РЕКУЛЬТИВАЦИЯ НАРУШЕННЫХ ПОЧВ

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STUDY OF YIELD AND DEVELOPMENT PHASES OF SESALPINIA AND WILD POMEGRANATE ON RECREATED SOILS

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Abstract. To ensure the rational use of soils, it is necessary to carry out reclamation measures, improve the reclamation state of irrigated soils, and prevent secondary salinization. As a result of oil production in Azerbaijan, soil pollution has become widespread. To restore 10,000 hectares of oil-contaminated soils, active reclamation measures are required. The situation on the Absheron Peninsula is more critical, since as a result of not taking environmental measures, vast areas of oil-polluted lands have formed, which, when inventoried and mapped, are shown as oil-polluted lands. These oil-contaminated areas differ in the thickness and depth of occurrence of oil products. Soil bitumization also occurs during gushing and oil spills as a result of extraction. To study the resistance of plants (Wild Pomegranate and Sezalpinia) to crude oil, experiments were carried out on reclaimed gray-brown sandy loam soils of the Absheron Peninsula, artificially contaminated with it. As a result of the data obtained, it was established that the development of the Wild Pomegranate on the Apsheron Peninsula, contaminated with oil products, is weak, and the yield is low. Positive results cannot be obtained on soils with separate percentages of contamination. Also, during the experiment, it was revealed that the plants of Sezalpinia are characteristic of the soils of this peninsula and they can be grown on soils contaminated with oil up to 5 %.

Key words: Apsheron Peninsula, oil pollution, recultivation, seedlings, settlement, yield.

INTRODUCTION

Soil pollution with oil and oil products in our country is observed mainly on the Absheron Peninsula. Soils in this region are more susceptible to anthropogenic impact. Improper exploitation of oil fields, oil production without complying with the basic requirements for environmental protection and other violations have led to the pollution of some landscape areas of the Absheron Peninsula.

The soils around the oil fields are contaminated with oil waste to varying degrees both in width and depth. About 40 % of the country's population lives on the Absheron Peninsula. Observations among the population living in oil-contaminated areas have shown the presence of certain microelements in the body - iodine, cobalt, copper, zinc, molybdenum and causes both deficiency and excess. Trace elements, including heavy metals, are major environmental pollutants.

The main task of the legislation on soil fertility is to protect the natural qualities of soil fertility, increase, restore and strengthen comprehensive measures, increase soil fertility and ensure food security, cleanse the soil from pollutants, giving priority to organic farming, providing the population with ecologically clean agricultural products.

The program adopted by the order of the President of the Republic of Azerbaijan dated September 28, 2006 to improve the ecological environment in the Absheron Peninsula provides for the cleaning of oil-contaminated land, processing and disposal of other industrial and domestic waste, construction of health facilities, landscaping, etc. Therefore, the impact of oil-contaminated soils on vegetation of the Absheron peninsula, methods and technologies used in reclamation on a scientific basis are considered relevant.

Targets and goals: Methods and technologies used in amelioration on a scientific basis are considered very important in the conditions of the Absheron Peninsula to study the impact of

oil-contaminated soils of the Absheron Peninsula on vegetation

Depending on the degree of soil salinity and other factors in the areas that need to be cleaned, the main causes of pollution and ways to eliminate them should be followed. After reclamation, recommendations are given on the use of these territories.

MATERIALS AND METHODS

Conducting research, analyzing the results obtained, and other questions are based on generally accepted and widely used existing methods. In solving the problem and generalizing, the method of "systems approach" was used, the accuracy, truthfulness and feasibility of the proposed theoretical discussions were based on specific research. In general, the general principles arising from the nature of the studied processes and decisions are more widely used.

Research object: The recultivated area of the 9th tier of the Bibikheibat oil and gas production department of SOCAR was selected as the object of the study. The goal is to study the resistance of woody plants to crude oil. Therefore, in the gray-brown sandy loam soils of the Apsheron Peninsula, artificial oil pollution of varying severity was carried out in pits (40 × 40 × 60) cm in size. The soils filled in the pits are isolated so that local soils around the pits do not undergo diffusion.

