International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 03 March 2023
DOI: 10.47191/ijcsrr/V6-i3-08, Impact Factor: 6.789
IJCSRR @ 2023
www.ijcsrr.org

The Effect of Salinity on the Initial Growth of Soy Varieties

Norboyeva Umida Toshtemirovna[1], Khamrokulova Nargiza Kamal kizi[2], Asadova Shakhnoza Zavkiddinova[3]
[1]Doctor of Biological Sciences, Professor, Bukhara State University, Bukhara, Uzbekistan
[2]Basic Doctoral Student, Bukhara State University, Bukhara, Uzbekistan
[3]Master's Student, Bukhara State University, Bukhara, Uzbekistan

ABSTRACT: The article presents the data obtained on the study of the characteristics of soil salinity on the initial growth of different soybean varieties in the conditions of the Bukhara region. During the experiments, it was found that during the first 21 days of the plant, stem and root growth and dry mass accumulation. Based on the above results, it was noted that the above indicators vary in different degrees depending on the soil salinity and the biological and various characteristics of the varieties.

KEYWORDS: Early Growth, Early Root, Early Stem, Soybean Varieties.

INTRODUCTION

At the same time, the issue of food safety has become one of the priority tasks in all countries of the world today. Because there is a worldwide food shortage due to global warming and demographic problems. The increase in natural disasters for various reasons has a negative impact on the supply of food products for the population. The main goal of the work being carried out today is to provide the population with the necessary food products.

The issue of studying and scientific justification of the technological properties of soybean varieties for growing and using them in the food and processing industry in the conditions of saline soil and climate of the Bukhara region is on the agenda. The value of soybean is the presence of all available amino acids in its composition - lysine, arginine, leucine, methionine and other non-exchangeable acids.

Growth and development are one of the most important factors in the production process of plants. Growth means an irreversible increase in the size and mass of cells of organs or the whole organism, which is associated with the neoplasm of their structures, and development means a qualitative change in the body, renewal [1].

Plants with low activity of growth processes, usually have low competition for nutrients and sunlight, and as a result, they develop slowly and usually show low productivity [2]. In the shade, this situation is exacerbated by their need for heat, and when left in low positive temperature conditions, the development of seedlings stops and may even lead to their death [3].

It follows that the main factor affecting the productivity of the soybean plant in the conditions of the Bukhara region is not the long, relatively cold period of spring or the extreme heat of the summer, but due to the salinity of the soil, soybean crops grow slowly and, as a result, cannot compete with other crops. One of the important limiting factors is the slow initial growth and development of seedlings, which makes heat-loving crops vulnerable to adverse weather conditions and insufficiently competitive with weeds.

In this regard, such areas need to create varieties with high activity of initial linear growth, so that in the early stages of development, they can quickly form a photo assimilation apparatus to further maintain the normal life of plants. For this, researchers suggest the active use of initial growth and development indicators of plants in selection [4].

MATERIALS AND METHODS

Research work was carried out based on vegetative experimental methods.

The research was carried out in the Laboratory of Ecological Physiology of Bukhara State University. 2 promising varieties of soybean (domestic Oyjamol and foreign Victoria) were used as objects of research.

Experiments were carried out in non-saline (1), moderately strongly saline (2) soils. Evaluation of the initial growth indicators of soybean seedlings was carried out by the roll (wrap) method [5] on 4, 7, 14 and 21 days 2 times for each variety sample in 25 seedlings, for 21 days.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 03 March 2023
DOI: 10.47191/ijcsrr/V6-i3-08, Impact Factor: 6.789
IJCSRR @ 2023
www.ijcsrr.org

RESULTS AND DISCUSSION

By studying the variation in initial growth parameters in soybean cultivars under study, earlier root emergence, faster soil penetration, and faster dry mass accumulation will have a major advantage in the survival battle with weeds.

Another disadvantage of the saline soil stress for the plant is that the cultivated plant cannot outcompete the foreign plant for food and light. According to modern physiological advances, the negative effects of soil salinity on plants are related to both the high osmotic pressure of the soil solution and the toxicity of salts. Under these conditions, toxic metabolic intermediates: diamines, putrescine and cadaverine accumulate in plant tissues. Under salt stress, the formation of proteins in plants slows down, and even the breakdown of previously formed protein complexes increases. A decrease in protein synthesis is manifested in a significant decrease in the rate of growth and development of plants, and in the disruption of metabolic processes.

Experiments carried out on soybeans showed that during the period of seed germination, in both plants of the control variant, first the root, and then the stem, developed more actively.

In the first 2 weeks of development, the rate of initial linear root growth in soybean seedlings was 1.3-1.4 cm/day. In addition, they grew most actively in the 2nd week, increasing in length by an average of 0.84-1.1 cm per day, and then their linear growth slowed down significantly, unlike the stem. On the 14th day of the plant, the rate of root growth was 13% less than that of germination, and on the 21st day, it was 27% less (Table 1).

