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PATHOGENIC MICROFLORA OF *SYRINGA L.* PLANTS

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During the research period (2015–2018), found parasitism of 9 micromycetes species on lilac plants. The most widespread (frequency of occurrence 81.3 %) was species Microsphaera syringae (Schwein.). Frequency of occurrence of the micromycetes Alternaria alternata (Fr.) Keissl. was 22.0 %, Cladosporium herbarum (Pers.) Link. – 12.3 %, Botrytis cinerea Pers. (Botryotinia fuckeliana (de Bary) Whetzel.) – 8.5 %, Phyllactinia suffulta Sacc. f. syringae Jacz. – 8.3 %, Phyllosticta syringae West. – 4.5 %, Ascochyta syringae Bres. – 3.3 %, Cercospora lilacis (Desm.) Sacc. – 2.3 % and Septoria syringae Sacc. et. Speg. – 1.0 %. It was established that during the bloom period on lilac flowers and leaves gray mold has spreading, which further does not develop in the summer vegetation period. Powdery mildew may appear from the middle of May and intensively appears on plants during the summer-autumn period. Phyllosticta leaf spot develops from the third decade of May. Other spots (septoria leaf spot, ascochyta blight, cercospora blight) appear on plants in the summer period. Alternaria blight and cladosporium leaf spot progress at the end of the summer and in the autumn periods. The parasitism on the lilac of found micromycetes leads to a decrease in the decorative properties of plants and a gradual loss of viability.

Keywords: *micromycetes, lilac, diseases, gray mold, powdery mildew, leaf spot diseases*

Introduction. Green plantations at the campus territory of Kyiv universities are a unique component of the green space in the capital of Ukraine, which play a significant role in the cognitive, educational, scientific and edifying processes. Taking into account the high ecological and aesthetic value of green plantations under the continual increase of negative impact, the creation of comfortable conditions of human existence in megalopolis is a priority task of the present days. That is why preserving the decorative properties and vitality of the plants, which are part of the green plantations system at Kyiv universities territories, is an important part of work concerning the natural environment protection. It should be noted that the species composition of highly-decorative, beautiful

blooming shrubs that are growing on the central campus territory of the NULES of Ukraine is rather limited, and therefore the determination of the phytosanitary condition of plants in order to develop measures for its preservation is a compulsory element for modern green building technologies. To the category of the most valuable beautiful blooming plants belongs common lilac (*Syringa vulgaris* Mill.), which is due to its beautiful decorative qualities, high varietal and species diversity, high potential of ecological plasticity [5]. At the same time, lilac plants are affected by many pathogens that cause diseases of different etiology, which reduce plants decorative properties and productivity [2, 9, 10]. Lilac diseases are studied in different countries over the world, while researchers often focus attention on the harmfulness of plant mycosis.

Lung diseases are studied in different countries of the world, paying attention to the harmfulness of mycoses of plants. In particular, on various continents there are common pathogens of powdery mildew – *Erysiphe syringae, Phyllactinia syringae* [3, 6]. In the conditions of China for the first time the defeat of plants with fungus was detected *Alternaria alternata* [4]. Shishkoff, N. [7] designate the effect of lilac fungi *Phytophthora ramorum*. Sidelnikova et al. [8], analyzing the species composition of fungi on tree and shrub plants in suburban parks of St. Petersburg, found on the lilac the parasitism of fungi *Erysiphe syringae* and *Ascochyta syringae*.

At the same time, the analysis of native scientific literature testifies to the insufficiency of the studying the lilac diseases with fungal etiology in conditions of Ukraine. Therefore, to prevent the spread of lilac diseases and to effectively implement the preventive measures for plants protection from diseases, the knowledge of its pathogens species composition is necessary.

The aim of the study was to establish the species composition of micromycetes that parasitize on lilac plants and to study the symptoms of diseases caused by them. To achieve this goal, the following tasks were provided: to conduct routine inspections and to take samples for mycological examination; to identify micromycetes that parasitize on lilac plants; to study the symptoms of mycoses and provide recommendations for plant protection.

Methods. The studying was conducted in the conditions of Kyiv territorial center of the National University of Life and Environmental Sciences of Ukraine. Examination of lilac plantings was carried out by the route method during the spring-autumn periods at 2015–2018. The leaves of plants with signs of diseases containing plaque, spot, necrosis and other symptoms were taken. Micromycetes identification was carried out at the problem scientific research laboratory "Mycology and phytopathology" at the Department of Plant Phytopathology named after V. F. Peresypkin in NULES of Ukraine by preparation of temporary microscopic slides and analysis of fungal structures by the light microscopy method. The moist chamber method was also used to stimulate the formation of micromycetes spores. As reference literature, in which the morphology of micromycetes occurring on lilac is described, standard determinants were used [2, 9]. Also the frequency of occurrence of micromycetes was investigated [1].

