УДК 631.811.2.58
AGRIS P35
https://doi.org/10.33619/2414-2948/87/12

# EFFECTIVENESS OF APPLYING FERTILIZERS UNDER WATERMELON ON THE MEADOW-GREY SOILS IN MUGAN-SALYAN ZONE

***©Jafarov V.,*** *Ph.D., Institute of Soil Science and Agrochemistry, Baku, Azerbaijan,*
***©Mustafaev Z.,*** *Ph.D., Institute of Agriculture, Baku, Azerbaijan, zahid.mustafayev67@mail.ru*

# ЭФФЕКТИВНОСТЬ ВНЕСЕНИЯ УДОБРЕНИЙ В ЛУГОВО-СЕРОЗЕМНЫХ ПОЧВАХ ПОД АРБУЗОМ В МУГАНО-САЛЬЯНСКОЙ ЗОНЕ

***©Джафаров В. И.,*** *канд. с.-х. наук, Институт почвоведении и агрохимии, г. Баку, Азербайджан*
***©Мустафаев З. Х.,*** *канд. с.-х. наук, Научно-исследовательский институт земледелия, г. Баку, Азербайджан zahid.mustafayev67@mail.ru*

*Abstract.* The meadow-gray soils are one of the most widespread species in Azerbaijan territory, mainly in the Kur-Araz lowland, in Nakhchivan plain regions, in the Samur-Davachi valley. The meadow-gray soils irrigated in the Mugan-Salyan zone are most commonly used in the agricultural lands of the region. Agrochemical characterization of soils plays an important role in defining a number of its features, including fertility, degree of provision of certain nutrients, determination of soil condition reaction, timing, norms, methods and proportions of fertilizers under separate plantings. In this context, the soil under watermelons has been researched, and the agrochemical properties of meadow-gray soils have been studied. Apart from the nutritional properties of plants, it has a great impact on the efficient use of fertilizers in the soil. Soil is the main source of plant nutrients. Different soils contain different amounts of nutrients. The soil contains more nutrients than it needs to produce high yields. Fertilized soil with less moisture increases the yield of agricultural crops. This is explained by the fact that only some of the nutrients in the soil are used by plants. Many of them remain unused. The nutrients contained in the soil go into the form used by plants from time to time as a result of the biological and chemical processes involved. In this regard, it is necessary to determine the amount of nitrogen, phosphorus, potassium and other elements found in the soil and which plants can easily use to ensure proper nutrition. The main reason why plants do not meet their nutrients is the use of fertilizers. Given the biology of watermelon, soil-climatic conditions and agrotechnical methods in Azerbaijan, the optimal dose and timing of fertilizers can be enhanced and improved.

*Аннотация.* Лугово-сероземные почвы, являясь одним из наиболее широко распространенных на территории Азербайджана типов почв, в основном сосредоточены в Кура-Араксинской низменности, в предгорной равнине Нахичевани и в Самур-Дивичинской низменности. Орошаемые лугово-сероземные почвы в Мугано-Сальянской зоне, чаще всего используются под посевы сельскохозяйственных культур. Агрохимическая характеристика почв играет важную роль в установлении ряда ее особенностей, включая плодородие, степень обеспеченности отдельными питательными элементами, определении реакции почвенной среды, сроков, норм, методов и соотношений внесения удобрений под отдельными культурами. В связи с этим проведены исследования на орошаемых лугово-сероземных почвах под арбузом и изучены агрохимические показатели исследуемой почвы. Удобрения оказывают большое влияние не только на питание растений, но и в эффективном обеспечении почвы питательными

