Ecology of micromycetes of higher plants of the Denov Arboratory

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Abstract. This article provides information on the distribution of pathogenic micromycetes in tall plants in the Denov Arboretum of the Surkhandarya region by plant species, genera and families. Due to the lack of scientific research on micromycetes, as well as wide taxonomic changes in the systematics of fungi, it was appropriate to collect information about pathogenic micromycetes found in high plants in the Surkhan oasis Denov Arboretum. Today, the Denov Arboretum has various types of ornamental trees and shrubs, including tall plants, in which the species composition of the micromycetes found in them, the cause of disease, is carried out during the monitoring and protection of the plants. it is necessary to study the information on the spread of pathogens of the shoot. The research work was carried out in 2019-2022 in the Denov arboretum of Surkhandarya region, and observations and herbarium samples of micromycetes of higher plants collected from the arboretum served as a source. Collection of herbarium samples from higher plants was carried out according to seasons, and laboratory experiments were carried out to analyze the collected herbarium samples, to isolate fungal species from plant tissues, and to study some biological properties.

1 Introduction

Denov Arboretum Park covers an area of 16.5 hectares, the main part of the park consists of perennial trees, there is an ecopark and an in vitro laboratory. Currently, more than 130 different introduced plant species are preserved in the Arboretum, their total number is 3500 bushes. There are more than 600 types and varieties of introduced fruit and ornamental trees, Buddleja davidii, Cousinia radians, Juglans regia, Cupressus sempervirens L., Quercus robur, Juniperus virginiana, Catalpa Spartium junceum speciose, Laurus nobilis L, Carya olivaformis Nutt. S.pecan, Cupressus, Castanea Crimean pine, Chinese bamboo, Laqerstremiya, Syringa L, Buxus, , Styphnolobium japonicum, Wisteria sinensis, Chaenomeles japonica, Australian acacia, Pinus nigra subsp. pallasiana, Olea europaea and other similar rare plants have been preserved [1].

It is known that in the process of evaluation, a group of fungi developed in close connection with plants, and the expansion or contraction of their distribution areas is inextricably linked to higher plants. Micromycetes of higher plants, including fungi, cannot

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absorb organic substances independently. Therefore, they fulfill their needs as parasites by saprotrophic feeding on living plants or plant debris. Accordingly, microphytes of higher plants cannot live independently without plants.

There are forms of phytopathogenic micromycetes that cause various diseases in plants, such as obligate parasite, conditional saprotroph and conditional parasite [2-4].

Therefore, it is important from a scientific and practical point of view to study and analyze the distribution of phytopathogenic micromycetes in host plants, their virulence and aggressiveness.

2 Materials and methods

Study of fungi using a microscope. A Moticam 5 N-300M binocular microscope was used to determine the species composition of micromycetes found in different parts of plants, and to study their morphological features. In order to study micromycetes alive and prepare temporary preparations, preparations are made from the diseased parts of the plant and dried without further processing. is placed on the glass and the cover is covered with glass. The prepared preparation was first viewed in the small lenses of the microscope, then in X 20, X 40 lenses. As a result of observation, mycelium, pycnidia, spores of micromycetes were studied in the damaged tissue of the plant. The use of this method is effective in studying the pathogenic properties of micromycetes, in determining the spread of signs of necrosis or disease in the affected parts of the plant [5-6].

The degree of damage to diseased plants was determined on a 5-point scale or percentage.

0 - 0 healthy plants, 1 - 10% infected plants, 2 - 11 - 25% infected plants, 3 - 26 - 50% infected plants, 4 - more than 50% infected plants more infected plant. [7-9]

3 Results and discussion

143 types of micromycetes belonging to 58 genera identified on the basis of the analysis of mycological herbarium samples collected as a result of research carried out in the arboretum were recorded in 73 species belonging to 27 families and 51 genera of higher plants in the arboretum.

Micromycetes are the most common host plants in Fraxinus excelsior - 11 species (7.69% of all identified micromycete species), Styphnolobium japonicum (=Sophora japonica) - 11 (7.69%), Populus alba - 9 (6.29), Salix alba – 6 (4.19), Ulmus minor – 4 (2.79), Quercus robur – 4 (2.79), Malus domestica – 4 (2.79), Prunus persica – 3 (2.09). In general, the average index of micromycetes found in the arboretum compared to host plants is 1.95. In 31 types of host plants, the occurrence of micromecete species is higher than the average, i.e. 2-11 (see Table 1).

Table 1. Denov Arboretum micromycete species distributed in higher plant species.

