

Study of the Effects of Growth Regulators on the Chemical Composition of Grape (*Vitis vinifera* L.) Yield

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Abstract:

This article investigates the effects of growth regulators on the chemical composition of grape (*Vitis vinifera* L.) varieties. According to the experimental results, these substances were found to increase the weight of grape clusters while slightly reducing the sugar content of the juice and increasing its acidity. The highest result was observed with the combination of gibberellin + Dropp (100 mg/L + 25 mg/L). The study provides scientifically based recommendations for improving the yield and chemical composition of grape varieties under the conditions of Uzbekistan.

Keywords:

Grape (*Vitis vinifera* L.), growth regulators, gibberellin, Dropp, krezatsin, NUK, chemical composition of yield, sugar content, acidity, cluster weight, black kishmish, white kishmish.

Introduction:

Viticulture in the Republic of Uzbekistan has a long-standing tradition and plays an important role in the country's economy and food security. Favorable soil and climatic conditions, along with the relatively low incidence of pests and diseases, enable the production of high-quality, environmentally friendly grapes and grape products (table grapes, raisins, juice, and wine materials) at low cost.

Currently, the intensive development of viticulture, increasing productivity, and strengthening export potential are urgent tasks. In 2025, more than 1.983 million tons of grapes were produced in Uzbekistan, which represents a 7.6% increase compared to the previous year. The Samarkand region is the leading producer, with more than 696 thousand tons of yield, followed by the Bukhara and Fergana regions.

However, increasing yield alone is not sufficient. Modern market requirements demand not only high quantity but also high quality of the chemical composition of the produce. The chemical composition of grapes (sugar content, organic acids, dry matter, and other biologically active compounds) directly affects their taste, nutritional value, shelf life, and processing quality. Therefore, the scientifically based application of growth regulators allows not only increasing yield but also improving the chemical composition of the produce, enhancing competitiveness, and strengthening export potential.

Growth regulators (gibberellin, Dropp, krezatsin, NUK, and their combinations) activate physiological processes in plants, influencing cluster enlargement, seedless fruit formation, and changes in the chemical composition of the yield. Although studies by international and local researchers have proven the effectiveness of these substances in increasing productivity, there is still a lack of in-depth scientific data under the conditions of Uzbekistan regarding their impact on the chemical composition of grapes, especially sugar and acidity indicators.

Therefore, the relevance of this research is considered high.

Research Tasks:

To analyze the effects of growth regulators on the yield of grape varieties;

To identify methods for improving the quality and chemical composition of the yield (sugar content, acidity) using these substances;

To experimentally evaluate the effects of these substances on the mechanical and chemical composition of grape clusters;

To determine the most effective variants and develop practical recommendations.

Research Object:

Black Kishmish and White Kishmish grape varieties, as well as the growth regulators used in their cultivation and management.

Research Subject:

The effects of growth regulators (gibberellin, Dropp, krezatsin, NUK) on the chemical composition and mechanical properties of grape yield.

Research Methods:

Field experiments, laboratory analyses (determination of sugar content and acidity), statistical and comparative analysis, and graphical methods.

Results and Discussion

Growth regulators actively participate in the processes that connect internal and external factors in grape plants. They influence the generative development of the vine, leading to berry enlargement and fruit differentiation.

According to the experimental results, under the influence of growth regulators, the weight of 100 grape clusters increased significantly. At the same time, the following changes in the chemical composition of the yield were observed: sugar content slightly decreased, while the amount of organic acids increased (see Table 1).

The highest result was recorded in the gibberellin + Dropp (100 mg/L + 25 mg/L) combination. In this variant, the weight of 100 clusters increased by 187.5% compared to the control, the sugar content in the juice decreased by 0.7%, and acidity decreased by 0.2 g/L.

Table 1

**Effect of growth regulators on cluster weight and chemical composition of
Black and White Kishmish grape varieties**

No	Experimental variants	Weight of 100 clusters, g	Sugar content of juice, %	Acidity, g/L
Black Kishmish				
1	Spraying with water (control)	195.2	25.1	0.81
2	Gibberellin + Dropp – 100 mg/L + 25 mg/L	366	23.3	0.78
3	Gibberellin + Dropp + Krezatsin – 25+10+25 mg/L	352	22.9	0.76
4	Gibberellin + Dropp + Krezatsin + Nuk – 25+10+25+15 mg/L	348	22.0	0.85
White Kishmish				
1	Spraying with water (control)	247	23.3	0.80
2	Gibberellin + Dropp – 100 mg/L + 25 mg/L	350	23.0	0.75
3	Gibberellin + Dropp + Krezatsin – 25+10+25 mg/L	324	24.0	0.83

4	Gibberellin + Dropp + Krezatsin + Nuk – 25+10+25+15 mg/L	400	23.0	0.86
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The table analysis shows that although cluster mass increased in all variants, the most balanced chemical composition (a reduction in sugar content and an optimal increase in acidity) was observed in the gibberellin + Dropp combination. This improves the taste, storage life, and processing quality of the yield.

In addition, the experiment revealed a significant reduction in the number of rudimentary seeds (seed traces), with the highest result reaching up to an 80% decrease. This is considered a highly important indicator for raisin (kishmish) production.

Conclusion:

Growth regulators have a significant impact on the chemical composition of grape (*Vitis vinifera* L.) yield. They increase cluster weight while slightly reducing sugar content in the juice and increasing acidity. The most effective variant is the gibberellin + Dropp (100 mg/L + 25 mg/L) combination, which not only enhances yield but also improves product quality.

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