Т. 9. №2. 2023
https://doi.org/10.33619/2414-2948/87

элементами. Почва является основным источником питательных веществ для растений. Различные почвы содержат неодинаковое количество питательных веществ. Почва содержит больше питательных веществ, чем необходимо для получения высоких урожаев. Но даже внесение небольшого количества удобрений способствует повышению урожайности сельскохозяйственных культур. Это объясняется тем, что из почвы растения используют для своего развития только небольшое количество питательных веществ. Большая часть питательных элементов остается неиспользованной. Вследствие проходящих время от времени в почве химических и биологических процессов питательные элементы, содержащие в почве, переходят в усвояемые растениями формы. В связи с этим, для правильного обеспечения растений питательными элементами необходимо установить содержание в почве азота, фосфора, калия и других питательных элементов. Для удовлетворения растений не достающими питательными элементами необходимо вносить удобрения. Учитывая биологические особенности арбуза, почвенно-климатические условия и агротехнические приемы возделывания арбуза в Азербайджане, установление оптимальной дозы и срока внесения удобрений могут способствовать увеличению урожайности и качества продукции. Регулируемые человеком внесение удобрений и проведение орошения, способствующие повышению урожайности арбузов, с агротехнической точки зрения очень важны. Принимая во внимание биологические особенности сортов и гибридов, применением минеральных и органических удобрений можно получить высокие урожаи культуры.

*Keywords:* organic fertilizers, inorganic fertilizers, *Citrullus lanatus*, phosphorus, potassium, crop yield, soil, indicators.

*Ключевые слова:* органические удобрения, минеральные удобрения, арбузы, фосфор, калий, урожайность, почва, индикаторы.

Agriculture is a mechanism of sustainable culturalization of natural resources. Scientific achievements create great material and technical changes in agriculture. In addition, opposite processes occur, which have a negative effect on natural components. Therefore, the prospects for the development of agricultural production and the socio-economic interests of society require the optimization of the entire system of nature use, the timely assessment of negative effects on the environment [2, 7].

Providing people with food products is one of the important tasks facing agricultural producers. Today, although the production of food products in the world is continuously increasing, this problem has not been completely solved.

The importance of organic and mineral fertilizers in obtaining high and quality products from agricultural crops is very great. If fertilizers are used correctly, even from the weakest soils, stable and high yields can be obtained. At present, 50-60% of agricultural products are purchased at the expense of mineral fertilizers applied to the soil.

From this point of view, it is very important to create a reliable food supply for the population, improve the fertility of the soil, increase the production of vegetables and melons, provide the population with quality food, and meet the needs of the commodity and canning industry [6].

In order to provide the population with food, it is of great importance to create an abundance of agricultural crops, including vegetables and melons.

Watermelon plants play a major role in providing the population with high-quality food products. Planting and production of melon plants in our republic is increasing year by year, but productivity is not satisfactory. As we know, productivity is the result of the interaction of internal

Т. 9. №2. 2023
https://doi.org/10.33619/2414-2948/87

and external environmental factors, that is, the unity of soil and weather factors with the main physiological processes in plants during the growing season determines the level and quality of the crop. Therefore, in order to increase the quantity and quality of the product, it is necessary to try to adjust all the influencing factors [9].

Kura-Araz lowland is the most valuable agricultural object of the republic. Favorable natural conditions have created a wide opportunity for the development of agriculture in these areas since ancient times [5].

In this regard, agrochemical characterization of soils under melon plants in irrigated grass-gray soils of the Mugham-Salyan zone, studying the effects of mineral and organic fertilizers on plants are important issues.

In order to increase the productivity of plants, it is an urgent matter to study the relevant agrotechnical rules, first of all, the correct application of organic and mineral fertilizers.

Improper assessment of the fertilizer rate during the application of mineral fertilizers, in particular, the failure to correctly and timely application of nitrogen fertilizer rates, causes plants to grow more biologically and, as a result, the quantity and quality of the product decrease [4, 10].

In addition, the application of high doses of mineral fertilizers to the soil leads to the accumulation of nitrites and nitrates in the fruits, and at the same time causes pollution of the environment.

Therefore, it is very important to find the right ratio of mineral fertilizers and apply them together with organic fertilizers in melon crops.

When applying fertilizers, we should try to ensure that the efficiency of fertilizers is high, that the amount of dry matter, sugars, and vitamins, which are the indicators of product quality, should be in focus, and that the amount of nitrites and nitrates from harmful nitrogen compounds should not exceed the permissible limit. To achieve these indicators, it is appropriate to apply mineral fertilizers with an equivalent amount of organic fertilizers to provide the watermelon plant with a good food and water regime, while keeping the soil moisture under control. In order to obtain a high and quality product, it is very important to apply high agrotechnical measures of optimal nutrient elements and water regime in watermelon cultivation.

