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THE CONTROL OF BLACK ROT *GUIGNARDIA BIDWELLI* –A DANGEROUS FUNGAL DISEASE OF GRAPEVINE

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Abstract: This pathogen, which are producing the black rot of grapevine *Guignardia bidwelii* (Ellis) Viala and Ravaz, and its anamorph *Phyllosticta ampelicida* (Engelman) van der Aa, is an ascomycete fungus that is responsible for about 5 to 80% production losses in grapevine cultures, although it is less frequent than other fungal diseases from this crop. In the present work, we review the problems related to this pathogen, its life cycle, virulence factors and mode of action, and especially the prevention of the infection and ways to control it, its spread in the world and in our country. We discuss practical considerations for control methods of the black rot, agrotechnical methods, genetical methods, chemical (fungicides, natural products the use of plant resistance stimulators), and biological control.

Key words: *black rot, Guignardia bidwelii, Phyllosticta ampelicida, prevention of infection, control methods,*

INTRODUCTION

Black rot is an important fungal disease of grapes that originated in North America but is now present in many areas of Europe. It can cause total crop losses in plantations located in hot and humid climates. Varieties of *Vitis vinifera* are the most susceptible. This pathogen, which produces the black rot of grapevine *Guignardia bidwelii* (Ellis) Viala and Ravaz, with the anamorphic form *Phyllosticta ampelicida* (Engelman) van der Aa, is an ascomycete fungus that causes about 5 to 80% production losses in grapevine live although it is less frequent than other fungal diseases of this crop (Hoffman 2004).

In the present work, we review some aspects related to this pathogen, the mode of action and especially the prevention of infection and ways to combat it, its spread in the world and in the country. We present practical considerations for combating black rot, using agrotechnical, genetic, chemical methods (fungicides, natural products, the use of plant resistance stimulators). This vine disease, originally occurred in North America, was introduced to Europe with plant material in the second half of the 19 th century (Hausmann et al, 2017) and it is spread in the world and in the country. We present practical considerations for combating black rot, using agrotechnical, genetic, chemical methods (fungicides, natural products, the use of plant resistance stimulators), and biological control.

The development cycle of this fungus. The inactive overwintering forms of pycnidia with pycnospores and asci with ascospores are found in vegetal remains, including mummified fruits (Onesti et al, 2018), and these can last for two years. In conditions of humidity and temperature in spring, they are spread by wind and rain and infects leaves and ropes with ascospores. The conidia that form can infect throughout the summer, at the end of the season the fungus overwinters as pycnidia and pseudothecia (after Szabo et al, 2023), then it has a asexual reproduction phase and a sexual phase too.

DISCUSSIONS

The paper presents an analysis of some results presented in the specialized literature to demonstrate the possibilities of combating the black rot of the grapevine *Guignardia bidwelii* and the anamorph *Phyllosticta ampelicida*.

Data showed that this disease is less common than grapevine blight, but the damage can reach almost 80% in some cases (Hoffman, 2011).

Its look like the atack of this pathogen of black rot, has effect on the decrease of trans resveratrol in wine (2,34 mg/dm3) - in normal vines (2,56 mg. Dm3), the same as attack of *Botritys cinerea*. (Dimitrov et al., 2020). In the same time, the disease do not affects wine composition and quality (Kellner et al, 2022), but the infections in clusters did (Hoffman et al., 2004).

Regarding the frequency of the attack (F%) of the monitored pathogen agent, it can be stated that the varieties, Tămâioasa Românească, Sauvignon Blanc, Italian Riesling are the most sensitive varieties, and the rest of the varieties have a greater resistance to the attack of the pathogen (Bailesteanu et al, 2020). After Băileșteanu et Mitrea, (2013) the period of susceptibility of grapes to this disease varies, but it was found in the Chardonnay and Riesling varieties (Hoffman et al, 2002, Hoffman et al., 2004) from the flowering tip about 3 to 5 weeks from this, so the age of the fruits affects the length of the incubation period.

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The occurrence of this disease has increased due to climate change in our country as well. The genetic analysis of the fungicide resistance of the pathogen was also done, as well as the genetic resistance of the grapevine to the attack of the fungus and the production of hybrids (Bettinelli et al, 2023). The varieties obtained by specialists from Hungary-where the disease was first observed in 1999- have a good resistance, as well as hybrids obtained in other countries. French-American hybrids and the varieties 'Csillám', 'Seyval blanc' ('SV 5276'). Other hybrids of *Vitis amurensis* were very resistant to infections with this fungi (Roznik et al., 2017, Szabo et al, 2023).

