STUDY OF MYCORHIZE-PRODUCING MUSHROOMS OF THE ELAEAGNUS ORIENTALIS. L UNDER THE CONDITIONS OF THE ARAL SEA REGION

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Abstract. *The article describes the results of the experiments on the cultivation of seedlings of the east oleaster by the method of rooting from cuttings of Tashkent-16 and Samarkand-7 varieties in the conditions of the Aral SEA region. The height of one-year seedlings is on average 85-220 cm at the end of the growing season (max. 280 cm), according to the preservation of seedlings, cuttings are prepared in the fall and stored in a special trench for the purpose of starting in winter. When planted in early spring, a low result of 35-40% was obtained. It was prepared in advance and immediately planted on ready-made seeds, which gave a high rate of interception of 65-85%.In the root system of these cultivated jida seedlings, there are obvious nodular formations, intensive growth of the seedlings was observed in the second half of summer during the complete formation of mycorrhizal nodules. Nodular formations have a morphological round, rice-like, flowing, sometimes shingle-like appearance, which are connected to the plant root. In the roots of each medium-sized seedling, mycorrhizal nodules with an average weight of 45-65 grams (in the conditions of Karakalpakstan) are formed, the diameter of each of them is up to 1.5-2.5 mm, and the data on the fact that these nodules show the characteristics of complete nitrogen absorption within 100-120 days given.*

Keywords: *under the conditions of Karakalpakstan, cuttings buried for the winter, trenches, intensive, at the end of the growing season, vegetable, fruit, flower, branches, bark.*

Introduction. Existing plants in the flora have various biological, ecological and economic importance in their own way. Accordingly, it is of practical importance to use the fruits, flowers, branches, bark and other materials of plants for their drying, processing, packaging, medicinal use in the pharmaceutical industry for use in the food industry.

At the same time, according to the bioecological properties of plants, they can be used in agriculture and forestry to improve land reclamation. According to their biological parameters, plants have the properties of strengthening salt and sand (saksavul, kandim, karabarok, etc.). Among the plants of this botanical world, the oriental sycamore improves land reclamation and also increases land productivity. Like legumes, mycorrhizal nodules are formed in their roots. During the formation of mycorrhizal fungus in the root of ginseng, it also acts as a protection for the plant. The interaction between fungi and plants has been studied for 200 years. There is a lot of scientific work on the mechanism of nitrogen assimilation by these beneficial microorganisms, but extensive research on this phenomenon of symbiotrophism began mainly in the second half of the 20th century. It is known that in forest conditions, many woody plants absorb nutrients and water from the soil with the help of mycorrhizal fungi. Especially the representatives of the leguminous

trees-shrubs (Fabaceae) family also have the properties of increasing soil fertility. Menshikov G.I. [4] recommended the planting of E. angustifolia along with leguminous trees as phytomeliorant plants for planting in Russian coalfields.

Li Zhengao [7] researches on the development of bacterial fertilizers to improve soil fertility and crop yield in China. It is aimed at the search for new microorganisms that are present in the natural plants of kandacho, oleaster and chakanda and produce similar nodule bacteria when infecting the roots of legumes with bacteria of the genus Rhizobium.

Methods of research. Conducting field and production experiments, Recommendation on "Comprehensive assessment of the East oleaster, vegetative propagation of its promising forms and establishment of plantations" (2017), 3317–90 (UzSSt 322.15.04.2009), " Seedlings of trees and shrubs", state standards was implemented based on the requirements of the methodological manual "Program and methodology for the study of variety of fruit, berry and nut crops" (1999).

Research results and their discussion: Individual nodules-shingles are formed in the root system of leguminous plants, which appear as a result of the growth of the parenchyma tissue of the root. Bacteria that have entered the tissue play a key role in their occurrence. Later, the bacteria that have penetrated into the tissue begin to produce nitrogenous compounds due to the assimilation of nitrogen from the air. As a result of their vital activity, nitrogen assimilation increases more and more, nitrogen accumulates at a level that is not only available for bacteria, but also for plant needs. It is known from the world forestry experience in the cultivation of many cultivated forests that the use of mycorrhizae always gives positive results in the restoration of forest biogeocenosis on degraded lands, in the growth and development of seedlings in forest nurseries, and in increasing the resilience of established cultivated forests. Due to the hyphae of the fungus, the adsorbing surface of the root system increases, the nutrition of the plant is improved due to the fermentation of mineral substances by the fungus.

1 – picture

Mycorrhizal nodules formed on the roots

Mycorrhiza increases the resistance of plants to harmful pathogenic environment and anthropogenic influences. Nodules on the roots of Elaeagnus appear after they are infected with nitrogen-fixing bacteria. Bacteria enter the plant root through the root buds and accumulate in the form of nodules under the root bark. In this case, the cell nucleus undergoes changes and starch accumulation occurs in the cells. Cells infected with bacteria begin to grow and shingles appear.

The nature of mycorrhizae was first described in 1879-1881 by F.M. Kamensky, in his opinion, the fungus ensures the absorption of water and mineral substances by plant roots. The

term "mycorrhiza" was proposed by Albert Bernhard Frank in 1885. Mycorrhizal plants are called mycotrophic plants [3]. [https://ru.wikipedia.org/wiki/%Mycorrhiza].

There are individual hypertrophic growths in the root of the plant, which look like the growths in the root of leguminous plants. They play an important role in plant life, because with their help, the plant has the opportunity to absorb atmospheric nitrogen.

The nodules in the roots of plants in the family of sedums were studied by Servettas (Servettaz), the first researcher [8].

When a suspension of crushed nodules was injected into the roots of young plants, they were observed to grow better than plants that were not infected with fungal nodules. The process of increasing the number of nodules in the roots of plants infected with bacteria was observed, while their number was noted to be very small in non-infected plants.

