

EVIDENCE OF THE MAIN PATHOGENIC AGENTS AND PESTS OF THE VINE AND ITS PHYTOSANITARY CONTROL IN THE CLIMATE CONDITIONS OF 2019

EVIDENȚA PRINCIPALILOR AGENȚI PATOGENI ȘI DĂUNĂTORI AI VIȚEI DE VIE ȘI CONTROLUL FITOSANITAR AL ACESTORA ÎN CONDIȚIILE CLIMATICE ALE ANULUI 2019

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Abstract. *The careful monitoring of vineyards plays a particularly important role in creating forecasts and warnings to help combat the main pathogens and pests. Main vine diseases such as downy mildew, powdery mildew and gray rot can cause significant production losses if not combated according to well-established phytosanitary programs. On the other hand, their irrational control can lead to the emergence of phytotoxicity phenomena, or forms of resistance to pests. The present paper aims to present the evolution of the main viticultural diseases that appeared in the SCDVV Iași vineyards, in the climatic conditions of 2019.*

Key words: pathogens, pests, phytosanitary control

Rezumat. *Ținerea sub atenta observație a plantațiilor viticole joacă un rol deosebit de important în crearea prognozelor și avertizărilor cu ajutorul cărora se vor combate principalii agenți patogeni și dăunători. Bolile cheie ale viței de vie precum mana, făinarea și putregaiul cenușiu pot produce pierderi semnificative de producție dacă nu sunt combătute după programe fitosanitare bine stabilite. Pe de altă parte, combaterea nerațională a acestora poate conduce la apariția fenomenelor de fitotoxicitate, sau a formelor de rezistență în ceea ce privește dăunătorii. În lucrare este prezentată evoluția principalelor boli și dăunători din plantațiile viticole ale SCDVV Iași, în condițiile climatice ale anului 2019.*

Cuvinte cheie: agenți patogeni, dăunători, control-fitosanitar

INTRODUCTION

Pathogen and pest control technologies are a major element in ensuring sustainable viticulture, leading to homogeneous and cost-effective production. The success of the control of diseases and pests on the vine is ensured when the control scheme is drawn up at plantation or farm level, in depending with microclimate conditions, the biological reserve of the pathogens, the sensitivity of the variety to their attack and last but not least. of pesticide choice (Tomoiağă, 2003; 2006; Severin *et al*, 1994)

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Pests together with vine pathogens show different forms of resistance, from one year to another, and climatic conditions, constantly changing, determine an adaptation of problematic individuals, an atypical evolution of diseases, hence the need for permanent monitoring in order to develop adequate control systems (Irimia *et al.*, 2009; Stoica *et al.*, 2007).

MATERIAL AND METHOD

The phytosanitary control of the vine within the Research-Development Station for Viticulture and Vinification in Iași was carried out in the plots with mainly cultivated varieties: Fetească alba, Fetească regală, Aligoté, Chardonnay and Aromat de Iași, located on flat land and on land with slopes, this having a direct involvement on the development of pathogens by creating microclimates.

The evaluation of the numerical density of the pathogens (*Plasmopara viticola*, *Uncinula necator* and *Botrytis cinerea*) and their evidence was performed by periodic field observations, sampling of plant materials and laboratory determinations. In order to assess the phytosanitary condition of the vineyards in the phenological stage BBCH 85-87, the frequency (F%), intensity (I%) and degree of attack (AD%) of each agent were determined by value. Pest monitoring (*Lobesia botrana* and *Eupoecilia ambiguella*) was performed using pheromone traps and vine observations. In order to establish the economic damage threshold (PED) of the pests, their record was kept by counting twice a week the captured moths, drawing graphs representing the flight curves for the two generations.

RESULTS AND DISCUSSIONS

The viticultural climate of the vegetation period was analyzed from April to September inclusive (tab. 1). During this period, average monthly temperatures were higher than the multiannual values, increasing from 10.4°C in April to 22.5°C in August.

Table 1

The viticultural climate of the vegetation period from 2019

Month	Air temperature			Rainfall (mm)	Days with rainfall > 10 mm	Hygroscopicity %	Duration of sunlight (hours)	Σ °t useful (°C)
	T med. (°C)	Media T min (°C)	Media T max (°C)					
IV	10.4	5.4	15.8	46.0	2	60	199.9	51.8
V	16.0	11.2	21.4	98.6	4	74	198.4	191.3
VI	22.4	16.5	28.8	63.0	2	72	276.5	371.8
VII	21.5	15.6	27.6	33.8	0	62	282.8	355.1
VIII	22.5	15.9	29.5	43.2	2	58	285.5	386.0
IX	17.4	11.4	24.9	38.8	2	57	239.2	223.5
Sum	-	-	-	323.4	12	-	1482.3	1579.5

The months of June, July and August were the warmest, the average maximum temperatures being 28.8°C, 27.6°C and 29.5°C respectively. Due to the high temperatures, the atmospheric drought started from June, the number of days with precipitations higher than 10 mm was very small, two days each in April, June, August and September, no day in July and four days in May. Thus, the volume of precipitation during the vegetation period was 323.4 mm compared to 398.1 mm as normal in the Copou Iași wine center. The relative humidity of the air had lower values than normal, being between 57% in September and 74% in May. The hours of sunshine were enough to shorten the duration of leaf wetting, the average for 2019 in the vegetation period being 1482.3 hours, compared to 1448.2 hours per year. The useful thermal balance during the vegetation period registered a value of 1579.5°C, compared to the normal value of 1386.0°C, a thermal increase of 193.5°C.

