

THE EFFECT OF ABSORBENTS AND WATER-SOLUBLE COMPLEX CHELATED FERTILIZERS IN DIFFERENT PLANTING METHODS ON THE DEVELOPMENT OF GRAPE PLANTS IN THE SOUTH OF UKRAINE

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Abstract The article presents data on the action of absorbents and water-soluble complex fertilizers with microelements in the form of chelates, as well as their interaction on the growth and development of technical grapes in the south of Ukraine. As a result of research, they have been shown to have a positive effect on the development of vegetative mass (increase in length, diameter of shoots and number of leaves), root system and improvement of quantitative and qualitative indicators, if productivity of grape plantations.

Keywords: Grapes, «Maximarin» absorbent, chelate fertilizers «Biochelate» and «Poly-feed», root system, leaf, bunches, harvest.

INTRODUCTION

Grapes are a perennial plant and, accordingly, throughout life grows and bears fruit in one place. Therefore, in order to obtain high and stable yields of grapes, the grapes at each stage of its development must meet all the conditions for plant life.

First of all, the longevity, productivity and profitability of vineyards depends on what measures will be taken when planting vines and the plant's need for environmental factors is met. One of such factors for plant development is nutrient and water regime. In addition, it is very important that water and nutrients (in easily digestible form) are in the soil in the area of the absorbing roots.

Most of the vineyards are located in the south of Ukraine, and one of the important reserves for high yields of grapes here is irrigation, as of all the factors influencing the growth, development and fruiting of grapes, moisture is the limiting in this area. Irrigation improves the conditions for root nutrition of plants and creates the necessary conditions for high plant productivity. [1 ,2]

That is, to create full-fledged vineyards with high productivity and good crop quality, sufficient growth force and longevity of plantations, it is necessary to carry out all work related to planting grapes in a high quality and timely manner.

PURPOSE The purpose of our research is to study both the individual effects of absorbents and in combination with water-soluble complex fertilizers with trace elements in the form of chelates on the survival, growth and development of individual organs of grapes and shrubs as a whole in different ways of planting industrial grapes. conditions of the south of Ukraine.

MATERIALS AND METHODS OF RESEARCH

Field experiments are carried out in "Agro-Koblevo" of the Berezansky region of the

Nikolaev area, Ukraine. The object of research is the grape variety Bastardo Magaratsky, which is grafted on the rootstock Riparia x Rupestris 101-14. The scheme of planting plants 3x1.0 m.

The experiments are carried out according to the following scheme:

Variant 1 - control (soaking the bushes in water and planting them under a water drill); variant 2 - coating the roots with «MaxiMarin» gel and planting them under a hydraulic drill; variant 3 - planting seedlings with two «MaxiMarin» tablets under a hydraulic drill; variant 4 - soaking the seedlings in "Biochelate" and coating the roots with «MaxiMarin» gel and planting them under a hydraulic drill; variant 5 - soaking the seedlings in "Biochelate" and planting them under a hydraulic drill with two «MaxiMarin» tablets; variant 6 - soaking the seedlings in "Poly-feed" and coating the roots with «MaxiMarin» gel and planting them under a hydraulic drill; variant 7 - soaking the seedlings in "Poly-feed" and planting them under a drill with two «MaxiMarin» tablets; variant 8- soaking the seedlings in "Poly-feed" and planting them under a hydraulic drill; variant 9 - soaking the seedlings in "Biochelate" and planting them under a hydraulic drill.

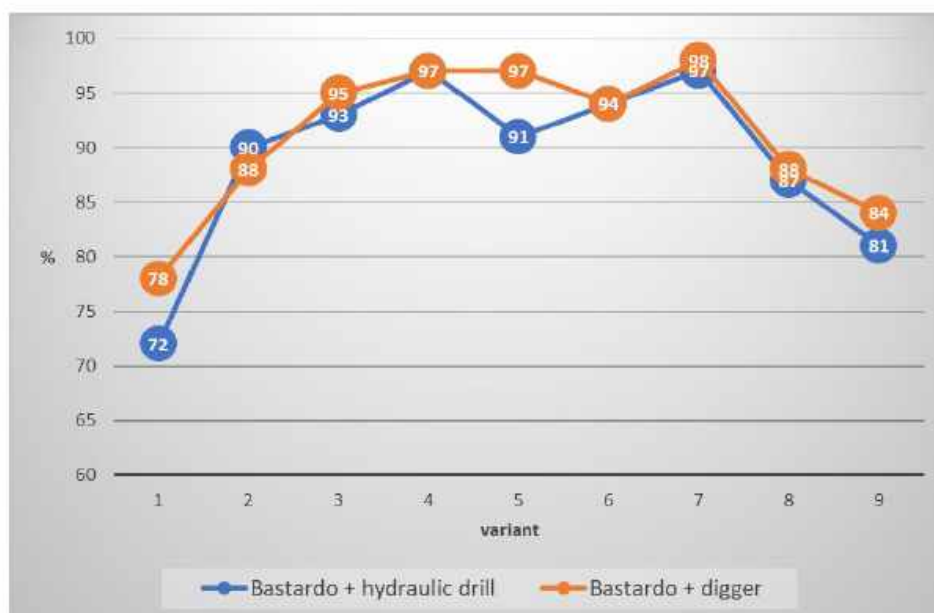
The second experiment is laid down in the same sequence as the first, only the prepared plants were planted under a digger, not under a hydraulic drill, and accordingly left a larger root system.

