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**DETERMINATION OF THE ECONOMIC-ECOLOGICAL EFFECTIVENESS
OF USING ORGANIC MINERAL FERTILIZERS AND GROWTH
PROMOTERS IN POTATO CROPS CULTIVATED IN THE FOOTHILLS OF
THE REPUBLIC OF ARTSAKH**

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Abstract

The article presents the results of the studies on the changes in the quantity, marketability and quality indicators of the potato crop under the influence of the application of organic mineral fertilizers and growth promoters in the post-forest brown soils of the Askeran region of the Artsakh Republic, in potato fields grown in arid conditions.

Two-year research has revealed that although the one-time application of equivalent amounts of organic and mineral fertilizers equally affected the quantity, marketability and

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

quality indicators of the potato crop, fractional or combined application of these fertilizers had a more beneficial effect on the specified indicators of potatoes than their one-time application.

At the same time, the studies revealed that in the one-time and fractional applications of organomix and mineral fertilizers, as well as bio-liquid application variants, compared to the variant without fertilization, the content of nitrates increased by 45-115 mg/kg, but their amount in the potato crop is within the limits of marginal permissible density. (MPD)

Due to the limitation and high cost of mineral fertilizers, fertilize the potato fields with organomix at the rate of 8 t/ha, 60% of which is in sowing and 40% with nutrition, first soak the potato planting material with a solution of bio-liquid (14 l/ha) 2-3 days before sowing and as a result, a potato crop of 350-360 c/ha will be ensured, with a high content of starch and ascorbic acid (vitamin C), which is proposed to be invested in agricultural production.

Key words: organomix, organic fertilizers, bio-liquid, potato arid condition, nitrates, starch.

Introduction

The high level of chemicalization in modern agriculture has led to negative environmental consequences. The growth of anthropogenic impact on the natural environment has set serious tasks for agricultural science to develop and apply alternative methods of farming.

Many researchers confirmed with their studies the high efficiency of separate and combined use of mineral and organic fertilizers in increasing the yield of agricultural crops, especially potatoes, and improving quality indicators. In the conditions of the inaccessibility of the use of organic fertilizers, as well as the use of high-priced mineral fertilizers, great importance is attached to the fertilizers of organic origin and growth regulators obtained by the latest technologies, which provide high results with low costs, both in terms of increasing the yield, improving quality and reducing the cost [1-6].

According to the data of the Statistical Service of the Republic of Artsakh and the Ministry of Agriculture [7], on average for 2016-2022, the sown areas in potato-growing regions of the republic amounted to 641.5 hectares, the average yield was only 69.4 c/ha. 24.8% of the potato acreage in Artsakh, or 156.6 hectares, belong to the Askeran district, where the yield of this crop is almost equal to or lower than the average, low index of the republic.

The requirement of potato plants for nutrients is carried out during the entire vegetation period. However, the crop assimilates a larger amount of nitrogen and ash elements, especially during the stages of cocooning and flowering, during which the growth of potato bushes is more intense. It is noteworthy that in the mentioned stages, potato bushes absorb 2.5-4.9 times more potassium than nitrogen and 6-8 times more than phosphorus.

Potatoes are very demanding, especially to organic fertilizers, which, while providing plants with nutrients, simultaneously improve the agro-physical properties of the soil, creating favorable conditions for plant growth and tuber accumulation.

The foothill zone of Artsakh, being one of the most extensive zones of the republic, is somewhat different from other agricultural zones with its physico-geographical conditions, geological structure, climate, soil, water and vegetation characteristics [8,9]. The low amount of precipitation during the vegetation period, the low content of organic matter in the soil, the

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

plant residues accumulated under the influence of high air temperature are quickly mineralized, a small amount of humus accumulates in the soil, and in such conditions, without the use of scientifically based technologies, it is not possible to provide high and quality harvest, even under conditions of ideal agro-technics. Therefore, the systematic and unified solution of the mentioned problems is extremely important and up-to-date and derives from the requirements of the strategy for the development of agriculture in the region and the republic, and is considered one of the priorities of ensuring food security.

