



Analysis of the Nematode Fauna of Watermelon Households of Akdarya District of Samarkand Region

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Abstract: In recent years, there has been an increase in the number of diseases caused by phytopathogens. These pathogens affect plants at different stages of their growth and agricultural production. Depending on weather conditions and the phytosanitary condition of crops, the prevalence of diseases can reach 70-80% of the entire plant population, and yields can decrease in some cases by 80-98% [1]. Plants have intracellular immunity, but specific phytopathogens are able to overcome it. The article presents a brief description of nematode species, their impact on the reduction of yield and quality of watermelon varieties "Marmar" (Marble). A comparative study of nematode of the settlements "Juraboy Darkhan" and "Ozod Darkhon" of the Akdarya district of the Samarkand region was carried out.

Keywords: nematode fauna, phytonematodes, watermelon, basal soil, phytohelminth, rhizosphere, nematosis.

Relevance. Phytonematodes, obligate endoparasites of the root system that cause plant diseases, are an important factor that reduces the yield of most agricultural field and greenhouse vegetable crops [2,3]. Phytonematodes cause great harm to agriculture both directly and stimulate the development of a number of fungal, bacterial and viral diseases of melon crops [1,4]. In this regard, the task of preventing losses of agricultural products from pests of cultivated plants arises.

Materials and methods.

This work was carried out during 2022 in the farms of the village "Jurabai Darkhon" and "Ozod Darkhon" of the Akdarya district of the Samarkand region.

The territory of the surveyed farms is located in the floodplain of the Akdarya River. The lands of the farms lie near the tugai zone. The climate is characterized by relatively high humidity. There are sharp fluctuations in temperature during the day and year. Precipitation is timed to the autumn-winter period.

The collection of material on the fauna of watermelon nematodes was carried out during the period of removable ripeness, and in August, September 2022. In the course of work on the territory of each farm, 10 plants with basal soil at a depth of 0-15 cm were extracted from vegetable crop plots. The study of the species composition of the nematode fauna was carried out on the basis of the analysis of own and literary data obtained during phytohelminthological studies of the rhizosphere of watermelon. When collecting and processing phytohelminthological



material, traditional methods were used. Nematodes were isolated by the visual method, the funnel method (Berman method), the Sainhort enlightenment method, the centrifuge-flotation method was partially used, the study and identification of nematodes by morphological method was carried out using temporary and permanent preparations. The definition is based on the structural features of the anal-vulvar plate of the oviparous female. In addition, a genetic polymerase chain reaction (PCR) method was used for identification, which made it possible to identify nematode species with the greatest accuracy. In our work, the multiplex PCR method with two sets of species-specific primers was used for molecular identification of watermelon nematodofauna species.

The degree of similarity of the faunal complexes of watermelon nematodes of the farms of the village "JurabaiDarkhon" and "OzodDarkhon" was determined by the Mounford community indicator calculated by the formula:

$$J = \frac{2j}{2 \times a \times b - (a + b) \times j} 1000$$

where, **J** is the index of generality, **j** is the number of common species in the two communities being compared, **a**, **b** is the number of species in each community.

The purpose and objectives of the study.

The purpose of this study is to study the regularity of the taxonomic and ecological distribution of the nematodofauna of watermelon farms of the village "JurabaiDarkhon" and "OzodDarkhon" of the Akdarya district of the Samarkand region.

In accordance with this goal, the following tasks were set:

- to identify the species composition of watermelon nematodes;
- to establish the taxonomic composition of the identified nematode species;
- to conduct a comparative analysis of the nematodofauna of the farms of the village "JurabaiDarkhon" and "OzodDarkhon";
- to identify foci of particularly dangerous parasitic nematode species.

Introduction. All pumpkin plants, including watermelon (*Citrulluslanatus*), are susceptible to nematosis (gallohelminthiasis, phytohelminthiasis). The affected plants look stunted, they have a general lag in growth, and the color of their leaves varies from pale green to yellow [5,6,7]. Infected plants have a tendency to wilt, as the intensity of water absorption is reduced. Although nematode-infected plants usually eventually die, they can sometimes struggle to survive until the end of the growing season. The disease leads to a significant decrease in yield and fruit quality. On the roots of infected plants, single or knotted, warty growths caused by nematodes are visible in groups. Secondary infection of roots with phytopathogenic fungi or bacteria is a common phenomenon. Nematodes can persist in the soil for many years. Nematodes spread with irrigation water contaminated with runoff from infected fields, and as a result of the movement of infected soil and infected plant material.

The main causes of diseases are:

- ✓ Violation of the rules of agricultural technology, poorly conducted planting, watering and more;
- ✓ Non-compliance with crop rotation;
- ✓ Lack of top dressing;
- ✓ Untimely processing of the site or its complete absence;



- ✓ Improperly purchased watermelon seeds or poor seed treatment before planting;
- ✓ Incomplete removal of plant residues or diseased crops

According to the authors, nematodes are widely distributed throughout the terrestrial ecosystem and have demonstrated the potential for use as indicators of ecosystem development [8]. Soil nematodes have great potential for use as an indicator of biodiversity and ecological stability, as well as for assessing the impact of land use change on soil condition. A set of plant and soil nematode species found in a natural or managed ecosystem, constitutes a community of nematodes. Their role in the soil ecosystem is to recycle nutrients by feeding plant tissues and microorganisms and releasing minerals for easy assimilation by plant roots [9].

