

RESPONSE OF SOME SOUR CHERRY VARIETIES TO THE ATTACK BY FIRE BLIGHT (*ERWINIA AMYLOVORA* BURRILL WINSLOW)

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Abstract: Research concerning the response of some pear varieties to the attack by *Erwinia amylovora*, a pathogen that causes the fire blight, was carried out on an intensive pear tree plantation on Farm No. 3 Lugoj of the Banat's University of Agricultural Sciences and Veterinary Medicine of Timisoara, Romania, in the soil and climate conditions of 2012. The following pear tree varieties were subjected: Aromat de Bistrița, Conferance, Favorita lui Clapp, Napoca, Cüre, and Euras. Observations made on pear shoots and fruits show that the variety Euras was not attacked by the pathogen *Erwinia amylovora* that produces fire blight in apple, pear, and quince. Of the five varieties studied, the pear variety Aromat de Bistrița was the most severely attacked by this pathogen, while the pear varieties Conferance and Cüre had shoots and fruits resistant to the attack. Based on the research carried out, the authors recommend the extension of the cultivation of the pear varieties Euras, Conferance and Cüre, while the pear varieties Aromat de Bistrița, Napoca and Favorita lui Clapp need prevention measures and integrated therapy to face the attack by the bacterium *Erwinia amylovora*.

Key words: pathogen, attack, attack rate, frequency, experience

INTRODUCTION

Fire blight represents a sanitary quarantine disease caused by the bacteria *Erwinia amylovora* (Burril) Winslow, observed in our country in 1992, in a pear orchard; afterwards it got extended step-by-step endangering other plantations until these had to be cut down. The disease was extended especially in the poorly maintained orchards, creating a serious reserve that was then spread even in the well-maintained ones, affecting pear, quince and apple trees (GH. SIMERIA et al., 2006).

In 2010, this disease was observed in Timișoara in an apple tree orchard, affecting the varieties: Yonathan, Generos, Florina, Delicios de Voinești, Pionier and Romus 2, and also in the Farm no. 3, in the pear varieties Aromat de Bistrița, Napoca, Conferance, Cüre and Clapp's Favourite. Both plantations belonged to the Didactic Base of Banat's University of Agricultural Sciences and Veterinary Medicine Timișoara.

The researches on the behaviour of some pear varieties under the attack of the bacteria *Erwinia amylovora* (Burril Winslow) were carried out in the collection of varieties and hybrids founded in 1997 (NICORICI NICOLAE, GHEORGHE SIMERIA), in the nursery farm Lugoj.

MATERIAL AND METHOD

The observations on the behaviour of the six pear varieties under the attack of the bacteria *Erwinia amylovora* (Burril Winter.) were performed in Farm no. 3 Lugoj – Experimental Didactic Base of Banat's University of Agricultural Sciences and Veterinary Medicine Timișoara.

The pear varieties studied were: Aromat de Bistrița, Conferance, Clapp's Favourite, Napoca, Cüre and Euras.

To determine pear varieties' reaction to the attack caused by the pathogen *Erwinia amylovora*, we carried out periodical observations, during vegetation, at the end of May (29 – 30.05.2012) and at the beginning of August (3 – 4.08.2012), on the frequency of attacks on leaves and sprouts.

In order to analyze fire blight's attack on pear sprouts and fruit, we applied the monofactorial experience calculation method. In concordance with the available phyto-sanitary control regulations, we took data from three trees/row, and this represented a repetition. For each of the three trees, we analyzed sprouts from all over the tree and noted attack's frequency. Each repetition's frequency represents a mean of the three trees observed.

In order to remove errors, we considered three repetitions for each variety from our experience.

During attack assessment, we applied the USDA scale to estimate the attack in concordance with the percentage on branches attacked with the entire corona, in 9 categories, as follows:

1.	100% attacked
2.	89 – 99% attacked
3.	76 – 86% attacked
4.	51 – 75% attacked
5.	26 – 50% attacked
6.	13 – 25% attacked
7.	7 – 12% attacked
8.	4 – 6% attacked
9.	1 – 3% attacked

The trees from the orchards attacked by *Erwinia amylovora* estimated in the categories 1 – 5 are proposed for removal, and those from the categories 6 – 9, with an attack frequency within tree corona of 1 – 25%, will be submitted to integrated prophylaxis and therapy measures.

RESULTS AND DISCUSSIONS

The frequency of *Erwinia amylovora*'s attack on pear sprouts

Under the climatic conditions of 2012, we observed symptoms of the attack caused by the bacteria *Erwinia amylovora* in the pear varieties from the tree collection from Experimental Didactic Base Timișoara, farm no. 3 Lugoj. The pear varieties behaved differently to this pathogen, as presented in tables 1 and fig. 1

Table 1.

