INCIDENCE OF MAJOR FUNGAL DISEASES IN AMPELOGRAPHIC COLLECTION OF USAMV IAŞI, ROMANIA

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Abstract: *Grapevine (Vitis vinifera L.) is one of the economically most important cultivated plants of the world and is susceptible to many fungal diseases, but highly destructive are downy mildew (Plasmopara viticola Berk. & Curt.), powdery mildew (Uncinula necator Schw.), and gray mould (Botrytis cinerea Pers.). The knowledge of spreading possibilities of grapevine fungal pathogen and their evolution in vineyards constitute a major objective for plant protection. Fungal pathogens damage fruit and wine quality, so that phytochemicals are used commonly in vineyards to prevent and limit pathogen infections. Incidence of the most important vineyard diseases (powdery mildew, downy mildew and gray mold) was investigated in ampelographic collection belonging to Agricultural Sciences and Veterinary Medicine University (USAMV) from Iaşi (SE Romania) during 2010 and 2011. Biological material was represented by different grapevine varieties, both table and wine grapes varieties. The field observations were correlated with yearly phenological and ecological elements witch lead to prognoses and control of main fungal pathogen. Depending on degree of attack recorded for each cultivar the resistance or sensibility of analyzed cultivars (by OIV 1983) was established. Fungal diseases were scored repeatedly during growing seasons according to criteria of the "Office International de la Vigne et du Vin" (OIV, 1983). Susceptibility or resistance to P. viticola, U. necator and B. cinerea were evaluated separately on leaves (not for B. cinerea) and berries and classified according to the OIV Scale (1 = high sensitivity; 9 = high resistance).The grape varieties taken in study showed different reactions under the same environmental conditions, materialized by different attack degrees of grapevine mildew, powdery mildew and grape gray mould. The aim of this study was to determine the presence and distribution of the most important vineyard diseases (powdery mildew, downy mildew and gray mold) across the ampelographic collection of USAMV Iaşi (SE Romania) during 2010 and 2011.*

Key words**:** *Vitis spp., fungal diseases, fungal pathogens*

INTRODUCTION

Grapevine (*Vitis vinifera* L.) is one of the oldest and economically most important cultivated plants of the world. Vineyards are covering 7.2 million hectares worldwide, and 52.2% from this area is in Europe (FAOSTAT, 2012). Grapevines are threatened by biotic (viruses, bacteria, fungi, phytoplasmas and insects) and abiotic stresses (drought, winter cold, etc.). Grapevine is susceptible to many fungal diseases, but highly destructive are downy mildew (*Plasmopara viticola*), powdery mildew (*Uncinula necator*), and gray mould (*Botrytis cinerea*).

Plasmopara viticola (Berk. & Curt.) Berl. and de Toni, is a very destructive pathogen on cultivated grapevine worldwide, especially in areas where warm and wet weather occurs during the production season (HEWITT et al., 1988). Symptoms of downy mildew appear as yellowish, oily lesions on leaf surface and causes leaf abscission, resulting in overall vigor reduction, winter injury or even death of susceptible vines (WAN et al., 2007).

Powdery mildew caused by *Uncinula necator* (Schw.) Burr. constitute a serious problem during favorable climatic conditions represented by dry and warm weather (STAUDT, 1997). Symptoms of powdery mildew appear as irregular chlorosis of gray-white with white

powder on the leaf surface, and as black net lines with white powder on berry, stalk and tendril surface. Powdery mildew retards the development of berries and causes berry crack, resulting in loss of berry quality and grape production (WAN et al., 2007).

Gray mold, caused by *Botrytis cinerea* Pers., is a common bunch rot in regions with warm, wet conditions. *B. cinerea* can attack berries, shoots and leaves. It causes pre- and postharvest decay of grapes during cold storage. It is the most economically important postharvest disease of table grapes (CAPPELLINI et al., 1986).

Fungal pathogens damage fruit and wine quality, so that phytochemicals are used commonly in vineyards to prevent and limit pathogen infections.

The aim of this study was to determine the presence and distribution of the most important vineyard diseases (powdery mildew, downy mildew and gray mold) across the ampelographic collection of USAMV Iaşi (SE Romania) during 2010 and 2011.

MATERIAL AND METHODS

Incidence of the most important vineyard diseases (powdery mildew, downy mildew and gray mold) was investigated in ampelographic collection belonging to Agricultural Sciences and Veterinary Medicine University (USAMV) from Iaşi (SE Romania) during 2010 and 2011. Frequency (F%), intensity (I%) and attack level (GA%) for existing grapevine varieties were determined. In case of downy mildew and powdery mildew observations were pursued on both, leaves and grapes.

Fungal diseases were scored repeatedly during growing seasons according to criteria of the "Office International de la Vigne et du Vin" (OIV, 1983). Susceptibility or resistance to *P. viticola*, *U. necator* and *B. cinerea* were evaluated separately on leaves (not for *B. cinerea*) and berries and classified according to the OIV Scale (1 = high sensitivity; 9 = high resistance).

