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Fauna And Dynamics Of Nematodes In The Roots And Rhizosphere Of Tomato In The Conditions Of Greenhouses In Tashkent

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Abstract:
This article highlights the dynamics of the nematode fauna in the roots and rhizosphere of tomato in greenhouses. In the process of analyzing the distribution of nematodes in terms of the phases of tomato development, the largest number of individuals was determined at the budding stage. In each phase of the plant development, the following characteristic types of nematodes have been established: in the sprouting (germination) phase - *Eudorylaimus labiatus, Heterocephalobus elongatus, Diplogaster longicaudata, Eucephalobus oxyroides, Psilenchus clavicaudatus;* in the seedling phase - *Geomonhystera villosa and Dorylaimoides elegans;* in the budding phase - *Xylorhabditis operosa, Panogralaimus armatus, Paraphelenchus pseudoparietinus, Nothotylenchus acris;* in the flowering phase - *Clarcus papillatus, Melonchulus solus, Mesorhabditis irregularis, Aphelenhoides subtenuis;* in the phase of initial fruit development - *Aphelenhoides limberi and Aph. saprophilus;* in the ripening phase- *Eudorylaimus centrocercus, Heterocephalobus filiformis, Chiloplacus lentus, Acrobeles complexus, Aphelenchus solani, Helicotylenchus nannus, Meloidogyne arenarie.* Among the real parasites, nematode species, including *Meloidogyne arenarei, Ditylenchus dipsaci, Pratylenchus pratensis, Psilenchus lavicaudatus, Bitylenchus dubius, Helicotylenchus nannus* were identified.
Key words: parasite plant nematode, fauna, tomato - Lycopersicon esculentum Mill., dynamics, soil, distribution, phases of plant development, ecological group, dominants.

INTRODUCTION

Actuality of the theme. In the current situation of the world, global environmental changes lead to a wide spread of parasitic organisms among cultivated plants in the agricultural sector and a rise in their parasitic effects. In this regard, there is a sharp reduction in the yield of cultivated plants in the agricultural sector, owing to the influence of parasitic nematodes. To date, 4100 species of parasitic plant nematodes have been identified, and some of them cause significant damage to agricultural sector, being economically crucial. The annual damage to the global economy amounts to $ 77 billion [28].

Phytohelminths, which are parasitic plant nematodes, considered the most dangerous pathogens. They not only decrease the yield of a number of important agricultural crops, but also significantly degrade its quality. These organisms represent a group of soil pathogens, the harmfulness of which is most pronounced under conditions of intensive farming and, which is especially important, during its specialization. The peculiarity of agrophytocenotic control of parasitic nematodes in protected ground is associated with the fact that in greenhouse conditions there are practically no natural enemies and other natural limiting factors for the development of these parasites. Permanent culture of susceptible plants, a long cultivation period, without replacing soils, optimal temperature and soil moisture usually lead to the massive development of phytohelminthiasis. Subsequently, the disease becomes one of the important factors in reducing the yield and quality of greenhouse products [21, 22].

The constant usage of greenhouses for the same crops establishes favorable conditions for the spread and development of many diseases and their pests. The vital functions of many nematode species are closely

related to the development of plants. Therefore, it is required to take into account the relationship of nematodes with the growing season of plants. This study gives us the opportunity to get a complete picture of the fauna of nematodes, the role of individual species in the general dynamics of the nematode population by the phases of plant development.

Indoor ground makes it possible to cultivate valuable agricultural crops, of which tomato and cucumber are optimal. Tomato fruits are valuable vitamin food products, the cultivation of which is concentrated in large areas of indoor and outdoor ground. Tomatoes are the most susceptible to parasitic nematodes, so they have a decrease in fertility by 50-60% [16].

