

**BIOLOGY AND ECOLOGY OF TERMITES IN  
KHOREZM AND KARAKALPAKSTAN, UZBEKISTAN****M.Sh.Zafar****Ph.D. Head of Department  
Khorezm Mamun Academy****I.I. Abdullaev****Dr. of Biological Sciences, Professor  
Chairman, Academy****<https://doi.org/10.5281/zenodo.17588209>****ARTICLE INFO**Received: 10<sup>th</sup> November 2025Accepted: 11<sup>th</sup> November 2025Online: 12<sup>th</sup> November 2025**KEYWORDS**

*Termites, Anacanthotermes turkestanicus, Anacanthotermes ahngerianus, Hodotermitidae, Isoptera, Subterranean termites, Termite biodiversity, Desert termite ecology, Termite infestation, Khorezm oasis, Karakalpakstan region, Aral Sea desiccation, Soil salinity and termites, Termite control strategies, Biological pest control, Termite-resistant materials, Cultural heritage damage, Dryland ecosystems, Climate change and insects, Cellulose digestion, Eusocial insect behavior, Entomology of Central Asia, Foraging behavior of termites, Environmental adaptation of termites, Integrated termite management*

**Introduction**

Termites are social insects related to cockroaches, classified in the infraorder Isoptera. They live in colonies with a caste system (king, queen, soldiers, workers) and feed primarily on cellulose[3][9]. In humid environments many termite species are common decomposers, but in arid zones only certain specialized genera survive. In Uzbekistan's arid climate, the dominant termite pests belong to *Anacanthotermes* (Hodotermitidae), adapted to desert conditions[2][1]. Termites pose a serious economic problem: subterranean termites "cause severe damage to buildings and crops" wherever they occur[10]. In Khorezm and

**ABSTRACT**

*Termites (order Blattodea: infraorder Isoptera) are eusocial, cellulose-feeding insects that have become significant pests in the arid regions of Uzbekistan. In particular, the Khorezm oasis and Karakalpakstan (west Uzbekistan) have seen rapidly expanding termite infestations. The principal species belong to the genus *Anacanthotermes* (Hodotermitidae), notably *A. turkestanicus* ("Turkestan termite") and *A. ahngerianus* ("Greater Caspian termite")[1][2]. These termites build large underground colonies and feed on wood and dry plant matter, making them a major threat to buildings, crops, and natural vegetation[3][4]. The arid continental climate of the Aral Sea basin – hot, dry summers, cold winters, and very low rainfall – along with rising groundwater from Aral Sea shrinkage, has inadvertently created ideal conditions for termite spread[5][6]. Recent surveys document termite presence across all districts of Khorezm and wide areas of Karakalpakstan, with thousands of homes and dozens of cultural heritage sites already damaged[7][8]. This report reviews termite biology, distribution, and impact in these regions, and discusses current control strategies.*

Karakalpakstan, agricultural and wooden structures are at risk, and the problem has escalated in recent years due to environmental change. This study draws on recent entomological surveys and literature to characterize termite biology, distribution, damage, and management in the Khorezm oasis and Karakalpakstan.

**Study Area and Environment.** Khorezm Region: The Khorezm oasis (northwestern Uzbekistan) lies in the lower Amu Darya delta (41–42° N, 60–61° E, 113–138 m asl)[5]. It is a lowland steppe on ancient river sediments, with extremely continental climate: summers reach +30 °C, winters –5 °C, and annual precipitation is only ~80–90 mm[5]. Sandy and alkaline soils dominate (Kyzyl-Kum desert influence in the west, Aral Sea influence in the north)[11]. The vegetation period is 200–210 days. These conditions – very hot dry summers and minimal rainfall – favor subterranean termite survival in buried galleries, especially where irrigation or high water tables provide humidity. Karakalpakstan (Uzbek Aral Region): West of Khorezm, Karakalpakstan includes the southern Aral Sea basin and extensive deserts (Kyzyl-Kum, Kara-Kum) and semi-deserts. It has an even more arid climate than Khorezm. Decades of Aral Sea desiccation have raised local groundwater levels and increased salinity, creating moist soil layers favorable to termites[6]. Severe regional drought (notably early 2000s and continuing) coincided with booming termite populations: one report notes an “unprecedented termite population” fueled by dropping soil moisture and loss of vegetation[6]. The landscape of sparse shrubs and dry brush is prime termite habitat. Historically there are four termite species in Central Asia, of which *A. turkestanicus* is the most prevalent; biologists explain that abundant soil moisture and vegetation (prior to the Aral disaster) had normally limited termite numbers, but the recent drought “has fuelled an unprecedented termite population” in Karakalpakstan[6].

