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AGROECOLOGICAL CHARACTERISTICS AND FERTILITY MANAGEMENT OF GRAY-BROWN SOILS UNDER VINEYARDS IN THE SAMUKH REGION

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Relevance and degree of completion of the topic. One of the most important environmental problems in modern times is the development of a scientific basis for strategies to protect and increase soil fertility. The development of viticulture and the preservation of vineyards in Azerbaijan are among the issues included in this problem. The “State Program for the Development of Viticulture in the Republic of Azerbaijan for 2012-2020” approved by the Decree of the President of the Republic of Azerbaijan Mr. I.H Aliyev dated December 15, 2011 No. 1890 states that viticulture and winemaking are among the agro-industrial sectors. Taking a special place, it is important for the country's economy in terms of value added and economic efficiency.

According to the State Statistics Committee, the total area of vineyards in Azerbaijan in 2019 is 16061.2 hectares, production 201842.4 tons and average productivity 104.8 s/ha, and in Ganja-Gazakh economic region 75074.9 tons of grapes from 4041.1 hectares the average productivity was 150.7 s/ha, 1024.2 ha, 11624.9 tons and 123 s/ha, respectively, in Samukh region. [www.stat.gov.az, 2019].

Much of the grapes are used as raw material for the wine and canning industries. Grape products are used fresh, dried, for food, various wines: table, dark, dessert, champagne, cognac, grape juice, various non-alcoholic products, etc. When the grapes are fully ripe, they contain 65-85% water, up to 35% glucose and fructose (a small amount of sucrose), 0.5-1.4% organic acids (wine, apple, etc.), 0.15-0, Contains 9% protein, 0.3-1.0% pectin, 0.3-0.5% minerals (potassium, calcium, phosphorus, etc.) and some vitamins. 100 g of grapes contain 0.02-0.12 mg A (carotene), 0.25-1.25 mg B (thiamine-aneurine), 0.43-12.2 mg C (ascorbic acid) and a very small amount of B2. Contains vitamins (ribophlavin), B6 (adermin), P (citrine), PP (nicotinic acid). 1 kg of grapes with a sugar content of 17% is equivalent to 1190 grams of potatoes, 1105 grams of milk, 387 grams of meat and 227 grams of bread in terms of calories [11, s.151-153].Samukh region occupies one of the main places in the

production of agricultural products in the country, including grape production. For this purpose, the study of agro-ecological properties of subsoil soils, the current state of fertilization, increasing the efficiency of fertilizers, the impact of soil fertility management on grape productivity, quality, sustainable development and ecological assessment of soils is one of the current scientific and theoretical problems.

Method and subject of research. Obtaining ecologically safe grape products with the application of grape plants, soil cover, mineral and organic fertilizers in the territory of Samukh region, analysis and assessment of ecological situation.

The purpose and tasks of the research. The main purpose of the study is to determine the scientific management of soil fertility and agro-ecological assessment of soils in the gray-brown soils irrigated in the Samukh region to obtain high and quality environmentally friendly products from grapes.

According to the purpose of the research, the following tasks are proposed:

-study of soil-climatic and ecological conditions of the area on the basis of literature data;

-study of agrochemical and basic physical and chemical properties of experimental lands;

-study of the effect of fertilizers on the main indicators of soil fertility by the development phases of the grape plant;

-study of the effect of fertilizers on the accumulation of nutrients in the grains of the grape plant;

-study of the effect of fertilizers on the development, structure, indicators and production of environmentally friendly products of grapes;

-study of the effect of nitrogen, phosphorus, potassium balance and fertilizers on the absorption of nutrients by grapes;

-ecological assessment of vineyards on a scientific and theoretical basis and determination of economic efficiency.

Research methods. The researches were carried out in 2015-2017 on irrigated gray-brown soils formed in the territory of “Amin”

production company operating in Karayeri settlement of Samukh region with “Tabrizi” grape variety in the following scheme:

1. Control (without fertilizer) 2. Manure 10 t / ha (background); 3.Background+$N_{60}P_{90}K_{60}$; 4.Background+$N_{90}P_{120}K_{90}$; 5. Background + $N_{120}P_{150}K_{120}$. The experiments were performed in 4 repetitions. The area of each unit is 240m^2 (20x12m) and consists of 4 rows, with 39 bushes recorded in each section of the reported 180 m2 (20x9m). The planting scheme is 3,5x1,5m and the age of the garden is 7 years. The vines are mounted on wires attached to vertical supports, the arrangement of the bushes is multi-branched and fan-shaped. Field experiments were carried out in the field, soil and plant samples were analyzed in the laboratory.

Nitrogen-ammonium nitrate 34.7%, phosphorus-simple superphosphate 18.7% and potassium-potassium sulfate 46%, and manure in the decomposed state (nitrogen 0.5%, phosphorus 0.25) %, potassium 0.6%) were used. Manure, phosphorus and potassium fertilizers are applied at full rate every year in the autumn-winter season before intercropping, 50% of nitrogen in the spring when shoots are formed, and 50% in the inter-row feeding in the budding-flowering phase. Agro-technical measures adopted for Ganja-Gazakh region were carried out in the field of practice. 0-30 from 5 places in the field before fertilizing; 30-60; Soil samples were taken from layers of 60-100 cm, samples were mixed, beaten in a porcelain bowl and analyzed through a sieve with a diameter of 1 mm. In order to determine the mobile forms of nutrients in the soil from 3 places (beginning, middle and end) of I and III repetitions on plant development phases, mixed samples from 0-30 and 30-60 cm layers were taken in all variants, phenological observations were made in 25 branches.

