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THE IMPACT OF FERTILIZATION AND FOLIAR STIMULATION PRODUCTS BOTH ON INCREASING THE RESISTANCE TO MAJOR PHYTOPATHOGENS ATTACKS, AND ON INCREASING THE QUANTITY AND QUALITY OF WINE GRAPES HARVEST

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Abstract

The paper aimed to demonstrate the impact of fertilization and foliar stimulation products both on increasing the resistance to major phytopathogens attacks, and on increasing the quantity and quality of wine grapes harvest. Applying the foliar fertilizer products Plonvit Kali (c1), Tytanit (c2) and Optysil (c3) to vines, for a period of three years (2011/2013), in phenophases of intensive growth of shoots and grapes at approved dosages, simultaneously with pesticide treatment, not only a reduction of pathogenic fungi attack was obtained, but also and an increase of harvest without diminishing the quality of the grapes.

Key words**:** *phytopathogens attacks, quality of wine grapes, fertilization stimulation products, foliar stimulation products*

INTRODUCTION

As a result of considerable practical experience from 1987[1], 1990[2], 1993[3], 1994[4], 2001[5], the impact of certain chemicals in the composition of foliar or basic fertilizers on improving resistance to disease in plants was observed, acting by favoring the synthesis of resveratrol or other stilbene compounds. Based on these observations, in the period 2011-2013, in the viticultural centre of Valea Călugarească, we experimented on an area of 6050 m2 on the effects of fertilizer and stimulation products for increasing resistance to disease attack.

For this purpose, three products were selected: a crystalline foliar NPK fertilizer (c1), which is soluble in water and has in its composition (g / kg product): total nitrogen 110; P2O5 – 120; K2O – 380; MgO – 1; SO2 – 11; B -0.3; Co- 0.01; Cu – 0.3; Fe- 1.5; Mn – 0.7; Mo- 0.02; Zn – 0.7 and Titan – 0.01. The treatment was done with 1kg / ha / in phenophases BBCH 61 (start blooming) BBCH 71 (beginning of fruit development) and BBCH 75 (berries reaching 50% of normal size).

Another product used (c2) is based on titanium and has in its composition (g/l) MgO 65, SO3-130 and Ti- 8.5. It was administered at a dose of 0.2 l / ha / treatment in the same phenophases as the previous product (BBCH 61, 71 and 75).

The last item checked (c3) has in its composition 200 g/l SiO2 and Fe 24 g/l. It was administered at a dose of 0.5 l / ha treatment in phenophases BBCH 61, 71 and 75.

The three products have good compatibility with a large number of plant protection products.

In order to check the effect of these products, we determined the frequency, the intensity and the degree of attack produced by the major damaging agents, as well as the quantity and quality of the harvest.

MATERIALS AND METHODS

The parameterization of the effects of the phyto-sanitary intervention programs on the main plant phytopathogens was performed by determining the intensity and severity of the produced attacks and by calculating the degree of attack.

The frequency of attacks is the relative value of the number of attacked plants or plant organs (n) relative to the number of plants or

organs observed (N).
For pathogenic fungi that cause mildew and powdery mildew in grapevine, the frequency was determined in three phenological moments: after blooming, in berry growth and at grapes compaction. For the gray mold only in the compaction phenophase – ripe start. Measurements were performed by direct observations on a number of plants 100 leaves and 100 grapes for each iteration.
The intensity of the attack is the relative value which gives the degree of plant attack coverage or range, a ratio of the infested area to the total area.
The intensity, as well as the frequency, were determined for pathogenic fungi that cause mildew and powdery mildew in grapevine in three phenological moments: after blooming, in berry growth and at grapes compaction. For the gray mold only in the compaction phenophase – ripe start. Measurements were performed by direct observations on a number of plants 100 leaves and 100 grapes for each iteration.
The degree of attack (GA) is the expression of the expanded seriousness of the attack on the plant or on the total number of plants on which we perform observations.

RESULTS AND DISCUSSIONS

1.The influence of fertilization and foliar stimulation products experimented upon in the viticultural centre of Valea Călugarească over the period 2011 -2013 regarding the degree of attack (Ga%) produced by mildew (Plasmopara viticola)

The observations performed were related to the frequency and intensity of attacks in three phenophases (after blooming, berry growth and compaction) and we calculated the ratio of the degree of attack (frequency x intensity per 100).
In terms of the favourability degree for the development of the fungus that causes mildew in grapevine, 2011 seemed to be the best: the attack intensity to the untreated control was 76%. 2012 and 2013 registered less amounts, with mildew occurring only sporadically.
Distinct differences were observed, significant and very significant, due to the influences of all products tested vs controls. The product which has silicon and iron in its composition (C3) manages to provide the plant, both leaves and grapes, increased resistance to the fungus attack (66% as compared to 100% in the control). Results on the influence of foliar stimulation products tested on the attack (GA%) produced by Plasmopara viticola, in 2011-2013, are displayed in the chart below (Fig. 1):

