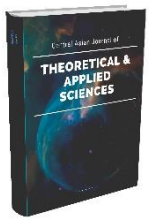

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INFLUENCE OF NUTRITIONAL CONDITIONS ON ROOT SYSTEM DEVELOPMENT, REPRODUCTIVE KIDNEY LAYING AND HARVEST QUALITY

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Annotation: *The scientific article provides experimental material devoted to the study of the influence of the norms of basic nutrients (NPK) and organic fertilization (manure) on the growth and development of Taifi pink grapes. As a result of the studies, it was found that optimal conditions for the development of plants are created when the following norms of organo-mineral fertilizers-N120P90K30 kg / ha and N120P90K30 + 5 t / ha manure.*

Keywords *grapes, growth, development, variety, fertilization, harvest.*

INTRODUCTION

Grapes are one of the most valuable dietary and foodstuffs. Grape berries contain up to 30% of easily digestible sugars - glucose and a small amount of sucrose, as well as a large set of organic acids and mineral salts. Grapes are distinguished by a high content of vitamins of groups A, C, P and B. Wine, bekmes, halva, sorbet, grape honey, syrup, jam, marmalade and other valuable nutritious products are prepared from grapes. Grape processing waste is widely used in production. Alcohol, enanthic ester, oil, vinegar, tartaric acid, fodder yeast, enoc dyes and other products are obtained from them. [6].

Research methodology. As an object of research in the experiment, the grape variety Taifi pink was used. On the experimental plot, fertilizers were applied to a depth of 25-30 cm. The plots were three-row, of which the average was counting. Each plot was planted with 240 plants. The experiments were repeated three times. Phosphate fertilizers 75% and potash fertilizers - 100% were applied in the second - third decades of November. The remaining 25% of phosphorus and 100% of nitrogen were added to top dressing during the growing season of plants.

Scheme of the experiment with fertilization:

1. Control - without fertilizers

2.N120kg / ha

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3. P90kg / ha
4.K30kg / ha
5.N120P90kg / ha
6.N120K30kg / ha
7.P90K30kg / ha
8.N120P90K30kg / ha
9.N120P90K30 + 5 t / ha manure kg / ha

Research results. The complex of external conditions (aeration, nutrition and moisture supply) have a huge impact on the size of the root system, the nature of its placement along the soil horizons and the formation of an active part capable of maximizing the use of nutrients. The interaction of the root system with the environment, the absorption of nutrients from the soil by it is an active physiological process associated with the vital activity of the whole organism. A large role in this belongs to agrotechnical methods and, first of all, the application of fertilizers, which contributes to the creation of a powerful absorbing root surface, which is extremely important for the mineral nutrition of grapes. [1, 2, 3, 4].

The roots of the grape bush develop in a large volume of soil and are much larger than the aerial part in length. Therefore, when developing agrotechnical methods for caring for soil and plants, it is necessary to take into account the nature of the distribution of the root system, which is capable of penetrating deep enough, even into the subsoil, which indicates its ability to grow rapidly and strongly branch. (5, 6).

Most researchers note that the bulk of small roots is distributed at a depth where the best combination of moisture, aeration and nutrients (40-60 cm).

The growth of the active part of the roots of grapes largely depends on the type of fertilizer. In experiments to study the effect of fertilizer types on the yield and quality of Kishmish black grapes, as well as the growth dynamics of active roots, 9 options were tested: without fertilizers, nitrogen, phosphorus and potassium fertilizers taken separately, in paired combinations and against the background of complete mineral fertilization.

The greatest effect in the experiment was obtained with the introduction of nitrogen fertilization. When phosphorus was added to one running meter of the root system, 46 growth points were formed. In relation to the control, this amounted to 145%. Less active roots are formed when plants are fertilized with potassium alone - 128%. Of the paired combinations, the vine responds best to nitrogen-phosphorus nutrition. The reaction of active roots to a nitrogen-potassium and phosphorus-potassium combination is very close and significantly inferior to a nitrogen-phosphorus mixture. The average number of developed points of growth per 1 meter of root for these combinations is 147, 163, and 143%, respectively, in relation to the control.

Complete mineral fertilization proved to be the best for the formation of absorbing roots. The length of the roots in this variant turned out to be the greatest and reached 1.5 - 2 m.

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Unilateral feeding with phosphorus or potassium without nitrogen does not give a strong development of absorbing and overgrowing roots for the reason that when mixed with fertilizers with soil particles, the latter are absorbed by it and pass into compounds inaccessible to the plant. In the presence of ammoniacal forms of nitrogen, which have a physiologically acidic reaction, phosphorus and potassium fertilizers dissolve faster and better and are absorbed by the plant in large quantities. (Table 1).

Table 1

Formation of active roots by grapes, depending on the nutrients introduced into the soil (2018-2020 yy).