In soil samples taken: pH potentiometer, humus according to I.V Tyurin, absorbed ammonia D.P.Konev, water-soluble ammonia calorimeter with the help of Nesler reagent, nitrate nitrogen Grandval-Lyaju, total nitrogen, total phosphorus C.E.Keldala and G.M.Sheglov, according to Machig's method, water-soluble phosphorus was determined by Deniz, total potassium by Smith,

water-soluble potassium by Alexandrov, exchangeable potassium by P.B.Protasov in a flame photometer, granulometric composition by N.A.Kachinsky modification by pipette, absorbed bases by K.K.Hedroys method.

In plant samples: absolute dry matter in a thermostat at 105 $_{o}$ C, total nitrogen, phosphorus and potassium according to K.E.Ginsburg, G.M.Sheglova and E.V.Vulfus, sugar in a hydrometer, vitamin C according to I.K Murry, titration with alkaline acid-malic acid, nitrates in ionometer (EV-74), determination of heavy metals was performed by atomic adsorption spectroscopy.

Ecological assessment of lands was carried out according to the methods of academician G.Sh.Mammadov and professor S.Z.Mammadova.

The results of field experiments, calculation of productivity, accuracy of experiment, mathematical analysis of correlative relations, economic efficiency were performed by V.N Peregudov, B.A Dospekhov, P.N Konstantinov and N.N Baranov methods.

Main points presented to the defense of the dissertation:

1. Changes in ammonia and nitrate nitrogen, mobile phosphorus and metabolic potassium absorbed in the soil according to the developmental phases of application of fertilizers under grape crops effect on nutrient accumulation in breast and monocotyledonous shoots;
2. Ecologically safe product and quality of grape plant;
3. Balance and ecological assessment of vineyards;
4. Economic efficiency.

Scientific novelty of the research. For the first time in the Samukh region, the effectiveness of mineral fertilizers in manure on the basis of agrochemical and agro-ecological assessment for the scientific management of soil fertility under vines. norms and economic balance were determined, the effect of fertilizers to obtain a safe ecological product was studied. Ecological assessment of vineyards was carried out, correction coefficients on productivity on the basis of fertilizer norms, total number of shoots, number of barley

shoots, final ecological points and final ecological price scale of soils identified.

Theoretical and practical significance of the research. It was found that the application of mineral fertilizers in the background of manure has a significant impact on the productivity and quality of grapes. Thus, the application of fertilizers at the rate of 10 t / ha (background) + $N_{90}P_{120}K_{90}$, increased the grape yield to an average of 172.5 s/ha in 3 years, growth control (without fertilizers) It was 59.5 s/ha or 71.7%. At the same time, the quality of the product increased compared to the non-fertilized version, and the amount of nitrates was lower than the allowable level (60 mg / kg in wet weight). Ecologically safe product was purchased.

Object of research. Experimental work was carried out in 2015-2017 on irrigated gray-brown soils with the grape variety "Tabrizi" in the production company "Amin" operating in Karayeri settlement of Samukh region in the following scheme: 1.Control (without fertilizer); 2.Manure 10 t/ha (background); 3. Background + $N_{60}P_{90}K_{60}$; 4.Background +$N_{90}P_{120}K_{90}$; 5. Background + $N_{120}P_{150}K_{120}$. The experiments were performed in 5 variants and 4 repetitions. The area of each unit is 240 m^2 (20m long x 12m wide) and consists of four rows (one outer guard, three internal reports), the reported 180 m^2 (20m x 9m) There are 39 branches in each section. The planting scheme is 3.0x1.5 m and the age of the garden is 7 years. The vines are mounted on wire rods attached to vertical supports, and the placement of the bushes is multifaceted and fan-shaped.

Approbation and application of research work. The results of the research were presented at the Department of Ecology of the Azerbaijan State Agrarian University, the Scientific Council of the Faculty of Agronomy (2015-2019), Ganja State University. International scientific conference on "Actual problems of economic sciences" (Ganja, 04-05 May 2018), "Application of agrarian insurance in Azerbaijan: problems and opportunities" at the Azerbaijan State Agrarian University Republican scientific-practical conference (Ganja, March 15, 2019), International scientific-practical conference on "Actual problems of food and light industry" at the Azerbaijan University of Technology (Ganja,

March 15, 2019), reported at the scientific-methodical seminar of the Institute of Soil Science and Agrochemistry of ANAS (2021) .

Application of the work. The results of field experiments were applied in 2018 in "Tabrizi" vineyard belonging to A.Sh. Imamguliyev in Samukh region and Mehtiyev A.A in Shamkir region. As a result of the application, due to the effect of fertilizers (manure 10 t / ha + $N_{90}P_{120}K_{90}$), the grape yield increased to 168.5 s / ha. The quality of the product was ecologically safe.

Name of the organization where the dissertation work was performed. The dissertation was completed at the Azerbaijan State Agrarian University.

Total volume of the dissertation in characters with an indication of the separate volumes of the structural units. The dissertation consists of an introduction, 7 chapters, results, 28 tables, 5 figures, a list of 257 titles, 44 tables and 1 appendix. The volume of the dissertation is 205 pages (excluding the list of references) and consists of 317491 characters.

Personal participation of the author: In the dissertation the author set the problem, conducted the experiment, analyzed and summarized the obtained results.

Publication: 6 articles and 4 theses reflecting the results of the research work were published. 2 articles and 1 thesis were published abroad.

In the introductory part of the dissertation, a brief description of the relevance of the work, the purpose of the research, scientific identity, the importance of science and practice, the methodology of relevant analyzes of soil and plant samples.

The first chapter, on the basis of literary materials, the degree of study of the issue in this field in foreign countries and in our Republic is commented.

The second chapter provides information on the geographical location and geomorphological structure of the study area, soil-forming rocks, climate, vegetation, micro-relief features, hydrography and water regime, soil structure.