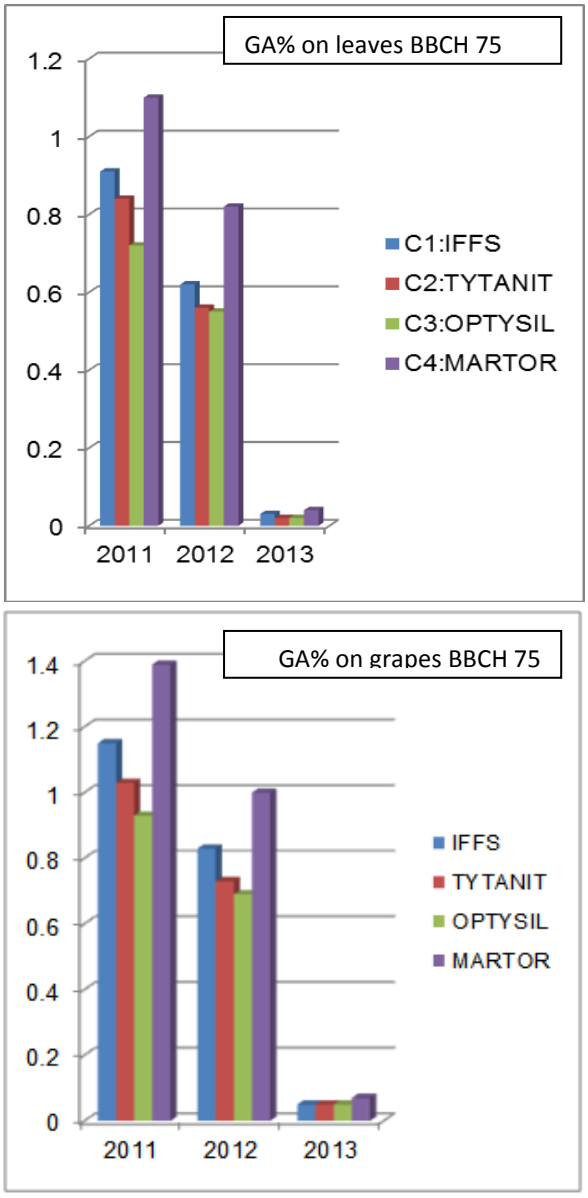

Fig. 1. The influence of foliar stimulation products tested on the attack (GA%) produced by *Plasmopara viticola* on leafs and grapes, in 2011-2013

2.The influence of fertilization and foliar stimulation products experimented upon in the viticultural centre of Valea Călugarească over the period 2011 -2013 regarding the

degree of attack (Ga%) produced by powdery mildew (Uncinula necator)

In 2011 the pressure of infection was high, and the intensity of the attack to the untreated control was 81.4%. Although the threat of infection was very low in 2012 and 2013, results on the impacts of fertilization products show the same trend.

After analyzing the results, we can conclude that the fertilization and stimulation products contribute to increasing plant resistence to this fungus. We present the results in graphical form illustrating the influence of fertilizing and foliar stimulation products tested on the degree of attack (Ga%) produced by powdery mildew (Uncinula necator) on vines in 2011-2013 (Fig. 2).

