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MONITORING THE ATTACK OF DIFFERENT PATHOGENS ON SOME ORNAMENTAL PLANTS FROM DIFFERENT GREEN SPACES OF CRAIOVA MUNICIPALITY

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Abstract
The research was carried out in the green area of Craiova, on the assortment of ornamental plants and aimed at monitoring the appearance and evolution of the spectrum of fungal pathogens, under the climatic conditions of the year 2019, a year poorer in rainfall compared to the average of the last 10 years.
The monitoring of the pathogens attack revealed the presence of the attack of 18 phytoparasites specific for 12 species of host plants, 8 plants showing the attack of a single pathogen, 3 plants of 2 pathogens each and one plant was attacked by 4 pathogens. Most host plants have been attacked by some specific pathogens, with the exception of dracila and mohonia which have been attacked by a single pathogen (Microsphaera berberidis).
The most common diseases identified are in the category of spots being produced by fungi of the genera Septoria, Phyllosticta, Sphaceloma, Diplocarpon, Cladosporium, Blumeriella, Venturia, followed by those in the category of powdery mildew produced by species of the genera Microsphaera, Erysiphe, Sphaerotheca, rot fungi of the genus Monilinia and rust produced by 1 species of the genus Phragmidium.

Keywords: attack, disease, host plant, monitoring, specific pathogens.

1. INTRODUCTION

The quantity and quality of dendrofloric plants, which occupy increasing areas in urban green spaces every year, are closely correlated with their protection against harmful organisms that can cause considerable damage to crops.
Numerous researchers from the country and abroad have had and still have concerns in this field, among which we mention: Costache and Roman (2001), Glawe (2003), Norin and Rumpunen (2003), Gelvonauskiene et al. (2004), Mitrea R. and Țucă (2006), Mitrea R. and Ștefan C. (2007), Akata and Heluta (2015).
Costache and Roman (2001) present the symptomatology, epidemiology of powdery mildew at lilac, rust, black spots and powdery mildew at rose and also indicated the measures, methods to prevent and combat them.
Glawe (2003) presented in North America the first report on powdery mildew on *Mahonia aquifolium*, attributing the attack to the fungus *Microsphaera berberidis* (D.C.).
Norin and Rumpunen (2003) conducted a survey on the attack of pathogens on Japanese quince (*Chaenomeles japonica*). The study was conducted in experimental fields in southern Sweden, where no phytosanitary treatments were applied. This study highlighted the attack of the pathogens

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Septoria cydoniae, Botrytis cinerea, Phlyctema vagabonda, Phoma exigua and Entomosporium mespili.

Gelvonauskiene et al. (2004) evaluated in Lithuania the response of 32 dwarf cherry genotypes to the attack of the pathogen *Blumeriella jaapii* (Rehm) Arx, responsible for the purple spot. During the study, he highlighted the influence of variations in weather conditions on the development and epidemiology of the pathogen.

Mitrea R. and Ștefan C. (2007) mention that the primary effect of a pathogen manifest at cell level, further can extend, observing metabolism modification of the entire plant, that can affect the normal development of the physiological processes, with direct or indirect consequence on the production quantity and quality.

Akata and Heluta (2015) identified on lilac plants the attack of the pathogen *Erysiphe syringae-japonica* responsible for the production of powdery mildew, this being the first report in Turkey.

The purpose of the research within the present paper was to monitor the attack of some phytoparasites and highlight the structure and dynamics of mycobiota in different green spaces of Craiova under the climatic conditions of the year 2019.

In order for these cultures to achieve the purpose for which they were created, it is necessary, among other things, to identify and accurately diagnose the attack of specific pathogens, thus being able to apply the most effective prevention and control measures.

2. MATERIALS AND METHODS

The green area of Craiova represented the research area in this study. The assortment of host plants was represented by ornamental species that predominate in the research space. In order to establish the spectrum of pathogens specific to the analyzed host plants, repeated macroscopic controls were performed on the various green organs, throughout the vegetation period in 2019.

At field controls, the intensity of the attack was determined for each pathogen in the host plant.

The intensity of the attack (I%), as Ivaşcu (2009) states, represents the degree of disease of a plant or organ and was calculated using the scale of values between 0 and 6, according to the following mathematical relation:

$$\mathbf{I\% = (\Sigma\ (i \times f)) / n}.$$

In which: i = grade given to the percentage of coverage with attack;

f = the number of plants with the same grade;

n = the total number of plants attacked.

In order to determine the intensity of the attack, it was necessary to analyze each pathogen on each plant andwas scored as follows:

\+ = attack with intensity in the range 1-25%;

++ = attack with intensity in the range 26-50%;

+++ = attack with intensity in the range 51-75%;

++++ = attack with intensity in the range 76-100%;

* = key pathogen.

The structure of the pathogenic mycobiota was presented in the alphabetical order of the botanical families of the host plants.

3. RESULTS AND DISCUSSIONS

Given the fact that the appearance and evolution of pathogens is directly influenced by climatic conditions, Table 1 shows the monthly averages of temperature and precipitation recorded in 2019.

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Table 1. Climatic conditions registered in Craiova, in 2019

Specification	Month							
	III	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Temperature (^{0}C) - 2019	9.9	11.9	16.2	22.7	22.8	25.3	20.2	14.4
Precipitation (mm) - 2019	22.9	44.6	45.7	126.7	36.0	7.1	2.8	29.5

From the presented data it can be noticed that 2019 was a year poor in precipitation with significantly high temperatures in summer.

