GROWTH AND DEVELOPMENT OF SOYBEAN VARIETIES IN MIDDLE SALT SOILS OF AGROCENOSIS

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Abstract: Soybean cultivation on saline soils of the Khorezm region is one of the most important agricultural practices. In terms of environmental values, soy is a very favorable crop. The study of soybean varieties on the medium saline soils of Khorezm set us the task of evaluating the available mid-ripening soybean varieties from the point of view of the possibility of their cultivation and to evaluate them.

Key words: soybeans, grains, salinization, soil, climate, vegetation, ripening, seeding rate, productivity, bean attachment height.

According to climatic conditions, the Amu Darya delta belongs to the northern region of the desert zone. The northern part of the territories of the lower reaches of the Amu Darya, mainly related to Karakalpakstan, can be estimated by the complex of agro-climatic characteristics as the least favorable for the development of late-ripening varieties of certain types of agricultural crops, in comparison with other zones of the Central Asian republics. The southern part of the territory, which mainly covers Khorezm region of Uzbekistan, Tashauz region of Turkmenistan and the southern regions of Karakalpakstan, is climatically more favorable than the northern part.

The Aral Sea region is characterized by a sharply continental climate: intense insolation, increased air dryness, and low precipitation. In the cold season, this region is influenced by the Siberian anticyclone, then continental air masses of moderate latitudes dominate there. Cold north and northwest winds cause a sharp drop in temperature. The western invasion of the winds that arise in the rear of the southern cyclones is accompanied by intense cloudiness and precipitation. In the autumn-winter period, a stable southwestern periphery of a strictly Siberian anticyclone is established, which leads to clear and dry weather. Continentality is

manifested in sharp changes in meteorological elements both in their diurnal course and throughout the entire calendar year.

Due to intensive economic activity, mainly irrigation, the lower soils in deep depressions experienced a periodic change in flooding and drainage, which resulted in the formation of swamp type soils. Currently, these soils are in the stage of intensive capillary-ground feeding, since groundwater lies in depressions of the living delta at a depth of 2.5-5.0 m. On the plains of the watersheds, where meadow name-alluvial soils with signs of temporary swamping were previously formed, the soils are in stages of weak capillary-soil nutrition. According to N.V. Bogdanovich (1955), the staged development of the soil cover occurred according to the scheme: hydromorphic stage – young alluvial deposits, weakly affected by the process of soil formation of the meadow and bog-meadow nature – meadow alluvial (wooden) soils of the initial stages of soil formation – meadow alluvial soils.

River banks, where meadow-takyr soils were previously widespread, enter the neoautomorphic stage (paleohydromorphic soils). In the eastern part of the delta, meadow – takyr soils developed in some areas, they also entered the stage of automorphic development. Thus, in all hydromorphic soils of the virgin part of the Amu Darya delta, there is a steady tendency to drainage, that is, a transition to an automorphic stage of development.

In addition, the soil cover of the Amu Darya delta is represented by various types of desert soils. At present, a list of typical soils has been established based on the stage-by-stage soil formation in the delta, as well as on the degree of their transformation due to a drop in the level of the Aral Sea: marsh, meadow, salt marshes, meadow takyr, desert, sandy, gray-brown. In areas moistened with groundwater, swamp-meadow, alluvial-meadow, alluvial-bog-meadow soils are developed.

The main irrigated land fund of the region is located on meadow, meadow-takyr, meadow-desert, meadow-alluvial soils. Meadow-alluvial soils of the initial stages of the formation of the desert zone are located along the Amu Darya River. The humus content in these soils (in a layer of 0-30 cm) ranges from 0.59 to 1.61%, potassium from 1.57 to 2.36%, total phosphorus content of 0.11 - 0.14%, mobile form 8 -26 mg / kg of soil.

Biological fixation of air nitrogen can be the main lever to solve the problem of vegetable protein. Including air nitrogen and the biological cycle, it provides for the production of additional protein. The protein productivity of crops capable of symbiotic nitrogen fixation under favorable symbiotic conditions is many times greater than the protein productivity of

crops that do not have this property. Products obtained with the participation of symbiotic fixed nitrogen have high nutritional and feed qualities, harmless to humans and animals. An attempt to significantly increase the protein content in plants and increase its collection per unit area using abundant fertilizer leads to the accumulation of nitrates in the vegetative mass, and sharply reduces the yield.