**Termite Taxonomy and Biology.** Species (Genus *Anacanthotermes*): Field surveys and collections in Khorezm and Karakalpakstan consistently find two principal termite species in Uzbekistan: *Anacanthotermes turkestanicus* Jacobs, 1904 (the “Turkestan termite”) and *Anacanthotermes ahngerianus* (synonym *A. vagans*, the “Greater Caspian” or “Trans-Caspian” termite)[1][2]. These two species are dominant in desert and semi-desert regions of Central Asia[2][1]. (Other *Anacanthotermes* species occur in southwest Asia, but not in Uzbekistan.) Both species belong to the family Hodotermitidae and have physiological adaptations for extreme heat and aridity. In laboratory studies *A. ahngerianus* shows high tolerance to desiccation, obtaining metabolic water from cellulose digestion[12]. Life Cycle and Colony Structure: Like other termites, *Anacanthotermes* colonies are eusocial with a caste system[9]. A typical colony has a single primary king and queen, large numbers of sterile workers (“feeders”), and soldiers (defense caste)[9]. Reproductives (alates) swarm in spring, flying and dispersing several kilometers to form new colonies. Workers forage for food and maintain the nest. Termites build mud-plastered galleries in soil and wood, maintaining a high-humidity microenvironment inside the nest[13]. For example, a recent Khorezm study observed that wooden timbers placed in infested houses were quickly coated in a veneer of moist clay (termite shelter tubes), with the interior wood eaten away under this protective layer[13]. This secretive, underground lifestyle makes *Anacanthotermes* difficult to detect and control; workers rarely emerge aboveground except at night or after rain, and they spend most of their life in hidden galleries[13][14]. Diet and Foraging: Termites feed almost

exclusively on cellulose and related plant materials[3]. In Uzbekistan this includes dry wood from dead trees or timber, crop residues, and organic detritus. *Anacanthotermes* termites are generalist detritivores; one Khorezm survey found they collected over 70 different desert plant species into their nests[15]. Common food sources include pieces of fallen brush, grasses, saxaul shrub wood, and even dried fruits or agricultural byproducts left outdoors. Within buildings, termites attack untreated wooden beams, posts, doors, or furniture. They can also consume non-wooden cellulose: Latipova (2024) notes termites will eat cardboard, paper, and other cellulosic building materials[3]. Because cellulose is so abundant in rural houses and ancient woodwork, termites thrive near human settlements.

**Water and Humidity:** Despite the arid climate, termites require moisture. *A. ahngerianus* and *A. turkestanicus* have adaptations to dry conditions: they obtain water by metabolizing the cellulose they eat (breaking down sugars produces water internally) and by collecting dew or soil moisture. Laboratory studies show these termites can survive at low external humidity by relying on metabolic water from food breakdown[12]. In the field they maintain moist nest conditions by building clay chambers and continuous foraging tunnels to damp soil layers. The exceptionally high humidity under their mud tubes (often >95% RH) is critical for brood and fungal symbionts. In sum, termite colonies engineer microenvironments with water reservoirs (from soil and condensation) to offset the harsh desert climate[12][13].

