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F.T. Jafarov[1]

SOIL EROSION IN MIL-KARABAKH REGION OF AZERBAIJAN AND ITS REDUCTION

[1]Agjabadi branch of Azerbaıjan State Pedagogical University, AZ 0400, Aghjabadi, 210, Hajibayli Avenue, , Azerbaijan, e-mail: faziljafarov@yahoo.com

Abstract: Studies show that the fertility of agricultural lands in the country is not satisfactory in the current situation. Soil salinization and erosion (including irrigation erosion) in the Mil -Karabakh regions of the Republic increased significantly. Most of the irrigated lands in Azerbaijan suffer from varying degrees of soil salinization. The presence of saline soils in the central region of Azerbaijan, especially in Kur-Araz lowland, is clearly a major problem today. Approximately 60 % of the Kur-Araz lowland area, with an area of 2.2 million hectares, consists of moderately and severely saline soils. It is possible to apply a system of agro technical, reclamation and agro ameliorative measures to protect soil erosion. The benefits of the conservation agriculture can be summarized as follows; Reduction of soil erosion, reduction of fuel and manpower costs, increase of water use efficiency. With the use of permanent seeding systems in row, plant residues can be stored on the soil surface, increasing crop productivity, reducing production costs, and enhancing the physical, chemical and biological characteristics of the soil.

Key words: Soil erosion, soil fertility, salinization, soil surface smoothing, check row planting, humus

INTRODUCTION

In order to meet the population's demand for agricultural products it is required to increase soil fertility. That is why increasing productivity and improving the quality of agricultural crops is still the most important issue.

Another change that has been observed throughout the entire central region is that the ongoing land degradation processes, changing and absolute weather conditions, as well as degraded irrigation systems have turned the cultivated areas into pastures.

Irrigated agriculture in Azerbaijan is mainly located on the Kur-Araz lowland - downstream of the Shirvan and Karabakh rivers, along the banks of the Kura and Araz rivers, and irrigation as a rule. It was implemented by primitive methods. That is why this problem played a major role in soil salinization [1-3].

For hundreds of years, soil contamination with enhanced fertilizers has led to a decrease in its organic content. Organic context of soil does not only provide nutrients to the soil. It is also a key element for stabilizing the most important soil structure. Therefore, many soils are degraded after prolonged intensive plowing [3-5].

The degradation process leads to erosion. Erosion process is widespread in Azerbaijan. The total area of eroded land in the Republic is 3144.7 thousand hectares, which is 36.4% of the total area of the republic. As a result of this process, the soil is washed away and its fertility is reduced. This also reduces the productivity of agricultural crops and has a negative impact on the quality.

Usually, the erosion process is so rapid that the soil cover is quickly washed away and completely loses its importance for farming. In soils affected by erosion, first the amount of humus is drastically reduced, and the water-physical properties of the soil deteriorate. The process of erosion also worsens its composition and nature along with the reduction of humus content. In these conditions, it is important to protect the arable land in the country against erosion [6, 7]

The main purpose of the study; the goal is to improve soil fertility through the preservation of plant residues in poorly fed soils in the Mil-Karabakh region of Azerbaijan.

The following issues have been studied regarding the solution of this problem:

Leveling the soil surface

Saving the irrigation water

Check row planting in the experiment area

MATERIALS AND METHODS

The experimental work was carried out in the Agjabadi farm of Mil-Karabakh region of Azerbaijan in 2017-2019.

The experiment was conducted on one-hectare land.

The experiment was conducted using a traditional control and storage scheme of crop residues used by farmers. The experiment has given farmers greater access to new technologies, which will prove that the results are more important in the long-term sustainability.

To study the soil characteristics, medium samples were collected from 5 locations of the site, dried in the laboratory, trampled, and analyzed by 1 mm sieve.

RESULTS AND DISCUSSION

The experiment was conducted to reduce soil erosion in 1 ha of Agjabadi district of Mil-Karabakh region of Azerbaijan.

For this purpose the surface is smoothed by a laser land leveler. Seeding and development of seeds in the laser-leveled soil area are usually the same, the water is distributed evenly on the soil surface during irrigation, without washing.

