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LAND TREATMENT COMPLEX FOR POMEGRANATE GROWING AND POSSIBILITIES OF AMELIORANTS APPLICATION IN THE MARTAKERT PLAIN ZONE

Saribek B. Galstyan
Shushi University of Technology
35/12, Naberejnaya 3rd alley, Stepanakert, RA
galstyan.saribek@mail.ru
ID: 0000-0001-6728-7817
Republic of Artsakh

Tamara G. Grigoryan
Shushi University of Technology
35/12, Naberejnaya 3rd alley, Stepanakert, RA
gtamara68@list.ru
ID: 0000-0002-1453-5300
Republic of Artsakh

Eleonora V. Avanesyan
Shushi University of Technology
35/12, Naberejnaya 3rd alley, Stepanakert, RA
avanesyane@rambler.ru
ID: 0000-0002-4443-2353
Republic of Artsakh

Alyosha T. Zakaryan
Shushi University of Technology
35/12, Naberejnaya 3rd alley, Stepanakert, RA
alyosha1603@mail.ru
ID: 0000-0001-7377-0725
Republic of Artsakh

Abstract

This paper examines the role of the pomegranate fertilization best dates and quantities in the soil-climatic conditions of the plain zone of the Martakert region of the Artsakh Republic in the process of increasing the soil moisture and the formation of xerophytic properties in plants. With this purpose in mind, in light brown gravel and sandy clay loam soils of mean thickness, taking into account the requirements of pomegranate for bioclimatic conditions and the importance of maintaining the soil fertility, the high efficiency of the combined use of organic-mineral fertilizers has been recorded in the course of experimental study. The combined application of semi-decayed manure and complete NPK mineral fertilizers has been found to be even more effective in half doses than double doses given separately. Pomegranate yield due to soil moisture provision will increase even more if a polymer mineral material (as a water-accumulating ameliorant) is added to the soil together with organic-mineral fertilizers.

Key words: ameliorant, manure, mineral fertilizers, fertilization, nutrition, soil moisture, pomegranate, crop yield.

Introduction

One of the most important problems of agriculture is the efficient use of solar energy, which from a farmers requires a creative approach to crop rotation farming, the application of agro-technical measures aimed at providing solar energy-transforming plants with such terrestrial substances as water and nutrients.

The bioclimatic conditions of the plain zone of the Artsakh Republic are favorable for growing of pomegranate, which is distinguished by its drought resistance and heat resistance properties.

For all crops, including pomegranate, yields are highly dependent not only on the active temperature conditions of the local climatic zone but also on the nutritional and water conditions of the soil, which correlate with such organic part of the soil hard phase as humus.

However, in dry steppe zones, as a rule, the soil is poor in humus.. If we add to that the fact that in addition to the crop of the orchard, the biomass that emerges every year as a result of trimming is also alienated, everything will be clear.

The remains of roots and dead leaves in the soil are not enough for the normal vital activity of microorganisms involved in the soil formation process; they start using humus as a source of energy, accelerating its biological decomposition. On the other hand, the use of medium to high doses of mineral fertilizers without organic fertilizers enhances the chemical activity of the soil, monovalent cations penetrated into the soil absorption complex, contribute to the acceleration of the humus decomposition [1].

Therefore, the combined use of organic fertilizers, ameliorants, and mineral fertilizers is compulsory among the complex agrotechnical measures designed to regulate the growth and development of plants in the pomegranate orchard. The effectiveness of mineral fertilizers increases when they are applied in the spring, before plants shoot out buds, for phosphorus-potassium fertilizers long remaining in carbonate soils since autumn react with calcium compounds, turning them into insoluble compounds that plants can hardly digest [4].

