

THE INFLUENCE OF ORGANIC FERTILISER NOVA® ON THE OENOLOGICAL POTENTIAL OF FETESCĂ REGALĂ AND ALIGOTÉ IN IASI VINEYARD

INFLUENȚA FERTILIZANTULUI ECOLOGIC NOVA® ASUPRA POTENȚIALULUI OENOLOGIC AL SOIURILOR FETESCĂ REGALĂ ȘI ALIGOTÉ, CULTIVATE ÎN PODGORIA IAȘI

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Abstract. *The necessity of vineyard fertilization is imposed by the fact that the vine is a perennial plant and it extracts for a long time large amounts of nutrients. In this context, this paper also includes a study on the use of a NOVA® organic fertilizer in establishing the oenological potential of vine varieties that are highly cultivated in Moldova, which allow the consumer to appreciate a wide range of wines. The technological grape indices of the studied varieties have demonstrated the superiority of applying biofertilisers, making them larger, less dense in berries that have a higher mass and must capacity. The grape yield is slightly larger, namely: 73.7% for the Aligoté variety, compared to 72.5% untreated variety, while for Fetească regală variety the increase is up to 65.9%, compared to 64.9%. The quality of the grapes has also been improved by application of the NOVA® foliar biofertiliser, the accumulation in sugar being higher while the acidity is more balanced. Accumulation in sugars allows the production of white table wines with geographical indication (Aligoté) or quality wines (Fetească regală).*

Key words: Fetească regală, Aligoté, grapevine variety, growth biostimulator, production

Rezumat. *Necesitatea administrării îngrășămintelor în cultura viței de vie este impusă de faptul că fiind plantă perenă, extrage timp îndelungat cantități mari de substanțe nutritive. În acest context se include și lucrarea de față, care constituie un studiu privind folosirea unui fertilizant de proveniență ecologică NOVA®, în stabilirea potențialului oenologic al unor soiuri de viță de vie, cu areal mare de cultură în Moldova și care permit obținerea unei game largi de vinuri apreciate de consumatori. Indicii tehnologici ai strugurilor la soiurile luate în studiu au demonstrat superioritatea aplicării tratamentului cu biofertilizator, aceștia devenind mai mari, mai lacși în boabe, cu boabele mai grele și capacitate mai mare de formare a mustului, randamentele la prelucrarea strugurilor fiind ușor mai mari, și anume: la soiul Aligoté 73,7%, față de 72,5%, iar la soiul Fetească regală de 65,9%, față de 64,9%. Calitatea strugurilor a cunoscut și ea o îmbunătățire prin aplicarea tratamentului cu biofertilizantul foliar NOVA®, acumulările în zaharuri fiind mai mari, iar aciditatea mai echilibrată. Acumulările în zaharuri din must permit obținerea vinurilor de masă albe cu indicație geografică (Aligoté), sau a celor de calitate (Fetească regală).*

Cuvinte cheie: Fetească regală, Aligoté, soi de viță de vie, biostimulator de creștere, producție

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INTRODUCTION

Obtaining quantitative and qualitative agricultural and horticultural productions, in the context of soil fertility growth or maintenance while taking in consideration a real protection of agroecosystems, is one of the major objectives of modern agriculture (Rotaru and Stoleru, 2011). Each farmer must understand the need for accurate assessment and regular monitoring of plant nutrient requirements based on realistic forecasts, depending on local technological conditions, soil, climate and expected yield (Burzo, 2014). In this way, excesses can be avoided and nutrient deficiencies can be corrected (Davies, 2004).

Rational fertilization with products admitted in organic viticulture, which are administered directly by spraying on the plant, facilitates their direct introduction into its metabolism and is a prerequisite for obtaining superior crops in terms of quantity and quality (Amiri and Fallahi, 2007).

MATERIAL AND METHOD

The determinations were made on two varieties for white wines characteristic to Iasi vineyard, namely Aligoté and Fetească regală. NOVA® is a complete organic fertilizer that has been made from compounds free of heavy metals and toxic substances, harmful to humans. This is a fertilizer with amino acids and organic enzymes intended to be applied by foliar and dripping fertilization. NOVA® product contains 14% organic nitrogen (N), 9% phosphorus (P), 8% potassium (K) and trace elements (iron 0.04%, manganese 0.04%, magnesium 0.32%, zinc 0.03%, copper 0.01% and 0.02% molybdenum). Three treatments with this product were carried out, the first before flowering (June 6th), the second after flowering (June 25th), and the last during intensive berry growth (July 19th) at 15 liters / ha.

