EVALUATION OF THE DOWNY MILDEW (*Plasmopara viticola*) AND OF THE GRAY ROT (*Botrytis cinerea)* ATTACK CORRELATED WITH THE LEAF TREATMENTS AND THE SOIL FERTILIZATION

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Abstract. The purpose of the study was to establish the degree of attack of grapevine downy mildew and gray rot on the Muscat Ottonel variety in different technological variants organized in the southern part of Muntenia region in a farm from Hotarele, Giurgiu County in the climatic and meteorological conditions of 2021. The results showed that in the experimental plots treated with 0.5 and 0.6% foliar fertilizers and 200 kg phosphorus and potassium active substance per ha, the degree of attack of the two diseases decreases (0.01% for *Plasmopara vitícola* and 0.04% for *Botrytis cinerea*) comparatively to the untreated control (0.13% and 0.54 % respectively).

Key words: *downy mildew, grey rot, foliar fertilization, soil fertilization, degree of attack.*

INTRODUCTION

The grapevine downy mildew caused by the *Plasmopara viticola* pathogen and the gray rot caused by the *Botrytis cinerea* pathogen are the most harmful diseases of the grapevine producing very significant damage with consequence on production in terms of quantity and quality.

For downy mildew disease, a formula that establishes the climatic conditions with role in dynamics of the pathogen *P. viticola* oospore germination was developed by Gompertz (Rossi et al., 2008) which takes into account the sum of daily temperatures, hourly temperatures (above 10°C), the sum of these daily rates in hours of rain and vapor pressure (4-5 hPa). Basically, the following conditions must be met for the infection to occur - the air temperature higher than 10°C, a minimum of 10 mm of precipitation in 24-48 h and the vine strings must be in the development phase of 10 cm long (Baldacci, 1947 quoted by Caffi et al, 2009). Regarding the degree of attack of this disease on different varieties of grapevines, researches carried out in Romania (Dumitriu & Mitrea, 2021) showed that in 2019 this was 1.36% for Merlot, 1.64% for Cabernet Sauvignon, 4.30% for Chardonnay, 3.23% for Sauvignon Blanc and 5.63% for Tămâioasă Românească. Suciu et al. (2012) found a degree of attack of 1.88% for Grasă de Cotnari, 0.74% for Fetească albă and only 0.99% for Aligote varieties. It has been found that the attack of disease reduces the effectiveness of water use and photosynthesis at the leaf level (Grimmer et al., 2012) with many negative consequences, including a decrease in production.

Gray rot disease attacks more than 200 species of plants including grapevine (Williamson et al. 2007). To reduce the degree of attack of disease when climatic conditions favor its development, it is necessary to apply some technological measures. Primary infection occurs under favorable conditions of humidity, temperature (2.5 mm rainfall, about 11°C temperature) and plant susceptibility (Kennelly et al., 2007). In Romania, the assessments in the Târnave Vineyard (Tomoioagă & Mihai, 2005) indicated a degree of attack of *B. cinerea* between 0.5 and 1.5%. A model of *B. cinerea* infection development has been developed by Gonzalez-Dominguez et al. (2015). The authors assess the severity of the infection based on prediction methods that take into account the source of the infection and the period in which it

occurs. They can predict the severity of infection on inflorescences and young clusters caused by conidia as well as those caused by mycelium. Bove et al. (2018) showed that organo-mineral foliar fertilization leads to increased resistance to these diseases. This method is based on integrated control principle and is accepted for many crops by applying both macro-nutrients (N, P, K, Ca) and micronutrients such as B, Mn, Fe, Zn. (Christensen, 2000).
The purpose of this work was to evaluate the attack degree of downy mildew and gray rot on grapevine (Muscat Ottonel variety) related on the leaf treatments and the soil fertilization.

MATERIALS AND METHODS

Three experimental blocks were set up, each with 4 variants in 4 repetitions and a control were organized in a vineyard with the Muscat Ottonel variety located in Hotarele commune (Giurgiu County). In the first block, chemical fertilizers based on phosphorus and potassium were applied in doses of 100, 125, 150 and 200 Kg. Treatments were also applied with foliar fertilizers in a concentration of 0.4% in the main four phases of vegetation, respectively before flowering, after flowering, at bunch closure and at ripening. In the second block, all 4 doses of chemical fertilizers with phosphorus and potassium were used and treatment with foliar fertilizers in a concentration of 0.5% was performed in the 4 previously mentioned phases of vegetation. In the third block, there were applied the same doses of chemical fertilizers with phosphorus and potassium and treatment with foliar fertilizers in a concentration of 0.6%, before flowering, after flowering, at bunch closure and at ripening. In order to establish the degree of attack of downy mildew, 50 leaves were analyzed for each variant, and 50 grapes for each variant were assessed for gray rot attack evaluation.

In 2021 in the area where the experimental fields are located (Table 1), the average air temperature was between 9.7°C and 24.4°C in period from April to September. The hottest were July and August months. The relative humidity was between 66% and 81%. The climatic values were provided by the Oltenita Meteo Station located in the area of experiment.