The fauna of watermelon nematodes in the UIS has not been studied enough. The studies were conducted only in some UIS countries.

For the first time, studies on the fauna of watermelon nematodes are given in the work of A.T. Tulaganov and S.M. Karimova "On nematodes of vegetable-melon crops of Namangan district" in 1953. The authors note 13 species that live in watermelon plants and in the root soil. The following are noted as harmful: *Ditylenchus dipsaci*, *Helicotylenchus multicinctus*.

Analysis of the literature data shows that the nematode fauna of watermelon and its basal soil in the UIS is characterized by more than 120 species of phytonematodes.

Results and discussions.

In the surveyed farms of the village "Jurabai Darkhon", 60 samples of the nematode fauna of watermelon and its rhizosphere of the Marmar variety were collected and analyzed. Of these, 39 samples were found with nematodes in the amount of 163 specimens. In the aboveground parts of plants in 7 samples – 24 specimens, in the root system in 15 samples – 80 specimens, in the rhizosphere – 59 (Table 1).

Table 1. The number of analyzed samples on the nematode fauna of watermelon and its rhizosphere in the farms of the village "Jurabai Darkhon" and "Ozod Darkhon" of the Akdarya district of the Samarkand region.

№	Name of the settlement	Sampling location									Total number		
		Stem and leaves			root			rhizosphere			Processed samples		
		Nematodes			Nematodes			Nematodes			Nematodes		
		Total	Availability	no	Total	availability	no	Total	availability	no	Total	availability	no
1.	"Jurabai Darkhon"	20	7	13	20	15	5	20	17	3	60	39	21
2.	"Ozod Darkhon"	20	8	12	20	18	2	20	18	2	60	44	16
Total:		40	15	25	40	33	7	40	35	5	120	83	37

The nematode fauna of watermelon and its root soil of farms in each village is presented differently (Table 2).



The species composition of nematodes of watermelon plants and its rhizosphere in farms "OzodDarkhon" is characterized by 29 species belonging to 4 orders – Chromadorida, Enoplida, Rhabditida, Tylenchida, 9 families, 16 genera.

Table 2. Species composition of watermelon nematodes and its rhizosphere in the farms of the settlements "JurabaiDarkhon" and "OzodDarkhon" of the Akdarya district of the Samarkand region.

№	type	Number of nematodes								Total number of detected nematodes
		farms of the village "JurabaiDarkhon"				farms of the village "OzodDarkhon"				
		Stemandleaves	root	Soil	Total:	Stemandleaves	root	Soil	Total:	
1.	<i>Proteroplectus parvus</i>			1	1					1
2.	<i>Eudorylaimus monhystera</i>			1	1					1
3.	<i>Eudorylaimus pratensis</i>			2	2	1			1	1
4.	<i>Aporcelaimellus obtusicaudatus</i>			3	3					3
5.	<i>Diphtherphora communis</i>			1	1					1
6.	<i>Rhabditis brevispira</i>		2		2					2
7.	<i>Rhabditis filiformis</i>			2	2					2
8.	<i>Mesorhabditis monhystera</i>		7	2	9			2	2	11
9.	<i>Mesorhabditis signifera</i>		2		2					2
10.	<i>Prothorhabditis</i> sp.			2	2					2
11.	<i>Panagrolaimus rigidus</i>	9	9	1	19		6	2	8	27
12.	<i>Panagrolaimus subelongatus</i>	12	40	4	56		4		4	60
13.	<i>Cephalobus persegnis</i>		1	1	2		1		1	3
14.	<i>Eucephalobus oxyuroides</i>		1		1					1
15.	<i>Heterocephalobus elongates</i>						1	1	2	2
16.	<i>Chiloplacus bidigulas</i>			3	3					3
17.	<i>Chiloplacus demani</i>			1	1					1
18.	<i>Chiloplacus propinquus</i>			2	2			3	3	5
19.	<i>Chiloplacus symmetricus</i>			1	1		1	3	4	5
20.	<i>Aphelenchus avenae</i>	2	2	2	6		1	2	3	9
21.	<i>Aphelenchus eremitus</i>							1	1	1
22.	<i>Aphelenchus solani</i>							2	2	2
23.	<i>Aphelenchoides parci etinus</i>						1	4	5	5
24.	<i>Tylenchus davaini</i>			2	2			1	1	3
25.	<i>Tylenchus filiformis</i>							1	1	1
26.	<i>Aglenchus agricola</i>		1		1					1
27.	<i>Tylenchorhynchus dubius</i>			1	1					1
28.	<i>Pratylenchus pratensis</i>							1	1	1
29.	<i>Pratylenchus clavicaudatus</i>							1	1	1
Total:		23	65	32	120	1	15	27	43	163



In the farms of the first settlement, the soil is medium loamy, during the sampling period the soil is high humidity, the preceding crop is onions. In total, 22 species have been registered in these farms, in the amount of 120 specimens.