No	Plant type	Micrometcet type	The number	%
1	*Acer negundo*	*Coniothyrium negundinis* *Neosetophoma samarorum* *Phyllosticta acerina* *Sawadaea bicornis*	4	2.79
2	*Aegilops cylindrica*	*Tilletia caries*	1	0.69
3	*Aesculus hippocastanum*	*Phyllosticta paviae*	1	0.69
4	*Amaranthus retroflexus*	*Wilsoniana bliti*	1	0.69

5	*Armenica vulgaris*	*Valsaria insitiva* *Stigmina carpophila*	2	1.40
6	*Buddleja davidii*	*Phoma buddleja* *Pleospora buddlejae* *Heterosporium sp.*	3	2.09
7	*Carex pachystylis*	*Anthracoidea eleocharidis*	1	0.69
8	*Catalpa speciose*	*Pleospora spegazziniana* *Phoma catalpae*	2	1.40
9	*Catalpa bignonioides*	*Leveillula bignoniacearum* f. catalpae	1	0.69
10	*Cercis siliouastu*	*Stemphylium sp .*	1	0.69
11	*Cercis canadensis*	*Cytospora cercidicola*	1	0.69
12	*Chitalpa tashkentensis*	*Trichocladia* sp.	1	0.69
13	*Cichorium intybus*	*Ustilago cynodontis*	3	2.09
14	*Convolvulus arvensis*	*Septoria convolvuli Desm.* *Erysiphe convolvuli DC*	2	1.40
15	*Cousinia* sp.	*Erysiphe cichoracearum f. cousiniae*	1	0.69
16	*Cousinia radians*	*Puccinia cousiniae*	1	0.69
17	*Crataegus pseudoheterophylla*	*Phyllactinia mali*	1	0.69
18	*Crataegus turkestanica*	*Monilinia johnsonii* *Leptoxyphium fumago*	2	1.40
19	*Cydonia oblonga*	*Monilinia linhartiana* *Podosphaera clandestina*	2	1.40
20	*Cynodon dactylon*	*Ustilago cynodontis*	1	0.69
21	*Elaeagnus angustifolia*	*Cytospora elaeagnicola*	1	0.69
22	*Falcaria vulgaris*	*Puccinia falcariae Fuckel.*	1	0.69
23	*Forsythia suspense*	*Alternaria forsythiae*	1	0.69
24	*Forsythiae giraldiana*	*Phomopsis dominici*	1	0.69
25	*Fraxinus excelsior*	*Massaria vomitoria* *Camarosporium orni* *Coniothyrium olivaceum* *Cucurbitaria fraxini* *Phoma fraxinea* *Coniothecium complanatum* *Diplodia infuscans* *Cucurbitaria fraxini* *Cytospora fraxini* *Dothiorella fraxini* *Hendersonia vagans*	11	7.69
26	*Fraxinus sogdiana*	*Septoria fraxini* *Phyllactinia fraxini* *Fusicladium fraxini*	3	2.09
27	*Gleditsia triacanthos*	*Diplodia gleditschiae* *Phoma gleditschiae*	2	1.40
28	*Glycyrrhiza glabra*	*Uromyces glycyrrhizae*	1	0.69
29	*Hibiscus syriacus*	*Cladosporium herbarum*	1	0.69

30	*Hordeum* sp	*Ustilago hordei*	1	0.69
31	*Juglans regia*	*Erysiphe juglandis* *Cytospora juglandina*	2	1.40
32	*Juniperus virginiana*	*Alternaria solani* *Phoma juniperi* *Metacapnodium juniperi* *Diplodia juniperi*	4	2.79
33	*Koelreuteria paniculata*	*Camarosporium koelreuteriae*	1	0.69
34	*Ligustrum lucidum*	*Hendersonia ligustri*	1	0.69
35	*Ligustrum vulgaris*	*Cladosporium herbarum*	1	0.69
36	*Malus domestica*	*Alternaria mali* *Venturia inaequalis* *Stigmina carpophila* *Podosphaera leucotricha*	4	2.79
37	*Malva neglecta*	*Puccinia malvacearum Bertero ex Mont.*	1	0.69
38	*Melia azedarach*	*Camarosporium meliae*	1	0.69
39	*Morus alba*	*Phyllactinia moricola* *Camarosporium passerinii*	2	1.40
40	*Pinus halepensis*	*Phoma inopinata*	1	0.69
41	*Pinus laricio*	*Capnodium pini*	1	0.69
42	*Platanus orientalis*	*Erysiphe platani*	1	0.69
43	*Poa bucharica*	*Puccinia poarum*	1	0.69
44	*Poa bulbosa*	*Phyllachora graminis* *Blumeria graminis*	2	1.40
45	*Poa sp.*	*Epichloe coenophiala*	1	0.69
46	*Populus alba*	*Melampsora pruinosae* *Melampsora populina* *Taphrina aurea* *Melasmia populinae* *Phyllactinia populi* *Stemphylium ilicis* *Alternaria tenuissima* *Drepanopeziza populi* *Melampsora laricis-tremulae*	9	6.29
47	*Populus bolleana*	*Capnodium salicinum* *Fusicladium radiosum*	2	1.40
48	*Populus nigra*	*Cytospora chrysosperma* *Septoria populi* *Diplodia rosarum*	3	2.09
49	*Prunus amygdalus*	*Polystigma rubrum* *Stigmina carpophila*	2	1.40
50	*Prunus armeniaca*	*Stigmina carpophila*	1	0.69
51	*Prunus cerasifera*	*Erysiphe prunastri*	1	0.69
52	*Prunus avium (=Prunus dulcis)*	*Phyllactinia babayanii* *Stigmina carpophila*	2	1.40
53	*Prunus persica*	*Monilinia laxa* *Podosphaera pannosa* *Stigmina carpophila*	3	2.09