Oil of the upper tier (depth of 500-800 meters) was used at the NGDU section. The density of oil in this area is 0.8775 cm^3.

RESULTS AND DISCUSSION

Experiments were carried out on both the genus Punica L, which belongs to the genus Narcissus, and the plant Sezalpinia. This pomegranate plant includes 2 species. In our country, common pomegranate is more common. Considered a small tree. Resistant to drought and salinity. With a mass of 100-500 g, round in shape, the bark is light yellow and red, poorly developed, light-requiring. There are many forms of this plant, differing in bioecological and morphological features. Distributed in Central Asia, Dagestan, Eastern and Southern Caucasus. In Azerbaijan, it is more common in the Mardakan dendrological garden, in Goychay, on the basis of the Institute of Horticulture, in the landscaping of Absheron.

Indicators of carbonate and PH of soils in the section of the 9th tier on the territory of the Bibi-Heybat oil and gas production department (on loamy-sandy loam soils), table 1.

The content of carbonates and pH of soils taken in the study area are shown in table 1. The total weight of water is shown in table 2.

Table 1 - Indicators of carbonate and pH of soils in the section of the 9th tier on the territory of the Bibi-Heybat oil and gas production department (on sandy soils)

№.	Number of cut	Soil name	Depth, cm	CO_2%	$CaCO_3$ %	pH
1	Section 1	sandy loam	0-20	0.637	1,447	8.53
2	Section 2	sandy loam	0-20	0.364	0.827	8.53
3		sandy loam	20-40	0.273	0.620	8.55
4		sandy loam	40-60	1.092	2.481	8.49
5		sandy loam	60-80	3.731	8.477	8.64
6	Section 3	sandy loam	0-20	0.455	1.034	8.69
7		sandy loam	20-40	1.092	2.481	8.7
8		sandy loam	40-60	7.462	16,954	8.3
9		sandy loam	60-80	8,463	19,228	8.1
10		sandy loam	80-100	10.465	23,777	8.6

Table 2 - ANDanalysis of the complete water extract of the soils of the experimental site at the Bibi-Heybat oil and gas production department $\frac{\%}{mq.\ ekv}$

Cuts	Depth	CO_3^-	HCO_3^-	Cl^-	SO_4^-	Ca^{++}	Mg^{++}	$Na^{++}K^+$	Dry residue %	Amount of salts %	Carbonate $CaCO_3$%	Salinity index
C-1	0-20	no	0,015 / 0,25	1,115 / 33,00	0,976 / 20,32	0,112 / 5,60	0,043 / 3,50	1,023 / 44,47	3,300	3.294	1,447	Brackish
C-2	0-20	no	0,015 / 0,25	1,540 / 44,00	1,180 / 24,57	0,136 / 6,80	0,040 / 3,30	1,351 / 58,72	4,270	4.262	0.827	Brackish
	20-40	no	0,015 / 0,25	1,435 / 41,00	1,078 / 22,44	0,140 / 7,00	0,040 / 3,30	1,228 / 53,39	3.948	3.936	0.620	Brackish
	40-60	no	0,009 / 0,25	1,103 / 31,50	0,991 / 20,63	0,128 / 6,40	0,044 / 3,60	0,973 / 42,28	3.263	3.248	2.481	Brackish
	60-80	no	0,015 / 0,25	0,718 / 20,50	0,626 / 13,03	0,104 / 5,20	0,024 / 2,00	0,611 / 26,58	2.105	2.098	8.477	Very strong rackish
C-3	0-20	no	0,015 / 0,25	0,823 / 23,50	1,253 / 26,16	0,176 / 8,80	0,038 / 3,10	0,874 / 38,01	3.188	3.179	1.034	Brackish
	20-40	no	0,015 / 0,25	0.757 / 21.62	1,238 / 25,85	0,174 / 8,70	0,038 / 3,10	0,826 / 35,92	3,055	3.048	2.481	Brackish
	40-60	no	0,018 / 0,30	0.428 / 12.22	0,278 / 5,81	0,034 / 1,70	0,009 / 0,70	0,366 / 15,93	1,140	1.133	16,954	Strong brackish
	60-80	no	0,018 / 0,30	0.395 / 11.28	0,175 / 3,65	0,016 / 0,80	0,013 / 1,10	0,307 / 13,33	0.930	0.924	19,228	Medium salty
	80-100	no	0,015 / 0,25	0.378 / 10.81	0,132 / 2,76	0,014 / 0,70	0,010 / 0,80	0,283 / 12,32	0.845	0.832	23,777	Medium salty