Results and discussion. As a result of phytopathological monitoring found that lesions of lilac plants were caused by 9 micromycetes species (Fig. 1). During years of research, the most widespread (frequency of occurrence 81.3 %) became *Microsphaera syringae* (Schwein.) species, which cause powdery mildew. The frequency of occurrence of micromycete *Alternaria alternata* (Fr.) Keissl. was 22.0 %. The *Cladosporium herbarum* (Per.) Links. species had spreading of 12.3 %. The frequency of occurrence of

other micromycetes was as follows: *Botrytis cinerea* Pers. (*Botryotinia fuckeliana* (de Bary) Whetzel.) – 8.5 %, *Phyllactinia suffulta* Sacc. *f. syringae* Jacz – 8.3 %, *Phyllosticta syringae* West. – 4.5 %, *Ascochyta syringae* Bres. – 3.3 %, *Cercospora lilacis* (Desm.) Sacc. – 2.3 % and *Septoria syringae* Sacc. et. Speg. – 1.0 %.

Micromycete *M. syringae* causes powdery mildew, resulting in the appearance of abundant white powdery plaque on the leaves surface and yearling sprouts (Fig. 2a). In the end of vegetative period, among the mycelium emerged cleistothecia – dark colored fetal bodies, like dots, visible to the naked eye. It was established that in case of severe damage of lilac plants by powdery mildew, the leaves prematurely dried up, and sick sprouts were shortened, partially deformed.

Micromycetes *A. alternata* and *C. herbarum* colonized the leaf apparatus of lilac plants. The symptoms of pathologies caused by them were characterized by the appearance of large brown necrotic spots on affected leaves (Fig. 2b), on both sides of which was formed a dark olive plaque. The affected leaves, as a rule, prematurely dried up, that caused to the loss of photosynthesis part of crown and the decrease in plant decorative qualities.

The phytopathogen and polyphage *B. cinerea* was intensively spread during the flowering period of lilac plants, especially in moist and rainy weather, causing gray mold. At the first stage, the external signs of disease appeared initially on flowers of inflorescences. On the petals there were small brown spots or sores that acquired a brown tint. In wet weather, the damaged tissues were covered with a dense gray plaque of fungus and rotted (Fig. 2c), and in low humidity – they dried up. At the second stage, due to the fall of affected flowers on the leaves, there were observed manifestations of leaf disease in form of spots appearance. In this case, the large brown necrotic spots (Fig. 2d) with a rare sporulation of pathogen on its surface were formed on leaf blades. Later, in high humidity, the affected parts of plants were saturated with moisture and rotted. In dry conditions, necrotic tissues were crumbled. The presence of a large amount of leaves affected by gray mold

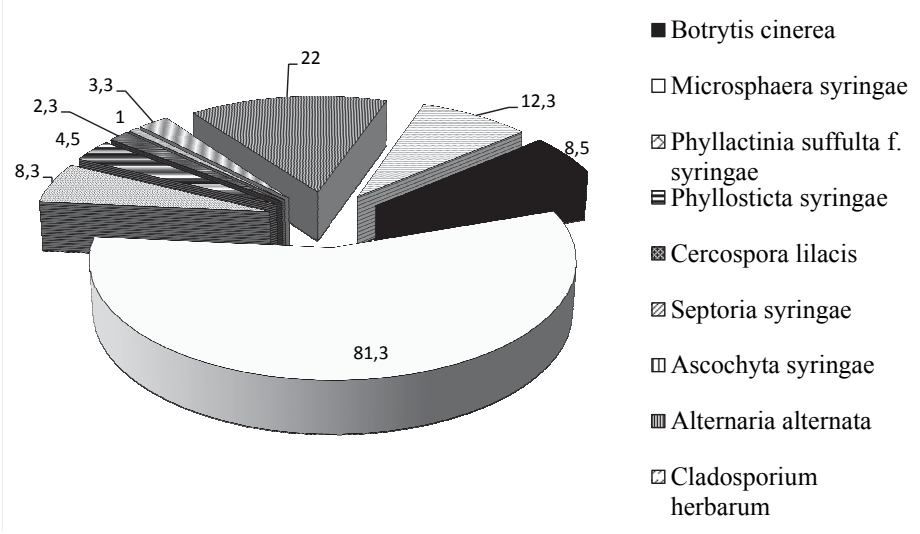

Fig. 1. The frequency of occurrence (%) of phytopathogenic micromycetes on *Syringa spp.* plants (average for 2015–2018)