54	*Pyracantha coccinea*	*Phoma* sp.	1	0.69
55	*Pyrus communis*	*Diplocarpon mespili* *Monilia fructigena* *Venturia pyrina*	3	2.09
56	*Quercus robur*	*Alternaria alternata* *Cladosporium gracile* *Erysiphe alphitoides* *Valsa intermedia*	4	2.79
57	*Ribes nigrum*	*Leveillula taurica*	1	0.69
58	*Robinia pseudoacacia*	*Cercospora curvata* *Erysiphe communis*	2	1.40
59	*Rosa canina*	*Diplodia rosarum* *Phragmidium tuberculatum*	2	1.40
60	*Rumex* sp.	*Erysiphe polygoni var. rumicis*	1	0.69
61	*Rumex crispus*	*Puccinia phragmitis*	1	0.69
62	*Salix alba*	*Leptosphaeria* sp. *Drepanopeziza sphaerioides* *Melampsora hissarica* *Valsa salicina* *Cytospora salicis* *Fusicladium salicis*	6	4.19
63	*Salix babylonica*	*Cytospora translucens*	1	0.69
64	*Salix dahynoides*	*Erysiphe salicis DC.* *Melasmia salicina*	2	1.40
65	*Styphnolobium japonicum (=Sophora japonica)*	*Alternaria tenuis* *Stemphylium sophorae* *Fusarium sophorae* *Trichothecium roseum* *Phomopsis sophorae* *Cytospora sophorae* *Leveillula leguminosarum* *Diplodia sophorae* *Diaporthe sophorae Sacc.* *Steganosporium* sp. *Camarosporium hendersonioides*	11	7.69
66	*Spiraea vanhouttei*	*Diplodia spiraeina*	1	0.69
67	*Strigosella africana*	*Albugo candida*	1	0.69
68	*Taraxacum sect. Taraxacum (=Taraxacum officinale)*	*Erysiphe cichotacearum* f. *taraxaci* Jacz.	1	0.69
69	*Ulmus minor* subsp. *minor (=Ulmus glabra*)	*Ulmus glabra Huds*	1	0.69
70	*Ulmus minor* subsp. *minor (=Ulmus densa)*	*Phyllosticta ulmi* *Dothiorella ulmi* *Stigmina compacta* *Hendersonia ulmea*	4	2.79
71	*Ulmus pumila*	*Cytospora ulmi* *Rhytisma ulmi* *Uncinula ulmi*	3	2.09
72	*Vitis vinifera*	*Erysiphe necator*	1	0.69

73	*Chitalpa tashkentensis*	*Trichocladia* sp.	1	0.69

As a result of the conducted research, it was noted that micromycetes found in host plants belonging to 51 genera. The average number of micromycete species found in plant families is 2.8. Among them, the number of fungi in 16 groups of host plants is higher than the average. These include *Populus - 14 species (9.79% of all identified micromycetes), Sophora - 11 (7.69%), Fraxinus - 13 (9.09%), Prunus - 9 (6.29%), Salix - 8 (5.59%), Ulmus - 8 (5.59%), Quercus – 4 (2.07%), Juniperus – 4 (2.07%), Malus – 4 (2.07%), Acer – 4 (2.07%), Buddleja – 3 (2.09%), Catalpa – 3 (2.09%), Cichorium – 3 (2.09%), Crataegus – 3 (2.09%), Pyrus – 3 (2.09%), Forsythia – 3 (2.09%)* series were found to be included.

4 Conclusion

143 types of identified micromycetes belonging to 58 genera are distributed in 27 families and 73 species belonging to 51 genera of higher plants in the arboretum.

Fraxinus excelsior - 11 species (7.69% of all identified micromycete species), Styphnolobium japonicum - 11 (7.69%), Populus alba - 9 (6.29), Salix alba - 6 (4.19)), Ulmus minor – 4 (2.79), Quercus robur – 4 (2.79), Malus domestica – 4 (2.79), Prunus persica – 3 (2.09).

Micromycetes as the most common leading plant families are Salicaceae - 23 species (16.08%), Rosaceae - 22 species (15.38%), Fabaceae - 18 species (12.58%), Oleaceae - 16 species (11.18%), Ulmaceae - 8 species (5.59%), Sapindaceae – 6 species (4.19%), Fagaceae – 5 species (3.49%), Cupressaceae – 5 species (3.49%) Asteraceae – 4 species (2.79%), Bignoniaceae – 4 species (2.79%) is considered.

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