Yield And Quality of Grapes with Different Areas Of Nutrition of Grape Bushes

Konysbayev Lesbek Karabayevich

Honored Worker of Agriculture, Academician of the Academy of Agricultural Sciences of the Republic of Kazakhstan
akonysbaev55@mail.ru

ABSTRACT

Experiments have been conducted to explore the influence of different areas of nutrition of grape bushes, that lead to the significant increase of the yield and quality of grapes. The highest yield of grape plantations was noted with the planting variant of 3x1 m (3333 bushes per 1 ha) - 2.3 kg/bush.

Keywords: Grape bush, planting scheme, feeding area, fruiting coefficient

I. Introduction

To date, experts in the viticulture industry have not come to an unanimous conclusion regarding the influence of both the distance between plants in a row and the width of the aisles, therefore, a certain influence of the nutrition area allocated to a grape plant with a high strain on their further productivity hasn't been determined. At the same time, some researchers, for instance Smirnov K.V. [1], Petrov V.S. [2] and others, believe that it is not advisable to increase the distance between the bushes.

According to another group of researchers, L.N. Shcherbakov, and A.P. Trukhanov [3], increasing the distance has a positive effect on productivity.

As A.G.Amirzhanov [4] explored, if vineyards are represented by the same type of vertical trellises in the form of a single tier, thickened plantings are characterized by a higher degree of photosynthetic power compared to rarely placed ones, as a result of which they become potentially more productive.

It should also be noted that in densely placed plantings, the level of photosynthetic power is much reduced, which subsequently leads to a decrease in the average weight of the bunch and the fruiting coefficient of the grape bush as a whole. At the same time, when calculating in rarely placed plantings in the same row, where grape bushes have a more powerful development, the coefficient of absorbed solar radiation is 15-20% higher than in thickened plantings.

In their studies, Sh.N. Huseynov, V.N. Gordeev, B.V. Gordeev Sh.N. [5] explored that with the increased area of pant nutrition the yield of bushes also boosted due to the growth of their vegetative mass and fruitfulness indicators, which increased by 1.3-2 times compared to the planting variant of 3x1 m. At the same time, the number of bushes with different planting patterns decreased more sharply (by 1.5-2.5 times).

II. Methodology

Fruitfulness of sprouts. The records of fertility indicators were carried out in the spring before the wreckage. The records

included all sprouts developing on fruit arrows and substitution knots of recording bushes according to the method of A.G. Amirdzhanov and D.S. Suleymanov [6]. Based on the record data for each bush, we calculated the number of developed and fruitful sprouts, and the number of inflorescences formed, and then, the percentage of fruitful sprouts, the fruiting coefficient (K1) and the fruitfulness coefficient (K2) were calculated for all accounting shoots (bushes).

III. Study results

The highest yield of grape plantations was noted with the planting variant of 3x1 m (3333 bushes per 1 ha) - 2.3 kg /bush. Increasing the distance between bushes in a row to 1.5; 2 and 2.5 m provided an increase in yield to 3, 4.1 and 4.6 kg, respectively, and reduced the productivity of bushes to 67, 68 and 61 kg /ha. Based on this, during our research, we set a goal to find out the effect of the density of grape plants on the further laying and formation of fruit-bearing organs and harvest, depending on the standing of grape bushes in a row, as well as with other equal conditions.

As a result of our experiments, an inverse relationship was established between the value of the indicators of the fruitfulness of the grape eyes/sptouts and the feeding area of the grape bushes of Ili and Bereke sorts.

Table 1. The actual and embryonic fruitfulness of the grape eyes in various planting schemes of grape bushes

Planting (scheme), mxm	Fruitfulness (embryonic)			Fruitfulness (actual)		
	fruitful sprouts, %	Coefficients		Fruitful sprouts, %	Coefficients	
		Fruiting	Fruitfulness		Fruiting	Fruitfulness
3 x 1,5	75,3	1,26	1,67	66,6	1,01	1,52
3 x 2	72,7	1,23	1,69	64,5	1,02	1,59
3 x 2,5	61,5	1,02	1,63	54,7	0,80	1,47
HCP 05	2,1	0,03	0,11	2,6	0,04	0,13

With an increase in the feeding area of the grape bush to 6m^2 and 7.5 m^2, a decrease in the fruitfulness of the shoots/grape eyes in the embryonic state was noted. Thus, the percentage of fruit-bearing shoots in sparsely placed plantings decreased to 72.7 and 61.5%, respectively, when planting bushes according to the 3x2 and 3x2.5m scheme, whereas, with a thicker planting, it was at the level of 75.3%. The difference between the variants is significant, and is explained by the best conditions for providing the grape eyes with solar energy, which causes their differentiation, since with a dense planting, the density of the leaf area is slightly lower.

The experiment indicated that the decrease in the fruiting coefficient to 1.23 and an increase in the fruitfulness coefficient of shoots to 1.69 in the case of a rare planting of bushes. In comparison with a dense planting of bushes, these indicators respectively amounted to 1.26 and 1.67, which in general is not confirmed by mathematical processing and is within the error of experiment. Consequently, an increase in the feeding area of a grape bush from 4.5 m^2 to 6m^2, with the same number of shoots per lineal meter of trellis, does not significantly affect the fruitfulness of the grape eyes, since the differentiation of the buds is approximately the same. Whereas in the variant of planting bushes 3x2.5m, the fruiting coefficient decreased significantly to 1.02, and the coefficient of fruitfulness of shoots decreased to 1.63, though it is within the error of experiment.

