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DISEASES AND PESTS SPECIES OF *BERBERIS* L. IN ABSHERON CONDITION

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БОЛЕЗНИ И ВИДЫ ВРЕДИТЕЛЕЙ *BERBERIS* L. В УСЛОВИЯХ АПШЕРОНА

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Abstract. The use of disease and pest resistant species in landscape design contributes to the effectiveness of green plantings. For this purpose, the pests *Berberis* L. and control measures in the dry subtropical climate of the Absheron Peninsula were studied. The main methods of disease control and prevention are considered. In conclusion, it is concluded that disease-resistant species should be chosen for landscaping; it is necessary to determine the optimal timing of plant growth and development; you should constantly monitor the general condition; dried branches and leaves must be periodically cleaned; autumn leaves should be collected and burned in winter as they contain pathogens. When a disease or pest is detected, chemicals should be used to prevent its development.

Аннотация. Использование в ландшафтном дизайне видов, устойчивых к болезням и вредителям, способствует эффективности зеленых посадок. С этой целью были изучены вредители *Berberis* L. и меры борьбы в сухом субтропическом климате Апшеронского полуострова. Рассмотрены основные методы борьбы и профилактики заболеваний. В заключении делается вывод, что для озеленения следует выбирать устойчивые к болезням виды; необходимо определить оптимальные сроки роста и развития растений; следует постоянно следить за общим состоянием; засохшие ветки и листья нужно периодически очищать; осенние листья следует собирать и сжигать зимой, так как они содержат болезнетворные микроорганизмы. При обнаружении болезни или вредителя следует использовать химические препараты, чтобы предотвратить его развитие.

Keywords: powdery mildews, plant pathology, cleistothecium, asci, ascospores.

Ключевые слова: мучнистая роса, фитопатология, клейстотеций, аски, аскоспоры.

Introduction

In recent years, ornamental plants have been widely used in our country's greenery. As a result of climate change and the impact of anthropogenic factors, many plants are often infected with diseases and pests [1–2]. Resistant seedlings should be used against disease and pests to ensure the longevity and economic efficiency of created greenery for this purpose. Species of *Berberis* L., which are resistant to adverse environmental factors, less demanding on the soil, and have the ability to prune in various forms, are widely used in landscape design [3]. Powdery mildews illness was found on species of *Berberis* L. in Absheron.

The purpose of the study: for this purpose, phytopathological and entomological samples collected by phytosanitary monitoring of *Berberis* L. species grown on experimental fields, they were delivered to the Plant Protection Laboratory analyzed and grouped in 2015–2018 [1–6].

The object of the research: as an object of study was used 9 species of the genus *Berberis* L. belonging to Berberidaceae Juss. a family which included: *Berberis vulgaris* L., *B. iberica* Steven & Fisch. ex DC., *B. densiflora* Boiss. & Buhse., *B. amurensis* Maxim., *B. levis* Franch., *B. thunbergii* DC., *B. julianae* C. K. Schneid., *B. koreana* Palib., *B. heteropoda* Schrenk.

Materials and methods

To determine the degree of infection used a 5-point scale related to the methodology of M. K. Khokhryakov and others [1]. In defining of the pest were cited to references of V. P. Vasiliev, I. Z. Livshits, O. E. Polynova [4, 6].

It was found that powdery mildew is widespread in species of *Berberis* L. as a result of monitoring and research conducted in connection with the study of the phytosanitary situation on Absheron.

The causative agent of powdery mildews in *Berberis* L. species is a fungus of kingdom Mycota, division *Ascomycota*, class *Leotiomycetes*, order *Erysiphales*, family *Erysiphaceae*, genus *Microsphaera*, species of *Microsphaera berberis* (DC.) Lev. (Figure 1).

This disease was found among the studied species. On the influence of causative agents are appeared formed primarily of weak white reticular cover in infected leaves of plants. As the disease progresses, the coating thickens, and a white flour-like coating appears on both sides of surfaces. They are destroyed as the disease affects more leaves and young shoots. In the second half of summer, yellow spots appear inside the coatings. These are cleistothecium, which are the fruiting bodies of the pathogen.

Later they are darkened and clearly visible with the eyes.

Cleistothecia consist of Asci and ascospores.

In the experimental field, the infection of level in *Berberis* L. species was determined on a 5-point scale (Table).

Table.