The third chapter reflects the ecological conditions of the Ganja-Gazakh region, the physical, chemical and agrochemical characteristics of the experimental lands.

The fourth chapter examines the effect of fertilizers on soil fertility and nutrient accumulation in annual shoots.

The fifth chapter examines the effect of fertilizers on the development of the vine, its structural characteristics and the production of environmentally friendly products.

The sixth chapter is devoted to the hijab of nutrient balance in the lands used under grape cultivation.

The seventh chapter, ecological assessment of grape-gray-brown (chestnut) soils was carried out on a scientific basis and economic efficiency was determined.

CONTENT OF THE WORK

Grapes belong to the Ampelidae-grape family by botanists because they are lianas. Later, due to the similarity of its flowers to the flowers of the filthy Rhamnac, garatikan Paliurus and innab Lisiphus, it was called the filthy Rhamnaceae R.Br. and finally the free-flowered Vitaseae Lindi.

The share of viticulture in Azerbaijan is 21.1% in the Aran economic region, 17.8% in Ganja-Gazakh, 16.5% in Nakhchivan, 12.8% in Daolig Shirvan and 10.2% in Guba-Khachmaz.

M.I.Mammadov [88.p,245-249], who has been conducting a long-term and comprehensive study of grape plants in Ganja-Gazakh region, conducted a study of the productivity, quality indicators, fertilization utilization rate and ecological assessment of the area by irrigating and cultivating with the use of mineral fertilizers. determined the conventional environmental scores through the correction coefficients of the environmental impact of the norms.

In her researches S.Sh.Abdulaliyeva determined the development of favorable differential agrotechnics, optimal bar load, optimal cultivation method [11, p.151-153].

At the AzET Institute of Viticulture and Enology, A.S.Huseynova and H.T.Abbasova determined that the yield of grapes in the 3x1.5

planting scheme was 133.3 in Bayanshira, 75.5 in Hindogni, 191.1 in Hamashara and 41.1 in Madrasa. 99.3, “Mahmudu” -230.0, “Shirvanshahi” -115.5, “Tavkveri” -255.5, “Rkasiteli” -131.1, “Isobella” -134.8, “Doynada” -288, It was 9 s / ha [66. p,100-104].

ECOLOGICAL CONDITIONS OF SAMUKH DISTRICT

Samukh region is included in the Ganja-Gazakh region and the Middle-Kura economic region, part of which falls into the Kura basin, the physical-geographical area of the gazelle and the Bozdag massif, and is bordered on the north by the Alazan valley. The area of the area is 1455 km2.

The relief is nival-glacial, erosive glacier in the mountainous part, gravitational-denudation, denudation-erosion in the middle mountain, and is composed of sediments of Jurassic-Anthropogenic origin [107, s.23-25; 194, s.201-203].].The climate is dry and semi-arid, temperate-hot steppe type. Average annual temperature 11.8-13.1 ° C, active temperatures only 4000-5000 ° C, average annual temperature 1-2 ° C, hottest July temperature 24-25 ° C, January temperature 1.1 ° C, the amount of precipitation is 252-294 mm.

Hydrography includes Zayamchay, Agstafachay, Hasansu, Shamkirchay, Tovuzchay, Goshgarchay, Incasu in the west and Injachay in the east.

Vegetation is mainly represented by deserts, semi-deserts, steppes, sparse forests, floodplain meadows, mosquitoes and shrubs [257. www.wikipedia.org]

Soil-forming rocks are composed of proluvial, deluvial, levus-like alluvial sediments.

AGROECOLOGICAL CHARACTERISTICS OF GRAY-BROWN SOILS

According to Professor M.M Salayev, dry, dark gray-brown (chestnut) soils are widespread in the Ganja-Gazakh plain. These soils are mainly dark gray-brown (chestnut), gray-brown (chestnut),

light gray-brown (chestnut), primitive gray-brown (chestnut), irrigated gray-brown from ancient times. (chestnut) and so on. divided into species.

In order to determine the amount of nutrients in the field of experimentation, it is easy to determine the potential reserve nutrients of the soil, such as total humus, nitrogen, phosphorus, potassium, and effective fertility - by the plant before the experiment. Assimilated nutrients have been identified. Analysis of soil samples shows that irrigated gray-brown (chestnut) soils are poorly supplied with assimilated forms of nitrogen, phosphorus and potassium. The reaction of the soil in the layer of 0-30 cm is close to neutral - 7.6, gradually increasing towards the lower layers, alkalizing in the layer of 60-100 cm - 8.0. The amount of humus, total nitrogen, phosphorus and potassium, which are the main indicators of soil fertility, is 2.08 in the 0-30 cm layer, respectively; 0.13; 0.14; Is 2.35%. However, as we went to the lower layers, these figures decreased significantly, reaching 0.83 in the 60-100 cm layer, respectively; 0.06; 0.07; Was 1.45%. Absorbed ammonia nitrogen 16.5-7.3; nitrate nitrogen 10.3-3.1, mobile phosphorus 17.8-8.5; Metabolic potassium fluctuates between 270.5-115.3 mg/kg.

Along with agrochemical indicators, the main physicochemical parameters of the experimental soils were studied.

The total amount of absorbed bases in the absorption complex was 30.0 mg / eq in the 0-30 cm layer and 21.4 mg / eq in the 60-100 cm layer. The amount of physical clay along the soil profile is 52.5-55.6%, and the amount of sludge is 28.7-24.5%.[5. p, 166-170]

Thus, agrochemical analysis of gray-brown (chestnut) soils irrigated in the Samukh region of Ganja-Gazakh region shows that due to the gradation accepted in our republic. (Gulahmadov AN, Akhundov FH, Ibrahimov SZ, 1980) These lands are poorly supplied with nutrients. Therefore, the combined application of organic and mineral fertilizers is very important for the development of grape crops in these lands, high ecologically clean yields and maintenance of soil fertility.

