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DISTRIBUTION AND DEVELOPMENT OF MAJOR DISEASES OF PLANTS
BELONGING TO THE GENUS *MAGNOLIA* UNDER THE CONDITIONS OF THE
TASHKENT BOTANICAL GARDEN

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Annotation: This article presents the results of a study on the distribution and development of major diseases, including fusariosis, leaf spot, powdery mildew, and anthracnose, affecting plants of the genus *Magnolia* (*M. grandiflora*, *M. kobus*, and *M. soulangeana*) in the Tashkent Botanical Garden during 2022–2024. The results demonstrated that the incidence of diseases varied depending on both plant species and observation year. In *M. grandiflora*, leaf spot and anthracnose were the most prevalent diseases, whereas leaf spot and powdery mildew predominated in *M. kobus*. In *M. soulangeana*, the dominant diseases varied from year to year. The findings are of practical significance for assessing the disease resistance of *Magnolia* species and developing appropriate plant protection measures.

Keywords: *Magnolia*, disease, leaf, shoot, root, vegetation period, humidity.

Introduction. Plants belonging to the genus *Magnolia* are of considerable importance as ornamental and introduced tree and shrub species [1]. However, their infection with various fungal diseases during the vegetation period can adversely affect plant growth, development, and ornamental characteristics. In particular, fusariosis, anthracnose, powdery mildew, and leaf spot are among the major diseases occurring in *Magnolia* species.

The distribution and development of diseases vary from year to year depending on plant species, growing conditions, soil moisture, temperature, and the state of agrotechnical practices. Therefore, systematic monitoring of the distribution and development of major diseases in *Magnolia* species is essential for assessing their phytosanitary condition and developing effective plant protection measures.

Leaf diseases in *Magnolia* plants, including leaf spot, have been reported in association with various fungal pathogens. Phytosanitary literature on *Magnolia* identifies leaf spot and other foliar diseases among the important diseases affecting representatives of this genus [3]. This emphasizes the necessity of regular monitoring of diseases during the vegetation period and determining their incidence.

The occurrence of powdery mildew in certain *Magnolia* species has been confirmed by scientific studies. In 2022, Choi et al. investigated the powdery mildew pathogen occurring on *M. kobus* based on morphological characteristics and ITS and LSU rDNA sequences and identified it as *Erysiphe magnoliicola*. The findings indicate the need for further pathogenological investigation of powdery mildew affecting *M. kobus* [2].



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Anthracnose diseases are associated with fungi belonging to the genus *Colletotrichum* and may cause necrotic lesions on leaves and other green plant organs. A study published in 2024 investigated the biological activity of magnolol, a compound obtained from *Magnolia officinalis*, against *Colletotrichum gloeosporioides* and highlighted the significance of this pathogen in anthracnose diseases [4]. These findings demonstrate the relevance of studying *Colletotrichum*-associated diseases in plants of the genus *Magnolia*.

Fusariosis and other wilt and root diseases are also among the factors affecting the phytosanitary condition of *Magnolia* plants. Comprehensive studies on *Magnolia* diseases have emphasized the importance of an integrated approach aimed at identifying fungal diseases, monitoring their distribution, and maintaining plant health [3].

STUDY AREA AND RESEARCH METHODS

Monitoring of the distribution and development of major diseases affecting plants of the genus *Magnolia* was conducted in the Tashkent Botanical Garden during 2022–2024.

The distribution and development of major diseases of *Magnolia* plants, including fusariosis, anthracnose, powdery mildew, and leaf spot, were monitored three times annually during the vegetation period, in May, June, and July. For this purpose, 50 plants were selected from five locations along the diagonal of the *Magnolia*-growing area, with 10 plants selected from each location. The development of diseases was also assessed on leaves, shoots, and roots showing visible disease symptoms.

The distribution of major diseases in *Magnolia* plants was determined using the following formula:

$$P = \frac{n \cdot 100}{N},$$

where:

P – disease incidence, %;

n – number of diseased plants in the sample, units;

N – total number of plants in the sample, units.