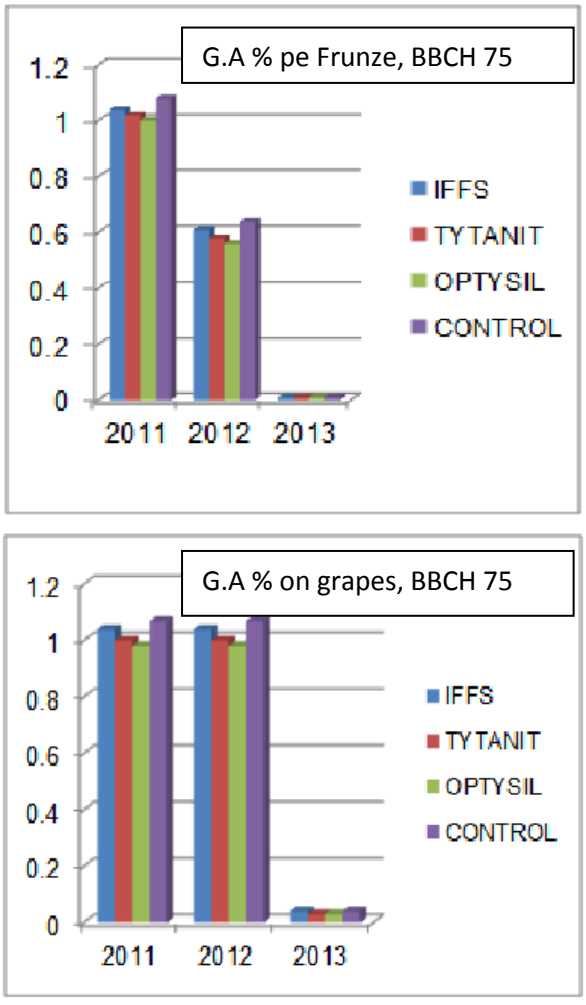

Fig. 2. The influence of fertilization and foliar stimulation products tested on the attack (GA%) produced by *Uncinula Necator* on leafs and grapes, in 2011-2013

3.The influence of fertilization and foliar stimulation products experimented upon in the viticultural centre of Valea Călugarească over the period 2011 -2013 regarding the degree of attack (Ga%) produced by the grapevine gray mold (Botrytis cinereia).

In the case of gray mold we also note the positive influence of the tested substances on vine plant resistance.

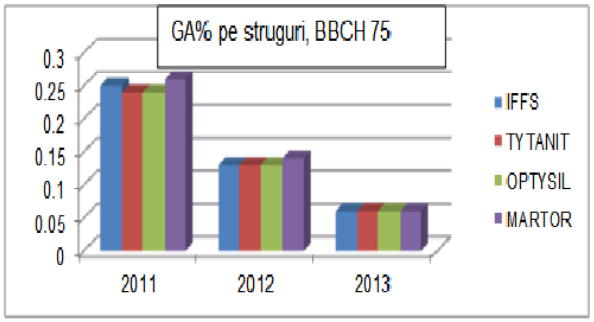

Fig. 3. The influence of fertilization and foliar stimulation products tested on the attack (GA%) produced by *Botrytis cinereia* on grapes, in 2011-2013

We can clearly observe a production increase brought by the use of the tested products in all three years of experiments:

Table 1. The influence of fertilization and foliar stimulation products experimented upon in the viticultural centre of Valea Călugarească over the period 2011 -2013 regarding the grape production (kg / vine plant)

Year	2011	*	2012	*	2013	*
Product	Kg/vine BBCH 85	%	Kg/vine BBCH 85	%	Kg/vine BBCH 85	%
c1 - IFFS	2.8	112.5	3.08	114.9	3.68	105.4
c2 - TYTANIT	2.71	108.8	2.98	111.2	3.54	101.4
c3 - OPTYSIL	2.79	112.1	3.07	114.6	3.55	101.7
c4 - control	2.49	100.0	2.68	100.0	3.49	100.0

*difference vs control

4.The influence of fertilization and foliar stimulation products experimented upon in the viticultural centre of Valea Călugarească over the period 2011 -2013 regarding the the content of sugar in unfermented wine.

According to the chart below we can say that the products have brought a production increase without significantly influencing the content of sugar in unfermented wine.

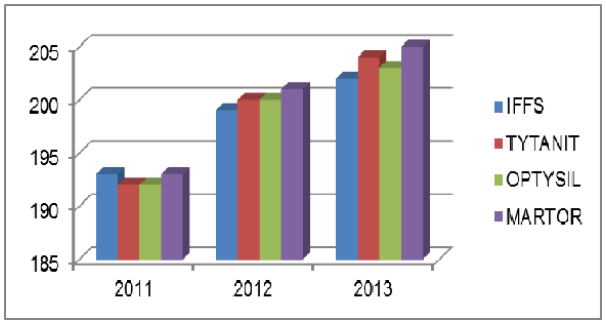

Fig. 4. The influence of fertilization and foliar stimulation products over the period 2011 -2013 regarding the content of sugar in unfermented wine

CONCLUSIONS

The fertilizing and stimulation products had an important impact on production resistance to damaging agents. These results combine the effects of two influences: intake of nutrients and the effect of reducing the damage caused by phytopathogenic agents. If we consider the influence of these products in reducing the mildew attack on grapes, it was by 27-36% lower.

Among the tested products fertilizer C1 is constantly noted, with distinctly significant differences, also demonstrating stimulation effects, alongside with the product named Optysil which, as we remember, diminished the studied pathogenic fungi degree of attack of (mildew, powdery mildew, gray mold).

These products make a crop contribution ranging between 110 – 115 % in the years 2011 – 2012. In 2013, when the pressure of infection was very low, these products influence on yield was of only 102-105%.

It is also worth noting that in the case of production increases, the crop quality, expressed by the accumulated sugars, was not diminished.

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