

## ТЕРМОТОЛЕРАНТНОСТЬ ШТАММОВ АКТИНОМИЦЕТОВ ПОСЛЕ ДЛИТЕЛЬНОГО ХРАНЕНИЯ

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### АННОТАЦИЯ

Проведены исследования по определению термотолерантности коллекционных штаммов актиномицетов после длительного хранения методом периодических пересевов. Культуры проверяли в динамике роста при 37–65 °С на среде пептонного агара. Показано, что из исследованных 26 культур актиномицетов коллекционного фонда, только 8 штаммов выросли на среде ПА при 37–65°С, которые являются термотолерантными. 18 штаммов являются истинными термофилами, растущие при 45-60 °С.

**Ключевые слова:** актиномицеты, термофилы, термотолерантность, периодические пересевы, коллекционные культуры.

## THERMOTOLERANCE OF ACTINOMYCETE STRAINS AFTER LONG STORAGE

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### ANNOTATION

Studies have been carried out to determine the thermotolerance of collection strains of actinomycetes after long storage by the method of periodic reseeded. The cultures were tested in the dynamics of growth at 37–65°C on a peptone agar medium. It was shown that out of the studied 26 cultures of actinomycetes of the collection fund, only 8 strains grew on the PA medium at 37–65°C, which are thermotolerant. 18 strains are true thermophiles growing at 45-60°C.

**Keywords:** actinomycetes, thermophiles, thermotolerance, periodic reseeded, collection cultures.

### INTRODUCTION

In terms of the commercial production of important biologically active compounds such as enzymes, antibiotics and pigments, actinomycetes are one of the most efficient groups of

microorganisms. Among its various genera as *Streptomyces*, *Saccharopolyspora*, *Amycolatopsis*, *Micromonospora*, *Actinoplanes*, *Thermomonospora*, *Thermoactinomyces* are major producers of industrially important biomolecules. Unexplored ecosystems can lead to the discovery of new biologically active compounds. Researches of recent years have shown that the existence of actinomycetes has been documented in unexplored extreme habitats. Thermophilic actinomycetes are reported to be efficient producers of novel secondary metabolites that exhibit a range of biological activities including the production of antibacterial, antifungal, and extracellular enzymes. [1,2,3].

Thermophilic actinomycetes (TA) are unique high-temperature aerobic bacteria belonging to the group of actinomycetes. Thermophilic actinomycetes isolated by seeding from nine different substrates of the Punjab environment were identified as 8 different species. The atmospheric presence of TA was detected by exposing petri dishes containing soy agar media to six different state media. Seven heat-loving species have been registered. *Thermoactinomyces vulgaris* was the dominant species with a prevalence of 87.5%, 87.1% and 100% in soil, natural manure and wheat field, respectively. [4,5].

Elevated temperatures are typical for the desert soils of Uzbekistan (in the summer months 45-50°C and above), as well as an abundance of desert plants: wormwood, camel's thorn, saltwort, white locust, tamariks, yantak [6,7] deserve attention as a source of thermophilic microorganisms, which are of interest as producers of biologically active substances.

In this regard, the purpose of this work was to determine the growth dynamics at different temperatures of local strains of thermophilic actinomycetes of the collection fund of the Academy of Sciences of the Republic of Uzbekistan, as well as to study the distribution of thermophilic actinomycetes in various regions of the republic to replenish the collection with local active strains.

### OBJECTS AND METHODS OF RESEARCH

The objects of the study were thermophilic collection strains of actinomycetes, stored by the method of periodic reseeded for many years.

To study the growth of cultures at a temperature of 50°C, a nutrient medium of peptone agar was used (PA, g/l: peptone - 1; sucrose - 2; NaCl - 0.5; MgSO<sub>4</sub> - 0.5; K<sub>2</sub>HPO<sub>4</sub> - 0.5; tap water - 1; pH=7.2, agar-agar-20 Since thermophilic microorganisms grow very rapidly, test cultures were incubated at 50°C for 2 days [8,9].

### RESEARCH RESULTS

The collection of industrially important cultures of microorganisms of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan stores local cultures of thermophilic actinomycetes (26 strains in total), isolated from the soils of the Navoi region (tamarix rhizosphere), desert soils of Kyzyl-Kum (yantak rhizosphere). They are stored by the method of periodic reseeded for many years (Fig. 1).