EFFECTS OF FERTILIZERS ON SOIL FERTILITY AND GENERAL NITROGEN, PHOSPHORE AND POTASSIUM ACCUMULATION IN SOLIDARITY

The application of fertilizers has had a significant effect on the change in the soil nutrient regime under the grape plant and significantly increases the amount of nutrients in the soil that are easily assimilated by the plant. increased. Thus, in the control (fertilizer-free) variant, ammonium nitrogen and nitrate nitrogen absorbed in the mass flowering phase are 17.5-18.3 and 10.3-10.8 mg in 0-30 cm layer. kg, in the layer of 30-60 cm, 15.3-15.8 and 7.1-7.5 mg/kg, respectively, mobile phosphorus and exchangeable potassium 18.3-19.5 and, respectively. 16.1-16.8 mg/kg; 271.5-278.3 and 221.5-225.3 mg/kg, the amount of nutrients in full maturity is legally reduced, absorbed ammonia nitrogen and nitrate nitrogen 0-30 and 12.3–12.8 and 10.1–10.5 mg / kg in a layer of 30–60 cm; 6.1-6.3 and 4.0-4.3 mg/kg, motor phosphorus and exchangeable potassium 13.1-13.5 and 10, respectively. 3-10.8 mg/kg; 205.5-210.3 and 168.7-170.5 mg/kg. The indicators studied in the 10 t/ha (background) variant of manure increased significantly compared to the control (without fertilizer) variant. Thus, in the mass flowering phase, the manure is absorbed in layers of 0-30 and 30-60 cm in the variant of 10 t/ha (background). yak nitrogen and nitrate nitrogen 21.8-22.5 and 18.5-19.7; 12.3-12.8 and 9.5-10.1 mg/kg, and phosphorus and exchangeable potassium 22.3-23.5 and 19.3-20.6; 281.5-285.8 and 229.0-232.3 mg / kg, ammonia nitrogen absorbed at the end of the growing season 13.3-14.1 and 11.5-12.1, nitrate nitrogen 6, 8-7,2 and 4,5-4,8, mobile phosphorus 14,8-15,1 and 12,1-12,5, exchangeable potassium um were 208.6-213.3 and 170.5-173.6 mg/kg [250.p,227-231]. Mathematical-statistical calculations of the application of mineral fertilizers under the vines in the background of manure show that, depending on the fertilizer norms, the yield (s/ha) of soil There is a correlation between the amount of nutrients in the diet (mg/kg) and this relationship has changed over the years as follows: $r = + 0.954 \pm 0.040$ and $r = + 0.957 \pm 0.036$.

EFFECTS OF FERTILIZERS ON THE DEVELOPMENT OF GRAPES, STRUCTURAL INDICATORS AND PRODUCTION OF ENVIRONMENTALLY SAFE GRAPES

In the control (without fertilizer) variant, the total number of shoots per plant is 29.8-30.1, barley shoots 18.0-18.5, the number of clusters in the vine is 22.8-23.7, the total number of shoots The bar coefficient is 0.76-0.78% and the bar coefficient of bar shoots is 1.26-1.28%, and the highest amount is observed in the background + $N_{90}P_{120}K_{90}$ variant. The number of shoots is 31.5-32.0, barley shoots 20.5-20.8, the number of clusters in the tin is 28.3-28.8, the bar coefficient of the total shoots is 0,88-0.90% and the bar coefficient of barley was 1.37-1.38% .[10, p.50-53].Seeds, combs and husks, which are considered to be the solid residue of grapes, make up 13.5-33.0%, which is mostly thrown away as waste in the technological process. However, this composition is rich in organic and mineral substances that are useful for the human body. That is why the efficient use of grape waste, as in the past, is still relevant in the world [124, p.39-43].

The study also studied the effect of fertilizers on the number of clusters in one vine, the mass of one cluster, the productivity of one cluster, the number of clusters in one cluster, and the mass of 100 clusters and 100 seeds.

In the control (without fertilizer) variant, the number of clusters in one vine is 22.8-23.7, the weight of one cluster is 0.220-0.222 kg, the productivity of one cluster is 5.01-5.26 kg, the number of clusters in one cluster 51-53 pieces, weight of 100 berries 286-285 grams and weight of 100 seeds 4.8-5.1 grams, manure studied in 10 t/ha (background) variant The number of clusters in a single coin is 25.6-25.8, with a significant increase in the number of controls (of course). units, weight of one bunch is 0.227-0.231 kg, productivity of one bunch is 5.84-5.95 kg, number of bunches in one bunch is 58-61 pieces, weight of 100 bunches is 315-317 gr and 100 The weight of the seeds was 4.5-4.8 grams.

Each of the indicators studied in the given variants of mineral fertilizers on the background of manure significantly increased. Thus, in the background + $N_{60}P_{90}K_{60}$ variant, the number of clusters in one vine is 27.0-27.7, the weight of one cluster is 0.245-0.248 kg, the productivity of one vine is 6.61-6.86 kg, the number of pods in a bunch is 69-72, the mass of 100 cherries is 365-370 g and the mass of 100 seeds is 4.2-4.4, and the highest values are in the background + -$N_{90}P_{120}K_{90}$. The number of clusters in one vine is 28.3-28.6 kg, the weight of one cluster is 0.268-0.273 kg, the productivity of one cluster is 7.60-7.80 kg, the number of clusters in one cluster 79-83 pieces, the weight of 100 cherries was 418-421 grams and the weight of 100 seeds was 3.3-3.7 pieces. [Table 5.2.1]

