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О МЕРАХ ПОВЫШЕНИЯ ПРОДУКТИВНОСТИ ВИНОГРАДА В УСЛОВИЯХ ЧЕЧЕНСКОЙ РЕСПУБЛИКИ

ON MEASURES TO INCREASE GRAPE PRODUCTIVITY IN THE CHECHEN REPUBLIC

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Изучение механизмов действия физиологически активных веществ имеет решающее значение для понимания их роли в регуляции физиологических процессов растений на всех этапах их развития. Эффективность физиологически активных веществ во многом зависит от условий окружающей среды и состояния растения. Целенаправленное воздействие на растение позволяет контролировать его развитие на всех этапах роста. Регуляторы роста – это вид физиологически активных веществ, широко применяемых в современном растениеводстве, обеспечивающих получение высококачественной продукции. Использование регуляторов роста в технологии возделывания винограда является одним из наиболее эффективных способов повышения урожайности. Проведен сравнительный анализ эффективности применения новых препаратов, содержащих физиологически активные ростовые вещества, в виноградных питомниках на разных этапах развития винограда. Цель исследования – оценка применения физиологически активных веществ, а именно регуляторов роста – ВИВА, НАГРО для повышения продуктивности и качества семенных сортов винограда в условиях зоны неустойчивого увлажнения Чеченской Республики. Исследования проводились на участках ООО «Агровин-Султан», расположенных в зоне неустойчивого увлажнения с засушливым континентальным климатом. Для района характерны продолжительное жаркое лето и относительно мягкая зима. Почвы региона преимущественно песчаные, каштановые и светло-каштановые, что обуславливает необходимость совершенствования технологии возделывания винограда для обеспечения его необходимым количеством макро- и микроэлементов. Выводы: 1.

Studying the mechanisms of action of physiologically active substances is crucial for understanding their role in regulating plant physiological processes at all stages of development. The effectiveness of physiologically active substances largely depends on environmental conditions and the plant's condition. Targeted action on the plant allows for control of its development at all stages of growth. Growth regulators are a type of physiologically active substance widely used in modern crop production, ensuring the production of high-quality products. The use of growth regulators in grape cultivation technology is one of the most effective ways to increase yields. A comparative analysis of the effectiveness of new products containing physiologically active growth substances in grape nurseries at different stages of grape development was conducted. The objective of the study was to evaluate the use of physiologically active substances, namely, growth regulators VIVA and NAGRO, to improve the productivity and quality of seed grape varieties in the unstable moisture zone of the Chechen Republic. The study was conducted on plots of Agrovin-Sultan LLC, located in a zone of unstable moisture with an arid continental climate. The region is characterized by long, hot summers and relatively mild winters. The region's soils are predominantly sandy, chestnut, and light chestnut, necessitating improved grape cultivation technologies to ensure adequate macro- and micronutrients. Conclusions: 1. The results of the studies convincingly demonstrated the effectiveness of VIVA and NAGRO biopreparations. 2. All doses of the new-generation fertilizers had a positive effect on grape yield, quality, and transportability

Результаты проведенных исследований убедительно показали эффективность применения биопрепаратов ВИВА и НАГРО. 2. Все дозы удобрения нового поколения оказали положительное влияние на урожайность, качество и транспортабельность винограда

Ключевые слова: РЕГУЛЯТОРЫ РОСТА, ВИНОГРАД, САЖЕНЦЫ, ПРИЖИВАЕМОСТЬ, УРОЖАЙНОСТЬ, КАЧЕСТВО ПРОДУКЦИИ

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Introduction. The expansion of vineyard acreage in the Russian Federation requires increased production of planting material. Moreover, the need to provide agricultural producers with domestically produced planting material is a pressing issue. This can be addressed by optimizing production technologies for seed, grafted, and own-rooted grapevines. Physiologically active substances and new forms of fertilizers are being actively used for this purpose. Physiologically active substances have a wide variety of physiological functions [2, 5, 7].

Studying the mechanisms of action of physiologically active substances is crucial for understanding their role in regulating physiological processes in plants throughout their development. The effectiveness of physiologically active substances depends largely on environmental conditions and the plant's condition. Targeted action on the plant allows for the control of plant development at all stages of growth.