Attack frequency of *Erwinia amylovora* on pear sprouts in the experimental year 2012

Variant no.	Variety	Attack frequency on sprouts %			Mean	Absolute difference	Significance
		Repetition I	Repetition II	Repetition III			
1	Aromat de Bistrița	13	15	16	14,66	-8,01	000
2	Conferance	4	1	1	2	+4,66	xx
3	Clapp's Favourite	7	5	6	6	0,66	-

4	Napoca	11	10	15	12	-5,34	00
5	Cüre	2	6	4	4	+2,66	-
6	Euras	0	0	0	0	6,44	xxx
Experimental mean		6,16	6,66	7,16	6,44	0,00	-

DL 5% = 3,09
 DL 1% = 4,34
 DL 0,1% = 6,13

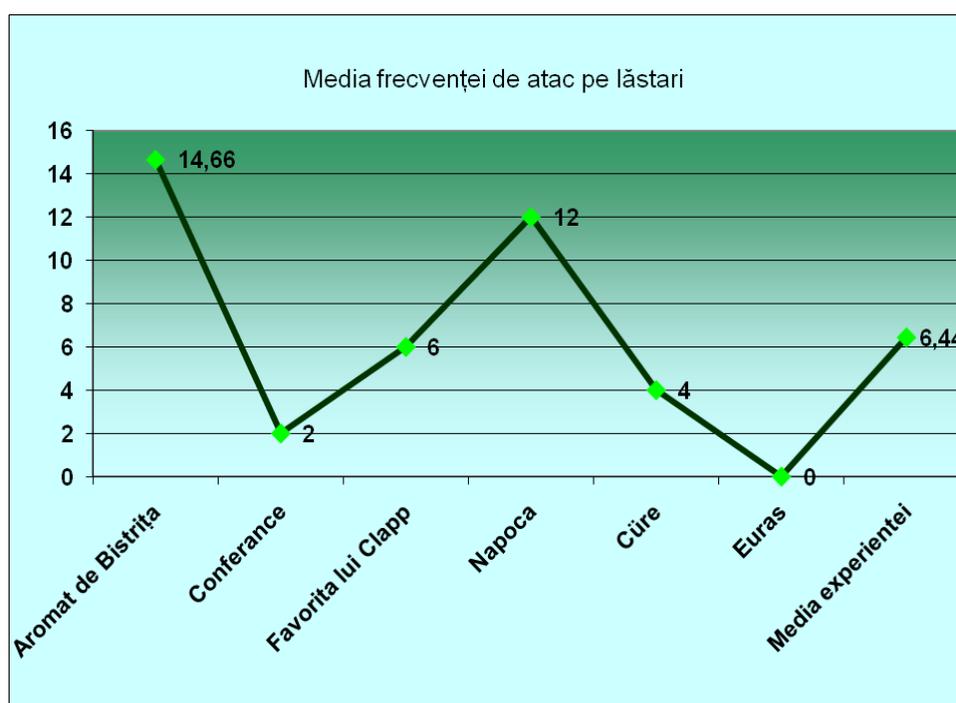


Figure1 The behaviour of some pear varieties under the attack of the bacteria *Erwinia amylovora* in the conditions of 2012

In 2012, the data presented in table 1 and figure 1 show that the most attacked pear variety on sprouts, by *Erwinia amylovora*, was Aromat de Bistrița, with a frequency of 14.66%, presenting very significantly negative differences compared with the experimental mean of 6.44%. This variety is followed by Napoca, with an attack frequency of 12%.

The variety Conferance proved good resistance to fire blight, with distinctly significantly positive differences compared with the experimental mean, and the varieties Clapp's Favourite and Cüre proved to be resistant to the attack caused by this bacteria.

Distinctly significantly negative differences compared with the control variant (experimental mean) were observed in the case of the variety Napoca.

The most resistant pear varieties to the attack on sprouts were Conferance and Cüre, presenting distinctly significantly positive differences compared with the experimental mean.

The pear variety Euras was not attacked by the bacteria *Erwinia amylovora* (Burril Winslow) in 2012.

Table 2.

Assessment of *Erwinia amylovora* attack on sprouts, in pear varieties, in 2012

<i>Variant no.</i>	<i>Variety</i>	<i>Mean attack frequency on sprouts (%)</i>	<i>Mark</i>
1	Aromat de Bistrița	14,66	6
2	Conferance	2,00	9
3	Clapp's Favourite	6,00	8
4	Napoca	12,00	7
5	Cüre	4,00	8
6	Euras	0	10
X	Experimental mean	6,44	8

According to USDA scale

In this table, we may observe the variety Euras without attack (10), the variety Conferance (9) with 1 – 3% attack, Clapp's Favourite and Cüre with 8 (4 – 6% attack), and the variety Napoca was marked with 7 (7 – 12% attack); the most reduced mark, 6, was given to the variety Aromat de Bistrița (13 – 25%).