At the same time, the percentage of juice and husks, combs, husks and seeds from one bunch was determined. In the control (fertilizer-free) variant, the juice and pulp part of one bunch is 86.2-87.5%, the comb part is 2.8-3.0%, the bark part is 5.5-6.2% and the seed part is 4.2. -4,6%, in the variant of manure 10 t / ha (background) 87,0-88,2 respectively; 2.6-2.8; 5.2-5.8 and 4.0-4.8%, and the highest indicators were observed in the background + $N_{90}P_{120}K_{90}$ variant 89.4-90.6, respectively; 2,0-2,3; 4.2-4.8 and 3.2-3.5%.. [141.p, 101-106]

Our research shows that the combined use of organic and mineral fertilizers increases the productivity of grapes, along with other indicators. As can be seen from Figure 1, the average yield of grapes in 3 years was 113.0 s/ha in the control (without fertilizer) variant, and 141 s /ha in the 10 t / ha (background) variant of manure. 6 s/ha, an increase of 18.6 s/ha or 22.4% compared to control. Co-application of mineral fertilizers against the background of manure significantly increased productivity compared to control (without fertilizers) and manure options of 10 t / ha. Thus, the productivity of 10 t/ha (background) + $N_{60}P_{90}K_{60}$ variant is 150.6 s / ha, the increase is 37.6 s/ha or 45.3% compared to the unfertilized variant, the highest Productivity was observed in 10 t/ha (background) + $N_{90}P_{120}K_{90}$ variant of manure, 172.5 s/ha, 59.5 s/ha or 71.7%,

respectively, 10 t / ha (background) of manure + $N_{120}P_{150}K_{120}$ variant At the same time, it decreased to 165.0 s / ha, 52.0 s / ha or 62.6%.

The accuracy of the experiment was p = 2.11-2.35%, the increase in variants was three or more times higher than E, s / ha (E = 3.00-3.55s/ha)..

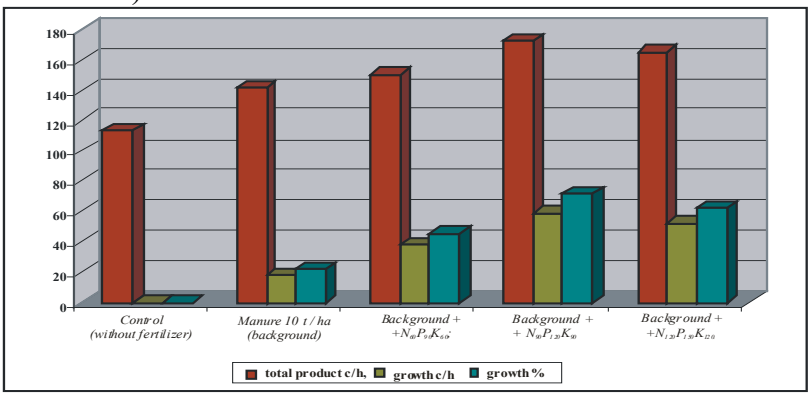

Figure 1. *Effect of fertilizers on grape productivity (average of 3 years, s / ha) 1. Control (without fertilizer); 2. Manure 10 t / ha (background) 3. Background + $N_{60}P_{90}K_{60}$; 4. Background + $N_{90}P_{120}K_{90}$; 5. Background + $N_{120}P_{150}K_{120}$.*

NUTRITION BALANCE UNDER THE GRAPE PLANT

Removal of nutrients from the soil with grape products and dry pruning material, the composition and amount of nitrogen, phosphorus, potassium entering the field with atmospheric sediments and irrigation water, the effect of fertilizers on the balance of nitrogen, phosphorus and potassium, nutrient uptake [6]. In the control (fertilizer-free) variant, nitrogen extracted from the soil with grape products and dry pruning material is 49.7-55.2 kg/ha, phosphorus 16.7-19.1 kg / ha, potassium 55.1-62.3 kg/ha, The most commonly used nutrients and fertilizers are manure 10 t/ha (background) + $N_{90}P_{120}K_{90}$ with nitrogen 109.2-120.2; phosphorus 48.8-49.9; potassium 144.1-158.5 kg/ha and 54.0-70.5 kg/ha or 38.6-50.4%, respectively; 29.7-33.2 kg/ha or 20.5-23.0%; It was 81.8-103.4 kg/ha or 54.5-69.0%. Thus, the application of mineral fertilizers under manure against the background of manure

significantly increases the ratio of fertilizer use of the plant to the control (without fertilizer) option**.**

It was determined that the amount of nutrients entering the soil through atmospheric sediments and irrigation water should be taken into account when calculating the nutrient balance.

In order to study the nutrients that enter the soil with atmospheric sediments, samples were taken regularly from the Ganja Regional Hydrometeorological Center in 2015-2016 to determine the concentration of ammonia nitrogen. , the composition and amount of nitrate nitrogen, phosphorus and potassium were determined.

During the study years, the amount of atmospheric sediments was 295.9-331.1 mm. Ammonia nitrogen in atmospheric sediments is 0.81-2.05 mg / l, nitrate nitrogen is 0.28-0.78 mg / l, phosphorus is 0.18-0, 50 mg / l, potassium is between 1.01-1.41 mg / l. Nitrogen predominated in atmospheric sediments.