The research was based on generally accepted research methods in viticulture and the results were processed mathematically using analysis of variance. [3 ,4, 5]

RESULTS AND DISCUSSION

As a result of research, we found that absorbents "MaxiMarin" both in gel form and in tablet form, both in pure form and when used together with water-soluble complex fertilizers with microelements in the form of chelates "Poly-Feed" and "Biochelate" really affects the survival of the grape plant, which confirms the data of graph 1. Namely, due to the retention of moisture and its return to the plant at the right time, which leads to better survival of grapes and improved plant use of micronutrients present in chelated fertilizers.

Thus, analyzing the percentage of survival in the experiment on the variety Bastardo Magaratsky planted under a hydraulic drill, the highest percentage of survival was observed in those variants where we used absorbents in combination with water-soluble complex fertilizers with microelements in the form of chelates and ranged from 91 to 97%. Slightly lower values in the variants with the use of separate absorbents, both in the form of tablets and in the form of gel - 93 and 90%, respectively. Even lower rates in the variants where we separately used water-soluble complex fertilizers with microelements in the form of chelates and were in "Poly-Feed" - 87%, and in "Biochelate" - 81%. The lowest survival rate of 72% was in control.



Graph 1. Survival of grape seedlings

An almost similar situation occurred in the experiment on the variety Bastardo Magaratsky planted under the digger, only here the percentage of survival of grape plants was slightly higher than the experiment on the variety Bastardo Magaratsky planted under the drill.

As for the effect of absorbents "MaxiMarin" and water-soluble complex fertilizers with microelements in the form of chelates "Poly-Feed" and "Biochelate" on the development of biometric indicators of grapes (leaf apparatus, shoot development), there is also a positive effect of these drugs, especially their joint use. Which indicates that satisfying the plant at the right time with moisture and mineral nutrition, in turn, will lead to better growth and development of aboveground organs. Exceedances are quite significant and reliable, as evidenced by statistical calculations (tables 1 and 2).

The root system as well as the leaf is of great importance in plant life. One of its functions is to provide the aboveground part of the bush with water and minerals. Many scientists have proven the participation of the root system in regulating the growth and development of the aboveground part of the bush. In our studies, absorbents and chelating fertilizers had a good effect on the underground part of the vine, in particular on a stronger development of the root system, which in turn led to better drought overcoming the grape plant.

Table 1

Influence of absorbents and water-soluble complex fertilizers with microelements in the form of chelates at planting of saplings under a hydrodrill on biometric indicators of bushes of grapes of the Bastardo Magaratsky grade

Variant	Amount of leaves, pcs.	Leaf blade diameter, cm	Leaf area surface of the bush, cm ²	Shoot length, cm	Diameter of a shoot, cm	Annual growth rate, cm ³
Variant 1.	15,26	5,82	405,42	28,38	0,23	1,17
Variant 2.	17,66	7,78	840,77	46,05	0,41	6,32
Variant 3.	19,13	7,25	788,46	44,32	0,43	6,58
Variant 4.	14,66	7,27	607,02	39,22	0,29	2,64
Variant 5.	20,00	6,44	651,50	38,15	0,38	4,41
Variant 6.	21,13	7,95	1047,67	53,60	0,46	9,16
Variant 7.	16,60	7,09	652,52	40,57	0,36	4,21
Variant 8.	15,60	7,47	679,56	41,83	0,33	3,72
Variant 9.	14,33	6,53	481,99	28,03	0,26	1,51
SSD ₀₅			72,60			0,95

*SSD₀₅ - The smallest significant difference

Table 2

Influence of absorbents and water-soluble complex fertilizers with microelements in the form of chelates at planting of seedlings under a digger on biometric indicators of bushes of grapes of the Bastardo Magaratsky grade

Variant	Amount of leaves, pcs.	Leaf blade diameter, cm	Leaf area surface of the bush, cm ²	Shoot length, cm	Diameter of a shoot, cm	Annual growth rate, cm ³
Variant 1.	13,00	6,82	476,44	29,54	0,25	1,48
Variant 2.	13,73	7,87	664,28	40,08	0,29	2,76
Variant 3.	13,33	8,24	712,91	43,42	0,34	4,02
Variant 4.	15,53	7,45	674,19	40,39	0,37	4,41
Variant 5.	15,73	7,90	770,13	44,33	0,38	5,03
Variant 6.	17,66	7,60	826,19	48,93	0,44	7,46
Variant 7.	18,93	8,01	956,46	52,60	0,44	8,19
Variant 8.	17,26	6,87	639,36	37,00	0,36	3,88
Variant 9.	14,53	6,62	499,53	27,80	0,28	1,71
SSD ₀₅			81,24			0,99

*SSD₀₅ - The smallest significant difference

Investigating the development of the root system, carrying out layer-by-layer excavation of the soil, the presence of roots in plants was recorded only at a depth of 40-50 cm in the first year of vegetation (table 3). The roots found were mainly fractions with a diameter of up to 1 mm and were the bulk and a diameter of 1-3 mm, the amount of which ranged from 25 to 48.8% of the total amount of developed roots. The presence of roots with a diameter of 3-5 mm was recorded only in 5 and 6 variants.

