

RESEARCH ARTICLE

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Study of Susceptibility to Powdery Mildew of Some Local Grape Cultivars

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Abstract

Grapevine powdery mildew is one of the most common diseases of grapevine. The varieties of *Vitis vinifera* specie are generally susceptible to powdery mildew, *Uncinula necator*. During the years 2013-2018 was estimated the susceptibility to powdery mildew (*Uncinula necator*) of ten local grape cultivars, AGB 3399, AGB 3418, AGB 3427, AGB 3448, AGB 3403, AGB 3410, AGB 3461, AGB 3460, AGB 2087, AGB 3402, at national collection of grapevine genetic resources, in Valias. The resistance degree was estimated according to OIV codes and Descriptor for grapevines. The results showed that two accessions, AGB 3448 and AGB 3427 have high resistance degree to powdery mildew, five accessions, AGB 2087, AGB 3402, AGB 3460, AGB 3410, AGB 3399 have medium resistance degree to powdery mildew and three accessions AGB 3418, AGB 3461, AGB 3403 have low resistance degree or very low degree to powdery mildew. These results will serve to recommend the farmers to spread the varieties with high resistance degree of powdery mildew (*Uncinula necator*). This study will serve as a good basis for the genetic improvement work of native grapevine cultivars.

Keywords: accession; grapevine; genetic resources.

1. Introduction

Grapevine powdery mildew or oidium is caused by a grapevine pathogen, *Erysiphe necator* (*Uncinula necator*). It is one of the most common and serious fungal diseases of grapevine that attacks all parts of the plant causing about 20% loss in grapevine production and wine quality due to off flavors. [1][3] [5] Grapevine powdery mildew is one of the oldest grapevine diseases known to science and practice. At the end of the 19th century the pathogen was introduced accidentally to European countries from North America where the disease has always existed, but the grown grapevine varieties were comparatively resistant, with low yield losses, so the disease did not attract the attention of the specialists.[3][4][5]

It probably came with American grape cuttings used to replant the French vineyards destroyed by phylloxera. Since that time, the damage caused by this plant pathogen has generally been controlled with multiple fungicide applications. [4] From the beginning of the 20th century, the disease was clearly a huge problem for European viticulture. [6] [4] In our country nowadays the fungus often caused significantly damage to the plant reducing the quantity and quality of production. Agrochemical treatments increase the cost of grape production and are associated with environmental pollution. The residue of the treatments often may affect the production of the wine. Cultivation of resistant

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varieties is the best way to reduce the damage caused by powdery mildew (*Uncinula necator*). It is an ecological alternative that reduces costs in vineyards, provides products of healthy grapes and wine.

For this reason our study was undertaken in order to identify accessions with high resistance to grapevine powdery mildew (*Uncinula necator*). The evaluated susceptibility of 10 grapevine accessions conserved in the national field collection of the Genetic Bank, regarding this fungal disease according to OIV codes and Descriptor for grapevines will help to identify resistant genotypes to grapevine powdery mildew (*Uncinula necator*) and to recommend them to scientists, seedling growers and growers.

2. Material and Methods

The study was realized in the national field collection of vines at the Albanian Genetic Bank, Valias, during the years 2013-2018. The object of study were the accessions AGB 3399, AGB 3418, AGB 3427, AGB 3448, AGB 3403, AGB 3410, AGB 3461, AGB 3460, AGB 2087, AGB 3402. (Table 1)

These accessions were planted in 2011 and have as rootstock Paulsen 1103. The distance between rows is 2.5m and from plant to plant in the same row is 1.2m. Pruning and agro-technical services were the same for all the plants in the study. Evaluation of infection by grapevine powdery mildew (*Uncinula necator*) was performed on leaves and fruit clusters according to the Descriptors for grapevine, 1997. Evaluation of the resistance degree to *Oidium* on leaves was performed three weeks after flowering began on the basis of descriptor OIV-455 using a rating scale 1-9. It is considered very low resistance (degree 1) when there are very vast unlimited patches or totally attacked leaf blades, strong sporulation and abundant mycelium; low resistance (degree 3) when there are vast patches, some limited, strong sporulation and abundant mycelium; medium resistance (degree 5) when patches are usually limited with a diameter of 2-5 cm; high resistance (degree 7) when there are limited patches < 2cm in diameter, limited sporulation and mycelium and a slight curling of the leaf blade; very high resistance (degree 9) when there are tiny spots or no symptoms, neither visible sporulation nor mycelium.

