QUANTIFICATION OF THE ATTACK OF SOME PATHOGENS THAT PRODUCE SPOTS ON SOME FLORICAL AND ORNAMENTAL PLANTS FROM DIFFERENT GREEN SPACES OF CRAIOVA MUNICIPALITY

SĂLCUDEAN (IONIȚĂ) THEODORA[1]*, ȘTEFAN CAMELINA[2], MITREA RODI[3]
[1]PhD University of Craiova, Faculty of Horticulture,Craiova.
[2] "FraţiiBuzeşti" National College, Craiova.
[3] University of Craiova, Faculty of Horticulture, Craiova.
*Corespondence autor E-mail: theodorrys13@gmail.com

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ABSTRACT

Research on the pathogen attack's which cause diseases called spots, was undertaken in the green area of Craiova, on the assortment of flowering and ornamental plants and aimed to quantify the spectrum of fungal pathogens in the climatic conditions of 2019.
On the 13 host plants, the characteristic attack of a number of 15 fungal pathogens that caused spots produced by fungi of the genera: Diplocarpon, Sphaceloma, Phyllosticta, Lasiobotrys Clodosporium, Alternaria, Septoria, Cercosporia, Blumeriella and Venturia was reported.
The notes on the frequency and intensity of the attack, in order to calculate the degree of attack were made for each host plant and pathogen together with the diseases signaling.
The degree of attack values for the 15 pathogens that produce spots on the 13 host plants ranged from 0.03% (Phyllosticta magnoliae Sacc.) and 7.1% (Diplocarpon rosae).

INTRODUCTION

Fungus cause one of the most serious diseases in plants, and due to the systematics of pathogens and their symptoms, we can emphasize that fungal spots are the most frequently seen causing, in fact, some of the worst damage.

Mycotic spots are produced by micromycetes which are divided in different cathegories, families and genera, and for a correct diagnosis microscopic studies are required on either the asexual or sexual part of the causative pathogens.

Among the most frequent pathologies produced by fungi, we mention: brown spots (septoriosis) that appear on chrysanthemums (*Septoria chrysanthemella*), carnations (*Septoria dianthi*), cyclamen (*Septoria cyclaminis*), nematode (*Septoria delphinella*), etc., the spot black of rose leaves (*Diplocarpon rosae Wolf*), anthracnose to rose (*Sphaceloma rosarum*) and dwarf cherry (*Blumeriellajaapii (Rehm) Arx.*).

Researchers from the country and abroad reported in their works data on morphology, symptomatology, epidemiology and control of fungal stains on flowering and ornamental plants depending on the species and the host plant, as follows: Costache M. et al. (2001), Mitrea R. and Ștefan C. (2007), Mehairjan (2012), Ciuc C. and Borcean A. (2017), Bhat et al. (2017), Sălcudean et al. (2019), Slavia M. et al. (2020).

COSTACHE M. et al. (2001) present the symptoms of spots, causative agents and recommends foliar treatments with specific products, ventilation of protected areas and burning the diseased plants. In 2000 and 2002 he presents the manifestation of the phytopathogenic agent.

MITREA R. and ȘTEFAN C. (2007) emphasized that the primary effect

of a pathogen is manifested and can extend to the cellular level, observing the change in the metabolism of the whole plant. Metabolism deviation affects the normal development of physiological processes, with repercussions on the quantity and quality of production.

MEHAIRJAN (2012) presents the spreading area of the rose black spot globally, symptoms of differential diagnosis as well as the most adequate measures and means to control the disease.

CIUI C. and BORCEAN A. (2017) have studied the attack of the pathogen *Diplocarpon rosae f.c. Marssonina rosae*, one of the major pathogens of plants in the Rosaceae family. This is one of the reasons why people who take care of roses will have to pay attention to the entire vegetation period of the pathogen attack.

BHAT et al. (2017) reported, in a nursery with Zinnia elegans in the Kashmir-India Valley, an outbreak of *Alternaria zinniae*, a new pathogen that has not been previously reported in this region and that infects plants causing significant losses. Microscopic examination of the diseased tissue revealed the characteristic presence of spores with a very long beak of *Alternaria zinniae*.

SĂLCUDEAN et al. (2019) investigated the reaction of 15 varieties of roses grown in the rosary in the Botanical Garden "Alexandru Buia" in Craiova to the attack of pathogens *Sphaerotheca pannosa (Wallr.) Lev*. *var. rosae Woron* and *Diplocarpon rosae Wolf* and highlighted that they show great variability. Thus, the fungus attack *Diplocarpon rosae* that produces the black spot of the rose manifested itself since May, was present throughout the summer and autumn and 3 varieties reacted as resistant medium, while 12 varieties showed resistance to 4 of them, the disease is not reported.

SLAVIA MATIC et al. (2020) have identified the fungus attack *Alternaria zinniae* on 13 host plants, which represented a recent outbreak of spot that has caused significant damage in the province of Biella (northern Italy).