All the detected nematode species are distributed unevenly across plant organs and in the soil. The aboveground parts of watermelon plants are poor in nematodes, there are 3 species registered here: *Panagrolaimusrigidus*, *Panagrolaimussubelongatus* and *Aphelenchusavenae* – 25 specimens. These species are common to all organs of the watermelon and rhizosphere.

Of the 9 species found in the root system, except *Panagrolaimussubelongatus* (40), all species have been recorded in insignificant numbers. The following species are noted only in the roots: *Rhabditisbrevispina*, *Mesorhabditissignifera*, *Eucephalobusoxyuroides*, *Aglenchusagricola*.

The rhizosphere is distinguished by a large variety of species (17), but in terms of the number of individuals (32) it is inferior to the root system (65). Two species are common to roots and soil, these are: *Mesorhabditiamonhystera*, *Cephalobuspersegnis*. All species registered in the rhizosphere have been found from 1 to 4 specimens.

The most numerous ecological group are devisaprobionts – 8 species, of which two species are recorded in all organs of the watermelon and the rhizosphere, one species in the roots and rhizosphere, four species only in the rhizosphere and one in the root system. This is followed by pararizobionts – 7 species registered only in the soil, except for one species noted in the roots.

Eusaprobionts are represented by 4 species. Of the phytohelminths, only *Tylenohorhynchusdubius* and the mycohelminth *Aphelenohusavenaewere* noted.

In the farms of the village "OzodDarkhon" the soil is light loamy, at the time of taking its humidity is average, the predecessor is cabbage. The nematodofauna of watermelon and its basal soil in this farm are poor in species and especially in the number of individuals. It is characterized by 16 species in the amount of 48 specimens. Of these, 6 species are registered only in these farms, these are: *Heterocephalobuselongatus*, *Aphelenchuseremitus*, *Aphelenchussolani*, *Aphelenchusparietinus*, *Tylenchusfiliformis*, *Pratylenchusclavicanatus*, *Pratylenchuspratensis*.

In the aboveground parts of the watermelon, the species *Eudorylaimuspratensis* was found to be the only specimen. 7 species (15 specimens) were found in the roots of plants, mainly characteristic species for the root system, noted in the farms of the first settlement.

In terms of the number of species (14), the rhizosphere is in the first place, but the number of individuals (27) of these species is also small, as in previous farms. The presence of dangerous parasites *Pratylenchuspratensis* and *Pratylenchusclavicanatus* is noted here. Of the 16 discovered species, 5 are common to the roots and rhizosphere, namely: *Panagrolaimusrigidus*, *Heterocephalobus elongatus*, *Chiloplacusasymmetricus*, *Aphelenchusavenae*, *Aphelenchusparietinus*.

In the farms of this village, representatives of all ecological groups are noted: eusaprobionts and phytohelminths for 6 species, pararizobionts – 3 species and eusaprobionts – 1 species.

Analysis of the nematodofauna of watermelon and its basal soil showed that the species composition of nematodes in different farms and their distribution in certain parts of plants is diverse.

Both farms are characterized by the maximum concentration of species in the rhizosphere of watermelon.

Of the 29 nematode species found, 9 are common.



The degree of similarity of the faunal complexes of watermelon nematodes of the farms of the village "JurabaiDarkhon" and "OzodDarkhon" was determined by the Mounford community indicator calculated by the formula:

$$J = \frac{2 \times 9}{2 \times 22 \times 16 - (22 + 16) \times 9} = 49,72$$

The degree of similarity of the nematodofauna of watermelon farms of the village "JurabaiDarkhon" and "OzodDarkhon" is 49.72.

Of the ecological groups, all representatives are marked and distributed as follows: devisabionts are in the first place – 8 species, 107 – specimens, of which *Panagrolaimussubelongatus* prevails and pararizobionts – 8 species, 14 specimens. Eusaprobionts and phytohelminths are represented by 6 species, respectively, by 19 and 20 specimens.

Conclusions:

1. The work was carried out during 2022 in the farms of the village "JurabaiDarkhon" and "OzodDarkhon" of the Akdarya district of the Samarkand region.
2. 60 samples of the nematode fauna of watermelon and its rhizosphere of the variety "Marmar" were collected and analyzed in the surveyed farms of the village "JurabaiDarkhon". Of these, 39 samples were found with nematodes in the amount of 163 specimens. In the aboveground parts of plants in 7 samples – 24 specimens, in the root system in 15 samples – 80 specimens, in the rhizosphere – 59.
3. In the surveyed farms of the OzodDarkhon settlement, 60 samples of the nematode fauna of watermelon and its rhizosphere of the Marmar variety were collected and analyzed. In the aboveground parts of plants – 15 specimens, in the root system – 33 specimens, in the rhizosphere – 35.
4. Fumigation or soil sterilization are the most effective methods of combating phytonematode. Agrotechnical measures, such as deep plowing, crop rotation and destruction of host weeds susceptible to the disease, can reduce the harmfulness of the disease.

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