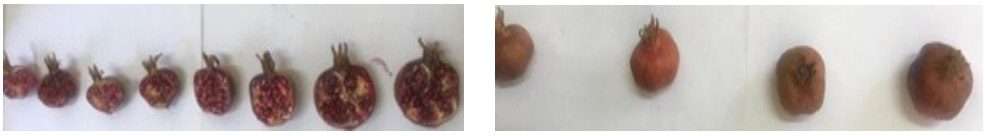

Figure 1 **-** Yield of wild pomegranate

During the growing season of the Wild Pomegranate and Sezalpinia plants, observations were made on April 8, 2019, June 22, July 31, August 21, and September 30, and records were made in Tables 3 and 4. In the control variant, the pomegranate plant had 7 fruits. The largest one weighs 100.85 grams, and the smallest one 30.48 grams. The weight of pomegranate in soil contaminated with 1% crude oil is 79.25 g, 58.91 g – 2 %, 54.47 g – 3 % and 50.12 g – 4 %. was. The annual growth of plants was 27 cm in the control variant, 23 cm at 1 % pollution, 22 cm at 2 % and 5 cm at 4 % oil pollution (table 3).

Another study was carried out on the Cesalpinia plant. This locally adapted plant belongs to the legume class with 2 kernels. The development of this plant, which is also used as a medicinal plant, is considered normal, the vegetation indicators are reflected in Table 4. In the control variant, plant growth was 13 cm, 52 cm in 1 % oil-contaminated soil, 13 cm in 2 %, 36 cm in 3 % and 14 cm at 4 %. No drying or fading was observed (table 4).

The vegetation indicators of wild pomegranate in 2019 on oil-contaminated soils are presented in Figures 1 and 2.

Figure 2 - Sisolpenia seeds

Figure 3 - Sisolpenia flowers

Unlike foreign countries, Azerbaijan has not yet adopted an "allowable limit" for lands contaminated with oil and oil products. In itself, this is considered unacceptable for a country that produces large quantities of oil.

According to the norms adopted in Russia, the permissible limit for the content of oil products in the soil is 1.5 g/kg. In this regard, taking into account the soil and climatic characteristics of the territory of Azerbaijan in a short time, it is advisable to scientifically determine the "permissible limits" for them of oil and oil products, to substantiate the regulatory documents.

Oil contaminated soils should be cleaned to a level that is not harmful to the environment, when the degree of contamination exceeds the permissible level. Depending on the type of soil and the oil substance that pollutes it, such soils are considered contaminated if the amount of oil products in them exceeds 0.01-0.1 %. The amount of oil products in the treated soils is determined by decantation.

Table 3 - Scheme of the experiment in the conditions of gray-brown, sandy loam soils of the Absheron Peninsula, contaminated with crude oil (Bibikheibat NGDU 9th tier) Wild Pomegranate Biometrics

№	Pollution Degrees	Planting date	Height of sunrise before the start of the experiment	Dates					
				08IV	22V	31VII	21VIII	30 IX	Height difference cm, Ra
1	Control of clean clay soil	17.III.2015	128	130	142	152	154	155	27
2	1 % oil pollution	17.III.2015	103	105	120	122	124	126	23
3	2 % oil pollution	17.III.2015	104	115	118	123	125	126	22
4	3 % oil pollution	17.III.2015	113	114	116	117	118	120	7
5	4 % oil pollution	17.III.2015	118	100	110	118	120	123	5