Watermelon is one of the widely distributed and popular plants in our country. Its fruits are rich in iron salts, vitamins and sugars, mainly glucose, fructose, and sucrose, which are necessary for the human body. The color of the lace is related to the presence of venotin and lycopene pigments in them. In addition, the fruits contain pectins.

Watermelon has medicinal value. Thus, the iron salts and folic acid contained in it are of great importance in the treatment of diseases of the cardiovascular system, kidney, liver, blood and nerves [9].

In addition, watermelon is irreplaceable for canning and use. Its juice is a raw material for the preparation of refreshing and tonic drinks.

## *Materials and Methods*

In 2017-2019, field experiments were carried out with watermelon plants in the Mugan-Salyan zone, in the territory of Azadkend municipality of Saatli administrative district.

Experiments were carried out in 6 variants in 4 repetitions, and the area of each block was 50 $m^2$.

From mineral fertilizers, ammonium salt (active substance 33.3%) was used as a nitrogen fertilizer, simple superphosphate (active substance 18%) was used as a phosphorus fertilizer, and potassium sulfate (active substance 51%) was used as a potassium fertilizer. Semi-decomposed organic fertilizers (containing 0.5% nitrogen, 0.3% phosphorus and 0.6% potassium) were used.

Т. 9. №2. 2023
https://doi.org/10.33619/2414-2948/87

In order to study the agrochemical properties of the area, soil samples were taken from the 0-20, 20-40, 40-60, 60-80 cm layers of the soil using the envelope method, and the environmental response of the soil — pH (in water suspension) was measured in a potentiometer device, total humus (I. B. Tyurin), total nitrogen (Keldal), total phosphorus (K. E. Ginzburg), total potassium (P. K. Smith) were determined.

In order to study the dynamics of nutrient elements in the study, the following chemical analyzes were carried out by taking soil samples at three stages during the vegetation period of plants: flowering, in other words, when 6-10 leaves are formed on the plant, during the period of fruit formation and at the end of vegetation (from depths of 0-25−25-50 cm). Absorbed ammonia ($N\text{-}NH_4$) was analyzed by D. P. Konev, nitrate nitrogen ($N\text{-}NO_3$) by Grandval-Liege, activated phosphorus (dissolved in 1% ammonium carbonate) by Machig, and exchangeable potassium by Protosov's method modified by J. Huseynov.

Product report on variants was made by Mesheryakov's ritazi calculation method.

Crimson Cvit variety of watermelon plant was used in the experiment. This variety is one of the fast-growing hybrid varieties. In practice, the agrotechnical care of the plants was carried out in accordance with the accepted agro-rules for the watermelon plant, with the exception of the norm of fertilizers.

## *Results and Discussion*

The Kura-Araz plain is an open wide depression that separates one of the Greater and Lesser Caucasus mountains from the other and extends from the east to the Caspian Sea. In a large part of the plain, the elevation of the earth's surface is below absolute zero, that is, below the level of the world ocean, and falls to minus 25.6 m near the Caspian Sea. It rises to 150-200 m in the foothills of the Greater and Lesser Caucasus, the slope is from the foothills of the mountains to the center of the plain, and then towards the sea, and varies from 0.05 to 0.0001. Its area is 2.2 million hectares. The slopes of the Greater and Lesser Caucasus are divided into large natural regions — plains by the Kura-Araz rivers and other small rivers. Mugan Plain — 478.4 thousand ha; Salyan Plain — 149 thousand ha, Karabakh Plain — 324.7 thousand ha, Mil Plain — 368.7 thousand ha and Shirvan Plain — 858.7 thousand ha.

The plain is surrounded by mountains on three sides. Therefore, the lowland is characterized by a hot climate. The summer here is dry and hot, and the winter is mild and has little snow. According to the temperature regime, it is subtropical, the average annual temperature is positive 12.5-14.6$^0$C. The amount of annual precipitation does not exceed 215-310 mm. The average monthly relative humidity of the air is high, it varies between 75-80% [7, 8].

The vegetation of the Kura-Araz lowland is diverse in terms of its composition, it is characterized by its own characteristics and belongs to the semi-desert type due to its climate. Vegetation mainly consists of wormwood, salt grass and meadow grass. The soils of the Kur-Araz lowland mainly belong to the gray soil type. The most widespread semi-type is grass-gray (3.0 m groundwater depth) soils [3].

