



Short Communication

Crop Rotation and its Effect on Nematodes Population

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Abstract | In order to investigate the effect of crop rotation on nematode population, soil sampling was carried out from the fields of the National Wheat Project of the National Rainfed Agricultural Research Institute, Maragheh-East Azerbaijan. Nematodes were extracted from 200 cm³ soil using the tray method. The number four different feeding groups were counted using a stereomicroscope and STATISTIX 10 software were used for statistical analysis. The results revealed that the applied crop rotation had no effect on plant parasitic nematodes population. Selecting the suitable crops in crop rotation will be have a significant effect on reducing nematode population and related crop losses.

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Keywords | Sampling, Soil nematodes, Statistical analysis, Wheat project



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Introduction

Applying of crop rotation on agricultural products has been considered as one of the desirable management practices in agriculture and has become a common method for nematode control in many cases. Farmers have accepted crop rotation in order to reach a good and acceptable levels of various pests, diseases and weeds control for many long times. It is also considered as one of the methods for improving of soil fertility and crop productivity (Nusbaum and Ferris, 1973).

Materials and Methods

After soil random sampling from the fields of the National Wheat Project of the Iranian Rainfed Agricultural Research Institute-Maragheh, which

where two wheat varieties, Homa and Baran had been planted in rotation with chickpea variety Anna, for duration of six years, nematode extraction was performed using tray method (Whitehead and Hemming, 1965). Nematode counting was performed in counting dish. The nematodes were grouped as, predators, plant parasites, bacterivores and omnivores, the four main feeding groups of nematodes based on their morphology.

Results and Discussion

The results of variance analysis which shows the effect of year of sampling, sampling, treatment (as the method and type of rotation), and Bilateral and Trilateral in effect between them, are presented in Table 1 which was performed using STATISIX 10 software.

Table 1: Variance component of nematode feeding group's population in experimental plots of wheat-based project.

SOV	Df	MS			
		Tylenchids plana parasites	Rhabditids bacterial feeders	Monochids predators	Dorylaimis omnivorous
Year	1	0.00120775**	0.0031722***	4.819E-07ns	4.694E-06**
Error I	8	0.00008504	0.0000532	1.138E-07	2.300E-07
Sampling	1	0.00505903***	0.0137515***	3.443E-09ns	4.058E-06***
Treatment	2	0.00001652ns	0.0000841ns	1.707E-07ns	1.453E-06**
Year*Sampling	1	0.00722766***	0.0127788***	9.784E-07**	2.915E-06**
Year*Treatment	2	0.00032787*	0.0002580ns	2.750E-07ns	6.961E-08ns
Sampling*Treatment	2	0.00033627*	0.0003576*	3.135E-08ns	3.280E-07ns
Year*Sampling*Treatment	2	0.00018957ns	0.0001642ns	4.560E-07*	3.308E-07ns
Error II	160	0.00008744	0.0001155	1.354E-07	2.710E-07
CV%	12.5	12.5	18.2	10.7	14.6

ns, *, ** and *** are non-significant, significant at the 5, 1 and 0.1 percent probability levels, respectively.

Due to the very complex structure and diverse and variable relationships between plant and environment (living/non-living one), it is very difficult to explain and justify the results, but it is clear that the used crop rotation had no control effect on population of plant parasitic nematodes. Host range, date and season of sampling, soil quality like as acidity, humidity, temperature, organic and mineral substances and the temperature and humidity of the environment has direct or/and indirect effect the result.

Some methods are accepted in different sciences as facts and we never try to check the ways of their efficiency by our researches. In plant protection, crop rotation always named as an effective, low-cost and ecofriendly approach in order to control of different plant pathogens, including nematodes besides other chemical and biological methods. Reducing the population of plant parasites in soil by growing diverse plants with different nutria needs in order to making balance of microelements and macroelements and making gap in the life cycle of plant pathogens by using not host plants of pathogens in fields, are two important basis in crop rotation. So, if we select not suitable plants in crop rotation, not only we will not get good protection of the plants but we also will lose time and soil quality, unfortunately. Although compared to recently presented deep learning models in nematode population (Shabrina *et al.*, 2023) which again identification of the nematodes by scientist is main step on them, the used method in the research was traditional and not based on digital and based on professional software's, but the results shows that the used crop rotation in the field had no effect on different

feeding groups of nematodes, mainly plant parasitic one, and we can not trust to any crop rotation which used in order to control plant parasites or preventing their damage on crops and selecting suitable plant in any crop rotation in order to achieve seemed crop protection is very important. Before applying any type of rotation in plant to get protection of them, making answer to the question "which crop is the best choice in crop rotation" will be very crucial note.

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Novelty Statement

In contrast with some references, the result shows that every crop rotation do not have positive effect on reducing different nematodes population, including plant parasitic nematodes.

Generative AI and AI-assisted technology statement

The authors declare that no Genrative AI was used in the creation of this manuscript.

Conflict of interest

The author has declared no conflict of interest.

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