

## RESEARCH RESULTS OF BM 86 AS A FOLIAR FERTILIZER FOR GRAPEVINES UNDER THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

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### Abstract

Environmental contamination, weather anomalies, nutrient imbalance, drought as well as long-term cultivation of multiannual crops are factors that condition intensive soil depletion. Considerable losses in plant productivity and loss of product quality can be observed. The article presents the results of research on the influence of the foliar fertilizer BM 86 of the French company "Arysta Life Science SAS" on the quantity and quality of grapes. Foliar fertilizer BM 86 tested in the conditions of the Republic of Moldova demonstrated its effectiveness in the growth and development of vines manifested by increased yield and quality of berries compared to the standard (Cosir, 2.0 l/ha). Based on the testing results it was recommended to include BM 86 fertilizer in the dosage of 3.0 l/ha in three foliar treatments of vines in the "State Register of Products for Phytosanitary Use and Fertilizers of the Republic of Moldova."

**Key words:** vine, foliar fertilizer, test, productivity, quality

Viticulture is one of the priority areas of the economy in the Republic of Moldova. According to IOVW data, the area of vineyards in the Republic of Moldova is 140 thousand ha, which represents 1.9% of the total area of vineyards in the world. The majority of plantations are represented by technical varieties used for wine and juice production. The contribution of the Republic of Moldova was 2 million hectolitres of the 279 million hectolitres of wine produced in the world in 2018. In general, most varieties grown in the country have a genetic potential determined by a fairly high productivity. However, the realization of this potential is slowed down by two factors: monoculture and periodic thermal stresses.

It is already known that the realization of the yield potential of vines can be increased by applying foliar fertilizers which are applied directly to the leaves of the vine and take effect quickly and safely. They can be used as a treatment for vines, depending on the needs of the plant and its deficiencies. Foliar fertilizer treatments on vines can be applied to all varieties of vines. They are sprayed on the leaves and solve specific problems. In order to produce tasty and healthy grapes, the best quality foliar fertilizers are chosen to ensure the success of any vine production.

In this context, in accordance with the Test Work Programme, drawn up annually by the "State

Centre for Approval and Homologation of Plant Protection Products and Fertilizers", the French preparation BM 86 from Arysta Life Science SAS was tested for the first time.

BM 86 contains microelements (B, Fe, Mn, Zn). The role of these microelements in plant metabolism is quite well known and conditions the accumulation of vegetative mass, the size of the harvest and the quality of the production obtained. Foliar fertilization with secondary macroelements that are also present in this preparation (Ca, Mg, S), which vines need several tens of kilograms per year, comes as a complement to basic fertilization in periods of nutritional disorders of plants. Foliar fertilization is unavoidable for the main macroelements (NPK). Foliar fertilization during the growing season is therefore part of sustainable agriculture as the main measure to improve plant nutrition under ecological protection conditions.

The aim of our research is to test different doses of foliar fertilizer at critical stages of vine development, and to assess the effectiveness on yield and quality of production obtained under the conditions of the Republic of Moldova.

### MATERIAL AND METHOD

The testing work of BM 86 preparation was carried out on the experimental lot located in the

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vineyard of Pinot Blanc variety in Codru commune, Chisinau municipality, Technological-Experimental Station (STE) "Codru" of the Scientific-Practical Institute of Horticulture and Food Technologies (figure 1).



Figure 1 Spatial location of the experimental plot

To determine the biological activity of the preparation BM 86 on Pinot Blanc vines, an experiment was set up in the field according to the scheme:

1. Control (unfertilised);
2. Standard Cosir, 2 litres/ha;
3. BM-86, 2 litres/ha;
4. BM-86, 3 litres/ha.

Three sprays were made according to the programme (figure 2,3,4).

Three sprays were performed according to the schedule:

- 1 - In the vegetation restart phase (26 April);
- 2 - during the bud swelling phase (12 May);
- 3 - in the after-flowering phase (1 July).

Cosir standard contains nutrients (NPK): 3.0 - 33.7 - 24.3 + Cu (0.02%) + B, Mn, Zn (0.1%) + Mo (0.001%). 40 : 25 + 2MgO + 2B + TE).

The tested fertilizer BM 86 contains NPK - 9 - 53 - 9 + Fe, B, Zn (0,1 %) + Cu, Mn (0,05 %) + Mo (0,005 %), therefore the tested preparation contains macroelements (N-241 g/l + MgO - 61,6 g/l + SO<sub>3</sub> -123,3 mg/l) and microelements (B-26,0 g/l + Mo-0,25 g/l + algae extract *Ascophylum nodosum* Ga-142-257 g/l). The preparations were applied foliar in three replicates of 10 bushes. The area of nutrition is 1.50 x 2.75 m, per hectare - 2400 grapevine bushes.



Figure 2 First treatment in the early vegetation phase



Figure 3 Second treatment at bud swelling



Figure 4 Third treat blooming phase

## RESULTS AND DISCUSSIONS

In vine cultivation, fertilization is intended to ensure an increased grape harvest without lowering the quality parameters and reducing the plants' resistance to diseases, pests or other natural factors. In order to achieve these goals on the vineyard, it is mandatory to have a real knowledge of the soil condition, what nutrients are accessible

to the plants and what is the annual food consumption according to the planned production. In this context agrochemical mapping was carried out. Soil samples were taken and laboratory analyses were carried out. Field and laboratory work were carried out according to standards and methodical recommendations.