Conflict Setting

The aim of the work is to study and find out for the first time the effect of the equivalent amounts and dates of application of organomix organic fertilizer, growth stimulating bio-liquid and organo-mineral fertilizers obtained by the Armenian-Norwegian joint enterprise (Orwako) from household and agricultural waste with the latest biotechnological methods, on the yield of potatoes cultivated in the conditions of the foothills of the Republic of Artsakh on the quality indicators of the crop and compare them with the results of the influence of the ratio of mineral fertilizers used in the region. Based on the results of the research, to present concrete suggestions to the agricultural production in order to maintain the level of soil fertility in the region and obtain ecologically safe food through the gradual development of organic agriculture.

The reaction of the soil environment of the testing ground, the pH ranges from 6.9 to 7.1, the amount of cations (Ca^{++} , Mg^{++}) absorbed in the soil layer is 24.2-29.8 mg/equ in 100 grams of soil. Humus content is 3.3-3.4%, with easily hydrolysable nitrogen (N 3.4mg) is weakly provided, mobile phosphorus is medium (P_2O_5 is 5.1 mg) with exchangeable potassium-good (K_2O in 100g of soil is 34,0-36 mg).

The field experiments were set up with 3 repetitions, the size of each version in the repetition was 20m², according to the following scheme:

1. Checker (without fertilization)
2. Organomix 8t/ha one time, in sowing
3. Organomix 10t/ha one-time, in sowing
4. Organomix 5t/ha (in sowing) + $\text{N}_{30}\text{P}_{40}\text{K}_{40}$ (in sowing) + with N_{30} nutrition
5. Organomix 5t/ha in sowing + organomix 3t/ha (with nutrition) + bio-liquid 14l/ha (nutrition)
6. Bio-liquid 14 l/ha by wetting the planting material + organomix 5 t/ha (in sowing) + organomix 3 t/ha (nutrition)
7. $\text{N}_{80}\text{P}_{80}\text{K}_{80}$ (in sowing) + N_{40} (nutrition)

Studies were conducted on the Impala potato variety, the planting rate of which was 32.4 c/ha in 2021, and 33.0 c/ha in 2020, further processing and harvesting were carried out in accordance with the agricultural rules adopted in the region.

Agrochemical indicators of soils, plants and tubers were determined by universal methods in the scientific center of Artsakh, given in the methodological manual on agro-chemistry analysis, nitrates in tubers were determined using the nitrate meter –“Soeks”. The yield data were subjected to mathematical analysis by the method of dispersion analysis, the determination of the experimental error ($S_x, \%$) and the most significant difference.

Research Results

According to the average data of the two-year repetitions of the field experiments, the equivalent doses and application periods of organo-mineral fertilizers, as well as the growth stimulator bio-liquid had a certain effect on the germination, growth and development of potatoes, the intensive formation of above-ground and underground organs, compared to the version without fertilization, in the versions that received organomix and growth stimulator. the weight increased by 130-150 grams, the leaves by 38-59 grams, and the number of stolons by 3.4-6.4 pieces, and as a result, providing favorable conditions for the accumulation of potato tubers and increasing the amount of harvest [10].

Although the patterns of effect of the tested fertilizers in the two years of the study were repeated, the level of potato yield in 2022 was higher than in 2021. Thus, if in 2022 the potato harvest in the version without fertilization was 150.0 c/ha, then in 2021 it was 142.4 c/ha, or about 8.0 cents less.

This circumstance is explained by the fact that in 2022, both the amount of atmospheric precipitation (562 mm) and the number of sunny days during tuber accumulation (38) were more favorable for potato growth and development than relatively little precipitation (476 mm) and sunny days. (only 25 solar days during vegetation, especially during tuber accumulation) in 2021.

This circumstance was also confirmed at the level of the Republic of Artsakh, in 2021, as a result of relatively unfavorable climatic conditions, the yield of potatoes decreased significantly, and this decrease was 13.7 c/ha per hectare on average.

Climatic conditions also had a certain impact on the efficiency of fertilizers: in favorable year 2022, the efficiency of organomix, mineral fertilizers and growth promoter was higher than in 2021 with unfavorable climatic conditions (Tab. 1).