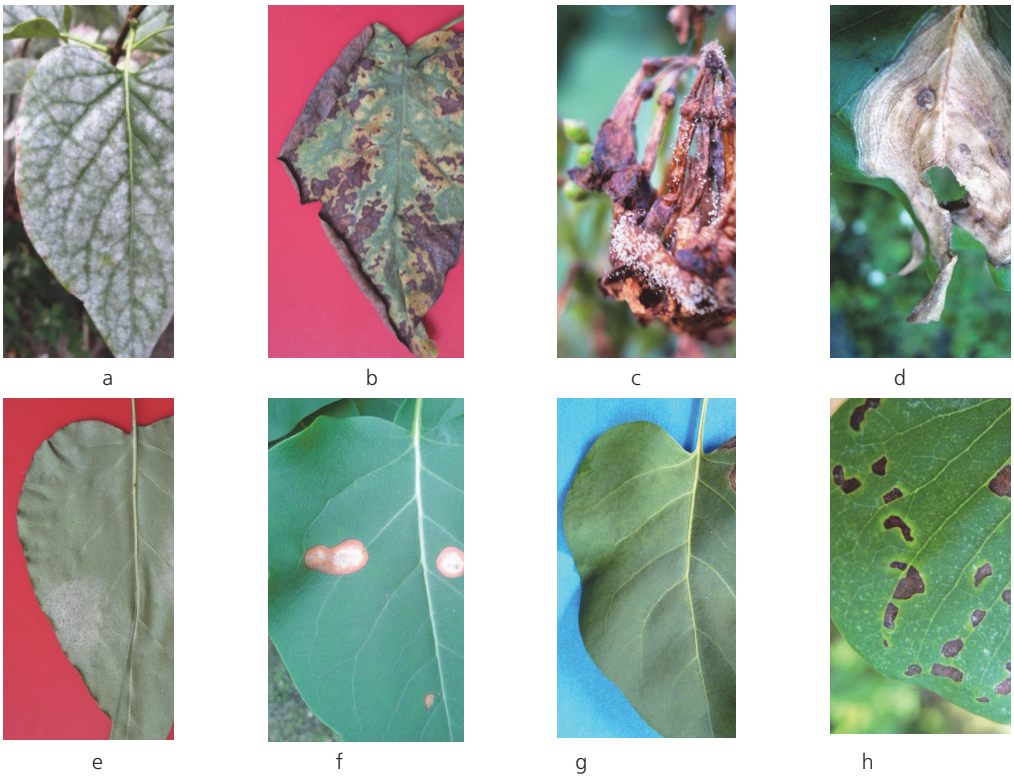

Fig. 2. Symptoms of lilac mycoses: a – powdery mildew *(Microsphaera syringae)*; b – compatible damage by alternaria blight and cladosporium leaf spot; c, d – gray mold; e – powdery mildew *(Phyllactinia suffulta Sacc. f. syringae)*; f – phyllosticta leaf spot; g – ascochyta blight; h – septoria leaf spot

caused a decrease in the vitality and decorative properties of lilac plants.

On lilac plants we detected the parasitism of micromycete *P. suffulta*, which is a causative agent of powdery mildew. The symptoms of disease were characterized by the appearance of chlorotic spots on the adaxial (upper) surface of leaf blade, whereas from the abaxial (lower) part of leaf appeared a barely noticeable white spiderish plaque (Fig. 2e). Large quantities of cleistothecia were also formed from the lower side of leaves in places where surface mycelium was formed. For some years, we observed cleistothecia on the upper side of leaf blade throughout surface, but at the same time, the white powdery plaque was not visually marked.

Under the lesions of lilac plants by micromycete *Phyllosticta syringae* found manifestations of phyllosticta leaf spot pathogenesis. Initially, reddish brown spots were formed on leaves, and further they acquired a gray brown tint with a narrow dark brown margin (Fig. 2f). The fungal pycnidia were formed on the upper side of leaf blades on the affected areas. During the vegetative period, the affected tissue of leaves also fell out.

Formation on leaves of brown spots (Fig. 2g) with different zonality and configuration was caused by *Ascochyta syringae*. This pathogen, under the strong development of disease, leads to the full leaves dying due to confluence of affected areas on leaf blades.