With the help of a laser land leveler, it is possible to smoothen the relief of the sowing area by giving it zero and moderate degrees.

In general, laser leveling of the surface of the soil is very effective in preventing water loss and washing of nutrients. During this time, soil erosion, salinity and other negative factors are reduced [8-10].

After the field is prepared for sowing, the check row planting equipment is used for sowing. During sowing with check row planting method, the sowing rate is reduced by 30-40 %, while saving the irrigation water and increasing the labor productivity of the plantation worker more than twice. In check row planting method, sowing machinery makes rows as well as sows 3-4 rows with 8-14 cm distance in between, during one shift.

The following is the planting system for plants, with the main and intermediate plants being planted in the same area on the soil without climatic conditions. Proper rotation of crops during crop rotation is important in improving crop yields, preserving soil fertility, and fighting against diseases and pests [7, 4].

Crop residues are cut and applied into the field after harvesting, in order to increase the natural fertility of the soil. The aim of this activity is to increase the activity of the microorganisms through plant residues that is, by means of crop residues in the field - to increase the amount of rot in the soil.

During the experiment process sowings of seeds of wheat, corn, sunflower, sorgo and cotton shifted regularly during the autumn, spring and summer at the same place. The plants residue remained on land surface after the harvest period. These residues applied after the chopping procedure by special chopper machine. These residues also protect the soil from sun shine, wind and negative impacts of rain, as well as irrigation and wind erosions. Besides of protection, residues also prevent negative impact of weeds growth [8, 3, 1]. During these works it is possible to get stable productivity, increasing soil fertility, as well as the recovering of micro and macro faunas in unplowed lands.

As the starting, the land levelled by laser, then wheat seed has been planted to this area in fall of 2017. As an interval planning, in the summer of 2018, Pharsalus has been planted to this land and again in the autumn of 2018 barley seed has been planted. After the harvest period, as an interval period corn seed has planted at summer of 2019, later, in autumn of the same year, again barley seed has been planted to this area. During this period following seeds have been planted as above-mentioned sequence in 1 ha land:

wheat, bean, barley, corn and again barley. Soil samples have been taken from experimental lands between 2017-2018 and 2019 and sent for laboratory testing. Results shown in table 1.

Table 1 - Agrochemical classifications of soils

Per year	Total nitrogen,%	Phosphorus mg/kg	Exchange potassium mg/kg	Humus %	Organic Carbon %
2017	0.135	25.9	191.0	2.7	1.60
2018	0.140	32.6	209.0	2.8	1.62
2019	0.155	34.3	211.0	3.1	1.80
Difference %	14.8	32.51	10.471	15	12.5

As it is described in figure, general nitrogen changed between 0.135-0.155 %, phosporus 25.9-34.3 %, potessium exhange 191.0-211.0 mg/kg, humus 2.7-3.1 %, organic carbon 1.60-1.80 % during 2017-2019. During the same period, the same farmer has planted 1 ha land of wheat seed and barley seed by traditional way. In the traditionally area the farmer used only autumnal cereals and residues have been removed from site like recent years. Results of samples analysis from that site shown in table 2.

Table 2 - Agcrochemical classification of soil.

Per year	Nitrogen %	Phosporus mq/kq	Potessium exchange mq/kq	Humus %	Organic carbon %
2017	0.150	20.61	218	3	1.89
2018	0.145	18.32	217	2.9	1.68
2019	0.140	17.50	216	2.85	1.64
Difference%	-6.667	-15.1	-0.9174	-5	-13

As it described in the table, between 2017 and 2019, general nitrogen changed between 0.150-0140 %, phosporus 20.61-17.50 %, potessium exhange 218.0-216.0 mg/kg, humus 3.0-2.85 %, organic carbon 1.89-1.64 %.

CONCLUSIONS

This article is about the declining of land erosion and increasing of land fertility through in the central part of the Azerbaijan. As a result of study, it became a clear that, levelling of soil with laser also check-row planting leads to save a water use and prevent a loss of nutrients during the irrigation. Meaning that, between 2017 and 2019, general nitrogen changed between 0.135-0.155 % phosporus 25.9-34.3, potessium exhange 191.0-211.0 mq/kq, humus 2.7-3.1 %, organic carbon 1.60-1.80 %.