A subtropical semi-desert climate with warm and frost-free winters and dry and hot summers is typical for areas where grass-gray soils are spread. According to the granulometric composition, the grass-gray soils are clayey and loamy. These soils contain appreciable amounts of readily soluble salts. According to the amount of nutrients, the irrigated grass-gray soils are moderately supplied. The absorption capacity of irrigated grass-gray soils is high [6].

In the agricultural crops of the region, mostly irrigated soils, including grass-gray soils, are used. From this point of view, research was conducted under the watermelon plant in those lands, and the agrochemical characteristics of grass-gray soils were studied.

Т. 9. №2. 2023
https://doi.org/10.33619/2414-2948/87

The agrochemical characterization of soils plays an important role in determining a number of its characteristics, including fertility, the degree of provisioning with individual nutrients, determination of the soil's environmental response, and determination of the time, norms, methods and proportions of fertilizers under individual crops. Grass-gray soils are one of the most widespread soil types in the territory of the Republic of Azerbaijan and are mainly distributed in the Kura-Araz plain, in the plain regions of Nakhchivan MR, and in the Samur-Devachi plain [2, 3].

The agrochemical characteristics of irrigated grass-gray soils in Mugan-Salyan region are given in Table 1.

Table 1

AGROCHEMICAL CHARACTERISTICS OF EXPERIMENTAL FIELD SOILS

| *depth, in cm* | *Total humus, %* | *Total nitrogen, %* | *N-$NH_4$ mg/kg* | *N-$NO_3$ mg/kg* | *Total phosphorus, %* | *Active phosphorus, $P_2O_5$ mg/kg* | *Total potassium, %* | *Exchangeable potassium, $K_2O$, mg/kg* | *pH water is suspended* |
|---|---|---|---|---|---|---|---|---|---|
| 0-20 | 2,19 | 0,14 | 14,78 | 8,92 | 0,13 | 20,64 | 3,44 | 250,75 | 8,0 |
| 20-40 | 1,53 | 0,12 | 10,64 | 7,21 | 0,10 | 16,40 | 2,56 | 215,57 | 8,3 |
| 40-60 | 0,92 | 0,11 | 17,61 | 4,05 | 0,08 | 10,07 | 1,74 | 168,30 | 8,1 |
| 60-80 | 0,73 | 0,08 | 7,23 | 2,12 | 0,07 | 5,05 | 1,55 | 121,60 | 8,4 |

As can be seen from the table, it was determined from the analysis of the samples taken from the 0-80 cm soil layer of the area where the field experiments will be conducted that the soils in the research area are poorly supplied with nutrients.

As can be seen from the obtained results, the reaction of the soil solution is weakly alkaline, the pH fluctuates between 8.0-8.4.

As a result of the research, it was determined that the total nitrogen in the 0-20-60-80 cm layer of the soil varies between 0.14-0.08. In general, the amount of nutrients decreases in the lower layers.

The amount of absorbed ammonia nitrogen (N-$NH_4$) was 14.78 and 10.64 mg/kg in the crop and sub-crop layers, but these indicators fluctuated between 17.61-7.23 in the deeper layers of the soil. In irrigated grass-gray soils, nitrogen in nitrate form is insufficient.

If the amount of N-$NO_3$ in the planting layer of the soil was 8.92 mg/kg in the top layer, this indicator was found to be 7.21-4.05 ml/kg in the 40-60 cm layer and 2.12 mg/kg in the 80 cm layer.

The amount of phosphorus and potassium in irrigated grass-gray soils was studied. The amount of total phosphorus in the 0-80 cm soil layer was 0.13-0.07%, and the amount of total potassium fluctuated between 3.44-1.55%. In those soils, the forms of phosphorus and potassium absorbed by plants are not enough in the soil. Thus, the amount of mobile phosphorus (according to Machigin) in the planting layer was 20.64-5.05 in the layer of 0-80 cm, the amount of exchangeable potassium was 250.75-121.60 mg/kg, and the indicators decreased in lower layers. .

Productivity is the result of biological and biochemical processes in the plant body and is highly dependent on species diversity, biological characteristics of varieties and environmental factors [9].

