

INFLUENȚA ATACULUI DE FOC BACTERIAN (*ERWINIA AMYLOVORA*) ÎN PLANTAȚIILE DE MĂR DIN BAZINUL POMICOL DÂMBOVIȚA

THE INFLUENCE OF FIRE BLIGHT ATTACK (*ERWINIA AMYLOVORA*) IN APPLE ORCHARDS FROM DÂMBOVIȚA BASIN

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Abstract

Signalling the bacterial fire blight in the second decade of May, year 2024, in the apple orchards belonging to RIFG Voinești and at private producers, mobilized researchers to establish the degree of differentiated attack on the varieties, but also the measures required to stop the attack. The bacterial fire blight produced by the bacterium *Erwinia amylovora* attacked the aerial organs of the trees, the characteristic symptoms being more evident in sensitive apple varieties on the young fruits that have browned, shrivelled, remaining attached to the branches, but also on the vegetative shoots with infection and withering of the tip bent in the form of a crutch. The research carried out showed that the strongest attack was manifested in the varieties 'Jonathan', 'Idared' and even on the variety 'Generos', with an initial attack with 3-4 inflorescences/tree on the varieties sensitive to diseases ('Golden delicious', 'Goldspur', 'Mutsu', 'Red delicious') and the resistance varieties ('Florina', 'Redix', 'Inedit', 'Iris', 'Real', 'Dacian', 'Romus 3') which can develop later. Apple varieties were also identified, including the own creations of RIFG Voinești, in which no forms of attack were reported. In order to stop the rather aggressive outbreaks of the bacterium *Erwinia amylovora*, it was decided to remove the infected plant organs and carry out treatments with specific products, which content *Aluminium Phosetyl*, with the recommendation that phytosanitary treatments in the following years be carried out preventively.

Cuvinte cheie: soiuri de măr, foc bacterian, forme de atac, măsuri de control.

Key words: apple varieties, bacterial fire blight, forms of attack, control measures.

1. Introduction

Research carried out annually within the Phytosanitary Protection Laboratory from SCDP Voinești, track the biology of pathogens and insect pests while identifying fire blight attack in orchards.

If in previous years, the attack was sporadic, in 2024, the bacterial fire blight manifested itself aggressively, in different intensities, differentiated by varieties and cultivation areas, in the apple orchards of Dâmbovița basin, to private producers, but also for quince and sporadically for pear.

The characteristic attack was identified from the second decade of May 2024, on the young shoots that were bent in the form of a crutch, but also on the growing fruits, being browned.

Reporting of rather aggressive outbreaks of the bacterium *Erwinia amylovora* in the apple orchards of private farmers and sporadically at RSFG Voinești, quickly moved on to carrying out treatments with specific products, with the recommendation that phytosanitary treatments in the following years be carried out preventively.

2. Material and methods

The research was carried out by observing the apple plantations in Dâmbovița basin with a diversified assortment of varieties, the degree of bacterial fire blight attack being assessed, but also the measures required to stop it.

The attack was monitored under several aspects, being highlighted on annual growths, fruiting branches, inflorescences and young fruits.

In the orchards belonging to Voinești Fruit Experimental Base were tested on the 'Jonathan' and 'Generos' apple varieties, a series of products to combat or stop the attack of bacterial fire blight:

- Aluminium phosetyl 800g/Kg;
- Fluopyram 50g/l + aluminium phosetyl 666g/l;
- Copper oxychloride 50%
- Copper hydroxide 77%;

At RIFG Voinești, the attack being sporadic, in 2024, 2 treatments were applied at an interval of 7-8 days, after reporting the bacterial fire blight attack.

Observations and determinations regarding the effectiveness of the fight were carried out 5-6 days after each treatment, both on inflorescences, annual shoots, but also on fruits in different stages of development.

3. Results and discussions

Bacterial fire rosacea, also called fire blight, is caused by a bacterium (*Erwinia amylovora*), which is native to the U.S. being identified in our country in 1992. In Dâmbovița Orchard Basin the first signal was in a private orchard in 1994 (Petre et al., 2020).

It is a devastating disease that affects the species: apple, pear, quince, raspberry, plum but also the ornamental plants from the spontaneous flora (Fig. 1). The disease manifests itself in the months of May - June, stagnates during the peak period and returns in the months of September - October. Due to its seriousness, it was included in the category of phytosanitary quarantine organisms in Addendum 11 from Government Decision 563/2007.

Method of attack and damages:

The bacterium infects trees in the spring, during the flowering period, when the weather is wet and warm. Risk factors and rapid spread include high atmospheric humidity and a temperature between 10 – 30°C, rain and wind (Agrios, 2005).

The first symptoms of the disease appear in the spring on flowers that wither brown and then turn black while retaining their shape. The symptoms can be confused with those of moniliosis (Severin, 1996; Norelli et al., 2003; Agrios, 2005).

Young shoots bend into a crutch shape (hooks) and turn brown to black (shoot burn). Infected leaves show necrotic spots (leaf necrosis) and may wilt turning brown or black (Severin, 1996; Norelli et al., 2003; Agrios, 2005).

In conditions of high humidity, bacteria produce a whitish, sticky exudate, visible on the surface of infected tissues (bacterial exudate). The bacterium can also cause cancerous lesions on the branches, trunk, which can spread and destroy the tree. If found only on the tree trunk, these lesions can cause the death of the upper part of the tree (Severin, 1996; Norelli et al., 2003; Agrios, 2005).