Table 1. The initial growth rate of root and stem of soybean varieties, cm

Varieties / Days	Oyjamol				Victoria			
	Control		Medium-strong salinity		Control		Medium-strong salinity	
	Root	Stem	Root	Stem	Root	Stem	Root	Stem
7	8.1	5.3	5.72	4.12	9.1	6.4	6.3	4.76
14	22.0	24.5	14.67	16.2	23.6	26.4	15.6	16.9
21	26.5	31.7	18.25	21.13	26.7	33.7	18.8	22.5

The dynamics of the root and its linear growth of soybean seedlings, after the 14th day, the growth rate relative to the stem slows down the reason for this is explained by the significant decrease in the number of nutrients in the seeds in the following days. Because there were not enough reserves for their normal growth and development. On the 7th day of the experiment, the root length of the Oyjamol variety was 8.1 cm in the control, and 5.72 cm in medium salinity conditions. On the 14th day of the experiment, it was 22.0 cm-14.67 cm and on the 21st day - 26.5 cm by 18.25 cm. This indicator was 5.3 cm in the control and 4.12 cm in medium-high salinity conditions on the 7th day of the experiment. On the 14th day of the experiment, it was -24.5 cm and 16.2 cm, and on the 21st day, it was 31.7 cm and 21.13 cm. Overall average initial growth was 40.6% less than control plant roots and 40.3% less stem growth compared to the control. The linear growth dynamics of the root and stem of soybean plants are explained by a significant decrease in the number of nutrients in the seeds on the 14th day and the following days. Correlations on this indicator were also observed in the research of other researchers [6-18].

On the 7th day of the experiment, the root length of the Victoria variety was 9.1 cm in the control, and 6.3 cm in medium-high salinity conditions. On the 14th day of the experiment, it was -23.6 cm -15.6 cm, and on the 21st day - 26.7 cm and 18.8 cm. This indicator was 6.4 cm in the control and 4.72 cm in medium salinity conditions on the 7th day of the experiment. On the 14th day of the experiment, it was -26.4 cm and 16.9 cm, and on the 21st day, it was 33.7 cm and 22.5 cm. When calculating the average initial growth, it was found that the roots of the Oyjamol cultivar were behind the growth by 40.5% and the stem by 39.6% in medium-high salinity soil compared to the control.

However, slightly different results were obtained for the rate of accumulation of dry matter. The rate of increase of dry weight in the roots of experimental soybean samples was lower on average compared to days after germination (Table 2).

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 03 March 2023
DOI: 10.47191/ijcsrr/V6-i3-08, Impact Factor: 6.789
IJCSRR @ 2023
www.ijcsrr.org

Table 2. Dry mass accumulation rate of roots and stems of soybean varieties, units/g

Varieties / Days	Oyjamol				Victoria			
	Control		Medium-strong salinity		Control		Medium-strong salinity	
	Root	Stem	Root	Stem	Root	Stem	Root	Stem
7	0.15	0.3	0.12	0.23	0.17	0.32	0.12	0.24
14	0.71	0.75	0.54	0.54	0.72	0.77	0.54	0.57
21	0.91	0.94	0.69	0.69	0.98	0.98	0.72	0.72

In the studied soybean cultivars, dry mass accumulation during initial growth was slightly behind the control in medium salinity soil, as was the growth rate of dry weight. On the 7th day of the experiment in the Oyjamol variety, the dry weight of the root was 0.15 g in the control, and 0.12 g in medium-strong saline conditions. On the 14th day of the experiment, it was -0.71 g to -0.54 g and on the 21st day - 0.91 g to 0.69 g, respectively. This indicator was 0.30 g in the control and 0.12 g in medium-high salinity conditions on the 7th day of the experiment. On the 14th day of the experiment, it was -0.75 g and 0.54 g, and on the 21st day -0.94 g and 0.69 g, respectively. In general, in terms of average dry weight accumulation rate, the Oyjamol variety lost 43.5% of root weight and 42.2% of stem weight in medium-high salinity soil compared to the control. Slightly different results were obtained in terms of indicators in the Victoria variety. On the 21st day of the experiment, it was observed that the mass of the stem and root was equal in the soybean varieties growing in medium-strong saline soil. In the Victoria variety, on the 7th day of the experiment, the dry weight of the roots was 0.32 g in the control, and 0.12 g in medium-high salinity conditions. On the 14th day of the experiment, it was -0.77 g - 0.54 g and on the -21st day - 0.98 g to 0.72 g, respectively. This indicator was 0.30 g in the control and 0.24 g in medium-high salinity conditions on the 7th day of the experiment. On the 14th day of the experiment, it was noted that it was -0.75 g to 0.57 g, and on the 21st day -0.94 g to 0.72 g. Overall, root weight and stem weight were 40.0% and 43.5% lower in medium-high salinity soils, respectively, than the control in terms of average dry weight accumulation.

