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COMPARATIVE ANALYSIS OF NEMATOLOGICAL SITUATION IN UCHKIZIL AND SOUTH SURKHAN RESERVOIRS

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ABSTRACT

The article provides a comparative analysis of the nematological situation in the Uchqizil and South Surkhan reservoirs. According to the results of the analysis, 119 species of free-living and phytoparasitic nematodes were identified in the reservoirs, 94 species in the Uchqizil reservoir, 93 species in the South Surkhan reservoir, and 66 species of nematodes in common for both reservoirs.

KEYWORDS: *Reservoir, Nematode, Soil, Root, Fauna, Uchqizil Reservoir, South Surkhan Reservoir.*

INTRODUCTION

Today, the biological potential of inland water bodies around the world requires rational use. This requires special attention to nematodes, which make up 58% to 90% of all invertebrates in the upper sedimentary layers of water bodies [9]. Nematodes are very common multicellular animals on Earth and are in an active biological development stage. They are actively involved in the utilization of organic matter in water bodies. Therefore, the development of measures to manage the diversity, specificity and quantity of biological species of nematodes is of great scientific and practical importance.

Free-living nematodes are a poorly studied group of invertebrates that have not been well studied theoretically and practically. They play an important role in the balance of organic matter in water bodies.

Free-living nematodes in the watersheds of Uzbekistan have not been studied to date, and we are studying it for the first time.

MATERIALS AND METHODS

Samples from coastal soils and coastal vegetation of the Uchqizil and South Surkhan reservoirs serve as research material. Sampling of nematodes was carried out in 2010-2020. During the study, samples were taken from a total of 800 coastal soils and 700 peripheral soils and plant roots by the route method.

The collected samples were brought to the problematic laboratory of phytohelminthology of Termez State University and nematodes in soil samples were isolated using the washing method. Samples taken from the top (1-2 cm) layer of soil to 1/4 m², with a total volume of 50-100 cm³, were placed in a special polyethylene bag and brought to the laboratory for research. To separate the nematodes from the soil mass, the samples were placed in a crystallizer, shaken, and the resulting fraction was poured into another crystallizer. This process was repeated several times. As a result, the nematodes floated to the surface of the water and were poured into another container. The molten fraction was passed through a gaseous sieve under a weak stream of water. The sediment left in the sieve was washed in a Peter bowl. The tip of the nematode was collected using a slightly bent entomological needle. Isolated nematodes were anesthetized in 4% formalin solution (fixation). The nematodes in the vial were treated with 7 parts glycerin, 23 parts 96% alcohol, and 70 parts distilled water. The solutions help to keep the nematodes for many years, and the glycerin in them helps to clear the nematode from the cuticle [1]. Permanent drugs were prepared by the method of Sainhorst [8].

Berman's funnel method was mainly used to separate nematodes from soil and plant tissues.

Samples of soil (20 cm³) and cut root (length 0.5–1cm, weight 20g) were placed in metal nets with milk filters, then in a 15 cm long glass funnel, filled with water by placing a clamped rubber on the narrow end, and 24 hours in summer, autumn and left at room temperature (10-200) for 48 hours in spring and 72 hours in winter. During this period, the nematodes emerge from the soil and roots into the water and settle in a rubber tube. Nematodes were fixed with 4% formalin.

The species composition of nematodes was studied under a light microscope MBR-3. Morphometric parameters of the De Man formula [104; 104 p.], Modified by Micoletzky [7], were used to determine the species.

RESEARCH RESULTS

Taxonomic analysis of the identified nematodes shows that in the Uchqizil and South Surkhan reservoirs of Surkhandarya region, 119 species of free-living and phytoparasitic nematodes were found in reservoir soils, hawthorn, taron aquatic plants and coastal reeds and sedges. It belongs to 18 subfamilies, 10 large families, 41 families, 40 subfamilies, 64 generations.

The identified nematodes belonged to 3 subclasses (Adenophorea, Chromadoria, Rhabditia), from which representatives of the subclass Adenophorea were found in large numbers in both reservoirs (Table 1).

TABLE 1 COMPARATIVE ANALYSIS OF NEMATODES DETECTED IN UCHQIZIL AND SOUTH SURKHAN RESERVOIRS

Subclasses	Families		Generation		Species		Individuals	
	Number	%	Number	%	Number	%	Number	%
Uchqizilreservoir								
Adenophorea	15	41,7	25	46,3	51	54,4	5701	54,3
Chromadoria	11	30,5	15	27,8	23	24,4	4106	39,1
Rhabditia	10	27,8	14	25,9	20	21,2	693	6,6
Total	36	100	54	100	94	100	10500	100
South Surkhan reservoir								
Adenophorea	15	40,6	22	40,9	43	46,4	2402	48,7
Chromadoria	10	27,0	13	24,0	21	22,5	1438	29,1
Rhabditia	12	32,4	19	35,1	29	31,1	1096	22,2
Total	37	100	54	100	93	100	4936	100

In the South Surkhan reservoir, the Rhabditia subclass included 12 (32.4%) nematodes belonging to the family, while in the Uchqizil reservoir, 11 (27.8%) nematodes belonging to the family were found.

