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BIOGEOCHEMICAL PROPERTIES OF CHALCOPHILE ELEMENTS IN IRRIGATED GRAY SOILS

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Annotatsiya: Sug'oriladigan bo'z tuproqlari o'ziga xos kimyoviy va fizik xususiyatlarga ega bo'lib, ularning tarkibida xalkofil elementlar muhim o'rin tutadi. Bu tuproqlarda xalkofil elementlarning biogeokimyoviy xossalari tuproq va o'simliklar o'rtasidagi murakkab munosabatlarda, shuningdek, tuproqning ekologik holatida katta ahamiyatga ega. Ushbu maqolada sug'oriladigan bo'z tuproqlarda xalkofil elementlarning tabiiy tarqalishi, ularning biogeokimyoviy xususiyatlari, tuproqdagi harakatlanishi va o'simliklarga ta'siri haqida ma'lumotlar berilgan.

Kalit so'zlar: sug'oriladigan bo'z tuproqlar, mikroorganizmlar, xalkofil elementlar, kimyoviy trkib, biologik faollik, biogeokimyoviy xossalar.

Аннотация: Орошаемые серые почвы обладают специфическими химическими и физическими свойствами, и халькофильные элементы играют важную роль в их составе. Биогеохимические свойства халькофильных элементов в этих почвах имеют большое значение в сложных взаимоотношениях почвы и растений, а также в экологическом состоянии почвы. В статье приведены сведения о естественном распределении халькофильных элементов в орошаемых серых почвах, их биогеохимических свойствах, перемещении в почве и их влиянии на растения.

Ключевые слова: орошаемые серые почвы, микроорганизмы, халькофильные элементы, химический состав, биологическая активность, биогеохимические свойства.

Abstract: Irrigated gray soils have specific chemical and physical properties, and chalcophile elements play an important role in their composition. The biogeochemical properties of chalcophile elements in these soils are of great importance in the complex relationship between soil and plants, as well as in the ecological state of the soil. This article provides information on the natural distribution of chalcophile elements in irrigated gray soils, their biogeochemical properties, movement in the soil and their effect on plants.

Keywords: irrigated gray soils, microorganisms, chalcophile elements, chemical composition, biological activity, biogeochemical properties.

INTRODUCTION

Irrigated peat soils are often found in semi-arid and arid regions, characterized by their high salinity and alkaline environment. In these soils, chalcophilic elements, that is, those necessary

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for special microorganisms and plants living in Saline and alkaline conditions, are involved in specific biogeochemical processes. Chalcophilic elements include sodium, potassium, magnesium, calcium, chloride, sulfate and other ions, which determine the chemical composition of the soil and influence its biological activity. The distribution of chalcophilic elements in irrigated peat soils is largely due to the physicochemical properties of the soil, the water regime and human activity. As a result of irrigation, the level of salinity in the soil can increase, which changes the amount of chalcophilic elements and their interaction. As a result, the life activity of microorganisms and plants in the soil is also significantly affected. From a biogeochemical point of view, chalcophilic elements act as catalysts in the decomposition, mineralization and other biological processes of organic matter in the soil. For example, magnesium ions play a central role in plant photosynthesis, while sodium is important in plant water exchange. At the same time, potassium and calcium ions are involved in improving the structure of the soil, which increases the water retention capacity of the soil.

MATERIALS AND METHODS

The movement of chalcophilic elements in irrigated peat soils depends on many factors. The pH level of the soil, the level of humidity, temperature and salinity determine the freedom and availability of elements. For example, under high pH conditions, some elements are in the form of hydroxides, which may be less available to plants. At the same time, an increase in the level of salinity increases the concentration of elements, but sometimes this can lead to the accumulation of elements at a toxic level. The presence of chalcophilic elements for plants directly affects their growth and development. Special chalcophilic plant species have developed in irrigated peat soils, adapted to living in high salinity and alkaline conditions. These plants optimize their metabolic processes by assimilating chalcophilic elements in the soil, thereby biologically stabilizing the soil. In this way, chalcophilic elements are an important part of the interaction between soil and plant. As a result of human activity, in particular, intensive irrigation and improper agrotechnical practices, the balance of chalcophilic elements can be disturbed on irrigated soils. This leads to salinity and degradation of the soil, resulting in a decrease in yield and a decrease in the biological activity of the soil. Therefore, control over the amount of chalcophilic elements and their biogeochemical properties is important in ensuring the stability of irrigated rich soils.[1]