Conflict setting

Based on the above-mentioned fact, and those circumstance that in the domestic farm enterprises so far do not have scientifically substantiated systems of agriculture, including crops fertilization, we have set ourselves the following task. During 2018-2020 to study the influence of separate application of organic and mineral fertilizers on the improvement of soil water regime on the growth, development, yield, and under study agro-technical measures economic efficiency of the eight-year-old Gyolosha pomegranate orchard under conditions of the forest brown alkalized gravelly soil of the lowland Martakert community of the Martakert region.

Triple field experiments have been carried out. The following options have been studied:

1. without fertilization, “checking”
2. Manure 30 t/ha
3. $N_{120}P_{100}K_{100}$
4. $N_{60}P_{50}K_{50}$ + manure 15 t/ha.

For the planning and installation of field experiments, the relief of the future test site, “the orchard”, hydrology, wind protection, the system of agro-technical measures used in the last three years were studied, and the agrochemical characteristic of the soil was given.

The plants in the selected garden are planted in 4x3 scheme. The garden had a flat terrain, which is provided with irrigation water and partially protected from winds. The garden was planted in 2011 and for the last three years was not regularly fed only with nitrogen fertilizers. In the first two years of planting, the inter-row spaces were occupied by dwarf plants, and in the last 3 years the weeds growing in the garden were harvested twice a year and used as fodder.

The following methods and techniques were used in the field and laboratory studies: in each option, "repetition", six plants were included in one row. The test site was provided with a series of protective layers on all sides. One row of protective layer was also left between the rows under study. Taking into account the fact that phosphorus ions move very slowly in the soil, and potassium chloride used in farms contains a large amount of chlorine, which can adversely affect the quality of the crop, they together with the manure were introduced into the soil in the autumn, after the harvest, and the nitrogen was introduces in the soil in the spring at the germination stage. was given in the spring, at the stage of buds shoot out. The soil moisture, 15 days after watering, was determined by the weighting method, the yield - by the widespread harvesting method, according to AR Khachatryan.

Research results

Pomegranate growth, fruit buds formation, flowering, current year shoots, fruit formation, and ultimately the quantity and quality of the crop, as with all crops, depend not only on the biological characteristics of the type or variety, but also on the environmental conditions in which the plant undergoes ontogenesis. In addition to the celestial factors "light, heat", pomegranate growth and development are significantly influenced by more easy-to-manage factors, such as water and nutrients. If the soil is supplied with sufficient water, fertilizers are considered a powerful lever for increasing yields, which can change the yield of crops to a very wide range.

There are few papers in the literature dealing with the same problem. According to numerous studies both mineral and organic fertilizers have a positive effect on pomegranate yield. However, their combination, even in smaller quantities, provides higher efficiency, because organic fertilizers, in addition to being a source of ready-to-eat nutrients, are also rich in organic matter, which improves the agrophysical properties of soil - air permeability, field moisture and biological activity.

To find the indirect effect of organic fertilizers on pomegranate plants, we determined the soil moisture by weight method 15 days after watering at different stages of vegetation. The data are presented in Table 1.

Table 1

Moisture content in the soil depending on fertilization "average of three years"

Option	Soil moisture, cm	Soil moisture (%) according to the soil depth			
		Flourishing stage	Fruits formation stage	Fruits ripening stage	Average
Checking	0 - 20	15,67	18,56	16,42	16,88
	20 - 40	19,45	23,51	21,31	21,42
Manure 30 t/ha	0 - 20	17,74	20,30	18,41	18,82
	20 - 40	22,56	26,18	23,37	24,01
$N_{120}P_{100}K_{100}$	0 - 20	16,76	19,67	17,14	17,86
	20 - 40	20,19	24,19	22,60	22,33
$N_{60}P_{50}K_{50}$ + manure 15 t/ha	0 - 20	16,68	21,40	18,15	18,74
	20 - 40	20,21	24,34	23,94	22,83

The combination of organic and mineral fertilizers has a positive effect on the increase of water supply in the soil, effective balancing of nutrients, contributes to the improvement of pomegranate growth rates, which create the preconditions for the emergence of crop yields elements and next year's fruiting buds formation.

