

## **EFFECT OF THE SEEDS OF SOYBEAN VARIETIES IN MODERATELY SALINE SOILS ON STEM HEIGHT WHEN SOWING WITH NITROFIX-P STRAIN**

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**Abstract:** This article examines the effect of the application of Nitrofix-P strain on the seeds of soybean varieties in moderately saline soils of Khorezm region, the formation of nodules in the roots, the effect on plant stem growth.

**Keywords:** soybean, variety, nitragin, nodule, plant, seed, soil, stem.

**Introduction.** Increasing soil salinity is one of the most common degradation processes in the world, leading to land desertification and declining soil fertility. There is an economic and social crisis in the world today, it is necessary to study the ecological and biological basis of plant development in order to provide society with food and to regulate its production in the agro-industry. The negative effects of salinity on plants are associated with the development of water deficiency, disruption of ionic homeostasis, and toxic effects of ions, it leads to decrease plants growth and development, fertility and productivity. Today, soil degradation is taking place around the world, and thousands of hectares of land are becoming unusable every year. These identified conditions can cause food shortages for humans as they increase day by day. That is why environmental issues are one of the most pressing issues in the 21st century.

**Analysis of the literature on the subject.** According to N.I. Vavilov (1953), the Khorezm oasis is one of the oldest sources of agriculture. The flow of the Amudarya in Khorezm and the flow of the Nile in Egypt, the soil, the species of growing plants are very similar to each other. He described as the most fertile and productive soil in 1929 when he was in Khorezm. Years later, as a result of the human factor, the water level of the Aral Sea decreased and environmental problems began all around. Of all the negative environmental processes in the oasis, the salts and sands flying from the dried bottom of the Aral Sea in the areas close to the Amudarya delta are primarily degrading the soil. Salt and sand falling on fertile soils on a daily basis have a negative impact on soil structure, agrophysical and agrochemical composition [6, pp. 41-44].

Due to the drying up of the Aral Sea in the soils of Khorezm region, the amount of chlorinated and sulfated salts is increasing. Due to the increase in the amount of salt in the soil, the yield of crops grown over the years is declining. The decrease in the yield of cultivated crops depends on the content of salts in the soil. Salts in the soil have a direct effect on plant cells.

Today, all the soils of Khorezm region belong to the group of moderate and strongly saline soils, and some areas are absolutely unsuitable for planting crops.

Since soybean has a positive effect on soil fertility, we tried to introduce nitrogen-fixing bacteria into the soil through seeds to determine the accumulation of biological nitrogen in the soil of soybean varieties in the region and to improve microbiological processes in the soil at least slightly. According to the report of Dorosinskiy L.M. [3], the endogenous bacteria gradually enter the soil when the plant matures and begin to live on their own without saprophytes. In the soil, these bacteria wait for their "owner", that is, the soybean bacteria wait soybeans, the pea bacteria wait the pea plants, if their original "owners" do not come they gradually begin to die. Academician D. N. equated leguminous crops to a plant that supplies nitrogen using free solar energy.

A number of scientists have studied the peculiarities of the influence of soil salts on the growth, development and high yields of soybean varieties, in particular in Russia Zelentsov S. V., Moshnenko E. V. (2017), V.F. Kuzin (1976), V.S.Petibskaya, I.V.Shvedov (2012), (2012), in Uzbekistan D.Yo.Yormatova [2] (1991) H.N.Atabaeva (2003), in Tajikistan Mirzoev R.S. [4] (1988) and others. According to them, soil composition and rhizobium bacteria affect the formation of phenological phases of soybean varieties.

**Research methodology.** In the experiment, the varieties were placed by randomization and planted in the 3rd iteration. Field experiments were conducted on "The basis of methods of conducting field experiments" (Tashkent-2007,).

The following options were studied in an experiment to study the effects of soybean seeds on Nitrofix P strain by increasing their productivity and soil fertility:

1) In the experiment, 4 varieties of soybeans, medium-ripe Nafis (control) control, Eureka-357, Selekt 302, Varieties grown for grain called Parvoz without the influence of Nitrofix P strain.

2) Effect of Nitrofix P (200 g / ha) strain on soybean varieties.

We studied the growth, development and yield of seeds of medium-ripe soybean varieties imported from local and foreign countries in the moderately saline soils of Khorezm region by processing them with nitragin strains. In the experiments, the middle-aged Eureka-357 of the Kazakhstan selection, the Selekt-302 of the Krasnodar selection, and the Parvoz from the local soybean varieties and Nafis as a control varieties were studied.