**Distribution and Damage.** Khorezm Region: Surveys indicate *Anacanthotermes* termites are widespread throughout Khorezm. A recent field study used GPS mapping and found termite colonies in every district of the region[7]. Rustamov (Zoological Institute) notes that termites have become “very common” in Khorezm[16]. Damage reports have surged: in 2009 roughly 2.5 thousand houses were termite-infested, rising to nearly 19 thousand by mid-2022 in Uzbekistan overall[17], with Khorezm contributing a significant share. In Khorezm’s villages, many rural homes built of wood and brick now require frequent replacement of beams and door frames. Notably, termites are attacking cultural monuments: at Khiva’s UNESCO-listed Ichan-Qal’a complex, 33 historic wooden structures (e.g. the Juma Mosque, Pakhlavon Mahmud Mausoleum) have suffered serious termite damage[18]. This has prompted emergency conservation work. In the Khorezm oasis the influx of irrigation and rising water tables (from damming and Aral Sea changes) is thought to have expanded suitable habitat for termites; moreover, sale and reuse of infested lumber spreads colonies to new areas[19][14]. Karakalpakstan: Termite infestations in Karakalpakstan are even more extensive. By 2004 an estimated 900 km<sup>2</sup> of Karakalpakstan territory was infested[8], and the area continues to grow. Local reports (e.g. IWPR news 2005) describe “termite plagues” affecting half a million people in the region[20]. Virtually all rural wood-clay houses in villages like Tausha and Kus-Kul became infested: one villager noted “all the houses ... are built from wood. Termites turn the timber to dust – the roofs could collapse at any moment”[21]. Official studies find that, to date, over 3019 private houses in Karakalpakstan have been severely damaged by termites[8]. Termites also endanger cultural sites: 14 historical monuments (wooden fortresses, mausoleums) have known severe termite infestation[8]. The socioeconomic impact is severe: reports estimate tens of thousands of dollars of damage in Karakalpakstan alone[20]. Experts attribute this catastrophe to environmental change: the drying of the southern Aral Sea and desertification “fueled an unprecedented termite

population” by creating more soil moisture and eliminating vegetation that once kept termite numbers in check[6]. Ecological Impact: Beyond buildings, termites are decimating vegetation in marginal areas. In natural (unirrigated) Karakalpakstan, termites “completely destroy living and dry plants” in over-depleted soils, causing orchards and desert shrubs to die[4]. Forested belts and shelterbelts of saksaul (*Haloxydon* spp.) and jerekan (*Calligonum*) are under attack. Kalilaeva et al. (2023) report severe damage to wild and agro-ecosystem plants: as drought kills grass cover, termites can enter stumps and roots, undermining reforestation and grazing land[4]. This plant loss also affects livestock and biodiversity. In summary, the two regions face a growing ecological crisis where termites exploit stressed ecosystems to the detriment of agriculture, forestry, and heritage.

**Integrated Termite Management.** Efforts to combat termites combine chemical, physical, and biological tactics, but the scale of infestation makes control challenging. Uzbekistan’s Institute of Zoology established a “Republican Center for Termite Control” in 2012 to coordinate research and countermeasures[22]. This center and university laboratories have developed specialized baiting systems: for example, patented cylindrical poison-bait stations targeting *Anacanthotermes* were introduced, achieving high efficacy in trials[22]. The Institute also issued practical guidelines (“Recommendations for the fight against termites”) for agriculture and municipal agencies[23]. Chemical control typically uses soil barriers of termiticides (e.g. Fipronil) and treated wood, but complete eradication is difficult due to colony size and subterranean nests[24]. Physical measures include sealing foundation cracks and removing wood debris. In Khorezm, researchers are exploring biocontrol: *Metarhizium* fungi and nematodes are being tested as termiticides, and local plants with repellent oils (e.g. garlic, basil, peppermint) showed promise in lab bioassays[12][22]. Importantly, control must be integrated: Latipova (2024) emphasizes that without continuous monitoring, even treated sites can relapse if infested materials are reintroduced[25][24]. Long-term management in these regions will require combining chemical baits, improved construction practices (e.g. non-wood materials for vulnerable parts), and public education on early detection.