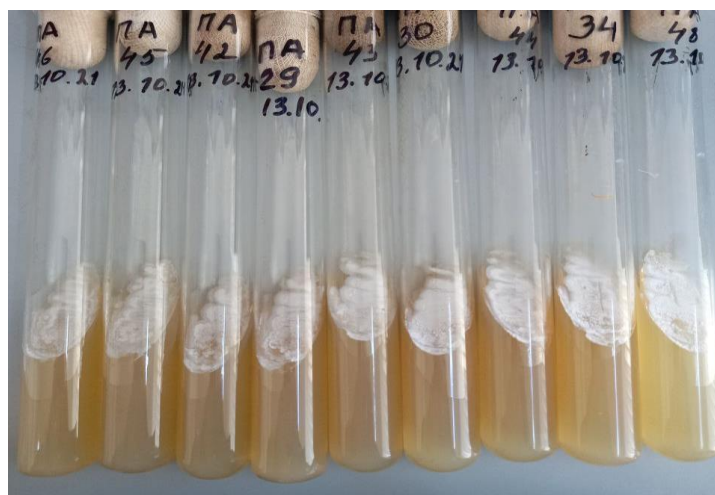


Fig.1. Growth of collection cultures of actinomycetes at a temperature of 50°C

Studies were carried out to determine the growth at different temperatures of 26 strains of thermophilic actinomycetes of the collection fund, isolated from the rhizosphere of various plants living in different regions of Uzbekistan. Table 1 shows the growth of 3 collection strains of the genus *Thermomonospora* at different temperatures.

Table number 1. Growth of collection actinomycetes at different temperatures

Place of selection	Collection No.	No. strain	40	45	50	55	60	65
Central Kyzyl-Kum, tamarix rhizosphere	25	22	-	++	++	++	+	-
Navain region, tomarix rhizosphere	30	145	+	++	+	+	+	-
Nukus city, Shorkul village, Yantak rhizosphere	42	115	-	++	++	++	-	-

Note: ++ - abundant growth, + - good growth, - no growth

In a comparative study of the growth of collection cultures of actinomycetes at temperatures of 37, 40, 45, 50, 55, 60, 65°C, it was found that only 8 strains of the genus *Thermomonospora* have a thermotolerant property, retaining the ability to grow at 37–60°C. At a temperature of 65°C, the cultures showed no growth.

The growth range of the remaining 18 collection cultures of thermophilic actinomycetes was 45–60°C. Since these strains did not show growth at temperatures of 37–40°C, they can be considered true thermophiles.

Figure 2 shows the growth of the collection strain *Thermomonospora* sp.145 at various temperatures.

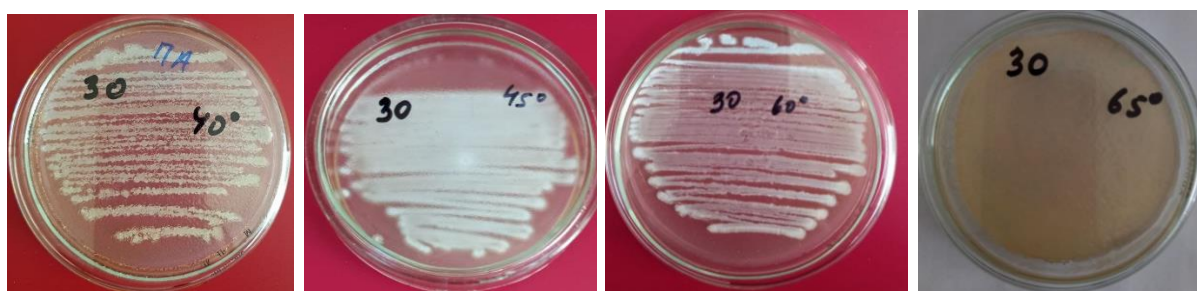


Fig.2. Growth of the collection strain *Thermomonospora* sp.145 at different temperatures



Thus, studies were carried out to determine the growth at different temperatures of 26 strains of actinomycetes of the genus *Thermomonospora*. The thermotolerance of 8 strains of actinomycetes of the collection fund of microorganisms of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan, which grow at 37–65°C, was established. 18 strains are true thermophiles, growing at 45-60°C.

Due to the high growth rate, thermophilic actinomycetes are widely used in various industries and agriculture, play a significant role in the circulation of substances in nature: in the destruction of oil and ozocerites, sulfur transformations and other processes, in wastewater treatment. This will serve as a basis for studying the biotechnological activity of thermophilic actinomycetes.

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