Uzbekistan has a huge potential for growing fruit, vegetables, cucurbits and other crops. Natural conditions in the republic contribute to the intensive development of the agricultural economy. The increase in the gross harvest of vegetables is mainly due to the expansion of cultivated areas and greenhouses. Parasitic nematodes are one of the reasons for the decline in the yield of vegetable crops both in open field and greenhouse conditions. Ochiq dala sharoitida va issiqxona sharoitida

The researches on parasite plant nematodes in Uzbekistan began in the thirties of the twentieth century. In this field, the scientists of the republic A.T. Tulaganova, A.Z. Usmanova [17, 18], Z.N. Narbaeva [8], O.M. Mavlyanova [5], Sh.Kh. Khurramova [19], Kh.S.Eshova [24, 25], A.Sh. Khurramova [20] and others have conducted researches. As a result of these researches, the faunistic complexes of plant nematodes of various biocenoses and agrocenoses in various zones of the republic have been identified, the indicator properties of parasite plant nematodes in determining the agrochemical properties of soils have been identified, and measures have been developed to combat parasitic nematodes.

O.I. Abdullaeva [1] provides information on the fauna of parasite plant nematodes of greenhouse crops in Uzbekistan in her work. B.A. Sulaimonov [15], Sh.O.Saidova, Kh.S. Eshova [13, 14] have conducted researches on the protection of tomato and cucumber cultures from root gall nematodes in greenhouses. However, the above data on the structure of the nematode fauna and their ecological features are outdated and do not provide complete information. For this reason, the determination of the faunistic complexes of nematodes and their dynamics in greenhouses, the establishment of parasitic species of plant nematodes are of scientific and practical importance.

The aim of this work is to comprehensively study the fauna and dynamics of tomato nematodes in root and rhizosphere during the growing season of a plant, in greenhouse conditions.

MATERIALS AND METHODS

The material was collected in 2020, in the Botanical Garden of the National University of Uzbekistan (NUUz). The analysis was carried out on a tomato of the "Sabina" variety (*Lycopersicon esculentum Mill*.) grown in greenhouses. Soil and plant samples were taken once a month during the tomato growing season from July to October. For analysis on the presence of nematodes, 25 plants were selected each time at a soil depth of 20 cm. Collection of samples from the root system and rhizosphere of plants was carried out in phases: before sowing, the sprouting (germination) phase, the seedling phase, the budding phase, the flowering phase, the phase of the beginning of fruit development, the ripening phase of tomatoes. At the same time, soil moisture and temperature were determined at a depth of 20 cm. For the analysis of nematodes, 175 soil and 150 root samples were collected and processed.

The collected samples were analyzed in the laboratory of "Experimental Zoology" at the Department of Zoology, NUUz. First, the plants were carefully examined for nematode infestation. Then, the rhizosphere and roots were examined separately for the presence of nematodes, and a modified Berman funnel method was used to isolate them from the soil and plant roots [5]. To determine the species of nematodes, temporary and permanent micropreparations were prepared according to the methods of E.S. Kiryanova and E.L. Krall [3]. The species composition of nematodes was studied under a microscope with an LED light sources of model OLYMPUS SC-180 (Japan, 2018). To determine the species, we used morphometric parameters obtained according to the generally accepted de Man formula modified by Micoletzky [3]. When determining the species of nematodes, the works of the following native and foreign authors were used, in particular A.A. Paramonova [9, 10], A. T. Tulaganova, A.Z. Usmanova [17, 18], E.S. Kiryanova, E.L. Krall [3], I. Y. Eliava [23], A.S. Ryss [11], M.R. Siddiqi [29], I. Andrassy [26] and others.

The degree of dominance of parasite plant nematodes in plant and soil samples was determined by the percentage state of individuals of certain species, to the number of all those found during the study of tomato. At the same time, according to the classification of Krogerus quoted by A.Sh. Khurramov [20], we divided them into four groups: dominants (accounting for 5-10% or more of the total number); subdominants (accounting for 2 - 5% of the total amount of parasite plant nematodes); precedents (less than 1-2% of the total number of parasite plant nematodes); sub-precedents or rare species (accounting for less than 1% of the total number of parasite plant nematodes). For the ecological grouping of plant nematodes, we used the well-known ecological classification of A.A. Paramonova [10]

RESULTS AND DISCUSSIONS

Fauna And Dynamics Of Nematodes In The Roots And Rhizosphere Of Tomato In The Conditions Of Greenhouses In Tashkent

The sowing periods of greenhouse crops is usually divided into winter-spring, spring-summer, autumn, transitional, extended and flow sowing periods. Each has a leading crop: tomato, cucumber, onion, green vegetables, seedlings and others. Tomato is one of the 15 leading crops, accounting for 85% of the world agricultural production [7]. Tomato has a special healing effect due to lycopene, which is a part of its ingredients, which is a powerful antioxidant that reduces the likelihood of developing cancer. Fresh fruits of tomatoes and tomato juice are useful for cardiovascular diseases, gastritis, loss of strength, memory loss, anemia [4, 6]. We studied the dynamics of the fauna of tomato nematodes in autumn sowing. During the growing season, 51 species of nematodes belonging to 6 orders, 15 families, 31 genera were found in the collected samples of tomato and its rhizosphere in greenhouses.

