BIOLOGICAL SCIENCES

ROSMARINUS PROSTRATUS MAZZIARY. APPLICATION OF GARDEN OINTMENT PREPARATION DURING VEGETATIVE PROPAGATION OF FORMIS

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Abstract

In the territory of the Republic of Azerbaijan, in addition to wild useful, essential and aromatic-spicy plants, the introduction of useful plants to the zones with suitable soil and climate conditions, the study of their bioecological properties, the scientific basis of cultivation agrotechnics and biologically active substances are also in the focus of attention. For this reason, *Lamiaceae* Martinov, which is widely used in greening promising *Rosmarinus prostratus* Mazziari belonging to the genus *Rosmarinus* L. included in the family introduction of the form in the Absheron Peninsula and the study of its phytochemical study was set as the goal. In the article, *Rosmarinus prostratus* Mazziari., which has special medicinal and decorative value at the same time during the vegetative propagation of the form, the application of the "Garden Ointment" preparation (AEF-MCG-2022-1(42)-12/08/3-M-08 Azerbaijan Science Foundation project number) produced by the Experimental-Industrial Plant LLC and the development dynamics of the species were investigated

Keywords: *Rosmarinus prostratus* Mazziari., Absheron Peninsula, introduction, Dendrology Garden, propagation, garden salve

Introduction

The Absheron peninsula was chosen as the area for the research. This area is $40^0 20'$ and $40^0 30'$ on the east coast of the Greater Caucasus and the west coast of the Caspian Sea; It is located east of Greenwich at latitudes $49^0 45'$ and $50^0 15'$. The Caspian Sea covers the peninsula from three sides. The area of the peninsula is 2192 km^2, which is 2.5% of the territory of the Republic of Azerbaijan. About 30,000 hectares of the territory belong to sand dunes, and other areas belong to gray-brown soils. The height of the Absheron peninsula rises from 26 meters to 300-400 meters above sea level and decreases from west to east. The relief of the Absheron peninsula was mainly formed in the fourth period, and it is made of various mixtures - soil, sand, sandstone and limestone fragments, clay, etc. organized [3]. For the relief of the peninsula, arid-denudation processes, canyons, depressions, erosion and abrasion changes, fragmentations, desert forms, etc., belonging to the dry semi-desert and desert climate. is characteristic. The relief and composition of the area consists of monoclinal elevations and synclinal plateaus consisting of denudation-resistant limestones. In the formation of the relief of the region, along with the atmospheric sediments, the winds also have a strong influence. Thus, water erosion plays an important role in the degradation of soils and sparse vegetation in the area [7].

The vegetation of the Absheron Peninsula is semi-desert, and a small amount of wormwood, ephemeral formations are dominated by desert. The flora of the area is not rich in terms of trees and shrubs, natural vegetation consisting of trees and shrubs can be found here only on rocks and gravel. *Lonicera iberica* M.Bieb, *Rhamnus pallasii* Fisch., *Rubus* subg., *Lycium ruthenicum* Murray., *Tamarix* L., *Artemisia* L., etc. occur in shrub plants [6]. In recent times, the establishment of green areas, parks and gardens has greatly enriched the species composition of dendroflora. Based on the monitoring carried out by the specialists of the Dendrology Garden, it was found that 660 species of trees and shrubs belonging to 87 families and 230 genera are used in the greening of the Absheron peninsula.

Lamiaceae Lindl as a research object in the article. *Rosmarinus prostratus* Mazziari belonging to the genus *Rosmarinus* L. included in the family (*Labiatae Juss*.). (spread rosemary) form was used. *Rosmarinus prostratus* Mazziari. Formsir has passed many years of introduction testing and is widely used in greening. *Rosmarin* L. genus is naturally found in North Africa, Turkey, Cyprus and southern parts of Europe, cultivated in Russia [5].

Most of the species included in the family *Lamiaceae* Martinov are mainly herbs of various sizes, subshrubs or shrubs, rarely trees [4]. The season has a cosmopolitan distribution. 6,900-7,200 species of 236 genera belonging to the family *Lamiaceae* Martinov are distributed almost everywhere in the world, mainly in the Mediterranean areas, as well as in Front and Central Asia [5].

