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ECOLOGICAL ASPECTS OF INCREASING THE NATURAL FERTILITY OF SALINE SOILS

Kuralova Rano Mirzaalievna,
Gulistan State University Biology Department 2nd Course Basic Doctoral Student
E-mail: quralovarano@gmail.com, Тел:+998999249385

A B S T R A C T

This article provides information about the possibilities of increasing fertility and improving the ecology of licorice (Glycyrrhíza glabra L.) by growing it in saline soils. The studies were conducted in Bayovut and Mirzaabad districts of Syrdarya region. The results of the study showed that in the third year the humus content in the soil increased by 0.11% compared to the first year, and the content of mobile potassium and phosphorus decreased. It was recognized that the sweet plant is an important ecological aspect in increasing the natural fertility of saline arable land and improving the ecology of the soil.

K E Y W O R D S

Legumes, symbiosis, mobile nitrogen, phosphorus, potassium, soil fertility, ecology, aspect

INTRODUCTION

The symbiosis of mycorrhiza occurring during the interaction of legumes and soil microorganisms contributes to the improvement of the ecological state of the soil[1]. This is important for saline arable lands, because the level of soil salinity stress as an abiotic factor negatively affects the growth and development of plants, reducing their productivity; on slightly saline soils by 10-20%; on moderately saline soils -by 20-50%; and on highly saline soils - by 50-80% [2]. At the same time, the level of salinity of the soil is considered one of the important criteria determining the salt resistance of plants.It was in a salty environment that legumes were selected from them that were salt-resistant as a result of research [2,3,4]. It was noted that the possibilities of legumes for the accumulation of biological nitrogen come from cost-effective technologies[5].

In this place, the licorice plant is recognized as a medicinal, nutritious, phytomeliorative plant. There is an increased content of humus, nitrogen in the soil layer of 0-50 cm. It was noted that the soil covers the surface layer during the season and prevents secondary salinization due to transpiration of mineralized wastewater through the root system with the help of aboveground vegetative organs[6,7,8,9,10].

In turn, it should be noted that the influence of the licorice plant on the preservation and restoration of the natural fertility of saline soils, on the ecology of the soil during cultivation has not been studied for many years. Based on this, a study was conducted, the main purpose of which was to study the effect of long-term cultivation of a sweet plant on the natural fertility of the soil. The study included data on the effect of a sweet plant planted for 6 and 3 years on soil fertility.

Methods and Object of Research

This study was conducted on irrigated, saline gray-meadow soils of the Syrdarya region in the farms "Galaba" of Bayaut district and “Okhunboev” of Mirzaabad district. The licorice plant **(**Glycyrrhíza glabra L.) was taken as the object of the research. In the Bayaut district, licorice has been grown for 6 years, and in Mirzaabad-for three years. The following analyses were carried out with the soils of the field where the licorice was planted. Analysis of agrochemical properties of soil: determination of soil humus - by the Tyurin method; gross NRK - by the Maltsev-Gritsenko method in a single sample;N-N03 - by the Grandval-Lajou method; N-NN4 - using the Nessler reagent; by the method of mobile phosphorus– machigin; by the method of Machigin-Protasov on a photometer with alternating Potassium flame [11].

Obtained Results

The obtained results showed that when licorice was grown in the Bayovutsky district for 6 years, the average (0-100 cm) humus content in the field in March was 0.77%, and in November this indicator was 0.85% (Fig.1). From these data it can be seen that by autumn the amount of humus increased. This may be due to the effect of the licorice plant, that is, its ability to accumulate nitrogen, as well as an increase in the amount of humus coming in autumn. If in March the content of humus in licorice grown in Mirzaabad district for 3 years was -0.69%, then in the autumn period its content averaged -0.88%. In this area, you can also see that since autumn, the humus content has been increasing in the soil where licorice is grown. In the Baimut district, the humus content increased by 0.08% in autumn compared to spring, and in the Mirzaabad district, this indicator was 0.19%. So, in Mirzaabad district for the third year of licorice sowing, an increase in the humus content was noted. This suggests that the influence of licorice on soil fertility increases from 3 years.

