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MONITORING THE DISTRIBUTION AND BIOLOGICAL FEATURES OF TERMITES BELONGING TO THE GENUS *ANACANTHOTERMES* IN ANTHROPOGENIC-TRANSFORMED AND NATURAL AREAS OF KARAKALPAKSTAN

Jangabaev Aydos Sarsenbaevich, Khabipov Shamsuddin Maksetbay ugli
Karakalpak State University named after Berdakh, Nukus, Uzbekistan

Abstract. In this article, the anthropogenic-transformed and natural distribution dynamics, pest levels, and biological trophic characteristics of Turkestan *(Anacanthotermes turkestanicus* Jacobs.) and Greater Transcaspian *(Anacanthotermes ahngerianus* Jacobs.) termites belonging to the genus *Anacanthotermes* (Jacobs) were studied in the conditions of the Republic of Karakalpakstan (during 2025–2026). During the research, a two-year comparative monitoring of the spread of termites in residential buildings, socio-economic facilities, cultural heritage sites, and cemeteries was conducted. Using specially colored bait, the food transport and movement routes of termites, as well as the quantitative ratio of colony strata, were determined.

Keywords: Termites, *Anacanthotermes turkestanicus*, *Anacanthotermes ahngerianus*, anthropogenic transformation, monitoring, cultural heritage, colony, trophic activity.

The sharply continental climate of the Republic of Karakalpakstan, high summer temperatures, and sandy-desert relief are considered favorable ecological environments for the development and spread of termites. Termites belonging to the genus *Anacanthotermes* primarily form natural populations in *Anacanthotermes turkestanicus* and *Anacanthotermes ahngerianus* in, steppes, semi-deserts, and foothills [1].

Anthropogenic factors such as population growth, the development of new land areas, and the construction of industrial and residential buildings are causing agrocenoses, settlements, socio-economic, and cultural heritage sites to migrate from natural termite hotspots to urbanized and transformed territories. While the Turkestan termite *A. turkestanicus* primarily damages wooden structures around and inside buildings, the Greater Transcaspian termite *A. ahngerianus* more often forms complex nest structures in open areas, agrocenoses, and external clay plasterwork of buildings.

The aim of this study is to monitor the distribution status of termites in the urbanized and natural areas of Karakalpakstan, assess the extent of their damage to buildings and historical sites, and determine the trophic and ecological characteristics of the colonies.

The studies were conducted in 2025–2026 in 16 districts of the Republic of Karakalpakstan and the city of Nukus. Residential buildings, social and economic

facilities, cultural heritage sites, and cemeteries were selected as the objects of the study.

The following methods were used in the study:

Field monitoring and inventory, in cooperation with responsible organizations, assessed the degree of damage (%) in apartments and facilities.

Assessment of trophic activity: To study the movement routes of termites and the ability of the colony to accumulate food, special bait prepared from a mixture of sunflower stalks *Helianthus annuus* talkan, carboxymethyl cellulose (KMC) glue, and water-soluble food dyes (green, yellow, red) was placed in cardboard tubes. Initial and 30-day (cleaned of clay and plaster) weights were statistically analyzed.

Determination of colony composition: Thermite burrows (with a diameter of 30 cm^2) were excavated, divided into classes (deputy queen, workers, soldiers, nymphs, and larvae), and quantitative indicators were analyzed at a confidence level of $P<0.001$ ($M \pm m$).

The results of two-year comparative monitoring conducted between 2025 and 2026 showed that in some regions, the number of affected households decreased as a result of preventive and control measures, while in others (for example, in Kungrad and Muynak), the extent of damage increased (Table 1).

Monitoring indicators of termites in Karakalpakstan (2025/2026)

Table 1.

№	District / City	Households (units)	Cultural heritage sites (units)	Economic objects (units)	Field land areas (ha)
1	Nukus	1883 / 1601	- / -	1 / 6	- / 39,7
2	Nukus District	14 / 17	1 / -	- / -	- / 1,5
3	Takhiatash District	- / 55	- / -	- / -	- / 5,0
4	Kegayli district	- / 4	2 / 1	- / -	- / 0,7
5	Karauzyak district	19 / 54	2 / 1	- / -	- / 27,0
6	Takhtakupyr District	77 / 97	- / -	2 / 5	60,3 / 59,4
7	Amu Darya river	12 / 12	- / -	- / -	- / -
8	Beruni district	134 / 111	2 / 2	- / 1	- / -
9	Ellikkala district	585 / 279	4 / 3	- / -	- / -

10	Turtkul District	364 / 473	2 / 2	2 / 4	- / 5,0
11	Khojeyli district	110 / 87	5 / 4	- / -	- / 25,0
12	Kungrad district	130 / 475	1 / -	- / -	- / 15,0
13	Muynak District	225 / 299	1 / 1	2 / 3	- / 5,8
14	Chimbay, Bozatau, Shumanay, Kanlykul	0 / 0	0 / 0	0 / 0	0 / 0

In experiments conducted in 40–45% of infected households in the village of Saymakhan in the Kegeyli district, termites assimilated various colored baits.

Experimental results revealed that termites lack the ability to distinguish colors, yet they possess a highly developed sense of smell and instinct for finding food. The discovery of bait installed in different rooms of one apartment in the corridors of another apartment proved that a single integrated termite colony operates within a single apartment.

Monitoring of the Shilpiq kurgan (Nukus), Ichan-kala and Shibiliy-ata (Kegeyli), Sultan-Uvois and Jampiq-kala (Karauzyak), Mizdahkan complex (Khojeyli), as well as the fortresses of Ancient Khorezm (Toprak-kala, Ayaz-kala, etc.) showed that their walls are made of clay and plaster, which is a favorable substrate for termites.

In the experiment conducted at the Ichan-Kala shrine, the wear and tear of baits installed on building columns (green), walls (yellow), and the exterior (red) was 83.0%, 89.8%, and 89.4%, respectively. Seasonal observations showed that:

In spring: termites are mainly in the eastern and southern outer parts of the building where the sun is shining;

In summer: in columns and wooden structures inside the building to protect against heat;

In autumn: active trophic movement occurs in the interstices and lower parts of the wall.

When studying the quantitative composition of termite burrows (30 cm^2) across strata in various ecological environments, the highest indicator and colony density were observed in the Shibiliy ota shrine (cemetery) area of the Kegeyli district

In an experiment conducted under natural conditions, it was established that 12 out of 35 termite burrows are specialized burrows for direct food collection. Termites re-plaster the damaged chamber walls with clay for 2–3 minutes,

confirming that they possess a high level of protection mechanism against light and negative environmental factors.

The distribution of termites in the Republic of Karakalpakstan remains at a high level, primarily in anthropogenic-transformed urbanized areas (Nukus, Turtkul, Kungrad, Muynak) and historical and cultural sites.

Members of the genus *Anacanthotermes* do not distinguish colors, but quickly find food through sensitivity and smell. They prefer sandy and clayey environments with a moisture content of 20–30%.

Within a single dwelling or facility, termites move as a single colony and change their movement trajectory depending on the season (outer sunny side in spring, interior timber in summer, walls in autumn).

The results obtained are of great practical importance in determining the exact locations and timing of the placement of insecticidal poisonous baits for termites.

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