Irrigation water not only creates moisture in the soil, but also absorbs nutrients into the soil. Therefore, irrigation water is of great importance in the circulation and migration of nutrients. The experimental area was irrigated 5 times with subartesian water and the irrigation norm was 800-1100 m^3/ha, vegetation irrigation varied between 4900-5800 m^3/ha. The composition and amount of nitrogen, phosphorus and potassium per hectare of irrigated water were determined, taking into account the irrigation norm. As can be seen from the table, ammonia nitrogen is 0.27-0.39 mg / l, nitrate nitrogen is 0.25-0.37 mg/l, phosphorus is 0.18-0.25 mg / l, and potassium is 3.18-3 in irrigation water. , Was 68 mg / l. In general, the amount of nutrients entering the experimental field annually with irrigation water is only 3.42-3.62 kg/ ha of ammonia and nitrate nitrogen, 1.65-1.73 kg/ha of phosphorus,17.41-19.88 kg of potassium hesitated between/ha [8.p,458-462].

Determining the nutrient balance of plants is very important for the proper application of the fertilization system in agriculture. Properly applied fertilization system can not only restore the natural flow of elements in the biological cycle, but also eliminate the deficiency or excess of elements observed in some areas. The main

sources of income of the nutrient balance are: 1) mineral fertilizers, 2) organic fertilizers, 3) plant residues, 4) sowing material, 5) biological fixation by microorganisms, 6) precipitation dont. The following are included in the balance of nutrients: 1) removal of the main product from the field; 2) removal of plant remains from the field; 3) groundwater infiltration or surface washing; 4) loss as a result of erosion processes; 5) loss in the form of gas, etc.

In order to use fertilizers effectively in agriculture and maintain ecological balance, fertilizer norms should be determined on the basis of nutrient balance, managing soil fertility on a scientific basis. In this regard, the study studied the balance of nutrients under the grape plant. The amount of nitrogen, phosphorus and potassium extracted from the soil by grape products and dry pruning material, fertilizers, irrigation water, atmospheric sediments was determined. The balance of the grape plant is based on the income and expenditure of nutrients. The balance was calculated by the "difference method". The best indicators are obtained in the variant of manure 10 t/ha (background) + $N_{90}P_{120}K_{90}$, nitrogen positive 30.77-40.82 kg/ha, phosphorus positive 97.54-98.27 kg/ha, potassium positive 15.38-28, 31 kg/ha was observed. The application of fertilizers to the soil on the basis of the balance of nutrients is economically efficient, in the protection of soil fertility and ecological balance, is higher than agricultural crops and It is very important to get a quality product.

ECOLOGICAL ASSESSMENT AND ECONOMIC EFFICIENCY OF VINEYARDS

Thus, the ecological assessment of subsoil soils on a scientific and theoretical basis, the determination of correction coefficients, the establishment of the final ecological price scales of irrigated gray-brown (chestnut) soils and the impact of fertilizers on the economic efficiency of vines are reflected. found.

One of the most important scientific-theoretical and practical issues in the ecological assessment of vineyards is the correct choice

of price criteria and correction factors. In our research, ecological assessment of vineyards in Samukh region was carried out at the following stages:

In the first stage - in accordance with the ecological requirements of the grape plant ("Tabrizi" grape variety), different physical and chemical characteristics of the soil (pH, salinity, amount of water-resistant aggregates, granulometric composition, height of the area, precipitation , Md index, $\Sigma t > 100C$, inclination) special assessment scales were developed according to the degree of manifestation, in the second stage - with the application of special assessment scales according to the degree of manifestation of individual soil characteristics, vineyards and vines at the research object - Ecological assessment scales of suitable lands were established, ecological assessment was carried out and ecological assessment points of lands were found;

In the third stage, the ecological scores of the lands were adjusted by applying the correction factors proposed by us.

Based on the environmental and soil indicators of the vineyards at the research site, the ecological scores varied between 77-96 points: irrigated dark gray-brown (chestnut) - 96 points; irrigated ordinary gray-brown (chestnut) - 83 points; irrigated light gray-brown (chestnut) - 77 points; irrigated gray-brown (chestnut) - 89 points.

The following biometric indicators of grapes were taken during the development of the system of correction coefficients to determine the ecological feasibility of the application of fertilizers:

- productivity of grapes;
- total number of shoots;
- number of bars;

When determining the correction coefficients, the results of our experiments with fertilizers with “Tabrizi” grape variety in Samukh region were used.

According to the productivity of “Tabrizi” grape variety (113.0-172.5 s / ha), the correction factors are 0.65 (control (without fertilizer) -1.00 (Background + $N_{90}P_{120}K_{90}$), the number of total

sprouts (29.8-31). , 5) 0.95-1.00 (control (without fertilizer)) - 1.00 (Background + $N_{90}P_{120}K_{90}$), respectively, and 0.86 (control (without fertilizer)) for the number of closed shoots (18.0-20.8)) -1.00 (Background+$N_{90}P_{120}K_{90}$). After applying the correction coefficients, the final score of the dark gray-brown (chestnut) soil irrigated depending on the fertilization norm at the research object is 51 (control (without fertilizer)) -96 (Background+$N_{90}P_{120}K_{90}$) [140.p, 35-138].

The final ecological score of the soils depending on the fertilizer norm is 44 (Control (without fertilizer)) -83 (Background + $N_{90}P_{120}K_{90}$) points, depending on the fertilizer norm, as a result of the application of correction factors in ordinary irrigated gray-brown (chestnut) soils under grape plantations. changed between. Some studies have shown that light gray-brown (chestnut) soils are less suitable for growing agricultural crops. However, in our research facility, these soils were rated high (89 points) based on environmental and soil indicators. The final ecological scores of the late gray-brown (chestnut) soils irrigated after the application of the correction coefficients fluctuated between 47 (No control) and 89 (Background +$N_{90}P_{120}K_{90}$). Thus, as a result of ecological assessment of vineyards, it was determined that the final quality score varies between 41 (Control (without fertilizer))-96 (Background + $N_{90}P_{120}K_{90}$) points [7,p.34-37] .

