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MYCOBIOTA OF TERMITES OF THE GENUS ANACANTHOTERMES

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Various biological, chemical and physical processes take place in the soil. Soil is a natural habitat for various physiological groups of microorganisms and many soil insects. The structure and composition of termite nest soil differs from the surrounding soil. It contains clay from the deep layers of soil that the termite family uses for building purposes and a large amount of other organic matter. Nests of the Turkestan termite are completely hidden on the soil surface, and the nests of the Greater Caspian termite, on the contrary, are clearly visible on the soil surface and represent a mound (roundness) of mud with a height of 20-50 cm [113; pp. 22-24]. Termite habitats are home to many fungi, some of which compete with termite food. Such competition can lead to separation of habitats, and subsequently to interactions such as symbiosis, parasitism, or pathogenicity. During the regular feeding, nesting and other activities of termites, various fungi infect their bodies. Mycobiota of termites plays an important role in their life activities. In all seasons of 2018-2020, in our studies related to the study of the mycobiota species composition of termites in the Khorezm oasis, we found fungi in termite nests and their internal chambers, on the walls of passageways, in the mouth, in the body, and in the digestive system. the presence of spores and hyphae was noted. The species composition of the fungi growing on the stems of sunflower (Helianthus annuus L.) was studied in relation to its use as a forage base against termites. In our research conducted under different conditions of the Khorezm oasis, 31 types of fungi were isolated from the termite body, soil near the termite nest, nest chambers and food, and the species composition was determined (Table 4.3.1).

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4.3.1-Table Meeting of micromycetes in different substrates

(Khorazm Oasis facilities, 2018-2020)

№	Types of fungi	The name of the substrate from which the fungi were isolated			
		In the termite body	Termite nest soil	Termite chambers	food
1	A.alternata	b	xv	b	xv
2	Alternaria sp.	-	k	-	tt
3	A.flavus	xv	tt	-	tt
4	A.niger	tt	tt	-	tt
5	A.oryzae	tt	k	-	b
6	A.sulphureus	b	b	-	b
7	A.tamarii	b	b	-	-
8	A.terreus	b	-	-	-
9	B.bassiana	b	-	-	-
10	B.tenella	k	-	-	-
11	C.acremonium	-	k	b	jk
12	C.globosum	-	k	-	k
13	C.brevicompactum	b	tt	-	tt
14	C.elegantulum	-	tt	-	tt
15	F.oxysporum	-	k	-	k
16	Fusarium sp.	B	k	-	k
17	Helminthosporium sp.	-	-	-	b
18	Mucor sp.	tt	tt	-	tt
19	P.chrysogenum	b	tt	-	jk
20	P.notatum	b	tt	b	k
21	Penicillium sp.	k	jk	-	-
22	S.brevicaulis	k	b	-	-
23	S.lobulata	-	b	b	jk
24	S.botryosum	-	-	b	b
25	M. durum	jk	b	-	-
26	E. aphidis	-	-	jk	-
27	S.globuliferum	-	-	-	jk
28	M.anisopliae	-	b	-	-
29	C. bisporus	-	b	-	-
30	P.monticola	-	-	-	b
31	P. incrassata	-	-	-	b
	Total	**17**	**22**	**6**	**21**

Note: The frequency of meeting fungal species on substrates: xv-all the time, tt-frequently, k-rarely, jk-very rarely, b-sometimes.

22 types of micromycetes were isolated from the soil layers of the termite nest. Alternaria alternata, Cladosporium brevicompactum, S. elegantulum, Aspergillus flavus, A. niger, Penicillium chrysogenum, P. notatum and Mucor sp. Few fungi were isolated from other soils. The results of the analysis of the fungal species and quantitative composition isolated from the soil of termite nests show that all the isolated species are soil saprotrophs, which means that they are characteristic of the Khorezm oasis soil cenosis. Saprotrophic soil fungal species (Alternaria alternate, Cephalosporium acremonium, Penicillium notatum, Stachybotrys lobulata, Stemphylium botryosum) do not play a role in the pathology of termites.

In our research, based on the microbiological analysis of fungi isolated from the substrates, 31 species belonging to 7 classes, 17 families, and 19 genera belonging to the Eumucota section were recorded. When analyzing the composition of species, it was noted that 6 species belonging to the genus Aspergilus, 3 species belonging to the genus Penicillium, and the rest of the genera consist of one or two species (Table 4.3.2).

4.3.2-table Composition of systematic groups of isolated fungi

(Khorazm Oasis facilities, 2018-2020)

Class	Family	Generation	Number of species
Zygomycetes	Mucoraceae	Mucor	1
	Stachybotryaceae	Myrothecium	1
Eurotiomycetes	Trichocomaceae	Aspergillus	6
		Penicillium	3
Ascomycotes	Hymenula	Cephalosporium	1
Dothideomycetes	Dematiaceae	Alternaria	2
	Cladosporiaceae	Cladosporium	2
	Pleosporaceae	Stemphylium	1
	Massarinaceae	Helminthosporium	1
Entomophthoromycetes	Entomophthoraceae	Entomophthora	1
Chytridiomycetes	Myrmicinae	Myrmicinosporidium	1
		Spicaria	2
Sordariomycetes	Chaetomiaceae	Chaetomium	1
	Cordycipitaceae	Beauveria	2
	Microascaceae	Scopulariopsis	1
	Clavicipitaceae	Cordycepioideus	1
	Stachybotryaceae	Stachybotrys	1
	Tuberculariaceae	Fusarium	2
	Clavicipitaceae	Metarrhizium	1
7	**17**	**19**	31

