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THE SIGNIFICANCE OF THE STEM HEIGHT OF GRAPE BUSHES FOR THEIR FURTHER FRUITING, YIELD AND QUALITY OF RECEIVED PRODUCTS

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ABSTRACT

Research has been carried out on the high-stemmed formation of grape bushes, allowing to a large extent to ensure an increase in their yield. The formation of grape bushes was carried out by the method of free placement of growth on the trellis and an increase in the height of the trunk to 170 cm, which contributed to an increase in the rates of fruiting and yield of the Iliysky and Bereke grape sorts, and a significant improvement in the quality of the products obtained.

KEYWORDS: *Grape Bush, High-Stemmed Formation, Stem, Crown, Trellis, Fruitfulness*

I. INTRODUCTION

One of the main directions of development of modern viticulture is the transition tointensive, low-cost, environmentally friendly and economically viable technologies that conserve resources and protect the environment, more efficiently use environmental factors and maintain grape plants in a healthy state by stimulating the defenses of the plant. **[1]**

The need to develop and introduce progressive methods of grape cultivation into production is explained by the fact that until now most of the industrial vineyards in the South Kazakhstan region are cultivated according to a long-established technology, the main elements of which are row spacings of 2-2.5 m, ground formation of a bush with vertical placement of growth. **[2]**

Thus, the agrobiological substantiation and development of new techniques and methods for cultivating high-stemmed vineyards is relevant and timely, and a comprehensive objective biological, technological and economic assessment will determine the most effective combination of these and recommend them for further use in production. This will allow obtaining high stable yields of good quality grapes while reducing labor costs and funds for the production of a product unit, which means that the profitability of the industry and the competitiveness of products will increase. **[3]**

II. Methodology

In the first year of planting the seedling, all conditions are created for good growth of its root and two strong shoots. Next to the bush, a bar with a height of 1.5 m is placed, to which the shoots are tied 3-4 times during the growing season. The installation of a trellis with two tiers of wires should be placed by the end of the first year of the growing season: first tier at a height of 100-

120 cm for tying cordons and after 30 cm second tier for planting green shoots with two parallel wires.

At the same time, the shaping of the trunk is carried out in the second year, with the creation of two shoulders and a base for creating spurs.

In the case of the normal development of second-order sucklings in the spring of the third year, branches form on the shoulders, cutting them off by 2-4 eyes. Removal of sucklingsand trimming of their spursis carried out if the sucklings turned out to be inferior. After the grape eyes are well swollen, they are removed on the trunk and on the spurs, with the exception of the two upper ones. Tying the stem itself and its shoulders should be done very carefully, as the garter material can cut into the growing wood. When the length of the shoots is 15–20 cm, the excess ones break off, and the remaining ones are tied to the trellis as they grow.

III. Research results

Important biological characteristics when assessing grape sorts are the indicators of fruiting, which regulate the productivity of plantings, and according to a number of researchers [1, 2, 3], the method of bushes management largely determines their size. Along with this, we studied the significance of the height of the stem of grape bushes in the further formation of their embryonic and actual fruitfulness.

The factors that indicate the level at which the reproductive organs in the hibernating buds/eyesare formed and laid during the previous growing season, and the value of the indicators of embryonic fruitfulness largely determines the degree of further actual fruitfulness of the eyes in the next year.

Studies have shown that bushes with a stem height of 170 cm contribute to an increase in the embryonic fruitfulness of the eyes, rather than in bushes with a stem height of 120 cm (Table 1).

Thus, there was an increase in the percentage of fruiting shoots to 73.2-75.3, the fruiting coefficient to 1.18-1.32, and the fruitfulness coefficient to 1.60-1.76, depending on the load of shoots.