The experiments were carried out in the experimental fields of the Khorezm Scientific Experimental Station of the Scientific Research Institute of Seed and Cultivation Agrotechnologies of the Khorezm Region. The experiments were four-fold, two-tiered, and observations on the study of shade varieties were made on the basis of methodological guidelines such as "Methods of conducting field experiments", "Methods of studying the biological fixation of nitrogen in the air."

**Analysis and results.** The specific soil-climatic conditions for each variety are determined by the duration of its growing period. Our experiments show that medium-ripe varieties created abroad are associated with the accumulation of useful temperatures necessary for their growth and ripening in our soil-climatic conditions. This is because each variety needs to get a certain amount of useful temperature before it can grow and bear fruit.

Nafis as a control variety, and Parvoz varieties are medium-ripe varieties, the temperature of 2200-2300C is required during the growing season for the germination of these varieties. In our country Parvoz and Nafis as a control varieties have been created for sowing in the main terms. Medium-grown Selekt 302 from Krasnodar 302 Eureka 357 cultivars of southern Russia and Kazakhstan are designed for hot climates, in fact they are medium-ripe, but when we planted the main and repeated, the growing period was reduced to 10-12 days.

The mechanical composition of the experimented soil was found to be medium sandy, alluvial irrigated meadow.

Before planting soybean varieties from the soils of the area where we conducted the experiment, the agrochemical composition was determined by taking samples from three places in layers 0-20, 20-40, 40-60 and 60-80 cm from the horizon. The amount of humus in the top layer of the experimental field was shown by the samples 0.498%, the amount of humus in the next layer 20-40 cm 0.420%, a sudden decrease of 0.078%. The next layer is the amount of humus 40-60 cm 0.353% and in layers of 60-80 cm, the amount of humus is absolutely reduced and 0.274%. It was found that the amount of humus in the soils in the 3rd and 4th layers from which the soil sample was taken was even lower.

Experiments on the cultivation of soybean varieties with nitragin strains in the moderately saline soils of Khorezm region are almost non-existent. In the experiment, the use of Nitrofix P-strains in moderately saline soils had a positive effect on the growth of soybean varieties. Planting of soybean varieties was carried out in the spring of 2018-2021, and before sowing soybean seeds were treated with nitragin strains. To do this, 200 grams of nitragin strain per hectare of soybean sown in nitragin strain was dissolved in 1 liter of water and mixed with the seeds in a cool place out of the sun and wrapped for one-one and a half hours. Soybean seeds treated with Nitragin strain should not be exposed to sunlight, otherwise *Rhizobium japonica* bacteria will be killed.

Because in saline soils, there was no information on whether nitrogen-fixing nodules were formed in the soybean roots. Given that the soils of the region are saline, we have experimentally determined the formation of biological nitrogen-fixing deposits. In our experiments, it was found that the first shoots form in the soybean roots within 12-14 days after the emergence of soybean grasses in the soybean roots.

When the plant entered the branching phase, the number of nodules on the roots was 6-8. Initially, a small swelling appears at the root, and then a nodule forms from this swollen area. In our experiment, we studied the geography of the location of the ends at the roots of the varieties, i.e. how close they are to the vertical and horizontal parts of the root. As it turned out, the nodules were formed mainly at a depth of 12-15 cm in the soybean root. As the plant roots fell into the lower layer of the soil, the number of nodules decreased, the number of nodules at 20-23 cm was 3-4, and another nodule at 23-28 cm was formed (Table 1).

When seeds of four varieties of soybean were sown without the application of nitrofix-P strain, not a single nodule was formed in these areas. This is because

Rhizobium japonica bacteria are not found in the soil, as soybean is a new plant in the region agriculture. Before sowing soybeans, bacteria are introduced into the soil through strains, and they remain in the soil under favorable conditions for 15–17 years.