Adenophorea subclass in the Red Reservoir 5701 individuals (54.3% of the total identified individuals), Chromadoria subclass 4106 (39.1%), Rhabditia subclass 693 (6.6%), and Adenophorea in the South-Surkhan reservoir junior class 2402 (48.7%), Chromadoria subclass 1438 (29.1%) and Rhabditia subclass 1096 (22.2%) individuals. According to the analysis, members of the subclass Adenophorea and Chromadoria are more common in the Uchqizil Reservoir than in the South Surkhan Reservoir.

"Floristic spectra" are widely used in botany, representing the main features of the systematic composition of floristic complexes. Analysis of the structure of faunistic complexes, especially helminths, has been developed by foreign scientists [1,2, 3,4].

The nematodes identified in the Uchqizil and South Surkhan reservoirs were distributed among the families as follows (Table 2).

TABLE 2 DISTRIBUTION OF NEMATODES IDENTIFIED IN THE UCHQIZIL AND SOUTH SURKHAN RESERVOIRS BY FAMILIES

№	Families	Uchqizil reservoir		South Surkhan reservoir	
		Number of species	%	Number of species	%
1	Alaimidae	2	2,1	1	1,1
2	Enoplidae	1	1,1	1	1,1
3	Oxystominidae	1	1,1	1	1,1
4	Prismatolaimidae	2	2,1	1	1,1
5	Tripylidae	8	8,5	5	5,3
6	Tobrilidae	8	8,5	10	10,9
7	Dorylaimidae	7	7,4	7	7,5
8	Qudsianematidae	2	2,1	2	2,1
9	Aporcelaimidae	2	2,1	1	1,1
10	Nyqolaimidae	1	1,1	1	1,1
11	Paradorylamidae	1	1,1	1	1,1
12	Thornidae	2	2,1	1	1,1
13	Ironidae	3	3,1	2	2,1
14	Mononchidae	8	8,5	7	7,5
15	Mylonchulidae	3	3,1	2	2,1
16	Chromadoridae	1	1,1	1	1,1
17	Cyatholaimidae	2	2,1	2	2,1
18	Ethomolaimidae	1	1,1	-	-
19	Microlaimidae	2	2,1	1	1,1
20	Monhysteridae	2	2,1	3	3,2
21	Leptolaimidae	2	2,1	2	2,1
22	Cylindrolaimidae	1	1,1	1	1,1
23	Axonolaimidae	2	2,1	2	2,1
24	Chronogasteridae	2	2,1	2	2,1
25	Rabdolaimidae	2	2,1	2	2,1
26	Plectidae	6	6,5	5	5,3
27	Rhabditidae	3	3,1	3	3,2
28	Panagrolaimidae	-	-	4	4,3
29	Teratocephalidae	1	1,1	1	1,1
30	Cephalobidae	6	-	10	10,9
31	Aphelenchididae	-	-	1	1,1
32	Paraphelenchidae	-	-	2	2,1
33	Aphelenchoididae	2	2,1	1	1,1
34	Tylenchidae	-	-	1	1,1
35	Tylodoridae	2	2,1	1	1,1
36	Neotylenchidae	1	1,1	-	-
37	Anguinidae	1	1,1	-	-
38	Pratylenchidae	2	2,1	-	-

39	Criconematidae	1	1,1	1	1,1
40	Paratylenchidae	1	1,1	1	1,1
41	Hoplolaimidae	-	-	3	3,2
	Total families	36		37	
	Types	94	100	93	100

The data in the table show that all nematode families are represented by a small number of species. Some of them include 8-10 species, others 3 species, and the rest 1-2 species. Analysis of the "Faunistic Spectrum" of nematodes in the Uchqizil and South Surkhan reservoirs allows to divide them into at least 3 families (dominant, subdominant and recessive).

The group of dominants includes families with 5-10 species. Representatives of 6 families (Tripylidae, Tobrilidae, Mononchidae, Dorylaimidae, Plectidae, Cephalobidae) in the South Surkhandarya reservoir and 6 families (Tripylidae, Tobrilidae, Mononchidae, Dorylaimidae, Plectidae, Cephalobidae) in the Red Reservoir.

The group of subdominants includes representatives of the family, which includes 2-4 species. There are 13 in the South Surkhandarya Reservoir (Qudsianematidae, Ironidae, Mylonchulidae, Cyatholaimidae, Monhysteridae, Leptolaimidae, Axonolaimidae, Chronogasteridae, Rabdolaimidae, Rhabditidae, Panagrolaimidae, Paraphelenchidae, Apavaidaida, Hoplolaimida, Hoplolaimida), Ironidae, Mylonchulidae, Cyatholaimidae, Mikrolaimidae, Monhysteridae, Leptolaimidae, Axonolaimidae, Chronogasteridae, Rabdolaimidae, Rhabditidae, Aphelenchoididae, Tylodoridae, Pratylenchidae).