Fertilizers and irrigation are the external environmental factors that have the greatest effect on the productivity of the watermelon plant and are easily controlled by humans.

K. A. Tmiryazyev shows that in order to get a high yield, it is necessary to first learn the demand of the plant and be able to satisfy it [1].

Т. 9. №2. 2023
https://doi.org/10.33619/2414-2948/87

The growth and development of plants is closely related to its living conditions. The most important external conditions for plant development is the food environment. Plants have different requirements for different nutrients for their growth and development.

Michurin proved that by changing the nutrition of a plant, it is possible to influence not only its yield, but also to change its nature in a way that is beneficial for humans.

In addition to the nutritional properties of plants, it has a great impact on the effective application of fertilizers in the properties of the soil. Soil is the main source of mineral nutrients for plants. The amount of nutrients varies in different soils. To obtain a high yield, the soil has more nutrients than it needs. Fertilizer applied to the soil with low rates increases the yield of agricultural plants more. This is explained by the fact that only a part of the nutrients in the soil is used by plants. Most of it remains unused. As a result of ongoing biological and chemical processes, the nutrients in the soil are transformed from time to time into the form used by plants. Therefore, it is necessary to determine the amount of nitrogen, phosphorus, potassium and other elements that are in the soil and that are easily used by plants in order to ensure proper nutrition of plants.

In order to obtain a high and stable yield, it is necessary to increase the level of agrotechnics in order to know the nutrient requirements of plants and to increase the effectiveness of fertilizers applied to the soil [1].

The human-controllable external environmental factors that affect the productivity of watermelon plants are fertilizers and irrigation, which are very important from an agrotechnical point of view. Taking into account the biological characteristics of varieties and hybrids, it is possible to obtain a high yield from plants by applying mineral and organic fertilizers. However, taking into account the biological characteristics of the watermelon plant, it is impossible to get the desired result if optimal irrigation is not applied, that is, if there is no mutual optimal relationship between fertilizers and irrigation.

It is worth noting that irrigation at an optimal rate significantly improves the assimilation of organic and mineral fertilizers by plants [9].

Vegetables and melons are very demanding on heat and humidity.

The yield of watermelon varieties can vary greatly depending on soil and climate conditions. Thus, the productivity of the Biryuchekutskiy 775 variety was 400-800 cents/ha in the Krasnodar region, 110 cents/ha in the Tovuz-Gazakh, Ganja zone, 172 cents/ha in the Guba-Khachmaz zone, and 177 cents/ha in the Absheron plain [9].

Mineral and organic fertilizers are the most active environmental factors affecting the productivity of the watermelon plant.

From the conducted studies, it was found that under optimal irrigation conditions, the biological mass of the watermelon plant increases at the same time as productivity. The application of mineral and organic fertilizers has a positive effect on the quality indicator of the product by increasing the number of fruits.

It should be noted that the weight of the fruits increased as the fertilizer doses increased. The combination of mineral and organic fertilizers accelerated the formation and growth of fruits.

As a result of the research, it became clear that giving high doses of mineral fertilizers increased the vegetative organs of the plant, and on the contrary caused the weakening of the development of the generative organs.

This happens as a result of the fact that mineral fertilizers cause a disturbance in the distribution of plastic substances formed in the process of photosynthesis among plant organs. That is, those plastic substances cause excessive growth of leaves, stems and stems [9].

In the conducted research, the observed effect of different norms and ratios of mineral and organic fertilizers on the growth and development of watermelon plant was reflected in the

productivity. It is characterized by the direct and rapid effect of nutrients on plant productivity during the application of mineral and organic fertilizers. Organic fertilizers enrich the soil with all the nutrients necessary for plant nutrition, improve its water-physical properties, agrochemical properties, and at the same time enrich the soil with beneficial microorganisms and accelerate the entry of mineral nutrients into the plant [11].

Considering that the organic fertilizer rate per hectare is not sufficient in our republic at present, it is considered effective to replace a part of the required organic fertilizer rate with an equivalent amount of mineral fertilizer. On the one hand, it is used to eliminate the shortage of organic fertilizers, but on the other hand, the combined application of fertilizers (mineral and organic) is used as an effective tool for increasing soil fertility and increasing plant productivity.