The degree of infection of *Magnolia* plants by major diseases was assessed using the following five-point scale:

0 points – healthy plants, with no disease symptoms;

1 point – plants affected by the disease by up to 10%;

2 points – plants affected by the disease by 11–25%;

3 points – plants affected by the disease by 26–50%;

4 points – plants affected by the disease by more than 50%.

The development of major diseases in *Magnolia* plants was determined using the following formula:

$$R = \frac{\Sigma(a \times b) \cdot 100}{N \cdot K}$$

where:

R – disease development, %;



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$\Sigma(a \cdot b)$ – sum of the products of the number of affected plant organs and their corresponding disease severity scores;

N – total number of observed plant organs;

K – maximum score on the assessment scale [5].

RESULTS. The observations revealed significant differences among *Magnolia* species in terms of the distribution and development of the major fungal diseases, namely fusariosis, leaf spot, powdery mildew, and anthracnose (Table 1).

Table 1.

Distribution and development of major diseases in plants of the genus *Magnolia* in the Tashkent Botanical Garden during 2022–2024

<i>Magnolia</i> species	Disease	Disease incidence, %			Disease development, %		
		2022	2023	2024	2022	2023	2024
<i>M. grandiflora</i>	Fusariosis	18.0	4.0	30.0	9.0	1.0	15.0
	Leaf spot	24.0	30.0	24.0	14.0	15.5	11.0
	Powdery mildew	8.0	2.0	10.0	3.0	0.5	3.5
	Anthracnose	30.0	34.0	40.0	12.0	17.5	19.5
<i>M. kobus</i>	Fusariosis	6.0	6.0	18.0	1.5	1.5	6.5
	Leaf spot	26.0	26.0	28.0	13.5	13.5	14.0
	Powdery mildew	10.0	22.0	30.0	2.5	11.5	15.0
	Anthracnose	34.0	18.0	6.0	17.5	5.0	1.5
<i>M. soulangeana</i>	Fusariosis	16.0	12.0	20.0	6.0	4.5	10.0
	Leaf spot	30.0	2.0	28.0	15.0	0.5	12.0
	Powdery mildew	14.0	30.0	2.0	4.0	15.0	0.5
	Anthracnose	16.0	34.0	32.0	5.0	17.5	16.5

In *M. grandiflora*, fusariosis was recorded at an incidence of 18.0% in 2022. In 2023, its incidence decreased to 4.0%; however, in 2024, it increased again, reaching 30.0%. This pattern may be associated with the relationship between fungal abundance and soil moisture. Similar values were observed for leaf spot, with an incidence ranging from 24.0% to 30.0%. Powdery mildew was relatively less prevalent in this species, with an average incidence of 6.7%, whereas anthracnose was recorded with an incidence of up to 40.0%.

In *M. kobus*, leaf spot and powdery mildew were characterized by relatively high levels of distribution. During 2022–2024, the incidence of leaf spot ranged from approximately 26.0% to 28.0%, while powdery mildew was recorded at levels ranging from 10.0% to 30.0%. Fusariosis occurred at a relatively low incidence of 6.0% during 2022–2023; however, in 2024, its incidence increased to 18.0%, with disease development reaching 6.5%. Anthracnose was widely distributed only during 2022–2023, with

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incidence values of 34.0% and 18.0%, respectively. In 2024, however, its incidence decreased considerably to only 6.0%.

In *M. soulangeana*, leaf spot was the most prevalent disease in 2022, reaching an incidence of 30.0% and a development level of 15.0%. In 2023, powdery mildew and anthracnose were the predominant diseases, with incidence rates of 30.0% and 34.0%, respectively. In 2024, leaf spot and anthracnose were the most widely distributed diseases, with incidence rates of 28.0% and 32.0%, respectively.

CONCLUSION

According to the results of multi-year observations conducted in the Tashkent Botanical Garden during 2022–2024, leaf spot and anthracnose were found to be widely distributed and to develop intensively in *M. grandiflora* during 2022–2023. In 2024, the incidence of all major diseases ranged from 2% to 40%.

These variations were associated with changes in soil moisture and temperature conditions, as well as the agrotechnical condition of the plants.

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