Table 4 - Scheme of the experiment on gray-brown loamy and sandy loam soils of the Absheron Peninsula, contaminated with crude oil and biometric parameters of the Sezalpinia plant

№	Pollution Degrees	Planting date	Height of sunrise before the beginning of the experiment in 2018, cm	Dates					
				08. IV	22.V	31.VII	21.VIII	30.IX	Height difference cm
1	Control of clean clay soil	21.III.2015	114	116	121	124	125	127	13
2	Oil pollution-1 %	21.III.2015	78	85	88	123	128	130	52
3	Oil pollution-2 %	21.III.2015	127	115	131	112	139	140	13
4	Oil pollution-3 %	21.III.2015	102	67	101	133	135	138	36
5	Oil pollution 4 %	21.III.2015	136	106	138	146	148	150	fourteen

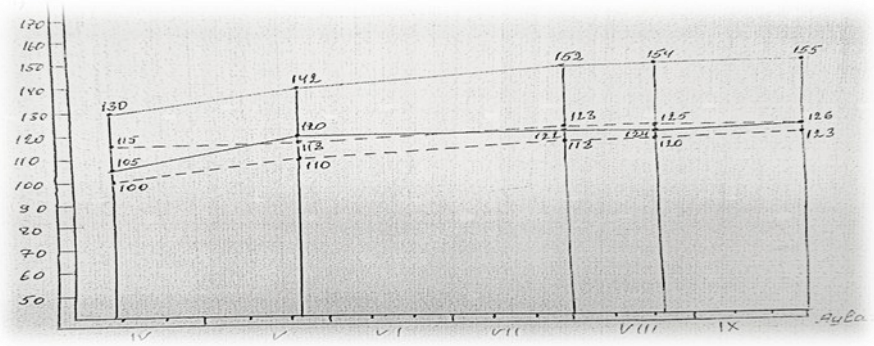

Figure 4 - Graph of vegetation indicators of wild pomegranate in 2019 in oil-contaminated soils

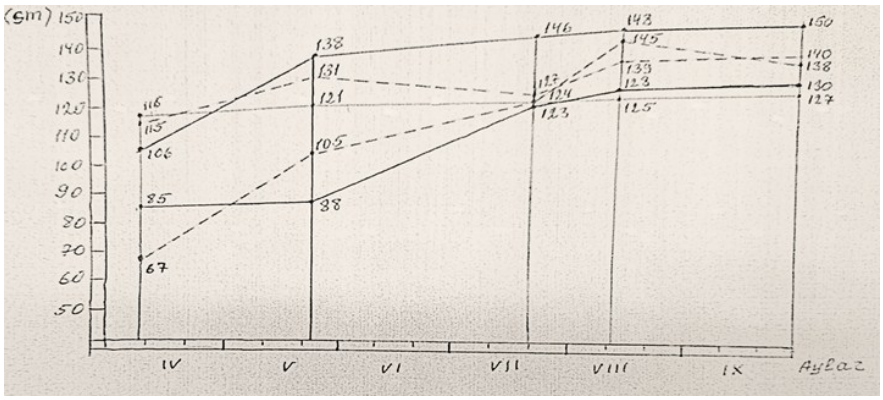

Figure 5 - Indicators of sezalpinia in 2019 during the vegetation period in oil-contaminated soils

CONCLUSION

1. From the experiments carried out on the Wild Pomegranate plant, it can be concluded that the development of this plant on the Absheron Peninsula is weak, and the yield is low. Positive results cannot be obtained on soils with separate percentages of contamination.

2. Experiments have shown that the plants of Sezalpinia are characteristic of the soils of the Absheron Peninsula and its development is satisfactory. This plant can be grown in soils contaminated with oil up to 5 %.