CONCLUSION

Thus, it was determined that the initial growth indicators of the studied soybean varieties change depending on the biological characteristics of the varieties and soil salinity. The dynamics of the root and its linear growth of soybean plants after the 14th day, the growth rate relative to the stem slows down, which can be explained by the significant decrease in the number of nutrients in the seeds in the following days.

Studies have shown that one of the most important limiting factors, namely salinity, slows the initial growth and development of seedlings, making heat-demanding soybean plants vulnerable to adverse weather conditions and less competitive with weeds.

REFERENCES

1. N.I. Yakushkina, E.Yu. Bakhtenko. Physiology of plants. M.: Vlados, 2004. 464 p.
2. Dragavtsev V.A. Physiological and genetic aspects of plant breeding. Physiological bases of plant breeding. St. Petersburg: VIR, 1995. Vol. II. Part I, pp.7-14
3. A.V. Amelin, I.I. Kuznetsov, V.N. Zaitsev. Peculiarities of initial growth in different soybean varieties. Vestnik OrelGAU. 2010. 6(27). pp.131-134.
4. Batygin N.F. Physiological bases of plant breeding under controlled conditions. Physiological bases of plant breeding. St. Petersburg: VIR, 1995. Vol. II. Part I pp.14-97.
5. V.A. Zaitsev, O.M. Korsakov. The efficiency of seed germination in rolls. Selection and seed production. 1983. No. 11. p. 39.
6. Fozilov Sh.M., Holliev A.E. Peculiarities of photosynthesis and transpiration rates in soybean leaves. Newsletter of Khorezm Ma'mun Academy: scientific journal. 7/1 (91), 2022. 181 p.
7. Norboeva U, Xamrokulova N. Soybean-a natural source of protein. InE Conference Zone 2022 Mar 19 (pp. 79-81).

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 03 March 2023
DOI: 10.47191/ijcsrr/V6-i3-08, Impact Factor: 6.789
IJCSRR @ 2023
www.ijcsrr.org

8. Toshtemirovna NU, Ergashovich KA. The geoecological zoning of the kyzylkum desert. International Journal of Advance Scientific Research. 2022 Mar 22;2(03):28-36.
9. Kholliyev A, Nazarova F, Norboyeva N. Cotton resistance indicators in the conditions of water deficiency. Збірник наукових праць SCIENTIA. 2021 Feb 1.
10. Ergashovich KA, Toshtemirovna NU, Davronovich KY, Azamatovna BZ, Raximovna AK. Effects of Abiotic Factors on the Ecophysiology of Cotton Plant. International Journal of Current Research and Review. 2021 Feb;13(4):4-7.
11. Ergashovich KA, Toshtemirovna NU, Iskandarovich JB, Toshtemirovna NN. Soil Salinity And Sustainability Of Cotton Plant. The American Journal of Agriculture and Biomedical Engineering. 2021 Apr 22;3(04):12-9.
12. Ergashovich KA, Toshtemirovna NU, Iskandarovich JB, Toshtemirovna NN. Soil Salinity And Sustainability Of Cotton Plant. The American Journal of Agriculture and Biomedical Engineering. 2021 Apr 22;3(04):12-9.
13. Ergashovich KA, Toshtemirovna NU, Davronovich KY, Azamatovna BZ, Raximovna AK. Effects of Abiotic Factors on the Ecophysiology of Cotton Plant. International Journal of Current Research and Review. 2021 Feb;13(4):4-7.
14. Kholliyev AE, Norboyeva UT, Kholov YD, Boltayeva ZA. Productivity of cotton varieties in soil salinity and water deficiency. The American Journal of Applied sciences. 2020;2(10):7-13.
15. Ergashovich KA, Davronovich KY, Toshtemirovna NU, Azamatovna BZ. Effect of soil types, salinity and moisture levels on cotton productivity. Journal of Critical Reviews. 2020;7(9):240-3.
16. Ergashovich KA, Azamatovna BZ, Toshtemirovna NU, Rakhimovna AK. Ecophysiological effects of water deficiency on cotton varieties. Journal of Critical Reviews. 2020;7(9):244-6.
17. Kholliye A, Norboyeva U, Adizova K. About the negative impact of salination on cotton. Збірник наукових праць ΛΌГΟΣ. 2020 Dec 16:50-2.
18. Норбоева, У. Т. On water resources of the biosphere and the effective use of. *Ученый XXI века* 1-1 (26) (2017): 33-36.

Cite this Article: Norboyeva Umida Toshtemirovna, Khamrokulova Nargiza Kamal kizi, Asadova Shakhnoza Zavkiddinova (2023). The Effect of Salinity on the Initial Growth of Soy Varieties. International Journal of Current Science Research and Review, 6(3), 1909-1912