The purpose of this thesis is to quantify the attack of phytoparasites responsible for the production of spots on flowering and ornamental plants in various green spaces of Craiova in the climatic conditions of 2019.

In order for these crops to achieve their purpose, it is necessary, among other things, to quantify the attack of specific pathogens that produce spots, thus being able to intervene with the most effective prevention and control measures.

MATERIAL AND METHODS

The green area of Craiova represented the research area in this study.

The research was carried out on the assortment of host plants represented by ornamental floricultural species that predominate in the research spaces.

During the vegetation period of the analyzed host plants, in the field, notations were made regarding the frequency (F%) and intensity (I%) in order to establish the degree of attack (GA%).

Attack frequency (F%) is the number of plants, or organs of the attacked plant (n), compared to the number of plants or organs analyzed (N), expressed as a percentage by the formula:

$$F\% = \frac{nx100}{N}$$

Attack intensity (I%) is the percentage in which a plant or plant organ is attacked, relative to the total number of plants analyzed.

The intensity of the attack is calculated according to the formula:

$$I\% = \frac{fxi}{n}$$ in which:

f = number of plants or organs attacked;

i = constitutes the percentage of coverage with attack;

n = represents the total number of plants or organs analyzed.

The scoring scale from 0 to 6 was used, in which:

Note 1 = 1-3% attack;

Note 2 = 4-10% attack;

Note 3 = 11-25% attack;

Note 4 = 26-50% attack;

Note 5 = 51-75% attack;

Note 6 = 76-100% attack.

The degree of attack (GA%) was expressed as a percentage as a function of frequency (F) and intensity of attack (I), relative to 100. The degree of attack is calculated according to the formula:

$$GA\% = \frac{F\% x\ I\%}{100}$$

RESULTS AND DISCUSSIONS

The known diseases as spotted spots in the field, on different host plants and their causative agent are presented in Table 1.

Analyzing the data entered in the table below, the 13 host plants showed the characteristic attack of a number of 15 fungal pathogens responsible for spots produced by fungi of the genera: *Diplocarpon, Sphaceloma, Phyllosticta, Lasiobotrys Clodosporium, Alternaria, Septoria, Cercosporia, Blumeriella and Venturia*.

Table 1

Pathogenic mycoflora responsible for diseases called stains on some floricultural and ornamental plants grown in the green area of Craiova in 2019

Nr. crt.	The botanical family	Host plant	Disease - pathogenic cause	Reporting period
1.	Astereaceae	Zinnia elegans Jacq.	**Leaf spot (Alternaryosis)** *Alternaria zinniae Pape*	September -October
2.	Berberidaceae	Berberis vulgaris L. Cv. Atro purpurea	**Leaf spot** *Septoria berberidis Niessl.*	September -October
3.	Bucsaceae	Buxus sempervirens L.	**Leaf spot** *Phyllosticta auerswaldii Allesch.*	September -October
4.	Capriofhyllaceae	Lonicera japonica	**Leaf spot** *Lasiobotrys lonicera (Fr.) Kze*	May
5.	Lamiaceae	Salvia sp.	**Brown spot (Septoriosis)** *Septoria salvie Pass*	June
6.	Liliaceae	Magnolia grandiflora	**White spot** *Cladosporium delectum Cook et Ell.*	September -October
7.			**Leaf spot** *Phyllosticta magnoliae Sacc.*	March
8.	Hydrangeaceae	Hydrangea hortensis S.M.	**Gray spot- (Cercosporiosis)** *Cercospora hydrangeae Ell. et Eu.*	May - October
9.	Malvaceae	Hybiscus syriacus L.	**Leaf spot** *Phyllosticta macularis (Desm.) Allesch.*	September -October
10.	Paeoniaceae	Paeonia officinalis	**Brown spot (Septoriosis)** *Colodosporium paeoniae Pass.*	May
11.	Rosaceae	Cerasus vulgaris Miller (Prunus cerasus)	**Leaf spot** *Blumeriella jaapii (Rehm) Arx.*	May - August
12.		Chaenomeles japonica (Thunb.)Spach	**Brown spot (Septoriosis)** *Septoria cydoniae Fuck.*	June - October
13.		Malus niedzwetzkyana Dieck.	**Leaf spot** *Venturia inaequalis (Cke.) Wint.*	June - October

Nr. crt.	The botanical family	Host plant	Disease - pathogenic cause	Reporting period
14.		Rosa sp.	**Black spot** *Diplocarpon rosae Wolf.*	June - The end of vegetation
15.			**Anthracnose** *Sphaceloma rosarum (Pass)*	June - September

Analyzing the structure of the mycoflora in each host species, it is observed that 11 of them showed the attack of a specific pathogen responsible for staining, and in 2 species (Rosa sp., Magnolia grandiflora) the attack of 2 specific pathogens was reported.

The pathogens responsible for the spots attacked the host plants during different periods of vegetation, some of them being considered key pathogens.

Of the total number of pathogens, 3 species manifested as key pathogens, and the remaining 12 as secondary pathogens.