The application of the biostimulator was carried out in 2016 on a group of vines located in the Ampelographic Collection of the Faculty of Horticulture, on a land with a slope of about 5%, on a chernozem cambic soil. The graft used is Berlandieri x Riparia Kober 5 BB with planting distances of 2.2 / 1.2 m, with a vertical monoplane support system and an average of 3700 vines / ha. The trellising system in the plantation is semi-high, trunk of 0.75 m, bilateral cord with cutting into medium length elements (spur + 4-7 buds cane) and 40-42 buds / vine, about 14-16 buds / m². Soil and vine maintenance works are those specific to the industrial viticultural ecosystem.

RESULTS AND DISCUSSIONS

Regarding the average number of grapes grown per vine (tab. 1), it was found that for both varieties, there were more grapes in the untreated variant, namely 53.52 for the Aligoté variety and 50.78 for the Fetească regală variety, while at the variants that were treated with the NOVA® biofertilizer, the numbers were slightly lower, ie 50.78 for the Aligoté variety and 37.03 for the Fetească regală.

Instead, the average mass of a grape had higher values for the grapes treated with the NOVA® biofertiliser: 115 grams for the Aligoté variety and 135 grams for the Fetească regală variety. Consequently, the production levels achieved were

different, being influenced by both the genetic nature of the variety and the application of the NOVA® biofertiliser treatment.

Table 1

Productive potential of studied varieties

Variant	Average no. of grapes per vine	Average mass of grape (g)	Average no. of berries per grape	Average production per vine (kg/vine)	Production per ha (calculated) (t/ha)
Aligoté-control.	53.52	105	132	5.62	20.79
Aligoté-treated	50.78	115	114	5.84	21.61
Fetească regală-control	39.42	120	88	4.73	17.50
Fetească regală-treated	37.03	135	75	5.00	18.50

Regarding the average number of berries formed on clusters, they are higher in the case of the untreated variant, while the version treated with the NOVA® biofertiliser shows lower values. In the Aligoté variety, 132 berries were formed on average on bunches of untreated varieties, while in the treated variant 114 berries were formed. At Fetească regală control, on average, 88 berries were formed, compared to 75 berries formed on average at the variant with NOVA® treatment.

Average production was slightly superior in the case of the NOVA® biofertiliser treatment so that, the production per hectare was superior with 820 kg/ha for Aligoté and 1000 kg/ha for Fetească regală.

The production per hectare was for the control variant was 20.79 t/ha for the Aligoté variety and 17.5 t/ha for Fetească regală. Following the application of the NOVA® Biostimulator treatments, the achieved yields were 21.61 t/ha for the Aligoté variety and 18.50 t/ha for Fetească regală.

Table 2

Technological indices for studied grape varieties

Variant	Structural index of the grapes	Compositional index of the berry	Berry index	Yield index	Must yield (%)
Aligoté-control	31.1	7.4	64.0	4.4	72.5
Aligoté-treated	33.6	8.6	61.9	4.8	73.7
Fetească regală-control	24.6	6.2	53.6	4.2	64.9
Fetească regală-treated	26.3	6.8	50.6	4.6	65.9

In the case of the studied varieties it is found that for the structural index of the grapes the higher values were for the treated variants (tab. 2). Therefore, following the application of the NOVA® biofertiliser, the weight gain of the berries, the values of this index were higher, being 33.6 for the Aligoté variety and 26.3 for the Fetească regală variety.

Also, in the case of the berry composition, the values were higher for the variants where NOVA® biofertiliser was applied, so the mass of the pulp was higher than that of the skins and seeds. Grape variety wise, the highest values were for Aligoté, 8.6, compared to those registered for Fetească regală, with 6.8.

The berry index was higher for the Aligoté variety, where the grains are smaller than those for the Fetească regală variety, which has medium berries. It is found that in the case of the variant where the NOVA® biofertiliser was applied due to the increase in grain sizes, the highest values are recorded for fertilized variants, namely 61,9 for Aligoté and 50,6 for Fetească variety royal.

The yield index had values specific to wine varieties being higher for variants where the NOVA® biofertiliser was applied, due to their larger berry size and more succulent berries. The values obtained were 4.8 for the Aligoté variety and 4.6 for the Fetească regală variety.

The must yield was higher for the Aligoté variety, 73.7%, at the limit of quality wines and table wines and for Fetească regală variety it was specific for quality wines, namely 65.9%.

Table 3

Results regarding the attack of main diseases for vines in the case of Aligoté

Studied diseases	Treated			Control sample		
	I %	F %	G.A. %	I %	F %	G.A. %
Downy mildew -leaves	4.42	16.87	0.75	8.78	14.86	1.30
Downy mildew -grapes	5.06	16.66	0.84	6.79	13.65	0.92
Powdery mildew -leaves	18.23	33.98	6.19	20.41	41.10	8.39
Powdery mildew -grapes	6.69	41.12	2.75	8.52	52.23	4.45
Grey rot on grapes	3.98	10.12	0.41	4.55	16.6	0.75

Table 4

Results regarding the attack of main diseases for vines in the case of Fetească regală