In terms of species composition, the nematodes of the order *Rhabditida* are the richest, 21 species were identified, the order *Tylenchida* - 11 species, the order *Aphelenchida* - 8 species, the order *Dorylaimida* - 7 species, the order *Mononchida* - 3 species, the order *Chromadorida* - 1 species were found.

Nematodes are unequally localized in plant roots and rhizosphere. Consequently, all types of nematodes can be classified into the following habitats. Seedling nematodes: *Eudorylaimus labiatus, Cephalobus nanus, Eucephalobus oxyroides, Heterocephalobus elongatus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster rhizophilus, D. longicaudata, Aphelenchus avenae, Aphelenchoides bicautatus, Psilenchus clavicaudatus.* Nematodes of the tomato root system, except those found in seedlings, are replenished with species *Aporcelaimellus obtusicaudatus, Xylorhabditis operosa, Acrobeles complexus, Chiloplacus lentus, Aphelenchus solani, Aglenchus agricola*. Nematodes of the tomato rhizosphere, in addition to those found in seedlings and roots, are represented by *Clarcus papillatus, Melonchulus solus, Eudorylaimus centrocercus, E. monohystera, Dorylaimoides elegans, Mesorhabditis irregularis, Cephalobus parvus, Heterocephalobus filiformis, Paraphelenchus pseudoparietinus, Aphelenhoides saprophilus, Aph. subtenuis, Seinura tenuicaudadata, Ditylenchus dipsaci, Helicotylenchus nannus, Nothotylenchus acris.*

Based on the ecological classification of A.A. Paramonov [10], all discovered species were divided into 5 groups: pararisobionts - free-living forms in the soil; eusaprobionts - real inhabitants of a putrid environment; devisaprobionts - semi-saprobiotic inhabitants; phytohelminths of nonspecific pathogenic effect or nonspecific parasites; phytohelminths with a specific pathogenic effect are real plant parasites. According to our data, the group of pararisobionts includes species of the genera *Prismatolaimus, Geomonhystera, Clarcus, Melonchulus, Eudorylaimus, Dorylaimoides, Aporcelaimellus.* Eusaprobionts are represented by species of genera *Pelodera, Xylorhabditis, Rhabditis, Mesorhabditis, Diplogaster.* Among the representatives of the devisaprobionts, nematodes of the genera *Cephalobus, Eucephalobus, Heterocephalobus, Acrobeles, Cervidellus, Chiloplacus, Panogralaimus* were found. In our materials, phytohelminths of nonspecific pathogenic effect (phytohelminths NSPE) are represented by species of genera *Tylenchus, Aglenchus, Filenchus, Aphelenchus, Aphelenhoides, Paraphelenchus, Seinura, Nothotylenchus.* Phytohelminths of a specific pathogenic effect (phytohelminths SPE) or real parasites are represented by species of genera *Aphelenhoides, Psilenchus, Bitylenchus, Ditylenchus, Helicotylenchus, Pratylenchus, Meloidogyne.*

In our material, pararisobionts are represented by 12 species, eusaprobionts - 6 species, devisaprobionts - 14 species, phytohelminths of nonspecific pathogenic effect - 13 species, real parasites - 6 species (table).

Table Qualitative and quantitative ratio of tomato nematodes in terms of the ecological group

№	Ecological group	The number of species	The total number of species in%	Number of individuals	The total number of individuals in%
1	Pararisobionts	12	23,5	189	13,3
2	Eusaprobionts	6	11,8	409	28,9
3	Devisaprobionts	14	27,4	562	39,6
4	Nonspecific paratsites	13	25,5	188	13,3
5	Real parasites	6	11,8	70	4,9
Total		51	100	1418	100

According to the table, devisaprobionts, nonspecific parasites and pararisobionts are relatively diverse in terms of qualitative composition. Specific parasites and eusaprobionts were found in a small number of species. In terms of the number of individuals, representatives of devisaprobionts and eusaprobionts prevail. Pararisobionts and nonspecific parasites are significantly inferior to the above mentioned ecological groups, and real parasites are few in number.

