WILSONOMYCES CARPOPHILUS (LÉV.) AND BLUMERIELLA JAAPII THE MOST HARMFULL CHERYTREES PATHOGENS

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Abstract. *Wilsonomyces carpophilus (Lév.) is a common pathogen of stone fruit trees and produce the leaf shot hole. Blumeriella jaapii on the other hand is a pathogen just for cherry trees and produce cherry leaf spot but this disease affects also the fruits because the main symptom are small spots which cold be both on leaves and fruits. Taking from this point of view, both pathogens affect the leaves and because they could attack in the same time, they are considered to be extremely dangerous for cherry trees because the main effect on the leaves are a rapid necrosis of some large parts of the infected leaves. After that the leaves are falling to early, at the end of the end of August and beginning of September. All this long process of cherry trees leaves decay bring with it some physiological problems like reducing possibility the trees resistance to some periods of drought which may appear any time in the reference are during the summer and also of a normal preparing for winter. For what it is known for the moment, both pathogens could be stop from their development on cherry trees just by some foliar treatment but in this case, it is essential to monitor all the way in the orchard the stage of leaf infection with these pathogens. This cases the key to a high efficiency of the treatment against those pathogens. By the present paper we bring a comprehensive evaluation of this cherry tree diseases in the interest area.*

Keywords*: Wilsonomyces carpophilus, Blumeriella jaapii*

INTRODUCTION

Over the last 4 years, many observations have been made that suggest that in the cherry tree, in the southwestern part of Romania, respectively the area between and the Danube, the most important diseases that mainly affect the leaf apparatus of stone trees (plum, apricot, peach, nectarine, cherry, sour cherry) are leaf spot caused by the phytopathogenic fungus Wilsonomyces carpophilus and cherry anthracnose caused by the phytopathogenic fungus *Blumeriella jaapii*. If we consider the epidemiological character of the two pathogens, *Blumeriella jaapii* should be considered less dangerous because this pathogen produces anthracnose only in cherry and sour cherry varieties. At the same time, Wilsonomyces carpophilus is a widespread pathogenic fungus in all stone fruit species, with small variations in virulence and aggressiveness values, mainly due to variations in the resistance to this pathogen of the stone tree species themselves but also of the cultivars (varieties and local populations) existing within these stone tree species.

The management of different technological links included in the integrated protection management (IPM) are directly dependent on the values of aggressiveness and virulence of plants diseases and pests. It is also necessary to take into account the variation in the values of the existing inoculum reserve in each location where it is necessary to apply a set of integrated control measures that also include the two pathogens, leaves leaf spot and anthracnose of cherry and sour cherry. For a more accurate approximation of the situation of the inoculum reserve, a measurement of the aggressiveness values of the pathogens should be taken into account, followed by the follow-up of the correlation of the aggressiveness values of the two pathogens in order to observe the evolution of both the aggressiveness of the pathogen and the tolerance of the cherry and sour cherry cultivars which are of interest.

MATERIAL AND METHODS

The evaluation of the evolution of the aggressiveness of the fungi, one that produce the leaf shot hole disease in stone fruits, produced by the phytopathogenic fungus *Wilsonomyces carpophilus* and the second one that produce anthracnose of cherry and sour cherry which is the phytopathogenic fungus *Blumeriella jaapii,* was carried out in the period 2020-2023. All these evaluations take place on the area located in the south-west of Romania between in the area of localities Berzovia, Grădinari, Cărbunari and Moldova Nouă. The area covered by those four locations can be considered favorable from a climatic point of view for cherry trees. From the point of view of the geography, it is a combined area of high plain, hill and a small mountains area. Thus, from this point of view, all the important landforms of the area are covered.

Isolated cherry trees located on public space in all indicated locations were taken into account for the evaluation. For this reason, we considered that an assessment of the intensity of the attack can lead to the formation of a clear picture of the presence of the agents as well as the situation of the pathogen reserve in the researched area.