Experimental parameters	Average length active root, mm.	The number of growth points per meter of root	The sum of growth points	
			pieces	% to manage
Control – with Fertilizer	0,7	25	515	100,0
N_{120} kg / ha	0,8	52	863	167,5
P_{90} kg / ha	0,8	46	751	145,8
K_{30} kg / ha	0,8	40	661	128,3
$N_{120} P_{90}$ kg / ha	0,9	50	819	159,0
$N_{120} K_{30}$ kg / ha	0,8	48	740	143,6
$P_{90} K_{30}$ kg / ha	0,8	48	758	147,1
$N_{120} P_{90} K_{30}$ kg / ha	1,6	59	98	191,0
$N_{120} P_{90} K_{30}$ +5 t/ ha manure	1,9	71	1011	196,3

Studies to study the effect of mineral fertilizers and, against their background, an insignificant amount of organic fertilizers (5t / ha), widely used in the world practice of viticulture, has shown that the annual application of mineral fertilizers at the rate of N120P90K30 contributes to the stable maintenance of the humus content in irrigated gray earth soils at level 1, 1-0.6% (Table 2).

Table 2

Dynamics of changes in the content of humus in the soil when fertilizing grapes,%. (2018-2020 yy).

Experimental	Horizons, cm

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parameters	0-10	10-30	30-50	50-70	70-90
Control – without Fertilizer	0,9	0,9	0,8	0,5	0,4
$N_{120}P_{90}K_{30}$ – Sequential (2 year)	1,1	1,0	0,7	0,6	0,4
Control – without Fertilizer	0,9	0,8	0,7	0,5	0,4
$N_{120}P_{90}K_{30}$ – Sequential (3 year)	1,1	1,0	0,9	0,7	0,4
Control – without Fertilizer	0,8	0,8	0,7	0,5	0,3
$N_{120}P_{90}K_{30}$ – Sequential (3 year) + 5 t/ha manure	1,2	1,2	1,1	0,9	0,5

In the case of systematic non-application of fertilizers, the conditions for humification of the soil deteriorate, and, consequently, the content of total humus in it. This decrease in the soil horizon of 10-70 cm is 0.1%. With the deepening of the root-inhabited horizon of grapes from 50 to 90 cm, the humus content to the more superficial layers decreases by 1.8-2.2 times, which, naturally, subsequently affects the development of the plant.

The best conditions for stabilizing the humus content in the root layer of grapes, as our experiments have shown, were observed when a full background of mineral fertilizers was applied to the soil annually with the addition of 5 t / ha of manure. In this case, the humus content in the soil in comparison with other variants of the experiment increased by 0.1-0.2%. Moreover, in the soil horizons of 10-70 cm, a stable level of humus content was observed over the years of application - 0.9-1.2%. In our opinion, this is due to the creation of favorable conditions in the soil for the activation of the activity of soil microflora and the processes of soil nitrification.

Studies have also established a positive effect of phosphorus on the formation of generative organs by plants in the wintering eyes of the vine. Under its influence, plants formed up to 69% of fruiting eyes, while with separate feeding of nitrogen and potassium, only 55 and 54%.

With nitrogen-phosphorus and nitrogen-potassium nutrition, the fertility of the eyes increased to 64%, and with complete mineral nutrition, this figure reached 85%, i.e. increased by 16-30%. In addition, a full-fledged mineral background, in comparison with a single-element diet, stimulates the establishment of plants by more than 1.3-2.2 times more than two ocellous inflorescences, which, as a result, provided a significant overall increase in yield in these variants of the experiment (Table 3)

Table 3

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Influence of various types and combinations of fertilizers on the fruitfulness of grape buds (2018-2020 yy).

Experience options	Fruitfulness eyes to the general the number of kidneys %	Eyes with two inflorescences to fruit buds,%	Eyes with one inflorescence to fruit kidneys,%
N_{120} kg / ha	55	22	78
P_{90} kg / ha	69	33	67
K_{30} kg / ha	54	19	81
$N_{120}P_{90}$ kg / ha	77	37	63
$N_{120}K_{30}$ kg / ha	64	20	80
$P_{90}K_{30}$ kg / ha	64	19,5	80,5
$N_{120}P_{90}K_{30}$ kg / ha	85	43	37
Control - no fertilizer	49	20	80

Conclusions:

1. Annual application of mineral fertilizers at the rate of N120 P90 K30 with the addition of 5 t / ha of manure contributes to an increase in the content of humus in the root horizon of the soil by 0.1-0.2% and its stabilization over the years of application at the level of 0.9-2.1 %.

2. When applying mineral fertilizers to the plantation of Kishmish Cherny grapes and calculating N120P90K30 kg / ha and N120P90K30 + 5 t / ha manure in the structure of the root system of grapes during the growing season can form up to 59-71 new points of growth, and the fruitfulness to the total number of buds per single bush to the control variant increases by 36%.

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