In our research, the economic efficiency of the application of mineral fertilizer norms under grape against the background of manure was also studied. It has been found that the application of fertilizers under grapes not only increases productivity and quality, but also increases the cost of production. Therefore, the analysis of the results of the application of fertilizers, productivity and quality of grapes from an economic point of view allows to accurately determine the effectiveness of experiments. When calculating economic efficiency, all costs incurred in the application of fertilizers and production, the cost of fertilizers, loading, transportation, delivery to the site, collection, transportation of products, etc. taken into account.

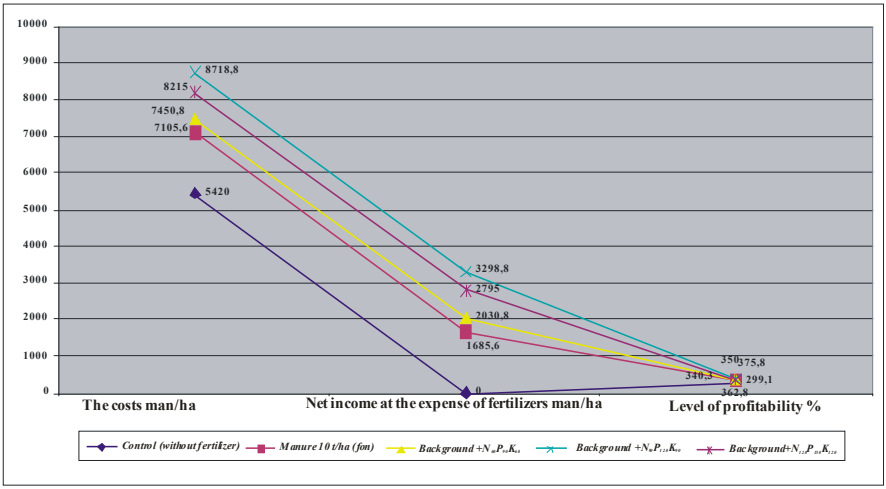

Figure 2 Economic efficiency of grapes (average of 3 years)
1. Control (without fertilizer)2. Manure 10 t/ha (fon) 3. Fon+$N_{60}P_{90}K_{60}$; 4. Fon+$N_{90}P_{120}K_{90}$; 5. Fon+$N_{120}P_{150}K_{120}$.

Net income from one hectare of vineyards is 5420.0-8718.8 manats, cost of 1 centner of grapes is 48.0-50.5 manats, net income from fertilizers is 1685, 6-3298.8 man/ha, and the level of profitability fluctuated between 299.1-375.8%. The highest net income was obtained at 10 t / ha (background) + $N_{90}P_{120}K_{90}$ compared to the control (fertilizer-free) option, and the corresponding net income was 8718.8 man/ha, 1 centner of product. The cost was 50.5 manat, net income from fertilizers was 3298.8 manat / ha and the level of profitability was 375.8%.

RESULTS

1. It has been found that the application of fertilizers under vines increases soil fertility in gray-brown soils irrigated at the end of the growing season. Depending on the fertilizer norms, absorbed ammonia nitrogen is 4.5-13.0 mg/kg, nitrate nitrogen is 2.3-6.4 mg/kg, mobile phosphorus is 8.0-17.5 mg/kg and Metabolic potassium increases between 13.3 and 24.3 mg / kg relative to the uncontrolled variant.

2. Under the influence of mineral fertilizer norms on the background of manure, in the flowering phase of grape sprouts, total nitrogen is 0.16-0.50%, phosphorus 0.08-0.25%, potassium 0.18-1.52%, respectively in fruit formation. as 0.15-0.56%; 0.07-0.29%; 0.12-0.45%, 0.13-0.45% at full maturity; Between 0.05-0.27% and 0.11-0.50% there was more fertilizer-control option.
3. Under the influence of fertilizers, the total number of shoots per plant is 1.2-1.9, the number of barren shoots is 1.6-2.8, the number of clusters in the pot is 3.3-5.8, the total number of shoots is coefficient 0.07-0.14% and bar coefficient of barley shoots 0.06-0.11%, the number of clusters in one vine is 3.3-5.8, the mass of one cluster is 0.023- 0.053 kg, productivity of one grain 1.35-2.79 kg, number of berries in one bunch 16-32 pieces, weight of 100 berries 82-136 grams, juice and raisins in one bunch 1.5-3.2% without fertilizer relatively increased, the weight of 100 seeds, on the contrary, 0.6-1.8 g, the comb part 0.3-0.8%, the shell part 0.7-1.4% and the seed part 0.4-1 , Decreased by 1% compared to the control-fertilizer option.
4. The average yield of grapes for 3 years was 113.0 s / ha in the non-fertilized variant, the highest yield was 10 t / ha (background) + 172.5 s / ha in the N90P120K90 variant, the increase was 59.5 s / ha compared to the control. ha or 71.7%. At the same time, sugar increased by 0.6-1.8 g / 100 cm3, titrated acidity decreased by 0.3-0.8 g / dm3 and nitrate nitrogen by 8.2-18.7 mg / kg. did not exceed the allowable limit (60 mg / kg) despite the increase. Ecologically safe product was purchased. The highest indicators were observed in the variant of manure 10 t / ha (background) + $N_{90}P_{120}K_{90}$.
5. As a result of research, the amount of Cd, Zn, Ar and Cu from heavy metals in grape juice was determined and their content exceeded the allowable limit (YVK-Cd-0.01, Zn-5.0, Ar-0.2, Cu-1 , 0) low, (on average in 2015-2016, Cd-0.009, Zn-4.3, Ar-0.16, Cu-0.665 mg.l) grape products were found to be environmentally safe for human health has been.