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ТҮЙІН

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ҚАЛПЫНА КЕЛТІРІЛЕТІН ТОПЫРАҚТАРДА ЦЕЗАЛЬПИНИЯ МЕН ЖАБАЙЫ АНАРДЫҢ ӨНІМДІЛІГІ МЕН ДАМУ ФАЗАЛАРЫН ЗЕРТТЕУ

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Ластанған жерлерді тиімді пайдалану үшін, осы жерлердің тұзданuын алдын-алу мақсатында рекультивациялық және мелиорациялық іс-шаралар жүргізу қажет. Әзірбайжанда мұнай өндіруге байланысты, қазіргі уақытта 10 мың гектар жер қалпына келтіру бойынша шұғыл шараларды қажет етеді. Абшерон түбегінде қалыптасқан жағдай сын көтермейді, өйткені табиғатты қорғау шаралар жүргізілмегендіктен, ластанған жерлердің ауқымды учаскелері пайда болды, олар есепке алу және картаға түсіру кезінде, ластанған жер ретінде көрсетіледі. Бұл аумақтар мұнай өнімдерінің қалыңдығы мен жайғасу тереңдігімен ерекшеленеді. Топырақтың битумдалуы мұнайды өндіру нәтижесінде атқылау мен төгілуі кезінде де жүреді. Өсімдіктердің (жабайы анар мен цезальпиния) шикі мұнайға төзімділігін зерттеу үшін, жасанды түрде ластанған Абшерон түбегінің қалпына келтірілген сұр-қоңыр құмдақ топырақтарында тәжірибелер қойылды. Алынған мәліметтер нәтижесінде, Абшерон түбегіндегі мұнай өнімдерімен ластанған топырақтарда жабайы анардың дамуы әлсіз және өнімділігі төмен екендігі анықталды. Жеке ластану пайызы бар топырақтарда оң нәтиже алу мүмкін емес екендігі көрсетілген. Сондай-ақ, тәжірибе барысында цезальпиния өсімдіктері осы түбектің топырақтарына тән және оларды 5 % - ға дейін мұнаймен ластанған топырақтарда өсіруге болатындығы анықталды.

Түйінді сөздер: Абшерон түбегі, мұнаймен ластану, рекультивация, көшеттер, қоныстану, өнімділік.

РЕЗЮМЕ

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ИЗУЧЕНИЕ УРОЖАЙНОСТИ И ФАЗ РАЗВИТИЯ СЕЗАЛПИНИИ И ДИКОГО ГРАНАТА НА РЕКУЛЬТИВИРУЕМЫХ ПОЧВАХ

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Для рационального использования загрязненных земель, необходимо проведение рекультивационных и мелиоративных мероприятий с целью дальнейшего предотвращения засоления этих земель. В Азербайджане в связи с добычей нефти, 10 тысяч гектаров земель в настоящее время требуют неотложных мер по рекультивации. Ситуация создавшаяся на Абшеронском полуострове более критична, так как в результате того, что не проводились природоохранительные меры образовались обширные участки замазученных земель, которые при инвентаризации и картировании, указываются как замазученные. Эти территории отличаются по толщине и глубине залегания нефтепродуктов. Битумизация почв также происходит при фонтанировании и разливах нефти в результате добычи. Для изучения устойчивости растений (Дикий гранат и Сезальпиния) к сырой нефти поставлены опыты на рекультивированных серо-бурых супесчаных почвах Апшеронского полуострова, искусственно ею загрязненных. В результате полученных данных установлено, что развитие дикого граната на Апшеронском полуострове, загрязненном нефтепродуктами, слабое, а урожайность низкая. Положительные результаты не могут быть получены на почвах с отдельными процентами загрязнения. Также в ходе эксперимента выявлено, что растения Сезальпинии характерны для почв этого полуострова и их можно выращивать на почвах, загрязненных нефтью до 5 %.

Ключевые слова: Апшеронский полуостров, нефтезагрязнение, рекультивация, саженцы, заселение, урожайность.