According to the data obtained (table 1) the soil of the experimental field is characterized with an optimal level of nutrient supply.

Table 1

**Agrochemical indices of leached chernozem (TES"Codru"). Testing the preparation BM 86 as a foliar fertilizer**

Experience variant	Humus, %	Phosphorus	Potassium	Nitrification capacity, N-NO <sub>3</sub>
				mg/g sol
1.Control (unfertilized);	3.62	2.40	24.10	2.50
2.Standard Cosir, 2 liters/ha;	3.57	2.54	24.10	1.85
3.BM-86, 2 liters/ha;	3.41	3.00	25.31	1.85
4.BM-86, 3 liters/ha.	3.77	3.88	28.92	2.32
Media	3.59	2.96	25.61	2.13

The soil resource assessment confirms the natural potential of the experimental land, which has a below average productivity capacity. This can be increased by applying mineral and organic fertilisers. From the calculations and measurements

carried out during the test it was established that the application of BM 86 fertilizer has a beneficial influence on the growth and development of vines by increasing yield (*table 2*) and berry quality (*table 3*).

Table 2

**Influence of fertilizer BM – 86 on the harvest of Pinot Blanc grapes obtained on leached chernozem, t/ha. TES "Codru", 2021**

Experience variant	Grape harvest, t/ha	Harvest surplus	
		t/ha	%
1.Control (unfertilized);	12.0	-	-
2.Standard Cosir, 2 liters/ha;	13.7	1.7	14
3.BM-86, 2 liters/ha;	14.4	2.4	20
4.BM-86, 3 liters/ha.	16.1	4.1	34
DL 0.5%	1.2	0.5	5.0
Sx, %	6.0	6.0	6.0

Table 3

**The influence of fertilizer on the quality of grapes of the Pinot Blanc Variety obtained on leached chernozem. TES "Codru", 2021**

Index and units of measurement	Experience variant			
	Control (unfertilized)	Standard Cosir, 2 liters/ha	BM-86, 2 liters/ha	BM-86, 3 liters/ha
Average harvest per bush, kg	5.0	5.7	6.0	6.7
Number of grapes per Bush, pcs	37	42	47	53
Grape weight, g	135	135	128	126
Weight per 100 grapes, g	158	162	180	170
Volume per 100 grapes, cm <sup>3</sup>	140	147	165	162
Sugar level, %	22.0	22.6	23.4	23.9
Total acidity, ‰	7.1	6.8	6.0	5.4
Vitamina C, mg/l	17.1	19.0	19.9	21.0

Note: The analyses were carried out in the Laboratory "Agrochemistry" (IPASP "Nicolae Dimo") and the Laboratory "Wine Technology, BDO" and "Hard Drinks" (IȘPHTA).

The production per hectare in the variants treated with bm 86 fertilizer was 14-16 t/ha, which was significantly higher than that obtained in the standard and unfertilized control variants (13.7-12.0 t/ha). The yield of pinot blanc grapes in the variants fertilised with bm 86 was 2.4 - 4.1 t/ha, (20 - 34 %).

The application of bm 86 fertilizer led to improved grape production quality. The average yield per bush is 6.0 - 6.7 kg for the bm 86 treated variety with a grape number between 47 and 53, contributing to a grape weight of 126 - 128 grams. At the same time, the volume of 100 grapes is 170

- 180 grams. The quality of grape production is improved: the sugar content is increased and the total acidity is reduced, while the vitamin c content is increased. It is known that acetylsalicylic acid protects the organic substance from oxidation, which ultimately acts beneficially on the organoleptic priorities of sparkling wines. The sugar in the must of the variants treated with the preparation bm 86 is at an increased level and the total acidity is medium. The must sugar content in the reference variants is - 22,0 %, total acidity - 7,1 ‰ and vitamin c content - 17,1 mg/l.

When applying the foliar preparation bm 86 at doses of 2-3 litres per hectare compared to the control and cosir, 2 litres per hectare (standard) the sugar content increased respectively by 1.4-1.9 %, vitamin c by 1.9-3.9 mg/l and the total acidity content decreased by 0.3-0.7 ‰. A more significant yield increase compared to the unfertilised control was observed in the variant treated with the preparation bm 86, at the dose of 3 litres per hectare - 4.1 t/ha (34 %). The results of the mathematical calculations showed that the grape yield increases from the preparations tested were distinctly significant.

### CONCLUSIONS

Foliar application of BM 86 fertilizer at a rate of 3 litres per hectare to Pinot Blanc vines had a beneficial influence on grape productivity and quality. Sugar content increased by 1.9% and vitamin C by 3.9 mg/l. The total acidity content decreased by 0.7 ‰.

The increase in grape production compared to the reference variety was 4.1 t/ha (34

%) and 1.7 t/ha (14 %) compared to the Cosir standard.

The French preparation BM 86 can be used as a foliar fertilizer on vines at the rate of 3 litres per hectare in three treatments and it is recommended to include it in the "State Register of Products for Phytosanitary Use and Fertilizers of the Republic of Moldova".

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