6. Due to the combined effect of organic and mineral fertilizers, the high amount of nutrients extracted from the soil by grape products and dry pruning material and the coefficient of fertilizer use are observed in 10 t / ha (background) + $N_{90}P_{120}K_{90}$ variant az¬ot 109.2-120.2; phosphorus 48.8-49.9; potassium 144.1-158.5 kg / ha and 54.0-70.5 kg / ha or 38.6-50.4%, respectively; 29.7-33.2 kg / ha or 20.5-23.0%; 81.8-103.4 kg / ha or 54.5-69.0%. As a result of the combined application of organic and mineral fertilizers, the negative balance of nutrients has been completely eliminated.
7. Ecological points of vineyards at the research object were determined by compiling special assessment scales on the basis of environmental and soil indicators. Ecological points of vineyards varied between 77-96 points: irrigated dark gray-brown (chestnut) - 96 points; irrigated ordinary gray-brown (chestnut) - 83 points; irrigated light gray-brown (chestnut) - 77 points; irrigated gray-brown (chestnut) - 89 points.
8. Correction coefficients based on productivity, total shoots and barley shoots have been developed to assess the ecological feasibility of subsoil soils and the ecological feasibility of fertilizer application. Correction coefficients in accordance with the productivity of "Tabrizi" grape variety (113.0 -172.5 s / ha) at the research object were 0.65 (Control (without fertilizer)) - 1.00 (Background + $N_{90}P_{120}K_{90}$), the number of total sprouts (29.8 - 31.5) 0.95-1.00 (Control (without fertilizer)) -1.00 (Background + $N_{90}P_{120}K_{90}$), respectively, and 0.86 (Control) according to the number of closed shoots (18.0-20.8) (without fertilizer)) - 1.00 (Background + $N_{90}P_{120}K_{90}$)
9. The final ecological price scale of sub-vineyard lands has been compiled in order to obtain ecologically safe products from Tabrizi grape varieties and maintain soil fertility. Price indicators of vineyards in Samukh region changed as follows: irrigated gray-brown (chestnut) lands - 100 points (quality score), 96 points (ecological points), 51-96 points (final ecological points); irrigated ordinary gray-brown (chestnut) soils - 90 points (quality

points), 83 points (ecological points), 44-83 points (final ecological points); irrigated light gray-brown (brown) soils - 60 points (quality score), 77 points (ecological score), 41-72 points (final ecological score), irrigated late gray-brown (chestnut) soils - 70 points (quality points), 89 points (ecological points), 47-89 points (final ecological points).

10. The highest net income from the combined effect of fertilizers was obtained at 10 t/ha (background) + N90P120K90 and net due to fertilizers compared to the control (without fertilizers) option. income increased by 3298.8 man/ha, and the level of profitability increased by 76.7%.

RECOMMENDATIONS FOR PRODUCERS

1. In order to obtain high-quality, ecologically safe products from "Tabrizi" grape varieties on gray-brown soils in the conditions of Samukh region and to maintain soil fertility. It is recommended to apply fertilizers at the rate of 10 t / ha + $N_{90}P_{120}K_{90}$ per year.
2. Fertilizer, phosphorus and potassium fertilizers should be applied in full plowing in the autumn-winter season before intercropping, when 50% of nitrogen is applied in spring. It is advisable to transfer 50% to the inter-row strip in the form of feeding at the beginning of budding.
3. It is expedient to use 10 t/ha + $N_{90}P_{120}K_{90}$ fertilizer norm to get ecologically safe grape product from grape plant.

The main points of the dissertation are presented in the following articles:

1. Prospects for the development of viticulture in Ganja-Gazakh region ANAS, News bulletin, № 2 (72), Ganja 2018, p.153-159
2. The main agrochemical and physical-chemical properties of vineyards in Ganja-Gazakh region “Azerbaijan Agrarian Science”, №2, Baku, 2018, p.166-170
3. Study of the effectiveness of fertilizers under the grape plant Materials of the international scientific conference dedicated to

the 95th anniversary of the national leader Heydar Aliyev, Ganja, 04-05 May 2018, p.50-53
4. The effect of application of fertilizers under grape plants on the change of agro-ecological properties of soil, scientific works of ADAU, Ganja 2018, № 3, p.34-39
5. Influence of fertilizers on yield and quality of table grape variety in Ganja-Kazakhstan zone of Azerbaijan, Agrarian Science, 5. 2018, Moscow, pp.53-55
6. Influence of introduction of mineral nutrients under chestnut soils on accumulation of common nitrogen, phosphorus, and potassium on annual age of grape culture. Materials of the scientific-practical conference “Application of Agrarian Insurance in Azerbaijan: Problems and Opportunities”, Ganja, March 15, 2019, pp.227-231
7. Scientific-theoretical bases and stages of ecological assessment of lands, scientific works of ADAU, Ganja 2019
8. Biological features and economic importance of grapes, materials of the international scientific-practical conference "Actual Problems of Food and Light Industry" dedicated to the 96th anniversary of national leader Heydar Aliyev, Ganja, 2019, p.39-40
9. Ecological assessment of the allocation of grape vines in the Samukh region of Azerbaijan, Modern problems of cultivation, science and technology. on the materials of the II international scientific-practical conference 28.06.2019 Moscow Collection of scientific works
10. Influence of fertilizers on the development of grape culture and structural indicators of the Bulletin of Science and Practice Bulletin of Science and Practice https://www.bulletennauki.com T. 5. №10. 2019
11. Effects of fertilizers on ground products and drying material transportation of nutrition from the soil // Bulletin of Science and Practice Bulletin of Science and Practice https://www.bulletennauki.com. T.7. No. 7. 2021, pp. 68-72

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The dissertation is accessible in the library of the Institute of Soil Science and Agrochemistry of ANAS.

Electronic versions of the dissertation and its abstract are available on the official website defterxana@tai.science.az.

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