RESULTS AND DISCUSSIONS

The recorded values of the attack intensities of the *Wilsonomyces carpophilus* fungus, as shown in table 1, in the 4 localities, during the period between April and September, varied between a minimum of 5% in the year 2023 in the Cărbunari locality and a maximum of 40% in the town of Berzovia in the year 2022. At this point it can be noted that the pathogen was present every year in all four locations during the entire period between April and September.

The differences in the intensity of the existing pathogen between the localities is relatively small, being, as can be seen, a maximum of 8.89% between Moldova Nouă and Cărbunari (table 1). Looking to this difference it could be explained only by the relief difference between the two locations which is quite important. Cărbunari is located on a mountain plateau at almost 700 m altitude and Moldova Nouă at an altitude of approximately 250 m, on the bank of the Danube. So there are some climatic peculiarities that make a difference in the behavior of cherry leaf spotting produced by *Wilsonomyces carpophilus*.

Regarding to the dynamics of the leaf shot hole disease between April and September (table 2), after three years of experiences it can be observed that the most unfavorable month is April, with the lowest average of the intensity of the attack over the time period. From this point of view, the most favorable month for the pathogen is September. The most plausible explanation is the sensitivity of the trees by going through the dry season of July and August and the decrease of plant immunity at the end of the season.

Among the three experimental years, the most favorable year for the development of this pathogen was 2022 and the least favorable was 2021. The year 2023 was the closest to the normal climatic conditions of the area, which led to a zonal average of fungus attack intensity located around 24 %. This average is relatively normal for trees that do not receive any attention from the point of view of plant protection, being protected only by the genetic resistance they have.

All these conclusions are joined by the fact that the pathogen was permanently present on the trees on which the determinations were made. Thus, there is every reason to substantiate the hypothesis that this constant attack by the Wilsonomyces carpophilus fungus is due both to the reserve of the pathogen that remains relatively constant from one year to the next and to the adaptation of this pathogen both to the climatic conditions and to the genetic resistance of the trees which it affects.

Table 1.

Fungus *Wilsonomyces carpophilus* variations of attack intensity due to the locality where the observations were made

Nr	Factor A Location	Factor B Month	Factor C Year			Averages of factor A	Difference	Interpretation
			2021	2022	2023			
1	Berzovia	April	20	35	25	32.72	7.44	**
		May	24	35	35			
		June	30	40	35			
		July	25	35	30			
		August	30	40	40			
		September	35	40	35			
2	Grădinari	April	15	20	20	21.94	-3.33	-
		May	15	15	25			
		June	20	25	20			
		July	20	25	25			
		August	20	20	25			
		September	25	30	30			
3	Cărbunari	April	10	15	5	16.39	-8.89	ooo
		May	10	20	5			
		June	15	20	15			
		July	15	20	15			
		August	15	20	15			
		September	25	35	20			
4	Moldova Nouă	April	15	20	20	25.28	Control	-
		May	20	25	20			
		June	20	30	25			
		July	20	30	25			
		August	20	30	25			
		September	40	40	30			

DL 5% = 4.26 DL 1% = 7.24 DL 0,1 % = 11.6

Table 2

Fungus *Wilsonomyces carpophilus* variations of attack intensity due to the month of observations

Factor B Month	April	May	June	July	August	September	Month average
Averages	18.33	20.75	24.58	23.75	25.00	32.08	24.08
Differences	-5.75	-3.33	0.50	-0.33	0.92	8.00	Control
Interpretation	oo	-	-	-	-	**	-

DL 5% = 3.36 DL 1% = 5.42 DL 0,1 % = 8.12

Table 3

Fungus *Wilsonomyces carpophilus* variations of attack intensity due to the year of observations

Factor C Year	2021	2022	2023	Media anilor
Averages	21.00	27.71	23.54	24.08
Differences	-3.08	3.63	-0.54	Control
Interpretation	o	*	-	-

DL 5% = 2.87 DL 1% = 4.44 DL 0,1 % = 7.24

The second pathogen present on the cherry trees on which this evaluation was performed, is *Blumeriella jaapii* that produces anthracnose, a disease that affects the leaves and fruits of cherries to a good extent. The attack of this pathogen proceeds in parallel with that of cherry leaf spot (*Wilsonomyces carpophilus*). Even if the symptom on the leaves is only in the form of very small black points, the damage is practically produced by the large number of these necrotic points produced by the pathogen and by the fact that the surface area affected by the mycelium of the fungus is at least 5 times larger than the of the necrotic point that represents the place of pathogen fruiting body.