The group of residents consists of representatives of the family, which includes 1 species. There are 18 (Alaimidae, Enoplidae, Oxystominidae, Prismatolaimidae, Aporcelaimidae, Nyqolaimidae, Paradorylamidae, Thornidae, Chromadoridae, Misrolaimidae, Cyndrolaimidae, Teratocephalida, Aphelenchididae, Aphelenchididae, Aphelenchididae, Aphelenchididae) in the South Surkhan reservoir. (Enoplidae, Oxystominidae, Nyqolaimidae, Paradorylamidae, Chromadoridae, Ethomolaimidae, Cyndrolaimidae, Teratocephalidae, Neotylenchidae, Anguinidae, Criconematidae, Paratylenchidae).

According to the results of faunistic studies in the Red Reservoir, 94 species (10,500 individuals) of nematodes were identified, of which 65 species (8,771 individuals) were free-living nematodes, 17 species (433) in the *Charafragilis* plant, and 12 species (311) torons. (*Polygonumhydropiper*) was found in the root and stem part of the plant, 28 species (533) in the root and root soil of reeds (*Phragmitesaustralis*) and 19 species (452) in the root and root soil of the plant (*Typhalatifolia*).

Of the total 65 species of nematodes identified in the Trinity Reservoir, 23 species (*Enoploidesfluviatilis*, *Paramphidelusdolichurus*, *Odontolaimuschlorurus*, *Tripylaglomerans*, *T. steineri*, *T. brevisetosis*, *T. longisaudatus*, *T. longus*, *T. abberans*, *Laimydorusflavomaculatus*, *Aquatidesaquatus*, *Ironustenuicaudatus*, *I. americanus*, *Miconchusniddensis*, *M. tunbridgensis*, *M. trionchus*, *Punctodorasalarim*, *Aphanolaimusaquatius*, *A. viviparous*, *Axonolaimusspinosus*, *Paraphanolaimusbehningi*, *Plectusparainquirendus*, *Teratocephalussostatus*) for the fauna of Uzbekistan.

According to the results of faunistic studies in the South Surkhandarya reservoir, 93 species (4936 specimens) of nematodes were identified, including 60 species (2963 specimens) of free-living nematodes, 18 species (336) in the plant Chara (*Charafragilis*), 25 species (547). Toron (*Polygonumhydropiper*) plant root and stem part, 27 species (596) reed (*Phragmitesaustralis*) plant root and iliac soil, and 19 species (494) maple (*Typhalatifolia*) plant root and rhizome soil.

Of the 60 species of nematodes identified in the soils of the South Surkhandarya Reservoir, 20 species (*Enoploidesfluviatilis*, *Paramphidelusdolichurus*, *Odontolaimuschlorurus*, *Tripylaglomerans*, *T. steineri*, *T. brevisetosus*, *T. longisaudatus*, *T. longus*, *T. abberans*, *Ironustenuicaudatus*, *Miconchusniddensis*, *M. tunbridgensis*, *M. trionchus*, *Punctodorasalarim*, *Aphanolaimusaquatus*, *A. viviparus*, *Axonolaimusspinosus*, *Paraphanolaimusbehningi*, *Teratocephalussostatus*, *Mononchoidesstriatus*) were recorded for the first time in Uzbekistan.

CONCLUSION

Of the 119 species of nematodes identified in the study, 66 species were common species and were found in both reservoirs. *A. primitivus*, *P. intermedius*, *T. affinis*, *T. papillata*, *T. cornuta*, *L. flavomaculatus*, *L. conurus*, *E. acuticauda*, *A. superbus*, *A. aquatus*, *P. macrolaimus*, *I. americanus* in the Trinity Reservoir, *M. aquaticus*, *M. signaturellus*, *E. pratensis*, *M. globiceps*, *M. filiformis*, *P. parietinus*, *R. filiformis*, *A. karakalpakensis*, *A. dasylocercus*, *C. hexalineatus*, *H. viviparus*, *D. intermedius*, *P. wescolagricus*, *P. pratensis* nematode species have been recorded and not found in the South Surkhandarya reservoir, *T. medius*, *T. allophusis*, *D. tepidus*, *E. centrocerus*, *M. attenuates*, *N. brachyuris*, *M. africana*, *M. palidicola*, *R. longicaudata*, *P. rigidus*, *P. subelongatus*, *D. rivalis*, *M. striatus*, *E. mucronatus*, *E. oxyuroides*, *E. striatus*, *A. maximus*, *P. batavicus*, *P. myceliophthorus*, *T. davainei*, *H. erythrinae*, *H. multicinctus*, *H. tylenchiformis* nematode species have been identified in the South Surkhandarya reservoir.

According to the analysis, the population density of nematodes in the Uchqizil reservoir is higher than in the South Surkhan reservoir. This situation can be explained by the low annual average turbidity in the Red Reservoir, the average annual mineralization, the high content of nitrogen in the water and the high phytobiomass. The Uchqizil reservoir is explained by the similarity of the nematode fauna to the South Surkhan reservoir, as well as the fact that the Surkhandarya water flows into the Uchqizil reservoir through the Zang canal.

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