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SEED PROPAGATION OF *Juniperus foetidissima* Willd. IN ABSHERON

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СЕМЕННОЕ РАЗМНОЖЕНИЕ *Juniperus foetidissima* Willd. НА АПШЕРОНЕ

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Abstract. The bioecological characteristics of the genus *Juniperus* L. on the Absheron Peninsula and its resistance to environmental factors are considered. The juniper, which occupies a very important place in the forests of Azerbaijan, is less demanding on environmental factors. At the Institute of Dendrology of Azerbaijan NAS, research on seed reproduction was carried out. Despite the fact that seed propagation is the only way to create new hybrid forms, the structure of the seeds and the growth characteristics of conifers make it difficult to use this propagation method. In the presented work, the influence of various factors on seed reproduction is considered and a model for the complex application of stratification and scarification for seed germination is proposed.

Аннотация. Рассматриваются биоэкологические особенности рода *Juniperus* L. на Апшеронском полуострове и его устойчивость к факторам окружающей среды. Можжевельник, занимающий очень важное место в лесах Азербайджана, менее требователен к факторам окружающей среды. В Институте дендрологии НАН Азербайджана были проведены исследования по семенному размножению. Несмотря на то, что семенное размножение является единственным способом создания новых гибридных форм, структура семян и характеристика роста хвойных пород затрудняют использование этого метода размножения. В представленной работе рассмотрено влияние различных факторов на размножение семенами и предложена модель комплексного применения стратификации и скарификации для прорастания семян.

Keywords: Absheron, seed germination, *Juniperus foetidissima*, stratification.

Ключевые слова: Апшерон, прорастание семян, *Juniperus foetidissima*, стратификация.

Absheron Peninsula is characterized by a semi-desert and arid steppe climate. The Institute of Dendrology with a total area of 12 ha is located in the north-east of Absheron, 3.2 km from the Caspian Sea and 40 km from Baku. The area is 8.2 m above sea level, the average annual temperature is 13–15 °C, humidity is 8.0–8.2% in winter and 35–40% in summer. Annual precipitation is 120–270 mm, the soil is alkaline (PH = 8–9), belongs to the type of gray clay and sandy soils. The average annual temperature in the area varies between 13.5–14.6. The temperature of warm months is very high (23.0–25.5). In a relatively warm winter, the temperature does not fall below 2.6–3.6 °C. Active temperatures range from 4,200 to 4,500. Most of the precipitation falls in the early spring and autumn months, and the annual amount varies between 110–232 mm. Annual

evaporation (947–1210 mm) is several times higher than the annual precipitation. Humidity coefficient is equal to 0.25–0.09. The amount of organic matter in the soil is low, 0.3–0.8%, and the amount of nitrogen, phosphorus and potassium is correspondingly small. The amount of carbonates varies widely from 3 to 29%.

Taking into account both scientific and practical importance of studying the bioecological features of the genus *Juniperus* (*Juniperus* L.) in the Absheron Peninsula and its tolerance to environmental factors, a number of scientific researches were carried out at the Institute of Dendrology of ANAS [1].

Objects and methods of research

Juniperus foetidissima Willd. which occupies a very important place among the arid forests of Azerbaijan, plays an important role in enrichment of air with oxygen, as well as being tolerated to environmental factors. It is a tree with a 1.5 m, sometimes up to 16 m high crown. The bark is gray in adults, brownish-red on young trees. Leaves are dark green, ovoid or scissor-shaped, sometimes oblong-rhombic, 2–10 mm long. It smells bad when you crush its leaves. It is a dicotyledonous plant. Cones are 7–13 mm in diameter, ovoid or yellowish, dark red in color. Seeds are 1–2, sometimes 3, oval or ovate, light brown. The cones are fully ripe in October–December of the second year. Pollination is anemophilic. Resistant to soil drought and heat.

J. foetidissima Willd has a strong root system and is widespread in both near-surface and deep layers of soil. It uses both atmospheric sediments and groundwater to supply water. According to the literature, the average life expectancy is 300–400 years [2–3].

Although juniper is mainly propagated by seedlings and saplings, the issue of its propagation by seeds has always been in the center of attention. At present, juniper seed germination is not considered efficient, as juniper seeds have a low germination rate. This is due to the fact that the seed coat is very thick and strong. Although seed reproduction is the only way to create new hybrid forms, the seed structure and growth characteristics of conifers make it difficult to use this method of reproduction. The economic and decorative significance of the ordinary succession requires the improvement of its seed propagation methods and the current research is devoted to the solution of this problem [4].

Results and discussion:

On the territory of the Institute of Dendrology of ANAS, 400 seeds obtained from berry-like cones randomly collected in *Juniperus foetidissima* trees were divided into 16 groups with 25 seeds each. The first 4 groups were stratified for 5, 4, 12, 16 weeks at 5 °C (Table) and then germinated in a laboratory environment. The first signs of germination began to be observed after 28 days. While no germination was observed in the first control group that was not stratified at 5 °C, 13% germination was recorded in the group followed by germination after 12 weeks of stratification. The cover of seeds was thinned before each of the next four groups was stratified at 5 °C. In nature, juniper seeds undergo natural scarification when they pass through the digestive tract of animals fed on these cons. In the laboratory, scarification was performed using the method proposed by Loutfy — 98% sulfuric acid. 4 groups of 25 seeds each — a total of 100 seeds were stored in a solution of sulfuric acid for 10 minutes. After the seeds peel, the second stage, stratification, begins. Only 2% germination was recorded in the non-stratified, only scarified group. It should be noted that the highest result in the experiment — 35%, was obtained after scarification and stratification at 5 °C for 12 weeks.

Only four of the following groups underwent stratification, and the other four groups

underwent stratification and scarification. No germination was recorded in the first control group, where germination was observed without stratification. This indicates that germination is not recorded in groups that have not been stratified. While 9% germination was recorded as a result of 12 weeks of stratification at 10 °C, stratification yielded 24% germination at the same time after scarification. Chemical scarification of seed coat with sulfuric acid increases germination by 15% after 12 weeks of stratification at 10 °C and by 22% at 12 °C after 12 weeks of stratification.

Table.

GERMINATION RATE OF *Juniperus foetidissima* Willd. SEED COLLECTED FROM THE TERRITORY OF INSTITUTE OF DENDROLOGY

Taken measures	5 °C stratification				5 °C stratification and scarification				10 °C stratification				10 °C stratification and scarification			
	0	4	12	16	0	4	12	16	0	4	12	16	0	4	12	16
Stratification duration (in weeks)	0	4	12	16	0	4	12	16	0	4	12	16	0	4	12	16
Germination percentage (in %)	0	5	13	9	2	11	35	23	0	4	9	2	0	11	24	19

Conclusion

The results of current study shows that the most effective way to increase germination rate of *Juniperus foetidissima* Willd. Seeds is 12-week stratification at 5 °C, after scarification with sulfuric acid solution. As can be seen from diagram 1.35% germination has been archived after application of this method.

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