As a result of the use of physiologically active substances, the growth and development of grape plants is activated, namely sap flow from the beginning of spring sap flow until the beginning of bud break; bud break and shoot growth; from the beginning of bud break until the beginning of flowering; flowering; from the beginning of flowering until the complete setting of berries, their full maturity and the fall of leaves [5, 9, 11].

Growth regulators are a type of physiologically active substance widely used in modern crop production, ensuring the production of high-quality

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products. The use of growth regulators in crop production improves product quality, accelerates ripening, increases frost and drought resistance, provides immune support, and, most importantly, reduces the frequency of agrochemical application in crop cultivation [1, 8, 10].

The use of growth regulators in grape cultivation technology is one of the most effective ways to increase crop yields, quality, and resistance to adverse environmental conditions. A comparative analysis of the effectiveness of using new products containing physiologically active growth substances in grape nurseries at different stages of grape development was conducted [3, 6, 10].

Purpose of the study– evaluation of the use of physiologically active substances, namely growth regulators – VIVA, NAGRO to increase the productivity and quality of seed grape varieties in the conditions of the unstable moisture zone of the Chechen Republic.

Place and conditions of the study. The research was conducted on Agrovin-Sultan LLC's plots located in a zone of unstable moisture, where an arid continental climate prevails. The area is characterized by a long, hot summer season and relatively mild winters. The region's soils are primarily sandy, with chestnut and light chestnut soils, necessitating improved grape cultivation technology to ensure adequate macro- and micronutrient supply [4, 5].

Object of study. The effect of VIVA on plant growth and development, the effectiveness of foliar feeding growth regulator NAGRO, its influence on the productivity of seed grape varieties. The experiments used grape varieties zoned for the Chechen Republic: Moldova and Augustin. The study was conducted from 2018 to 2020 in the Shelkovsky District of the republic.

Results and discussion. A key factor influencing the growth and development of grapevines on a plantation is the level of nutrient supply. The research program included an experiment aimed at determining the effectiveness

of foliar feeding using NAGRO and VIVA growth regulators, as recommended in generally accepted viticulture practices (Table 1).

Table 1 - The effect of growth regulators on the growth and development of plants on grape plantations, Moldova variety, (2018-2020)

Option	Shoot length, cm ²	Shoot maturation, %	Shoot diameter, mm	Leaf surface area, cm ²
1. Control	126.6	41.9	5.0	2045.9
2. VIVA– 50 mg/10 l of water.	158.4	45.5	6.0	2739.0
3. VIVA– 10 mg/10 l of water.	210.1	36.8	6.4	3573.3
4. NAGRO – 50 mg/10 l of water	117.2	43.7	5.3	2049.5
5. NAGRO – 10 mg/10 l of water	133.3	48.6	5.9	2077.4

The NAGRO preparation had a stimulating effect on shoot growth; the average shoot length was 158.4 cm, while in the control it was 126.6 cm.

In the NAGRO treatment, at a concentration of 100 mg/10 L of water, the average shoot length was 133.3 cm. However, this increase was only possible due to the relatively high air temperature of 33.6%. Treatment of plants with a weaker NAGRO solution (50 mg/10 L of water) did not produce the expected effect; shoot length was 117.2 cm, which is 9.4 cm shorter than the control.

The same trend is evident in the analysis of other plant development parameters. High results in shoot vigor and foliar development were achieved in the VIVA and NAGRO treatments, at a concentration of 100 mg/10 L of water. In the best treatment, VIVA, the average shoot length was 210.1 cm, shoot maturation was 36.8%, shoot diameter was 6.4 mm, and leaf surface area was 3573.3 cm².

In the variant with the use of the NAGRO growth regulator at a low concentration (50 mg/10 l of water), the results obtained were close to the control (without treatment): shoot length – 117.2 cm, maturation – 43.7%, shoot diameter – 5.3 mm, leaf surface area – 2049.5 cm², in the control these indicators had the following values – 126.6 cm, 41.9%, 5.0 mm, 2045.9 cm².

Observations of plant growth dynamics during the growing season allowed us to establish some patterns from the use of growth regulators VIVA and NAGRO (Table 2).

A significant difference in the initial shoot growth rate was noted, indicating the absorption of the treatments by plants after treatment. Shoot length varied between the experimental treatments from 12.7 to 21.0 cm, which is 2.5 to 10.8 cm higher than the control.