Table 2

Effect of fertilizers on pomegranate yield and the next year's germination "average of three years"

Option	Number of fruits on one shrub, piece	Number of fruits fallen from one shrub, piece	Average mass of fruits, gr	Amount of normally colored fruits, %	Number of fruit-buds on one shrub, piece
Checking	101	17	268	75	255
Manure 30t/ha	126	19	296	78	316
$N_{120}P_{100}K_{100}$	123	19	304	79	310
$N_{60}P_{50}K_{50}$ + manure 15 t/ha	123	18	309	80	327

The data presented in Table 2 show that the fertilizers had a significant effect on the number of fruits per bush, the average fruit mass, the number of normally colored fruits, and the number of fruit buds per shrub. Only in the version with 30 t / ha manure, the number of fruits per shrub exceed by 65 compared to the checking option, the average fruit weight exceeded by 35 g, the number of normally colored fruits - by 7%, and the number of fruit buds per bush -by 70. In this option, the number of fruits dropped from one bush was relatively low by "2%". Almost the same data were recorded only in the option of mineral fertilizers "N 120 P 100 K 100". According to the data given in Table 2, the indicators mentioned in the option of joint use of organic-mineral fertilizers were higher. From this it can be deduced that the combined use of organic-mineral fertilizers is agronomical necessary.

The crop yield was determined by collecting and weighing the crop. The results are presented in Table 3.

Table 3

The effect of fertilizers on pomegranate yield "average of three years."

Option	The average crop from one tree, kg	Crop yield according to repetitions/ha			The average crop of the fruit, gr/ha	The difference with regard to checking	
		I	II	III		g/h	%
Checking	27	225	223	224	224	-	-
Manure 30 t/ha	37,2	309	306	312	309	85	37,9
$N_{120}P_{100}K_{100}$	37,5	312	309	315	312	88	39,2
$N_{60}P_{50}K_{50}$ + manure 15 t/ha	38	315	319	314	316	92	41,0

According to the data presented in Table 3 in case of 30 t of manure per hectare, the crop yield compared to the checking option increased by 85 centner per hectare, in case of complete mineral N120 P100 K100 by 88, and in case of N60 P50 K50 + manure by 92 c / ha.

One of the main goals of our study was to find out the economic efficiency of the joint use of organic-mineral fertilizers separately. The results are given in Table 4.

Table 4

Economic efficiency of fertilizer application in pomegranate orchard

Version	Average fruit yield gr/ha	Crop supplement gr/ha	Price of 1.0 gr product (1000 AMD)	Additional harvest value (1000 AMD)	Additional harvest costs, (1000 AMD)					Additional profit was received, (1000 AMD)	Against extra spent 1.0 AMD was received profit
					Salary	Material costs	Equipment operating costs	Other expenses	Total costs		
1	224	-	-	-	-	-	-	-	-	-	-
2	309	85	20	1700	287	30	70	38.7	427,7	1272,3	2,97
3	312	88	20	1760	245	131	30	40.6	446,6	1313,4	2,94
4	316	92	20	1840	251	80	50	38.1	419,1	1420,9	3,39

As the above tabulated data show, the reduction and join use of fertilizers' doses has contributed to the reduction of total fertilization costs, increased additional profit and the level of profitability. The use of ameliorants will make increasing of the soil moisture possible, as a result we can get a higher crop yield at a lower cost.

Conclusion

The combined application of organic fertilizers, further soil absorption increasing ameliorators, and mineral fertilizers, even in smaller doses, compared to high doses of their individual use, will increase soil moisture, optimal nutrient balance, increase crop yields, and reduce expenses spent on a unit product.

