

FAUNISTIC ANALYSIS OF NEMATODES OF WILD MEDICINAL PLANTS IN SURKHANDARYA REGION OF UZBEKISTAN

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DOI: [https://doi.org/10.63001/tbs.2024.v19.i02.S.I\(1\).pp681-683](https://doi.org/10.63001/tbs.2024.v19.i02.S.I(1).pp681-683)

KEYWORDS

faunal analysis, nematode, Surkhandarya region, wild medicinal plants, sea buckthorn, rose hips, barberry, hawthorn, root system, root soil.

Received on:

15-09-2024

Accepted on:

19-12-2024

ABSTRACT

The article provides data on the fauna, taxonomic composition and distribution of nematodes of some wild medicinal plants in the conditions of the Surkhandarya region of Uzbekistan. As a result of a study in the root system and rhizosphere of some wild medicinal plants (sea buckthorn, rose hips, barberry, hawthorn), 47 species of nematodes were identified, belonging to 31 genera, 19 families, 5 orders and 2 subclasses. The main faunal complex of nematodes of wild medicinal plants consists of the species *Eudorylaimus labiatus*, *E. pratensis*, *Tylencholaimus minimus*, *Diphtherophora communis*, *Cephalobus persegnis*, *Chiloplacus sclerovaginitus*, *Eucephalobus oxyuroides*, *Panagrolaimus rigidus*, *Aphelenchus avenae*, *Aphelenchoides parietinus*, *A. limberi*, *cius capitatus*, *Helicotylenchus dihystrera*, *H. erythrinae*, *Pratylenchus pratensis* and *Ditylenchus dipsaci*.

INTRODUCTION

In Uzbekistan, meeting the population's needs for food products and medicinal plants is identified as one of the priorities, and this issue is reflected in a number of decrees and resolutions. Therefore, expanding the area for planting medicinal plants and developing measures to combat their pests are among the urgent tasks facing researchers.

In recent years, in natural biocenoses, massive drying out of shoots, branches and plants has been observed, leading to the death of plants, including medicinal ones. Among the complex of harmful organisms in nature, parasitic plant nematodes are the most widespread and economically important.

Parasitic plant nematodes can cause serious crop losses and are among the most significant pests of various agricultural crops, especially perennials - shrubs and trees. Numerous species of nematodes are carriers of viral, fungal and bacterial infections. Parasitic nematodes carry out their life activities either in the soil as ecto- and endoparasites and usually damage the

underground parts of plants, or as endoparasites of above-ground organs.

The purpose of our research was to study the fauna, species composition, distribution and ecology of nematodes of some wild medicinal plants in the conditions of the Surkhandarya region of Uzbekistan. The paper presents preliminary results of our research. Comprehensive scientific work on the study of the fauna of nematodes of wild medicinal plants in the southern part of the Republic of Uzbekistan continues.

On the territory of Uzbekistan, the fauna, features of the distribution of nematodes of wild medicinal plants were studied by O. Mavlonov, N. Hakimov, S. Narzullayev [5], K. S. Boltayev, T. M. Odilova [3], K. S. Boltayev, F. A. Jamilova, N. I. Mamarasulova [4], S. Soatov, N. Xudoyberdieva, A. Bekmurodov [10], M. Turopova, A. Bekmurodov [12].

A review of the literature shows that the fauna, ecology and distribution features of nematodes of wild medicinal plants in Uzbekistan have not been sufficiently studied.

Material and research methods

The material for this work was samples of some wild medicinal plants (sea buckthorn (*Hippophae rhamnoides*), rose hips (*Rosa canina* L.), barberry (*Berberis vulgaris*), hawthorn (*Crataegus laevigata*)), collected on medicinal plants in mountainous areas (Mountains Baysun and Babatag) Surkhandarya region of Uzbekistan. Samples for analysis were collected in the summer of 2022-2023.

The studies were carried out using the generally accepted route method [2]. This method was used to determine the faunal complex of nematodes of wild medicinal plants in the southern regions of Uzbekistan. To study the nematological complex of wild medicinal plants, 300 plant and 300 soil samples were collected and analyzed. From them, 1236 nematodes were extracted using various methods.

When carrying out the ecological and faunal part of the research, to identify the species composition of nematodes of wild medicinal plants and the patterns of their distribution in the root system and root soil of plants, we used the route method, widely used by phytohelminthologists in the CIS countries [2].