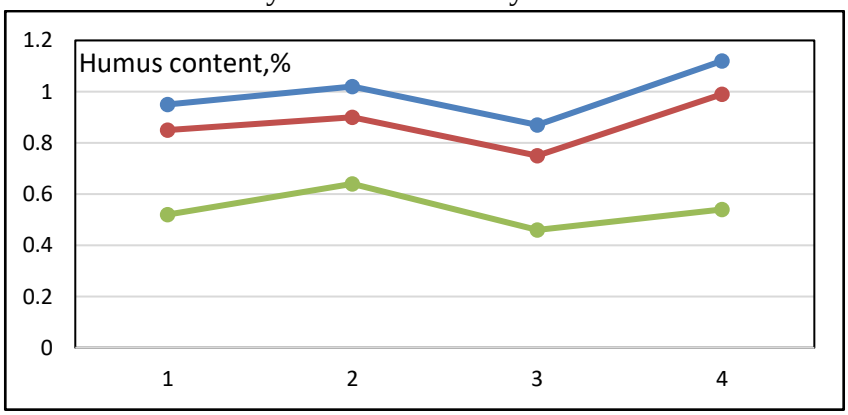

Figure 1. Humus content in the soil of the field where licorice is grown, in %

Note: 1 - humus content in the soil on which licorice was grown for 6 years in Bayaut district, on average in March; 2- in November: 3 - humus content in the soil on which licorice was grown for 3 years in Mirzaabad district in March; 3- in November.

The amount of mobile phosphorus varied depending on the soil layer. The arable soil layer was equal to -18.6 at 30-50 cm and 10.8 mg/100 g at 50-100 cm, while in March in the soil conditions of the Bayaut district (0-30 cm) the average level was 17.2 mg/100 g. These data indicate a decrease in the amount of mobile phosphorus in the lower part of the soil. By autumn, the content of mobile phosphorus was equal to 16.0 mg/100g at 0-30 cm, at 30-50 cm - 15.4 mg and at 50-100 cm - 9.87

mg/100g. The results of tests conducted in Mirzabad district for 3 years showed that the content of mobile phosphorus in March was -18.4 mg/100g, in autumn - 15.3 mg/100g, at 30-50 cm - 16.6 and 14.4 mg/100g, and at 0-100 cm -11.8 (Fig.2). By autumn, the amount of mobile phosphorus in all layers decreased. Based on these data, in both regions there was a decrease in the level of mobile phosphorus by autumn (in November) by 6-7% (1.77-2.2 mg/100 g) compared to spring. The recurrence of such a condition could be caused, firstly, by the high demand of legumes for phosphorus, and secondly, by their behavior as a result of watering during the growing season.

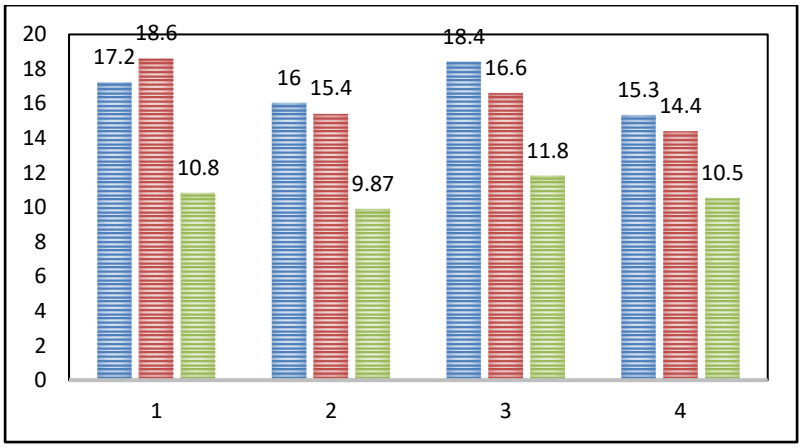

Figure 2. Change in the amount of mobile phosphorus in the fascia cross - section , mg / 100g in soil