Table 2

Phytosanitary treatments program - 2019

Crt. No.	Time of application of phenophase treatment / date	Pathogen or pest	The product used	Dose (kg,L/ha)
1.	Sprout 3 – 5 cm / 06.05.2019	Mites + Mildew	Sulfocalcic gravy	12 L/ha
2.	Sprout 10 – 25 cm / 20.05.2019	Powdery mildew + Downy mildew + Mites	Profiler + Topas + Envidor	2,5 kg/ha + 0,25 l/ha + 0,4 l/ha
3.	Before flowering / 02.06.2019	Powdery mildew + Downy mildew + Moths	Forum Gold + Vivando + Envidor	1,5 kg/ha + 0,2 L/ha + 0,4 L/ha
4.	End of flowering / 13.06.2019	Powdery mildew + Downy mildew	Forum Gold + Vivando	1,5 kg/ha + 0,2 L/ha
5.	Growing grains / 20.06.2019	Powdery mildew + Downy mildew	Folpan 80 WG + Kumulus	1,5 kg/ha + 3,0 kg/ha
6.	Compaction of bunches / 01.07.2019	Powdery mildew + Downy mildew + Gray rot	Ridomil + Kumulus + Cantus	2,5 kg/ha + 3,0 kg/ha + 1,2 kg/ha
7.	Entering in ripening / 16.07.2019	Powdery mildew + Downy mildew + Gray rot	Ridomil + Kumulus + Cantus	2,5 kg/ha + 3,0 kg/ha + 1,2 kg/ha
8.	Ripening / 29.07.2019	Powdery mildew	Bouillie bordelaise	5,0 kg/ha

When developing control programs, the sensitivity to attack of pathogens of cultivated varieties, the economic threshold of damage, as well as the effectiveness of treatments performed in the previous year were taken into account. Phytosanitary interventions with contact and systemic products aimed to limit or even stop the outbreaks of infection. Thus, the 8 phytosanitary treatments were carried out according to the warnings and the climatic conditions of the year, aiming at maintaining a healthy foliar apparatus that would support the production and ensure in addition a good differentiation of the buds for next year's harvest (tab. 2).

The attack of pathogens manifested itself differently depending on the variety and the location of the plot in the plantation. By daily monitoring the climatic factors responsible for the downy mildew attack (*Plasmopara viticola*), respectively the minimum daily temperature and humidity (rain, dew, fog), corroborated with the vegetation phenophase, it was estimated that the primary infection occurred on May 15, the first oil spots being identified on May 29. The variety Fetească albă was the most affected, being located in a microclimate area favorable to the pathogen, with an intensity of 32.5% on grapes, a frequency of 66.4% and a degree of attack of 21,6% . The lowest degree of attack was reported on grapes in variety Fetească regală, respectively 2,2%.

Regarding the pathogen that produces powdery mildew, *Uncinula necator*, it can be seen that its appearance and evolution was influenced by very high temperatures in June, July and August, which conditioned its development especially in susceptible varieties. Thus, in the conditions of 2019, the powdery mildew attack manifested itself in a moderate proportion, being reported in the Fetească regală variety, only on grapes, with an intensity of 7.5% and a frequency of 7.9%.

Observations made on the gray rot of grapes, produced by the fungus *Botrytis cinerea*, showed that the attack occurred only in the Aromat de Iași variety, an early variety, after the cracking of the skin of the berries, with an intensity of 32.1%, a frequency of 33,0% and an attack rate of 10,6% (tab. 3).

Table 3

Manifestation of the attack of the main pathogens - 2019

The pathogen	Variety	The attacked organs	I, %	F, %	A.G. %
<i>Plasmopara viticola</i>	Aligoté	Leafs	21.0	46.5	9.8
		Grapes	34.5	35.3	12.9
	Fetească regală	Leafs	6.9	9.5	0.7
		Grapes	17.7	12.2	2.2
	Fetească albă	Leafs	18.0	16.25	3.0
		Grapes	32.5	66.4	21.6
	Chardonnay	Leafs	18.6	38.5	7.16
		Grapes	34.4	37.2	12.8
<i>Uncinula necator</i>	Fetească regală	Grapes	7.5	7.9	0.6
<i>Botrytis cinerea</i>	Aromat de Iași	Grapes	32.1	33.0	10.6

Among the dangerous pests found in the experimental plantations in the Copou Iasi wine center, we mention the grape moths (*Lobesia botrana* den et Schiff, *Eupoecilia ambiguella* Hb. *Sparganatipillereana* Den et Schiff), the eriofizi and tetranichizi mites (Gallic mite of the calf - *Eriophyes vitis* Nal and the common calf mite - *Tetranychus urticae* Koch). The climatic conditions in the vegetation period of 2019 had a significant influence on the evolution of the vine pest populations. The observations made on the binocular magnifying glass

during the budding phenophase as well as those during the vegetation period did not report any symptoms of mite and spider attack. Under these conditions, the only treatment that was applied was the one with sulfocalcic gravy from the bud to control the powdery mildew, with secondary action on these pests as well.