Table 1

The effect of organic fertilizers and growth promoters on the amount of potato harvest (2021-2022 average data)

N	Variants	Average yield of repetitions, by years, c/ha		The average yield of two years, c/ha	Extra harvest	
		2021	2022		c/ha	%
1	Checker (without fertilization)	142,4±2	150,0±3	146,2±2,5	-	-
2	Organomix 8t/ha one-time, in sowing	290,0±6	301,0±4	295,5±5,0	149,3	102,1
3	Organomix 10t/ha one-time, in sowing	296,0±7	315,±5	305,5±6	159,3	109,0
4	Organomix 5t (in sowing) N ₃₀ P ₄₀ K ₄₀ (in sowing+) with N ₃₀ nutrition	300,0±4	307,0±5	303,5±4,5	157,3	107,6
5	Organomix 5t/ha in sowing + organomix 3t/ha (with nutrition) + bio-liquid 14l/ha (nutrition)	307,0±5	322,0±6	313,5±5,5	167,3	114,4
6	Bio-liquid 14 l/ha by wetting the planting material + organomix 5 t/ha (in sowing) + organomix 3 t/ha (nutrition)	342,0±7	372,0±6,2	357,0±6,6	210,8	144,2
7	N ₈₀ P ₈₀ K ₈₀ (in sowing)+ N ₄₀ (nutrition)	285,0±6	300,0±5,4	292,5±5,7	146,3	100,1
Sx,%		1,5	1,3			
MSD 0,95 g		5,4	4,8			

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

Thus, if compared to organomix 8 t/ha, organomix 5t/ha + organomix 3t/ha (before wetting the planting material with bio-liquid) and $N_{80}P_{80}K_{80}+N_{40}$ version, the additional harvest of potatoes was 151.0 c/ha, 222.0 c/ha and 150.0 c/ha, in 2021, the additional harvest of potatoes was 147.6 c/ha, 199.6 c/ha, and 142.6 c/ha, i.e., the efficiency of fertilizers in the tested versions in 2022 was 3.7-8.0% was higher than in 2021 with unfavorable climatic conditions.

At the same time, it can be seen from the data in the table that the equivalent doses of organo-mineral fertilizers compared to the version without fertilization almost equally affected the increase in potato yield, but when in the version of fractional application of organomix, the potato planting material was soaked with a bio-liquid solution before sowing, in that version, the average data of two years increased the yield compared to the version without fertilization was the highest and was 210.8 c/ha or 144.2%, even compared to the version where the bio-liquid was given as extra-root nutrition at the stage of potato cocooning, where the crop addition was 167.3 c/ha (114.4%), or by changing the method of application of bio-liquid by soaking the tubers before planting, the difference in yield compared to the application of extra-root nutrition was 43.5 c/ha or 29.8%.

This circumstance once again confirms the fact that the bio-liquid contributed to the sprouting of dormant buds in the base of the potato plant material, which resulted in the formation of more above-ground (stems) and underground (stolons) organs, resulting in increased potato yield.

According to the results of field experiments, it was proved that the fractional application of organomix and mineral fertilizers and their combined equivalent doses had a more beneficial effect on the increase in the number of potato crops compared to the one-time application, if compared to the option without fertilization, if the one-time application of organo-mineral fertilizers provided 146.3-149.3 c/ha crop addition (100.1-102.1%), then their fractional and equivalent joint doses are 157.3-167.3 c/ha or 107.6-114.4%.

From the results of the studies, it can be seen that mineral and organic fertilizers, as well as the use of bio-liquid that promotes growth, had a certain effect on the marketability of the structure of the potato crop and the weight of the marketable tubers (Tab. 2).

Thus, if in the version without fertilization, the marketability of the potato crop (50-100 and 100g and higher tubers) was 65.6%, and the weight of the marketable tubers was 62 grams, then with the effect of applied fertilizers and growth promoters, the marketability of the crop was 80.2-87%, and the weight of marketable tubers 79.6-95.4 grams, or in the options without fertilization, the marketability increased by 14.6-21.4%, and the weight of marketable tubers 17.6-33 with 4 grams.