Note: 1-the amount of mobile phosphorus in Bayaut district in March: 0-30; in the layer 30-50 and 50-100 cm; 2-the amount of mobile phosphorus in Bayakut district in November: 0-30; in the layer 30-50 and 50-100 cm; 3-the amount of mobile phosphorus in Mirzaabad district in March: 0-30;30-50 and 50-100 cm in layer; 4-the amount of mobile phosphorus in Mirzaabad district in November: 0-30; in layer 30-50 and 50-100cm;

The mobile potassium content in the Bayaut district was equal to 144 mg/100 g in 0-30 cm of the soil layer, in 30-50 cm -138 mg/100 g, and in 50-100 cm -115 mg/100 g. By autumn, these indicators were 127; 122 and 100 mg/100 g, respectively. In autumn, the content of mobile potassium decreased by 5-5. 5% (12.6-13.0 mg /100g) compared to spring. This condition can be explained by the high demand of legumes for the element potassium.

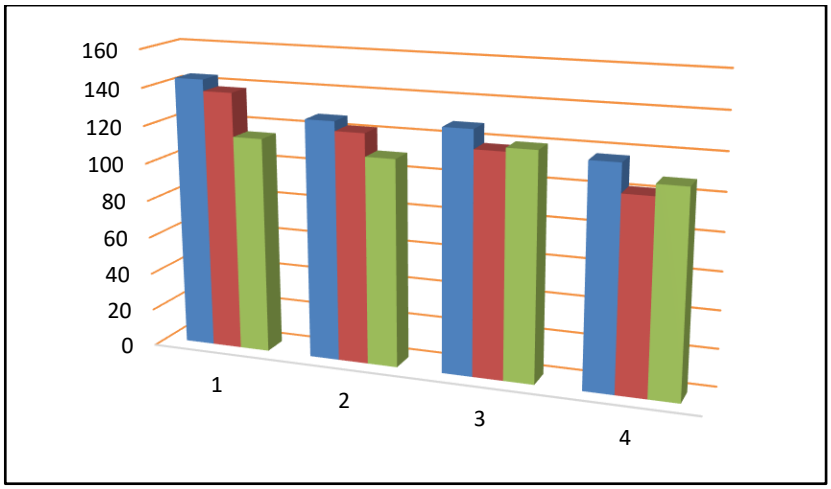

Figure 3. The content of mobile potassium in planted licorice mg/100 g.

Note: 1-the amount of mobile potassium in Bayaut district in March: 0-30; in the layer 30-50 and 50-100 cm; 2-the amount of mobile potassium in Bayaut district in November: 0-30; in the layer 30-50 and 50-100 cm; 3-the amount of mobile potassium in Mirzaabad district in March: 0-30; in the layer 30-50 and 50-100 4- mobile potassium content in Mirzaabad district in November: 0-30; in the layer 30-50 and 50-100 cm;

In general, if when growing licorice for 6 years (in the Bayaut district), the average humus content in the 0-100 cm soil layer was 0.77%, then with autumn care it was 0.85%. In Mirzaabad district, these figures were 0.69 and 0.88%, respectively. From these data, it was noted that the humus content increases from autumn compared to spring. In particular, in Mirzaabad district, this indicator has almost doubled compared to Salavat district. From these data, it was noted that the influence of the licorice plant on soil fertility increased from the third year, and a stable figure was observed in the sixth year. It is noted that the content of mobile phosphorus and potassium decreases by 5-7% in autumn compared to spring. It is quite natural that such a condition is registered. This can be explained by the fact that the licorice plant has high needs for phosphorus and potassium, characteristic of legumes.

Based on the conducted research, the following conclusions can be drawn.

1. It was noted that the humus content in the soil of cultivated fields where licorice was grown increased by 0.11% in the third year compared to the first year. It is noted that from the third year, soil fertility has stabilized.
2. There was a decrease in the content of mobile phosphorus and potassium by autumn by 5-7% compared to spring.
3. It was considered appropriate to use licorice to improve the ecology of saline soils.

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