TABLE 1 THE INFLUENCE OF DIFFERENT HEIGHTS OF THE STEM OF GRAPE BUSHES ON THE FORMATION OF EMBRYONIC AND ACTUAL FRUITFULNESS OF THE EYES

Load rate, pob/m2	Fruitfulness (embryonic)			Fruitfulness (actual)		
	percentage of fruiting shoots	coefficient		percentage of fruiting shoots	coefficient	
		Fruiting	Fruitfulness		Fruiting	Fruitfulness
Medium shaping with a stem height of 120cm						
35-40	75,0	1,26	1,67	65,9	0,98	1,48
45-50	74,3	1,24	1,68	65,4	1,02	1,56
55-60	71,3	1,13	1,59	62,8	0,91	1,45
High-stem shaping with a stem height of 170cm						
35-40	75,3	1,26	1,67	66,6	1,01	1,52
45-50	74,8	1,32	1,76	66,2	1,08	1,62
55-60	73,2	1,18	1,60	64,8	0,96	1,48
HCP_{05}	1,2	0,07	0,05	0,7	0,05	0,03

It is well known that the setting and formation of the reproductive organs are largely determined by the nutritional conditions.

It was revealed that the type of formation with a high stem and the introduction of growth in free form on a vertical trellis promotes an increase in the volume of the crown, an improvement in illumination and aeration of leaves, an increase in the energy of photosynthesis.

Thus, the influx of photosynthetic products was most marked in the places of inflorescences, the improvement of their development and differentiation was largely facilitated by the formation of grape bushes on a high stem. At the same time, the data obtained during the experiment testify to the higher rates of embryonic fruitfulness in all variants of the experiment in comparison with the actual one. Therefore, the part of the inflorescences that was laid in the eyes died in the summer due to a lack of nutrients in the spring of the next year, and in the winter the other part of the eyes died. According to this, taking into account the load of shoots, there is a decrease in the number of fruitful shoots by 12-13%, noted in variants with a standard height of 120 cm, and with a standard height of 170 cm by 11-12%. The data obtained indicate a slightly better preparedness of bushes with a high formation of a stem for autumn and winter, as well as better nutrition of the grape eyes in the initial period of shoot growth.

A significantly high level of actual fruitfulness was obtained in all variants of the load with shoots in plants with a stem height of 170 cm in the variant with embryonic fruitfulness of the eyes, the death of inflorescences from unfavorable conditions was observed to the least degree. With a stem height of 170 cm and a load of 35-40 shoots per 1 m2 in our studies, the coefficient of fruiting and fertility was 3% higher, compared with the same load of shoots with the option of forming bushes with a stem of 120 cm. The fruiting coefficient during the load per 1 m2 in 45-50 and 50-65 shoots was higher by 6 and 5%, and the fruitfulness coefficient by 4 and 2%, respectively.

The results of the research agree with the conclusions of a number of researchers who have devoted their studies to the questions of the fruitfulness of eyes [4]. According to which, the suppression of the development of polarity and the moderation of growth processes during the period of active growth of shoots is facilitated by the high-stem formation of bushes and the free placement of their shoots on the trellis. As a result, the number of established inflorescences in the eyes of the lower zone of the shoots increased and a greater supply of nutrients to the places where the fruiting organs were laid was noted. Whilst, the growth processes in plants are enhanced due to the vertical placement of the growth on the trellis, as a result of which there is a greater supply of nutrients to the points of growth, and therefore to a lesser extent to the places of setting and differentiation of inflorescences. At the same time, the eyes located in the lower zone of the shoots are in worse nutritional conditions, since they were formed during the period of production of a larger amount of nutrients consumed by actively growing shoots; however, the assimilation surface of the leaves is still incompletely developed.

The distribution of photosynthetic products is rational, depending on the development of vegetative and reproductive organs of grape bushes and the general development of their assimilation processes at a high level in favor of the reproductive organs entirely contributed to an increase in fruiting in variants with a stem height of 170 cm (Table 2).

However, the analysis of fruiting indicators should not be considered as a final assessment that reflects the advantage of each individual type of formation, since the size and quality of the yield are the most important indicators of efficiency when identifying the reasons for the reaction of the variety to agronomic influences. Considering that various forms of grape bushes can significantly change productivity under the influence of some agrotechnical factors, one of the important conditions of our research was the observance of the same agrotechnical background in all variants of the experiment.

It should be noted that when conducting research in all years, the load of green shoots did not have significant fluctuations in all variants of the experiment and was within the boundaries of the planned mark.

According to the ongoing changes in the development of the grape plant during their cultivation on a high stem, their response to the stem height was clearly revealed in terms of the yield. A significantly high yield per unit area and bush was obtained in variants with a stem height of 170 cm, with all load gradations, respectively, with a high level of reliability.