Micromycete *Cercospora lilacis* caused the appearance of gray or reddish spots on both

sides of leaf blades. The presence of its large amount led to the drying of affected leaves. Characteristic plaque from pathogen sporification was formed in the presence of high air humidity.

In case of *Septoria syringae* parasitism on lilac plants, various shaped brown spots (Fig. 2h) with dark margin and pycnidia were formed on affected leaves. The affected leaves dried up under intensive development of septoria leaf spot.

According to the results of analysis the periods of lilac diseases manifestation caused by phytopathogenic micromycetes we have found that minimal indexes of damage the plant over ground part with gray mold and powdery mildew were noted in the second decade of May (Table). In particular, gray mold (the pathogen *B. cinerea*) manifested in the spring (on flowers), during the active blooming of lilac plants. Further, after the end of blooming process, especially in wet and rainy weather, the leaves that were dying were severely affected. It should be noted that since the second decade of June we have not observed the development of gray mold on lilac vegetative organs. The transformation of the first symptoms of powdery mildew caused by micromycete *M. syringae* (the second decade of May) into epiphytotium has been observed from the middle of June and further during July to September.

During years of research, the beginning of development phyllosticta leaf spot (pathogen *Phyllosticta syringae*) occurred from the third decade of May. As a rule, single leaves on separate sprouts of plants were affected. The disease reached its maximal development in the end of growing season (August to September) and in the autumn period.

Septoria leaf spot of lilac (pathogen *Septoria syringae)* has been diagnosed since the third decade of June. During years of research, the disease did not have an intense development.

Parasitism of micromycete *Phyllactinia suffulta* Sacc. *f. syringae* has been detected since the first decade of June. As a rule, powdery mildew further acquired a wide spreading.

The first symptoms of ascochyta blight (pathogen *Ascochyta syringae*) and cercospora leaf spot (pathogen *Cercospora lilacis*) on lilac have been detected since middle of July. During years of research, we have not detected massive disease outbreaks.

The development of alternaria blight (pathogen *A. alternata*) and cladosporium blight (pathogen *C. herbarum*) on the lilacs leaves occurred from August, with following intensive colonization of plants. It should be noted that plants, which were weakened by the influence of adfavorable abiotic and biotic environmental factors, may have an earlier manifestation of these diseases.

The systematic analysis of lilac plantings condition, the detection of micromycetes parasitism periods and development of mycosis caused by them, is necessary for the implementation of sanitary and preventive measures complex aimed at preserving the decorative properties of plants and limiting the harmfulness of fungal diseases. Establishment of micromycetes complex that parasitize on lilac plants and disease symptoms will allow more qualitatively evaluate the efficiency of agro-technical and therapeutic techniques that limit the damage of plants by pathogens and implement the most optimal measures for diseases control.

Conclusions. According to the results of perennial phytopathological monitoring of lilac plantings, we have established a population of phytopathogenic micromycetes, which includes the following species: *Microsphaera syringae* (Schwein.), *Alternaria alternata* (Fr.) Keissl., *Cladosporium herbarum* (Pers.) Link., *Botrytis cinerea* Pers. (*Botryotinia fuckeliana* (de Bary) Whetzel.), *Phyllactinia suffulta* Sacc. *f. syringae* Jacz.,

Periods of lilac diseases manifestation and development

Disease	Months and decades														
	May			June			July			August			September		
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Gray mold		▓	▓	▓											
Powdery mildew (Microsphaera syringae)		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Phyllosticta leaf spot			▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Powdery mildew (Phyllactinia suffulta Sacc. f. syringae)				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Septoria leaf spot						▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Ascochyta blight								▓	▓	▓	▓	▓	▓	▓	▓
Cercospora blight								▓	▓	▓	▓	▓	▓	▓	▓
Alternaria blight										▓	▓	▓	▓	▓	▓
Cladosporium leaf spot											▓	▓	▓	▓	▓

Note: ▓ – period of diseases manifestation and development

Phyllosticta syringae West., *Ascochyta syringae* Bres., *Cercospora lilacis* (Desm.) Sacc., *Septoria syringae* Sacc. et. Speg.

The highest frequency of occurrence was typical for *Microsphaera syringae* (81.3 %), *Alternaria alternata* (22.0 %) and *Cladosporium herbarum* (12.3 %). The frequency of occurrence of *Botrytis cinerea* was 8.5 %, and *Phyllactinia suffulta* Sacc. *f. syringae* Jacz – 8.3 %. Micromycetes *Septoria syringae, Cercospora lilacis, Ascochyta syringae* and *Phyllosticta syringae* were characterized by a frequency of occurrence in a range from 1.0 to 4.5 %.