Rosmarinus prostratus Mazziari. - spreading rosemary is an evergreen shrub up to 1.5 m tall and spreading to 1.5 m wide. When its 70 cm long branches begin to grow, they extend to 1.5-2.0 m near the surface of the soil, and it got its name from here because of the way it spreads. The leaves are thick, bright green, with a white vein in the middle reminiscent of a fir needle. The color of the leaves varies from light green (in spring) to blue (in autumn). During flowering, the top of the plant is covered with purple or blue small, dense flowers (Figure 1.)

Figure 1. Introduction of Rosmarinus prostratus Mazziari. in Absheron conditions

Material and methods of research

During the vegetative reproduction of the plant, the method of T.V. Khromova was referred to. The effect of planting time, substrate composition and growth factors on root binding of pencils was investigated. The methodology of A.A.Molchanov and V.V.Smirnov was used in the study of annual growth and development of 3-year-old plants. To determine the annual growth dynamics, measurements were made on 10 plants every 10 days from the beginning to the end of vegetation. In determining the morphology of the root system, it was studied in 1-3-year-old plants using V.A. Kolesnikov's method of "washing the roots completely out". At the end of the vegetation, the roots of the plant were dug up and their length, development, type, diameter of the root throat, depth and diameter of the roots were studied.

The soil analyzes of the territory were conducted by the laboratory, expertise and certification center of the Agrarian Services Agency under the Ministry of Agriculture of the Republic of Azerbaijan on the order of the Dendrology Garden public legal entity.

The territory of the researched Dendrology Garden is located in the north-eastern part of the Absheron peninsula, in Mardakan settlement. Its area covers 12 hectares, it is 8 m above sea level. According to the long-term studies of the "Ecology and Climate" laboratory of the Dendrology Garden, it was determined that the average annual air temperature here reaches +13.0ºC, minimum -15ºC. Very rarely, on frosty days, the temperature drops to -8-10ºC. The laboratory, expertise and certification center of the Agrarian Services Agency under the Ministry of Agriculture of the Republic of Azerbaijan carried out soil analyzes of the area based on the order of the Dendrology Garden public legal entity (Figure 2.).

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Direktor
İbrahimov Ilqar Hərsan oğlu
7/4/2024

ANALİZ NƏTİCƏLƏRİ
Results of analysis

Protokolun nömrəsi / Protocol number	P052641		
Sifarişçinin adı / Name of Customer	Dendrologiya bağı		
Sifarişçinin ünvanı / Address of Customer	Bakı Mərdəkan qəsəbəsi kəndi		
Nümunənin götürüldüyü yer / Sampling location	Mərdəkan qəsəbəsi kəndi	Nümunənin götürülmə tarixi / Date of Sampling	6/25/2024
Nümunənin tipi / Sample Type	16	Nümunənin qəbul tarixi / Date of Receipt of Sample	6/25/2024
Nümunənin sayı / Sample quantity	9 ədəd	Sınağın başlama və bitmə tarixi / Date of Analysis	7/1/2024 7/4/2024
Müraciət ərizəsinin qeydiyyat nömrəsi / The registration number of application	02148	Əkiləcək bitki / Crop varieties	Zeytun

Figure 2. Results of sampling analysis by the laboratory, expertise and certification center of the Agrarian Services Agency.

According to the analysis results of the soil cover of 2024, according to the sample taken from the 0-30 cm layer of the soil in the area of 40°48827N - 50.15908E, it is very weakly supplied with nitrogen, the main nutrient element, moderately supplied with phosphorus, and highly supplied with potassium (Table 1).

Table 1.