The influence of the application of mineral and organic fertilizers on the productivity of the watermelon plant in irrigated grass-gray soils was studied in field experiments. The effect of mineral and organic fertilizers on the productivity of the watermelon plant is given in table 3 (3-year average productivity). As can be seen from the table, the application of mineral and organic fertilizers separately, as well as their joint application in different rates and proportions, had different effects on the productivity of the watermelon plant. Thus, according to the results of a 3-year study, the application of mineral and organic fertilizers, regardless of their high or low rates, had a positive effect on the productivity of the watermelon plant, and the lowest productivity was recorded in the control (without fertilizer) option. During the separate application of mineral fertilizers at the rate of Fon + $N_{120}$, the three-year average productivity is 298.2 s/ha, the increase is 79.9 s/ha in the control (without fertilizer) option, the average productivity in the option with Fon+$N_{30}$+16 t/ha manure is 380.9 s/ha control (compared to the no-fertilizer option) increase was determined to be 220.6 s/ha.

Thus, the highest productivity was determined in the field experiment conducted in the variant where Fon+$N_{30}$+16 t/ha manure was applied during the joint application of mineral and organic fertilizers to increase the productivity of the watermelon plant.

Table 2

THE EFFECT OF APPLYING FERTILIZERS ON THE PRODUCTIVITY OF THE WATERMELON PLANT IN IRRIGATED GRASS-GRAY SOILS
(2017-2019, 3-year average productivity)

| *Experiment options* | *Yield s/ha* | | | *3-year average yield* | *increase s/ha* |
|---|---|---|---|---|---|
| | *2017* | *2018* | *2019* | | |
| No fertilizer (control) | 196,7 | 162,1 | 122,1 | 160,3 | |
| P90K60-Fon | 240,1 | 249,6 | 230,8 | 240,2 | 79,9 |
| Background | 308,2 | 296,1 | 289,7 | 298,2 | 137,9 |
| Fon+N60+ 12 t/ha manure | 343,1 | 371,4 | 375,2 | 363,2 | 202,9 |
| Fon+N30+ 16 t/ha manure | 381,4 | 372,2 | 389,1 | 380,9 | 220,6 |
| Fon+20 t/ha manure | 295,3 | 296,0 | 296,5 | 295,5 | 135,2 |

## *Conclusion*

1. The agrochemical properties of grass-gray soils of Mughan-Salyan region were studied and it was determined that nitrogen, phosphorus and potassium elements are poorly supplied in the 0-80 cm layer of the soil in their general and modified forms.

2. The amount of ammonia nitrogen (N-$NH_4$) absorbed in the sown and subsoil layer of grass-gray soils is 14.78-7.23 mg/kg; the amount of nitrate nitrogen (N-$NO_3$) is 8.92-2.12 mg/kg; activated phosphorus (according to Machigin) $P_2O_5$ 20.64-5.05; and the amount of exchangeable potassium $K_2O$ was determined to be 250.75-121.60 mg/kg.

3. Giving mineral fertilizers together with manure under the watermelon plant restores soil fertility by playing an important role in increasing humus, nitrate and ammonia nitrogen, active phosphorus and exchangeable potassium in the soil layer and sub-soil layer, and creates a basis for high and stable harvest.

4. During the joint application of mineral and organic fertilizers in increasing the productivity of the watermelon plant, a higher productivity was determined than the variant in which Fon+$N_{30}$+16 t/manure was applied. According to the results of the three-year study, the average productivity in the Fon+$N_{30}$+16 t/manure option was 380.9 s/ha, and 220.6 s/ha in the control without fertilizer.

*References:*

1. Abdullaev, Kh. & Gulakhmadov, Kh. (1956). Pitanie i udobrenie rastenii. Baku. (in Russian).

2. Babaev, M. P., Mamedov, G. M., & Eiyubova, S. M. (2010). Rol' agrokhimicheskikh issledovanii pochv Azerbaidzhana v reshenii problemy prodovol'stvennoi bezopasnosti. In *Sbornik nauchnykh trudov,* Baku. (in Azerbaijani).

3. Dzhafarov, M. I. (2006). Svoistva pochvy i primenenie udobrenii. Baku. (in Azerbaijani).

4. Dzhafarov, V. I. (2014). Rol' mineral'nykh i organicheskikh udobrenii v povyshenii produktivnosti ovoshchnykh rastenii. In *Rol' molodykh uchenykh v sel'skom khozyaistve: problemy i vozmozhnosti: Materialy respublikanskoi nauchnoi konferentsii,* Baku. (in Azerbaijani).