The evidence of the *Lobesia botrana* and *Eupoecilia ambiguella* moth generations was kept with the help of pheromone traps (atraAMBIG and atraBOT), strategically placing a number of 3 traps/ha, both for the first and for the second generation.

For the species *Lobesia botrana* for the first generation, the flight took place over a period of 21 days, from the end of April to the middle of May, the maximum of the flight curve reaching on 01.05.2019 with an average number of 154.7 moths on the trap (fig. 1).

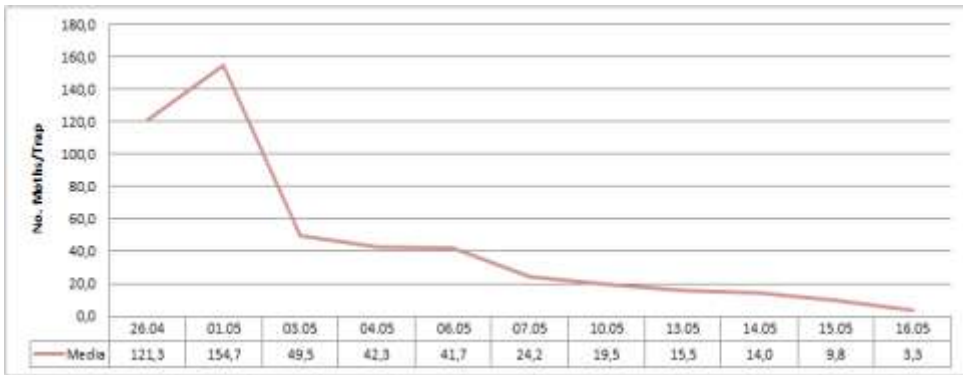


Fig. 1 Flight curve of the species *Lobesia botrana*

In the second generation, the economic damage threshold was not reached, the flight taking place over a period of 4 weeks, starting from 27.06.2019 to 01.08.2019. The maximum flight curve for the second generation was reached on 15.07.2019 when an average number of 23.5 moths / trap was recorded (fig. 2).

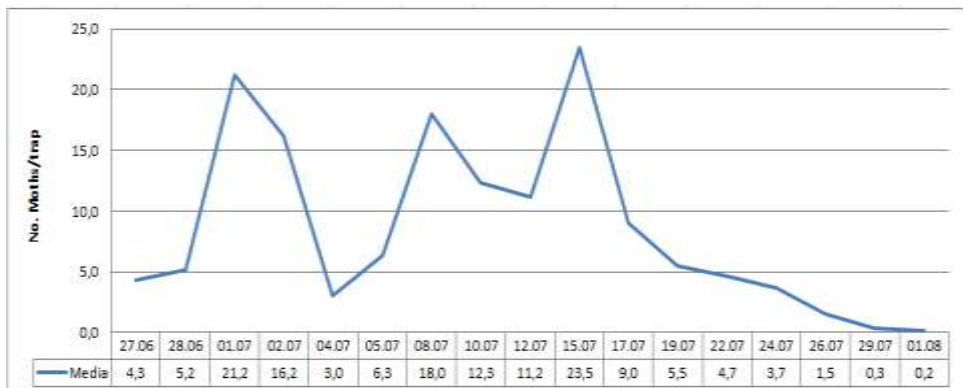


Fig. 2 Flight curve of the species *Lobesia botrana*

It should be noted that, for both the first generation (G1) and the second generation (G2) of moths, only adults of *Lobesia botrana* were caught in a number that exceeded the PED in the Fetească albă variety in G1, on May 1, under these conditions, two control treatments were warned and applied.

Another pest reported in 2019 in the vineyards of SCDVV Iasi was the frosted moth-bug (*Metcalfa pruinosa*), which has not been found before.

CONCLUSIONS

The analysis of the values of the climatic elements in the vegetation period of 2019 shows that it was warmer than normal, with little rainfall, and the distribution of quantities was not uniform, this leading to difficulties in combating of downy mildew.

Plasmopara viticola attacking with a fairly high frequency the varieties located in areas of favorable microclimate. The pathogens *Uncinula necator* and *Botrytis cinerea* did not cause vine problems. Of the pests reported, only *Lobesia botrana* exceeded the PED, which required two treatments.

During the vegetation period, eight treatments were carried out to control diseases and pests in correlation with the evolution of climatic factors and according to the economic damage threshold (PED), which contributed to maintaining a healthy foliar apparatus and obtaining normal quantitative productions and qualitatively.

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