It is noteworthy that the equivalent doses of organomix and mineral fertilizers and their one-time application equally affected both the quantity and product quality of the potato harvest, as well as the weight of commercial tubers. From the data in tab. 2, it can be seen that from the one-time application of the norm of 8t/ha of organomix and the equivalent doses of mineral fertilizers ($N_{80}P_{80}K_{80}+N_{40}$), the marketability of potatoes provided 81.3 and 81.4%, respectively, and the weight of commercial tubers was 80.4- 80.2 grams. Both in terms of yield, marketability and the weight of marketable tubers, the potato planting material before wetting the seed with bio-liquid and fractional application of organomix (organomix 5 t/ha in sowing + organomix 3 t/ha with nutrition) is considered the best, where a potato harvest of

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

357.0 c/ha was obtained. marketability 87.0%, and the weight of commercial tubers 95.4 grams.

The difference in climatic conditions during the years of the experimental works also had a certain effect on the structure of the obtained crop.

Table 2

The effect of organic fertilizers and growth promoters on the structure of the potato crop (2021-average data)

N	Variants	The yield of tubers, t/ha	Tubers by fractions,%			Productivity of tubers, %	Weight of commercial tubers, %
			100g	50-100g	up to 50g		
1	Checker (without fertilization)	146,2±2,5	31,4	34,2	34,4	65,6	62,0
2	Organomix 8t/ha one-time, in sowing	295,5±5,0	43,2	38,1	18,7	81,3	80,4
3	Organomix 10t/ha one-time, in sowing	305,5±6	44,0	38,4	17,6	82,4	82,0
4	Organomix 5t (in sowing) N ₃₀ P ₄₀ K ₄₀ (in sowing)+ with N ₃₀ nutrition	303,5±4,5	43,2	37,0	19,8	80,2	79,6
5	Organomix 5t/ha in sowing + organomix 3t/ha (with nutrition) + bio-liquid 14l/ha (nutrition)	313,5±5,5	43,9	41,4	14,7	85,3	83,5
6	Bio-liquid 14 l/ha by wetting the planting material + organomix 5 t/ha (in sowing) + organomix 3 t/ha (nutrition)	357,0±6,6	45,2	41,8	13,0	87,0	95,4
7	N ₈₀ P ₈₀ K ₈₀ (in sowing) + N ₄₀ (nutrition)	292,5±5,7	42,4	39,0	18,6	81,4	80,2

In the favorable year of 2022, compared to the year 2021 with relatively unfavorable climatic conditions, both in the non-fertilized version, the levels of mineral and organic fertilizers and growth promoter effects in the structure of the potato crop are significantly different. If in 2022, the marketability of potatoes in the version without fertilization was 68.2%, the weight of marketable tubers was 63.4 g, then in 2021, those same indicators were 63.0% and 60.6 g, respectively. Compared to 2021, the marketability of potato tubers increased by 2.4-3.0%, and the average weight of commercial tubers increased by 1.9-2.9 g in the favorable year of 2022 in the variants that received organics, mineral fertilizers and growth stimulants. In general, the impact of this or that factor is evaluated not only by the criteria of the wet mass of the crop, but also the index of its dry matter content is also important.

The content of dry matter, starch and ascorbic acid (vitamin C) in potato tubers has an important production and economic significance. In that regard, we paid special attention to the study of the content of dry matter, starch, ascorbic acid (vitamin C) and nitrates in the tubers. According to the research results, it was found that the applied soil conditioners had a significant effect on the content of dry matter, starch, ascorbic acid and nitrates, as well as dry matter and starch content in the tubers (Tab. 3).

According to two-year average data, compared to the version without fertilization, the content of dry matter in potato tubers increased by 2.5-3.2%, the content of starch by 2.1-

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

3.4%, under the influence of mineral, organic fertilizers and growth promoter and ascorbic acid by 0.3-1.4%. It is noteworthy that the effect of the combined use of organomix and bio-liquid, as well as organomix and mineral fertilizers, has a more beneficial effect on the outcome of the mentioned indicators than the full combination of mineral fertilizers, which is confirmed by literature data [11,12].