5. Dzhalilova, L. Z. (2013). Nekotorye pokazateli pochv Muganskoi ravniny opytnogo uchastka. *Pochvovedenie i zemledelie, 21*(3), 562. (in Azerbaijani).

6. Gasanov, Yu. Ch. (2013). Monitoring agrofizicheskikh svoistv oroshaemykh zemel' Azerbaidzhana. Baku. (in Azerbaijani).

7. Movsumov, Z. R. (2011). Plodorodie pochv Azerbaidzhana, ispol'zovanie mineral'nykh udobrenii i uroven' produktivnosti rastenii. In *Sbornik nauchnykh trudov, 1*(20). (in Azerbaijani).

8. Madatzade, A. A., & Shikhlinskii, A. M. (1968). Klimat Azerbaidzhana. Baku, 16-30. (in Russian).

9. Yusifov, M. (2004). Fiziologiya arbuza. Baku. (in Azerbaijani).

10. Zamanov, P. B. (2013). Agrokhimicheskie osnovy deistviya elementov pitaniya i udobrenii na svoistva pochvy i produktivnost' rastenii. Baku. (in Azerbaijani).

11. Asadov, Sh. D. (1975). Effektivnost' udobrenii pod plody pochvy razlichnykh pochvenno-klimaticheskikh uslovii Azerbaidzhanskoi SSR: Avtoref. … d-r s.-kh. nauk. Baku. (in Russian).

*Список литературы:*

1. Абдуллаев Х. Гулахмадов Х. Питание и удобрение растений. Баку, 1956. 105 с.

2. Бабаев М. П., Мамедов Г. М., Эйюбова С. М. Роль агрохимических исследований почв Азербайджана в решении проблемы продовольственной безопасности // Сборник научных трудов. Баку, 2010. 269 с.

3. Джафаров М. И. Свойства почвы и применение удобрений. Баку, 2006. 156 с.

4. Джафаров В. И. Роль минеральных и органических удобрений в повышении продуктивности овощных растений // Роль молодых ученых в сельском хозяйстве: проблемы и возможности: Материалы республиканской научной конференции. Баку, 2014. 122 с.

5. Джалилова Л. З. Некоторые показатели почв Муганской равнины опытного участка. // Почвоведение и земледелие. 2013. Т. 21. №3. С. 562.

6. Гасанов Ю. Ч. Мониторинг агрофизических свойств орошаемых земель Азербайджана. Баку: Вяз, 2013. 286 с.

7. Мовсумов З. Р. Плодородие почв Азербайджана, использование минеральных удобрений и уровень продуктивности растений // Сборник научных трудов. 2011. Т. 1. №20.

8. Мадатзаде А. А., Шихлинский А. М. Климат Азербайджана. Баку, 1968. С. 16-30.

9. Юсифов М. Физиология арбуза. Баку, 2004. 216 с.

10. Заманов П. Б. Агрохимические основы действия элементов питания и удобрений на свойства почвы и продуктивность растений. Баку, 2013. 266 с.

11. Асадов Ш. Д. Эффективность удобрений под плоды почвы различных почвенно-климатических условий Азербайджанской ССР: Автореф. … д-р с.-х. наук. Баку, 1975. 64 с.

*Работа поступила*
*в редакцию 09.01.2023 г.*

*Принята к публикации*
*21.01.2023 г.*

*Ссылка для цитирования:*

Jafarov V., Mustafaev Z. Effectiveness of Applying Fertilizers Under Watermelon on the Meadow-Grey Soils in Mugan-Salyan Zone // Бюллетень науки и практики. 2023. Т. 9. №2. С. 98-106. https://doi.org/10.33619/2414-2948/87/12

*Cite as (APA):*

Jafarov, V., & Mustafaev, Z. (2023). Effectiveness of Applying Fertilizers Under Watermelon on the Meadow-Grey Soils in Mugan-Salyan Zone. *Bulletin of Science and Practice, 9*(2), 98-106. https://doi.org/10.33619/2414-2948/87/12