Table 4

Fungus *Blumeriella jaapii* variations of attack intensity due to the locality where the observations were made

Nr	Factor A Location	Factor B Month	Factor C Year			Averages of factor A	Difference	Interpretation
			2021	2022	2023			
1	Berzovia	April	5	10	5	13.33	-4.72	o
		May	5	10	5			
		June	10	15	10			
		July	10	15	20			
		August	10	20	20			
		September	15	25	30			
2	Grădinari	April	5	5	10	12.50	-5.56	oo
		May	5	10	10			
		June	10	10	10			
		July	15	15	10			
		August	15	15	15			
		September	20	25	20			
3	Răcășdia	April	5	5	5	12.78	-5.28	oo
		May	5	10	5			
		June	5	10	10			
		July	15	20	15			
		August	15	20	15			
		September	20	25	25			
4	Cărbunari	April	10	15	10	18.06	0.00	-
		May	15	20	10			
		June	15	20	10			
		July	15	20	20			
		August	15	25	25			
		September	25	25	30			

DL 5% = 2.72 DL 1% = 5.12 DL 0,1 % = 8.45

Table 5

Fungus *Blumeriella jaapii* variations of attack intensity due to the month of observations

Factor B Month	April	May	June	July	August	September	Month average
Averages	7.50	9.17	11.25	15.83	17.50	23.75	14,17
Differences	-6.67	-5.00	-2.92	1.67	3.33	9.58	Control
Interpretation	oo	o	-	-	*	***	-

DL 5% = 3.24 DL 1% = 5.46 DL 0,1 % = 7.83

Table 6

Fungus *Blumeriella jaapii* variations of attack intensity due to the year of observations

Factor C Year	2021	2022	2023	Year averages
Averages	11.88	16.25	14.38	14,17
Differences	-2.29	2.08	0.21	Control
Interpretation	o	*	-	-

DL 5% = 1,26 DL 1% = 2,48 DL 0,1 % = 4,12

The manifestation of cherry threes anthracnose (*Blumeriella jaapii*) is similar to that of leaf spotting (*Wilsonomyces carpophilus*) in the sense that both pathogens infect the leaves approximately in April (it rarely happens that the attack is delayed by cold springs). The mode of attack is also relatively similar as the attack occurs throughout the growing season if this is allowed to occur according to the life cycle of the two pathogens. From this perspective, things are also demonstrated in the case of our observations (table 1). Thus, the anthracnose attack began in April and continued throughout the entire vegetation period in all four locations where inspections of the two pathogens were carried out.

Following the development of the anthracnose (*Blumeriella jaapii*) attack, it can be seen that at the beginning of the period, in April, the attack was well below the average limit of the credit period (table 5). Then the intensity of the attack of the *Blumeriella jaapii* fungus began to increase, reaching in the August-September period to be well above the three-year average of the April-September period.

Looking into the distribution of the attack intensity over the three years of observations (table 6), it can be observed that there is a total similarity between the evolution of the two pathogens of the foliar system of the cherry, the most favorable year from all points of view being 2022 and the most unfavorable year was 2021.

CONCLUSIONS

1. Both pathogens were recorded in all four locations which means that they cover the entire relevant territory where the locations are located.
2. The attack of the two phytopathogenic fungi is continuous throughout the growing season having intensity records in each of the 6 months in which records were made for all locations.
3. The reserve of the two pathogens is ensured, a fact demonstrated both by the constant attacks recorded in April and by the relatively high intensities in September (the last month in which we made observations)
4. Considering the above, the recommendation is that those who have young cherry trees or cherry orchards in the area covered by the four locations where determinations were made, must be prepared to carry out a treatment with a systemic product but with

a relatively short downtime (since cherries ripen quickly and must be harvested), as soon as the first spots or points appear as a symptom of one of the two pathogens.

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