As can be seen from the data entered in the table 2, on the 12 host plants the characteristic attack of a number of 18 fungal pathogens responsible for diseases in the category of rot (1 species), powdery mildew (5 species), spots (11 species) was reported and rust (1 species).

Analyzing the structure of the mycobiota in each host species, it is found that 8 of them showed the attack of a specific pathogen, in 3 species (***Chaenomeles japonica (Thunb.) Spach, Magnolia grandiflora and Berberis vulgaris L. Cv. Atro purpurea***) the attack of 2 specific pathogens each, and in ***Rosa sp.*** the number of pathogens reported was 4.

Figure 1. Conidiophores and cleistotes on Mahonia aquifolium (Pursh) Nutt leaves - Microsphaera berberidis

Figure 2. Spots on Lonicera japonica leaves - Lasiobotrys lonicerae

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Table 2. Pathogenic mycobiota of some ornamental plants cultivated in the green area of Craiova Municipality

Nr. No.	The botanical family	Host plant	Disease - pathogenic cause	I% +→++++	Reporting period	Obs.
1.	*Berberidaceae*	*Berberis vulgaris L. Cv. Atro purpurea*	**Powdery mildew** - *Microsphaera berberidis (DC.) Lév*	++++	June-October	* (Key pathogen)
2.			**Spot** - *Septoria berberidis Niessl.*	+	September - October	
3.		*Mahonia aquifolium (Pursh) Nutt*	**Powdery mildew** - *Microsphaera berberidis* (Figure 1)	++++	June-October	*
4.	*Bucsaceae*	*Buxus sempervirens L.*	**Spot**– *Phyllosticta auerswaldii Allesch.*	++	September - October	
5.	*Capriofhyllaceae*	*Lonicera japonica*	**Leaves spot**- *Lasiobotrys lonicera (Fr.) Kze* (Figure 2)	+	May	
6.	*Liliaceae*	*Magnolia grandiflora*	**White spot** - *Cladosporium delectum Cook et Ell.* (Figure 3)	+	September - October	
7.			**Leaves spot**- *Phyllosticta magnoliae Sacc.*	+	March	
8.	*Malvaceae*	*Hybiscus syriacus L.*	**Leaves spot** - *Phyllosticta macularis (Desm.) Allesch.*	+	September - October	
9.	*Oleraceae*	*Syringa* vulgaris L.	**Powdery mildew**- *Erysiphe syringae-japonica*	++++	End of summer	*
10.	*Ranunculaceae*	*Clematis vitalba*	**Powdery mildew**- *Oidium clematidis*	++	May- end of summer	
11.	*Rosaceae*	*Cerasus vulgaris Miller*	**Spot** – *Blumeriella jaapii (Rehm) Arx.*	++	May-August	*
12.		*Chaenomeles japonica (Thunb.) Spach*	**Monilia**- *Monilinia fructigena*	++	October	
13.			**Brown spot**-*Septoria cydoniae Fuck.*		September - October	
14.		*Malus floribunda*	**Spot** – *Venturia inaequalis (Cke.) Wint.*	++	June-October	*
15.		*Rosa sp.*	**Powdery mildew** - *Sphaerotheca pannosa (Wallr.) Lev. var. rosae Woron*	++++	May- end of vegetation	*
16.			**Black spot** - *Diplocarpon rosae Wolf.*	++++	June- end of vegetation	*
17.			**Rust –***Phragmidium mucronatum*	++	June- end of vegetation	*
18.			**Anthracnose** - *Sphaceloma rosarum (Pass)*	+	June-September	

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Figure 3. Attack on magnolia leaves - Cladosporium delectum

Most host plants have been attacked by specific pathogens with the exception of barberry and mahonia, both of which have been attacked by the fungus *Microsphaerea berberidis*.
The most common diseases identified are in the category of spots, being produced by fungi of the genera *Septoria*, *Phyllosticta*, *Diplocarpon*, *Cladosporium*, *Blumeriella*, *Venturia*, followed by those in the category of powdery mildew, produced by species of the genera *Microsphaerea*, *Erysiphe* , *Spharotheca*, rot, products of the genus *Monilinia* and rust products of 1 species of the genus *Phragmidium*.
The pathogens attacked the host plants during different periods of vegetation, some of them being considered key pathogens.
Of the total number of pathogens, 8 species manifested as key pathogens, and the remaining 10 as secondary pathogens.
Due to the high intensity of the attack, the key pathogens have unfavorably influenced the development of plants with repercussions especially in terms of flower and leaf quality.
In the future, the attack of secondary pathogens should not be neglected, because, with the increase of biological reserves from year to year as well as unfavorable climate changes, they can become key pathogens.

4. CONCLUSION

1. In the climatic conditions of 2019, on the 12 species of ornamental plants from the green area of Craiova Municipality, the attack of 18 pathogens was identified.
2. Regarding the distribution of pathogens in host plants, *Rosa sp*. is host for 4 phytoparasites, in 3 species (***Chaenomeles japonica (Thunb.) Spach, Magnolia grandiflora and Berberis vulgaris L. Cv. Atro purpurea***) the attack of 2 specific pathogens was reported, and the remaining 8 host plants show the attack of a single pathogen.
3. Of the 18 pathogens reported, 8 species are key pathogens for specific host plants and 10 species are secondary pathogens.

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4. Most host plants have been attacked by specific pathogens, with the exception of barberry and mahonia, both of which have been attacked by the fungus *Microsphaerea berberidis.*

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