Crops of legumes that actively fix the nitrogen of the air solve the problem of conservation and even expanded reproduction of the natural fertility of the soil. After cultivation of such crops, 80-100 kg of nitrogen per 1 ha remain in the soil with root and crop residues, i.e. more than can be obtained from the soil during the growing season. Thus, the symbiotic fixation of air nitrogen not only ensures high protein productivity of legumes, but also increases the yield of subsequent crops in the rotation, contributes to the preservation of soil fertility.

The expansion of irrigated soils in terms of mechanical composition indicates a great diversity of the irrigated territory of Khorezm region. In the region as a whole, the area of bog alluvial soils is 32.0%, medium loamy – 35.5%, light loamy – 24.5% and loamy and sandy – 8% of the total irrigated area.

The largest area of heavy soils is located in the northern soil-climatic zone or in the lower reaches of the Amu Darya and light soils in the southern zone or in the upper reaches of the Amu Darya. According to I.U. Smetova (1994), the vast majority of irrigated soils are characterized by very low humus content (72.4%). The area of irrigated soils with an average content of humus as a whole amounted to 21.3%.

The area of irrigated soils with high humus content (0.81-1.03%) is only 5.5% and they are located mainly in Urgench, Shovot and Khonka districts.

Therefore, soybean cultivation on saline soils of Khorezm region is one of the most important agricultural practices. In terms of environmental values, soy is a very favorable crop.

The study of soybean varieties on the medium saline soils of Khorezm set us the task of evaluating the available mid-ripening soybean varieties from the point of view of the possibility of their cultivation and to evaluate them.

The need to study these varieties is due to the fact that soy is considered a monsoon plant and also shows high demands on air humidity and soil fertility. These biological factors in the conditions of Khorezm are absent.

Experiments on the study of varieties were laid in farms located in the middle reaches of the Amu Darya River. Such a distribution of experiments

was needed in order to more fully encompass the diversity of soil and climatic conditions.

In the middle reaches of the Amu Darya River, experiments were laid in farms of Urgench district of the Uzbek Research Institute branch, cotton growing in the experimental plot on saline hydromorphic soils. The average annual air temperature is equal to 11.8 - 13.8°C, the average long-term period with a temperature above 10°C in the average course is 198 days.

To this end, farms located in the most typical conditions characteristic of this zone were identified.

In 2018-2022 Parvoz, Nafis, Eureka 357, and Selecta 302 varieties were studied at the experimental cotton growing institute of Urgench district. The experiments were carried out with 4 row plots, with row spacing of 0.6 m, plot length of 20 m. Sowing was carried out in the third decade of April.

For all varieties, the density of standing is 350-400 thousand plants / ha. The depth of sowing seeds is 4-5 cm, the experimental fields during the growing season were maintained in a loose, weed-free condition, watering was carried out at NV 70-80%, N - 60, P_2 0_5 - 90, K_2 0-60 kg / ha were applied under soybean . For study, mid-ripening was taken 100-116 days.

Shoots in all varieties appeared on the 7-8th day. In the appearance of the first ternate leaf in varieties, no difference was noted in the flowering phase in early ripening varieties 10-12 days earlier than mid-ripening varieties. In the ripening phase for mid-ripening groups of varieties, the differences were significant.

Tests of mid-ripening varieties Parvoz, Nafis, Eureka-357, Selecta-302 conducted in 2018-2022. showed that to complete the development of soybeans, crops before ripening required a sum of active temperatures for these varieties 2000 - 2200°C.

Phenological studies have shown that soybean varieties ripened almost simultaneously in the soon-ripening groups.

From table 1.2.1.it can be seen that in all soybean varieties growth and development on medium saline soils occurs normally.

So in mid-ripening varieties, the vegetative period from seedlings to ripening amounted to ripen almost simultaneously, their vegetation period was 111-115 days.

The research results showed that the habit of plants in all varieties was not the same. The height of plants, the number of leaves, side shoots and beans were significantly different.

Thus, the growth of plants in height in early ripening varieties was 73-79 cm, mid-ripening varieties had a height of 107-116 cm and in late-ripening varieties, the height of plants was 125-131 cm.

According to our data, soy tolerates drought very well before flowering. High temperatures and lack of precipitation during the flowering period, the formation of bean filling leads to a sharp decrease in yield.

Mid-ripening Parvoz variety ripening in 112-119 days has high potential, but as a rule, this one was high-yielding and tall.