Table 2. – Dynamics of growth of grape shoots, Moldova variety (2018-2020)

Option	Date of shoot length measurements							
	18.05	29.05	09.06	June 19	June 29	09.07	July 19	July 29
Control (no treatment).	10.2	19.5	34.1	65.1	104.5	120.6	124.7	126.6
VIVA- 50 mg/10 l of water	21.0	37.7	59.4	89.7	139.9	154.8	157.9	158.4
VIVA- 10 mg/10 l of water	15.6	36.7	66.3	108.7	164.1	191.4	201.4	210.1
NAGRO – 50 mg/10 l of water	14.7	26.9	44.4	68.6	101.7	110.7	115.7	117.2
NAGRO – 10 mg/10 l of water.	12.7	25.4	43.9	69.2	107.6	123.9	132.5	133.3

By the end of the growing season, the best result in terms of shoot growth strength was obtained in the variant using VIVA at a concentration of 10 mg/10 l of water; the average shoot length by the end of the growing season was 210.1 cm.

Evaluation of the effect of the growth regulator NAGRO with foliar feeding on the growth, development and productivity of plantings was carried out on the variety Augustine. Each experimental row is separated by two

protective rows on the right and left. The experiments were repeated three times. The number of vines in each treatment was 15. The plantings were trained with long-arm vines, and the vineyards were not covered. Pruning was short, to 4-5 buds. The plantings were of seed origin. entered into fruiting. The production site showed not only high yields, but also high sugar content in berries. The grape yield increase with the use of growth regulators was 0.49-0.82 t/ha, or 10.6-17.8%, compared to the untreated control. Sugar content in the treatments with growth regulators was 4.6-5.6% higher than in the untreated control.

As a result of the conducted research, it can be concluded that the use of the NAGRO growth regulator in the phase of the beginning of sap flow and before flowering led to an increase in the main indicators of plant growth and development. The fruiting rate under the influence of the applied growth regulator ranged from 0.84% to 0.92%, which is 0.05% to 0.13% higher than the control. The growth regulator's effect on the number of shoots developing on the bush, including fruiting inflorescences, and fruiting was revealed.

The growth regulator studied had a positive effect on increasing berry size and weight. All treatments treated with the growth regulator outperformed the control treatment in terms of bunch weight, number of berries per bunch, and 50-berry weight (Table 3-4).

Table 3 – Effect of the growth regulator NAGRO on sugar content, variety Augustin (2018-2020)

Experience options	Yield, t/ha				Yield increase, t/ha	Mass concentration, g/cm ³	
						Sugar content	Titrate acidity
	2018	2019	2020	Avg.			

I. Control without fertilizer	3.30	3.65	3.55	3.50	-	23.0	8.0
II. NAGRO – 500 mg/100 l of water	4.35	4.50	4.59	4.48	0.98	23.6	7.9

Table 4. – Effect of the NAGRO growth regulator on the yield of grape bushes and the sugar content in berries, Augustin variety (2018-2020)

Experience options	Grape yield at the beginning of fruiting, t/ha				Sugar content, g/dm ³			
	2018	2019	2020	Avg.	2018	2019	2020	Avg.
I. Control without fertilizer	4.00	4.45	5.33	4.59	160.0	165.0	170.0	165.0
II. NAGRO – 500 mg/100 l of water	4.32	4.80	6.13	5.08	165.0	170.0	183.0	172.6
III. NAGRO - 100 mg/100 l of water	4.53	5.06	6.66	5.41	165.0	172.0	186.0	174.3
HSR ₀₅ , t/ha	0.08	0.08	0.09					

All doses of growth regulators had a positive effect on grape transportability. The crush strength of the berries in the third treatment was higher than the control. The berries were characterized by very strong attachment to the stem. The strength of the berries after detachment from the stem after application of different doses NAGRO increased compared to control. The bunches had a smart appearance and there was no pea-sized berry.

Conclusions:

1. The results of the conducted studies convincingly demonstrated the effectiveness of using VIVA and NAGRO biopreparations on the growth and development of seed grape varieties.

A significant difference in the magnitude of growth was noted in the initial period of shoot growth, which is an indicator of the absorption of preparations by plants after treatment.

2. All doses of the new-generation fertilizer had a positive effect on grape yield, quality, and transportability. The berries were characterized by very strong attachment to the stem. Berry detachment from the stem increased after application of various doses of NAGRO.

Based on the above, the advisability of using VIVA and NAGRO growth regulators in areas with unstable moisture is beyond doubt.

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