Depth(cm)		0-30 cm			
Coordinates		40.48827 – 50.15908			
Land description		S-1 p-1 By the pine-tree			
Parameter	*Method Reference*	*Unit*	*Result*	*Norm*	*Conclusion*
Organic matter (hummus)	Walkley-Black	%	0.49	2-3	Very weak
Phosphorus (P_2O_5) (Can be assimilated)	Olsen ($NaHCO_3$)	kg\ha	111.64	60-120	Medium
Kalium (K_2O) (Can be assimilated)	Masloviy (CH_3COONH_4)	kg\ha	786	250-550	High
pH	1:2.5 Soil water mixture	-	8.32	6.6-7.5	Weakly alkaline
Salinity (EC)	1:2.5 Soil water mixture	mS/cm	1.375	0-2	Saltless
Lime (carbination)	Scheibler	%	22.46	5-15	High
Sodium (Na) (Can be assimilated)	Masloviy (CH_3COONH_4)	mg/kg	800	81-120	Very high
Calsium (Ca) (Can be assimilated)	Maslovıy (CH_3COONH_4)	mg/kg	10620	1150-3500	Very high
Water saturation	Saturation	ml	36	51-70	Less grainy
Zinc (Zn) (Can be assimilated)	DTPA	mg/kg	0.84	1.0-2.4	Weak
Iron (Fe) (Can be assimilated)	DTPA	mg/kg	8.64	2.5-4.5	High
Manganese (Mn) (Can be assimilated)	DTPA	mg/kg	4.5	14-50	Weak
Copper (Cu) (Can be assimilated)	DTPA	mg/kg	0.16	>0.2	Insufficient
Magnesium (Mg) (Can be assimilated)	Masloviy(CH_3COONH_4)	mg/kg	465	160-480	Medium
HCO_3^- (in the soil)	Saturation filtrate	mel/l	3.1		
Cl^{1-} (in the soil)	Saturation filtrate	mel/l	35.8		
SO_4^{2-} (in the soil)	Saturation filtrate	mel/l	21.7		
SAR (in the soil)	Calculation	mel/l	5.98	<12	
Ca^{2+} (in the soil)	Saturation filtrate	mel/l	15		
Ca^{+} Mg^{2+} (in the soil)	Saturation filtrate		35		
Mg^{2+} (in the soil)	Saturation filtrate	mel/l	20		
Na^{+} (in the soil)	Saturation filtrate	mel/l	25		
K^{+} (in the soil)	Saturation filtrate	mel/l	0.58		
Total nitrogen (N) (in the soil)	Kjeldahl	%	0.025	0.09-0.17	Very weak

As can be seen from the table, the fertility of the soil is salt-free, weakly alkaline, highly calcareous (carbonate) soil with a very poor supply of humus. Analyzes of trace elements that can be assimilated in this area were also carried out. The soil is poorly supplied with Mn, Zn and Cu, except for Fe as a microelement. Anion and cation analyzes were performed in this area. The excess of Cl, hydrocarbon anion and Na in the soil leads to a decrease in the quality of the soil. The 30-60 cm layer of this soil is very poorly supplied with nitrogen, medium with phosphorus, and high with potassium. Soil fertility is salt-free, weakly alkaline, high and very high calcareous (carbonate) soil with a very poor supply of humus. Chlorine, hydrocarbonate anion, sodium exceeding the norm in the soil leads to a decrease in the quality of the soil (Table 2.).

Table 2.

