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The Effect Of Bud Load On Bud Development In Seedless Large-Berried Grape Varieties Under The Climatic Conditions Of Karakalpakstan

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Abstract: The Influence of Load on the Grapevine Bush on Yield, Quantity, and Quality of Shoots. Grape yield depends on the number of formed shoots and their productivity. In the Kishmish Irtišar variety, the highest number of fruit-bearing shoots 65.9% was recorded at a load of 120 clusters. When the load increased to 160 clusters, the number of fruit-bearing shoots decreased to 58.9%. At a load of 80 clusters, the average indicator was 63.5%. Similar trends were observed in the Kishmish Sogdiana and Kishmish Botir varieties. The ripening and growth length of the shoots also depended on the load: at a load of 120 clusters, shoot ripening was the highest at 84.2%, while at 160 clusters it decreased to 75.6%. The average shoot growth length was also best at the 120-cluster load. The study found that increasing the load on the grapevine bush positively affects the increase in the number of clusters and the overall yield volume.

Keywords: Burden, buds, shoot, sap flow, seedless, pruning length.

Introduction: In recent ears, our country has paid special attention to further developing viticulture, significantly increasing the export of new grape varieties and processed grape products, and creating a national brand for viticulture. In leading countries worldwide in the production of seedless grapes and raisins, agronomic techniques that increase the yield of seedless grape varieties are being applied, particularly defining the optimal vine load according to the variety, and establishing efficient irrigation and fertilization norms. These measures allow increasing the volume of seedless grape production by 1.2 to 1.5 times

compared to traditional technologies. In our country, seedless grape varieties are widely cultivated, but their optimal vine load for each variety has not been scientifically established. By determining the optimal vine load for seedless large cluster grape varieties, we can further increase the production volume of seedless grapes.

Field and laboratory experiments as well as scientific research results were tested and applied in production using established methods such as "The methodology for calculations and phenological observations in experiments with fruit and berry plants" [1; p.64], and the "Methods of botanical description and agrobiological study of grape varieties" [7; pp.347-400]. The statistical analysis of research results was carried out using computer programs "Excel 2010" and "Statistica 7.0 for Windows," with a confidence interval of 0.95% according to the recommended method [4; pp.71-75]. According to several authors [2; pp.13–15; 3; pp.4–8], vine load is a significant agrotechnical factor affecting yield and quality. Excessive or insufficient vine load negatively impacts the subsequent growth and development of vines. An increased load delays ripening, reduces sugar content, increases acidity, and causes berry shatter and fragmentation, whereas insufficient load can lead to excessive vegetative growth. Therefore, determining the optimal vine load for each variety is essential to obtaining high and quality yields.

METHOD

Focuses on the effect of bud load on bud burst and shoot growth in grapevines. The bud load, bud burst, and shoot development of the grape varieties Kishmish Irtishar, Kishmish Sogdiana, and Kishmish Botir have been scientifically studied. Field and laboratory experiments along with scientific studies were conducted to evaluate how varying bud loads influence the physiological processes of bud swelling, sprouting, and subsequent shoot growth. The research analyzed the balance between vegetative growth and fruit production under different load conditions, which is crucial for optimizing grape yield and quality. These studies help determine the optimal bud load for each grape variety to maximize productivity without adversely affecting growth or fruit maturation. The findings contribute to improving vineyard management practices through scientifically based load regulation for seedless grape cultivars.

The research was conducted from 2021 to 2023 at the Academic Mahmud Mirzaev Scientific Research Institute of Horticulture, Viticulture and Winemaking, specifically at the Qaraqalpaqstan ITS.

The aim of the research. The development of buds in seedless large-cluster grape varieties depends on the vine load.

Study of the growth of seedless large-cluster varieties and the interdependence of vine load.

The objects of the study were grape varieties Kishmish Irtishar, Kishmish Sogdiana, and Kishmish Botir.

The experiment was conducted in suitable geographic and climatic conditions with three variants in four replications. In each variant, observations and counts were carried out on 20 vines.

The total number of buds on the vine was determined by direct counting. The main results of the research were confirmed by mathematical processing and statistical analysis using the variation statistics method of B.A. Dospeshov.

RESULTS

In the studies conducted from 2021 to 2023, the vine load of three seedless grape varieties grown under conditions for studying the dependence of bud development on vine load was analyzed. According to the results, the phenological phases of the seedless grape varieties Kishmish Irtishar, Kishmish Sogdiana, and Kishmish Botir depend on the vine load. The results are presented in

The effect of vine load on bud burst and shoot growth, 2021-2023.

The effect of vine load on bud burst and shoot growth, 2021-2023.

Table 1.

Variety.	Bud load of the vine, number of buds.	Percentage of bud burst on the vine.	Percentage of shoots growing from buds.
Kishmish Irtishar.	80 (control)	69,7 ± 1,77	9,1
	120	61,4 ± 1,22	12,3

	160	60,5 ± 1,26	15,9
Kishmish Sogdiana	80 (control)	69,9 ± 1,22	8,9
	120	64,3 ± 0,83	13,8
	160	59,9 ± 1,07	16,9
Kishmish Botir.	80 (control)	68,7 ± 1,30	8,8
	120	65,6 ± 1,04	13,9
	160	60,1 ± 1,23	15,7

1 Figure

Study of the growth dynamics of grape clusters.

Observations indicated that when the vine load increased, 2-3 leaves formed on some of the developing buds, and their growth was observed to be slow. This condition was sufficiently expressed when a moderate and high load was applied to the studied varieties in the experiment, whereas a lower load resulted in a weaker manifestation of this phenomenon.

Our experiments on studying the dependence of the phenological phases of seedless grape varieties on vine load showed that when the bud load of the Kishmish Irtishar variety vines was maintained at 80 buds per vine, the highest bud burst percentage observed was 69.7%. When the load increased to 120 buds, the percentage of sprouted buds decreased to 61.4%, and at a load of 160 buds, it further decreased to 60.5% The sprouting of shoots from the buds showed an inverse proportional relationship to bud burst. Accordingly, the highest shoot growth was recorded when the bud load on the vine was 160, reaching 15.9%. The lowest shoot growth, 9.1%, was observed at a bud load of 80. When the load was 120 buds, shoot growth held an intermediate position at 12.3%.

CONCLUSION

According to the results of experiments conducted between 2021 and 2023, increasing the load on the vine significantly affects bud burst and shoot growth. In the seedless grape varieties Kishmish Irtishar, Sogdiana, and Botir, the highest bud burst percentage (69.7–69.9%) was observed when the vine bud load was maintained at 80 buds per vine, while shoot growth was at its lowest (8.8–9.1%). When the load was increased to 120 and 160 buds, bud burst percentages decreased to 60.5–64.3% and 59.9–60.5%, respectively. However, shoot growth increased, reaching 12.3–16.9%. These results indicate an inverse proportional relationship between bud burst and shoot growth, highlighting the importance of optimizing vine

bud load for balanced growth and productivity.

Furthermore, under high load conditions (120 and 160 buds), the developing buds were observed to form 2-3 leaves, but their growth was slow. This finding confirms that the interaction between the load amount and the grape variety influences these developmental processes. The phenological phases of seedless grape varieties also change depending on the vine load, and determining the optimal load amount is crucial for balancing yield and growth processes. This balance plays a significant role in ensuring both productivity and healthy vegetative development in grapevines.

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