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ՆՌՆԵՆՈՒ ՄՇԱԿՄԱՆ ԱԳՐՈՏԵԽՆԻԿԱԿԱՆ ՄԻՋՈՑԱՌՈՒՄՆԵՐԻ ՀԱՄԱԼԻՐԸ ԵՎ ՄԵԼԻՈՐԱՆՏՆԵՐԻ ԿԻՐԱՌՄԱՆ ՀՆԱՐԱՎՈՐՈՒԹՅՈՒՆՆԵՐԸ ՄԱՐՏԱԿԵՐՏԻ ՀԱՐԹԱՎԱՅՐԱՅԻՆ ԳՈՏՈՒՄ

Ս.Բ. Գալստյան, Թ.Գ. Գրիգորյան, Է.Վ. Ավանեսյան, Ա.Տ. Զաքարյան
Շուշիի տեխնոլոգիական համալսարան

Արցախի Հանրապետության Մարտակերտի շրջանի հարթավայրային գոտու հողակլիմայական պայմաններում ուսումնասիրվել է նռնենու պարարտացման լավագույն ժամկետների ու չափաքանակների կիրառման դերը՝ հողի դաշտային խոնավունակության բարձրացման, բույսերի մոտ քսերոֆիտ հատկությունների ձևավորման գործընթացում: Այդ նպատակով բաց շագանակագույն խճաքարային, կավավազային միջին հզորության հողերում, հաշվի առնելով կենսակլիմայական պայմաններին նռնենու կողմից ներկայացվող պահանջներն ու հողի բերրիության պահպանման կարևորությունը, փորձարարահետազոտական ճանապարհով բացահայտվել է օրգանական և հանքային պարարտանյութերի համատեղ օգտագործման բարձր արդյունավետությունը: Պարզվել է, որ կիսաքայքայված գոմաղբի և լրիվ (NPK) հանքային պարարտանյութերի համատեղ կիրառումը, թեկուզ կես չափաքանակներով ավելի արդյունավետ է, քան առանձին-առանձին տրվող դրանց կրկնակի չափաքանակները: Հողում խոնավության ապահովման հետ կապված նռնենու բերքատվությունը ավելի կբարձրանա եթե օրգանական և հանքային պարարտանյութերի հետ համատեղ հող մտցվի նաև պելիմերահանքային նյութ (որպես ջրակուտակիչ մելիորանտ):

Բանալի բառեր. մելիորանտ, գոմաղբ, հանքային պարարտանյութեր, պարարտացում, սնուցում, հողի խոնավություն, նռնենի, բերքատվություն:

КОМПЛЕКС АГРОТЕХНИЧЕСКИХ МЕРОПРИЯТИЙ ПО ВОЗДЕЛЫВАНИЮ ГРАНАТА И ВОЗМОЖНОСТИ ПРИМЕНЕНИЯ МЕЛИОРАНТОВ В РАВНИННОЙ ЗОНЕ МАРТАКЕРТА

С.Б. Галстян, Т.Г. Григорян, Э.В. Аванесян, А.Т. Закарян
Шушинский технологический университет

В почвенно-климатических условиях равнинной зоны Мартакертского района Республики Арцах была изучена роль применения лучших сроков и доз удобрения граната в процессе повышения полевой влажности почвы и формирования ксерофитных свойств у растений. С этой целью на светло-коричневых щебнистых, суглинистых почвах средней мощности, учитывая требования, предъявляемые гранатом к биоклиматическим условиям и важность сохранения плодородия почвы, экспериментально-исследовательским путем была выявлена высокая эффективность совместного использования органических и минеральных удобрений. Было обнаружено, что совместное использование полуперепревшего навоза и полного минерального удобрения (NPK), даже в половинных дозах, более эффективно, чем внесение их двойных доз по отдельности.

Урожайность граната, связанная с обеспечением влажности почвы, повысится еще больше, если вместе с органическими и минеральными удобрениями в почву будет внесен также полимерно-минеральный материал (как водонакопительный мелиорант).

Ключевые слова: мелиорант, навоз, минеральные удобрения, удобрение, питание, влажность почвы, гранат, урожайность.

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