Of the species of nematodes found in the roots and rhizosphere of tomato, 6 species are dominant, 12 species are subdominants, 10 species are precedents, and 23 species are sub-precedents or rare.

The phase distribution of nematodes and individual species within the surveyed areas is not the same. The quantitative and qualitative composition of the fauna of tomato nematodes and their rhizosphere does not

remain constant and undergoes significant changes. The greatest variety of parasite plant nematode species in the greenhouse was noted in the phase of full ripening phase of tomato (23 species). The quantitative composition of plant nematodes increases and reaches a maximum in the budding phase (340 specimen).

In early July, prior to sowing, soil samples were taken from a depth of 20 cm (25 tomato plants in each phase). During this period, the soil temperature in the greenhouse was on average 26.50^0 C and the moisture level was 25.8%.

Of total soil samples taken before sowing, 13 species were found in the amount of 65 specimens. The following identified species were marked in insignificant quantities: *Prismatolaimus intermedus, Aporcelaimellus obtusicaudatus, Cephalobus nanus, Chiloplacus propinquus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster longicaudata, Aphelenchus avenae, Aphelenhoides bicaudatus, Tylenchus davaineii, Aglenchus agricola, Bitylenchus dubius, Seinura tenuicaudadata*. No typical nematode species were found in this phase.

In the **sprouting (germination) phase** of tomato, the soil temperature in the greenhouse was on average 28.30^0 C, and moisture level was 33.8%.

During the germination phase, 11 species of nematodes in the amount of 112 specimens were found in the roots and rhizosphere. Identified species are *Eudorylaimus labiatus, Cephalobus nanus, Eucephalobus oxyroides, Heterocephalobus elongatus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster rhizophilus, D. longicaudata, Aphelenchus avenae, Aphelenchoides bicautatus, Psilenchus clavicaudatus.* The species *Eudorylaimus labiatus, Heterocephalobus elongatus, Diplogaster longicaudata, Eucephalobus oxyroides, Psilenchus clavicaudatus* were typical for this phase.

In the **seedling phase** of tomato, the soil temperature in the greenhouse was on average 26.0^0 C, and moisture level was 26.5%. During this phase, 18 species of nematodes in the amount of 145 specimens were found in the roots and rhizosphere. Identified species are *Pelodera stongloides, Geomonhystera villosa, Prismatolaimus intermedus, Dorylaimoides elegans, Eudorylaimus pratensis, E. monohystera, Aporcelaimellus obtusicaudatus, Cephalobus nanus, C. persegnis, C. parvus, Eucephalobus striatus, Chiloplacus symmetricus, Ch. propinquus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster rhizophilus, Aphelenchus avenae, Filenchus filiformus.* The roots are inhabited by the nematodes *Cephalobus persegnis, Eucephalobus oxyroides, Chiloplacus propinquus, Ch. symmetricus*, represented in small numbers. In the rhizosphere, *Prismatolaimus intermedus* and larvae of the genus *Eudorylaimus* dominated. In the seedling phase of the tomato, the number of species increased slightly in comparison with the germination period. *Geomonhystera villosa and Dorylaimoides elegans* are found only in this phase of development.

In the **budding phase** of tomato, the soil temperature in the greenhouse was on average 19.3^0C, and moisture level was 25.0%. 19 species of nematodes in the amount of 340 specimens were found in the roots and rhizosphere. Identified species are *Pelodera strongyloides, Xylorhabditis operosa, Cephalobus nanus, C. persegnis, Eucephalobus striatus, Chiloplacus symmetricus, Ch. propinquus, Cervidellus insubricus, Panogralaimus armatus, P.rigidus, Diplogaster coranata, D. rhizophilus, Rhabditis brevispina, Mesorhabditis monhystera, Aphelenchus avenae, Paraphelenchus pseudoparietinus, Seinura tenuicaudadata, Ditylenchus dipsaci, Nothotylenchus acris.* The largest number of individuals in greenhouses was noted in this phase of the tomato. The most common types were *Cephalobus nanus, Diplogaster rhizophilus, Rhabditis brevispina u Mesorhabditis monhystera.* The species *Rhabditis brevispina, Mesorhabditis monhystera and Diplogaster rhizophilus* dominated in the rhizosphere. *Xylorhabditis operosa, Panogralaimus armatus, Paraphelenchus pseudoparietinus, Nothotylenchus acris* were typical for this phase.