The relationship between microorganisms and chalcophilic elements is also of great importance. Irrigated peat soils contain special chalcophilic microorganisms that provide the processes of mineralization of organic matter and nitrogen cycle under salinity conditions. These microorganisms support the biological activity of the soil and improve plant nutrition. However, they can also play a role in reducing the concentration of harmful ions in the soil. The study of the biogeochemical properties of chalcophilic elements in irrigated peat soils is ecologically and agronomically important. A deep understanding of the movement of these elements in the soil, their interaction with plants and microorganisms helps to develop effective management strategies in irrigated areas. Through this, it will be possible to prevent salinity of the soil, increase yields and maintain an ecological balance.[2]

RESULTS AND DISCUSSIONS

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Watering has a very important effect on the movement of chalcophilic elements in the soil. Through irrigation, the soil is moistened, which changes the chemical and physical processes in the soil. In moist soil, chalcophilic elements, which are salinity-resistant elements, dissolve with water and are able to migrate in dissolved form. The presence of water ensures that the elements are Ionic, which facilitates their movement through the soil. Thus, irrigation accelerates the spread of chalcophilic elements in the soil, and their concentration can increase. Watering also affects the level of salinity in the soil. If the irrigation water is salty, it increases the amount of salinity in the soil, which leads to an increase in chalcophilic elements. In saline soils, the content of ions such as sodium, potassium, magnesium increases, these elements can be toxic to plants. Therefore, it is necessary to pay attention to the quality of irrigation water, since salt water can further saline the soil and enhance the harmful effects of chalcophilic elements. Watering also changes the pH of the soil. The degree of acidity or alkalinity of the soil determines the chemical form of chalcophilic elements. For example, in alkaline soils, some elements are in the form of hydroxide or carbonate, which are less absorbed by plants. Through irrigation, the pH of the soil can change, which affects the freedom and movement of the elements. Therefore, irrigation practices also allow control of soil chemistry. Irrigation also changes the physical properties of the soil. It controls the processes by which water enters and exits the soil, affecting the density, porosity and structure of the soil. In a good soil structure, water can quickly enter and excess salinity elements can be washed away. But if the soil density is high, the movement of water slows down, and chalcophilic elements can accumulate in the soil. Therefore, the intensity and method of irrigation play an important role in improving or worsening the structure of the soil.[3]

The movement of salinity elements in the soil through irrigation also affects the absorption of nutrients by plants. Together with water, salinity elements reach the root zone and can be absorbed by plants. If the amount of these elements exceeds the norm, it can be harmful to plants. Therefore, by controlling the quality of irrigation and irrigation water, the negative effects of chalcophilic elements can be reduced. In general, irrigation is one of the main factors affecting the movement of chalcophilic elements in the soil. It moisturizes the soil, increases the solubility of the elements, changes the level of salinity, controls the pH and affects the structure of the soil. Proper planning and implementation of irrigation will help reduce the negative impact of chalcophilic elements in the soil and is important in maintaining soil fertility. At the same time, the quality, quantity and method of irrigation of irrigation water play a key role in controlling the movement of chalcophilic elements in the soil.[4]

CONCLUSION

In conclusion, the biogeochemical properties of chalcophilic elements in irrigated peat soils form a complex and multifaceted relationship between soil and plants. These elements play an important role in determining the chemical composition of the soil, supporting biological processes and ensuring plant adaptability. As a result of irrigation practices and human activities, the amount and effect of these elements can change, which leads to salinity and degradation of the soil. Therefore, in-depth study and management of the biogeochemical properties of chalcophilic elements in irrigated rich soils is necessary to ensure ecological stability and agronomic efficiency.

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