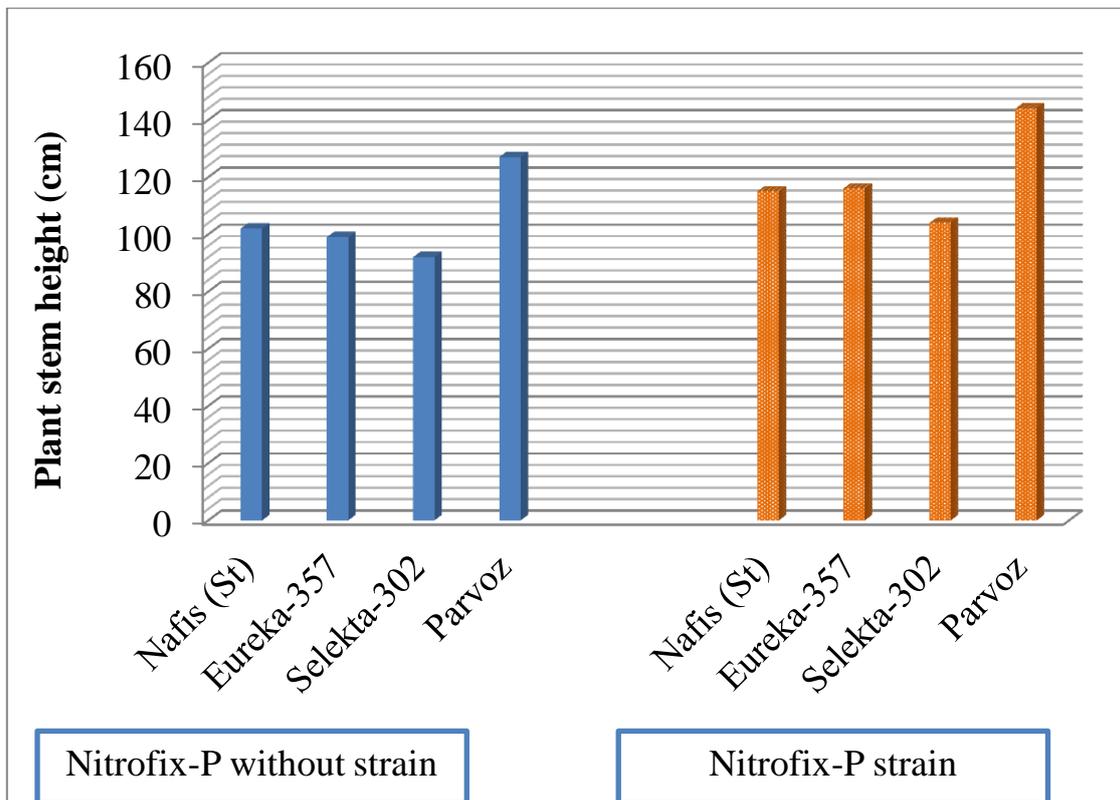
Table 1

**Formation of nodules on roots when seeds of soybean varieties are nitrated, cm.  
(2018-2021)**

Soybean varieties	In the branching phase		The beginning of flowering		The end of flowering		Ripening phase	
	Verti Cal	Gori zontal	Verti Cal	Gor zon tal	Verti Cal	Gori zontal	Verti Cal	Gori zontal
Nafis-ct	7	4	16	8	25	15	30	16
Parvoz	9	5	19	11	33	19	37	23
Selekta-302	6	6	15	9	24	16	29	19
Eureka-357	8	5	16	8	30	17	33	20

**When planted without nitragin, no nodules were formed at the root of the plant.**

The study of nodules formed in the roots of soybean varieties revealed that the Nitrofix-P strain produced different amounts of nodules in different soybean varieties. In the branching phase, the number of nodules in the vertical position in the roots was 6-9, while the number of nodules in the horizontal position of the roots was 4-6. The nodules were formed by the end of the flowering phase in the roots of soybean varieties, at which time no significant change in the number of nodules in the roots of soybean varieties was observed when a single plant reached the ripening phase. It was found that the change in the number of nodules at the end of the flowering phase and the ripening phase was significantly increased. Soybean varieties formed at the roots had a major impact on the increase in biometric performance, such as stem height.



**Figure 1 Effect of soybean seeds on stem height when sown by Nitrofix-P strain**

When the seeds of soybean varieties were sown without Nitrofix-P strain the height of the stem in Nafis control variety is 102 cm, in the Eureka-357 variety of Kazakhstan it is 99 cm, in the Seleкта-302 variety it is 92 cm and in the local Parvoz variety it is 127 cm. low was observed. Seeds of soybean varieties were sown with Nitrofix-P strain and increased to 12-17 cm in cultivars. The neck length of the Seleкта-302 variety was found to be lower in both variants than in the control variety, and vice versa in the local Parvoz variety (Figure 1).

The formation of nodules on the roots of soybeans is biologically positive, as it is characteristic of all legumes, starting from the flowering phase, provides itself with nitrogen fertilizer and leaves a certain amount of nitrogen in the soil for the next year's crop. According to scientists [4], when planted after soybean, the yield of cotton increased by 6-7 quintals, grain by 8-10 quintals, and potatoes by 35-37 quintals.

Soy protein, oil and isolate can be used in the processing industry in the country to produce a number of environmentally friendly products, and these products are high quality and protein-free and do not contain substances harmful to human health. The proliferation of soybean products will lead to the provision of people with environmentally friendly food, but in this regard, a great deal of research is being done to bring new technologies and investments to provide the food industry with cheap raw materials.

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