INFECTION RATE IN SPECIES OF *BERBERIS* L. WITH POWDERY MILDEW
ON ABSHERON, IN POINTS

| Species | The degree of infection of berberis (mainly leaves) with the powdery mildew disease | | | | |
|---|---|----|-----|----|---|
| | I | II | III | IV | V |
| <i>Berberis vulgaris</i> L. | | | | + | |
| <i>B. iberica</i> Steven & Fisch. ex DC. | + | | | | |
| <i>B. densiflora</i> Boiss. & Buhse. | | + | | | |
| <i>B. amurensis</i> Maxim. | | + | | | |
| <i>B. levis</i> Franch., <i>B. thunbergii</i> DC. | + | | | | |
| <i>Berberis thunbergii</i> DC. | | | + | | |
| <i>B. julianae</i> C. K. Schneid, | + | | | | |
| <i>B. koreana</i> Palib. | + | | | | |
| <i>Berberis heteropoda</i> Schrenk. | | + | | | |

I point — on the surface of the leaf there is a faint white coating of 5–10%; II point — 10–20% of the surface of the leaf is covered with white coating; III point — 20–40% of the surface of the leaf is covered with white coating; IV point — 50–75% of the surface of the leaf is covered with white coating; V point — the surface of the leaf is completely covered with a white coating.

Studied powdery mildew infectious degree in species of *Berberis* L. is given in Table.

In the studied species of *Berberis iberica* Steven & Fisch. ex DC., *B. julianae* C. K. Schneid., *B. levis* Franch. and *B. koreana* Palib., was observed very little damage on the leaves, and it was rated as I point. II point was given to the species of *B. densiflora* Boiss. & Buhse., *B. amurensis* Maxim. and *B. heteropoda* Schrenk. 20–40% of the leaves were covered with white coating, the infection rate of *Berberis thunbergii* was rated in III points and 50–75% of the leaves of *Berberis vulgaris* L. were covered with white coating; therefore, the degree of infection with powdery mildew was rated in IV point. In the studied species of *Berberis* L. wasn't observed damage in V point.

According to our observations, in the experimental field of the Institute of Dendrology in Absheron, insect pest is phylum Arthropoda, class Insecta, order Hemiptera, family Membracidae, genus *Stictocephala*, species *Stictocephala bisonia* Kopp & Yonke is belonging to the kingdom Animalia.

When determining the pest of *Stictocephala bisonia* Kopp & Yonke, references were used by the literature of the authors [6] (Figure 2).

Stictocephala bisonia Kopp & Yonke is a polyphagous insect that attacks various young fruit trees, including apples, pears, quinces, plums, apricots, pomegranates, walnuts; wild plants: ash, poplar, oak, jasmine, elm, etc., it lays.



Figure 1. Powdery mildews disease on species of *Berberis vulgaris* L.



Figure 2. *Stictocephala bisonia* Kopp & Yonke pest species of *Berberis thunbergii* eggs on plants.

Larvae damage the plant by sucking its juice. Larvae feed with many herbs such as with alfalfa, peas, carrots, potatoes etc.

The harmful organism breeds once a year and overwinters in the study area. In autumn, an adult female pest of *Stictocephala bisonia* Kopp & Yonke lays eggs on young branches with a diameter of 4–6 mm. In this case, the female insect using its ovipositor opens longitudinal furrows on the bark of the branch and lays eggs there. Most time the juice begins to leak from the furrow and form injury. The damaged branch stops growing, darkens, and dies. It is easier for disease-causing microorganisms to enter from the damaged area to the plant.

As a result of phenological observations, it was found that in the first decade of June larvae emerge from eggs laid by a pest of *Stictocephala bisonia* Kopp & Yonke in autumn. Larvae hatched from eggs fall on the ground and feed on the root parts of the plant. Larvae grow by feeding and molt 5 times. Larvae have completed their development turning into adult insects in late July and early August. Egg lays lasts from August to early October.

Control measures

Agrotechnical, chemical, biological, and at the same time integrated control methods should be applied against pathogens and pests found in species of *Berberis* L.

Agrotechnical and mechanical measures of control — in this case, the damaged leaves and branches collected, removed from the field, and burned, the territory around the plant was deeply spaded.

Chemical control measures — in this case, depending on the type of disease and pest, an appropriate chemical preparation applied to the plant. It is advisable to use 0.1–0.2% solutions of the ‘Almaz’ and ‘Topaz’ preparations in the early stages of disease powdery mildews.

The following measures were taken to struggle *Stictocephala bubalus* F. in the species of *Berberis* L. that we studied in Absheron.

First of all, the planting material should be strictly controlled to prevent the pest from spreading to the new areas, weeds in the row and young pest larvae on them must be destroyed by environmentally friendly drugs in the garden (mid-June). Rows should be freed from weeds. In the autumn-winter period, the pest eggs are clearly visible, so these branches are cut, removed from the field, and destroyed.

Based on the foregoing, disease-resistant species should be selected for landscaping; it is necessary to determine the optimal time of growth and development of plants; general condition should be constantly monitored; dried branches and leaves should be periodically cleaned; leaves that fall in the autumn should be collected and burned during the winter, as they contain pathogens. If a disease or pest is detected, chemical preparations should be used to prevent it from developing.

Results

Powdery mildews disease was found in species of *Berberis* L. studied in Absheron conditions. Infection rate was assessed using a 5-point scale. In the research area were found pest of *Stictocephala bisonia* Kopp & Yonke and were identified control measures against them.

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