AN ECOLOGICALLY BASED INTEGRATED MANAGEMENT STRATEGY FOR PLANT-PARASITIC NEMATODES IN DOG ROSE PLANTATIONS

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Abstract

This article analyzes existing phytohelminthological observations of nematodes associated with dog rose (*Rosa canina* L.) in Surkhandarya Region from the standpoint of integrated management. It considers prevention, agronomic measures, biological control options, diagnosis-based decisions, and local validation. The study distinguishes proposed interventions from experimentally demonstrated efficacy and identifies a structured approach to monitoring. Recommendations are based on comparison with the relevant scientific literature; no unverified percentages of control efficacy are presented.

Keywords

Rosa canina L., nematodes, Surkhandarya, rhizosphere, phytohelminthology, integrated management.

Introduction

Identifying biological factors associated with the underground organs of medicinal plants is essential for their conservation. Dog rose is important both as a component of natural vegetation and as a source of medicinal raw materials. Nematodes include root-feeding parasites on the one hand and free-living groups associated with microbial activity on the other.

It is ecologically incorrect to treat different trophic groups as a single category of "pests." Regional species inventories therefore need to be evaluated separately in terms of biological functions, associations with plants, and diagnostic reliability.

Research objective: To analyze an ecologically based integrated management strategy for plant-parasitic nematodes in dog rose plantations using existing regional observations and verifiable international sources.

Materials and Methods

For this analysis, observations of nematodes from the roots and rhizosphere soil of wild medicinal plants in Surkhandarya were compared with relevant scientific publications from 2023–2024. Existing results were evaluated as material for secondary analysis, not as a new laboratory experiment.

Taxonomic analysis distinguishes species, genera, and higher systematic units. Ecological assessment considers nematode feeding habits, root associations, and the context of observation. Species occurrence, abundance, and damage to plants are treated as independent indicators.

For future primary investigations, standardized volumes of soil and root samples, replicated plots, seasonal observations, morphometric descriptions, and molecular identification where necessary are recommended. No new measurements, p-values, or percentages of treatment efficacy were calculated in this article.

Results

Integrated management of plant-parasitic nematodes should combine root and rhizosphere monitoring, selection of healthy seedlings, sanitation, soil management, and targeted biological measures.

These groups refer to the combined study dataset. They must not be interpreted as exact percentages for the dog rose rhizosphere alone.

1. Priority of prevention

The issue of priority of prevention demonstrates the need to distinguish accurately among taxa recorded in the root–soil system of dog rose. Although a species list defines the scope of observation, the ecological role, site of occurrence, and effects on plants of each taxon must be investigated separately. Therefore, scientific conclusions in this area should be based not merely on taxon names but on examined samples, diagnostic characters, and repeated observations.

In practical terms, it is advisable to establish a standardized recording form for this topic: the sampling date, geographical plot, soil moisture, plant developmental stage, visible root symptoms, and identified nematode taxon should be recorded separately. Such information prevents inappropriate generalizations in subsequent comparisons and makes ecological monitoring results reproducible.

2. Agronomic measures

The issue of agronomic measures demonstrates the need to distinguish accurately among taxa recorded in the root–soil system of dog rose. Although a species list defines the scope of observation, the ecological role, site of occurrence, and effects on plants of each taxon must be investigated separately. Therefore, scientific conclusions in this area should be based not merely on taxon names but on examined samples, diagnostic characters, and repeated observations.

3. Opportunities for biological control

The issue of opportunities for biological control demonstrates the need to distinguish accurately among taxa recorded in the root–soil system of dog rose. Although a species list defines the scope of observation, the ecological role, site of occurrence, and effects on plants of each taxon must be investigated separately. Therefore, scientific conclusions in this area should be based not merely on taxon names but on examined samples, diagnostic characters, and repeated observations.

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4. Monitoring-based decision-making

The issue of monitoring-based decision-making demonstrates the need to distinguish accurately among taxa recorded in the root–soil system of dog rose. Although a species list defines the scope of observation, the ecological role, site of occurrence, and effects on plants of each taxon must be investigated separately. Therefore, scientific conclusions in this area should be based not merely on taxon names but on examined samples, diagnostic characters, and repeated observations.

5. Local trials and control treatments

The issue of local trials and control treatments demonstrates the need to distinguish accurately among taxa recorded in the root–soil system of dog rose. Although a species list defines the scope of observation, the ecological role, site of occurrence, and effects on plants of each taxon must be investigated separately. Therefore, scientific conclusions in this area should be based not merely on taxon names but on examined samples, diagnostic characters, and repeated observations.

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6. Ecological and economic sustainability

The issue of ecological and economic sustainability demonstrates the need to distinguish accurately among taxa recorded in the root–soil system of dog rose. Although a species list defines the scope of observation, the ecological role, site of occurrence, and effects on plants of each taxon must be investigated separately. Therefore, scientific conclusions in this area should be based not merely on taxon names but on examined samples, diagnostic characters, and repeated observations.

Discussion

Discussion focus 1 priority of prevention. International literature interprets nematode community composition as a dynamic system influenced by the host plant, soil, moisture, and management conditions. From this perspective, comparing species recorded in Surkhandarya with inventories from other regions is useful; however, differences in species richness cannot be equated directly with phytosanitary risk or soil degradation. Conclusions must be expressed cautiously when observation methods, sample numbers, or the depth of identification differ.

The scientific and practical significance of priority of prevention is that separating control and experimental plots, collecting repeated samples, and documenting morphological characters will strengthen the evidentiary basis of subsequent research. In particular, for plant-parasitic species, plant symptoms, root damage, and nematode identification must be consistent with one another. This sequence helps ensure that recommendations have a biological basis.

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Conclusions

The principal components of integrated nematode management in dog rose plantations include the use of healthy planting materials, systematic examination of roots and rhizosphere soil, implementation of appropriate agronomic and phytosanitary measures, and application of scientifically validated biological control agents. The coordinated implementation of these measures provides a comprehensive framework for reducing potential phytosanitary risks and improving plantation sustainability.

The biological effectiveness of the proposed management measures against plant-parasitic nematodes should be evaluated through controlled field experiments under local soil and climatic conditions. Reporting specific percentage reductions in nematode

populations or control efficacy without experimental verification is scientifically unjustified. Therefore, quantitative assessments must be supported by replicated experiments, appropriate controls, and reliable statistical analysis.

The assessment of nematode fauna, ecological and trophic characteristics, and phytosanitary significance in the rhizosphere of dog rose should be based on data specifically associated with Rosa canina L. Findings obtained from combined investigations of different medicinal plant species must be analyzed separately to avoid inaccurate interpretations of host-associated nematode communities. This approach contributes to a more reliable understanding of host–parasite interactions and the potential phytosanitary risks posed by individual nematode taxa.

Future investigations should prioritize standardized and replicated sampling procedures, morphological identification supplemented by molecular diagnostic methods when necessary, and the combined assessment of nematode population densities and root damage symptoms. Furthermore, the development of seasonal monitoring programs adapted to the soil and climatic conditions of Surkhandarya Region is essential for improving the scientific reliability and practical applicability of integrated nematode management strategies.

In conclusion, ecologically based integrated management of plant-parasitic nematodes in dog rose plantations should rely on the coordinated application of preventive measures, reliable diagnostic procedures, continuous monitoring, and targeted control practices. The proposed approach provides a scientific and methodological foundation for developing practical phytosanitary recommendations aimed at improving the ecological stability, plant health, and sustainable management of Rosa canina L. plantations. However, its effectiveness must be confirmed through further controlled field investigations before specific management outcomes can be established.

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