According to Zach, these nodules contain hyphae of fungi of the order Hyphomycetales. Inside the hyphae there are dark-colored stick-like formations, which, according to the researcher's conclusions, are unused products of the activity of fungi.

According to E.P. Spratt and A.K. Panosyan, Elaeagnus root nodules appear after the roots are infected with nitrogen-fixing bacteria. According to them, bacteria enter the root with the help of root buds and accumulate in the cells. Then there is an overgrowth of infected cells. Spratt's experiments showed that Pseudomonus radicicola in the nodules of ginseng can also damage the seedlings of other plants.

K. Panosyan was able to isolate the nodule bacteria from the roots of oleaster in a pure state and identified it as Bacterium radicicola var. called pschat. Later, Cardner showed that the nodule-forming bacteria in the roots of sorghum play an important role in plant nutrition, and they have the ability to absorb atmospheric nitrogen, like bacteria in leguminous plants and small roots [1, 5].

V.I. According to Zapryagaeva [2], nodular mycorrhizal formations appear in 1-year-old seedlings.

In our research, when the root system of the seedlings grown from 1-year-old cuttings was studied, it was found that they also have nodular mycorrhizal formations. As the age of the tree grows, the number of mycorrhizal formations increases. According to A.S. Rodionova, mycorrhiza is a complex relationship between green plants and mycorrhizal fungus, the fungus takes nitrogen-free organic matter from the plant, and in turn, the plant absorbs nitrogenous substances, mineral salts and water through the fungus. In addition, it was found that the mycorrhizal fungus provides the root system of the green plant with vitamin V1 (thiamine), a type of vitamin that activates the growth of the plant's root system.

In the course of our research, Tashkent 16 and Samarkand 7 varieties of the east oleaster (these varieties were created in 2020) were watered 7 times during the experiments on the cultivation of saplings by the rooting method in the Khojayli State Forestry Department of Khojayli district of the Republic of Karakalpakstan (irrigation in different regions depending on the climatic conditions rate may change during one vegetation period). Intensive growth and development of seedlings was noted in the second half of summer.

The average height of one-year seedlings at the end of the growing season is 85-220 cm (max. 280 cm), according to the preservation of seedlings, the cuttings are prepared in autumn and kept in a special trench in winter for the purpose of startification. The rate of interception of cuttings prepared before the start of movement and planted on ready-made beds was 65-85% on

average. The study of the root system of the seedlings showed that the fibrous lateral roots developed from the lateral callus grow up to 70-85 cm (max. 110 cm) and have a diameter of 3-5 mm. It was noted that the main biomass of seedlings (about 80%) is located in the 0-60 cm soil layer.

It was observed that the lateral roots of oleaster seedlings developed not only from the callus, but also from the pen shoots under the soil. In nature, the sedum plant grows in arid soils far from the river, so they form an arrow root that penetrates deep into the soil layer. It is known from our research that when growing gerbera seedlings from seeds, mainly arrow roots are formed in seedlings, and it can be observed that lateral roots are formed in seedlings grown from cuttings. In the experimental nursery, the root system of almost all oleaster seedlings has obvious nodular formations, and our research revealed that mycorrhizal nodules were fully formed in the second half of summer in the seedlings grown from oleaster cuttings, and they supported the nutrition of the seedlings and ensured their intensive growth.

Nodular formations have a morphological round, rice-like, flowing, sometimes shingle-like appearance, which are connected to the plant root. Mycorrhizal nodules with a diameter of 1.5-2.5 mm are formed in the roots of each medium-sized seedling, weighing on average 45-65 grams (in the conditions of Karakalpakstan).

Figure 2

One bush is 180 cm long, picked from a seedling and washed weight indicator

These nodular bacteria are formed in the roots of ginseng seedlings within 70-80 days and show full nitrogen absorption properties within 100-120 days, ensuring intensive growth of seedlings in the second half of summer.

If the planting pattern of our experimental area is 90*15 cm, and if we calculate how many seedlings are needed for one hectare, for example, there are 167 rows in 100 meters and 667 seedlings in one row. 111389 seedlings *65 grams = 7240285 grams / 1000 = 7240 kilograms. So, our saplings in one hectare naturally supply the river with 7240 kg of natural nitrogen in one year.

Now, let's calculate how much natural nitrogen it will give to one hectare of land if the 4x4 m-shaped fields planted in the 7-8-year-old Lalmiclor fields. For example, if we multiply 25 rows in 100 meters and 25 rows in 25 rows, there will be 625 seedlings. If a oleaster tree produces 65 grams of mycorrhiza in one year, now an 8-year-old tree will have 520 grams. 625 pieces * 520 grams = 325000 grams /1000 = 325 kg.

If we take into account the fields on the irrigated banks, 278 seedlings will be planted in the form of 6*6 m, 278 * 65 grams = 180,7 grams / 1000 = 18.7 kg will be enriched with natural nitrogen per year.

Summary. Thus, it is possible to consider the intensive growth of the seedlings in the second half of the summer (August-September) as the nodules created by these bacteria and the process of assimilation of atmospheric nitrogen passing through them. The characteristic of assimilation of this important atmospheric nitrogen of the cypresses ensures good plant growth, the soil under the cypresses can be enriched with nitrogen at the rate of 5000-7000 kg/ha per year, depending on the thickness of the trees.

For this reason, it is necessary to take into account this valuable biological feature when planting the oleaster tree in saline, degraded and infertile lands. The oleaster tree enriches the soil with nitrogen, and by giving valuable fruits, it serves as a source of food for the food industry and fauna. It was observed in the research that the secret of the oleaster tree growing well in low-fertility lands and being fruitful is closely related to this phenomenon of mycorrhiza.

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