Depth (cm)		30-60 cm			
Coordinates		40.48827 – 50.15908			
Land description		S-1 p-1 By the pine-tree			
Parameter	*Method Reference*	*Unit*	*Result*	*Norm*	*Conclusion*
Organic matter (hummus)	Walkley-Black	%	0.38	2-3	Very weak
Phosphorus (P2O5) (Can be assimilated)	Olsen (NaHCO3)	kg\ha	97.9	60-120	Medium
Kalium (K2O) (Can be assimilated)	Maslovıy (CH3COONH4)	kg\ha	579	250-550	High
pH	1:2.5 Soil water mixture	-	8.12	6.6-7.5	Less grainy
Salinity (EC)	1:2.5 Soil water mixture	mS/cm	1.73	0-2	Saltless
Lime (karbination)	Scheibler	%	21.06	5-15	High
Sodium (Na) (Can be assimilated)	Maslovıy (CH3COONH4)	mg/kg	972	81-120	Very high
Calsium (Ca) (Can be assimilated)	Maslovıy (CH3COONH4)	mg/kg	10110	1150-3500	Very high
Water saturation	Saturation	ml	37.6	51-70	Light grainy
Zinc (Zn) (Can be assimilated)	DTPA	mg/kg	0.64	1.0-2.4	Weak
Iron (Fe) (Can be assimilated)	DTPA	mg/kg	5.2	2.5-4.5	High
Manganese (Mn) (Can be assimilated)	DTPA	mg/kg	3.16	14-50	Very weak
Copper (Cu) (Can be assimilated)	DTPA	mg/kg	0.224	>0.2	Sufficient
Magnesium (Mg) (Can be assimilated)	Maslovıy (CH3COONH4)	mg/kg	502	160-480	High
CO3 2- (in the soil)	Saturation filtrate				
HCO3- (in the soil)	Saturation filtrate	mel/l	2.7		
Cl1- (in the soil)	Saturation filtrate	mel/l	73		
SO4 2- (in the soil)	Saturation filtrate	mel/l	48.2		
SAR (in the soil)	Calculation	mel/l	10.77	<12	
Ca2+ (in the soil)	Saturation filtrate	mel/l	24		
Ca+ Mg2+ (in the soil)	Saturation filtrate		63		
Mg2+ (in the soil)	Saturation filtrate	mel/l	39		
Na+ (in the soil)	Saturation filtrate	mel/l	60.4		
K+ (in the soil)	Saturation filtrate	mel/l	0.47		
Total nitrogen (N) (in the soil)	Kjeldahl	%	0.019	0.09-0.17	Very weak

Results and their discussions

During the propagation of *Rosmarinus prostratus* Mazziari, the generative or vegetative method is used [1]. Propagation by seeds is rarely used, because the percentage of germination of seeds is a poor 10-20%. Vegetative reproduction of the species is carried out by division of the bush, layering of the bush and penning [2].

Pen propagation can be done twice a year: in spring and autumn. Rooting agent (Kornevin), peat, compost (Carbon-Nitrogen (C-N) ratio 20:1, 35:1, Humidity 50-60%, PH 6.5-8.0), perlite, growth hormone (Garden Safe Materials such as TakeRoot Rooting Hormone for Plants: 3 butyric acid 0.1 % ($C_{12}H_{13}O_2$)) were used. Pieces of 10-12 cm long were cut from the mother plant, the leaves in the lower part were cleaned and immersed in cornvine (Figure 3.).

Figure 3. Pen propagation of Rosmarinus prostratus Mazziari

The "Garden Ointment" preparation (AEF-MCG-2022-1(42)-12/08/3-M-08 Azerbaijan Science Foundation project number) produced by the Experimental-Industrial Plant LLC was applied to the wounds caused by the cutting of samples from the mother plant. "Garden Ointment" is a preparation for sterilizing and healing damage to ornamental and fruit trees after pruning and grafting. Garden Ointment prevents stem rot, damage from rodents, frost, sunburn and the introduction of pathogenic organisms due to moisture entering incisions.

The ointment creates an "artificial shell" effect on the trunk shell, it is used to accelerate the regeneration

process. The ointment made of T-46 turbine oil, paraffin, polyethylene, polymer Lubimax 181-TDS material does not burn, does not dry, kneads, and does not melt under the influence of cold. the finished product does not require preheating, it can be used at a temperature of +4°C. It can be used throughout the year, except for frost and rainy days, as water can damage the newly applied protective layer. It is recommended to cover it with a bandage to increase its effectiveness.

Rosemary samples were planted in pots prepared by mixing peat and perlite with water in a ratio of 1/1. Pots are placed in a sunny and warm place. According to research, the initial rooting process occurs after 4-5 weeks. The samples are transferred here by filling the pots with a compost mixture (Carbon-Nitrogen: Carbon-Phosphorus, Oxygen concentration more than 5%). After transplanting, the plant was supported twice with growth hormone (Garden Safe TakeRoot Rooting Hormone for Plants: 3 butyric acid 0.1% ($C_{12}H_{13}0_2$)). New plant individuals grown in pots for several months were transplanted to the open field with a distance of 10 cm. To increase the fertility of the soil layer, 40-50 tons of burnt horse, sheep, goat or cow organic manure was applied before planting. If burnt organic fertilizer is not given, 100-200 kg of solid humic acid can be given per hectare. It will improve the soil structure, fertility, activity of microbiological processes in the soil and reduce the negative effects of lime in the soil. In addition, since the soil is highly calcareous, 100-150 kg of powdered sulfur and micronutrient fertilizers lacking in the area were sprinkled and plowed per hectare before planting. With this method, we reduce both soil pH and the negative effects of soil lime. As the pH is weakly alkaline and strongly alkaline, normal irrigation was carried out, and DAP (diammonium phosphate) fertilizer was given as heel fertilizer. During pen propagation, it is possible to obtain 60-80% rooted individuals.

