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# RHIZOSPHERE SOIL SAMPLING FOR THE ISOLATION OF MICROMYCETES WITH ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY

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**Abstract:** This paper describes the appropriate procedures for rhizosphere soil sampling, emphasizing the importance of proper sample collection, handling, and transportation for the isolation of micromycetes with antibacterial and antifungal activity.
**Keywords:** *Alhagi maurorum, Karelinia caspia, Tamarix spp., Halostachys caspica*, micromycetes, rhizosphere, sterility, transportation.

**Annotatsiya:** Ushbu tezisda antibakterial va antifungal faollikka ega mikromitsetlarni ajratib olish uchun rizosfera tuprog‘idan namuna olishning tegishli usullari bayon etilgan. Bunda namunalarni to‘g‘ri yig‘ish, saqlash va tashishning ahamiyatiga alohida e’tibor qaratilgan.
**Kalit so‘zlar:** *Alhagi maurorum, Karelinia caspia, Tamarix spp., Halostachys caspica*, mikromitsetlar, rizosfera, sterillik, tashish.

**Аннотация:** В статье описываются соответствующие методы отбора проб ризосферной почвы для выделения микромицетов, обладающих антибактериальной и антифунгальной активностью. Особое внимание уделяется важности правильного сбора, хранения и транспортировки образцов.
**Ключевые слова:** *Alhagi maurorum, Karelinia caspia, Tamarix spp., Halostachys caspica*, микромицеты, ризосфера, стерильность, транспортировка.

## Introduction

Micromycetes, or microscopic fungi, represent a diverse group of organisms that inhabit a wide range of environments, including soil and plant-associated habitats. They play important ecological roles in organic matter decomposition, nutrient cycling, and interactions with plants and other microorganisms [2,7]. In addition to their ecological significance, certain micromycetes produce secondary metabolites with antibacterial and antifungal properties, making them promising candidates for biotechnological applications [10].

The rhizosphere is a particularly interesting environment for studying microscopic fungi because plant roots influence the composition and activity of associated microbial communities. Studies have demonstrated that filamentous fungi isolated from plant rhizosphere soil may exhibit antibacterial activity against selected bacterial pathogens [1]. Furthermore, research on

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micromycetes has shown that antimicrobial activity can vary among fungal isolates, highlighting the importance of systematic isolation and screening procedures [10].

Therefore, appropriate rhizosphere soil sampling is an essential initial step in the search for micromycetes with antibacterial and antifungal potential. Careful sample collection, handling, transportation, and subsequent fungal isolation can support the recovery of viable fungal cultures for further antimicrobial screening.

## Materials and methods

Sampling site selection is an important step in soil microbiological research because soil characteristics, vegetation, environmental conditions, and human activities may influence the composition of microbial communities [3,9]. Sciurba et al. [12] emphasized the importance of clearly documenting sampling locations, sampling procedures, and sample-handling conditions to improve the reliability and reproducibility of microbiological studies. For investigations of rhizosphere microorganisms, researchers select suitable plants and collect their roots together with the soil adhering to them, as the rhizosphere is a biologically active zone in which plant roots interact with diverse microorganisms [4,13].

During sample collection, researchers use clean sampling tools and separate containers for individual samples to minimize cross-contamination. Information such as the sampling location, collection date, and plant species is recorded to ensure sample traceability [12]. The collected roots and their associated rhizosphere soil are then transported to the laboratory for further processing and microbial isolation.

Prompt transportation and appropriate storage conditions are important because temperature and storage duration can affect soil microbial community composition and metabolic activity. Dickie et al. [6] described cooling and suitable storage conditions as important considerations for maintaining sample integrity. In a study by Cui et al. [5], different soil-storage methods were found to influence microbial community structure and metabolic activity, while fresh soil was considered preferable for investigations involving microbial metabolic activity. Therefore, researchers are encouraged to minimize the interval between sample collection and laboratory processing. Following arrival at the laboratory, rhizosphere soil can be prepared for the isolation of micromycetes and subsequent screening for antibacterial and antifungal activity.

## Results

Plant samples were collected from a field site in Amudarya District, Republic of Karakalpakstan, Uzbekistan. A total of four plant species were sampled, including their roots and associated rhizosphere soil: *Alhagi maurorum*, *Karelinia caspia*, *Tamarix* spp., and *Halostachys caspica*.

The plants were carefully excavated together with their root systems and associated soil using sterilized tools [8]. Each plant sample was placed in a separate sterile bag to prevent cross-contamination. The bags were securely sealed and labelled to identify the samples and their collection locations.

During transportation to the laboratory, precautions were taken to protect the samples from direct sunlight, excessive heat, and freezing. These measures were intended to minimize environmental influences that could affect the viability and composition of the microorganisms associated with the plant roots [14].

Upon arrival at the laboratory, loosely attached soil was gently removed from the roots by shaking. Soil adhering closely to the root surfaces, representing the rhizosphere soil fraction, was then carefully collected using sterile techniques and transferred into separate sterile containers [11]. The collected rhizosphere soil samples were prepared for subsequent laboratory procedures aimed at isolating micromycetes and screening the obtained fungal isolates for antibacterial and antifungal activity.


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## Discussion

The collected plant–rhizosphere soil samples provide a basis for investigating rhizosphere-associated micromycetes. Previous research has described methods for studying microbial communities in soil, rhizosphere, and root samples [11]. Fungi are also recognized as potential sources of antibacterial and antifungal substances [2]. Therefore, further laboratory isolation and screening are necessary to determine whether the collected samples contain micromycetes with these biological activities.

## Conclusion

Proper selection and collection of plant roots and rhizosphere soil samples are essential initial steps in research aimed at isolating micromycetes with antibacterial and antifungal activity. Appropriate sampling, handling, storage, and transportation help preserve sample quality and support reliable results during subsequent laboratory isolation and screening procedures.

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