-white, about 4 mm. In the adult worm phase, it hibernates in a cocoon at a depth of 6-15 mm in the soil, in May and June it turns into a tuber, and after 7-11 days, mature breeds fly out of the tuber, and after 2-3 days, the female breeds begin to lay one egg under the lower leaves of the plant. The female lives for 5-7 days and lays 45-55 eggs. Larvae appear 6-10 days after the insect lays its eggs. The larva that hatched from the egg feeds on the leaf plate for 13-18 days and falls into the upper part of the soil and turns into a tuber. The insect produces one generation per year.

Barberry sawfly (*Grapholitha berberidis* L.) An insect belonging to the family Tortricidae, order Lepidoptera. The butterfly is 10-12 mm in size, the front wing is dark brown, the back wing is gray-brown. Eggs are 6-8 mm, pale yellow, later turn orange. The worm is 10-14 mm in size, the body is reddish, the head is brown. The bulb is brown, 6-8 mm in size. The mature worm of the insect hibernates in a cocoon in plant debris, plant trunk crevices.

In early spring, the plant produces a bud during the budding period, after 8-12 days a mature brood emerges from the bud, and after 6-8 days the egg-laying phase begins. One mature breed can lay up to 50-60 eggs. A mature breed lives 14-18 days. Embryonic development of eggs in spring and autumn is 10-15 days, in summer 3-5 days.

Hatched worms feed on young twigs, leaves, and fruits, and the larval stage lasts 10-22 days. Worms that have completed their lives complete the generation by cocooning in the plant itself and in its remains. The insect gives one generation in 16-24 days in spring and autumn, in 8-15 days in summer. In the conditions of Uzbekistan, the insect gives 4-5 generations per season.

Countermeasures. In the fight against harmful plant organisms, agrotechnical control measures play an important role, in which compliance with phytocontrol rules, cleaning the area from plant residues and weeds, inter-row processing, correct use of mineral and organic fertilizers,

as well as adherence to farming culture serve to increase the plant's immunity to diseases and pests. does.

As biological control measures, biological drugs against diseases include Trichodermin, Sporagin s.e.k., Bist sus.k. and against pests, the use of Trichogramma, Golden Eye and Brakon entomophages is effective.

As a chemical control measure, the application of 3% Bordeaux liquid in the autumn and early spring, during the vegetative period, and 1% during the growing season, is of great importance in the prevention of diseases.

Against powdery mildew Fundazol 50% (1.0-2.0 kg/ha), Segra 80% (8.0-10.0 kg/ha) to use fungicides 2-3 times during the growing season, and against rust Colossal 25% em.c. (0.15 l/ha), Folikur BT 22.5 em.k. (0.15 l/ha), Kurzat R n.kuk against spotting diseases. (2.5-3.0 kg/ha), Rex Dua, 49.5% sus.k. (0.5 l/ha), the use of fungicides at the specified consumption rates is highly effective in protecting zirk from diseases.

In the fight against pests, the use of drug No. 30 (40-50 l/ha) during the rest period of the plant is one of the important measures to free the plant from the wintering stage of pests. During the growing season of plants, Tsiper ultra 50% em.k. (0.1-0.15 l/ha) and Betafos 20% em.k. (2.5-3.0 l/ha) insecticides should be used up to 2 times in the prescribed rate.

Summary. 1. In the course of the researches, it was noted that the representatives of the Berberis L. group were affected by powdery mildew, rust, and spotting diseases, as well as the development of pests such as leafhopper, leaf beetle, and leaf beetle.

2. The correct organization of the integrated control system against plant diseases and pests, the use of agrotechnical, biological and chemical control measures in the established order. Species of the Berberis L. series have important theoretical and practical importance in increasing the medicinal and medicinal properties.

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