Some types of fungi damage wood and destroy its structure, breaking down cellulose into certain components. Rotten wood makes it easier for termites to feed. Certain types of fungi that have been identified enter termite stomachs with nutrients and serve as a source of additional nutrients. Termites that feed mainly on fungal activity digest up to 50-60% of lignin from wood decomposed by fungi, while termites that feed on undecayed wood can digest up to 1.0-6.0% of lignin [159; p. 72]. Also, it was found that nitrogen is 10-15 times more in wood infected with fungus compared to wood not infected with fungus. In our conducted research, it was noted that fungi belonging to the genera Alternaria, Cladosporium, Termitomyces, and Hitari are abundant in the stalks of sunflower and sassi carpet. Along with species belonging to the genera Stachybotrys, Stemphilium, and Helminthosporium of the Dematiaceae family, Chaetomium fungi from the genus of sac fungi are actively involved in the degradation of sunflower stem cellulose. It was noted that termites mainly feed on plants decomposed by micromycetes of the genera Alternaria, Cladosporium and Termitomyces. In particular, it was noted that there is a symbiotic relationship between termites belonging to the genus Anacanthotermes and the genera Termitomyces and Khitari fungi. These fungi, rich in protein, carbohydrates, and vitamins, play an important role as additional food in the life of termites. It was found that termite larvae use their mycelium and conidia as food. Poriaincrassata and Lentinus genera are especially useful for termites and important in digesting their food.

Also, some fungi Lenzites trabea Pers., Polyporus versicolor Fries and Poria monticola Murr are poisonous and have been studied to cause the death of termites. Alternaria alternata, Alternaria sp., Penicillium notatum, Beauveria bassiana, Beauveria tenella found in all identified substrates were found in infected and dead termite bodies.

Ascomycete pyrenomycete, Cordycepioideus bisporus are fungi that have an intermediate status between parasite and pathogen. Entomophthora aphidis and Sporotrichum globuliferum have a harmful effect on termites. In our research, when 2 types of Spicaria and one type of Metarrhizium, Cephalosporium, Myrothecium and Fusarium were tested, 90-100% were killed within 1-20 days. Also, in our research, it was found that Myrmicinosporidium durum fungi parasitize termites. Aspergillus flavus, A. niger, A. oryzae, A. sulphureus, Cephalosporium acremonium, Cladosporium brevicompactum, Fusarium sp., Mucor sp., Penicillium chrysogenum, Stachybotrys lobulata and Stemphilium botryosum were isolated from 3 substrates.

In the Khorezm oasis research facilities, 22 types of micromycetes were rarely found in the soil around termite nests, 21 types in termite food, 17 types in termite bodies, and 6 types in termite chambers (Table 4.3.3).

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4.3.3-table Meeting of micromycetes in different substrates

(Khorazm Oasis facilities, 2018-2020)

Micromycetes meeting	The name of the substrate from which the fungi were isolated			
	In the termite body	In the soil of the termite nest	In termite chambers	In food
All the time	1	1	-	1
often	3	7	-	6
Few	3	6	-	4
very little	1	1	1	4
Sometimes	9	7	5	6
Total	**17**	**22**	**6**	**21**

Or if 70.9% of the 31 types of fungi identified were recorded in termite nests. 19.3% were found in termite chambers. According to our research, termite nests, especially termite chambers, are sterile from pathogenic microorganisms. Termites are immune to pathogenic fungi, and the saliva of worker termites has been found to have fungicidal effects on fungi other than beneficial fungi, including Termitomyces (Figure 4.3.1).

References

1. Hu J., Neoh, K.B., Appel, A.G. & Lee, C.Y. (2012). Subterranean termite open-air foraging and tolerance to desiccation: Comparative water relation of two sympatric Macrotermes spp. (Blattodea: Termitidae) // Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology, doi: 10.1016/j.cbpa. 161: 201-207 rr.
2. Hussain A., Tian M.Y., He Y.R. and Ahmed S. (2009). “Entomopathogenic Fungi disturbed the larval growth and feeding performance of Ocinara varians Walker (Lepidoptera: Bombycidae) Larvae” // Insect Science, Vol.16, No.6, 511–517 pp.
3. Hussain A., He M.Y., Tian Y.R., Bland J.M., and Gu W.X., (2010a). “Behavioral and electrophysiological responses of C. formosanus towards entomopathogenic fungal volatiles” // Biological Control, Vol.55, 166-173 pp.
4. Hussain A., Ahmed S. and Shahid M. (2011). “Laboratory and field evaluation of Metarhizium anisopliae var. anisopliae for controlling subterranean termites” // Neotropical Entomology, Vol.40, No.2 244-250 pp.
5. Ibrahim S.A., Henderson G. and Fei H. (2003). Toxicity, repellency, and horizontal transmission of fipronil in the Formosan subterranean termite (Isoptera: Rhinotermitidae) // J. Econ. Entomol. 96: 461-467 rr.