The volume of the soil sample with dangling roots was about 1 kg. The roots were completely removed, washed, and 20 g of them were placed for nematode isolation. To isolate nematodes from the soil, 3 samples of 20 cm³ each were placed.

The collected samples were analyzed in the phytohelminthological laboratory at Termez State University. First, the plants were carefully examined for infestation by root-knot and other parasitic nematodes. Then the root soil and plant roots were examined separately.

Nematodes were removed using the Baermann funnel method and fixed with a 4% formaldehyde solution. Clearing of nematodes was carried out in a mixture of glycerol and alcohol (1:3) and for office processing of the material, permanent preparations were prepared in glycerin according to the Seinhorst method [11]. Soil samples for the presence of cyst nematodes were usually analyzed using the standard Decker method [1].

The species composition of nematodes in wild medicinal plants was studied under an MBR-3 microscope. To identify species, we used morphometric indicators obtained using the generally accepted De Man formula [7] as modified by Micoletzky [6]. The degree of dominance of nematodes in plant and soil samples was determined from the percentage of individuals of certain species to the number of all detected by Witkowski [8]. In this case, species that constitute more than 10% of all discovered species are dominant and eudominants, dominants are 5.1-10%, subdominants are 2.1-5%, precedents are 1.1-2%, subprecedents or rare species are less than 1 % of individuals.

Results and Discussion

This study presents the results of a preliminary analysis of the selected material. As a result of nematological studies of wild medicinal plants in the Surkhandarya region of Uzbekistan, we discovered a total of 47 species of nematodes belonging to 31 genera, 19 families, 5 orders and 2 subclasses.

Sea buckthorn nematodes. As a result of the study in the root system and root soil of wild medicinal plants, we identified 31 species of nematodes belonging to 19 genera, 13 families, 5 orders and 2 subclasses. Species *Eudorylaimus labiatus*, *E. pratensis*, *Tylencholaimus minimus*, *Diphtherophora communis*, *Cephalobus persegnis*, *Chiloplacus sclerovaginat*, *Eucephalobus oxyuroides*, *Panagrolaimus rigidus*, *Aphelenchus avenae*, *Aphelenchoides parietinus*, *A.limberi*, *Quinisulcius capitatus*, *Helicotylenchus dihystra*, *H.erythrinae*, *Pratylenchus pratensis*, *Ditylenchus dipsaci* was detected in large quantities in the root system and root soil of plants. Species *Rhabditis brevispina*, *Filenchus leptosoma*, *Aglenchus agricola* were found in insignificant quantities.

Rose hip nematodes. In our material, 25 species of nematodes belonging to 16 genera, 11 families, 4 orders and 2 subclasses were found in the root system and root soil of wild medicinal plants. The dominant species of identified nematodes were *Eudorylaimus labiatus*, *Cephalobus persegnis*, *Acrobelopides buetschlii*, *Chiloplacus quintastriatus*, *Panagrolaimus rigidus*, *Aphelenchus avenae*, *Aphelenchoides parietinus*, *A.composticola*, *Quinisulcius capitatus*, *Helicotylenchus dihystra*, *H.erythrinae* and *Ditylenchus dipsaci*. The species

Rhabditis brevispina, *Xiphinema basiri*, *X.elongatum* were not numerous in number of individuals.

Barberry nematodes. In the root system and root soil of wild medicinal plants, 21 species of phytonematodes have been registered, belonging to 16 genera, 10 families, 4 orders and 2 subclasses. Of the detected nematodes, the dominant species were *Cephalobus persegnis*, *Acrobelopides buetschlii*, *Chiloplacus quintastriatus*, *Panagrolaimus rigidus*, *Aphelenchus avenae*, *Aphelenchoides parietinus*, *A.composticola*, *A.limberi*, *Quinisulcius capitatus*, *Helicotylenchus dihystra*, *H.erythrinae* and *Ditylenchus dipsaci*. The species *Rhabditis brevispina*, *Xiphinema basiri*, *X.elongatum* were not numerous in number of individuals.