Table 3

The effect of organo-mineral fertilizers and growth stimulants on the content and effectiveness of dry matter, starch and vitamin C in potato tubers (average data for 2021-2022)

N	Variants	Dry matter, %	starch, %	vitamin C, mg %	Outcome, c/ha		Nitrate content, mg/kg
					Dry matter	starch	
1	Checker (without fertilization)	20,3	15,8	9,6	29,7	23,1	75,0
2	Organomix 8t/ha one-time, in sowing	23,1	18,8	10,9	68,2	55,6	115,0
3	Organomix 10t/ha one-time, in sowing	23,3	18,7	10,8	71,2	57,1	170,0
4	Organomix 5t(in sowing) N ₃₀ P ₄₀ K ₄₀ (in sowing)+ N ₃₀ with nutrition	22,9	18,4	11,0	69,5	55,8	140,0
5	Organomix 5t/ha in sowing+ organomix 3t/ha (with nutrition)+bio-liquid 14l/ha (nutrition)	23,4	18,9	11,0	73,4	59,3	135,0
6	Bio-liquid 14L/ha wetting the planting material + organomix 5t/ha (in sowing)+organomix 3t/ha (nutrition)	23,5	19,2	10,9	83,9	68,5	140,0
7	N ₈₀ P ₈₀ K ₈₀ (in sowing)+ N ₄₀ (nutrition)	22,8	17,9	9,9	66,7	52,4	190,0

At the same time, it can be seen from the data in the table that although the combined use of organomix and bio-liquid did not have a significant effect on the content of dry matter, starch and ascorbic acid, the content of the mentioned substances increased due to the high yield. If the content of dry matter, starch and vitamin C in the version of one-time use of organomix was 23.1 mg %, 18.8 mg % and 10.9 mg %, respectively, then in the versions of organomix and bio-liquid, this indicator (version 6) was 23.5 %, 19.2% and 10.9%, but due to the high yield, dry matter content per 1 ha increased by 15.7 centners, and starch content by 12.9 centners.

Determination of nitrate content is considered the main indicator of potato quality assessment. It is known that the limit permissible concentration of nitrate content for potatoes grown in the open field is 250 mg in 1 kg of potato tubers.

As shown by the data of the "Soex" nitrate meter, which are given in tab. 3, the potato tubers obtained in our experiments with the use of organomix, mineral fertilizers and bio-liquid despite the comparison with the version without fertilization, where the content of nitrates is 75.0 mg/kg, of all options in the obtained harvest, the content of nitrates increased by 45-115 mg/kg, but everywhere their amount is within the limits of permissible limit concentration (PLC) (Fig. 1).