In our experiments, much attention was paid to the study of the quality of grapes, depending on the influence of formations with different stem heights, in view of the fact that there are works indicating a decrease in the sugar content of berries with high-stem formation **[4].**

It was revealed that in the juice of grapes, there is a slight change in the sugar content, which manifests itself in the transition from a vertically located growth and the formation of bushes with a stem of 120 cm to a freely located growth and the formation of bushes with a stem of 170 cm.

A significant influence of the standard height in the conducted studies with the standard formation of bushes on the following indicators was not established - the number of berries in a bunch, as well as their average weight. Although with a high-standard formation, all these indicators in total provided the highest fruitfulness of the bushes. Therefore, the free placement of the growth on the trellis and the increase in the height of the trunk up to 170 cm contributed to an increase in the rates of fruiting and yield of the Iliyskiy and Bereke grape sorts, and to a significant improvement in the quality of the products obtained.

TABLE 2 THE QUALITY OF THE HARVEST AND GRAPE BUNCH WHEN FORMING BUSHES WITH DIFFERENT STEM HEIGHTS

Load rate, w.p.m.	Load, thousand / ha			Harvest		Average bunch weight, g	Average berry weight, g	Number of berries in bunches, pcs	Mass concentration	
	shoots	fruitful shoots	bunches	from 1 bush, kg	from 1 hectare, c				sugars, g / 100cm3	acids, g / dm3
Medium shaping with a stem height of 120 cm and vertical growth control										
35-40	127	84	124	7,84	174,2	140	1,40	100	22,1	7,3
45-50	164	109	169	10,49	233,1	138	1,27	109	21,4	7,5

55-60	191	120	173	8,97	199,3	115	1,19	97	20,8	7,5
High-stem forming with a stem height of 170cm and a free growth position										
35-40	127	84	127	8,09	179,8	142	1,42	100	21,9	7,9
45-50	164	109	178	11,20	248,9	140	1,28	109	21,5	7,2
55-60	189	122	182	9,68	215,1	118	1,20	98	20,9	7,3
HCP_{05}		5,3	7,8	1,2	7,5	3,1	2,8	9,3	1,4	0,8

On average for 3 years, a higher grape harvest with the recommended cultivation method in both farms was provided by the Iliyskiy and Berekesorts (Table 3). So, in the RSKP Experimental farm named after "K.Konysbaev" of the Saryagash region, the yield of Bereke grapes was 127.5 c / ha, in the Raushan farm of the Sairam region, the Iliysky variety - 180 c / ha, exceeding the yield in plantings where the bushes were formed without a stem on average by 32.5 and 60 centners / ha, respectively. Reducing direct costs per 1 hectare of plantations in the RGKP Experimental farm named after "K.Konysbaeva" of the Saryagash region accounted for 26%, and in the farm "Raushan" of the Sairam region by 24%.

TABLE 3 THE RESULTS OF THE PRODUCTION CHECK OF THE RECOMMENDED METHOD OF GROWING GRAPES

Farm	Growing method	Productivity, c / ha	Direct costs, thousand tenge	Received profit, thousand tenge
K.Konysbaev	fan-shaped	95,0	324,0	56,0
	high-stemmed	127,5	240,0	270,0
“Raushan”	fan-shaped	120,0	350,0	130,0
	high-stemmed	180,0	265,0	475,0

Calculations of economic efficiency showed that the introduction into production of a high-stemmed grape bush instead of a standard-free fan-shaped one and the observance of the technology of cultivation of this crop contribute to the receipt of net profit from one hectare of about 272-475 thousand tenge, which, respectively, is 216-355 thousand tenge more. Thus, the experiment results of our recommended methodfor the cultivation of grapes confirm the conclusions drawn from the analysis of the results, obtained in the experimental plantings of grapes.

IV. CONCLUSION

In the irrigated conditions of the South Kazakhstan region to realize the potential of a grape plant of industrial sortsIliyskiy and Bereke, and other grape sorts of similar biological characteristics, it is necessary to carry out the formation with free placement of growth and with a stem height of 130-170 cm. The planting scheme should be 3 x 1.5 m, the load rate is 45-50 shoots per $1m^2$ of trellis, and the length of the vines pruning, respectively, from 5 to 8 eyes.

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