The evaluation of resistance degree to *Oidium* on the fruit cluster was performed before veraison began and before harvest on the basis of the OIV-456 descriptor, using rating scale 1-9. It is considered low resistance

(degree 1-3) when many berries of all clusters are attacked with *Oidium* (some are attacked moderately) and there are many cracked berries; medium resistance (degree 5) is considered when there are many attacked berries (up to 30 %), most clusters are moderately attacked, (some, however are attacked severely) and cracked berries are rare; while high resistance (degree 7 to 9) is considered when only a few berries out of all clusters are attacked (slightly attacked) and there are no cracked berries. [2]

3. Results and Discussion

Climatic conditions for all years have been suitable for the development of grapevine powdery mildew (*Uncinula Necator*). The data obtained by the observations regarding the degree of grapevine powdery mildew resistance for each accession , object of the study which was calculated for five years and statistically provided for the whole period show: Accessions with low resistance degree to grapevine powdery mildew are AGB 3418, AGB 3461, AGB 3403. Their resistance degree values range from 2.49 to 3.49. Linear correlation has been observed between the resistance degree to *Oidium* infection on leaves and the resistance degree to *Oidium* infection on the fruit cluster. Five accessions result with medium resistance degree: AGB 3399, AGB 2087, AGB 3402, AGB 3460, AGB 3410. Their resistance degree values to grapevine powdery mildew infection range from 4.67- 5.65. Accessions AGB 3448 and AGB 3427 have approximately high resistance degree value and their respectively resistance degree to grapevine powdery mildew on leaves is 6.72 ± 0.34 and 6.58 ± 0.23 , while resistance degree to fruit cluster results in 6.84 ± 0.38 and 6.76 ± 0.05 , respectively. (Table 1) The obtained results make it possible to create an archive with data on the resistance degree of cultivars to the fungal disease of grapevine powdery mildew (*Uncinula Necator*) as well as to complete the database of vine germplasm with specific data. These results facilitate the work of genetic improvement for the selection of cultivars of interest in future studies.

Table 1. Leaf and fruit cluster resistance degree to powdery mildew (*uncinula necator*)

Accession Code	Accession Name	Evaluation of resistance degree to powdery mildew on leaves	Evaluation of resistance degree to powdery mildew on fruit cluster
AGB 3399	Kotekë e zezë	5.20±0.05	5.30±0.24
AGB 3418	Rrush Oge	3.49± 0.21	3.06±0.45
AGB 3427	Dhelpër	6.58 ±0.23	6.76±0.05
AGB 3448	Korith i kuq	6.72±0.34	6.84±0.38
AGB 3403	Krakje	2.49±0.56	3.10±0.05
AGB 3410	I kuq i bashajve	5.65±0.05	5.53±0.40
AGB 3461	Kardinal tip	3.12±0.45	3.04±0.07
AGB 3460	Rrush Puke	4.67±0.69	4.35±0.52
AGB 2087	Rrush Gjyle	5.00±0.12	4.56±0.52
AGB 3402	Sulltaninë e Cërskës	5.23± 0.06	4.98±0.76

OIV 455 degree of grapevine powdery mildew (*Uncinula Necator*) resistance on leaves: 1 = very low ; 3 = low ; 5 = medium; 7 = high; 9 = very high

OIV 456 degree of grapevine powdery mildew (*Uncinula Necator*) resistance on fruit cluster: 1-3 = low; 5 = medium; 7-9 =high

4. Conclusions

Evaluation of 10 grapevine accessions: AGB 3465, AGB 3468, AGB 3409, AGB 3408, AGB 3407, AGB 3423, AGB 3401, AGB 3411, AGB 4233, AGB 4230 for the presence on leaves and on fruit cluster of the infection by fungal disease of grapevine powdery mildew (*Uncinula Necator*) led to the identification of two accessions AGB 3448 and AGB 3427 having high resistance degree to grapevine powdery mildew (*Uncinula Necator*), five accessions, AGB 2087, AGB 3402, AGB 3460, AGB 3410, AGB 3399 having medium resistance degree to grapevine powdery mildew (*Uncinula Necator*) and three accessions AGB 3418, AGB 3461, AGB 3403 that have low or very low resistance degree to grapevine powdery mildew (*Uncinula Necator*). Accessories with high resistance to grapevine powdery mildew (*Uncinula Necator*) can be grown without use of pesticides or with minimal

protection and will serve as a good basis for genetic improvement work to be used in developing new resistant varieties. These grapevine cultivars that show a high resistance degree to powdery mildew are suitable to spread further as resistant cultivars.

5. References

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