Studied diseases	Treated			Control sample		
	I %	F %	G.A. %	I %	F %	G.A. %
Downy mildew -leaves	5.08	17.32	0.88	9.95	15.32	1.52
Downy mildew -grapes	5.69	18.21	1.04	7.14	17.14	1.22
Powdery mildew -leaves	21.73	46.55	10.11	35.65	74.14	26.36
Powdery mildew -grapes	7.89	52.42	4.13	16.02	68.08	11.04
Grey rot - grapes	5.27	11.49	0.61	7.88	28.49	2.32

Following application of the NOVA® biofertiliser, there is an improvement in the resistance to the main diseases of the vine. Thus, in the case of the Aligoté variety, the degree of downy mildew attack is less than one and a half times at the treated variant, and relatively similar in the case of attack on grapes (tab. 3). In Fetească regală variety, the highest values are recorded at leaf attack 1.04%, double compared to the values present in the fertilised variant 1.52% (tab. 4). In powdery mildew, the degree of attack was stronger in both varieties, the highest

values being recorded for leaf attack, Fetească regală variety, untreated variant, of 26.36%. The lowest values were for Aligoté grape variety, only 2.75%. A very good resistance is also recorded in the case of grey rot, so one of the major gains in using NOVA® biofertilizers is to increase disease resistance.

Table 5

Mass of 100 berries (g) in grapes during maturation

Grape variety	Grape véraison		After 15 days		After 25 days		Grape maturation	
	T	N	T	N		T	N	T
Aligoté	125	114	132	129	141	136	152	144
Fetească regală	163	152	169	159	174	166	181	174

T-tratat cu biofertilizator N- netratat cu biofertilizator

The mass of 100 berries has increasing values since veraison, but was superior to the treated variant (tab. 5). Thus, in the Aligoté variety, it ranged from 125 g during veraison to 152 g at full maturation, in the treated variant, while in the control variant the limits were from 114 g during veraison to 144 g at full maturation. In the case of Fetească regală variety, the treated variant, the limits ranged from 163 g during veraison to 181 g at full maturation. For the control samples, the mass of 100 berries ranged from 152 grams to 174 grams, at full maturation.

At the time of veraison, the accumulation of sugars in grapes was small in both varieties (tab. 6). In the control variant Aligoté variety, sugars were registered at 99 g/L, reaching full maturity at 187 g/L, which allows the obtaining of wines with geographical indication, whereas in the treated variant, the accumulations in sugars allowed the production of quality wines, at 195 g/L.

In the case of the Fetească regală variety, the accumulations in sugars were superior in both variants and even higher after application of fertilization. Thus, the limits for the treated variant ranged from 116 g/L at veraison and reached 226 g/L at full maturation. At the same vegetation phenophases, the untreated lot values ranged from 115 g/L to 220 g/L, in both cases, quality white wines being able to be obtained.

Table 6

Sugars evolution (g/L) in grapes during maturation

Grape variety	Grape véraison		After 15 days		After 25 days		Grape maturation	
	T	N	T	N		T	N	T
Aligoté	102	99	128	123	159	150	195	187
Fetească regală	116	115	154	149	199	192	226	220

T-treated with biofertiliser N- control

The titratable acidity of the must was lower in the variant treated with the biostimulator, but not significantly, so that balanced wines can be obtained by using the NOVA® fertilizer (tab. 7). The variation limits for the Aligoté variety were, in the fertilized variant, ranging from 18.3 g/L to 5.2 g/L tartaric acid at full

maturation. For Fetească regală, at the same phenological data, these values were between 13.7 g/L tartaric acid to 4.9 g/L tartaric acid at full maturation.

Table 7

Acidity evolution (g/L tartaric acid) in grapes during maturation

Grape variety	Grape véraison		After 15 days		After 25 days		Grape maturation	
	T	N	T	N	T	N	T	N
Aligoté	18.3	19.7	9.9	10.7	7.8	8.1	5.2	5.6
Fetească regală	13.7	14.2	9.1	10.4	6.4	6.6	4.9	5.1

T-treated with biofertiliser N- control

CONCLUSIONS

1. By applying the NOVA® foliar biofertiliser, the Aligoté and Fetească regală varieties have increased their productive potential, by increasing the average weight of a grape and the mass of 100 berries. The studied Technological Grape Indices have demonstrated the necessity of applying biofertilizers, making them larger, denser, with heavier grains, and higher must production capacity, the yields for grape processing being slightly higher.

2. Resistance to disease has been greatly improved by the use of NOVA® foliar biofertiliser, the degree of attack being almost halved compared to untreated variants.

3. The quality of grapes has also been improved by applying the NOVA® foliar biofertilizer, the accumulations in sugars is higher and with a more balanced acidity, so that the gluco-acidimetric index has values close to those specific to wine grapes. Accumulation of sugars in musts allows the production of white table wines with geographical indication (Aligoté) or quality wines (Fetească regală).

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