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ТҮЙІН

Ф.Т. Джафаров[1]

ӘЗІРБАЙЖАННЫҢ МИЛЬ-ҚАРАБАҚ АЙМАҒЫНДАҒЫ ТОПЫРАҚ ЭРОЗИЯСЫ ЖӘНЕ ОНЫҢ ТӨМЕНДЕУІ

[1]Әзірбайжан мемлекеттік педагогикалық университетінің Агджабеди филиалы, AZ 0400, Агджабеди, Гаджибейли даңғылы 210, Азербайджан,

e-mail: faziljafarov@yahoo.com

Зерттеулер қазіргі уақытта ауыл шаруашылығы пайдалануындағы жердің құнарлылығының қанағаттанғысыз жай-күйін көрсетеді. Миль-Қарабақ аймағында топырақтың эрозияға ұшырауы (оның ішінде ирригациялық эрозия) және сортаңдануы едәуір өсті. Әзірбайжанда суармалы жерлердің едәуір бөлігі белгілі бір дәрежеде тұзденуға ұшыраған. Әзірбайжанның орталық бөлігінде, әсіресе Құра-Араксин ойпатында тұздалған және сортаңданған жерлердің болуы бүгінгі таңда негізгі проблема болып табылады. Құра-Араксин ойпатының шамамен 60 %-ы 2,2 млн гектарды құрайтын алқап - орташа және қатты сортаңданған топырағы бар жерлер. Топырақты эрозиядан қорғау үшін агрохимиялық, мелиоративтік және агромелиоративтік іс-шаралар кешенін қолдану мүмкін. Консервативтік шаруашылықтың артықшылығы: топырақ эрозиясының төмендеуі, жанармай мен жұмыс күшін пайдалану шығындарының азаюы, су ресурстарын пайдалану тиімділігін арттыру болып табылады. Тұрақты қатардағы егіс жүйесін қолданумен қатар, ол топырақ бетінде өсімдік қалдықтарын сақтау, өсімдік шаруашылығы саласындағы шығындарды азайту, өндірістік шығындарды азайту және топырақтың физикалық, химиялық және биологиялық қасиеттерін едәуір жақсарту үшін мүмкіндік туғызады.

Түйінді сөздер: топырақ эрозиясы, топырақ құнарлылығы, тұздану, топырақ бетін тегістеу, бөлек себу, гумус.

РЕЗЮМЕ

Ф.Т. Джафаров[1]

ЭРОЗИЯ ПОЧВЫ В МИЛЬСКОЙ-КАРАБАХСКОЙ ЗОНЕ АЗЕРБАЙДЖАНА И ЕЕ СНИЖЕНИЕ

[1]Агджабединский филиал Азербайджанского Государственного Педагогического Университета, AZ 0400, Агджабеди, пр. Гаджибейли 210, Азербайджан,

e-mail: faziljafarov@yahoo.com

Исследования показывают неудовлетворительное состояние плодородия земель, находящихся в настоящее время в сельскохозяйственном использовании. Засоление и подверженность почвы эрозии (в том числе ирригационной эрозии) в Мильско-Карабахской зоне значительно повысились. В Азербайджане значительная часть орошае-

мых земель в той или иной степени подвержены засолению. В центральной части Азербайджана, в особенности в Кура-Араксинской низменности наличие засоленных и солонцеватых земель сегодня является основной проблемой. Приблизительно 60 % земель Кура-Араксинской низменности площадь, которых составляет 2,2 млн гектаров – это земли со средней и сильно засоленной почвой. Для защиты почвы от эрозии возможно применение комплекса агротехнических, мелиоративных и агромелиоративных мероприятий. Преимуществом консервативного хозяйства является: снижение эрозии почвы, уменьшение расходов на горючее и на использование рабочей силы, повышение эффективности использования водных ресурсов. Наряду с применением системы постоянного рядового посева, оно создает возможность для сохранения растительных остатков на поверхности почвы, роста урожайности, уменьшения производственных затрат и значительного улучшения физических, химических и биологических свойств почвы.

Ключевые слова: эрозия почвы, плодородность почвы, засоление, разглаживание поверхности почвы, раздельный посев, гумус.