The frequency of *Erwinia amylovora*'s attack on pear fruit

Table 3

The attack frequency of *Erwinia amylovora* on pear fruit in the experimental year 2012

<i>Variant no.</i>	<i>Variety</i>	<i>Attack frequency on fruit %</i>			<i>Mean</i>	<i>Absolute difference</i>	<i>Significance</i>
		<i>Repetition I</i>	<i>Repetition II</i>	<i>Repetition III</i>			
1	Aromat de Bistrița	9	7	9	8,33	-4,78	00
2	Conferance	1	2	0	1,0	+2,55	x
3	Clapp's Favourite	6	5	2	4,33	-0,78	-
4	Napoca	6	6	7	6,33	-2,78	00
5	Cüre	2	1	1	1,33	+2,22	x
6	Euras	0	0	0	0,0	3,55	xxx
Experimental mean		4,0	3,5	3,16	3,55	0,0	-

DL 5% = 1,82

DL 1% = 2,55

DL 0,1% = 3,60

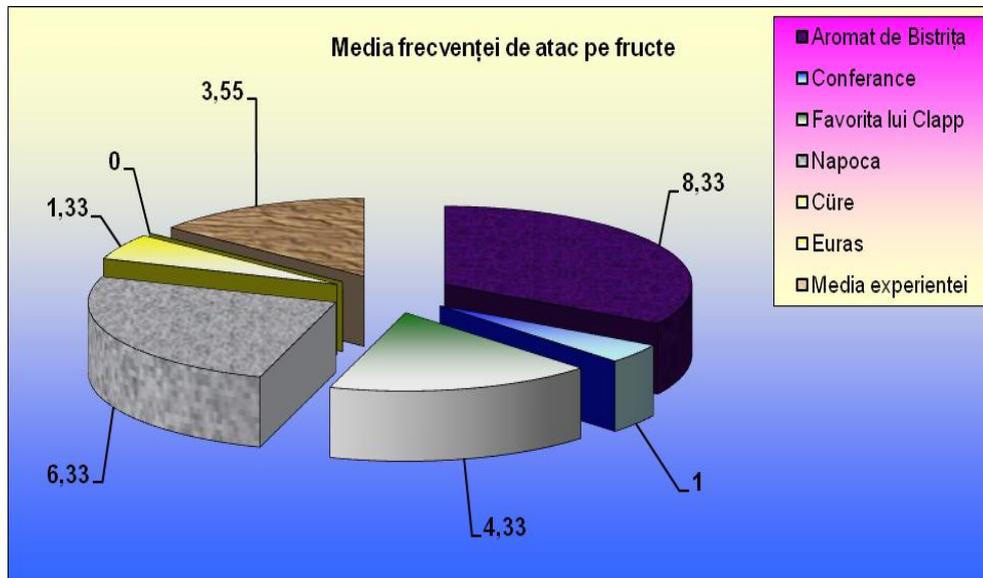


Figure 2. . Graphic representation of the frequency of *Erwinia amylovora* attack on fruit in 2012

The tables3 present the mean attack frequencies recorded in the six pear varieties from the tree collection in 2012.

The data included in table3 and figure2 show that the most attacked on fruit, by the bacteria *Erwinia amylovora*, was the variety Aromat de Bistrița, with distinctly significantly negative differences compared with the experimental mean. The mean attack frequency in this variety was 8.33%, and the experimental mean was 3.55%.

Also, in the case of the variety Napoca we determined distinctly significantly negative differences compared with the control variant, and the mean attack frequency on fruit was 6.33%.

Also resistant to fire blight were the varieties Conferance and Cüre, and they presented significantly positive differences compared with the experimental mean of 2.55%, respectively 2.22%.

In the case of the variety Clapp’s Favourite, the frequency of the attack caused by *Erwinia amylovora*, on fruit, was 4.33%, compared with 3.55% experimental mean, without obvious differences from a statistical point of view compared with the experimental mean.

The pear variety Euras did not present attack caused by *Erwinia amylovora*.

Table 4

Assessment of *Erwinia amylovora* attack on fruit in pear varieties

Variety no.	Variety	Mean attack frequency on fruit (%)	Mark
1	Aromat de Bistrița	8,33	7
2	Conferance	1,00	9
3	Clapp’s Favourite	4,33	8
4	Napoca	6,33	8
5	Cüre	1,33	9

6	Euras	0	10
Experimental mean		3,55	8

According to USDA scale

The data presented in table 4 show that the variety Euras, marked with 10, did not present attack on fruit, the varieties Conferance and Cüre were marked with 9 (1.0 – 1.33%), Clapp’s Favourite and Napoca with 8 (4.33 – 6.33%), and the variety Aromat de Bistrița had the most reduced mark – 7 (7 – 12%).

CONCLUSIONS

- ✚ The climatic conditions from 2012, from the Orchard Center Lugoj, especially during April, May and June, were favourable for the aparition and development of the bacteria *Erwinia amylovora*, which causes pear fire blight.
- ✚ During the determinations carried out on sprouts and fruit, we observed that the pear variety Euras did not present attack caused by the pathogen *Erwinia amylovora*.
- ✚ Out of the other 5 varieties studied, the pear variety Aromat de Bistrița was the most attacked by the pathogen *Erwinia amylovora*, with attack frequencies of 14.66% on sprouts and 8.33% on fruit.
- ✚ Also resistant to fire blight attack (*Erwinia amylovora*) on sprouts and fruit, the varieties Conferance and Cüre presented significantly positive differences compared with the experimental mean (control variant).
- ✚ In the pear varieties Napoca and Clapp’s Favourite, the frequency of *Erwinia amylovora* attack on sprouts and fruit was without obvious statistical differences compared with the experimental mean of year 2012.

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