In the **flowering phase** of tomato, the soil temperature in the greenhouse was on average 18.0^0C, and moisture level was 21.1%. In this phase, 21 species of nematodes in the amount of 229 specimens were found in the roots and rhizosphere. Identified species are *Clarcus papillatus, Melonchulus solus, Cephalobus nanus, C. persegnis, Eucephalobus striatus, Chiloplacus symmetricus, Ch. propinquus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster rhizophilus, Rhabditis brevispina, Mesorhabditis irregularis, M. monhystera, Aphelenchus avenae, Aphelenhoides bicaudatus, Aph. subtenuis, Tylenchus davaineii, Aglenchus agricola, Seinura tenuicaudadata, Pratylenchus pratensis, Ditylenchus dipsaci.* The species *Rhabditis brevispina, Mesorhabditis monhystera, Diplogaster rhizophilus u Seinura tenuicaudadata* dominated in the rhizosphere. In the flowering phase of tomato, a decrease in the number of nematodes is observed. The most common were eusaprobionts and devisaprobionts. For this phase, the characteristic species are *Clarcus papillatus, Melonchulus solus, Mesorhabditis irregularis, Aphelenhoides subtenuis.*

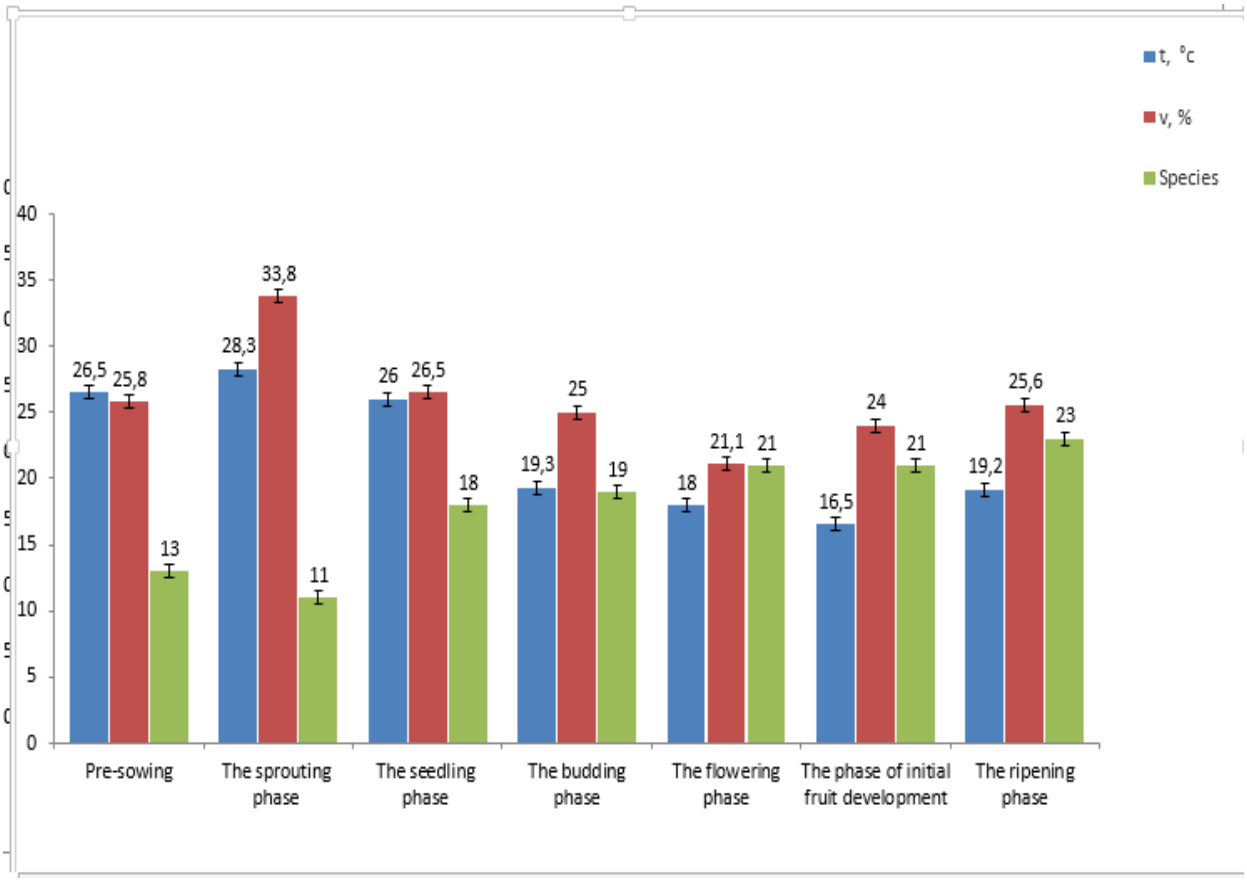
In the phase of **initial fruit development** of tomato, the soil temperature in the greenhouse was on average 16.5^0 C, and moisture level was 24.0%