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

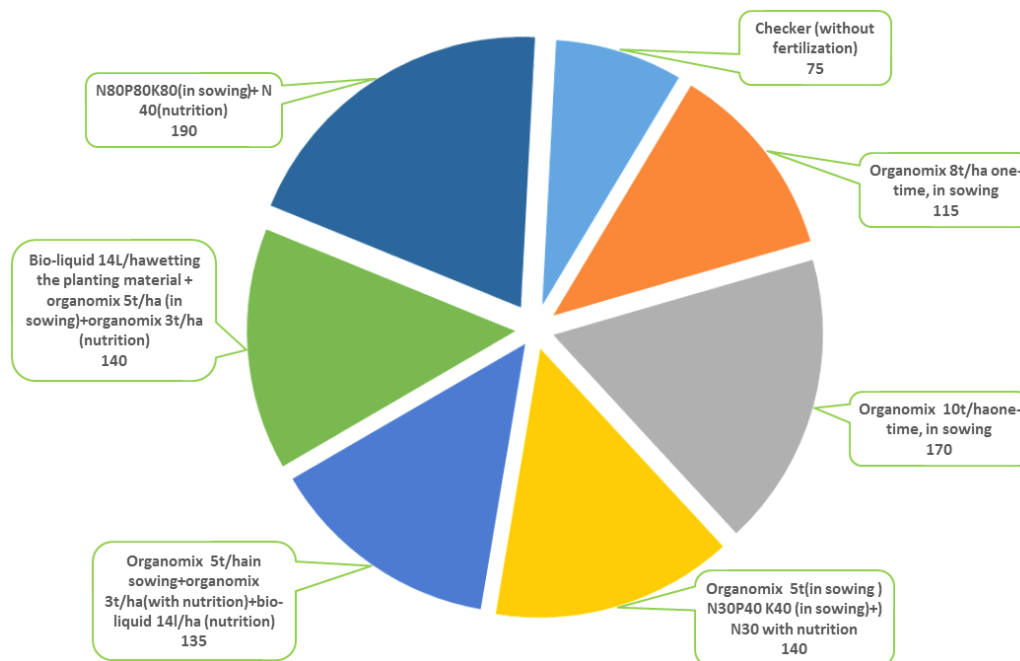


Fig. 1 Nitrate content, mg/kg

In other words, the used fertilizers and growth promoter contributed to the rapid germination of potato planting material, normal growth and development of plants, significantly increased the amount of potato crop cultivated in drought conditions, improved the marketability of tubers and ensured the production of ecologically safe food with high quality characteristics.

Conclusion

In post-forest brown soils of the Askeran region of the Republic of Artsakh, the one-time application of equivalent amounts of organic and mineral fertilizers to potato seedlings grown in drought conditions equally affected the growth, development, yield and marketability of potatoes, while the fractional or combined application of these fertilizers had a more beneficial effect on the aforementioned indicators of potatoes, than their one-time use.

Bio-liquid, as a growth stimulator, contributes to the rapid germination of potato seedlings, normal growth and development of plants. Soaking the tubers with bio-liquid of the same rate before planting significantly increases the amount of potato harvest, improves the marketability of the tubers, increases the content of dry matter and starch, and at the same time ensures ecologically safe high-quality potatoes.

Although in the variants of one-time and fractional application of equivalent doses of organomix and mineral fertilizers, compared to the variant without fertilization, the content of nitrates increased by 45-115 mg/kg, but their amount in the potato crop is within the limits of permissible limit density (PLD).

Due to the limitation and high cost of mineral fertilizers, in case of their absence, fertilize the potato fields with an organomix at the rate of 8t/ha, 60% of which-in sowing and 40%-with nutrition, process the potato planting material in advance (2-3 days before sowing) with a bio-liquid solution 14 l/ha and as a result, in drought conditions, a high-quality potato

V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

harvest of 350-360 c/ha will be provided, which is recommended to be invested in agricultural production.

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V.A. Aleksanyan, M.Sh. Mirzoyan, S.B. Galstyan, M.H. Galstyan

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**ՕՐԳԱՆԱՀԱՆՔԱՅԻՆ ՊԱՐԱՐՏԱՆՅՈՒԹԵՐԻ ԵՎ ԱՃԻ ԽԹԱՆԻՉԻ ԿԻՐԱՌՄԱՆ
ՏՆՏԵՍԱԵԿՈՒՈՒԳԻԱԿԱՆ ԱՐԴՅՈՒՆԱՎԵՏՈՒԹՅԱՆ ՈՐՈՇՈՒՄԸ ՆԱԽԱԼԵՌՆԱՅԻՆ
ԳՈՏՈՒ ՊԱՅՄԱՆՆԵՐՈՒՄ ՄՇԱԿՎՈՂ ԿԱՐՏՈՖԻԼԻ ՑԱՆՔԵՐՈՒՄ**

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Հոդվածում ներկայացված է ԱՀ Ասկերանի շրջանի հետանտառային շագանակագույն հողերում, անջրդի պայմաններում աճեցվող կարտոֆիլի դաշտերում օրգանահանքային պարարտանյութերի և աճի խթանիչի կիրառման ազդեցությամբ կարտոֆիլի բերքի քանակի, ապրանքայնության և որակական ցուցանիշների կրած փոփոխությունների վերաբերյալ կատարված ուսումնասիրությունների արդյունքները:

Երկամյա հետազոտություններով բացահայտվել է, որ չնայած օրգանական և հանքային պարարտանյութերի համարժեք չափաքանակների միանվագ կիրառությունը հավասարապես է ազդել կարտոֆիլի բերքի քանակի, ապրանքայնության և որակական ցուցանիշների վրա, սակայն այդ պարարտանյութերի կոտորակային կամ համատեղ կիրառությունը առավել բարերար է ազդել կարտոֆիլի նշված ցուցանիշների վրա, քան դրանց միանվագ կիրառությունը: Պարզվել է, որ օրգանոմիքսի և հանքային պարարտանյութերի համարժեք չափաքանակների միանվագ և կոտորակային, ինչպես նաև կենսահեղուկի կիրառման տարբերակներում, առանց պարարտացման տարբերակի համեմատությամբ, նիտրատների պարունակությունը ավելացել է 45-115 մգ/կգ-ով, սակայն դրանց քանակությունը կարտոֆիլի բերքում գտնվում է սահմանային թույլատրելի խտության շրջանակներում: Հանքային պարարտանյութերի սահմանափակության և

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թանկության պատճառով, կարտոֆիլի դաշտերը պարարտացնել 8 տ/հա նորմայով օրգանոմիքսով, որի 60%-ը՝ ցանքակից և 40%-ը սնուցմամբ, նախապես կարտոֆիլի տնկանյութը 2-3 օր ցանքից առաջ թրջել կենսահեղուկի (14 լ/հա նորմայով) լուծույթով և արդյունքում կապահովվի 350-360 գ/հա կարտոֆիլի բերք՝ օսլայի և ասկորբինաթթվի (վիտամին C) բարձր պարունակությամբ, որն էլ առաջարկվում է ներդնել գյուղատնտեսական արտադրությունում:

Բանալի բաներ. օրգանոմիքս, հանքային պարարտանյութ, կենսահեղուկ, կարտոֆիլ, չոր նյութ, օսլա, նիտրատներ:

ОПРЕДЕЛЕНИЕ ХОЗЯЙСТВЕННО-ЭКОЛОГИЧЕСКОЙ ПРОДУКТИВНОСТИ ОРГАНО-МИНЕРАЛЬНЫХ УДОБРЕНИЙ И ПРИМЕНЕНИЯ СТИМУЛЯТОРОВ РОСТА В ПОСЕВАХ ВОЗДЕЛЫВАЕМОГО КАРТОФЕЛЯ В УСЛОВИЯХ ПРЕДГОРНОЙ ЗОНЫ

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В статье представлены результаты исследований по изменению количества, качества продукции и качественных показателей урожая картофеля под влиянием применения органо-минеральных удобрений и стимуляторов роста на постлесных бурых почвах Аскеранского района в картофельные поля, выращенные в засушливых условиях. Двухлетними исследованиями установлено, что хотя разовое внесение эквивалентных количеств органических и минеральных удобрений в равной степени влияло на количество, качество продукции и качественные показатели урожая картофеля, дробное или комбинированное внесение этих удобрений оказывало более благотворное влияние на урожай картофеля, указанных показателей картофеля, чем их разовое применение.

Выявлено, что при разовом и дробном внесении органических и минеральных удобрений, а также вариантов внесения биожидкости по сравнению с вариантом без внесения удобрений содержание нитратов увеличивается на 45-115 мг/сут. кг, но их количество в урожае картофеля находится в рамках ограниченно допустимой плотности.

В связи с ограниченностью и дороговизной минеральных удобрений удобрить картофельные поля органической смесью из расчета 8 т/га, из которых 60% из семян и 40% из подкормки, посадочный материал картофеля предварительно замочить раствором биожидкости (14 л/га) за 2-3 дня до посева и в результате будет обеспечен урожай картофеля 350-360 ц/га с высоким содержанием крахмала и аскорбиновой кислоты, который предлагается вкладывать в сельскохозяйственное производство.

Ключевые слова: органомикс, минеральное удобрение, биожидкость, картофель, сухое вещество, нитраты, крахмал.

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