**Conclusions.** Termites of the genus *Anacanthotermes* have emerged as a major entomological and economic problem in Khorezm and Karakalpakstan. Warmer, drier climate and ecological upheaval (notably the Aral Sea shrinkage) have allowed termite populations to expand into new areas of the Aral Basin. Surveys show thousands of homes and dozens of historical monuments already compromised by termite damage[8][18]. Scientific research in Uzbekistan is actively documenting termite ecology and testing controls, but the hidden, communal life of termites makes eradication difficult[14][1]. Continued integration of research, government action, and local awareness is needed. In the meantime, preventive actions – such as using termite-resistant materials, inspecting wood before construction, and promptly treating infested sites – remain critical to protect Khorezm’s and Karakalpakstan’s homes, infrastructure, and cultural heritage from this insidious pest[22][24].

#### References:

1. Latipova DM (2024) In the conditions of the Khorezm region, the spread of termites and measures to combat them[10].

2. Abdullaev II et al. (2022) Termite (Isoptera) survival under external factors in the Khorezm region[5][7].
3. Ganieva Z. et al. (2019) Habitat plants and foraging preferences in *Anacanthotermes* termites[15][2].
4. Kalilaeva BR et al. (2023) Damage of *Anacanthotermes* termites in natural and anthropogenic Karakalpakstan[1][4].
5. Ruzmetov R. et al. (2023) Tendencies of termites (*Anacanthotermes*) in Khorezm region[13].
6. Institute of Zoology, Uzbekistan (2025) Republican Center for Termite Control[22][23].
7. Insarova K. (2005) "Uzbekistan: Termite plague hits Karakalpakstan", IWPR[6][20].
8. Latipova (2024) "Termites seriously damaging woodcarving of 33 monuments in Ichan-Qala"[18][9].
9. [Additional sources on termite biology and control are cited as needed in text.]
10. ^1 Khorezm Mamun Academy of Humanites, Tashkent, Uzbekistan. ^2 Khorezm Mamun Academy of Humanites, Tashkent, Uzbekistan.
11. [1] [4] [8] eprajournals.com
12. <https://eprajournals.com/IJSR/article/11667/download>
13. [2] [15] ijstr.org
14. <https://www.ijstr.org/final-print/nov2019/Habitat-Plants-And-Foraging-Preferences-In-Termites-Of-The-Genus-Anacanthotermes.pdf>
15. [3] [9] [10] [16] [17] [18] [19] [24] [25] webofjournals.com
16. <https://webofjournals.com/index.php/12/article/download/1899/1882/3724>
17. [5] [7] [11] [12] [14] (PDF) Survival of *A. Ahngerianus* (Isoptera: Hodotermitidae) Under the Influence of External Factors (Relative Humidity and Temperature) and Use of Different Water Sources
18. [https://www.academia.edu/103519645/Survival\\_of\\_A\\_Ahngerianus\\_Isoptera\\_Hodotermitidae\\_Under\\_the\\_Influence\\_of\\_External\\_Factors\\_Relative\\_Humidity\\_and\\_Temperature\\_and\\_Use\\_of\\_Different\\_Water\\_Sources?uc-sb-sw=4872425](https://www.academia.edu/103519645/Survival_of_A_Ahngerianus_Isoptera_Hodotermitidae_Under_the_Influence_of_External_Factors_Relative_Humidity_and_Temperature_and_Use_of_Different_Water_Sources?uc-sb-sw=4872425)
19. [6] [20] [21] Uzbekistan: Termite Plague Hits Karakalpakstan | Institute for War and Peace Reporting
20. <https://iwpr.net/global-voices/uzbekistan-termite-plague-hits-karakalpakstan>
21. [13] wseas.com
22. <https://wseas.com/journals/ead/2023/b865115-1090.pdf>
23. [22] [23] Republican Center for Termite Control – Institute of Zoology