RESULTS AND DISCUSSIONS

Registered climatic conditions showed differences between both observation years. Therefore, in 2010 the registered values for precipitation and temperature were close to normal values, but 2011 can be characterized as a very dried year, with temperature instability and low precipitation quantities. Observations have showed that incidence of each pathogen was influenced by climatic conditions and their biological reserve. Following the occurrence and evolution of pathogens, it is noted that in 2010 were present: downy mildew – *Plasmopara viticola*, powdery mildew – *Uncinula necator* and grape gray mould – *Botrytis cinerea*. It was reported sporadic attacks by anthracnose - *Elsinoë ampelina* Shear. In 2011 the same fungal pathogens were identified, plus sporadic attacks caused by *Pseudopeziza tracheiphila* Müller-Thurgau. Also, the presence of *Grapevine fanleaf virus* and *Flavescence dorée phytoplasma* was confirmed by serological method ELISA (Enzyme-Linked Immunosorbent Assay).

In figure 1 the fungal pathogen *Plasmopara viticola* registered higher frequency values in 2010 compared to 2011 on table and wine grape varieties at leaves level. Varieties Cetățuia, Pance D'Espagne, Perlă de Csaba and Afuy Ali showed appropriate values, with a frequency above 40%. Moldova was the only cultivars which was not affected by *P. viticola* during sanitary survey. From wine varieties Muscat Ottonel and Armaş were the most affected cultivars. Muscat Ottonel detached from others varieties and registered 49% attack level in 2010.

Regarding the attack frequency on berries, table grape genotypes showed almost equally values for both years, with a maximum degree of attack 30% in case of Ceauş and Princess genotypes (Figure 2). Moldova genotype was not affected by the pathogen. In wine varieties situation of fungal presence was almost the same for both years. Blauerzweigelt, Busuioacă de Bohotin, Fetească neagră and Riesling Italian showed the higher values of

pathogen attack, while Aligote and Armaş showed fast zero or very low incidence in both years.

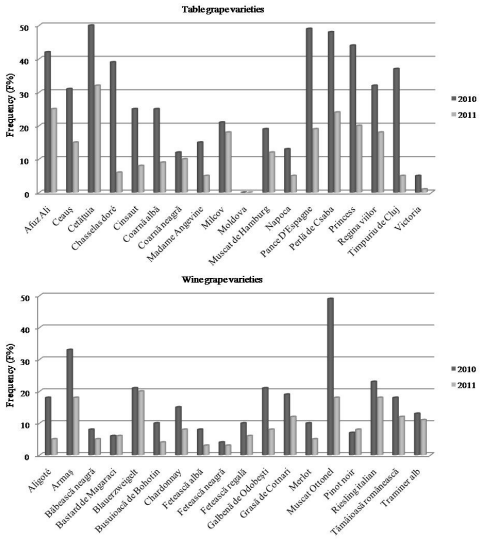

Figure 1: Incidence of downy mildew on leaves from table and wine grape varieties during 2010-2011.

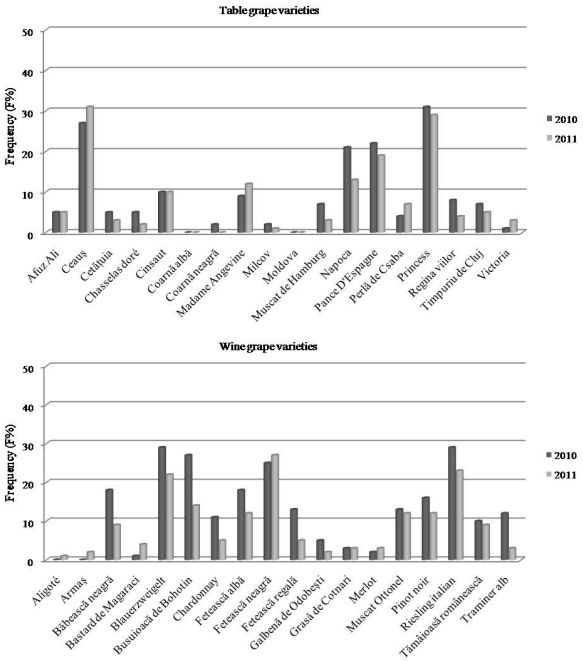

Figure 2: Incidence of downy mildew on berries from table and wine grape varieties during 2010-2011.

In 2011, compared to 2010, fungal pathogen *Uncinula necator* on leaves and berries was observed with higher frequency on both, table and wine grapes varieties (figure 3). This high values in 2011 can be explained with climatic data: high temperature and low precipitation quantities. In 2011 incidence of downy mildew with values above 30% were registered in case of Cetăţuia and Coarnă neagră varieties from table grape and in case of Busuioacă de Bohotin, Fetească neagră, Merlot and Tămâioasă românească.