Hawthorn nematodes. As a result of the study, 18 species of nematodes belonging to 11 genera, 9 families, 4 orders and 2 subclasses were registered in the root system and root soil of wild medicinal plants. Species *Tylencholaimus minimus*, *Diphtherophora communis*, *Cephalobus persegnis*, *Acrobelopides buetschlii*, *Chiloplacus quintastriatus*, *Panagrolaimus rigidus*, *Aphelenchus avenae*, *Aphelenchoides parietinus*, *A.composticola*, *Quinisulcius capitatus*, *Helicotylenchus dihystra*, *H.erythrinae* and *Ditylenchus dipsaci* was found in large quantities in the root system and basal soil of plants. The species *Rhabditis brevispina*, *Xiphinema basiri*, *X.elongatum* were not numerous in number of individuals.

CONCLUSION

As a result of a study in the root system and rhizosphere of some wild medicinal plants (sea buckthorn, rose hips, barberry, hawthorn), 47 species of nematodes were identified, belonging to 31 genera, 19 families, 5 orders and 2 subclasses. The main faunal complex of nematodes of wild medicinal plants consists of the species *Eudorylaimus labiatus*, *E. pratensis*, *Tylencholaimus minimus*, *Diphtherophora communis*, *Cephalobus persegnis*, *Chiloplacus sclerovaginat*, *Eucephalobus oxyuroides*, *Panagrolaimus rigidus*, *Aphelenchus avenae*, *Aphelenchoides parietinus*, *A.limberi*, *Quinisulcius capitatus*, *Helicotylenchus dihystra*, *H.erythrinae*, *Pratylenchus pratensis* and *Ditylenchus dipsaci*.

An analysis of the studies has shown that the fauna, ecology, taxonomy, and distribution features of nematodes of wild medicinal plants in the conditions of the Surkhandarya region of Uzbekistan are insufficient. In this direction, conducting large-scale phytohelminthological research, identifying the faunal complex of nematodes of wild medicinal plants, and developing measures to combat parasitic species are of great scientific and practical importance in the national economy of Uzbekistan.

REFERENCES

- Dekker H. Plant nematodes and their control. - M. Kolos, 1972. 445 p.
- Paramonov A.A. On some fundamental issues of phytohelminthology // In the book: Sat. works of young phytohelminthologists. - M.: 1958. - P.3-11.
- Boltayev K. S., Odilova T. M. Results of studying the ecology of the nematode fauna of the Zerafshan Valley // Materials of the 20th All-Russian Scientific Research. conf. young scientists. April 4-5, 2019 B. 62.
- Boltayev K. S., Jamalova F. A., Mamarasulov H.I. Ecological grouping of nematode fauna of tugai plants // Bulletin of the Khorezm Academy of Sciences. Khiva. 2021. pp. 33-37.
- Mavlyanov A.M., Khakimov N.Kh., Narzullaev S.B. Vertical-zonal distribution of nematodes of wild plants in the Zerafshan Mountains of Uzbekistan. Russian journal of parasitology. 2019; 13 (4) :109-115. <https://doi.org/10.31016/1998-8435-2019-13-4-109-115>.
- Micoletzky G. Die freilebenden Erd-Nematoden, mit besonderer Berücksichtigung der Steiermark und der Bukowina, zugleich mit einer Revision sämtlicher nicht mariner, freilebender Nematoden in Form von esen-Beschreibungen und Bestimmungs-schlüssel // Arch. Naturgesch. -1922. Ant. A. - Vol. 87. - 650 p.
- De Man J.G. Die einheimischen, frei in der reinen erde und im siissen wasser Lebenden Nematoden. - Tijdschr // Nedrl. Dierk. Vereen, 1880. - V.5. - 104 p.

- Witkowski T. Struktura zgrupowania nicieni żyjących w glebie upraw rolniczych // Stud. Soc. Sci. Torun. 1966. T.8. - No.3. - 53 p.
- Shpanko D.N., Belasheva O.V. Some current issues and promising directions in the parasitology of medicinal plants // Fundamental Research. - 2011. - No. 7. - pp. 223-229
- Soatov S., Xudoyberdieva N., Bekmurodov A. Fauna and distribution of phytonematodes of some medicinal plants in the

Surkhandarya region of Uzbekistan // ISSN: 2776-0979, Volume 3, Issue 5, May., 2022

- Seinhorst J.W. A rapid method for the transfer of nematodes from fixative to anhydrous glycerin // Nematologica. 1959. V. 4, № 1. P. 67-69.
- Turopova M., Bekmurodov A. Nematodes of wild medicinal plants growing in Boysun district // "Modern trends of biology: problems and solutions" Republican scientific and practical conference, November 25, 2023.