BIOECOLOGY OF RODENTS IN THE CONDITIONS OF KARAKALPAKSTAN AND THEIR RELATIONSHIP WITH SOIL

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Annotation: This thesis examines the bioecological characteristics of rodents inhabiting the Karakalpakstan region, including their habitats, feeding sources, population dynamics, and their influence on soil fertility. The research results show that rodents directly affect the physical and chemical properties of the soil, playing an important role in maintaining ecosystem balance.

Keywords: Rodents, bioecology, population, soil, ecosystem, agrobiocenosis, ecological balance.

Introduction

The Republic of Karakalpakstan is an ecologically unique region characterized by a sharply continental climate and semi-desert landscapes. In such conditions, rodents (order Rodentia) occupy an essential place in the ecosystem. They are among the key factors influencing soil composition, vegetation cover, and the balance of the food chain. Rodents participate actively in natural processes through burrowing, consuming plant roots, and dispersing seeds. Therefore, studying their bioecological role and interaction with the environment is one of the important directions of modern ecology.

1. Rodent Species Found in Karakalpakstan

Field studies have identified around 25 rodent species in this region. The most widespread ones include: Tamarisk gerbil (Meriones tamariscinus), Libyan jird (Meriones libycus), Yellow ground squirrel (Spermophilus fulvus), Small five-toed jerboa (Allactaga elater), Lesser Egyptian jerboa (Jaculus blanfordi), Northern house mouse (Mus musculus), Brown rat (Rattus norvegicus), and Northern three-toed jerboa (Dipus sagitta). These species inhabit a wide range of environments—from the Amu Darya delta to the Kyzylkum and Ustyurt plateaus. Some live in anthropogenic areas, while others are integral parts of natural desert ecosystems.

2. Bioecological Characteristics

The main biological feature of rodents is their continuously growing incisors, which they use to gnaw seeds, roots, and hard plant materials. Most species are nocturnal or active at dawn and dusk. Some enter partial hibernation during winter. They reproduce rapidly — females may produce 3–5 litters per year, each consisting of 5–12 offspring. Such reproductive potential leads to a rapid increase in population density and may influence ecological stability.

3. Relationship with Soil

Rodents live in burrows dug into the soil. Their activity affects the soil structure in several ways: improving soil aeration, stimulating microbial activity, enhancing water infiltration, and promoting seed dispersal. However, excessive rodent populations may have negative effects: damage to agricultural crops by feeding on roots and seeds, over-loosening of soil causing erosion, and transmission of infectious diseases such as tularemia and plague.

4. Influence on Soil Fertility

Rodent activity accelerates the circulation of organic substances in the soil. Their feces and decomposed remains serve as nutrient sources for microorganisms. For example, in areas inhabited by ground squirrels, soil humus content increases by 15–20%. Burrowing improves soil aeration. However, overpopulation can compact the soil and disturb its structure.

5. Maintaining Ecological Balance

The regulation of rodent populations through natural methods is the most ecologically acceptable way: protecting predatory birds (owls, eagles, falcons) that feed on rodents, increasing plant diversity, reducing anthropogenic pressure and chemical use, and implementing soil monitoring and biological control methods.

Conclusion

Rodents play a crucial role in the ecosystems of Karakalpakstan. Their bioecological activity significantly affects soil fertility, vegetation development, and ecological balance. However, overpopulation can damage agricultural systems. Therefore, maintaining a balanced population through natural and biological control is an important ecological task.

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