Division of the bush - this method of vegetative reproduction is the least labor-intensive and the most widely used method. The process of reproduction of the plant is carried out in autumn (September-October). A bush with a sufficiently strong root system and a large number of shoots was selected to obtain a high result. For the purpose of comparative analysis of the species, the root system of 1, 2, 3-year-old individuals was studied in laboratory conditions (Figure 4.).

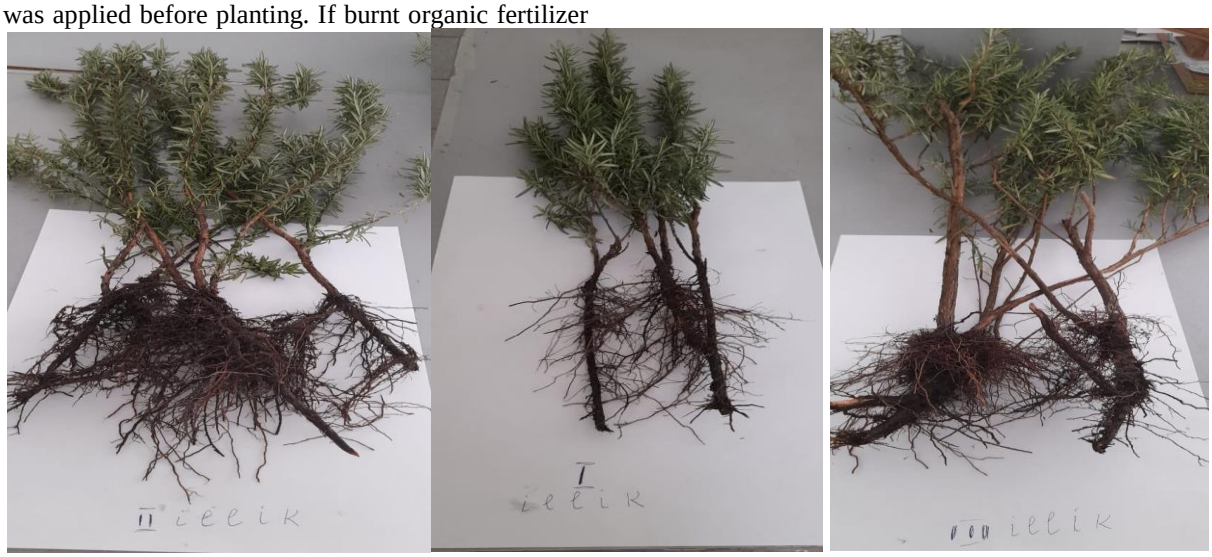

Figure 4. Rosmarinus prostratus Mazziari. study of the root system

The mother plant was carefully dug up and divided into several parts without damaging the plant root. Each new bush was planted in separate planting holes, keeping the growth point above the ground level (Figure 5.).

Figure 5. Rosmarinus prostratus Mazziari.-Propagation by dividing the bush

Another vegetative propagation method, bush layering, is a less commonly used method. At this time, the part of the mother plant that has formed a flower is folded and that part is buried with soil. Transplantation is carried out after new leaves appear on the branch.

Final result

During the research it was found that Rosmarinus prostratus Mazziari. It is possible to get faster results during vegetative propagation. Bush division, pen and folding method were studied comparatively. In reproduction by division of the bush, the development is fast, the plant takes root quickly. While pen propagation requires more agrotechnical care, the method of dividing the mother bush requires less labor. After planting rosemary, the soil should be moist, but not wet, for the plant to be more productive and grow well in all three methods. The first sign of rosemary dehydration is the appearance of yellow leaves at the base of the stems. At this time, the plant reacts to excess moisture by dropping its leaves**.**

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