Signs of mid-ripening and high seed productivity of the variety are very rarely combined, so the Parvoz crop for four years averaged 33.8 kg / ha, and the yield of Eureka 357 was 30.4 kg / ha, the Nafis variety yielded 28,2 / ha. (table 1.).

Table 1.

Evaluation of the yield of soybean varieties on saline soils in the middle course of the Amu Darya River 2018-2022 in a pilot farm in Urgench district

Variety	Vegetation period, days	Height of plants, cm	Number of beans on one plant, pieces	Weight of seeds of one plant, gr	Weight of 1000 seeds, gr	Crop of seeds, centner / ha
Parvoz	122	139	67	14	134	33,8
Eureka-357	118	104	62	9	132	30,4
Nafis	110	107	56	10	138	28,2
Selecta-302	111	95	48	8	130	27,0

The mid-season Parvoz variety averaged 67 pcs. beans and seed yield was 5.0 kg / ha higher compared to Selecta 302 varieties. Mid-season soybean varieties yielded a high seed yield in Khorezm region. They have great potential for the accumulation of additional photosynthesis products. In these varieties, the leaf surface is formed for a long time and reaches its maximum value only by mid-June, when sowing in late April

In the crops of mid-ripening Parvoz varieties, the photosynthetic potential due to the rapid growth of the leaf surface at the beginning of the growing season until mid-July is not inferior in comparison with other varieties. The leaf surface formed by these varieties at the beginning of the formation of beans for a long time remains at the same level. The outflow of plastics passes at optimal air temperatures for this process, the leaves turn yellow and fall off.

The cultivation of soybean plants and other crops on medium course irrigated soils subject to salinization requires special agro-technical measures to eliminate the negative effects of the excess of toxic salts, chlorides and sulfates on the growth, development and productivity of cultivated crops.

The correct selection of varieties for these soil and climatic conditions is of great interest. In the middle reaches of the Amu Darya River, the most widespread are those varieties that are most highly productive, adapted to local conditions, with an optimal growing season.

All soybean varieties were sown at the same time – April 25, the third decade of April. During sowing, ammonium nitrate was simultaneously introduced at the rate of 60 kg of nitrogen per hectare. At the beginning of the growing season, 2-3 cultivations and cultivation were carried out, as well as mineral fertilizers $N_{12}o$, P2O5, K_20 – 60 kg / ha.

The experimental fields were kept clean from weeds, the number of irrigation varied depending on the precocity of the variety and the depth of groundwater from 4-7 m, with an irrigation rate of 800 m^3. The forerunner was cotton.

The duration of the growing season of soybean varieties in the middle course was almost the same, no significant difference was noted (Table 1.2.1).

The mid-season Nafis variety (standard) matured in 110 days, and the Parvoz variety in 122 days. The vegetation duration of the Krasnodar breeding of Selecta-302 varieties averaged 111 days in 4 years. Variety Eureka-357 ripened in 118 days.

Their characteristic feature is that inflorescences are laid in sinuses already from the 3-4th leaf. The duration of flowering of early ripening varieties is 23–28 days, in mid-ripening varieties 28-34 days. Reducing the duration of the growing season depends on the variety of foreign varieties we shorten the growing season. The lower beans reach almost full maturity, while in all varieties they continue to remain completely unripe, the beans on the upper side.

The longest period of development is the flowering phase. Soybean flowers are very small, mostly open in the morning, but close by noon.

In soybean varieties, the influence of seeding rates on the biological characteristics of varieties was manifested throughout the growing season. Our varieties were distinguished by growth processes, regardless of the variety and seeding rate, intensive plant growth continued until the 1st of August.

Conclusion

Crop yield largely depends on the size and growth rate of the assimilation surface. In our experiments, the mid-season Parvoz variety exceeded the Nafis and Eureka-357 varieties in leaf area by 9.4 and 29.5 thousand m^2 / ha, respectively, and is distinguished by a longer period of their life. By the end of flowering, the maximum leaf area was in the Parvoz variety (63.5 thousand m^2 / ha). In the variety Eureka -357 it amounted to 60.9 thousand, in the variety Nafis - 54.1 thousand m / ha. With late sowing, the period of the most intensive formation of the leaf surface coincides with the phase of soybean bloom. The best conditions for the formation of a leaf surface on saline soils are when sown in late May and early June.

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