A review (Szabo et al, 2023) of problem related of *Guignardia bidwelli*, inner mechanisms of infection and tried to integrate up to date data about this phytopathogen. They showed that the pathogen appears in 1853 then spread in Europe- possible in other parts of the world, the vine cultivars from Europe were sensitive to it. The authors made a very good review of the problerm of *Guignardia bidwelii* attack and showed that the formation of pycnidia on leaves, and infection on fruits leads to cluster death. The control of the disease must use different cultivation practice, in order to reduce accumulation and spreading. The organic cultivation, this pathogen cannot be stopped. The authors citing other papers, showed that the efficient control is a mix of agrotechnical, cultivars which showed genetical resistance and use of efficient fungicides, and in the same time, less harmfull for environment, use of some biological treatments (extracts of *Yucca*, *Hedera helix*, a suspension of *Bacillus subtilis* with copper sulphate, and extract of filtrate of *Aspergillus niger*.

An IT soft system like DEEP Lab v 3+, an improved formula, can be used to assess the extent of the pathogen's attack on plants (Yuan et al., 2022). Another model to assess the incubation period of *Guignardia* is classical accumulation of degrees / days (Molitor et al., 2012).

The main mechanical treatments are the application of drastic cuts that can successfully eliminate the infection, being also tested for the eradication of Elsinöe, in the USA, by cutting the cords from the top (Sosnowski et al., 2012) and the removal of plant remains from the soil, especially of mummified grapes having an efficiency of preventing the occurrence of the disease of about 80% (Hoffman et al, 2004).

Chemical treatment. The tendency to reduce the use of pesticides in crops as well as climate changes have imposed new approaches to grapevine crops, including clarifying the relationship between life and living pathogens of the ascomycetes type, as well as clarifying the resistance of pathogens to fungicides (Pirello et al, 2019). and the identification of pathogen effectors, and a multidisciplinary approach to these infections.

The main treatments are the application of cuts, fungicides such as Sovran 50WG, Flint 50W G (strobilurin), Abound Flowable (2.08F) containing azoxystrobin from Syngenta, Pristine 38WDG (pyraclostrobin, 12.8% and boscalid 25.2%), recommended in the USA, Another recommended fungicide is mycobutanil. to fungicides such as Sovran 50WG, Flint 50W G (strobilurin), Abound Flowable (2.08F) containing azoxystrobin from Syngenta, Pristine 38WDG (pyraclostrobin, 12.8% + boscalid 25.2%), recommended in USA
(Head, 2018).

Other recommended fungicides are mycobutanil and azoxystrobin (Hoffman et al. 2003), the dose of mycobutanil for 59% inhibition is 0.04 mg/l, the application of a mycobutanil solution of 60 mg/l producing total inhibition Application of azoxystrobin 200 mg /l produces a low incidence of the disease or no symptoms at all. The application of pyraclostrobin as well as myclobutanil have proven to be effective as prevention and of control of the black rot, especially in periods of maximum susceptibility (Molitor et al., 2011).

For cultivation in an eco system, treatment is done with copper-based products, at the recommended intervals and doses. A *Primula* root extract is also proposed (Koch et al 2013) which is as effective as Polyram WG (metiram), inhibiting approximately over 90%, spore germination. A special treatment against fungi is that with gibberellic acid (Hed, et al, 2011).

CONCLUSIONS

1.There are many studies and recommendations of universities and agricultural organizations and companies related to agriculture and plant protection.
2.This disease is not so often found in the vineyards, but the damages and crop loss are very important.
3. Under the conditions of climate change, a change in the dynamics of this pathogen, as well as other plant pathogens, can be observed.
4. There are a number of pesticides that can be used to control this pathogen, but they must be applied at set periods and used within the integrated protection of the vines.
5.Taking into account that the resistance forms, remains over winter time, in plants debris and soil, the strategy must contain agrotechnical measures.
6.The paper presents the methods of control of the black rot of grapevine *Guignardia bidwelii*, in order to establish the control strategies.

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