Fruit affected by fire blight shrivel, mummify, turn black and remain on the tree, but new growth is most vulnerable (Severin, 1996; Norelli et al., 2003; Agrios, 2005).

The factors that contribute to the spread of the bacterium are: migratory birds, insects, flies, ants, bees through pollination during flowering, annually through improper pruning, wind and rains contribute the most to the dissemination of the pathogen.

Assessment of fire blight attack in Voinești area

In the year 2024, the onset of flowering in apple was recorded from the first decade of April and ended in the second decade, a period in which the bacterial burn did not meet attack conditions, it manifested itself after the second decade of May.

The research carried out showed that the strongest attack in apple orchards in the private sector was manifested in the varieties 'Jonathan', 'Idared', 'Generos', 'Gala', 'Fuji', 'Jonagold', where the degree of attack was over 70% per inflorescences, 49% on annual shoots and over 30% of growing fruits (Fig. 2).

With early attack, with 3 – 4 inflorescences with growing fruit, per tree in disease-susceptible varieties: 'Golden delicious', 'Goldspur', 'Mutsu', 'Red delicious' and apple disease-resistant types: 'Florina', 'Redix', 'Inedit', 'Iris', 'Real', 'Dacian', 'Romus 3'. In parallel, apple varieties were also reported, including own creations of SCDP Voinești, in which no forms of attack appeared: 'Remar', 'Goldrush', 'Valery', 'Ciprian', 'Cezar', 'Revidar', 'Everest' etc. (Fig. 3)

Measures and means of limiting the attack

Signalling of an early degree of attack also in the orchards belonging to Voinești Fruit Experimental Base, it was quickly moved to the execution of a treatment on the entire surface with the aluminium phosetyl product in conc. 0.3%, a treatment that was repeated every 2 weeks only for the 'Jonathan', 'Idared', 'Generos' apple varieties.

In parallel, the biological effectiveness of 4 specific products used to stop the fire blight attack (*Erwinia amylovora*) was studied on the 'Jonathan' and 'Generos' varieties.

The degree of attack being sporadic, it was completely stopped, with very good effectiveness by the aluminium phosetyl product in conc. 0.3%, but also the copper-based products and the fluopyram + aluminium phosetyl product which 71.6 WG in conc. 0.3% .

Previous research and that carried out in the year 2024, both at Voinești Station, but also the measures taken by private producers, highlight a combination of chemical, biological and cultural methods, to prevent or minimize the attack on apple orchards by fire blight:

- the selection of apple varieties that show natural resistance to bacterial fire blight can significantly reduce the risk of infection;
- early detection of the disease;
- cultural hygiene - tidying up the plantations by correct cuts - removing the affected branches at a distance of 30-40 cm below the disease limit;
- disinfections of instruments (scissors, saw), after each use, in chlorine;
- avoiding the transport of infected material;
- burning it in a space to limit any risk of contamination;
- phytosanitary treatments applied preventively and curatively with fungicides based on copper, antibiotics but also chemicals: fluopyram and aluminium phosetyl.

By combining cultural measures with biological and chemical measures applied preventively or curatively, it stops the attack of fire blight (*Erwinia amylovora* Burr.) in apple, pear, quince orchards, ensuring healthy fruit production in sustainable quantities.

4. Conclusions

Bacterial fire blight in apple, but also in quince or pear, represents a major threat to the culture of trees, both on the production capacity, in case of an extensive attack in a fruit-growing area, a phytosanitary quarantine can be declared, with the clearing of the plantations.

The degree of attack of bacterial blight produced by *Erwinia amylovora* Burr., recorded in May 2024, in the apple orchards of private producers in Voinești area, more aggressively for Jonathan, Idared, Generos varieties, it represents a signal for carrying out specific treatments in the following years, since the flowering period.

The risk of infection of fruit orchards with fire blight can be avoided by preventive treatments applied with the product Aliette 80 WG in conc. 0.3% or other specific products, but especially by promoting in culture the varieties that show natural resistance to bacterial burn.

By combining cultural, biological and chemical measures, effective fire blight management is possible to protect orchards and ensure healthy and sustainable fruit production.

References

1. Agrios G.N., 2005. Plant Pathology (5 th.eu) Elsevier Academic Press.
2. Norelli J.L., Jones, A.L., Aldwyckte, N.S., 2003. Fire blight management in the twenty – first century: Using mew technologies that enhance brost resistance in apple. "Plant Disease".
3. Petre Gh., Comănescu D.N., Petre Valeria, Bolbose Cecilia, Erculescu Mihaiela, 2020. Șapte decenii de activitate și creație științifică în pomicultura românească, 1950 – 2020, București (in Romanian)
4. Severin Valerian, 1996. Focul bacterian al rozaceelor (*Erwinia amylovora*). Editura Ceres (in Romanian).

Figures



a) apple

b) pear

c) quince

Fig. 1. Aspects of bacterial blight in the apple, pear and quince orchards



a) attacked tree

b) attacked annual growth

c) attacked growing fruit

Fig. 2. The degree of attack on apple in private orchards



a) 'Cezar' cv.

b) 'Remar' cv.

c) 'Valery' cv.

Fig. 3. Disease-resistant apple varieties without blight attack