However, it should be noted that when recalculating the number of inflorescences per hectare with the same load per 1 m^2, in the variant with rarely placed grape bushes, less of them are formed.

During our experiments, compared with the actual one, the degree of embryonic fertility was determined at a higher level. The obtained results indicate the loss of both the grape eyes and the inflorescences laid down in the previous growing season due to the prevailing unfavorable winter conditions, as well as due to the intake of nutrients to the grape eyes in negligible quantities during the spring growing season. The percentage of loss of the grape eyes on the variants is at the same level, therefore, the higher actual percentage of fruitful grape eyes on the variant with the planting of grape bushes 3 x 1.5 m is due to a higher percentage of embryonic fruitfulness (Table 1). Just as on the variant with a rare planting of bushes, the high coefficient of fruitfulness of shoots is due to the better provision of grape eyes, due to the more powerful development of the bush and leaf canopy. But as noted earlier, the differences between the options are not significant and are within the error of experiment. Therefore, there is no significant effect of changes in the area of bush nutrition on the processes of bud differentiation, when the load of shoots per running meter remains at the same level, and, consequently, the illumination conditions do not differ much in the variants.

According to the calculation of the economic efficiency of growing grape plantations with different bush feeding areas, the analysis indicates the advantage of increasing the area: economic indicators increase, and costs decrease. A decrease in labor costs is observed with a decrease in labor costs, invested funds for the care of vineyards, and a decrease in harvesting costs. As a result, when changing the planting option from 3 x 1.5 m to 3 x 2 m, there was a reduction in direct costs for caring for the vineyard, which amounted from 268.1 thousand tenge to 247.8 thousand tenge per 1 hectare of plantings (Table 2).

Table 2. The impact of different cultivation methods on the economic efficiency of grape production

Planting scheme, m.	Load by shoots per 1l.m., pieces	Crop capacity, centner/ha	Direct costs, thousand tenge	Cost price, 1centner, tenge	Costs of gross product, thousand tenge	Net profit per 1 centner, thousand tenge	Profitability level, %
Stem pruning with the stem height 170 cm and free arrangement of increment							
3 x 2,5	35-40	133,5	242,3	1815	534,0	291,7	120
3 x 2	35-40	177,9	247,8	1393	711,6	463,8	187
3 x 1,5	35-40	179,8	268,1	1491	719,2	451,1	168
	45-50	248,9	289,9	1165	995,6	705,7	243
	55-60	215,1	277,4	1290	860,5	583,1	210

IV. Conclusion

Exploring the effect of the increase of feeding area of bushes from 4.5 m^2 to 6 m^2 on the productivity of high-stamp vineyards in the conditions of southern Kazakhstan, we found that the productivity of planting does not decrease, since the increase in the feeding area has a positive effect on the yield of the bush, and mathematical processing of the results confirms this. Consequently, the decrease in the productivity of grape planting with an increase in the feeding area is not established, and the increase in the yield of bushes is substantial. However, during the increase in the feeding area to 7.5 m2, the productivity of the vineyard decreased, although the yield of the bushes increased.

References

1. Smirnov K. V. Nauchnye osnovy razrabotki i sovershenstvovaniya progressivnyh system vedeniya i formirovaniya kustov vinograda [Scientific foundations] Scientific foundations for the development and improvement of progressive systems for the management and formation of grape bushes. // Grapes and wine of Russia.-1997.-№4.- pp.2-6
2. Petrov V. S. Kudryashova V. V., & Chulkov V. V. Formirovanie plodonosnosti pobegov vinograda (dlya modelirovaniya i upravleniya productivnym potentsialom ampelotsenoza), [Formation of fruitfulness of grape shoots (for modeling and management of productive potential of ampelocenosis)] //Wine making и viticulture.- 2008.-№4.- pp. 24-25.
3. Sherbakov L. H. & Tryukhanova A. P. Svetovoy rezhim i produktivnost' nasazhdenii vinograda sorta Semilyon pri raznyh schemah posadki i nagruzkah pobegami [Light regime and productivity of Semillon grape plantings with different planting schemes and shoot loads] //Physiological and biological foundations of high productivity of fruit crops and grapes – Novocherkassk.-1986.-pp.71-75.
4. Amirzhanov A. G. O strukturnoi organizatsii vinogradnika intensivnogo tipa [On the structural organization of an intensive type vineyard] //Gardening, viticulture and winemaking in Moldova.1974.-№3.-pp.19-23.
5. Guseinov Sh. N., Gordeyev V. N., & Gordeyev B. V. Vliyanie agrotechnicheskih priemov na produktivnost' sorta Soviniyon zelenyi na Kubani, [The influence of agrotechnical techniques on the productivity of the Sauvignon (green sort) in Kuban] // Winemaking and viticulture -2006.-№5.-pp.34-35.
6. Amirdzhanov A. G. & Suleimanov D. S. Otsenka productivnosti sortov vinograda i vinogradnikov (metodicheskie ukazaniya) VNIIViV "Magarach" [Evaluation of the productivity of grape varieties and vineyards (Guidelines) in "Magarach". АзНИИВиВ.-Baku.-1986.-56p.