The length of the roots in all diameters according to the variants of the experiment differed, it was the largest when using absorbents in both tablet and gel form. The combined use of absorbent with "Poly-Feed" contributed to the elongation of the roots of all fractions

Table 3

Influence of absorbents and water-soluble complex fertilizers with microelements in the form of chelates on the development of the root system of Bastardo Magaratsky grapes

Variant	The diameter of the roots	Number of roots, pcs	Root length, cm
Variant 1	up to 1 mm	13,3	4,9
	1-3 mm	4,6	7,9
	3-5 mm	-	-
Variant 2	up to 1 mm	11	6,6
	1-3 mm	9,3	9,2
	3-5 mm	-	-
Variant 3	up to 1 mm	13	5,1
	1-3 mm	11,3	10,0
	3-5 mm	0,6	7,2
Variant 4	up to 1 mm	11,0	7,2
	1-3 mm	5,3	9,9
	3-5 mm	-	-
Variant 5	up to 1 mm	10,0	6,2
	1-3 mm	8,6	9,9
	3-5 mm	-	-
Variant 6	up to 1 mm	9,6	6,9
	1-3 mm	6	12,6
	3-5 mm	1,6	6,9
Variant 7	up to 1 mm	6,3	5,6
	1-3 mm	6	9,4
	3-5 mm	-	-
Variant 8	up to 1 mm	7,6	7,3
	1-3 mm	8	8,9
	3-5 mm	-	-
Variant 9	up to 1 mm	11	6,7
	1-3 mm	6,5	8,1
	3-5 mm	-	-

The purpose of every agronomist-vine grower is to grow grapes and get the harvest of a given condition, so most of all agricultural techniques, which are used mainly to increase yields, improve crop quality and extend the life of plantations, if they are perennials. Analyzing the impact of these agricultural practices on the quantitative and qualitative indicators of yield, the highest indicators, again, were recorded in the variants using absorbents "MaxiMarin" in combination with water-soluble complex fertilizers with microelements in the form of chelates "Poly-Feed" and "Biochelat" (table 4). The analysis of qualitative indicators of harvest showed that at rather high productivity of grape plantations in our opinion, we received rather qualitative indicators of sugar content and acidity.

Table 4

Influence of absorbents and water-soluble complex fertilizers with microelements in the form of chelates on the yield and quality of Bastardo Magaratsky grapes on average in two years (2014-2015)

Variant	Years of research	Number of clusters, pcs.	Mass of grapes, gr	Yield from the bush, kg	Yield from 1 hectare		Mass concentration	
					tons	%	sugars, g/dm ³	titratable acids, g/dm ³
Variant 1	average	16,9	102,2	1,731	5,77	100,00	192	5,22
Variant 2	average	17,1	128,4	2,190	7,31	126,68	192	4,83
Variant 3	average	16,9	128,5	2,170	7,24	125,47	204	4,77
Variant 4	average	17,5	121,7	2,136	7,11	123,22	183	4,93
Variant 5	average	17,4	143,0	2,497	8,32	144,19	201	4,82
Variant 6	average	17,8	137,4	2,452	8,17	141,59	196	4,83
Variant 7	average	19,1	125,3	2,395	7,98	138,30	205	4,89
Variant 8	average	17,1	118,5	2,025	6,74	116,81	188	5,08
Variant 9	average	15,9	125,9	2,000	6,69	115,94	180	5,40

Thus, the highest yields on average for two years (2014-2015) were observed in the variants where we used absorbents "MaxiMarin" in different forms, both separately and in combination with chelating fertilizers "Biochelat" and "Poly-feed". Thus, the highest rate was observed in the variant with the use of two tablets "MaxiMarin" in combination with chelate fertilizer "Biochelat" and was 8.32 tons per hectare, which significantly exceeds the control, which was 5.77 tons, that is the experimental variant exceeded the control 1.5 times.

The mass concentration of sugars in the juice of berries, on average over two years, ranged from 180 in the variant where we used "Biochelat" and up to 205 g/dm³ in the variants where we used absorbents, at an acidity of 4.77 to 5.40 g/dm³, which is considered to be quite good indicators for the conditions of our zone, where we conduct the experiment.

CONCLUSIONS

Thus, based on the above and the data we obtained, we can conclude that the absorbents "MaxiMarin" in different forms of manufacture: gel, tablet, both in pure form and when used together with water-soluble complex fertilizers with microelements in the form of chelates "Poly-Feed" and "Biochelate", due to their properties, really affect the survival, growth and development of grape bushes, root system and quantitative and qualitative yields of grapes of the studied variety Bastardo Magaratsky in industrial conditions in southern Ukraine. In particular, the more intensive development of the root system, which in turn leads to better overcoming of drought by the grape plant.

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