The fauna of tomato nematodes in the phase of the initial fruit development is characterized by 21 species in the amount of 292 specimens. Identified species are *Prismatolaimus intermedus, Eudorylaimus pratensis, E. monohystera, Aporcelaimellus obtusicaudatus, Cephalobus nanus, C. persegnis, Eucephalobus striatus, Chiloplacus propinquus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster rhizophilus, Mesorhabditis monhystera, Aphelenchus avenae, Aphelenhoides limberi, Aph. parietinus, Aph. bicaudatus,*

Aph. saprophilus, Tylenchus davaineii, Seinura tenuicaudadata, Pratylenchus pratensis, Ditylenchus dipsaci. The dominant species were mainly eusaprobionts and pararisobionts. Typical species for this phase are *Aphelenhoides limberi* and *Aph. saprophilus.*

In the **ripening phase** of tomato, the soil temperature in the greenhouse was on average 19.2^{0}C, and moisture level was 25.6%**.**

The fauna of tomato nematodes in the ripening phase is characterized by 23 species in the amount of 231 specimens. Identified species are *Eudorylaimus centrocercus, E. monohystera, Aporcelaimellus obtusicaudatus, Cephalobus nanus, C. persegnis, Eucephalobus striatus, Heterocephalobus filiformis, Acrobeles complexus, Chiloplacus lentus, Cervidellus insubricus, Panogralaimus rigidus, Diplogaster rhizophilus, Rhabditis brevispina, Mesorhabditis monhystera, Aphelenchus avenae, Aph. solani, Aphelenhoides parietinus, Tylenchus davaineii, Aglenchus agricola, Seinura tenuicaudadata, Helicotylenchus nannus, Meloidogyne arenarie, Ditylenchus dipsaci.* Dominant species are *Mesorhabditis monhystera, Diplogaster rhizophilus.* In this phase of development, the number of species and individuals remained almost unchanged, but species *Eudorylaimus centrocercus, Heterocephalobus filiformis, Chiloplacus lentus, Acrobeles complexus, Aphelenchus solani, Helicotylenchus nannus, Meloidogyne arenarie* appeared.



Picture. Distribution of nematodes in terms of the phases of tomato development.

The study on the distribution of nematodes in the rhizosphere during the growing season showed that the soil is the main biotope for the main part of many parasitic and free-living nematodes. Food resources, moisture level and soil temperature are decisive factors that determine the quantitative and qualitative composition of nematodes at different soil depths [2]. According to our studies, among the ecological groups of nematodes found in the root system in all phases of the plant development, phytohelminths dominate in some cases (budding phase, flowering phase, the phase of initial fruit development), in others, devisaprobionts dominate (the phase of initial fruit development). Of the phytohelminths, phytohelminths of nonspecific pathogenic effect, represented by 13 species, prevail. A group of pararisobionts was found in the roots in all phases of the growing season.