Due to the high attack intensity, the key pathogens have unfavorably influenced the development of plants with repercussions especially in terms of flower and leaf quality.

The notes on the attack frequency and intensity, in order to calculate the degree of attack were made for each host plant and pathogen together with the diseases signaling.

Table 2

Quantification of the attack produced by some phytoparasites responsible for stains on some flowering and ornamental plants cultivated in the green area of Craiova in 2019

Nr. crt.	Host plant	Disease - pathogenic cause	Year 2019			Obs.
			F%	I%	GA%	
1.	Zinnia elegans Jacq.	**Leaf spot (Alternaryosis)** *Alternaria zinniae Pape*	6,9	3,1	0,2	
2.	Berberis vulgaris L. Cv. Atro purpurea	**Leaf spot** *Septoria berberidis Niessl.*	5,3	2,7	0,14	
3.	Buxus sempervirens L.	**Leaf spot** *Phyllosticta auerswaldii Allesch.*	13,6	15,8	7,8	
4.	Lonicera japonica	**Leaf spot** *Lasiobotrys lonicera (Fr.) Kze*	7,4	2,2	1,6	
5.	Salvia sp.	**Brown spot (Septoriosis)** *Septoria salvie Pass*	15,9	3,9	6,2	
6.	Magnolia grandiflora	**White spot** *Cladosporium delectum Cook et Ell.*	4,3	1,3	0,05	
7.		**Leaf spot** *Phyllosticta magnoliae Sacc.*	3,9	0,9	0,03	
8.	Hydrangea hortensis S.M.	**Gray spot-(Cercosporiosis)** *Cercospora hydrangeae Ell. et Eu.*	12,7	13,6	1,7	
9.	Hybiscus syriacus L.	**Leaf spot** *Phyllosticta macularis (Desm.) Allesch.*	5,9	2,9	1,7	
10.	Paeonia officinalis	**Brown spot (Septoriosis)** *Colodosporium paeoniae Pass.*	24,8	19,6	4,8	
11.	Cerasus vulgaris Miller (Prunus cerasus)	**Leaf spot** *Blumeriella jaapii (Rehm) Arx.*	19,3	6,4	1,2	

Nr. crt.	Host plant	Disease - pathogenic cause	Year 2019			Obs.
			F%	I%	GA%	
12.	Chaenomeles japonica (Thunb.)Spach	**Brown spot (Septoriosis)** *Septoria cydoniae Fuck.*	6,3	3,2	0,2	
13.	Malus niedzwetzkyana Dieck.	**Leaf spot** *Venturia inaequalis (Cke.) Wint.*	25,7	12,3	3,1	
14.	Rosa sp.	**Black spot** *Diplocarpon rosae Wolf.*	38,8	18,5	7,1	
15.		**Anthracnose** *Sphaceloma rosarum (Pass)*	4,9	2,8	1,3	

As it can be seen from the data presented in Table 2, the pathogen with the highest incidence of attack, reported by frequency, was *Diplocarpon rosae* producing the black spot of the rose, followed by *Cladosporium paeoniae* responsible for the brown spot of the peony leaves. and *Venturia inaequalis (Cke.) Wint* responsible for spotted ornamental red apple.

In 2019, the lowest frequency was observed in the case of the pathogen *Cladosporium delectum Cook et Ell.* which produces white spot and *Phyllosticta magnoliae Sacc.* responsible for leaf spot, both in magnolia.

Regarding the virulence of the attack, rendered by intensity, the high values were noted for the fungi *Diplocarpon rosae* and *Cladosporum paeoniae*.

The values of the degree of attack for the 15 pathogens that produce spots on the 13 host plants ranged from 0.03% (*Phyllosticta magnoliae Sacc.)* And 7.1 (*Diplocarpon rosae*).

CONCLUSIONS

1. In order for these crops of flowering and ornamental plants to achieve their purpose, it is necessary, among other things, to quantify the attack of specific pathogens which produce stains, so that the most effective measures for prevention and control can be taken;

2. The floricultural and ornamental plants from different green spaces of Craiova municipality are attacked by a series of phytoparasites, in different periods of vegetation, and the incidence and virulence of the attack oscillate from one year to another within each host plant;

3. On the 13 host plants, the characteristic attack of a number of 15 fungal pathogens responsible for spots produced by fungi of the genera: *Diplocarpon, Sphaceloma, Phyllosticta, Lasiobotrys Clodosporium, Alternaria, Septoria, Cercosporia, Blumeriella* and *Venturia* was reported;

4.The attack of the 15 pathogens responsible for the spots was manifested with variable frequency and intensity within the same species depending on the year of culture, the degree of attack being influenced more by the incidence of the attack than by its virulence;

5. The virulence of the attack, rendered by intensity, the high values were noted for the fungi *Diplocarpon rosae* and *Cladosporum paeoniae*.

6. The values of the degree of attack for the 15 pathogens that produce spots on the 13 host plants ranged from 0.03% (*Phyllosticta magnoliae Sacc.*) And 7.1 (*Diplocarpon rosae*).

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