Table 1. Average monthly data of temperature (C°) and RU% in 2021 at the Oltenita Meteo Station

Month	Average temperature (C°)	Relative Humidity (%)
January	2.4	86
February	3.2	83
March	4.9	78
April	9.8	69
May	17.5	66
June	20.5	79
July	24.4	68
August	23.8	64
September	17.2	64
October	9.7	81
November	7.3	86
December	2.9	88

RESULTS AND DISCUSSIONS

Results obtained in this study are presented in figures 1 and 2. Regarding *Plasmopara viticola* (Fig. 1) it was found that in variants V4 and V8 the degree of attack was 0.01% and in V12 was 0.04% comparatively with the control groups (M1-3) where an average of the degree of attack was 0.10%. It can be seen that these are the plots treated with 0.5% and 0.6% foliar fertilizers and fertilized with chemical fertilizers, phosphorus and potassium in doses of 200 Kg s.a/ha. Regarding *Bortytis cinerea* (fig. 2), the degree of attack was 0.16% in the variant V8 and

0.04% in the variant V12, these being fertilized with 200 kg s.a/ha and treatments with foliar fertilizers in concentration of 0.5 and 0.6%. In the untreated control treatments (M1-3), the degree of attack was with an average of 0.54%.

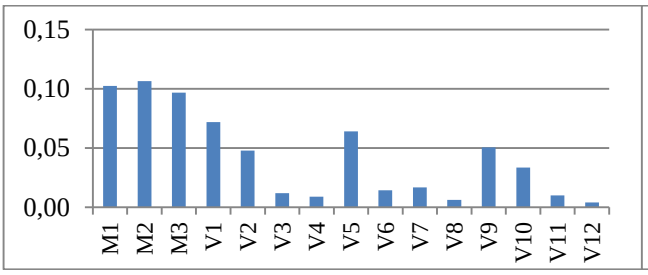

Figure 1. Degree of attack of downy mildew on Muscat Ottonel variety at Hotarele in 2021

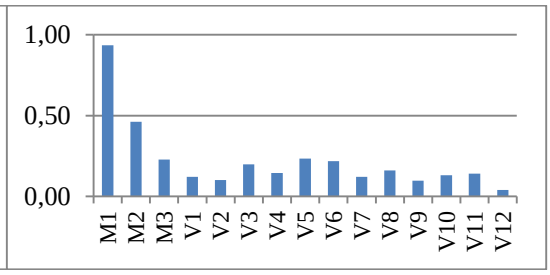

Figure 2. Degree of attack of gray rot attack on Muscat Ottonel variety at Hotarele in 2021

The mean weight of bunches and 100 berry fresh mass were positive corelated with the vineyard fertilization quantity/hectare (Table 1). The grape sugar content was between 186.25 g/l in untreated check and a maximum of 213.7 g/l in case of treatment 12, receiving a soil fertilization of 200 kg/ha phosphorous and potassium and 0.6% foliar fertilizer during vegetation.

Table 1. Production quality expressed in bunch weight, 100 berry fresh mass and sugar content

Variant	Treatment description	Mean weight of bunches (g)	100 berry fresh mass (g)	Sugar content (g/L)
M1	Untreated check 1st series	160.2	192.7	202.2
M2	Untreated check 2nd series	140.8	217.7	203.3
M3	Untreated check 3rd series	150.2	156.2	186.25
V1	100 kg/ha phosphorous and potassium +0.4% foliar fertilizer	188.4	216.9	203.3
V2	125 kg/ha phosphorous and potassium +0.4% foliar fertilizer	171.4	214.9	203.3
V3	150 kg/ha phosphorous and potassium +0.4% foliar fertilizer	161	200.8	205.7
V4	200 kg/ha phosphorous and potassium +0.4% foliar fertilizer	201.6	229.3	206.8
V5	100 kg/ha phosphorous and potassium +0.5% foliar fertilizer	172	239.4	194.2
V6	125 kg/ha phosphorous and potassium +0.5% foliar fertilizer	170	232.2	195.35
V7	150 kg/ha phosphorous and potassium +0.5% foliar fertilizer	176.2	245.7	193
V8	200 kg/ha phosphorous and potassium +0.5% foliar fertilizer	185.8	239.7	209.1
V9	100 kg/ha phosphorous and potassium +0.6% foliar fertilizer	162	199.5	204.5
V10	125 kg/ha phosphorous and potassium +0.6% foliar fertilizer	179.4	274.5	204.5
V11	150 kg/ha phosphorous and potassium +0.6% foliar fertilizer	179.6	241.6	212.5
V12	200 kg/ha phosphorous and potassium +0.6% foliar fertilizer	209	269.3	213.7

CONCLUSIONS

The best results were obtained in the vineyard experimental treatments treated with foliar fertilizers in concentration of 0.5% and 0.6% and fertilized with 200 kg of phosphorus and potassium/ha, respectively variants V4, V8, V12, these having the lower degrees of attack of the two pathogenic fungi. The best quality of production was recorded in the V8 and V12 variants fertilized with a combination of 200 Kg (active substance) phosphorus and potassium/ha and foliar fertilizers in a concentration of 0.5% and 0.6%. It is necessary to further experiment with this technology, in order to confirm the results obtained but also to elaborate recommendations to the farmers.

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