Studies of some authors have proved that the quantitative and qualitative composition of plant nematodes does not remain constant and changes both in time and in space. Such changes can be associated with various reasons, including the nature of the cultivation of crops, the species specificity of plant nematodes, the growth and development of plants, and changes in the environment itself [5, 12, 22, 27]. According to our results, it was found that each phase of tomato development is characterized by a certain group of plant nematodes. The maximum number of species is recorded in the full ripening phase of tomatoes, and individuals

in the phase of budding. The dominant species are *Cephalobus nanus, Mesorhabditis monhystera, and Diplogaster rhizophilus*.

When studying the fauna of parasite plant nematodes, the issues of population density and dynamics of the number of their individuals are of great importance. Without these data, it is impossible to develop preventive measures to combat parasitic nematodes. At the same time, the main attention was paid to the study of changes in the species composition and the number of individuals of nematodes in various ecological groups, especially parasitic species. More than four thousand parasitic nematode species associated with plants are known, which differ significantly from each other, both in morphology and ecology [2]. During the study of parasite nematodes of tomato, we registered 6 species of true parasites. Among them, a peanut rootworm nematode - *Meloidogyne arenarei* (sedentary endoparasite) was identified in the ripening phase. Stem nematode - *Ditylenchus dipsaci* (endoparasite) was found in the budding phase, flowering phase, fruit development and ripening phases of tomato. The sprout nematode - *Pratylenchus pratensis* (endoparasite) was found in the phase of flowering and fruit development. Among the ectoparasites, *Psilenchus lavicaudatus* were found only in the germination phase, *Bitylenchus dubius* was found in the phase of pre-sowing, *Helicotylenchus nannus* in the ripening phase. The presence of such parasites as *Ditylenchus dipsaci, Pratylenchus pratensis, Meloidogyne arenarei* are, as a rule, the cause of dangerous diseases of vegetable crops, therefore, attention should be paid to the threat of the spread of these species.

CONCLUSIONS

1. When studying the entire complex of nematode species inhabiting the root system and rhizosphere of tomato, 51 species of plant nematodes were found in greenhouses.
2. Among the ecological groups of parasite plant nematodes in terms of qualitative composition, devisaprobionts, nonspecific parasites and pararisobionts were relatively diverse. Specific parasites and eusaprobionts were found in a small number of species. Devisaprobionts and eusaprobionts prevail in terms of the number of individuals. Pararisobionts and nonspecific parasites are significantly inferior to the above mentioned ecological groups, and true parasites were found in smaller numbers.
3. The number of dominant species is 6, subdominants - 12 species, precedents - 10 species and sub-precedents or rare - 23 species.
4. The distribution of nematodes according to the phases of tomato development is not the same: 13 species were found in the soil, prior to sowing, 11 species were found in the (sprouting) germination phase, 18 species were found in the phase of the seedling, 19 species were in the budding phase, 21 species were in the flowering phase, 21 species in the phase of initial fruit development, 23 species- in the ripening phase.
5. When studying the dynamics of nematodes in greenhouses in individual phases of tomato development, the following groups were identified that are characteristic only of a certain phase: in the sprouting phase - *Eudorylaimus labiatus, Heterocephalobus elongatus, Diplogaster longicaudata, Eucephalobus oxyroides, Psilenchus clavicaudatus;* in the seedling phase - *Geomonhystera villosa* and *Dorylaimoides elegans*; in the budding phase - *Pelodera operosa, Panogralaimus armatus, Paraphelenchus pseudoparietinus, Nothotylenchus acris;* in the flowering phase - *Clarcus papillatus, Melonchulus solus, Mesorhabditis irregularis, Aphelenhoides subtenuis;* in the phase of initial fruit development - *Aphelenhoides limberi* and *Aph. saprophilus;* in the ripening phase - *Eudorylaimus centrocercus, Heterocephalobus filiformis, Chiloplacus lentus, Acrobeles complexus, Aphelenchus solani, Helicotylenchus nannus, Meloidogyne arenarie.*
6. When studying the fauna of tomato nematodes of root and rhizosphere in greenhouse conditions, we registered 6 species of real parasites: *Meloidogyne arenarei, Ditylenchus dipsaci, Pratylenchus pratensis, Psilenchus lavicaudatus, Bitylenchus dubius, Helicotylenchus nannus*.

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