Monitoring of lilac diseases manifestation periods has shown that during the blooming period on lilac flowers and leaves spreads gray mold, which further does not develop in the summer period of vegetation. Powdery mildew may appear from the middle of May and is intensively manifested on plants in the summer-autumn period. Phyllosticta leaf spot may develop from the third decade of May. Other spots (septoria leaf spot, ascochyta blight, cercospora blight) appears on plants in the summer period. Alternaria blight and cladosporium leaf spot are inherent for the end of the summer and autumn periods.

Thus, the establishment of the micromycetes species representation on lilac plants which are growing on plantings of common use at the NULES of Ukraine campus and the period of its parasitism allows introducing system of effective and environmentally safe protective work to restore its decorative properties and vitality

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АНОТАЦІЯ

Піковський М. Й., Колесніченко О. В., Мельник В. І., Грисюк С. М. *Патогенна мікофлора рослин syringa l. Біоресурси і природокористування. 2019.* ***11****, №1–2. С.26–33. https://doi.org/10.31548/bio2019.01.003*

За період досліджень (2015 – 2018 рр.) на рослинах бузку встановлено паразитування 9 видів мікроміцетів. Найбільшого поширення (частота трапляння 81,3 %) набував вид Microsphaera syringae (Schwein.). Частота трапляння мікроміцета Alternaria alternata (Fr.) Keissl. становила 22,0 %, Cladosporium herbarum (Pers.) Link. – 12,3 %, Botrytis cinerea Pers. (Botryotinia fuckeliana (de Bary) Whetzel.) – 8,5 %, Phyllactinia suffulta Sacc. f. syringae Jacz. – 8,3 %, Phyllosticta syringae West. – 4,5 %, Ascochyta syringae Bres. – 3,3 %, Cercospora lilacis (Desm.) Sacc. – 2,3 % та Septoria syringae Sacc. et. Speg. – 1,0 %. Встановлено, що в період квітування на квітках і листках бузку поширення має сіра гниль, яка надалі в літній період вегетації не розвивається. Борошниста роса може з'являтися із середини травня та інтенсивно проявлятися на рослинах протягом літньо-осіннього періоду. Філостиктоз розвивається, починаючи з третьої декади травня. Інші плямистості (септоріоз, аскохітоз, церкоспороз) виникають на рослинах в літній період. Альтернаріоз та кладоспоріоз прогресують в кінці літнього та осіннього періодів. Паразитування на бузку виявлених мікроміцетів призводить до зниження декоративних властивостей рослин та поступової втрати життєздатності.

Ключові слова: *мікроміцети, бузок, хвороби, сіра гниль, борошниста роса, плямистості листя*

АННОТАЦИЯ

М. И. Пиковский, Е. В. Колесниченко, В. И. Мельник, С. Н. Грисюк. *Патогенная микофлора растений syringa l. // Биоресурсы и природопользование. – 2019. – **11**, №1–2. – С.26–33. https://doi.org/10.31548/bio2019.01.003*

За период исследований (2015 – 2018 гг.) в растениях сирени установлено паразитирование 9 видов микромицетов. Наибольшего распространения (частота встречаемости 81,3 %) приобрел вид Microsphaera syringae (Schwein.). Частота встречаемости микромицета Alternaria alternata (Fr.) Keissl. составила 22,0 %, Cladosporium herbarum (Pers.) Link. – 12,3 %, Botrytis cinerea Pers. (Botryotinia fuckeliana (de Bary) Whetzel.) – 8,5 %, Phyllactinia suffulta Sacc. f. syringae Jacz. – 8,3 %, Phyllosticta syringae West. – 4,5 %, Ascochyta syringae Bres. – 3,3 %, Cercospora lilacis (Desm.) Sacc. – 2,3 % и Septoria syringae Sacc. et. Speg. – 1,0 %. Установлено, что в период цветения на цветках и листьях сирени распространена серая гниль, которая в дальнейшем в летний период вегетации не развивается. Мучнистая роса может появляться с середины мая и интенсивно проявляться на растениях в летне-осенний период. Филостиктоз развивается, начиная с третьей декады мая. Другие пятнистости (септориоз, аскохитоз, церкоспороз) возникают на растениях в летний период. Альтернариоз и кладоспориоз прогрессируют в конце летнего и осеннего периодов. Паразитирование на сирени выявленных микромицетов приводит к снижению декоративных свойств растений и постепенной потери жизнеспособности.

Ключевые слова: *микромицет, сирень, болезни, серая гниль, мучнистая роса, пятнистости листьев*

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