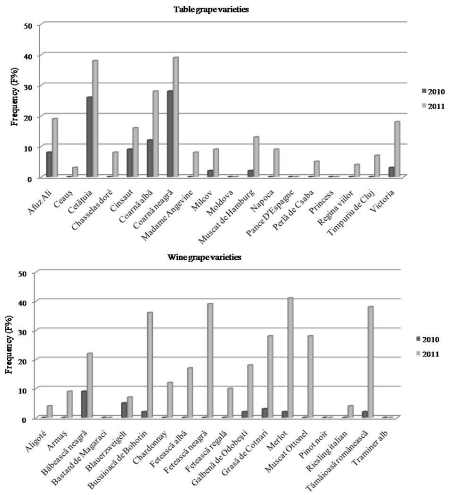

Figure 3: Incidence of powdery mildew on leaves from table and wine grape varieties during 2010-2011.

Berries attack on table grape varieties as Cetăţuia, Coarnă albă, Afuz Ali and Milcov recorded frequency values exceeding 60% in 2010 and will be registered as very sensitive on this fungal pathogen. In both years Moldova cultivar showed no powdery mildew symptoms. In case of wine varieties Galbenă de Odobeşti and Grasă de Cotnari recorded the highest attack values (Figure 4).

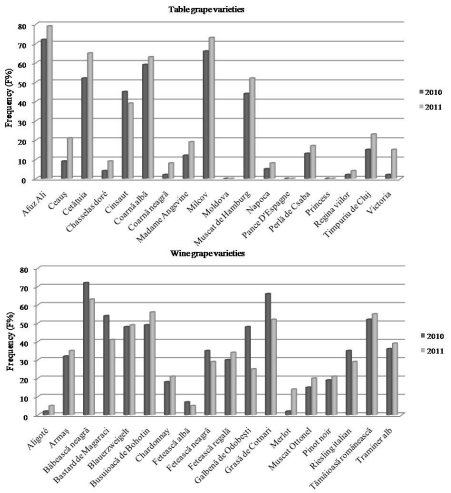

Figure 4: Incidence of powdery mildew on berries from table and wine grape varieties during 2010-2011.

Figure 5 present the frequency of fungal pathogen *Botritys cinerea* on grapevine berries, with lower values in 2011 comparing to 2010. Timpuriu de Cluj, Victoria and Moldova cultivars presented no or low incidence of this fungus in both years. Chasselas doreé, Perlă de Csaba and Cinsaut varieties recorded higher values in 2010. Regarding wine varieties, the attack of gray mould showed higher values in 2010 than in 2011 in all studied varieties. The most sensitive cultivars are Galbenă de Odobeşti, Busuioacă de Bohotin, Aligote and Armaş.

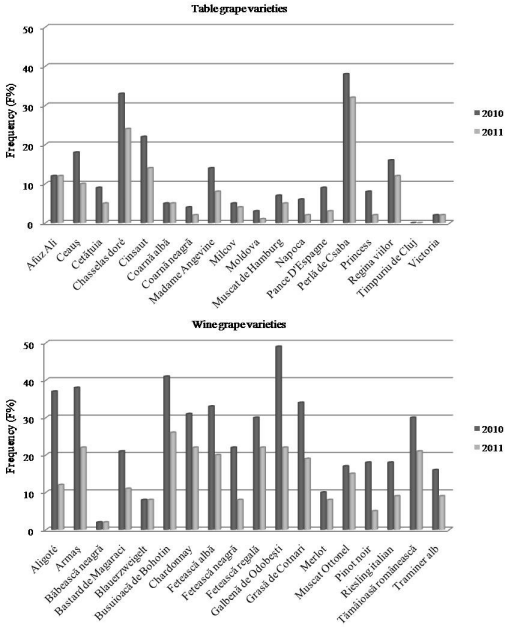

Figure 5: Incidence of gray mould on berries from table and wine grape varieties during 2010-2011.

CONCLUSIONS

Results for both years have showed that incidence of each pathogen was influenced by climatic conditions and their biological reserve.

Plasmopara viticola registered higher frequency values in 2010 compared to 2011 on table and wine grape varieties at leaves level. Sensitive varieties were Cetăţuia, Pance D'Espagne, Perlă de Csaba and Afuy Ali, with expression 3 and 4 according to the OIV code 455. Very resistant to this pathogen with expression 9 was only Moldova. Medium and high resistant (expression 5, 6, 7) were the most of wine varieties, with exception of Muscat Ottonel and Armaş.

Regarding the attack frequency on berries, table grape genotypes with very low resistance were Ceauş and Princess with expression 2 according to OIV code 456. Moldova genotype was not affected by the pathogen. The rest of varieties showed medium and high resistance to the pathogen, with values expression of 5, 6, 8 and 9. In wine varieties situation of fungal presence was almost the same for both years. Blauerzweigelt, Busuioacă de Bohotin, Fetească neagră and Riesling Italian showed the higher values of pathogen attack, while Aligote and Armaş showed fast zero or very low incidence in both years.

Uncinula necator attack on bunches showed very low resistance for both type of varieties, with expression 2 according to the OIV code 456 on Cetăţuia, Coarnă neagră,

Busuioacă de Bohotin, Fetească neagră, Merlot and Tămâioasă românească.

In case of fungal pathogen *Botritys cinerea* the most sensitive cultivars are Chasselas doreé, Perlă de Csaba, Cinsaut, Galbenă de Odobeşti, Busuioacă de Bohotin, Aligote and Armaş.

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